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External Review Draft

EXPOSURE FACTORS HANDBOOK

Update to Exposure Factors Handbook
EPA/600/8-89/043 - May 1989

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Exposure Assessment Group
Office of Health and Environmental Assessment
U.S. Environmental Protection Agency
Washington, DC 20460

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PREFACE

The National Center for Environmental Assessment has prepared this handbook to address factors commonly used in exposure assessments. This handbook was first published in 1989 in response to requests from many EPA program and regional offices for additional guidance on how to select values for exposure factors.

Several events have sparked the efforts to revise the Exposure Factors Handbook. First, since its publication in 1989, new data have become available. Second, the Risk Assessment Council issued a memorandum titled "Guidance on Risk Characterization for Risk Managers and Risk Assessors" dated February 26, 1992 which emphasized the use of multiple descriptors of risk (i.e., central tendency, high end of individual risk, population risk, important subpopulations). Third, EPA published the final Guidelines for Exposure Assessment.

As part of the efforts to revise the handbook, the EPA Risk Assessment Forum sponsored a two-day peer involvement workshop which was conducted during the summer of 1993. The workshop was attended by 57 scientists from academia, consulting, private industry, the states, and other federal agencies. The purpose of the workshop was to identify new data sources, discuss adequacy of the data and the feasibility of developing statistical distributions and establish priorities.

As a result of the workshop, two new chapters have been added to the handbook. These chapters are: consumer products use and the reference residence. This document also provides a summary of the available data on consumption of drinking water; consumption of fruits, vegetables, beef, dairy products, and fish, soil ingestion; inhalation rates; skin surface area; lifetime; activity patterns; and body weight.

AUTHORS, CONTRIBUTORS, AND REVIEWERS

The National Center for Environmental Assessment (NCEA) was responsible for the preparation of this handbook. The original document was prepared by Versar Inc. under EPA Contract No. 68-02-4254, Work Assignment No. 189. John Schaum, NCEA-Washington Office, served as the EPA Work Assignment Manager, providing overall direction and coordination of the production effort as well as technical assistance and guidance. Revisions, updates, and additional preparation were provided by Versar Inc. under Contract Numbers 68-D0-0101 and 68-D3-0013. Russell Kinerson and Greg Kew have served as EPA Work Assignment Managers during previous efforts of the update process. Jackie Moya served as Work Assignment Mnager for the current updated version, providing overall direction, technical assistance, and as contributing author.

AUTHORS

Patricia Wood
Linda Phillips
Aderonke Adenuga
Nica Mostaghim
Teri Schaeffer
Mike Koontz
Harry Rector
Wes Kleene

Exposure Assessment Division
Versar Inc.
Springfield, VA

REVIEWERS

The following individuals at the U.S. Environmental Protection Agency have reviewed an earlier draft of this document and provided valuable comments:

Elizabeth Bryan
Science Policy Council

Janine Dinan
Office of Solid Waste and Emergency Response

Karen Hammerstrom
Office of Research and Development

James J. Konz
Office of Solid Waste and Emergency REsponse

Sue Norton
Office of Research and Development

Mary Pace
Office of Research and Development

James Ryan
Office of Research and Development

John Schaum
Office of Research and Development

Anne Sergeant
Office of Research and Development

Paul White
Office of Research and Development

1. INTRODUCTION

1.1. BACKGROUND

The Exposure Factors Handbook is intended to serve as a support document to EPA's Guidelines for Exposure Assessment (U.S. EPA, 1992) by providing data on standard factors that may be needed to calculate human exposure to toxic chemicals. The Guidelines were developed to promote consistency among the various exposure assessment activities that are carried out by the various EPA program offices. This handbook should assist in this goal by providing a consistent framework to calculate dose.

The handbook is organized by grouping the factors into those needed for each specific route of exposure (i.e., ingestion, inhalation, or dermal), or those needed for more than one route. Finally, procedures for analyzing uncertainty in exposure assessments are presented.

The Exposure Factors Handbook is an extension of earlier efforts towards standardizing the Agency's exposure assessment calculations sponsored by the Exposure Assessment Group, Office of Health and Environmental Assessment, Office of Research and Development. U.S. EPA (1985) presents detailed information on body weight, body surface area, and respiration rate in the report "Development of Statistical Distributions or Ranges of Standard Factors Used in Exposure Assessments." The results of this earlier study are incorporated into this handbook.

This handbook is the update of an earlier version prepared in 1989. Revisions, updates, and additional information are reflected through, but not limited to, the following areas:

- addition of drinking water rates for children;
- changes in soil ingestion rates for children;
- addition of soil ingestion rates for adults;
- addition of tapwater consumption for adults and children;
- addition of mean daily intake of food class and subclass by region, age and per capita rates;
- addition of mean moisture content of selected fruits, vegetables, grains, fish, meat and dairy products;
- addition of food intake by class in dry weight per day;

- update of homegrown food intake;
- expansion of data in the dermal chapter;
- update of fish intake data;
- expansion of data for time spent at residence;
- update of body weight data;
- update of population mobility data;
- addition of new data for average time spent in different locations and various microenvironments;
- addition of data for occupational mobility;
- addition of breast milk ingestion;
- addition of consumer product use; and
- reference residence factors.

The 1989 Exposure Factors Handbook was divided into two parts: Part I which provided the equations and data on factors used in assessing exposure by ingestion, inhalation, and dermal routes; and Part II which demonstrated how to apply the standard factor statistics summarized in Part I to specific exposure scenarios. During the workshop held in 1993, panelists were provided with several options for revising Part II of the handbook. These options were:

- present methods (i.e., equations) but no values for assessing exposures;
- list examples of exposure scenarios
- list exposure scenarios that represent current exposure assessment methods with default values; and
- eliminate Part II.

About half of the participants recommended eliminating Part II of the handbook. One of the major concerns with Part II was that the values used in the standard scenarios may become default values and that this will discourage risk assessors from accounting for the uniqueness of site-specific situations. Therefore, this revised version of the handbook does not include standard scenarios. However, the methods and equations have been included in the relevant parts of the document. A separate guidance document and a series of technical support documents that illustrate the process for constructing risk descriptors are currently under development.

This handbook is a compilation of available data from a variety of different studies. With very few exceptions, the data presented in this handbook are the analyses done by the authors of the studies or papers. No additional analyses of the raw data were conducted by the authors of this Handbook. The studies (e.g., surveys, papers, etc.) discussed in this Handbook to define a particular factor were grouped into **Key Studies** and **Other Relevant Studies** depending on the adequacy of the data and its applicability to the exposure factor being evaluated. The recommended values for each exposure factor are based on the results of the Key Studies. The strengths and limitations of each study are discussed to provide the reader with a better understanding of the uncertainties associated with the values derived from each one of these studies. For some exposure factors, data are so limited that studies could not be grouped into Key or Relevant. In those cases, the recommended values for the exposure factor are based on the data available.

Since the studies included in this Handbook varied in terms of their objectives, design, scope, presentation of results, etc., the level of detail and the statistics discussed in this Handbook for each study may vary from study to study. For example, some authors used geometric means to present their results, while others used means or distributions. To the extent possible, every effort was made to present discussions and results in a consistent manner.

Terms that have been used to describe racial populations may include a number of different terminologies for the same population. However, to avoid misreporting results of the studies, the classifications reported in this Handbook are ones as reported in the original reference source.

Some of the steps for performing an exposure assessment are (1) determining the pathway of exposure, (2) identifying the environmental media which transports the contaminant, (3) determining the contaminant concentration, (4) determining the exposure time, frequency, and duration, and (5) identifying the exposed population. Many of the issues related to characterizing exposure from selected exposure pathways have been addressed in a number of existing EPA guidance documents include, but not limited to are the following:

- Guidelines for Exposure Assessment (U.S. EPA 1992a);
- Dermal Exposure Assessment: Principles and Applications (U.S. EPA 1992b);
- Guidance for Dermal Exposure Assessment (U.S. EPA 1992c);
- Methodology for Assessing Health Risks Associated with Indirect Exposure to Combustor Emissions (U.S. EPA, 1990);
- Risk Assessment Guidance for Superfund (U.S. EPA, 1989);
- Estimating Exposures to 2,3,7,8-TCDD (U.S. EPA, 1988a);
- Superfund Exposure Assessment Manual (U.S. EPA, 1988b);
- Selection Criteria for Models Used in Exposure Assessments (U.S. EPA 1988c);
- Selection Criteria for Mathematical Models Used in Exposure Assessments (U.S. EPA 1987);
- Standard Scenarios for Estimating Exposure to Chemical Substances During Use of Consumer Products (U.S. EPA 1986);
- Pesticide Assessment Guidelines, Subdivisions K and U (U.S. EPA, 1984, 1986); and
- Methods for Assessing Exposure to Chemical Substances (U.S. EPA, 1983).

These documents serve as valuable information resources to assist in the assessment of exposure. The reader is encouraged to refer to them for a more detailed discussion.

1.2. GENERAL EQUATION FOR CALCULATING DOSE

The definition of exposure as used in the Guidelines (U.S. EPA, 1992) is "condition of a chemical contacting the outer boundary of a human." This means contact with the visible exterior of a person such as the skin, and openings such as the mouth, nostrils, and lesions. The amount of chemical ingested, inhaled, or in material applied to the skin is called potential dose. Starting with a general integral equation for exposure (U.S. EPA 1992), several dose equations can be derived depending upon boundary assumptions. One of the more useful of these derived equations is the Average Daily Dose (ADD). The ADD, which is used for many noncancer effects, averages the total dose over the period of dosing. The ADD can be calculated by averaging the potential dose (D_{pot}) over body weight and an averaging time.

(1-1) $$ADD_{pot} = [\text{Total Dose}]/[\text{Body Weight x Averaging Time}]$$

For effects such as cancer, where the biological response is usually described in terms of lifetime probabilities, even though exposure does not occur over the entire lifetime, doses are often presented as lifetime average daily doses (LADDs). The LADD takes the form of the equation 1-1 with lifetime replacing averaging time. The LADD is a very common term used in carcinogen risk where linear non-threshold models are employed.

The total dose can be expanded as follows:

(1-2) $$\text{Total Dose} = \text{Contaminant Concentration x Intake Rate x Exposure Duration}$$

Contaminant concentration is the concentration of the contaminant in the medium (air, food, soil, etc.) contacting the body and has units of mass/volume or mass/mass.

The intake rate refers to the rates of inhalation, ingestion, and dermal contact depending on the route of exposure. For ingestion, the intake rate is simply the amount of food containing the contaminant of interest that an individual ingests during some specific time period (units of mass/time). Much of this handbook is devoted to standard rates of ingestion for some broad classes of food. For inhalation, the intake rate is the rate at which contaminated air is inhaled. Factors that affect dermal exposure are the amount of material that comes into contact with the skin, and the rate at which the contaminant is absorbed.

The exposure duration is the length of time that contaminant contact lasts. The time a person lives in an area, frequency of bathing, time spent indoors vs. outdoors, etc. all affect the exposure duration. The Activity Patterns Section (Section 5.3) gives some examples of population behavior patterns, which may be useful for estimating exposure durations to be used in the exposure calculations.

When the above parameter values remain constant over time, they are substituted directly into the dose equation. When they change with time, a summation approach is needed to calculate dose. In either case, the exposure duration is the length of time exposure occurs at the concentration and intake rate specified by the other parameters in the equation.

Dose can be expressed as a total amount (with units of mass, e.g., mg) or as an dose rate in terms of mass/time (e.g., mg/day), or as a rate normalized to body mass (e.g., with units of mg of chemical per kg of body weight per day (mg/kg-day)). The LADD is usually expressed in terms of mg/kg-day or other mass/mass-time units.

In using the LADD, the upper-bound cancer risk is estimated by adjusting the exposure to account for absorption into the body and multiplying by the slope factor of the dose-response function. Since the slope factor is derived on the basis of administered dose, the dose should be expressed on a comparable basis. If the absorption from the medium used in the animal studies is the same as that occurring in the human exposure scenario, no adjustment is needed.

The lifetime value used in the above equation is the period of time over which the dose is averaged. For carcinogens, this should represent the average life expectancy of the exposed population. For dose estimates to be used for assessments other than carcinogenic risk, different averaging periods are frequently used. For acute exposures, the administered doses are usually averaged over a day or single event. For chronic noncancer effects, the time period used is the actual period of exposure. The objective in selecting the averaging time is to express the dose in a way which makes it comparable to the dose-response relationship used in conjunction with the dose estimate to calculate risk.

The body weight used to calculate the potential dose in the above equation should reflect the average weight of the exposed population during the time when the exposure actually occurs. If the exposure occurs continuously throughout an individual's life or only during the adult ages, using an adult average weight of 70 kg should provide sufficient accuracy. However, when the exposure is limited to childhood, the weight representing those ages should be used. Body weight is covered in more detail in the section on other factors needed for exposure calculations in Section 5.

Some of the parameters used in estimating exposure (primarily concentrations) are exclusively site specific, and therefore default recommendations could not be used.

Note that only the average body weight value is recommended under the set of values for the parameter ranges. Since the body weight appears in the denominator of the dose equation, a smaller value would lead to larger doses. This would make the combination of values used in the high-end estimate less likely, since the combination of low body weight and high consumption (or inhalation) rates is not likely to occur.

Similarly, only the average lifetime value is recommended under the set of values for the parameter ranges. Use of a short lifetime estimate in the high-end estimate scenario could be unlikely in conjunction with a long exposure duration assumption. Additionally, certain lifetime assumptions are made in derivation of the cancer potency factor. Sorting out how to maintain consistency between the dose and potency values while adjusting lifetime over a relatively narrow range implies more precision than is appropriate in risk assessment.

The link between the intake rate value and the exposure duration value is a common source of confusion in defining exposure scenarios. It is important to define the duration estimate so that it is consistent with the intake rate:

- The intake rate can be based on an individual event, such as 100 g of fish eaten per meal. The duration should be based on the number of events or, in this case, meals.

- The intake rate can also be based on a long-term average, such as 10 g/day. In this case the duration should be based on the total time interval over which the exposure occurs.

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The objective is to define the terms so that when multiplied together they give the appropriate estimate of mass of contaminant contacted. This can be accomplished by basing the contact rate on either a long-term average (chronic exposure) or an event (acute exposure) basis, as long as the duration value is selected appropriately. Consider the case in which a person eats a 100-g fish meal every 10 days (long-term average is 10 g/day) for 40 years:

(100 g/meal) (meal/10 days) (365 days/year) (40 years) = 146,000 g

(10 g/day) (365 days/year) (40 years) = 146,000 g

Thus, a duration of either 36.5 meals/year or 365 days/year could be used as long as it is matched with the appropriate intake rate.

Normally, exposure scenarios such as those presented in this document are used to estimate individual risks. If the scenario is considered representative of a population, then the population risk is estimated by multiplying the individual risk by the population size. Note that exposure duration less than an individual's lifetime were typically recommended. In these cases, the population risk must be computed using the total population exposed over a 70-year period. For example, if the exposure duration is assumed to last 10 years for an individual, the exposed population over 70 years could be 7 people since a different person could be exposed during each 10-year period.

1.3. ORGANIZATION

The handbook is organized as follows:

Chapter 2	Provides factors for estimating human exposure to toxic compounds through ingestion of contaminated water, food and soil.
Chapter 3	Provides factors for estimating exposure as a result of inhalation of vapor and particulates.
Chapter 4	Presents factors for estimating dermal exposure to environmental contaminants that come in contact with the skin.
Chapter 5	Provides additional factors which are not presented in Chapters 2, 3,, and 4, but are necessary to calculate exposure from ingestion, inhalation and dermal exposure routes.

Chapter 6	Presents data on consumer product use.
Chapter 7	Presents factors used in estimating residential exposures.
Chapter 8	Presents an analysis of uncertainty and discusses methods that can be used to evaluate and present the uncertainty associated with exposure scenario estimates.

1.4. REFERENCES FOR CHAPTER 1

U.S. EPA. (1983-1989) Methods for assessing exposure to chemical substances. Volumes 1-13. Washington, DC: Office of Toxic Substances, Exposure Evaluation Division.

U.S. EPA. (1984a) Pesticide assessment guidelines subdivision K, exposure: reentry protection. Office of Pesticide Programs, Washington, DC. EPA/540/9-48/001. Available from NTIS, Springfield, VA; PB-85-120962.

U.S. EPA. (1985) Development of statistical distributions or ranges of standard factors used in exposure assessments. Washington, DC: Office of Health and Environmental Assessment. EPA No. 600/8-85-010. Available from: NTIS, Springfield, VA. PB85-242667.

U.S. EPA. (1986) Standard scenarios for estimating exposure to chemical substances during use of consumer products. Volumes I and II. Washington, DC: Office of Toxic Substance, Exposure Evaluation Division.

U.S. EPA. (1986) Pesticide assessment guidelines subdivision U, applicator exposure monitoring. Office of Pesticide Programs, Washington, DC. EPA/540/9-87/127. Available from NTIS, Springfield, VA; PB-85-133286.

U.S. EPA. (1987) Selection criteria for mathematical models used in exposure assessments: surface water models. Exposure Assessment Group, Office of Health and Environmental Assessment, Washington, DC. WPA/600/8-87/042. Available from NTIS, Springfield, VA; PB-88-139928/AS.

U.S. EPA. (1988a) Estimating exposure to 2,3,7,8-TCDD. Office of Health and Environmental Assessment, Washington, DC. EPA/600/6-88/00SA. Available from NTIS, Springfield, VA; PB-88-231196/AS.

U.S. EPA. (1988b) Superfund exposure assessment manual. Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-88/001. Available from NTIS, Springfield, VA; PB-89-135859.

U.S. EPA. (1988c) Selection criteria for mathematical models used in exposure assessments: groundwater models. Exposure Assessment Group, Office of Health and Environmental Assessment, Washington, DC. EPA/600/8-88/075. Available from NTIS, Springfield, VA; PB-88-248752/AS.

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2. INGESTION ROUTE

Contaminated water, food, and soil are potential sources of human exposure to toxic compounds that may be ingested. The potential dose of a toxic compound resulting from ingestion is a function of consumption rate, contaminant concentration, and exposure duration. This chapter focuses on consumption rates of broad classes of food including water, fruits and vegetables, beef, dairy products, and fish.

Nondietary soil ingestion is also a potential exposure route of toxic compounds. A variety of studies have been conducted to estimate soil consumption rates. The results of these studies are also summarized in this chapter, and may be used by the assessor to estimate exposure to contaminants based on soil ingestion.

2.1. DOSE EQUATION FOR INGESTION

The general ADD_{POT} (average daily potential dose) equation for ingestion exposure on a per-unit-body weight basis is:

$$ADD_{POT} = [C \times IR \times DF \times ED]/[BW \times AT] \qquad \text{(Eqn. 2-1)}$$

where:

ADD_{POT}	= average daily potential dose (mg/kg-day);
C	= contaminant concentration in each medium (mg/L or mg/g);
IR	= intake rate (L/day or g/day);
DF	= diet fraction;
ED	= exposure duration (days);
BW	= body weight (kg); and
AT	= averaging time (days) for noncarcinogenic effects AT = ED, and for carcinogenic effects AT = 70 years or 25,550 days.

Intake rate refers to the quantity of material consumed per unit time. It is preferable that intake rates be determined for the population of interest. However, in the absence of such data, they can be estimated from generic rates which are derived from relevant regional studies or national consumption surveys. The contaminant concentration refers to the concentration in food or whatever is being ingested. It is determined by analyzing samples from the contaminated source. The diet fraction is the fraction of material consumed from the contaminated source. Exposure duration refers to the time an individual ingests material (i.e., food, water, soil) from a contaminated source. Total exposure by ingestion is calculated by summing exposure from specific sources (i.e., drinking water, fruits, vegetables, meat, soil, etc.).

For assessments where lifetime averaging is appropriate (such as when evaluating chemicals with chronic, cancer endpoints), averaging time is replaced by lifetime (LT = 70 years x 365 days/yr), and the ADD becomes the Lifetime Average Daily Dose (LADD). Similar assumptions apply as for the ADD calculations.

2.2. DRINKING WATER CONSUMPTION

2.2.1. Background

Drinking water is a potential source of human exposure to toxic substances. Contamination of drinking water may occur, for example, by percolation of toxics through the soil to ground water that is used as a source of drinking water, by runoff or discharge to surface water that is used as a source of drinking water, intentional or unintentional addition of substances to treat water (e.g., chlorination), and leaching of materials from plumbing systems (e.g., lead). Estimating the magnitude of the potential dose of toxics from drinking water requires information on the quantity of water consumed. The purpose of this section is to describe key published studies that provide information on drinking water consumption (Section 2.2.2) and to provide recommendations of consumption rate values that should be used in exposure assessments (Section 2.2.6).

Currently, the U.S. EPA uses the quantity of 2 L per day for adults and 1 L per day for infants (individuals of 10 kg body mass or less) as default drinking water intake rates (U.S. EPA, 1980). These rates include drinking water consumed in the form of juices and other beverages containing tapwater (e.g., coffee). The National Academy of Sciences (NAS, 1977) estimated that daily consumption of water may vary with levels of physical activity and fluctuations in temperature and humidity. It is reasonable to assume that some individuals in physically-demanding occupations or living in warmer regions may exceed this level of water intake.

Numerous studies have generated data on drinking water intake rates. In general, these sources support EPA's use of 2 L/day for adults and 1 L/day for children as upper-percentile tapwater intake rates. Many of the studies have reported fluid intake rates for both total fluids and tapwater. *Total fluid intake* is defined as consumption of all types of fluids including tapwater, milk, soft drinks, alcoholic beverages, and water intrinsic to purchased foods. *Total tapwater* is defined as food and beverages that are prepared or reconstituted with tapwater (i.e., coffee, tea, frozen juices, soups, etc.). Data for both consumption categories are presented in the sections that follow. However, for the purposes of exposure assessments involving source-specific contaminated drinking water, intake rates based on total tapwater are more representative of source-specific tapwater intake. Given the assumption that purchased foods and beverages are widely distributed and less likely to contain source-specific water, the use of total fluid intake rates may overestimate the potential exposure to toxic substances present only in local water supplies.

All studies on drinking water intake that are currently available are based on short-term survey data. Although short-term data may be suitable for obtaining mean intake values that are representative of both short- and long-term consumption patterns, upper-percentile values may be different for short-term and long-term data because more variability generally occurs in short-term surveys. It should also be noted that most drinking water surveys currently available are based on recall. This may be a source of uncertainty in the estimated intake rates because of the subjective nature of this type of survey technique.

The available studies on drinking water consumption are summarized in the following sections. They have been classified as either key studies or other relevant studies based on the applicability of their survey designs to exposure assessment needs. Recommended intake rates are based on the results of key studies, but other relevant studies are also presented to provide the reader with added perspective on the current state-of-knowledge pertaining to drinking water intake.

2.2.2. Key General Population Studies

Cantor et al. - National Cancer Institute Study - The National Cancer Institute (NCI), in a population-based, case control study investigating the possible relationship between bladder cancer and drinking water, interviewed approximately 8,000 adult white individuals, 21-84 years of age (2,805 cases and 5,258 controls), using a standardized questionnaire (Cantor et al., 1987). The individuals interviewed were asked to recall the level of intake of tapwater and other beverages in a typical week during the winter prior to the interview. Total beverage intake was divided into the following two components: (1) beverages derived from tapwater; and (2) beverages from other sources. Tapwater used in cooking foods and in ice cubes was apparently not considered. Participants also supplied information on the primary source of the water consumed (i.e., private well, community supply, bottled water, etc.). The control population was randomly selected from the general population to match bladder cancer cases in terms of age, sex, and geographic location of residence. Although the control population was not entirely representative of the U.S. population as a whole, it was used in estimating water intake rates. The fluid intake rates for the bladder cancer cases were not used because their participation in the study was based on selection factors that could bias the intake estimates for the general population. Based on responses from 5,258 white controls (3,892 males; 1,366 females), average intake rates for a "typical" week were compiled by sex, age group, and geographic region. These rates are listed in Table 2-1. The average total fluid intake rate was 2.01 L/day for men of which 70 percent (1.4 L/day) was derived from tapwater, and 1.72 L/day for women of which 79 percent (1.35 L/day) was derived from tapwater. The overall average adult total tapwater intake rate was 1.39 L/day. Frequency distribution data reported by Cantor et al. (1987) for total tapwater intake are presented in Table 2-2. These data suggest a 50th percentile value of approximately 1.3 L/day and an upper percentile value of approximately 2.0 L/day (this value is between 82nd and 100th percentile, based on Table 2-2; the 95th percentile intake rate was not reported by Cantor et al. 1987). These values represent the usual level of intake for this population of adults.

A limitation associated with this data set is that the population surveyed was not representative of the general U.S. population. Also, the data are based on recall of behavior

Table 2-1. Average Total Tapwater Intake Rate by Sex, Age, and Geographic Area

Group/Subgroup	Number of Respondents	Average Total Tapwater Intake,[a,b] L/day
Total group	5,258	1.39
Sex		
Males	3,892	1.40
Females	1,366	1.35
Age, years		
21-44	291	1.30
45-64	1,991	1.48
65-84	2,976	1.33
Geographic area		
Atlanta	207	1.39
Connecticut	844	1.37
Detroit	429	1.33
Iowa	743	1.61
New Jersey	1,542	1.27
New Mexico	165	1.49
New Orleans	112	1.61
Seattle	316	1.44
San Francisco	621	1.36
Utah	279	1.35

[a] Standard deviations not reported in Cantor et al. (1987).
[b] Total tapwater defined as all water and beverages derived from tapwater.

Source: Cantor et al., 1987.

Table 2-2. Frequency Distribution of Total Tapwater Intake Rates[a]

Consumption Rate (L/day)	Frequency[b] (%)	Cumulative Frequency (%)
≤0.80	20.6	20.6
0.81-1.12	21.3	41.9
1.13-1.44	20.5	62.4
1.45-1.95	19.5	81.9
≥1.96	18.1	100.0

[a] Represents consumption of tapwater and beverages derived from tapwater in a "typical" winter week.
[b] Extracted from Table 3 in Cantor et al. (1987).

Source: Cantor, et al., 1987.

from a previous time period. This may somewhat degrade response accuracy. Other limitations are that the time period surveyed was 1 week in the winter when water intake rates may be somewhat lower than at other times of the year (i.e., summer). Finally, the relatively short-term nature of the survey make extrapolation to long-term consumption patterns difficult.

Canada Department of Health and Welfare - Tapwater Consumption in Canada - In a study conducted by the Canadian Department of Health and Welfare, approximately 1,000 individuals were surveyed to determine the per capita total tapwater intake rates for various age/sex groups during winter and summer seasons (Canadian Ministry of National Health and Welfare, 1981). Intake rate was also evaluated as a function of physical activity. A representative sample of the Canadian population was surveyed based on the 1971 Canadian census format. Participants monitored water intake for a 2-day period (1 weekday, and 1 weekend day) in both the summer and winter during 1977 and 1978. The amount of tapwater consumed was estimated based on the respondents' identification of the type and size of beverage container used, compared to standard sized vessels. The survey questionnaires included a pictorial guide to help participants in classifying the sizes of the vessels. For example, a small glass of water was assumed to be equivalent to 4.0 ounces of water, and a large glass was assumed to contain 9.0 ounces of water. The study also accounted for water derived from ice cubes and popsicles, and water in soups, infant formula, and juices. The survey did not attempt to differentiate between tapwater consumed at home and tapwater consumed away from home. The survey also did not attempt to estimate intake rates for fluids other than tapwater. Consequently, no intake rates for total fluids were reported.

For adults (over 18 years old) only, the average total tapwater intake rate was 1.49 L/day, and the 90th percentile rate was 2.50 L/day. Daily consumption distribution patterns for various age groups are presented in Table 2-3. Intake rates for specific age groups and seasons are presented in Table 2-4. Based on the daily total tapwater intake rates for all ages and seasons combined, the average rate was 1.34 L/day, and the 90th percentile rate was 2.36 L/day. Average daily total tapwater intake rates based on the level of physical activity

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Table 2-3. Daily Total Tapwater Intake Distribution by Age Group (Approx. 0.20 L Increments, Both Sexes, Combined Seasons)

Amount Consumed[a] L/day	5 and Under %	5 and Under Number	6-17 %	6-17 Number	18 and Over %	18 and Over Number
0.00 - 0.21	11.1	9	2.8	7	0.5	3
0.22 - 0.43	17.3	14	10.0	25	1.9	12
0.44 - 0.65	24.8	20	13.2	33	5.9	38
0.66 - 0.86	9.9	8	13.6	34	8.5	54
0.87 - 1.07	11.1	9	14.4	36	13.1	84
1.08 - 1.29	11.1	9	14.8	37	14.8	94
1.30 - 1.50	4.9	4	9.6	24	15.3	98
1.51 - 1.71	6.2	5	6.8	17	12.1	77
1.72 - 1.93	1.2	1	2.4	6	6.9	44
1.94 - 2.14	1.2	1	1.2	3	5.6	36
2.15 - 2.36	1.2	1	4.0	10	3.4	22
2.37 - 2.57	-	0	0.4	1	3.1	20
2.58 - 2.79	-	0	2.4	6	2.7	17
2.80 - 3.00	-	0	2.4	6	1.4	9
3.01 - 3.21	-	0	0.4	1	1.1	7
3.22 - 3.43	-	0	-	0	0.9	6
3.44 - 3.64	-	0	-	0	0.8	5
3.65 - 3.86	-	0	-	0	-	0
>3.86	-	0	1.6	4	2.0	13
TOTAL	100.0	81	100.0	250	100.0	639

[a] Includes tapwater and foods and beverages derived from tapwater.

Source: Canadian Ministry of National Health and Welfare, 1981.

Table 2-4. Average Daily Total Tapwater Intake by Age and Season (L/day)[a]

	Age (years)						
	<3	3-5	6-17	18-34	35-54	≤55	All Ages
Average							
Summer	0.57	0.86	1.14	1.33	1.52	1.53	1.31
Winter	0.66	0.88	1.13	1.42	1.59	1.62	1.37
Summer/Winter	0.61	0.87	1.14	1.38	1.55	1.57	1.34
90th Percentile							
Summer/Winter	1.50	1.50	2.21	2.57	2.57	2.29	2.36

[a] Includes tapwater and foods and beverages derived from tapwater.

Source: Canadian Ministry of National Health and Welfare, 1981.

of the survey participants are presented in Table 2-5. The amounts of tapwater consumed that are derived from various foods and beverages are presented in Table 2-6.

These data provide useful information on the seasonal variability of total tapwater intake. The survey also included data for some tapwater-containing items not covered by other studies (i.e., ice cubes, popsicles, and infant formula) and may, therefore, be more representative of total tapwater consumption than some other less comprehensive surveys. However, the estimated intake rates were based on identification of standard vessel sizes. The accuracy of this type of survey data is not known. This study estimated tapwater intake rates in Canada which may not be representative of tapwater intake rates in the United States. In addition, certain age groups were under represented. These data were also based on a short-term survey and may not be entirely representative of long-term consumption patterns.

Ershow and Cantor - Total Water and Tapwater Intake - Ershow and Cantor (1989) estimated water intake rates based on data collected by the USDA 1977-1978 Nationwide Food Consumption Survey (NFCS). Daily intake of tapwater and total water was calculated for various age groups for males, females, and both sexes combined. Tapwater was defined as "all water from the household tap consumed directly as a beverage or used to prepare foods and beverages." Total water was defined as tapwater plus "water intrinsic to foods and beverages" (i.e., water contained in purchased food and beverages). Daily total tapwater intake rates by age group are presented in Table 2-7. These data indicate that total tapwater intake for adults (ages 20-64) ranges from approximately 0.15 to 3.78 L/day with a mean intake rate of 1.37 L/day. Total tapwater intake for children (ages 1-10) ranges from approximately 0.06 to 1.95 with a mean intake rate of 0.74 L/day. The 90th percentile rate is 2.27 L/day for adults (ages 20-64) and 1.29 L/day for children (ages 1-10). Table 2-8 depicts the daily intake rates for total fluids by age. The mean intake rate for total fluids is 2.24 L/day for adults (ages 20-64) and 1.56 L/day for children (ages 1-10). The 90th percentile rates are 3.32 L/day and 2.24 L/day for adults and children, respectively. Total tapwater intake rates, as defined by this study, should be more representative of the rates of source-specific water consumed and should be used in assessing exposure to contaminants in local drinking water supplies. Ershow and Cantor (1989) also reported total tapwater intake

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Table 2-5. Average Daily Total Tapwater Intake as a Function of Physical Activity at Work and in Spare Time (16 Years and Older, Combined Seasons, L/day)

	Work		Spare Time	
Activity Level[a]	Consumption[b] L/day	Number of Respondents	Consumption[b] L/day	Number of Respondents
Extremely Active	1.72	99	1.57	52
Very Active	1.47	244	1.51	151
Somewhat Active	1.47	217	1.44	302
Not Very Active	1.27	67	1.52	131
Not At All Active	1.30	16	1.35	26
Did Not State	1.30	45	1.31	26
TOTAL		688		688

[a] The levels of physical activity listed here were not defined any further by the survey report, and categorization of activity level by survey participants is assumed to be subjective.
[b] Includes tapwater and foods and beverages derived from tapwater.

Source: Canadian Ministry of National Health and Welfare, 1981.

Table 2-6. Average Daily Tapwater Intake Apportioned Among Various Beverages (Both Sexes, by Age, Combined Seasons, L/day)[a]

	Age Group					
	Under 3	3-5	6-17	18-34	35-54	55 and Over
Total in Group	34	47	250	232	254	153
Water	0.14	0.31	0.42	0.39	0.38	0.38
Ice/Mix	0.01	0.01	0.02	0.04	0.03	0.02
Tea	*	0.01	0.05	0.21	0.31	0.42
Coffee	0.01	*	0.06	0.37	0.50	0.42
"Other Type of Drink"	0.21	0.34	0.34	0.20	0.14	0.11
Reconstituted Milk	0.10	0.08	0.12	0.05	0.04	0.08
Soup	0.04	0.08	0.07	0.06	0.08	0.11
Homemade Beer/Wine	*	*	0.02	0.04	0.07	0.03
Homemade Popsicles	0.01	0.03	0.03	0.01	*	*
Baby Formula, etc.	0.09	*	*	*	*	*
TOTAL	0.61	0.86	1.14	1.38	1.55	1.57

[a] Includes tapwater and foods and beverages derived from tapwater.

* Less than 0.01 L/day

Source: Canadian Ministry of National Health and Welfare, 1981.

Table 2-7. Total Tapwater Intake (ml/day) for Both Sexes Combined[a]

Age (yr)	Number of Observations	Mean	SD	S.E. of Mean	Percentile Distribution 1	5	10	25	50	75	90	95	99
<0.5	182	272	247	18	*	0	0	80	240	332	640	800	*
0.5 - 0.9	221	328	265	18	*	0	0	117	268	480	688	764	*
1 - 3	1498	646	390	10	33	169	240	374	567	820	1162	1419	1899
4 - 6	1702	742	406	10	68	204	303	459	660	972	1302	1520	1932
7 - 10	2405	787	417	9	68	241	318	484	731	1016	1338	1556	1998
11 - 14	2803	925	521	10	76	244	360	561	838	1196	1621	1924	2503
15 - 19	2998	999	593	11	55	239	348	587	897	1294	1763	2134	2871
20 - 44	7171	1255	709	8	105	337	483	766	1144	1610	2121	2559	3634
45 - 64	4560	1546	723	11	335	591	745	1057	1439	1898	2451	2870	3994
65 - 74	1663	1500	660	16	301	611	766	1044	1394	1873	2333	2693	3479
75+	878	1381	600	20	279	568	728	961	1302	1706	2170	2476	3087
Infants (ages <1)	403	302	258	13	0	0	0	113	240	424	649	775	1102
Children (ages 1-10)	5605	736	410	5	56	192	286	442	665	960	1294	1516	1954
Teens (ages 11-19)	5801	965	562	7	67	240	353	574	867	1246	1701	2026	2748
Adults (ages 20-64)	11731	1366	728	7	148	416	559	870	1252	1737	2268	2707	3780
Adults (ages 65+)	2541	1459	643	13	299	598	751	1019	1367	1806	2287	2636	3338
All	26081	1193	702	4	80	286	423	690	1081	1561	2092	2477	3415

[a] Total tapwater is defined as "all water from the household tap consumed directly as a beverage or used to prepare foods and beverages."

* Value not reported due to insufficient number of observations.

Source: Ershow and Cantor, 1989.

Table 2-8. Total Fluid Intake (ml/day) for Both Sexes Combined[a]

Age (yr)	Number of Observations	Mean	SD	S.E. of Mean	Percentile Distribution 1	5	10	25	50	75	90	95	99
<0.5	182	1014	294	22	*	587	652	842	974	1168	1344	1516	*
0.5 - 0.9	221	1258	322	22	*	769	854	1038	1250	1463	1629	1766	*
1 - 3	1498	1356	450	12	552	731	842	1041	1299	1601	1915	2220	2703
4 - 6	1702	1520	482	12	613	835	967	1197	1464	1796	2144	2374	2913
7 - 10	2405	1711	508	10	774	990	1119	1355	1652	1990	2392	2609	3209
11 - 14	2803	1918	651	12	702	1041	1191	1469	1822	2278	2738	3140	3876
15 - 19	2998	2049	768	14	729	1013	1206	1508	1933	2454	3029	3469	4500
20 - 44	7171	2171	839	10	788	1083	1266	1597	2032	2589	3239	3702	5054
45 - 64	4560	2359	826	12	948	1256	1439	1805	2241	2771	3436	3921	5129
65 - 74	1663	2249	739	18	902	1216	1388	1738	2151	2680	3237	3580	4414
75+	878	2103	697	24	739	1175	1305	1633	2040	2485	2940	3267	4074
Infants (ages <1)	403	1148	332	17	510	631	759	920	1120	1339	1597	1727	2060
Children (ages 1-10)	5605	1559	507	7	617	838	970	1210	1497	1843	2236	2507	3013
Teens (ages 11-19)	5801	1989	719	9	717	1025	1196	1489	1874	2369	2908	3336	4251
Adults (ages 20-64)	11731	2243	839	8	821	1133	1324	1665	2109	2663	3318	3793	5081
Adults (ages 65+)	2541	2199	728	14	860	1196	1352	1700	2109	2616	3132	3482	4370
All	26081	2072	803	5	728	1012	1188	1511	1950	2485	3098	3550	4655

[a] Total fluid is defined as tapwater plus "water intrinsic to foods and beverages."

* Value not reported due to insufficient number of observations.

Source: Ershow and Cantor, 1989.

as percentages of total fluid intake, and the percentages of total fluids derived from food, drinking water, and beverages for each age group. These data are reported in Tables 2-9 and 2-10.

These data were based on the USDA NFCS which is a large geographically and seasonally balanced survey of a representative sample of the U.S. population. However, it should be noted that the data are based on short-term recall. These factors introduce an unknown degree of uncertainty into the estimation of standard intake rates for the population.

Roseberry and Burmaster - Lognormal Distributions for Water Intake - Roseberry and Burmaster (1992) fit lognormal distributions to the water intake data reported by Ershow and Cantor (1989) and estimated population-wide distributions for total fluid and total tapwater intake based on proportions of the population in each age group. The mean was estimated as the zero intercept, and the standard deviation was estimated as the slope of the best fit line for the natural logarithm of the intake rates plotted against their corresponding z-scores (Roseberry and Burmaster, 1992). Least squares techniques were used to estimate the best fit straight lines for the transformed data. Summary statistics for the best-fit lognormal distribution are presented in Table 2-11. Tables 2-12 and 2-13 present the estimated quantiles and arithmetic averages for total tapwater and total fluid intake rates reported by Roseberry and Burmaster (1992). The mean total tapwater intake rates for the two adult populations (age 20-65 years, and 65+ years) were estimated to be 1.27 and 1.34 L/day.

These intake rates are based on the data originally presented by Ershow and Cantor (1989). Consequently, the same advantages and disadvantages associated with the Ershow and Cantor (1989) apply to this data set.

2.2.3. Other Relevant General Population Studies

National Academy of Sciences-Drinking Water and Health - NAS (1977) calculated the average per capita water (liquid) consumption per day to be 1.63 L. This figure was based on a survey of the following literature sources: Evans (1941); Bourne and Kidder (1953); Walker et al. (1957); Wolf (1958); Guyton (1968); McNall and Schlegel (1968); Randall (1973); NAS (1974); and Pike and Brown (1975). Although the calculated average intake volume was 1.63 L per day, NAS (1977) adopted a larger volume (2 L per day) to represent

Table 2-9. Total Tapwater Intake (as Percent of Total Water Intake) by Broad Age Category[a,b]

Age (yr)	Mean	Percentile Distribution								
		1	5	10	25	50	75	90	95	99
<1	26	0	0	0	12	22	37	55	62	82
1-10	45	6	19	24	34	45	57	67	72	81
11-19	47	6	18	24	35	47	59	69	74	83
20-64	59	12	27	35	49	61	72	79	83	90
65+	65	25	41	47	58	67	74	81	84	90

[a] Does not include pregnant women, lactating women, or breast-fed children.
[b] Total tapwater is defined as "all water from the household tap consumer directly as a beverage or used to prepare foods and beverages."
0 = Less than 0.5 percent.

Source: Ershow and Cantor, 1989.

Table 2-10. General Dietary Sources of Total Fluid by Broad Age Category[a]

Age (yr)	Source	mL/day								% of Total mL/day							
			Standard	Percentile Distribution							Standard	Percentile Distribution					
		Mean[b]	Deviation	5	25	50	75	95	99	Mean	Deviation	5	25	50	75	95	99
<1	Food[c]	250	198	0	72	236	371	633	843	21	16	0	8	21	32	50	60
	Drinking Water	197	186	0	0	240	240	480	880	16	14	0	0	17	24	39	60
	Other Beverages	701	235	333	558	693	839	1085	1332	63	19	33	51	63	76	97	100
	All Sources	1148	332	631	920	1120	1339	1727	2060	100							
1-10	Food[c]	409	175	175	283	384	506	727	924	27	10	13	20	26	33	44	53
	Drinking Water	505	354	0	240	480	720	1200	1600	30	16	0	20	30	41	56	68
	Other Beverages	645	247	283	483	630	784	1083	1372	43	14	21	33	42	52	66	77
	All Sources	1559	507	838	1210	1497	1843	2507	3013	100							
11-19	Food[c]	515	230	204	349	487	638	933	1197	27	10	12	20	26	33	44	54
	Drinking Water	664	483	0	320	560	880	1600	2160	31	17	0	20	31	42	60	73
	Other Beverages	809	382	289	566	756	984	1490	2105	42	15	18	32	41	51	67	78
	All Sources	1989	719	1025	1489	1874	2369	3336	4251	100							
20-64	Food[c]	545	239	223	375	509	678	992	1254	26	10	11	18	24	32	44	55
	Drinking Water	674	555	0	320	560	960	1760	2560	28	17	0	16	28	40	59	71
	Other Beverages	1024	539	358	668	925	1267	2001	2912	46	17	20	35	46	57	75	84
	All Sources	2243	839	1133	1665	2109	2663	3793	5081	100							
65+	Food[c]	575	243	238	406	542	711	1028	1273	27	10	12	20	26	33	45	54
	Drinking Water	776	554	0	400	720	1040	1920	2400	33	17	0	22	33	45	61	74
	Other Beverages	849	381	310	604	807	1032	1523	2037	40	15	16	30	39	49	66	78
	All Sources	2190	728	1196	1700	2109	2616	3482	4370	100							
All	Food[c]	517	236	201	351	483	647	955	1220	26	10	12	19	25	32	44	54
	Drinking Water	651	520	0	240	560	880	1600	2400	30	17	0	17	29	41	59	71
	Other Beverages	904	481	318	596	811	1110	1774	2612	44	16	19	33	44	55	73	83
	All Sources	2072	803	1012	1511	1950	2485	3550	4655	100							

a Does not include pregnant women, lactating women, or breast-fed children.
b Individual values may not add to totals due to rounding.
c Food category includes soups.
0 = Less than 0.5 g/day or 0.5 percent.

Source: Ershow and Cantor, 1989.

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Table 2-11. Summary Statistics for Best-Fit Lognormal Distributions for Water Intake Rates[a]

Group	ln Total Fluid Intake Rate μ	σ	R^2
0 < age <1	6.979	0.291	0.996
1 ≤ age <11	7.182	0.340	0.953
11 ≤ age <20	7.490	0.347	0.966
20 ≤ age <65	7.563	0.400	0.977
65 ≤ age	7.583	0.360	0.988
All ages	7.487	0.405	0.984
Simulated balanced population	7.492	0.407	1.000

Group	ln Total Tapwater Intake μ	σ	R^2
0 < age <1	5.587	0.615	0.970
1 ≤ age <11	6.429	0.498	0.984
11 ≤ age <20	6.667	0.535	0.986
20 ≤ age <65	7.023	0.489	0.956
65 ≤ age	7.088	0.476	0.978
All ages	6.870	0.530	0.978
Simulated balanced population	6.864	0.575	0.995

[a] These values were used in the following equations to estimate the quantiles and averages for total tapwater and total fluid intake shown in Tables 2-12 and 2-13.

97.5 percentile intake rate = exp [μ + (1.96 · σ)]
75 percentile intake rate = exp [μ + (0.6745 · σ)]
50 percentile intake rate = exp [μ]
25 percentile intake rate = exp [μ - (0.6745 · σ)]
2.5 percentile intake rate = exp [μ - (1.96 · σ)]
Mean intake rate - exp [μ + 0.5 · σ^2)]

Source: Roseberry and Burmaster, 1992.

Table 2-12. Estimated Quantiles and Means for Total Tapwater Intake Rates (mL/day)[a]

Group	Percentile 2.5	25	50	75	97.5	Arithmetic Average
0 < age < 1	80	176	267	404	891	323
1 ≤ age < 11	233	443	620	867	1,644	701
11 ≤ age < 20	275	548	786	1,128	2,243	907
20 ≤ age < 65	430	807	1,122	1,561	2,926	1,265
65 ≤ age	471	869	1,198	1,651	3,044	1,341
All ages	341	674	963	1,377	2,721	1,108
Simulated Balanced Population	310	649	957	1,411	2,954	1,129

[a] Total tapwater is defined as "all water from the household tap consumed directly as a beverage or used to prepare foods and beverages."

Source: Roseberry and Burmaster, 1992.

Table 2-13. Estimated Quantiles and Means for Total Fluid Intake Rates (mL/day)[a]

Group	Percentile					Mean
	2.5	25	50	75	97.5	
0 < age < 1	607	882	1,074	1,307	1,900	1,120
1 ≤ age < 11	676	1,046	1,316	1,655	2,562	1,394
11 ≤ age < 20	907	1,417	1,790	2,262	3,534	1,901
20 ≤ age < 65	879	1,470	1,926	2,522	4,218	2,086
65 ≤ age	970	1,541	1,965	2,504	3,978	2,096
All NFCS	807	1,358	1,785	2,345	3,947	1,937
Simulated Balanced Population	808	1,363	1,794	2,360	3,983	1,949

[a] Total fluid is defined as tapwater plus "water intrinsic to foods and beverages."

Source: Roseberry and Burmaster, 1992.

the intake of the majority of water consumers. This value is relatively consistent with the total tapwater intakes rate estimated from the key studies presented previously. However, the use of the term "liquid" was not clearly defined in this study, and it is not known whether the populations surveyed are representative of the adult U.S. population. Consequently, the results of this study are of limited use in recommending total tapwater intake rates.

Pennington - Total Diet Study - Based on data from the U.S. Food and Drug Administration's (FDA's) Total Diet Study, Pennington (1983) reported average intake rates for various foods and beverages for five age groups of the population. The Total Diet Study is conducted annually to monitor the nutrient and contaminant content of the U.S. food supply and to evaluate trends in consumption. Representative diets were developed based on 24-hour recall and 2-day diary data from the 1977-1978 U.S. Department of Agriculture (USDA) Nationwide Food Consumption Survey (NFCS) and 24-hour recall data from the Second National Health and Nutrition Examination Survey (NHANES II). The number of participants in NFCS and NHANES II was approximately 30,000 and 20,000, respectively. The diets were developed to "approximate 90 percent or more of the weight of the foods usually consumed" (Pennington, 1983). For the purposes of this report, the consumption rates for the food categories defined by Pennington (1983) were used to calculate total fluid and total tapwater intake rates for five age groups. Total tapwater includes tapwater, tea, coffee, soft drinks, and soups and frozen juices that are reconstituted with tap water. Reconstituted soups were assumed to be composed of 50 percent tapwater, and juices were assumed to contain 75 percent tapwater. Total fluids include total tapwater in addition to milk, ready-to-use infant formula, milk-based soups, carbonated soft drinks, alcoholic beverages, and canned fruit juices. These intake rates are presented in Table 2-14. Based on the average intake rates for total tapwater for the two adult age groups, 1.04 and 1.26 L/day, the average adult intake rate is about 1.15 L/day. These rates should be more representative of the amount of source-specific water consumed than are total fluid intake rates. Because intake rates estimated by Pennington (1983) are based on the USDA NFCS, the same limitations associated with the Ershow and Cantor (1989) data apply to these data.

Table 2-14. Average Daily Fluid Intake Rate by Age Group from the Total Diet Study

Age Group	Average Daily Consumption Rate (L/day) Total Fluids[a]	Total Tapwater[b]
6-11 months	0.80	0.20
2 years	0.99	0.50
14-16 years	1.47	0.72
25-30 years	1.76	1.04
60-65 years	1.63	1.26

[a] Includes milk, "ready-to-use" formula, milk-based soup, carbonated soda, alcoholic beverages, canned juices, water, coffee, tea, reconstituted juices, and reconstituted soups. Does not include reconstituted infant formula.

[b] Includes water, coffee, tea, reconstituted juices, and reconstituted soups.

Source: Derived from Pennington, 1983.

Gillies and Paulin - New Zealand Study - Gillies and Paulin (1983) conducted a study to evaluate variability of mineral intake from drinking water. A study population of 109 adults (75 females; 34 males) ranging in age from 16 to 80 years (mean age = 44 years) in New Zealand was asked to collect duplicate samples of water consumed directly from the tap or used in beverage preparation during a 24-hour period. Participants were asked to collect the samples on a day when all of the water consumed would be from their own home. Individuals were selected based on their willingness to participate and their ability to comprehend the collection procedures. The mean total tapwater intake rate for this population was 1.25 (±0.39) L/day, and the 90th percentile rate was 1.90 L/day. The median total tapwater intake rate (1.26 L/day) was very similar to the mean intake rate (Gillies and Paulin, 1983). The reported range was 0.26 to 2.80 L/day.

The advantage of these data are that they were generated using duplicate sampling techniques. Because this approach is more objective than recall methods, it may result in more accurate response. However, these data are based on a short-term survey that may not be representative of long-term behavior, and the population surveyed may not be representative of the U.S. population.

Hopkin and Ellis - Drinking Water Consumption in Great Britain - A study conducted in Great Britain over a 6-week period during September and October 1978, estimated the drinking water consumption rates of 3,564 individuals from 1,320 households in England, Scotland, and Wales (Hopkins and Ellis, 1980). The participants were selected randomly and were asked to complete a questionnaire and a diary indicating the type and quantity of beverages consumed over a 1-week period. Total liquid intake included total tapwater taken at home and away from home; purchased alcoholic beverages; and nontapwater-based drinks. Total tapwater included water content of tea, coffee, and other hot water drinks; homemade alcoholic beverages; and tapwater consumed directly as a beverage. The assumed tapwater contents for these beverages are presented in Table 2-15. Based on responses from 3,564 participants, the mean intake rates and frequency distribution data for various beverage categories were estimated by Hopkin and Ellis (1980). These data are listed in Table 2-16. The mean per capita total liquid intake rate for all individuals surveyed was 1.59 L/day, and the mean per capita total tapwater intake rate was 0.95 L/day. Liquid intake rates were also

Table 2-15. Assumed Tapwater Content of Beverages

Beverage	% Tapwater
Cold Water	100
Home-made Beer/Cider/Lager	100
Home-made Wine	100
Other Hot Water Drinks	100
Ground/Instant Coffee:[a]	
Black	100
White	80
Half Milk	50
All Milk	0
Tea	80
Hot Milk	0
Cocoa/Other Hot Milk Drinks	0
Water-based Fruit Drink	75
Fizzy Drinks	0
Fruit Juice 1[b]	0
Fruit Juice 2[b]	75
Milk	0
Mineral Water[c]	0
Bought cider/beer/lager	0
Bought Wine	0

[a] Black - coffee with all water, milk not added; White - coffee with 80% water, 20% milk; Half Milk - coffee with 50% water, 50% milk; All Milk - coffee with all milk, water not added;

[b] Fruit juice: individuals were asked in the questionnaire if they consumed ready-made fruit juice (type 1 above), or the variety that is diluted (type 2);

[c] Information on volume of mineral water consumed was obtained only as "number of bottles per week." A bottle was estimated at 500 mL, and the volume was split so that 2/7 was assumed to be consumed on weekends, and 5/7 during the week.

Source: Hopkins and Ellis, 1980.

Table 2-16. Intake of Total Liquid, Total Tapwater, and Various Beverages (L/day)

Beverage	All Individuals					Consumers Only			
	Mean Intake	Approx. Std. Error of Mean	Approx. 95% Confidence Interval for Mean	10 and 90 Percentiles	1 and 99 Percentiles	Percentage of Total Number of Individuals	Mean Intake	Approx. Std. Error of Mean	Approx. 95% Confidence Interval for Mean
Total Liquid	1.589	0.0203	1.547-1.629	0.77-2.57	0.34-4.50	100.0	1.589	0.0203	1.547-1.629
Total Liquid Home	1.104	0.0143	1.075-1.133	0.49-1.79	0.23-3.10	100.0	1.104	0.0143	1.075-1.133
Total Liquid Away	0.484	0.0152	0.454-0.514	0.00-1.15	0.00-2.89	89.9	0.539	0.0163	0.506-0.572
Total Tapwater	0.955	0.0129	0.929-0.981	0.39-1.57	0.10-2.60	99.8	0.958	0.0129	0.932-0.984
Total Tapwater Home	0.754	0.0116	0.731-0.777	0.26-1.31	0.02-2.30	99.4	0.759	0.0116	0.736-0.782
Total Tapwater Away	0.201	0.0056	0.190-0.212	0.00-0.49	0.00-0.96	79.6	0.253	0.0063	0.240-0.266
Tea	0.584	0.0122	0.560-0.608	0.01-1.19	0.00-2.03	90.9	0.643	0.0125	0.618-0.668
Coffee	0.190	0.0059	0.178-0.202	0.00-0.56	0.00-1.27	63.0	0.302	0.0105	0.281-0.323
Other Hot Water Drinks	0.011	0.0015	0.008-0.014	0.00-0.00	0.00-0.25	9.2	0.120	0.0133	0.093-0.147
Cold Water	0.103	0.0049	0.093-0.113	0.00-0.31	0.00-0.85	51.0	0.203	0.0083	0.186-0.220
Fruit Drinks	0.057	0.0027	0.052-0.062	0.00-0.19	0.00-0.49	46.2	0.123	0.0049	0.113-0.133
Non Tapwater	0.427	0.0058	0.415-0.439	0.20-0.70	0.06-1.27	99.8	0.428	0.0058	0.416-0.440
Home-brew	0.010	0.0017	0.007-0.013	0.00-0.00	0.00-0.20	7.0	0.138	0.0209	0.096-0.180
Bought Alcoholic Beverages	0.206	0.0123	0.181-0.231	0.00-0.68	0.00-2.33	43.5	0.474	0.0250	0.424-0.524

Source: Hopkin and Ellis, 1980.

estimated for males and females in various age groups. Table 2-17 summarizes the total liquid and total tapwater intake rates for 1,758 males and 1,800 females grouped into six age categories (Hopkin and Ellis, 1980). The mean total liquid intake rate reported for adults was 1.79 L/day (1.07 L/day for tapwater based drinks and 0.72 L/day for non-tapwater based drinks).

The advantage of using these data is that the responses were not generated on a recall basis, but by recording daily intake in diaries. The latter approach may result in more accurate responses being generated. Also, the use of total liquid and total tapwater was well defined in this study. However, the relatively short-term nature of the survey make extrapolation to long-term consumption patterns difficult. Also, these data were based on the population of Great Britain and not the United States. Drinking patterns may differ among these populations as a result of varying weather conditions and other socio-economic factors.

U.S. EPA - Office of Radiation Programs - Using data collected by USDA in the 1977-78 NFCS, U.S. EPA (1984d) determined daily food and beverage intake levels by age to be used in assessing radionuclide intake through food consumption. Tapwater, water-based drinks, and soups were identified subcategories of the total beverage category. Daily intake rates for tapwater, water-based drinks, soup, and total beverage are presented in Table 2-18. As seen in the table, mean tapwater intake for different adult age groups (age 20 and older) ranged from 0.62 to 0.76 L/day, water-based drinks intake ranged from 0.34 to 0.69 L/day, soup intake ranged from 0.03 to 0.06 L/day, and mean total beverage intake levels ranged from 1.48 to 1.73 L/day. Total tapwater intake rates were estimated by combining the average daily intakes of tapwater, water-based drinks, and soups for each age group. For adults (ages 20 and older), mean total tapwater intake rates range from 1.04 to 1.47 L/day, and for children (ages <1 to 19), mean intake rates range from 0.19 to 0.90 L/day. These intake rates do not include reconstituted infant formula. The total tapwater intake rates, derived by combining data on tapwater, water-based drinks, and soup should be more representative of source-specific drinking water intake than the total beverage intake rates reported in this study. These intake rates are based on the same USDA NFCS data used in Ershow and Cantor (1989). Therefore, the data limitations discussed previously also apply to this study.

Table 2-17. Summary of Total Liquid and Total Tapwater Intake for Males and Females (L/day)

Beverage	Age Group	Number		Mean Intake		Approx. Std. Error of Mean		Approx 95% Confidence Interval for Mean		10 and 90 Percentiles	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Total Liquid Intake	1-4	88	75	0.853	0.888	0.0557	0.0660	0.742-0.964	0.756-1.020	0.38-1.51	0.39-1.48
	5-11	249	201	0.986	0.902	0.0296	0.0306	0.917-1.045	0.841-0.963	0.54-1.48	0.51-1.39
	12-17	180	169	1.401	1.198	0.0619	0.0429	1.277-1.525	1.112-1.284	0.75-2.27	0.65-1.74
	18-30	333	350	2.184	1.547	0.0691	0.0392	2.046-2.322	1.469-1.625	1.12-3.49	0.93-2.30
	31-54	512	551	2.112	1.601	0.0526	0.0215	2.007-2.217	1.558-1.694	1.15-3.27	0.95-2.36
	55+	396	454	1.830	1.482	0.0498	0.0356	1.730-1.930	1.411-1.553	1.03-2.77	0.84-2.17
Total Tapwater Intake	1-4	88	75	0.477	0.464	0.0403	0.0453	0.396-0.558	0.373-0.555	0.17-0.85	0.15-0.89
	5-11	249	201	0.550	0.533	0.0223	0.0239	0.505-0.595	0.485-0.581	0.22-0.90	0.22-0.93
	12-17	180	169	0.805	0.725	0.0372	0.0328	0.731-0.8790	0.659-0.791	0.29-1.35	0.31-1.16
	18-30	333	350	1.006	0.991	0.0363	0.0304	0.933-1.079	0.930-1.052	0.45-1.62	0.50-1.55
	31-54	512	551	1.201	1.091	0.0309	0.0240	1.139-1.263	1.043-1.139	0.64-1.88	0.62-1.68
	55+	396	454	1.133	1.027	0.0347	0.0273	1.064-1.202	0.972-1.082	0.62-1.72	0.54-1.57

Source: Hopkin and Ellis, 1980.

Table 2-18. Mean and Standard Error for the Daily Intake of Beverages and Tapwater by Age

Age	Tapwater Intake (mL)	Water-Based Drinks (mL)[a]	Soups	Total Beverage Intake[b] (mL)
All ages	662.5 ± 9.9	457.1 ± 6.7	45.9 ± 1.2	1434.0 ± 13.7
Under 1	170.7 ± 64.5	8.3 ± 43.7	10.1 ± 7.9	307.0 ± 89.2
1 to 4	434.6 ± 31.4	97.9 ± 21.5	43.8 ± 3.9	743.0 ± 43.5
5 to 9	521.0 ± 26.4	116.5 ± 18.0	36.6 ± 3.2	861.0 ± 36.5
10 to 14	620.2 ± 24.7	140.0 ± 16.9	35.4 ± 3.0	1025.0 ± 34.2
15 to 19	664.7 ± 26.0	201.5 ± 17.7	34.8 ± 3.2	1241.0 ± 35.9
20 to 24	656.4 ± 33.9	343.1 ± 23.1	38.9 ± 4.2	1484.0 ± 46.9
25 to 29	619.8 ± 34.6	441.6 ± 23.6	41.3 ± 4.2	1531.0 ± 48.0
30 to 39	636.5 ± 27.2	601.0 ± 18.6	40.6 ± 3.3	1642.0 ± 37.7
40 to 59	735.3 ± 21.1	686.5 ± 14.4	51.6 ± 2.6	1732.0 ± 29.3
60 and over	762.5 ± 23.7	561.1 ± 16.2	59.4 ± 2.9	1547.0 ± 32.8

[a] Includes water-based drinks such as coffee, etc. Reconstituted infant formula does not appear to be included in this group.
[b] Includes tapwater and water-based drinks such as coffee, tea, soups, and other drinks such as soft drinks, fruitades, and alcoholic drinks.

Source: U.S. EPA, 1984d.

International Commission on Radiological Protection - Reference Man - Data on fluid intake levels have also been summarized by the International Commission on Radiological Protection (ICRP) in the Report of the Task Group on Reference Man (ICRP, 1981). These intake levels for adults and children are summarized in Table 2-19. The amount of drinking water (tapwater and water-based drinks) consumed by adults ranged from about 0.37 L/day to about 2.18 L/day under "normal" conditions. The levels for children ranged from 0.54 to 0.79 L/day. Because the populations, survey design, and intake categories are not clearly defined, this study has limited usefulness in developing recommended intake rates for use in exposure assessment. It is reported here as a relevant study because the findings, although poorly defined, are consistent with the results of other studies.

2.2.4. Pregnant and Lactating Women

Ershow et al., 1991 - Intake of Tapwater and Total Water by Pregnant and Lactating Women - Ershow et al. (1991) used data from the 1977-78 USDA NFCS to estimate total fluid and total tapwater intake among pregnant and lactating women (ages 15-49 years). Data for 188 pregnant women, 77 lactating women, and 6,201 nonpregnant, nonlactating control women were evaluated. The participants were interviewed based on 24 hour recall, and then asked to record a food diary for the next 2 days. "Tapwater" included tapwater consumed directly as a beverage and tapwater used to prepare food and tapwater-based beverages. "Total water" was defined as all water from tapwater and nontapwater sources, including water contained in food. Estimated total fluid and total tapwater intake rates for the three groups are presented in Tables 2-20 and 2-21, respectively. Lactating women had the highest mean total fluid intake rate (2.24 L/day) compared with both pregnant women (2.08 L/day) and control women (1.94 L/day). Lactating women also had a higher mean total tapwater intake rate (1.31 L/day) than pregnant women (1.19 L/day) and control women (1.16 L/day). Ershow et al. (1991) also reported that rural women (n=1,885) consumed more total water (1.99 L/day) and tapwater (1.24 L/day) than urban/suburban women (n=4,581, 1.93 and 1.13 L/day, respectively). Total water and tapwater intake rates were lowest in the northeastern region of the United States (1.82 and 1.03 L/day) and highest in the western region of the United States (2.06 L/day and 1.21 L/day). Mean intake per unit

Table 2-19. Measured Fluid Intakes (mL/day)

Subject	Total Fluids	Milk	Tapwater	Water-Based Drinks[a]
Adults ("normal" conditions)[b]	1000-2400	120-450	45-730	320-1450
Adults (high environmental temperature to 32°C)	2840-3410 3256 ± SD = 900			
Adults (moderately active)	3700			
Children (5-14 yr)	1000-1200	330-500	ca. 200	ca. 380
	1310-1670	540-650	540-790	

[a] Includes tea, coffee, soft drinks, beer, cider, wine, etc.
[b] "Normal" conditions refer to typical environmental temperature and activity levels.

Source: ICRP, 1981.

Table 2-20. Total Fluid Intake of Women 15-49 Years Old

Reproductive Status[a]	Mean	Standard Division	Percentile Distribution 5	10	25	50	75	90	95
mL/day									
Control	1940	686	995	1172	1467	1835	2305	2831	3186
Pregnant	2076	743	1085	1236	1553	1928	2444	3028	3475
Lactating	2242	658	1185	1434	1833	2164	2658	3169	3353
mL/kg/day									
Control	32.3	12.3	15.8	18.5	23.8	30.5	38.7	48.4	55.4
Pregnant	32.1	11.8	16.4	17.8	22.8	30.5	40.4	48.9	53.5
Lactating	37.0	11.6	19.6	21.8	28.4	35.1	45.0	53.7	59.2

[a] Number of observations: nonpregnant, nonlactating controls (n = 6,201); pregnant (n = 188); lactating (n = 77).

Source: Ershow et al., 1991.

Table 2-21. Total Tapwater Intake of Women 15-49 Years Old

Reproductive Status[a]	Mean	Standard Deviation	Percentile Distribution 5	10	25	50	75	90	95
mL/day									
Control	1157	635	310	453	709	1065	1503	1983	2310
Pregnant	1189	699	274	419	713	1063	1501	2191	2424
Lactating	1310	591	430	612	855	1330	1693	1945	2191
mL/kg/day									
Control	19.1	10.8	5.2	7.5	11.7	17.3	24.4	33.1	39.1
Pregnant	18.3	10.4	4.9	5.9	10.7	16.4	23.8	34.5	39.6
Lactating	21.4	9.8	7.4	9.8	14.8	20.5	26.8	35.1	37.4
Fraction of daily fluid intake that is tapwater (%)									
Control	57.2	18.0	24.6	32.2	45.9	59.0	70.7	79.0	83.2
Pregnant	54.1	18.2	21.2	27.9	42.9	54.8	67.6	76.6	83.2
Lactating	57.0	15.8	27.4	38.0	49.5	58.1	65.9	76.4	80.5

[a] Number of observations: nonpregnant, nonlactating controls (n = 6,201); pregnant (n = 188); lactating (n = 77).

Source: Ershow et al., 1991.

body weight was highest among lactating women for both total fluid and total tapwater intake. Total tapwater intake accounted for over 50 percent of mean total fluid in all three groups of women (Table 2-21). Drinking water accounted for the largest single proportion of the total fluid intake for control (30 percent), pregnant (34 percent), and lactating women (30 percent) (Table 2-22). All other beverages combined accounted for approximately 46 percent, 43 percent, and 45 percent of the total water intake for control, pregnant, and lactating women, respectively. Food accounted for the remaining portion of total water intake.

The same advantages and limitations associated with the Ershow and Cantor (1989) data also apply to these data sets (Section 2.2.2). A further advantage of this study is that it provides information on estimates of total water and tapwater intake rates for pregnant and lactating women. This topic has rarely been addressed in the literature.

2.2.5. High Activity Levels/Hot Climates

McNall and Schlegel, 1968 - Practical Thermal Environmental Limits for Young Adult Males Working in Hot, Humid Environments - McNall and Schlegel (1968) conducted a study that evaluated the physiological tolerance of adult males working under varying degrees of physical activity. Subjects were required to pedal pedal-driven propeller fans for 8-hour work cycles under varying environmental conditions. Two groups of eight subjects each were used. Work rates were divided into three categories as follows: high activity level [0.15 horsepower (hp) per person], medium activity level (0.1 hp per person), and low activity level (0.05 hp per person). Evidence of physical stress (i.e., increased body temperature, blood pressure, etc.) was recorded, and individuals were eliminated from further testing if certain stress criteria were met. The amount of water consumed by the test subjects during the work cycles was also recorded. Water was provided to the individuals on request. The water intake rates obtained at the three different activity levels and the various environmental temperatures are presented in Table 2-23. The data presented are for test subjects with continuous data only (i.e., those test subjects who were not eliminated at any stage of the study as a result of stress conditions). Water intake was the highest at all activity levels when environmental temperatures were increased. The highest intake rate was

Table 2-22. Total Fluid (mL/Day) Derived from Various Dietary Sources by Women Aged 15-49 Years[a]

	Control Women			Pregnant Women			Lactating Women		
		Percentile			Percentile			Percentile	
Sources	Mean[b]	50	95	Mean[b]	50	95	Mean[b]	50	95
Drinking Water	583	480	1440	695	640	1760	677	560	1600
Milk and Milk Drinks	162	107	523	308	273	749	306	285	820
Other Dairy Products	23	8	93	24	9	93	36	27	113
Meats, Poultry, Fish, Eggs	126	114	263	121	104	252	133	117	256
Legumes, Nuts, and Seeds	13	0	77	18	0	88	15	0	72
Grains and Grain Products	90	65	257	98	69	246	119	82	387
Citrus and Noncitrus Fruit Juices	57	0	234	69	0	280	64	0	219
Fruits, Potatoes, Vegetables, Tomatoes	198	171	459	212	185	486	245	197	582
Fats, Oils, Dressings, Sugars, Sweets	9	3	41	9	3	40	10	6	50
Tea	148	0	630	132	0	617	253	77	848
Coffee and Coffee Substitutes	291	159	1045	197	0	955	205	80	955
Carbonated Soft Drinks[c]	174	110	590	130	73	464	117	57	440
Noncarbonated Soft Drinks[c]	38	0	222	48	0	257	38	0	222
Beer	17	0	110	7	0	0	17	0	147
Wine Spirits, Liqueurs, Mixed Drinks	10	0	66	5	0	25	6	0	59
All Sources	1940	NA	NA	2076	NA	NA	2242	NA	NA

[a] Number of observations: nonpregnant, nonlactating controls (n = 6,201); pregnant (n = 188); lactating (n = 77).
[b] Individual means may not add to all-sources total due to rounding.
[c] Includes regular, low-calorie, and noncalorie soft drinks.

NA: Not appropriate to sum the columns for the 50th and 95th percentiles of intake.

Source: Ershow et al., 1991.

Table 2-23. Water Intake at Various Activity Levels (L/hr)[a]

Room Temperature[b] (°F)	Activity Level					
	High (0.15 hp/man)[c]		Medium (0.10 hp/man)[c]		Low (0.05 hp/man)[c]	
	No.[d]	Intake	No.	Intake	No.	Intake
100	--	--	--	--	15	0.653 (0.75)
95	18	0.540 (0.31)	12	0.345 (0.59)	6	0.50 (0.31)
90	7	0.286 (0.26)	7	0.385 (0.26)	16	0.23 (0.20)
85	7	0.218 (0.36)	16	0.213 (0.20)	--	--
80	16	0.222 (0.14)	--		--	--

[a] Data expressed as mean intake with standard deviation in parentheses.
[b] Humidity = 80 percent; air velocity = 60 ft/min.
[c] The symbol "hp" refers to horsepower.
[d] Number of subjects with continuous data.

Source: McNall and Schlegel, 1968.

observed at the low activity level at 100°F (0.65 L/hour) however, there were no data for higher activity levels at 100°F. It should be noted that this study estimated intake on an hourly basis during various levels of physical activity. These hourly intake rates cannot be converted to daily intake rates by multiplying by 24 hours/day because they are only representative of intake during the specified activity levels and the intake rates for the rest of the day are not known. Therefore, comparison of intake rate values from this study cannot be made with values from the previously described studies on drinking water intake.

United States Army - Water Consumption Planning Factors Study - The U.S. Army has developed water consumption planning factors to enable them to transport an adequate amount of water to soldiers in the field under various conditions (U.S. Army, 1983). Both climate and activity levels were used to determine the appropriate water consumption needs. Consumption factors have been established for the following uses: (1) drinking, (2) heat treatment, (3) personal hygiene, (4) centralized hygiene, (5) food preparation, (6) laundry, (7) medical treatment, (8) vehicle and aircraft maintenance, (9) graves registration, and (10) construction. Only personal drinking water consumption factors are described here.

Drinking water consumption planning factors are based on the estimated amount of water needed to replace fluids lost by urination, perspiration, and respiration. It assumes that water lost to urinary output averages one quart/day (0.9 L/day) and perspiration losses range from almost nothing in a controlled environment to 1.5 quarts/hour (1.4 L/day) in a very hot climate where individuals are performing strenuous work. Water losses to respiration are typically very low except in extreme cold where water losses can range from 1 to 3 quarts/day (0.9 to 2.8 L/day). This occurs when the humidity of inhaled air is near zero, but expired air is 98 percent saturated at body temperature (U.S. Army, 1983). Drinking water is defined by the U.S. Army (1983) as "all fluids consumed by individuals to satisfy body needs for internal water." This includes soups, hot and cold drinks, and tapwater.

Planning factors have been established for hot, temperate, and cold climates based on the following mixture of activities among the work force: 15 percent of the force performing light work, 65 percent of the force performing medium work, and 20 percent of the force performing heavy work. Hot climates are defined as tropical and arid areas where the temperature is greater than 80°F. Temperate climates are defined as areas where the mean daily temperature ranges from 32°F to 80°F. Cold regions are areas where the mean daily temperature is less than 32°F. Drinking water consumption factors for these three climates are presented in Table 2-24. These factors are based on research on individuals and small unit training exercises. The estimates are assumed to be conservative because they are rounded up to account for the subjective nature of the activity mix and minor water losses that are not considered (U.S. Army, 1983). The advantage of using these data is that they provide a conservative estimate of drinking water intake among individual performing at various levels of physical activity in hot, temperate, and cold climates. However, the planning factors described here are based on assumptions about water loss from urination, perspiration, and respiration, and are not based on survey data or actual measurements.

2.2.6. Recommendations

The key studies described in this section were used in selecting recommended drinking water (tapwater) consumption rates for adults, children, and other subpopulations. Although different survey designs and populations were utilized by key and relevant studies described in this report, the mean and upper-percentile estimates reported in these studies appear to be relatively consistent. The general design of both key and relevant studies and their limitations are summarized in Table 2-25. It should be noted that studies that surveyed large representative samples of the population provide more reliable estimates of intake rates for the general population. Survey results based on recall may be somewhat biased because of the subjectivity involved. However, Cantor et al. (1987) noted that retrospective dietary assessments generally produce moderate correlations with "reference data from the past." Most of the surveys described here are based on short-term recall.

Table 2-24. Planning Factors for Individual Tapwater Consumption

Environmental Condition	Recommended Planning Factor (gal/day)[a]	Recommended Planning Factor (L/day)[a,b]
Hot	3.0[c]	11.4
Temperate	1.5[d]	5.7
Cold	2.0[e]	7.6

[a] Based on a mix of activities among the work force as follows: 15% light work; 65% medium work; 20% heavy work. These factors apply to the conventional battlefield where no nuclear, biological, or chemical weapons are used.

[b] Converted from gal/day to L/day.

[c] This assumes 1 quart/12-hour rest period/man for perspiration losses and 1 quart/day/man for urination plus 6 quarts/12-hours light work/man, 9 quarts/12-hours moderate work/man, and 12 quarts/12-hours heavy work/man.

[d] This assumes 1 quart/12-hour rest period/man for perspiration losses and 1 quart/day/man for urination plus 1 quart/12-hours light work/man, 3 quarts/12-hours moderate work/man, and 6 quarts/12-hours heavy work/man.

[e] This assumes 1 quart/12-hour rest period/man for perspiration losses, 1 quart/day/man for urination, and 2 quarts/day/man for respiration losses plus 1 quart/12-hours light work/man, 3 quarts/12-hours moderate work/man, and 6 quarts/6-hours heavy work/man.

Source: U.S. Army, 1983.

Table 2-25. Drinking Water Intake Surveys

Study	Number of Individuals	Type of Water Consumed	Time Period/ Survey Type	Population Surveyed	Comments
Canadian Ministry of National Health and Welfare, 1981	970	Total tapwater consumption	Weekday and weekend day in both summer and winter; estimation based on sizes and types of containers used	All ages; Canada	Seasonal data; includes many tapwater-containing items not commonly surveyed; possible bias because identification of vessel size used as survey techniques; short-term study
Cantor et al., 1987	5,258	Total tapwater; total fluid consumption	1 week/usual intake in winter based on recall	Adults only; weighted toward older adults; U.S. population	Based on recall of behavior from previous winter; short-term data; population not representative of general U.S. population
Ershow and Cantor, 1989	Based on data from NFCS; approximately 30,000 individuals	Total tapwater; total fluid consumption	3-day recall, diaries	All ages; large sample representative of U.S. population	Short-term recall data; seasonally balanced data
Gillies and Paulin, 1983	109	Total tapwater consumption	24 hours; duplicate water samples collected	Adults only; New Zealand	Based on short-term data
Hopkin and Ellis, 1980	3,564	Total tapwater, total liquid consumption	1 week period, diaries	All ages; Great Britain	Short-term diary data
ICRP, 1981	Based on data from several sources	Water and water-based drinks; milk; total fluids	NA[a]	NA[a]	Survey design and intake categories not clearly defined
McNall and Schlegel, 1968	Based on 2 groups of 8 subjects each	Tapwater	8-hour work cycle	Males between 17-25 years of age; small sample	Based on short-term data

Table 2-25. Drinking Water Intake Surveys (continued)

Study	Number of Individuals	Type of Water Consumed	Time Period/ Survey Type	Population Surveyed	Comments
NAS 1977	Calculated average based on several sources	Average per capita "liquid" consumption	NA[a]	NA[a]	Total tapwater not reported; population and survey design not reported
Pennington, 1983	Based on NFCS and NHANES II; approximately 30,000 and 20,000 participants, respectively	Total tapwater; total fluid consumption	NFCS:24-hour recall on 2-day dairy; NHANES II:24-hour recall	NFCS:1 month to 97 years; NHANES II:6 months to 74 years; representative samples of US population	Based on short-term recall data
Rosenberry and Burmaster, 1992	Based on data from Ershow and Cantor, 1987	Total tapwater; total fluid consumption	3-day recall, diaries	All ages; large sample representative of US population	Short-term recall data; seasonally balanced; suitable for Monte Carlo simulations
U.S. Army, 1983	NA	All fluids consumed to satisfy body needs for internal water; includes soups, hot and cold drinks and tapwater	NA	NA	Study designed to provide water consumption planning factors for various activities and field conditions; based on estimated amount of water required to account for losses from urination, perspiration, and respiration
USEPA, 1984d	Based on NFCS; approximately 30,000 individuals	Tapwater; water based foods and beverages; soups; beverage consumption	3-day recall, diaries	All ages; large sample representative of US population	Short-term recall data; seasonally balanced

[a] Not applicable.

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Adults - The total tapwater consumption rates for adults that have been reported in these surveys can be summarized as follows:

Mean (L/day)	90th percentile (L/day)	Reference
1.63 (calculated)	-	NAS, 1977.
1.39	-	Cantor et al., 1987.
1.25	1.90	Gillies and Paulin, 1983.
1.04 (25 to 30 yrs)	-	Pennington, 1983.
1.26 (60 to 65 yrs)	-	Pennington, 1983.
1.49	2.50	Canadian Ministry of Health and Welfare, 1981.
1.04-1.47 (ages 20+)	-	U.S. EPA, 1984d.
1.37 (20 to 64 yrs)	2.27	Ershow and Cantor, 1989.
1.46 (65+ yrs)	2.29	Ershow and Cantor, 1989.
1.27 (20 to 64 yrs)	-	Roseberry and Burmaster, 1992
1.34 (65+ yrs)	-	Roseberry and Burmaster, 1992

The combined results of the studies discussed above suggest that the average adult drinking water intake rate is between 1.30 and 1.40 L/day. Based on the key surveys that are most applicable to general population exposure assessments (i.e., Cantor et al., 1987; Ershow and Cantor, 1989), 1.4 L/day is recommended as the average drinking water consumption rate. This average rate differs from the widely used default adult drinking water consumption rate of 2.0 L/day. A 2.0 L/day intake rate appears to represent the upper 80th-90th percentile of intake rates among the adult population. The higher value is supported by the 90th percentile tapwater intake rate suggested by Ershow and Cantor (1989) which was 2.27 L/day, and the 82nd percentile rate estimated by Cantor et al. (1987) which was 1.96 L/day. Because these values are based on short-term data, a value of 2.0 L/day is recommended as the upper-percentile drinking water consumption rate for adults for use in chronic exposure assessments. For acute assessments, the higher value should probably be used (i.e., 2.27 L/day). Alternatively, the lognormal distribution data (Tables 2-11 and 2-12) generated by Roseberry and Burmaster (1992) may be used.

Children - The intake rates for children reported by various studies on drinking water intake rates are summarized below.

Arithmetic Average (L/day)	90th percentile (L/day)	Reference
0.20 (6-11 months)	-	Pennington, 1983.
0.19 (<1 yr)	-	U.S. EPA, 1984d.
0.30 (<1 yr)	0.65	Ershow and Cantor, 1989.
0.32 (<1 yr)	-	Roseberry and Burmaster, 1992.
0.50 (2 yrs)	-	Pennington, 1983.
0.61 (<3 yrs)	1.50	Canadian Ministry of National Health and Welfare, 1981.
0.58 (1-4 yrs)	-	U.S. EPA, 1984d.
0.87 (3-5 yrs)	1.50	Canadian Ministry of National Health and Welfare, 1981
0.67 (5-9 yrs)	-	U.S. EPA, 1984d.
0.74 (1-10 yrs)	1.29	Ershow and Cantor, 1989.
0.70 (1-10 yrs)	-	Roseberry and Burmaster, 1992.
1.14 (6-17 yrs)	2.21	Canadian Ministry of National Health and Welfare, 1981.
0.80 (10-14 yrs)	-	U.S. EPA, 1984d.
0.72 (14-16 yrs)	-	Pennington, 1983.
0.90 (15-19 yrs)	-	U.S. EPA, 1984d.
0.97 (11-19 yrs)	1.70	Ershow and Cantor, 1989.
0.91 (11-19 yrs)	-	Roseberry and Burmaster, 1992.

For children less than 1 year old, 0.3 L/day appears to represent the average intake rate for water-based beverages, and 0.7 L/day appears to be an appropriate upper-percentile value for drinking water consumption. However, these values may not include water used to prepare powdered infant formula. Based on data from Ershow and Cantor (1989) and Roseberry and Burmaster (1992), the recommended average drinking water intake rate is 0.7 L/day for ages 1-10 years, and the upper-percentile rate is 1.3 L/day. For older children (ages 11-19 years), the recommended average is 1.0 L/day, and the upper-percentile value is 1.7 L/day. Intake rates for specific percentiles of the distribution may be selected using the lognormal distribution data generated by Roseberry and Burmaster (1992) (Tables 2-11 and 2-12).

Pregnant and Lactating Women - Based on the data from Ershow and Cantor (1991) the recommended average drinking water intake rate for pregnant women is 1.2 L/day, and the upper-percentile value is 2.2 L/day. For lactating women, the recommended average drinking water intake rate is 1.3 L/day, and the upper-percentile value is 1.9 L/day.

High Activity/Hot Climates - Data intake rates for individuals performing strenuous activities under various environmental conditions are limited. However, the data presented by McNall and Schlegel (1968) and U.S. Army (1983) provide bounding intake values for these individuals. According to McNall and Schlegel (1968), hourly intake can range from 0.21 to 0.65 L/hour depending on the temperature and activity level. Intake among physically active individuals can range from 6 L/day in temperate climates to 11 L/day in hot climates (U.S. Army, 1983).

2.3. CONSUMPTION OF FRUITS AND VEGETABLES

2.3.1. Background

The primary source of information on consumption rates of fruits and vegetables among the United States population is the U.S. Department of Agriculture's (USDA) Nationwide Food Consumption Survey (NFCS). Data from the NFCS have been used in various studies to generate consumer-only and per capita intake rates for both individual fruits and vegetables and total fruits and total vegetables. Consumer-only intake is defined as the quantity of fruits and vegetables consumed by individuals who ate these food items during the survey period. Per capita intake rates are generated by averaging consumer-only intakes over the entire population of users and non-users. In general, per capita intake rates are appropriate for use in exposure assessment for which average dose estimates for the general population are of interest because they represent both individuals who ate the foods during the survey period and individuals who may eat the food items at some time, but did not consume them during the survey period. Total fruit intake refers to the sum of all fruits consumed in a day including canned, dried, frozen, and fresh fruits. Likewise total vegetable intake refers to the sum of all vegetables consumed in a day including canned, dried, frozen, and fresh vegetables. For the purposes of this Handbook, the distinctions between fruits and vegetables are those commonly used, not the botanical definitions. For example, in this report, tomatoes are considered vegetables, although technically they are fruits.

Intake rates may be presented on either an as consumed or dry weight basis. As consumed intake rates (g/day) are based on the weight of the food in the form that it is consumed. In contrast, dry weight intake rates are based on the weight of the food consumed after the moisture content has been removed. In calculating exposures based on ingestion, the unit of weight used to measure intake should be consistent with those used in measuring the contaminant concentration in the produce.

Estimating source-specific exposures to toxic chemicals in fruits and vegetables may also require information on the percentage of fruits and vegetables grown above and below ground. The percentages of foods grown above and below ground will be useful when the concentrations of contaminants in foods are estimated from concentrations in soil, water, and air. For example, vegetables grown below ground may be more likely to be contaminated by soil pollutants, but leafy above ground vegetables may be more likely to be contaminated by deposition of air pollutants on plant surfaces.

The purpose of this section is to provide: (1) intake data for individual fruits and vegetables, and total fruits and total vegetables; (2) data for converting between as consumed and dry weight intake rates; and (3) percentages of fruits and vegetables grown above and below ground. Values for these variables that are recommended for use in exposure assessment are also presented. Recommendations are based on average and upper-percentile intake among the general population of the U.S. Available data have been classified as being either a key or a relevant study based on the applicability of the data to exposure assessment needs. Recommendations are based on data from key studies, but relevant studies are also presented to provide the reader with added perspective on this topic. It should be noted that all of the key studies and many of the relevant studies are based on data from USDA's NFCS. The USDA NFCS is described below.

2.3.2. Intake Studies

2.3.2.1. U.S. Department of Agriculture Nationwide Food Consumption Survey

USDA conducts the NFCS approximately every 10 years. The three most recent NFCSs were conducted in 1965-66, 1977-78, and 1987-88. The purpose of these surveys was to "analyze the food consumption behavior and dietary status of Americans" (USDA, 1992). The survey uses a statistical sampling technique designed to ensure that all seasons, geographic regions of the U.S., and demographic and socioeconomic groups are represented. There are two components of the NFCS. The household component collects information over a 7-day period on the socioeconomic and demographic characteristics of households, and the types, value, and sources of foods consumed. The individual component collects information on food intakes of individuals within each household over a 3-day period (USDA, 1993).

The same basic survey design was used for the three most recent NFCSs, but the sample sizes and statistical classifications used were somewhat different (USDA, 1992). In 1965-66, 10,000 households were surveyed (USDA, 1972). The sample size increased to 15,000 households (over 36,000 individuals) in 1977-78, but decreased to 4,500 households in 1987-88 because of budgetary constraints and a low response rate (37 percent). Data from the 1977-78

NFCS are presented in this Handbook because the data have been published by USDA in various publications and reanalyzed by various EPA offices according to the food items/groups commonly used to assess exposure. Published one-day data from the 1987-88 NFCS and the results of a recently conducted EPA analysis of the 1987-88 NFCS data are also presented.

Individual daily intake rates and average user and per capita intake rates calculated from NFCS data are based on averages of reported individual intakes over one day or three consecutive days. Such short-term data are suitable for estimating average daily per capita intake rates representative of both short-term and long-term consumption. However, upper percentile individual intakes reported either as user intakes or per capita intakes are likely to be higher than the true long-term upper percentile daily average intakes because interindividual variability in a distribution will decrease with the length of time over which the factor is measured. The individual upper percentile intakes rates represent intakes by users of the products over the three-day survey period. Long-term estimates require that the average intake over three days is the same as the average intake over 365 days for each individual, that is, the product is consumed every day of the year, resulting in the long-term overestimate.

2.3.2.2. Key Intake Studies Based on the USDA NFCS

Pao et al. (1982) - Foods Commonly Eaten by Individuals - Using data gathered in the 1977-78 USDA NFCS, Pao et al. (1982) calculated percentiles for the average quantities of individual fruit and vegetables consumed by members of the U.S. population who had consumed these fruits and vegetables over a 3-day period. The data were collected during NFCS home interviews of 37,874 respondents, who were asked to recall food intake for the day preceding the interview, and record food intake the day of the interview and the day after the interview. Pao et al. (1982) reported mean intake rates for consumers, standard deviations, intake rates for consumers at various percentiles, maximum amounts consumed, percentages of individuals using the food in the 3-day study, quantities consumed per eating occasion, and per capita intake rates. For example, as shown in Table 2-26, 74.4 percent of the individuals surveyed used white potatoes in three days, the mean daily intake rate for consumers was 78 g/day and the average quantity consumed per eating occasion was 125g. Per capita intake rates were calculated by multiplying the average intake rate for consumers by the fraction of individuals using the food

Table 2-26. Quantity ("as consumed") of Fruits and Vegetables Consumed and the Percentage of Individuals Using These Foods in 3 Days

Food category	Consumers-only Three-Day Averages at Specified Percentiles (g/day)[a] 5	25	50	75	90	95	99	Maximum consumed in any one day (g/day)	Consumers-only Three-day Average quantity consumed (g/day) Average	Standard Deviation	Quantity consumed per eating occasion (g) Average	Standard Deviation	% Indiv. using food in 3 days	Per capita three-day average quantity consumed (g/day)[b]
Raw vegetables														
White potatoes	14	33	62	103	158	202	309	1,560	78	65	125	90	74.4	58.0
Cabbage and coleslaw	5	15	20	40	40	60	90	1,080	27	20	68	45	9.7	2.6
Carrots	1	5	17	22	41	51	96	500	18	19	43	40	5	0.9
Cucumbers	3	12	23	47	79	105	220	840	37	45	80	76	5.6	2.1
Lettuce and tossed salad	3	13	31	54	90	113	186	1,080	40	39	65	59	50.7	20.3
Mature onions	1	6	7	15	24	37	73	660	13	16	31	33	8.5	1.1
Tomatoes	10	20	30	60	91	123	205	907	44	42	81	55	27.8	12.2
Cooked vegetables														
Broccoli	12	26	31	57	62	99	137	680	41	27	112	68	6.2	2.5
Cabbage	13	25	50	50	100	102	200	750	50	39	128	83	4.7	2.4
Carrots	6	15	25	39	52	71	103	736	30	21	70	59	9.8	2.9
Corn, whole kernel	7	26	28	51	57	85	133	850	38	27	95	56	23.9	9.1
Lima beans	7	28	29	58	85	113	170	875	43	33	110	75	2.8	1.2
Mixed vegetables	11	30	31	62	78	123	187	454	46	33	117	69	3.4	1.6
Cowpeas, field peas, black-eyed peas	11	29	44	58	117	117	233	1,050	53	42	131	88	2.9	1.5
Green peas	7	19	28	55	57	84	113	850	35	26	90	57	18.3	6.4
Spinach	8	30	34	65	68	103	137	454	45	29	121	70	4.5	2.0
String beans	6	23	23	47	69	93	140	840	35	29	86	54	27.3	9.6
Summer squash	11	36	36	72	108	143	287	860	56	46	145	98	2.8	1.6

Table 2-26. (continued)

Food category	Consumers-only Three-Day Averages at Specified Percentiles (g/day)[a]							Maximum consumed in any one day (g/day)	Consumers-only Three-day Average quantity consumed (g/day)		Quantity consumed per eating occasion (g)		% Indiv. using food in 3 days	Per capita three-day average quantity consumed (g/day)[b]
	5	25	50	75	90	95	99		Average	Standard Deviation	Average	Standard Deviation		
Sweet potatoes	14	34	38	68	85	132	200	1,020	52	38	136	87	4.1	2.1
Tomato juice	30	45	81	121	182	243	354	1,879	94	72	91	122	3.9	3.7
Cucumber pickles	2	6	11	22	43	50	90	810	18	20	45	45	9.2	1.7
<u>Fruits</u>														
Grapefruit	38	45	89	110	165	205	268	804	90	58	159	58	4.7	4.2
Grapefruit juice	41	63	83	165	250	329	658	1,976	131	115	202	99	3.6	4.7
Oranges	24	48	48	97	145	180	290	1,160	78	54	146	57	9	7.0
Orange juice	42	73	125	166	249	290	496	1,992	133	92	190	84	35.5	47.2
Apples	23	46	46	92	138	184	276	1,272	75	53	141	49	18.2	13.6
Applesauce, cooked apples	11	38	43	85	127	160	253	1,016	61	47	134	86	9.8	6.0
Apple juice	41	62	83	145	227	289	496	1,302	116	98	191	101	3.8	4.4
Cantaloupe	21	45	68	91	181	181	272	1,362	81	61	171	91	3.3	2.7
Raw peaches	25	51	51	101	263	203	355	760	84	66	160	75	4.5	3.8
Raw pears	27	55	55	109	114	164	273	2,132	75	50	163	69	3.1	2.3
Raw strawberries	12	25	37	50	99	120	225	600	46	44	100	58	2.1	1.0

[a] Percentiles are cumulative; for example, 50 percent of people eat 62 g white potatoes per day or less.

[b] Per capita intakes were calculated by multiplying the average quantity consumed for consumers-only by the fraction of individuals using the food item in 3 days.

Source: Total consumption data from Pao et al., 1982.

in 3 days. For white potatoes, the per capita intake rate was estimated to be 58 g/day (78g/day x 0.744). The intake rates are presented on an as consumed (g/day) basis. The data presented in Table 2-26 are for all ages of the population, combined. If age-specific intake data are needed, refer to Pao et al. (1982).

Although Pao et al. (1982) reported distributions of intake rates for individual fruits and vegetables, these tabulated data cannot be used to derive a distribution of intake rates for total fruits and vegetables. Obtaining a frequency distribution for all fruits and vegetables by summing the distributions for individual fruits and vegetables is not appropriate because a person whose intake rate for tomatoes falls in the 90th percentile may not have a 90th percentile intake rate of broccoli. Summing ingestion rates would also imply that all individuals consume all of the fruit and vegetables listed in Table 2-26. Consequently, these data should only be used in exposure assessments where the consumption of individual fruits and vegetables is of interest. Intake data for total fruits and total vegetables are presented later in this Section.

The advantages of using these data are that they were derived from the USDA NFCS and are representative of the U.S. population. This data set provides distributions for a number of commonly eaten fruits and vegetables, but the list of foods is limited and does not account for fruits and vegetables included in complex food dishes. Also, these data are based on short-term dietary recall and it's quite unlikely that they accurately reflect long-term consumption patterns.

The U.S. EPA's Dietary Risk Evaluation System (DRES) - USEPA, Office of Pesticide Programs - The U.S. EPA, Office of Pesticide Programs (OPP) uses the Dietary Risk Evaluation System (formerly the Tolerance Assessment System) to assess the dietary risk of pesticide use as part of the pesticide registration process. OPP sets tolerances for specific pesticides on raw agricultural commodities based on estimates of dietary risk. These estimates are calculated using pesticide residue data for the food item of concern and relevant consumption data. Intake rates are based primarily on the USDA 1977-1978 NFCS although intake rates for some food items are based on estimations from production volumes or other data (i.e., some items were assigned an arbitrary value of 0.000001 g/kg-day (Kariya, 1992). OPP has calculated per capita intake rates of individual fruits and vegetables for 22 subgroups (age, regional, and seasonal) of the population by determining the composition of NFCS food items and disaggregating complex food dishes into their component raw agricultural commodities (RACs) (White et al. 1983).

The DRES per capita, as consumed intake rates for all age/sex/demographic groups combined are presented in Table 2-27. These data are based on both consumers and non consumers of these food items. Data for specific subgroups of the population are not presented here, but are available through OPP via direct request. The data in Table 2-27 may be useful for estimating the risks of exposure associated with the consumption of individual fruits and vegetables. It should be noted that these data are indexed to the actual body weights of the survey respondents and are expressed in units of grams of food consumed per Kg bodyweight per day. Consequently, use of these data in calculating potential dose does not require the body weight factor in the denominator of the average daily dose (ADD) equation. It should also be noted that conversion of these intake rates into units of g/day by multiplying by a single average body weight is not appropriate because the DRES data base did not rely on a single body weight for all individuals. Instead, DRES used the body weights reported by each individual surveyed to estimate consumption in units of g/kg-day.

The advantages of using these data are that complex food dishes have been disaggregated to provide intake rates for a very large number of fruits and vegetables. These data are also based on the individual body weights of the respondents. Therefore, the use of these data in calculating exposure to toxic chemicals may provide more representative estimates of potential dose per unit body weight. However, because the data are based on NFCS short-term dietary recall the same limitations discussed previously for other NFCS data sets also apply here.

Food and Nutrient Intakes of Individuals in One Day in the U.S., USDA (1980, 1992b) - USDA calculated mean intake rates for total fruits and total vegetables using NFCS data from 1977-78 and 1987-88 (USDA, 1980; USDA, 1992b). The mean total intake rates are presented in Tables 2-28 and 2-29 for fruits and Tables 2-30 and 2-31 for vegetables. These values are based on intake data for one day from the 1977-78 and 1987-88 USDA Nationwide Food Consumption Surveys, respectively. Data from both surveys are presented here to demonstrate that although the 1987-88 survey had fewer respondents, the mean per capita intake rates for all individuals are in good agreement with the earlier survey. Also, slightly different age classifications were used in the two surveys providing a wider range of age categories from which exposure assessors may select appropriate intake rates. Tables 2-28 through 2-31 include both per capita intake rates and intake rates for consumers-only for various ages of individuals.

Table 2-27. Mean Per Capita Intake Rates for Fruits and Vegetables Based on All Sex/Age/Demographic Subgroups

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Alfalfa Sprouts	0.0001393	0.0000319
Apples-Dried	0.0002064	0.0000566
Apples-Fresh	0.4567290	0.0142203
Apples-Juice	0.2216490	0.0142069
Apricots-Dried	0.0004040	0.0001457
Apricots-Fresh	0.0336893	0.0022029
Artichokes-Globe	0.0032120	0.0007696
Artichokes-Jerusalem	0.0000010	*
Asparagus	0.0131098	0.0010290
Avocados	0.0125370	0.0020182
Bamboo Shoots	0.0001464	0.0000505
Bananas-Dried	0.0004489	0.0001232
Bananas-Fresh	0.2240382	0.0088206
Bananas-Unspecified	0.0032970	0.0004938
Beans-Dry-Blackeye Peas (cowpeas)	0.0024735	0.0005469
Beans-Dry-Broad Beans (Mature Seed)	0.0000000	*
Beans-Dry-Garbanzo (Chick Pea)	0.0005258	0.0001590
Beans-Dry-Great Northern	0.0000010	*
Beans-Dry-Hyacinth (Mature Seeds)	0.0000000	*
Beans-Dry-Kidney	0.0136313	0.0045628
Beans-Dry-Lima	0.0079892	0.0016493
Beans-Dry-Navy (Pea)	0.0374073	0.0023595
Beans-Dry-Other	0.0398251	0.0023773

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Beans-Dry-Pigeon Beans	0.0000357	0.0000357
Beans-Dry-Pinto	0.0363498	0.0048479
Beans-Succulent-Broad Beans (Immature Seed)	0.0000000	*
Beans-Succulent-Green	0.2000500	0.0062554
Beans-Succulent-Hyacinth (Young Pods)	0.0000000	*
Beans-Succulent-Lima	0.0256648	0.0021327
Beans-Succulent-Other	0.0263838	0.0042782
Beans-Succulent-Yellow, Wax	0.0054634	0.0009518
Beans-Unspecified	0.0052345	0.0012082
Beets-Roots	0.0216142	0.0014187
Beets-Tops (Greens)	0.0008287	0.0003755
Bitter Melon	0.0000232	0.0000233
Blackberries	0.0064268	0.0007316
Blueberries	0.0090474	0.0008951
Boysenberries	0.0007313	0.0006284
Bread Nuts	0.0000010	*
Bread Fruit	0.0000737	0.0000590
Broccoli	0.0491295	0.0032966
Brussel Sprouts	0.0068480	0.0009061
Cabbage-Chinese/Celery, Inc. Bok Choy	0.0045632	0.0020966
Cabbage-Green and Red	0.0936402	0.0039046
Cactus Pads	0.0000010	*
Cantaloupes	0.0444220	0.0029515
Carambola	0.0000010	*

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Carob	0.0000913	0.0000474
Carrots	0.1734794	0.0041640
Casabas	0.0007703	0.0003057
Cassava (Yuca Blanca)	0.0002095	0.00001574
Cauliflower	0.0158368	0.0011522
Celery	0.0609611	0.0014495
Cherimoya	0.0000010	*
Cherries-Dried	0.0000010	*
Cherries-Fresh	0.0321754	0.0024966
Cherries-Juice	0.0034080	0.0009078
Chicory (French or Belgian Endive)	0.0006707	0.0001465
Chili Peppers	0.0000000	*
Chives	0.0000193	0.0000070
Citrus Citron	0.0001573	0.0000324
Coconut-Copra	0.0012860	0.0000927
Coconut-Fresh	0.0001927	0.0000684
Coconut-Water	0.0000005	0.0000005
Collards	0.0188966	0.0032628
Corn, Pop	0.0067714	0.0003348
Corn, Sweet	0.2367071	0.0062226
Crabapples	0.0003740	*
Cranberries	0.0150137	0.0006153
Cranberries-Juice	0.0170794	0.0022223
Crenshaws	0.0000010	*

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Cress, Upland	0.0000010	*
Cress, Garden, Field	0.0000000	*
Cucumbers	0.0720821	0.0034389
Currants	0.0005462	0.0000892
Dandelion	0.0005039	0.0002225
Dates	0.0006662	0.0001498
Dewberries	0.0023430	*
Eggplant	0.0061858	0.0007645
Elderberries	0.0001364	0.0001365
Endive, Curley and Escarole	0.0011851	0.0001929
Fennel	0.0000000	*
Figs	0.0027847	0.0005254
Garlic	0.0007621	0.0000230
Genip (Spanish Lime)	0.0000010	*
Ginkgo Nuts	0.0000010	*
Gooseberries	0.0003953	0.0001341
Grapefruit-Juice	0.0773585	0.0053846
Grapefruit-Pulp	0.0684644	0.0032321
Grapes-Fresh	0.0437931	0.0023071
Grapes-Juice	0.0900960	0.0058627
Grapes-Leaves	0.0000119	0.0000887
Grapes-Raisins	0.0169730	0.0009221
Groundcherries (Poha or Cape-Gooseberries)	0.0000000	*
Guava	0.0000945	0.0000558

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Honeydew Melons	0.0183628	0.0042879
Huckleberries (Gaylussacia)	0.0000010	*
Juneberry	0.0000010	*
Kale	0.0015036	0.0006070
Kiwi	0.0000191	0.0000191
Kohlrabi	0.0002357	0.0001028
Kumquats	0.0000798	0.0000574
Lambsquarter	0.0000481	0.0000481
Leafy Oriental Vegetables	0.0000010	*
Leeks	0.0000388	0.0000221
Lemons-Juice	0.0189564	0.0009004
Lemons-Peel	0.0002570	0.0001082
Lemons-Pulp	0.0002149	0.0000378
Lemons-Unspecified	0.0020695	0.0003048
Lentiles-Split	0.0000079	0.0000064
Lentiles-Whole	0.0012022	0.0002351
Lettuce-Head Varieties	0.2122803	0.0059226
Lettuce-Leafy Varieties	0.0044328	0.0003840
Lettuce-Unspecified	0.0092008	0.0004328
Limes-Juice	0.0032895	0.0005473
Limes-Pulp	0.0000941	0.0000344
Limes-Unspecified	0.0000010	*
Loganberries	0.0002040	*
Logan Fruit	0.0000010	*

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Loquats	0.0000000	*
Lychee-Dried	0.0000010	*
Lychees (Litchi)	0.0000010	*
Maney (Mammee Apple)	0.0000010	*
Mangoes	0.0005539	0.0002121
Mulberries	0.0000010	*
Mung Beans (Sprouts)	0.0066521	0.0006462
Mushrooms	0.0213881	0.0009651
Mustard Greens	0.0145284	0.0024053
Nectarines	0.0129663	0.0013460
Okra	0.0146352	0.0017782
Olives	0.0031757	0.0002457
Onions-Dehydrated or Dried	0.0001192	0.0000456
Onions-Dry-Bulb (Cipollini)	0.1060612	0.0021564
Onions-Green	0.0019556	0.0001848
Oranges-Juice	1.0947265	0.0283937
Oranges-Peel	0.0001358	0.0000085
Oranges-Pulp	0.1503524	0.0092049
Papayas-Dried	0.0009598	0.0000520
Papayas-Fresh	0.0013389	0.0005055
Papayas-Juice	0.0030536	0.0012795
Parsley Roots	0.0000010	*
Parsley	0.0036679	0.0001459
Parsnips	0.0006974	0.0001746

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Passion Fruit (Granadilla)	0.0000010	*
Pawpaws	0.0000010	*
Peaches-Dried	0.0000496	0.0000152
Peaches-Fresh	0.2153916	0.0078691
Pears-Dried	0.0000475	0.0000279
Pears-Fresh	0.1224735	0.0050442
Peas (Garden)-Green Immature	0.1719997	0.0067868
Peas (Garden)-Mature Seeds, Dry	0.0017502	0.0002004
Peppers, Sweet, Garden	0.0215525	0.0010091
Peppers-Other	0.0043594	0.0004748
Persimmons	0.0004008	0.0002236
Persian Melons	0.0000010	*
Pimentos	0.0019485	0.0001482
Pineapple-Dried	0.0000248	0.0000195
Pineapple-Fresh, Pulp	0.0308283	0.0017136
Pineapple-Fresh, Juice	0.0371824	0.0026438
Pitanga (Surinam Cherry)	0.0000010	*
Plantains	0.0016370	0.0007074
Plums, Prune-Juice	0.0137548	0.0017904
Plums (Damsons)-Fresh	0.0248626	0.0020953
Plums-Prunes (Dried)	0.0058071	0.0005890
Poke Greens	0.0002957	0.0001475
Pomegranates	0.0000820	0.0000478
Potatoes (White)-Whole	0.3400582	0.0102200

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Potatoes (White)-Unspecified	0.0000822	0.0000093
Potatoes (White)-Peeled	0.7842573	0.0184579
Potatoes (White)-Dry	0.0012994	0.0001896
Potatoes (White)-Peel Only	0.0000217	0.0000133
Pumpkin	0.0044182	0.0004354
Quinces	0.0001870	*
Radishes-Roots	0.0015558	0.0001505
Radishes-Tops	0.0000000	*
Raspberries	0.0028661	0.0005845
Rhubarb	0.0037685	0.0006588
Rutabagas-Roots	0.0027949	0.0009720
Rutabagas-Tops	0.0000000	*
Salsify (Oyster Plant)	0.0000028	0.0000028
Shallots	0.0000000	*
Soursop (Annona Muricata)	0.0000010	*
Soybeans-Sprouted Seeds	0.0000000	*
Spinach	0.0435310	0.0030656
Squash-Summer	0.0316479	0.0022956
Squash-Winter	0.0324417	0.0026580
Strawberries	0.0347089	0.0020514
Sugar Apples (Sweetsop)	0.0000010	*
Sweetpotatoes (including Yams)	0.0388326	0.0035926
Swiss Chard	0.0016915	0.0004642
Tangelos	0.0025555	0.0006668

Table 2-27 (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/Kg Body Weight-Day)	Standard Error
Tangerine-Juice	0.0000839	0.0000567
Tangerines	0.0088441	0.0010948
Tapioca	0.0012199	0.0000951
Taro-Greens	0.0000010	*
Taro-Root	0.0000010	*
Tomatoes-Catsup	0.0420320	0.0015878
Tomatoes-Juice	0.0551351	0.0029515
Tomatoes-Paste	0.0394767	0.0012512
Tomatoes-Puree	0.17012311	0.0054679
Tomatoes-Whole	0.4920164	0.0080927
Towelgourd	0.0000010	*
Turnips-Roots	0.0082392	0.0014045
Turnips-Tops	0.0147111	0.0025845
Water Chestnuts	0.0004060	0.0000682
Watercress	0.0003553	0.0001564
Watermelon	0.0765054	0.0068930
Yambean, Tuber	0.0000422	0.0000402
Yautia, Tannier	0.0000856	0.0000571
Youngberries	0.0003570	*

* Not reported

[a] Consumed in any raw or prepared form

Source: DRES data base.

Table 2-28. Mean Total Fruit Intake in a Day by Sex and Age (1977-1978)[a]

Age (yr)	Per Capita Intake (g/day)	Percent of Population Using Fruit in a Day	Intake (g/day) for Users Only[b]
Males and Females			
1 and under	169	86.8	196
1-2	146	62.9	231
3-5	134	56.1	239
6-8	152	60.1	253
Males			
9-11	133	50.5	263
12-14	120	51.2	236
15-18	147	47.0	313
19-22	107	39.4	271
23-34	141	46.4	305
35-50	115	44.0	262
51-64	171	62.4	275
65-74	174	62.2	281
75 and over	186	62.6	197
Females			
9-11	148	59.7	247
12-14	120	48.7	247
15-18	126	49.9	251
19-22	133	48.0	278
23-34	122	47.7	255
35-50	133	52.8	252
51-64	171	66.7	256
65-74	179	69.3	259
75 and over	189	64.7	292
Males and Females			
All ages	142	54.2	263

[a] Based on USDA Nationwide Food Consumption Survey (1977-1978) data for one day.
[b] Intake for users only was calculated by dividing the per capita intake rate by the fraction of the population using fruit in a day.

Source: USDA, 1980.

Table 2-29. Mean Total Fruit Intake in a Day by Sex and Age (1987-1988)[a]

Age (yr)	Per Capita Intake (g/day)	Percent of Population Using Fruit in 1 Day	Intake (g/day) for Users Only[b]
Males and Females			
5 and under	157	59.2	265
Males			
6-11	182	63.8	285
12-19	158	49.4	320
20 and over	133	46.5	286
Females			
6-11	154	58.3	264
12-19	131	47.1	278
20 and over	140	52.7	266
Males and Females			
All Ages	142	51.4	276

[a] Based on USDA Nationwide Food Consumption Survey (1987-1988) data for one day.
[b] Intake for users only was calculated by dividing the per capita intake rate by the fraction of the population using fruits in a day.

Source: USDA, 1993.

Table 2-30. Mean Total Vegetable Intake in a Day by Sex and Age (1977-1978)[a]

Age (yr)	Per Capita Intake (g/day)	Percent of Population Using Vegetables in a Day	Intake (g/day) for Users Only[b]
Males and Females			
1 and under	76	62.7	121
1-2	91	78.0	116
3-5	100	79.3	126
6-8	136	84.3	161
Males			
9-11	138	83.5	165
12-14	184	84.5	217
15-18	216	85.9	251
19-22	226	84.7	267
23-34	248	88.5	280
35-50	261	86.8	300
51-64	285	90.3	316
65-74	265	88.5	300
75 and over	264	93.6	281
Females			
9-11	139	83.7	166
12-14	154	84.6	183
15-18	178	83.8	212
19-22	184	81.1	227
23-34	187	84.7	221
35-50	187	84.6	221
51-64	229	89.8	255
65-74	221	87.2	253
75 & over	198	88.1	226
Males and Females			
All Ages	201	85.6	235

[a] Based on USDA Nationwide Food Consumption Survey (1977-1978) data for one day.
[b] Intake for users only was calculated by dividing the per capita intake rate by the fraction of the population using vegetables in a day.

Source: USDA, 1980.

Table 2-31. Mean Total Vegetable Intake in a Day by Sex and Age (1987-1988)[a]

Age (yr)	Per Capita Intake (g/day)	Percent of Population Using Vegetables in 1 Day	Intake (g/day) for Users Only[b]
Males and Females			
5 and under	81	74.0	109
Males			
6-11	129	86.8	149
12-19	173	85.2	203
20 and over	232	85.0	273
Females			
6-11	129	80.6	160
12-19	129	75.8	170
20 and over	183	82.9	221
Males and Females			
All Ages	182	82.6	220

[a] Based on USDA Nationwide Food Consumption Survey (1987-1988) data for one day.
[b] Intake for users only was calculated by dividing the per capita intake rate by the fraction of the population using vegetables in a day.

Source: USDA, 1993.

Intake rates for consumers-only were calculated by dividing the per capita consumption rate by the fraction of the population using vegetables or fruits in a day. The average per capita vegetable intake rate is 201 g/day based on the 1977-78 data (USDA, 1980) and 182 g/day based on the 1987-88 data (USDA, 1992). For fruits the average per capita intake rate is 142 g/day based on the two most recent USDA NFCSs (USDA, 1980; USDA, 1993).

The advantages of using these data are that they provide intake estimates for all fruits and all vegetables combined. Again, these estimates are based on short-term dietary data which provide valid estimates of the means of usual consumption.

U.S. EPA Analysis of 1987/88 USDA NFCS Data - EPA analyzed data from the 1987-88 USDA NFCS to generate distributions of intake rates for various fruit and vegetable items/groups. The fruit and vegetable items/groups selected for analysis included total fruits, total vegetables, selected individual food items; fruits and vegetables categorized as exposed, protected, and roots; and various USDA fruit and vegetable categories (i.e., dark green vegetables, deep yellow vegetables, other vegetables, citrus fruits, and other fruits). Food items/groups were identified in the NFCS data base according to NFCS-defined food codes. Appendix 2-A presents the codes used to determine the various food groups. Intake rates for these food items/groups represent intake of all forms of the product (i.e., homeproduced and commercially produced). The USDA data were adjusted by applying the sample weights calculated by USDA to the data set prior to analysis. These weights were designed to "adjust for survey nonresponse and other vagaries of the sample selection process" (USDA, 1987/88). Intake rates were indexed to the body weight of the survey respondent and reported in units of g/kg-day. The food analysis was accomplished using the SAS statistical programming system (SAS, 1990).

Distributions of intake rates were determined by apportioning the amount of food used by a household among family members based on average serving sizes for specified age groups of the population and the number of weekly meals consumed by each family member. A detailed description of the methodology used to generate distributions of homegrown intake is presented in Section 2.7 (Intake Rates for Various Homeproduced Food Items) of this Handbook. The same method was used to determine the intake rates of all forms (i.e., homeproduced and commercially prepared) of fruits and vegetables presented in this section.

Intake rates for various subcategories of the population within census regions are presented in Tables 2-32 through 2-36 for total fruits and Tables 2-37 through 2-41 for total vegetables. Tables 2-42 through 2-63 present intake rates for individual fruit and vegetable items/groups. Intake rates for exposed, protected, and root produce are presented in Tables 2-64 through 2-68, and intake rates based on the various USDA categories are presented in Tables 2-69 through 2-73. These distributions represent intake rates for consumers of the food item/group of interest. These data represent one-week average intake rates for family members from those surveyed households who reported eating the food item/group of interest during the survey period. The total number of individuals in the data set (i.e., both individuals who ate the food item and those who did not eat the food item during the survey period) are presented in Table 2-185 in Section 2.7.2. These total number of individuals surveyed may be used with the consumer only data presented here to calculate per capita intake rates for the survey population as shown in Section 2.7.2.

The advantages of these data are that they provide distributions for the various food items/groups. Also, the NFCS was designed to be representative of the U.S. population. However, these data are based on short-term dietary recall and may not accurately reflect long-term intake patterns. Additional advantages and limitations of this analysis are outlined in Section 2.7.4 of this Handbook.

2.3.2.3. Relevant Intake Studies

U.S. EPA - Office of Radiation Programs - The U.S. EPA Office of Radiation Programs (ORP) has also used the USDA 1977-1978 NFCS to estimate daily food intake (U.S. EPA, 1984d; 1984e). ORP uses food consumption data to assess human intake of radionuclides in foods. The 1977-1978 NFCS data have been reorganized by ORP, and food items have been classified according to the characteristics of radionuclide transport. Data for selected agricultural products are presented in Table 2-74 and Table 2-75. These data represent per capita, as consumed intake rates for total, leafy, exposed, and protected produce as well as total grains, breads, and cereals. Exposed produce refers to products that can intercept atmospherically deposited materials (e.g., apples, pears, berries, etc.). The term protected refers to products that are protected from deposition from the atmosphere (e.g., citrus fruit, carrots, corn, etc.).

Table 2-32. Intake of Total Fruits (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	173840000	9125	5.53E+00	6.19E-04	0.00E+00	1.61E-01	4.46E-01	7.43E-01	1.59E+00	3.34E+00	6.37E+00	1.18E+01	1.75E+01	3.73E+01	1.46E+02
Age															
< 01	2773000	152	2.86E+01	1.95E-02	0.00E+00	5.80E-01	1.95E+00	2.54E+00	8.94E+00	1.63E+01	3.35E+01	7.13E+01	1.12E+02	1.46E+02	1.46E+02
01-02	5565000	310	1.71E+01	6.49E-03	6.30E-01	8.56E-01	2.63E+00	3.92E+00	7.04E+00	1.25E+01	2.14E+01	3.73E+01	4.63E+01	8.16E+01	8.69E+01
03-05	7663000	434	1.15E+01	3.59E-03	0.00E+00	5.67E-01	1.71E+00	2.43E+00	5.16E+00	8.64E+00	1.55E+01	2.41E+01	3.17E+01	4.24E+01	7.60E+01
06-11	15455000	870	6.68E+00	1.55E-03	0.00E+00	2.16E-01	8.62E-01	1.37E+00	2.78E+00	5.14E+00	8.50E+00	1.34E+01	1.77E+01	3.20E+01	4.88E+01
12-19	18897000	1001	4.13E+00	8.65E-04	0.00E+00	1.15E-01	4.08E-01	6.90E-01	1.59E+00	3.12E+00	5.29E+00	8.53E+00	1.23E+01	1.85E+01	2.44E+01
20-39	55722000	2779	3.39E+00	5.21E-04	0.00E+00	1.31E-01	3.34E-01	5.64E-01	1.14E+00	2.30E+00	4.21E+00	7.02E+00	9.67E+00	2.09E+01	4.39E+01
40-69	52802000	2825	4.67E+00	7.71E-04	0.00E+00	1.57E-01	4.51E-01	7.45E-01	1.56E+00	3.09E+00	5.62E+00	9.66E+00	1.47E+01	2.93E+01	6.76E+01
70 +	14963000	754	5.55E+00	1.32E-03	0.00E+00	2.25E-01	7.29E-01	1.14E+00	2.49E+00	4.43E+00	7.13E+00	1.09E+01	1.36E+01	2.52E+01	5.89E+01
Seasons															
Fall	44875000	1486	5.12E+00	1.28E-03	0.00E+00	1.61E-01	4.70E-01	7.49E-01	1.60E+00	3.15E+00	5.74E+00	1.04E+01	1.47E+01	3.48E+01	1.46E+02
Spring	42081000	3629	5.18E+00	1.09E-03	0.00E+00	1.72E-01	4.16E-01	7.21E-01	1.53E+00	3.15E+00	6.18E+00	1.15E+01	1.69E+01	3.37E+01	1.24E+02
Summer	41038000	1282	7.05E+00	1.67E-03	0.00E+00	7.58E-02	3.59E-01	6.86E-01	1.64E+00	3.94E+00	7.91E+00	1.59E+01	2.39E+01	4.99E+01	1.33E+02
Winter	45846000	2728	4.91E+00	8.00E-04	0.00E+00	1.91E-01	5.02E-01	8.26E-01	1.62E+00	3.29E+00	6.16E+00	1.06E+01	1.51E+01	2.61E+01	6.36E+01
Ubanization															
Central City	51747000	2030	6.12E+00	1.48E-03	0.00E+00	1.61E-01	3.70E-01	7.03E-01	1.61E+00	3.41E+00	6.57E+00	1.25E+01	1.97E+01	4.69E+01	1.46E+02
Nonmetropolitan	40950000	2738	4.67E+00	9.60E-04	0.00E+00	1.57E-01	3.73E-01	5.94E-01	1.31E+00	2.90E+00	5.46E+00	1.03E+01	1.51E+01	3.22E+01	7.81E+01
Surburban	81083000	4355	5.60E+00	7.91E-04	0.00E+00	1.67E-01	5.53E-01	8.93E-01	1.76E+00	3.46E+00	6.70E+00	1.22E+01	1.74E+01	3.49E+01	1.24E+02
Race															
Asian	2261000	107	9.84E+00	1.37E-02	2.65E-01	2.71E-01	6.90E-01	8.86E-01	1.49E+00	3.89E+00	8.80E+00	1.81E+01	4.69E+01	1.44E+02	1.44E+02
Black	19137000	987	6.22E+00	2.58E-03	0.00E+00	1.19E-01	3.29E-01	5.64E-01	1.37E+00	3.09E+00	6.49E+00	1.37E+01	2.00E+01	5.50E+01	1.33E+02
Native American	1282000	75	3.93E+00	6.09E-03	2.35E-01	2.51E-01	3.16E-01	4.24E-01	1.17E+00	2.45E+00	4.01E+00	6.58E+00	8.16E+00	5.24E+01	5.24E+01
Other/NA	4425000	216	7.40E+00	7.69E-03	1.16E-01	1.98E-01	5.86E-01	8.13E-01	1.79E+00	3.38E+00	7.12E+00	1.34E+01	2.13E+01	8.16E+01	1.46E+02
White	146675000	7738	5.34E+00	5.66E-04	0.00E+00	1.63E-01	4.70E-01	7.76E-01	1.62E+00	3.36E+00	6.34E+00	1.14E+01	1.67E+01	3.48E+01	1.24E+02
Response to Questionnaire															
Do you garden?	65218000	3574	5.39E+00	8.29E-04	0.00E+00	1.85E-01	5.54E-01	8.62E-01	1.79E+00	3.48E+00	6.34E+00	1.17E+01	1.67E+01	3.47E+01	7.40E+01
Do you farm?	6987000	409	4.39E+00	1.79E-03	0.00E+00	9.60E-02	2.91E-01	5.54E-01	1.21E+00	2.99E+00	5.46E+00	1.08E+01	1.38E+01	1.98E+01	3.47E+01

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Table 2-33. Intake of Total Fruits (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	39176000	1922	6.03E+00	1.35E-03	0.00E+00	2.48E-01	6.21E-01	9.97E-01	1.91E+00	3.80E+00	7.20E+00	1.26E+01	1.87E+01	3.69E+01	1.46E+02
Age															
< 01	536000	28	4.08E+01	5.06E-02	0.00E+00	0.00E+00	7.00E+00	8.66E+00	1.44E+01	2.56E+01	5.83E+01	7.13E+01	1.46E+02	1.46E+02	1.46E+02
01-02	1053000	55	1.70E+01	1.14E-02	3.41E+00	3.41E+00	4.28E+00	6.41E+00	9.23E+00	1.52E+01	1.95E+01	3.07E+01	3.73E+01	8.28E+01	8.28E+01
03-05	1490000	92	1.23E+01	6.32E-03	8.10E-01	1.32E+00	2.28E+00	3.81E+00	6.32E+00	1.08E+01	1.65E+01	2.39E+01	2.95E+01	3.17E+01	3.39E+01
06-11	3477000	181	7.90E+00	2.85E-03	7.59E-01	9.12E-01	1.58E+00	1.91E+00	4.07E+00	6.46E+00	1.06E+01	1.63E+01	1.93E+01	2.57E+01	2.69E+01
12-19	4294000	202	4.97E+00	1.84E-03	0.00E+00	1.64E-01	5.33E-01	8.13E-01	2.20E+00	3.99E+00	6.91E+00	1.04E+01	1.28E+01	1.67E+01	1.87E+01
20-39	11971000	569	3.71E+00	1.16E-03	0.00E+00	1.75E-01	5.05E-01	8.03E-01	1.48E+00	2.65E+00	4.65E+00	7.48E+00	1.00E+01	2.14E+01	3.82E+01
40-69	12661000	628	5.22E+00	1.76E-03	6.44E-02	1.98E-01	5.71E-01	8.86E-01	1.63E+00	3.34E+00	6.09E+00	1.13E+01	1.72E+01	3.49E+01	4.73E+01
70 +	3694000	167	5.07E+00	1.90E-03	9.60E-02	4.12E-01	8.40E-01	1.28E+00	2.51E+00	4.18E+00	6.75E+00	1.01E+01	1.18E+01	1.61E+01	2.62E+01
Seasons															
Fall	9159000	269	6.04E+00	3.90E-03	0.00E+00	6.44E-02	5.35E-01	7.78E-01	1.49E+00	3.28E+00	6.59E+00	1.14E+01	1.87E+01	5.83E+01	1.46E+02
Spring	9946000	759	5.90E+00	2.49E-03	0.00E+00	2.00E-01	5.37E-01	1.12E+00	1.92E+00	3.83E+00	6.91E+00	1.29E+01	1.72E+01	3.56E+01	1.24E+02
Summer	8888000	259	6.61E+00	2.57E-03	1.98E-01	3.14E-01	6.71E-01	9.95E-01	2.00E+00	4.13E+00	7.70E+00	1.56E+01	2.34E+01	3.76E+01	4.73E+01
Winter	11183000	635	5.66E+00	1.74E-03	0.00E+00	2.84E-01	8.13E-01	1.20E+00	2.12E+00	3.90E+00	7.47E+00	1.20E+01	1.71E+01	2.57E+01	6.23E+01
Urbanization															
Central City	8926000	306	8.04E+00	4.16E-03	8.99E-02	2.25E-01	7.03E-01	1.19E+00	2.30E+00	4.62E+00	8.32E+00	1.87E+01	2.45E+01	5.83E+01	1.46E+02
Nonmetropolitan	5374000	357	3.99E+00	1.79E-03	0.00E+00	9.60E-02	4.43E-01	5.84E-01	1.15E+00	2.84E+00	5.21E+00	8.46E+00	1.16E+01	2.07E+01	3.48E+01
Surburban	24876000	1259	5.75E+00	1.43E-03	0.00E+00	2.58E-01	6.91E-01	1.12E+00	1.92E+00	3.69E+00	7.20E+00	1.20E+01	1.67E+01	3.37E+01	1.24E+02
Race															
Asian	333000	13	1.45E+01	3.58E-02	1.14E+00	1.14E+00	2.27E+00	2.27E+00	2.74E+00	1.09E+01	1.21E+01	7.13E+01	7.13E+01	7.13E+01	7.13E+01
Black	3385000	123	6.94E+00	4.26E-03	3.14E-01	3.14E-01	1.25E+00	1.56E+00	2.55E+00	4.16E+00	8.24E+00	1.37E+01	2.15E+01	3.56E+01	6.23E+01
Native American	38000	4	6.91E+00	2.55E-02	3.45E+00	3.45E+00	3.45E+00	3.45E+00	3.45E+00	4.55E+00	6.69E+00	1.71E+01	1.71E+01	1.71E+01	1.71E+01
Other/NA	987000	48	1.15E+01	2.74E-02	1.98E-01	1.98E-01	3.21E-01	7.34E-01	1.79E+00	3.90E+00	7.79E+00	2.13E+01	2.14E+01	1.46E+02	1.46E+02
White	34433000	1734	5.70E+00	1.18E-03	0.00E+00	2.18E-01	5.84E-01	9.70E-01	1.85E+00	3.72E+00	6.92E+00	1.20E+01	1.78E+01	3.49E+01	1.24E+02
Response to Questionnaire															
Do you garden?	12303000	655	5.50E+00	1.94E-03	0.00E+00	2.49E-01	6.71E-01	1.03E+00	1.80E+00	3.57E+00	6.40E+00	1.16E+01	1.76E+01	3.03E+01	7.13E+01
Do you farm?	785000	37	3.02E+00	3.37E-03	9.60E-02	9.60E-02	5.84E-01	7.12E-01	1.20E+00	1.75E+00	3.37E+00	6.14E+00	1.10E+01	1.23E+01	1.23E+01

Table 2-34. Intake of Total Fruits (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	42822000	2399	5.60E+00	1.52E-03	0.00E+00	1.49E-01	3.41E-01	6.29E-01	1.45E+00	3.12E+00	6.02E+00	1.17E+01	1.73E+01	4.50E+01	1.44E+02
Age															
< 01	812000	44	3.22E+01	4.70E-02	5.80E-01	5.80E-01	1.56E+00	1.95E+00	9.78E+00	1.36E+01	2.86E+01	1.16E+02	1.33E+02	1.44E+02	1.44E+02
01-02	1712000	97	1.93E+01	1.42E-02	6.30E-01	6.30E-01	1.03E+00	3.42E+00	6.69E+00	1.28E+01	2.64E+01	4.63E+01	5.50E+01	8.69E+01	8.69E+01
03-05	2115000	123	1.11E+01	6.65E-03	3.11E-01	3.48E-01	1.27E+00	1.92E+00	4.63E+00	7.62E+00	1.40E+01	2.70E+01	3.23E+01	4.24E+01	4.24E+01
06-11	3890000	241	6.45E+00	3.46E-03	1.93E-01	2.09E-01	5.87E-01	1.29E+00	2.82E+00	4.84E+00	7.22E+00	1.25E+01	2.34E+01	3.20E+01	4.55E+01
12-19	5084000	288	3.89E+00	1.71E-03	0.00E+00	1.15E-01	2.87E-01	4.50E-01	1.27E+00	2.75E+00	5.11E+00	8.59E+00	1.21E+01	1.90E+01	2.32E+01
20-39	14062000	740	3.30E+00	1.15E-03	0.00E+00	1.46E-01	2.95E-01	4.71E-01	1.09E+00	2.18E+00	3.79E+00	6.73E+00	8.73E+00	2.34E+01	4.39E+01
40-69	12097000	693	4.18E+00	1.48E-03	0.00E+00	1.17E-01	3.26E-01	6.33E-01	1.35E+00	2.81E+00	5.12E+00	8.90E+00	1.32E+01	2.18E+01	6.76E+01
70 +	3050000	173	5.03E+00	2.28E-03	1.66E-01	2.54E-01	8.11E-01	1.04E+00	2.19E+00	4.27E+00	6.59E+00	9.46E+00	1.24E+01	1.84E+01	2.52E+01
Seasons															
Fall	13714000	473	5.00E+00	2.37E-03	0.00E+00	1.61E-01	4.50E-01	8.11E-01	1.67E+00	3.16E+00	5.48E+00	9.84E+00	1.39E+01	3.31E+01	1.44E+02
Spring	9452000	928	4.67E+00	2.26E-03	0.00E+00	1.53E-01	2.81E-01	5.56E-01	1.27E+00	2.86E+00	5.41E+00	1.05E+01	1.53E+01	2.90E+01	1.16E+02
Summer	9132000	303	9.36E+00	5.25E-03	0.00E+00	1.15E-01	2.81E-01	4.86E-01	1.76E+00	4.53E+00	9.05E+00	2.18E+01	3.60E+01	8.69E+01	1.33E+02
Winter	10524000	695	3.94E+00	1.41E-03	1.04E-01	1.91E-01	4.08E-01	6.19E-01	1.22E+00	2.50E+00	5.04E+00	8.22E+00	1.21E+01	2.52E+01	4.52E+01
Urbanization															
Central City	16182000	635	6.76E+00	3.49E-03	0.00E+00	1.46E-01	2.81E-01	4.62E-01	1.31E+00	3.08E+00	6.36E+00	1.28E+01	2.70E+01	7.48E+01	1.44E+02
Nonmetropolitan	12962000	963	4.22E+00	1.46E-03	0.00E+00	1.49E-01	3.06E-01	5.55E-01	1.33E+00	2.83E+00	5.24E+00	9.08E+00	1.30E+01	2.24E+01	6.76E+01
Surburban	13678000	801	5.52E+00	1.83E-03	0.00E+00	1.97E-01	7.26E-01	9.98E-01	1.78E+00	3.46E+00	6.34E+00	1.27E+01	1.71E+01	3.47E+01	7.06E+01
Race															
Asian	849000	37	1.38E+01	3.16E-02	4.86E-01	4.86E-01	8.48E-01	8.86E-01	1.22E+00	3.74E+00	7.95E+00	3.31E+01	4.69E+01	1.44E+02	1.44E+02
Black	2572000	115	1.19E+01	1.53E-02	0.00E+00	0.00E+00	1.93E-01	2.87E-01	8.27E-01	3.56E+00	8.28E+00	3.17E+01	7.48E+01	1.33E+02	1.33E+02
Native American	116000	6	2.50E+00	5.31E-03	5.69E-01	5.69E-01	5.69E-01	5.69E-01	1.21E+00	1.52E+00	4.86E+00	4.86E+00	4.86E+00	4.86E+00	4.86E+00
Other/NA	890000	33	5.04E+00	4.98E-03	7.50E-01	7.50E-01	1.24E+00	1.63E+00	1.90E+00	3.55E+00	7.12E+00	1.02E+01	1.28E+01	2.20E+01	2.20E+01
White	38395000	2208	5.01E+00	1.09E-03	0.00E+00	1.47E-01	3.92E-01	6.47E-01	1.48E+00	3.10E+00	5.94E+00	1.07E+01	1.58E+01	3.54E+01	1.16E+02
Response to Questionnaire															
Do you garden?	21223000	1204	5.26E+00	1.48E-03	0.00E+00	1.55E-01	4.56E-01	8.48E-01	1.66E+00	3.28E+00	6.09E+00	1.18E+01	1.63E+01	3.47E+01	7.06E+01
Do you farm?	2514000	161	4.81E+00	3.07E-03	8.46E-02	1.15E-01	2.72E-01	3.03E-01	9.82E-01	3.50E+00	6.34E+00	1.11E+01	1.40E+01	2.69E+01	2.69E+01

Table 2-35. Intake of Total Fruits (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	57855000	3070	5.07E+00	9.15E-04	0.00E+00	1.19E-01	3.73E-01	6.62E-01	1.40E+00	3.09E+00	5.99E+00	1.11E+01	1.62E+01	3.51E+01	8.16E+01
Age															
< 01	857000	48	2.01E+01	2.11E-02	1.12E+00	1.12E+00	1.56E+00	2.46E+00	6.32E+00	1.50E+01	2.42E+01	4.67E+01	7.40E+01	7.81E+01	7.81E+01
01-02	1750000	101	1.54E+01	1.17E-02	6.52E-01	9.44E-01	2.04E+00	3.47E+00	5.72E+00	1.08E+01	1.81E+01	3.43E+01	4.50E+01	8.16E+01	8.16E+01
03-05	2328000	127	1.13E+01	7.36E-03	7.79E-01	9.29E-01	1.64E+00	2.24E+00	5.11E+00	8.23E+00	1.46E+01	2.05E+01	2.94E+01	7.60E+01	7.60E+01
06-11	4630000	254	5.65E+00	2.22E-03	0.00E+00	0.00E+00	6.34E-01	1.06E+00	2.20E+00	4.65E+00	7.63E+00	1.23E+01	1.49E+01	1.95E+01	3.39E+01
12-19	5961000	330	3.85E+00	1.50E-03	0.00E+00	0.00E+00	3.26E-01	5.78E-01	1.49E+00	2.76E+00	5.15E+00	7.83E+00	1.20E+01	1.77E+01	2.14E+01
20-39	19052000	947	3.12E+00	8.08E-04	0.00E+00	9.82E-02	2.69E-01	4.89E-01	9.66E-01	2.02E+00	4.01E+00	6.49E+00	9.60E+00	1.83E+01	3.96E+01
40-69	17961000	984	4.56E+00	1.29E-03	0.00E+00	1.35E-01	4.14E-01	6.97E-01	1.46E+00	2.98E+00	5.57E+00	9.67E+00	1.37E+01	2.91E+01	4.99E+01
70 +	5316000	279	6.11E+00	2.90E-03	0.00E+00	2.54E-01	6.34E-01	1.01E+00	2.47E+00	4.67E+00	7.44E+00	1.12E+01	1.44E+01	4.50E+01	5.89E+01
Seasons															
Fall	11881000	399	4.35E+00	1.49E-03	9.26E-02	2.00E-01	4.15E-01	6.62E-01	1.43E+00	3.11E+00	5.71E+00	8.97E+00	1.19E+01	1.85E+01	7.81E+01
Spring	14979000	1289	4.79E+00	1.64E-03	0.00E+00	1.31E-01	3.88E-01	6.51E-01	1.30E+00	2.78E+00	5.51E+00	1.05E+01	1.67E+01	3.23E+01	6.62E+01
Summer	15538000	491	6.19E+00	2.49E-03	0.00E+00	0.00E+00	2.81E-01	5.78E-01	1.27E+00	3.12E+00	6.67E+00	1.44E+01	2.09E+01	4.99E+01	8.16E+01
Winter	15457000	891	4.78E+00	1.22E-03	0.00E+00	1.67E-01	4.67E-01	7.40E-01	1.63E+00	3.29E+00	6.20E+00	1.06E+01	1.48E+01	2.37E+01	4.82E+01
Urbanization															
Central City	15326000	631	5.16E+00	1.93E-03	0.00E+00	0.00E+00	3.53E-01	6.68E-01	1.49E+00	3.27E+00	6.16E+00	1.06E+01	1.50E+01	2.85E+01	8.16E+01
Nonmetropolitan	16983000	1070	5.11E+00	1.73E-03	0.00E+00	1.64E-01	3.58E-01	5.96E-01	1.25E+00	2.83E+00	5.81E+00	1.18E+01	1.75E+01	3.98E+01	7.81E+01
Surburban	25546000	1369	4.99E+00	1.28E-03	0.00E+00	9.82E-02	4.31E-01	6.98E-01	1.47E+00	3.10E+00	6.04E+00	1.10E+01	1.55E+01	2.94E+01	7.60E+01
Race															
Asian	534000	26	4.59E+00	6.53E-03	2.65E-01	2.65E-01	2.71E-01	3.94E-01	1.02E+00	4.00E+00	6.65E+00	9.68E+00	1.13E+01	2.98E+01	2.98E+01
Black	11765000	680	5.00E+00	1.96E-03	0.00E+00	0.00E+00	3.53E-01	5.46E-01	1.24E+00	2.96E+00	5.97E+00	1.19E+01	1.74E+01	3.39E+01	7.81E+01
Native American	111000	5	5.92E+00	2.54E-02	3.26E-01	3.26E-01	3.26E-01	3.26E-01	6.21E-01	2.04E+00	8.16E+00	2.60E+01	2.60E+01	2.60E+01	2.60E+01
Other/NA	1372000	76	8.60E+00	1.39E-02	1.16E-01	1.29E-01	3.06E-01	6.91E-01	1.47E+00	2.29E+00	6.06E+00	2.09E+01	4.67E+01	8.16E+01	8.16E+01
White	44073000	2283	4.99E+00	9.79E-04	0.00E+00	1.31E-01	3.98E-01	6.84E-01	1.48E+00	3.14E+00	5.99E+00	1.08E+01	1.51E+01	3.22E+01	7.60E+01
Response to Questionnaire															
Do you garden?	19154000	1057	5.42E+00	1.56E-03	0.00E+00	2.18E-01	4.64E-01	7.32E-01	1.66E+00	3.49E+00	6.54E+00	1.16E+01	1.66E+01	3.58E+01	7.40E+01
Do you farm?	2158000	123	4.26E+00	3.36E-03	0.00E+00	0.00E+00	2.54E-01	4.15E-01	9.04E-01	2.69E+00	4.65E+00	1.21E+01	1.76E+01	1.91E+01	3.23E+01

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Table 2-36. Intake of Total Fruits (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	33927000	1732	5.68E+00	1.23E-03	0.00E+00	1.82E-01	5.74E-01	9.21E-01	1.84E+00	3.51E+00	6.73E+00	1.24E+01	1.80E+01	3.63E+01	1.07E+02
Age															
<01	568000	32	2.46E+01	2.81E-02	1.70E+00	1.70E+00	2.54E+00	4.32E+00	8.94E+00	1.62E+01	3.15E+01	5.67E+01	6.53E+01	1.07E+02	1.07E+02
01-02	1050000	57	1.65E+01	1.11E-02	1.77E+00	1.77E+00	2.83E+00	3.39E+00	8.98E+00	1.38E+01	2.29E+01	3.08E+01	3.86E+01	5.01E+01	5.01E+01
03-05	1700000	91	1.17E+01	7.70E-03	5.21E-01	8.47E-01	2.05E+00	3.13E+00	5.07E+00	8.50E+00	1.72E+01	2.27E+01	3.26E+01	4.72E+01	6.36E+01
06-11	3428000	193	7.14E+00	3.89E-03	3.29E-01	5.95E-01	1.16E+00	1.86E+00	2.75E+00	4.82E+00	8.64E+00	1.45E+01	2.12E+01	4.24E+01	4.88E+01
12-19	3558000	181	3.94E+00	1.91E-03	1.83E-01	3.16E-01	5.44E-01	1.00E+00	1.61E+00	3.15E+00	4.57E+00	7.51E+00	1.15E+01	1.89E+01	2.44E+01
20-39	10637000	523	3.63E+00	1.16E-03	0.00E+00	1.69E-01	4.00E-01	6.32E-01	1.18E+00	2.47E+00	5.04E+00	7.85E+00	1.05E+01	1.80E+01	3.47E+01
40-69	10083000	520	4.77E+00	1.72E-03	0.00E+00	1.82E-01	6.32E-01	9.46E-01	1.78E+00	3.23E+00	5.69E+00	9.53E+00	1.51E+01	2.90E+01	5.59E+01
70 +	2903000	135	5.69E+00	2.49E-03	0.00E+00	0.00E+00	6.87E-01	1.52E+00	2.94E+00	4.86E+00	7.16E+00	1.00E+01	1.21E+01	2.81E+01	2.81E+01
Seasons															
Fall	10121000	345	5.35E+00	2.50E-03	0.00E+00	1.02E-01	6.14E-01	9.21E-01	1.74E+00	3.04E+00	5.38E+00	1.05E+01	1.86E+01	5.01E+01	6.53E+01
Spring	7704000	653	5.64E+00	2.64E-03	0.00E+00	1.85E-01	5.28E-01	7.79E-01	1.82E+00	3.55E+00	6.78E+00	1.22E+01	1.77E+01	3.36E+01	1.07E+02
Summer	7420000	227	6.57E+00	2.39E-03	1.64E-01	2.32E-01	5.86E-01	1.05E+00	2.25E+00	4.71E+00	8.24E+00	1.54E+01	1.93E+01	2.90E+01	4.88E+01
Winter	8682000	507	5.36E+00	2.23E-03	1.46E-01	1.82E-01	5.56E-01	9.21E-01	1.65E+00	3.42E+00	6.49E+00	1.09E+01	1.74E+01	3.47E+01	6.36E+01
Urbanization															
Central City	11313000	458	5.00E+00	1.70E-03	1.69E-01	1.85E-01	6.51E-01	9.90E-01	1.77E+00	3.31E+00	6.08E+00	1.01E+01	1.59E+01	2.98E+01	5.67E+01
Nonmetropolitan	5631000	348	4.98E+00	2.62E-03	0.00E+00	2.40E-01	5.37E-01	6.98E-01	1.77E+00	3.39E+00	5.74E+00	9.90E+00	1.47E+01	2.90E+01	5.34E+01
Surburban	16983000	926	6.38E+00	1.99E-03	0.00E+00	1.72E-01	5.53E-01	9.34E-01	1.92E+00	3.77E+00	7.40E+00	1.50E+01	2.04E+01	4.24E+01	1.07E+02
Race															
Asian	545000	31	6.02E+00	1.14E-02	7.33E-01	7.33E-01	9.78E-01	9.78E-01	1.49E+00	3.10E+00	8.70E+00	9.84E+00	1.63E+01	4.72E+01	4.72E+01
Black	1415000	69	4.33E+00	5.16E-03	2.38E-01	2.84E-01	7.12E-01	7.49E-01	1.13E+00	2.49E+00	5.04E+00	7.45E+00	1.44E+01	3.86E+01	3.86E+01
Native American	1017000	60	3.77E+00	7.00E-03	2.35E-01	2.51E-01	2.99E-01	4.24E-01	1.17E+00	2.46E+00	3.81E+00	6.43E+00	7.44E+00	5.24E+01	5.24E+01
Other/NA	1176000	59	4.41E+00	2.99E-03	2.57E-01	2.57E-01	6.14E-01	1.05E+00	2.03E+00	3.86E+00	6.46E+00	8.51E+00	9.89E+00	1.34E+01	1.83E+01
White	29774000	1513	5.86E+00	1.34E-03	0.00E+00	1.81E-01	5.89E-01	9.71E-01	1.89E+00	3.62E+00	6.91E+00	1.29E+01	1.89E+01	3.48E+01	1.07E+02
Response to Questionnaire															
Do you garden?	12478000	656	5.50E+00	1.74E-03	1.69E-01	2.32E-01	7.48E-01	1.17E+00	2.13E+00	3.80E+00	6.52E+00	1.17E+01	1.65E+01	3.36E+01	6.36E+01
Do you farm?	1530000	88	4.57E+00	3.82E-03	1.71E-01	1.82E-01	4.70E-01	1.10E+00	2.16E+00	3.47E+00	5.34E+00	7.65E+00	1.17E+01	3.47E+01	3.47E+01

Table 2-37. Intake of Total Vegetables (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	183106000	9634	5.60E+00	5.13E-04	0.00E+00	2.01E-01	6.60E-01	1.13E+00	2.18E+00	3.93E+00	6.70E+00	1.10E+01	1.54E+01	3.22E+01	1.55E+02
Age															
< 01	2788000	155	3.34E+01	1.65E-02	0.00E+00	2.44E+00	4.54E+00	1.05E+01	1.64E+01	2.39E+01	4.52E+01	6.24E+01	8.26E+01	1.55E+02	1.55E+02
01-02	5667000	318	1.51E+01	5.19E-03	3.68E-01	6.70E-01	3.05E+00	4.41E+00	7.63E+00	1.22E+01	1.93E+01	2.97E+01	3.51E+01	5.03E+01	1.31E+02
03-05	8030000	455	1.02E+01	2.33E-03	0.00E+00	3.52E-01	2.00E+00	3.10E+00	5.33E+00	8.99E+00	1.35E+01	1.82E+01	2.36E+01	3.18E+01	3.66E+01
06-11	16489000	926	7.05E+00	1.27E-03	0.00E+00	3.89E-01	1.14E+00	2.08E+00	3.59E+00	5.74E+00	9.20E+00	1.39E+01	1.72E+01	2.34E+01	4.22E+01
12-19	20158000	1070	4.20E+00	6.94E-04	0.00E+00	0.00E+00	7.62E-01	1.13E+00	2.09E+00	3.45E+00	5.46E+00	8.13E+00	1.01E+01	1.64E+01	2.36E+01
20-39	59356000	2966	3.59E+00	4.04E-04	0.00E+00	1.27E-01	4.63E-01	8.08E-01	1.58E+00	2.85E+00	4.67E+00	7.15E+00	9.16E+00	1.42E+01	3.79E+01
40-69	55361000	2975	4.87E+00	5.40E-04	0.00E+00	2.32E-01	7.63E-01	1.25E+00	2.27E+00	3.95E+00	6.29E+00	9.49E+00	1.16E+01	1.95E+01	4.98E+01
70 +	15257000	769	5.31E+00	9.23E-04	0.00E+00	4.99E-01	1.04E+00	1.48E+00	2.75E+00	4.52E+00	7.00E+00	9.93E+00	1.24E+01	1.69E+01	3.10E+01
Seasons															
Fall	46344000	1537	5.54E+00	1.11E-03	0.00E+00	2.05E-01	6.50E-01	1.06E+00	2.05E+00	3.69E+00	6.33E+00	1.07E+01	1.57E+01	3.44E+01	1.55E+02
Spring	44729000	3856	5.41E+00	9.51E-04	0.00E+00	1.81E-01	5.66E-01	9.60E-01	2.08E+00	3.82E+00	6.51E+00	1.07E+01	1.55E+01	3.29E+01	9.67E+01
Summer	44394000	1390	6.14E+00	1.11E-03	0.00E+00	9.16E-02	6.36E-01	1.22E+00	2.47E+00	4.38E+00	7.76E+00	1.18E+01	1.60E+01	3.44E+01	1.16E+02
Winter	47639000	2851	5.32E+00	9.19E-04	0.00E+00	3.40E-01	8.51E-01	1.34E+00	2.20E+00	3.81E+00	6.41E+00	1.04E+01	1.38E+01	2.97E+01	1.31E+02
Urbanization															
Central City	54722000	2162	5.76E+00	1.18E-03	0.00E+00	1.27E-01	5.56E-01	9.56E-01	1.95E+00	3.69E+00	6.53E+00	1.12E+01	1.68E+01	3.79E+01	1.55E+02
Nonmetropolitan	43843000	2934	5.86E+00	1.01E-03	0.00E+00	2.46E-01	6.67E-01	1.26E+00	2.43E+00	4.24E+00	7.30E+00	1.16E+01	1.57E+01	2.93E+01	1.29E+02
Surburban	84481000	4536	5.36E+00	6.16E-04	0.00E+00	2.19E-01	7.99E-01	1.20E+00	2.21E+00	3.91E+00	6.51E+00	1.06E+01	1.44E+01	3.11E+01	9.63E+01
Race															
Asian	2413000	114	1.05E+01	1.32E-02	2.49E-01	2.49E-01	7.72E-01	1.66E+00	2.62E+00	5.21E+00	9.93E+00	1.94E+01	2.99E+01	1.55E+02	1.55E+02
Black	21077000	1088	5.92E+00	1.76E-03	0.00E+00	0.00E+00	7.00E-01	1.16E+00	2.08E+00	3.89E+00	6.80E+00	1.24E+01	1.74E+01	3.36E+01	1.16E+02
Native American	1449000	90	1.05E+01	1.85E-02	4.62E-01	7.69E-01	1.15E+00	1.41E+00	2.37E+00	4.35E+00	8.86E+00	1.45E+01	4.15E+01	1.31E+02	1.31E+02
Other/NA	4683000	225	6.80E+00	3.58E-03	0.00E+00	2.39E-01	6.54E-01	1.24E+00	2.51E+00	4.84E+00	8.15E+00	1.52E+01	1.87E+01	3.79E+01	6.05E+01
White	153424000	8115	5.39E+00	4.76E-04	0.00E+00	2.19E-01	6.54E-01	1.13E+00	2.18E+00	3.90E+00	6.57E+00	1.07E+01	1.46E+01	2.93E+01	1.16E+02
Response to Questionnaire															
Do you garden?	67247000	3708	5.63E+00	6.92E-04	0.00E+00	2.76E-01	8.63E-01	1.31E+00	2.44E+00	4.19E+00	6.98E+00	1.10E+01	1.44E+01	2.53E+01	8.26E+01
Do you farm?	7329000	435	6.30E+00	2.04E-03	0.00E+00	2.60E-01	9.39E-01	1.30E+00	2.86E+00	4.91E+00	8.10E+00	1.26E+01	1.68E+01	2.45E+01	4.65E+01

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Table 2-38. Intake of Total Vegetables (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	40338000	1900	5.73E+00	9.92E-04	0.00E+00	3.59E-01	8.02E-01	1.24E+00	2.33E+00	4.19E+00	6.73E+00	1.10E+01	1.55E+01	3.66E+01	7.94E+01
Age															
< 01	545000	29	3.68E+01	2.42E-02	0.00E+00	0.00E+00	7.64E+00	1.19E+01	2.28E+01	3.75E+01	4.79E+01	6.24E+01	6.24E+01	7.94E+01	7.94E+01
01-02	1070000	56	1.37E+01	8.49E-03	1.27E+00	1.27E+00	2.95E+00	4.39E+00	7.07E+00	1.15E+01	1.80E+01	2.47E+01	3.22E+01	3.90E+01	4.39E+01
03-05	1490000	92	1.09E+01	6.09E-03	1.55E+00	1.65E+00	2.48E+00	3.21E+00	5.68E+00	9.72E+00	1.38E+01	2.36E+01	2.54E+01	3.66E+01	3.66E+01
06-11	3589000	185	7.55E+00	2.93E-03	3.50E-01	7.72E-01	1.34E+00	2.12E+00	3.67E+00	5.80E+00	9.37E+00	1.59E+01	1.89E+01	2.87E+01	3.03E+01
12-19	4445000	210	4.72E+00	1.65E-03	0.00E+00	3.59E-01	8.04E-01	1.43E+00	2.26E+00	3.84E+00	6.07E+00	9.43E+00	1.12E+01	1.65E+01	1.73E+01
20-39	12432000	586	3.73E+00	9.58E-04	0.00E+00	1.58E-01	5.28E-01	8.69E-01	1.62E+00	3.03E+00	4.91E+00	7.34E+00	9.06E+00	1.22E+01	3.79E+01
40-69	13127000	654	5.01E+00	1.10E-03	1.75E-01	4.63E-01	8.25E-01	1.25E+00	2.53E+00	4.20E+00	6.31E+00	9.76E+00	1.23E+01	1.93E+01	3.70E+01
70 +	3640000	168	5.54E+00	1.80E-03	1.04E-01	4.52E-01	1.32E+00	1.90E+00	3.02E+00	4.89E+00	7.51E+00	1.01E+01	1.17E+01	1.48E+01	3.10E+01
Seasons															
Fall	9219000	271	6.22E+00	2.72E-03	0.00E+00	2.29E-01	8.07E-01	1.27E+00	2.24E+00	4.04E+00	6.46E+00	1.11E+01	1.87E+01	5.31E+01	6.24E+01
Spring	10205000	783	5.15E+00	1.76E-03	0.00E+00	2.79E-01	6.59E-01	1.07E+00	2.12E+00	3.80E+00	6.31E+00	9.96E+00	1.37E+01	3.10E+01	7.94E+01
Summer	9308000	271	6.27E+00	1.92E-03	1.58E-01	4.52E-01	6.77E-01	1.07E+00	2.60E+00	4.61E+00	8.41E+00	1.15E+01	1.59E+01	3.70E+01	4.52E+01
Winter	11606000	655	5.43E+00	1.54E-03	0.00E+00	4.63E-01	9.56E-01	1.49E+00	2.44E+00	4.22E+00	6.44E+00	1.07E+01	1.35E+01	3.03E+01	4.66E+01
Urbanization															
Central City	9284000	317	6.90E+00	2.66E-03	3.59E-01	4.52E-01	9.07E-01	1.38E+00	2.48E+00	4.46E+00	8.19E+00	1.37E+01	2.12E+01	4.66E+01	6.05E+01
Nonmetropolitan	5427000	362	5.84E+00	2.13E-03	0.00E+00	3.38E-01	5.28E-01	1.27E+00	2.73E+00	4.47E+00	7.20E+00	1.22E+01	1.60E+01	2.13E+01	4.39E+01
Surburban	25627000	1301	5.29E+00	1.13E-03	0.00E+00	2.76E-01	8.02E-01	1.18E+00	2.24E+00	4.03E+00	6.41E+00	1.02E+01	1.32E+01	3.22E+01	7.94E+01
Race															
Asian	333000	13	1.18E+01	3.20E-02	7.57E-01	7.57E-01	7.57E-01	7.72E-01	8.55E-01	4.93E+00	9.28E+00	6.24E+01	6.24E+01	6.24E+01	6.24E+01
Black	3508000	131	6.00E+00	3.67E-03	3.50E-01	5.00E-01	1.13E+00	1.43E+00	2.20E+00	3.67E+00	6.31E+00	1.31E+01	1.92E+01	3.18E+01	4.66E+01
Native American	38000	4	5.17E+00	2.55E-02	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.48E+00	1.95E+00	7.71E+00	1.45E+01	1.45E+01	1.45E+01	1.45E+01
Other/NA	1012000	45	1.02E+01	1.24E-02	6.54E-01	6.54E-01	1.06E+00	1.39E+00	4.13E+00	6.55E+00	1.05E+01	1.87E+01	3.79E+01	6.05E+01	6.05E+01
White	35447000	1787	5.52E+00	9.48E-04	0.00E+00	3.47E-01	7.58E-01	1.23E+00	2.33E+00	4.18E+00	6.69E+00	1.07E+01	1.46E+01	3.21E+01	7.94E+01
Response to Questionnaire															
Do you garden?	12432000	663	5.64E+00	1.77E-03	9.00E+00	3.66E-01	8.07E-01	1.30E+00	2.33E+00	4.22E+00	6.87E+00	1.07E+01	1.37E+01	3.52E+01	7.94E+01
Do you farm?	830000	42	5.17E+00	4.94E-03	1.04E-01	2.30E-01	4.38E-01	9.16E-01	1.36E+00	4.24E+00	7.81E+00	1.02E+01	1.60E+01	2.13E+01	2.13E+01

Table 2-39. Intake of Total Vegetables (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	45505000	2542	5.39E+00	1.17E-03	0.00E+00	1.48E-01	5.56E-01	9.35E-01	1.96E+00	3.52E+00	6.13E+00	1.10E+01	1.59E+01	2.99E+01	1.55E+02
Age															
< 01	812000	44	3.47E+01	4.01E-02	2.44E+00	2.44E+00	4.54E+00	9.08E+00	1.51E+01	1.82E+01	4.81E+01	7.43E+01	1.16E+02	1.55E+02	1.55E+02
01-02	1748000	100	1.42E+01	6.95E-03	3.68E-01	1.31E+00	3.05E+00	3.92E+00	6.62E+00	1.37E+01	1.93E+01	2.46E+01	3.51E+01	4.17E+01	4.17E+01
03-05	2209000	130	9.85E+00	4.43E-03	2.75E-01	5.25E-01	2.26E+00	3.20E+00	5.10E+00	8.82E+00	1.25E+01	1.94E+01	2.44E+01	3.13E+01	3.51E+01
06-11	4221000	260	6.24E+00	2.25E-03	1.85E-01	5.16E-01	1.02E+00	1.95E+00	3.06E+00	4.50E+00	8.21E+00	1.34E+01	1.54E+01	2.07E+01	3.73E+01
12-19	5436000	306	3.77E+00	1.33E-03	0.00E+00	0.00E+00	6.01E-01	9.35E-01	1.72E+00	3.00E+00	4.86E+00	7.00E+00	9.93E+00	1.78E+01	2.36E+01
20-39	15112000	797	3.32E+00	7.98E-04	0.00E+00	1.09E-01	3.61E-01	6.19E-01	1.40E+00	2.68E+00	4.13E+00	6.24E+00	8.92E+00	1.52E+01	3.29E+01
40-69	12809000	729	4.54E+00	1.17E-03	0.00E+00	9.88E-02	5.03E-01	9.16E-01	1.86E+00	3.43E+00	5.99E+00	9.56E+00	1.15E+01	2.25E+01	4.05E+01
70 +	3158000	176	4.82E+00	2.04E-03	4.82E-01	4.99E-01	1.01E+00	1.28E+00	2.38E+00	3.76E+00	6.17E+00	1.03E+01	1.28E+01	1.62E+01	1.79E+01
Seasons															
Fall	14211000	491	5.15E+00	2.35E-03	0.00E+00	1.21E-01	4.81E-01	7.74E-01	1.73E+00	3.15E+00	5.89E+00	1.05E+01	1.51E+01	2.63E+01	1.55E+02
Spring	10277000	997	5.41E+00	2.22E-03	0.00E+00	1.19E-01	4.83E-01	8.21E-01	1.96E+00	3.62E+00	6.04E+00	1.07E+01	1.59E+01	4.15E+01	7.43E+01
Summer	10077000	333	6.72E+00	3.06E-03	0.00E+00	7.02E-02	5.38E-01	1.12E+00	2.47E+00	4.06E+00	7.77E+00	1.38E+01	1.92E+01	4.05E+01	1.16E+02
Winter	10940000	721	4.44E+00	1.32E-03	2.27E-01	3.16E-01	7.44E-01	1.17E+00	1.87E+00	3.16E+00	5.42E+00	9.08E+00	1.13E+01	2.44E+01	3.51E+01
Urbanization															
Central City	17144000	670	5.87E+00	2.62E-03	0.00E+00	1.09E-01	4.81E-01	8.16E-01	1.75E+00	3.32E+00	6.17E+00	1.24E+01	1.82E+01	5.06E+01	1.55E+02
Nonmetropolitan	14018000	1033	5.05E+00	1.39E-03	0.00E+00	2.40E-01	5.38E-01	9.02E-01	1.99E+00	3.61E+00	6.15E+00	1.07E+01	1.44E+01	2.77E+01	4.85E+01
Surburban	14343000	839	5.13E+00	1.42E-03	0.00E+00	1.19E-01	7.74E-01	1.19E+00	2.18E+00	3.57E+00	6.01E+00	1.02E+01	1.52E+01	2.78E+01	4.81E+01
Race															
Asian	849000	37	1.37E+01	3.39E-02	2.49E-01	2.49E-01	6.36E-01	8.68E-01	2.12E+00	3.05E+00	9.56E+00	2.99E+01	7.25E+01	1.55E+02	1.55E+02
Black	2773000	125	9.76E+00	9.66E-03	0.00E+00	0.00E+00	6.19E-01	1.52E+00	3.06E+00	4.98E+00	1.03E+01	1.93E+01	2.44E+01	1.16E+02	1.16E+02
Native American	116000	6	2.94E+00	1.66E-03	2.37E+00	2.37E+00	2.37E+00	2.37E+00	2.57E+00	2.57E+00	3.13E+00	3.92E+00	3.92E+00	3.92E+00	3.92E+00
Other/NA	966000	37	8.01E+00	7.97E-03	3.48E-01	3.48E-01	3.97E-01	1.44E+00	2.65E+00	4.41E+00	1.15E+01	1.82E+01	1.92E+01	3.68E+01	3.68E+01
White	40801000	2337	4.86E+00	8.10E-04	0.00E+00	1.47E-01	5.48E-01	9.18E-01	1.87E+00	3.39E+00	5.76E+00	1.02E+01	1.41E+01	2.56E+01	5.73E+01
Response to Questionnaire															
Do you garden?	22159000	1262	5.16E+00	1.13E-03	0.00E+00	2.85E-01	6.01E-01	9.90E-01	2.04E+00	3.61E+00	6.16E+00	1.07E+01	1.46E+01	2.63E+01	4.81E+01
Do you farm?	2681000	173	6.36E+00	3.81E-03	3.77E-01	4.34E-01	4.99E-01	1.12E+00	2.43E+00	4.56E+00	9.04E+00	1.29E+01	1.84E+01	3.23E+01	4.17E+01

Table 2-40. Intake of Total Vegetables (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	62400000	3320	5.70E+00	8.76E-04	0.00E+00	1.57E-01	7.61E-01	1.20E+00	2.23E+00	4.05E+00	6.97E+00	1.10E+01	1.53E+01	3.26E+01	1.31E+02
Age															
< 01	863000	50	3.15E+01	2.68E-02	2.63E+00	2.63E+00	3.56E+00	5.54E+00	1.54E+01	2.24E+01	3.78E+01	6.44E+01	8.26E+01	1.16E+02	1.16E+02
01-02	1777000	104	1.83E+01	1.30E-02	1.08E+00	1.22E+00	3.96E+00	6.15E+00	8.93E+00	1.35E+01	2.25E+01	3.29E+01	4.32E+01	1.31E+02	1.31E+02
03-05	2520000	138	1.01E+01	4.24E-03	3.52E-01	3.52E-01	1.19E+00	2.63E+00	4.65E+00	9.09E+00	1.40E+01	1.76E+01	2.13E+01	3.18E+01	3.36E+01
06-11	5139000	281	7.43E+00	2.37E-03	0.00E+00	0.00E+00	1.10E+00	2.22E+00	4.00E+00	6.39E+00	9.42E+00	1.43E+01	1.84E+01	2.45E+01	4.22E+01
12-19	6518000	362	4.25E+00	1.18E-03	0.00E+00	0.00E+00	7.44E-01	1.27E+00	2.14E+00	3.67E+00	5.60E+00	7.76E+00	9.86E+00	1.62E+01	2.25E+01
20-39	20908000	1039	3.74E+00	6.66E-04	0.00E+00	1.30E-01	5.10E-01	8.65E-01	1.69E+00	3.04E+00	4.90E+00	7.42E+00	9.49E+00	1.43E+01	3.25E+01
40-69	19142000	1058	5.06E+00	9.27E-04	0.00E+00	2.20E-01	8.83E-01	1.42E+00	2.38E+00	4.04E+00	6.71E+00	9.61E+00	1.16E+01	1.76E+01	4.90E+01
70 +	5533000	288	5.31E+00	1.52E-03	0.00E+00	7.04E-01	1.04E+00	1.37E+00	2.69E+00	4.63E+00	7.33E+00	9.35E+00	1.21E+01	1.82E+01	2.53E+01
Seasons															
Fall	12565000	419	5.45E+00	1.61E-03	0.00E+00	2.64E-01	8.32E-01	1.16E+00	2.13E+00	4.02E+00	6.85E+00	1.06E+01	1.42E+01	2.55E+01	6.44E+01
Spring	16422000	1413	5.54E+00	1.59E-03	0.00E+00	1.40E-01	5.66E-01	1.03E+00	2.12E+00	3.91E+00	6.72E+00	1.09E+01	1.61E+01	3.36E+01	9.67E+01
Summer	17310000	547	5.92E+00	1.81E-03	0.00E+00	0.00E+00	6.79E-01	1.26E+00	2.31E+00	4.29E+00	7.45E+00	1.11E+01	1.53E+01	3.13E+01	1.16E+02
Winter	16103000	941	5.81E+00	1.88E-03	0.00E+00	2.32E-01	8.51E-01	1.35E+00	2.37E+00	4.04E+00	6.93E+00	1.10E+01	1.48E+01	3.19E+01	1.31E+02
Urbanization															
Central City	16547000	695	5.61E+00	2.13E-03	0.00E+00	0.00E+00	5.37E-01	9.81E-01	1.94E+00	3.76E+00	6.76E+00	9.98E+00	1.54E+01	3.78E+01	1.31E+02
Nonmetropolitan	18586000	1172	6.28E+00	1.54E-03	0.00E+00	2.20E-01	9.87E-01	1.63E+00	2.76E+00	4.71E+00	7.92E+00	1.18E+01	1.67E+01	2.67E+01	1.16E+02
Surburban	27267000	1453	5.35E+00	1.12E-03	0.00E+00	2.19E-01	8.06E-01	1.18E+00	2.12E+00	3.86E+00	6.48E+00	1.05E+01	1.42E+01	3.26E+01	5.88E+01
Race															
Asian	654000	32	9.73E+00	1.01E-02	1.66E+00	1.66E+00	1.66E+00	2.47E+00	3.28E+00	7.21E+00	1.28E+01	2.29E+01	2.97E+01	2.97E+01	2.97E+01
Black	13099000	747	5.17E+00	1.55E-03	0.00E+00	0.00E+00	6.18E-01	1.01E+00	1.92E+00	3.71E+00	6.72E+00	1.05E+01	1.43E+01	3.19E+01	6.44E+01
Native American	162000	8	3.33E+01	1.08E-01	2.23E+00	2.23E+00	2.23E+00	2.23E+00	5.17E+00	1.16E+01	3.28E+01	1.31E+02	1.31E+02	1.31E+02	1.31E+02
Other/NA	1545000	86	5.34E+00	3.48E-03	3.67E-01	7.88E-01	9.96E-01	1.32E+00	2.34E+00	4.17E+00	6.79E+00	9.93E+00	1.52E+01	2.09E+01	2.18E+01
White	46940000	2447	5.70E+00	9.68E-04	0.00E+00	2.19E-01	8.08E-01	1.22E+00	2.31E+00	4.10E+00	7.00E+00	1.09E+01	1.52E+01	3.13E+01	1.16E+02
Response to Questionnaire															
Do you garden?	20100000	1120	6.41E+00	1.41E-03	0.00E+00	7.40E-01	1.28E+00	1.80E+00	3.03E+00	4.98E+00	8.04E+00	1.18E+01	1.57E+01	2.67E+01	8.26E+01
Do you farm?	2232000	130	6.62E+00	3.45E-03	0.00E+00	0.00E+00	1.22E+00	1.95E+00	3.52E+00	5.25E+00	8.17E+00	1.18E+01	1.74E+01	2.98E+01	3.03E+01

Table 2-41. Intake of Total Vegetables (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	34803000	1790	5.54E+00	1.08E-03	0.00E+00	2.39E-01	7.76E-01	1.19E+00	2.24E+00	4.05E+00	6.76E+00	1.12E+01	1.47E+01	2.85E+01	1.29E+02
Age															
< 01	568000	32	3.13E+01	3.28E-02	1.03E+01	1.03E+01	1.15E+01	1.17E+01	1.76E+01	2.18E+01	3.84E+01	4.67E+01	7.99E+01	1.29E+02	1.29E+02
01-02	1072000	58	1.26E+01	8.07E-03	5.60E-01	5.60E-01	6.70E-01	4.54E+00	7.77E+00	1.12E+01	1.48E+01	2.17E+01	2.93E+01	4.15E+01	4.26E+01
03-05	1781000	94	1.02E+01	4.08E-03	4.14E-01	4.14E-01	2.62E+00	4.05E+00	6.28E+00	8.91E+00	1.34E+01	1.82E+01	1.95E+01	2.65E+01	2.95E+01
06-11	3510000	199	7.00E+00	2.58E-03	2.39E-01	4.30E-01	1.25E+00	1.90E+00	4.11E+00	6.13E+00	9.13E+00	1.28E+01	1.57E+01	2.10E+01	3.44E+01
12-19	3759000	192	4.12E+00	1.43E-03	6.07E-02	2.99E-01	7.99E-01	1.20E+00	2.20E+00	3.50E+00	5.62E+00	7.98E+00	9.69E+00	1.41E+01	1.89E+01
20-39	10904000	544	3.51E+00	8.85E-04	0.00E+00	1.12E-01	4.13E-01	8.52E-01	1.50E+00	2.72E+00	4.58E+00	7.17E+00	1.01E+01	1.47E+01	1.99E+01
40-69	10283000	534	4.74E+00	1.18E-03	0.00E+00	3.47E-01	9.29E-01	1.46E+00	2.36E+00	3.94E+00	6.06E+00	8.86E+00	1.15E+01	2.03E+01	4.14E+01
70 +	2926000	137	5.59E+00	2.21E-03	3.25E-01	4.19E-01	1.03E+00	1.54E+00	2.85E+00	4.90E+00	6.89E+00	1.18E+01	1.46E+01	1.69E+01	1.91E+01
Seasons															
Fall	10349000	356	5.56E+00	2.16E-03	0.00E+00	1.74E-01	8.58E-01	1.16E+00	2.08E+00	3.81E+00	6.27E+00	1.13E+01	1.57E+01	3.84E+01	7.99E+01
Spring	7825000	663	5.48E+00	2.15E-03	0.00E+00	1.86E-01	5.67E-01	9.47E-01	2.02E+00	3.98E+00	6.97E+00	1.08E+01	1.52E+01	2.73E+01	9.63E+01
Summer	7639000	237	5.75E+00	1.63E-03	9.16E-02	2.42E-01	7.72E-01	1.41E+00	2.56E+00	4.66E+00	7.58E+00	1.17E+01	1.34E+01	2.03E+01	3.44E+01
Winter	8990000	534	5.39E+00	2.40E-03	1.83E-01	4.09E-01	7.98E-01	1.35E+00	2.16E+00	3.91E+00	6.54E+00	1.06E+01	1.43E+01	2.49E+01	1.29E+02
Urbanization															
Central City	11747000	480	4.93E+00	1.41E-03	6.07E-02	1.74E-01	5.67E-01	1.04E+00	1.98E+00	3.70E+00	5.96E+00	9.51E+00	1.40E+01	2.22E+01	4.13E+01
Nonmetropolitan	5812000	367	6.44E+00	4.20E-03	0.00E+00	3.25E-01	1.00E+00	1.48E+00	2.52E+00	4.34E+00	7.24E+00	1.13E+01	1.58E+01	4.67E+01	1.29E+02
Surburban	17244000	943	5.65E+00	1.32E-03	0.00E+00	2.39E-01	7.99E-01	1.27E+00	2.33E+00	4.24E+00	6.97E+00	1.16E+01	1.52E+01	2.65E+01	9.63E+01
Race															
Asian	577000	32	6.10E+00	4.37E-03	1.95E+00	1.95E+00	2.11E+00	2.71E+00	3.65E+00	4.91E+00	6.93E+00	1.14E+01	1.40E+01	1.49E+01	1.49E+01
Black	1697000	85	5.24E+00	3.53E-03	0.00E+00	0.00E+00	1.06E+00	1.59E+00	2.37E+00	3.94E+00	6.92E+00	1.03E+01	1.33E+01	2.02E+01	3.23E+01
Native American	1133000	72	8.24E+00	1.56E-02	4.62E-01	4.62E-01	1.08E+00	1.24E+00	2.22E+00	4.35E+00	8.80E+00	1.28E+01	1.65E+01	1.29E+02	1.29E+02
Other/NA	1160000	57	4.81E+00	3.17E-03	0.00E+00	4.43E-02	2.99E-01	5.70E-01	2.51E+00	4.10E+00	6.31E+00	9.69E+00	1.22E+01	1.44E+01	1.44E+01
White	30236000	1544	5.47E+00	1.06E-03	0.00E+00	2.42E-01	7.76E-01	1.18E+00	2.19E+00	4.04E+00	6.69E+00	1.11E+01	1.51E+01	2.85E+01	9.63E+01
Response to Questionnaire															
Do you garden?	12496000	661	5.22E+00	1.22E-03	4.43E-02	2.63E-01	9.43E-01	1.33E+00	2.44E+00	4.15E+00	6.49E+00	1.06E+01	1.33E+01	2.03E+01	4.65E+01
Do you farm?	1586000	90	6.32E+00	4.08E-03	4.41E-01	9.58E-01	1.42E+00	1.53E+00	3.40E+00	5.03E+00	7.72E+00	1.18E+01	1.68E+01	2.39E+01	4.65E+01

Table 2-42. Intake of Total Apples (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	117731000	6209	1.79E+00	2.65E-04	0.00E+00	7.55E-02	1.83E-01	2.60E-01	5.05E-01	9.72E-01	2.01E+00	3.88E+00	5.95E+00	1.25E+01	7.02E+01
Age															
<01	2350000	131	8.89E+00	7.01E-03	0.00E+00	2.23E-01	8.00E-01	1.08E+00	3.02E+00	6.21E+00	1.12E+01	1.79E+01	2.33E+01	7.00E+01	7.02E+01
01-02	4314000	243	6.08E+00	2.79E-03	2.74E-01	3.38E-01	7.64E-01	1.15E+00	2.31E+00	4.45E+00	7.27E+00	1.26E+01	1.95E+01	2.65E+01	3.24E+01
03-05	6087000	333	3.98E+00	1.59E-03	0.00E+00	1.76E-01	5.71E-01	9.15E-01	1.58E+00	2.68E+00	5.03E+00	7.64E+00	1.16E+01	2.13E+01	3.17E+01
06-11	11444000	631	2.26E+00	6.30E-04	0.00E+00	1.30E-01	3.47E-01	5.08E-01	8.55E-01	1.63E+00	2.96E+00	4.77E+00	6.44E+00	9.30E+00	2.53E+01
12-19	13067000	683	1.22E+00	3.79E-04	0.00E+00	5.75E-02	1.54E-01	2.43E-01	4.60E-01	8.31E-01	1.47E+00	2.39E+00	3.65E+00	8.46E+00	1.11E+01
20-39	36594000	1845	1.11E+00	1.99E-04	0.00E+00	7.16E-02	1.51E-01	2.10E-01	3.89E-01	7.59E-01	1.42E+00	2.36E+00	3.21E+00	5.42E+00	1.17E+01
40-69	34585000	1868	1.25E+00	2.28E-04	0.00E+00	6.96E-02	1.74E-01	2.51E-01	4.61E-01	8.34E-01	1.53E+00	2.73E+00	3.85E+00	6.85E+00	1.09E+01
70+	9278000	475	1.49E+00	4.96E-04	8.93E-02	1.66E-01	2.46E-01	3.45E-01	5.53E-01	1.08E+00	1.83E+00	3.31E+00	3.97E+00	7.14E+00	1.84E+01
Seasons															
Fall	32676000	1088	2.11E+00	6.46E-04	0.00E+00	7.57E-02	2.04E-01	2.95E-01	5.51E-01	1.16E+00	2.25E+00	4.49E+00	6.90E+00	1.63E+01	7.00E+01
Spring	26571000	2322	1.77E+00	5.83E-04	0.00E+00	5.75E-02	1.69E-01	2.59E-01	4.89E-01	9.20E-01	1.88E+00	3.78E+00	5.99E+00	1.61E+01	7.02E+01
Summer	24030000	746	1.69E+00	4.40E-04	0.00E+00	6.67E-02	1.72E-01	2.51E-01	5.04E-01	9.15E-01	2.05E+00	3.83E+00	5.50E+00	1.13E+01	2.20E+01
Winter	34454000	2053	1.59E+00	3.84E-04	0.00E+00	8.78E-02	1.84E-01	2.50E-01	4.86E-01	9.20E-01	1.81E+00	3.43E+00	5.83E+00	1.06E+01	3.24E+01
Urbanization															
Central City	34233000	1354	1.95E+00	5.18E-04	0.00E+00	6.80E-02	1.55E-01	2.26E-01	5.02E-01	9.69E-01	2.16E+00	4.53E+00	6.41E+00	1.58E+01	7.02E+01
Nonmetropolitan	26277000	1761	1.57E+00	4.14E-04	0.00E+00	7.25E-02	1.80E-01	2.51E-01	4.57E-01	9.22E-01	1.80E+00	3.39E+00	4.97E+00	1.06E+01	2.19E+01
Surburban	57161000	3092	1.81E+00	4.07E-04	0.00E+00	8.93E-02	2.10E-01	2.83E-01	5.31E-01	9.96E-01	2.00E+00	3.81E+00	5.77E+00	1.24E+01	7.00E+01
Race															
Asian	1542000	74	4.53E+00	9.24E-03	2.17E-01	2.17E-01	2.66E-01	3.08E-01	6.29E-01	1.17E+00	3.35E+00	8.79E+00	1.19E+01	7.00E+01	7.00E+01
Black	11725000	597	1.94E+00	8.60E-04	0.00E+00	4.94E-02	1.39E-01	2.19E-01	4.96E-01	9.40E-01	2.17E+00	4.37E+00	7.41E+00	1.44E+01	3.24E+01
Native American	701000	46	1.06E+00	1.76E-03	1.54E-01	1.54E-01	1.56E-01	2.03E-01	2.90E-01	4.74E-01	1.29E+00	1.94E+00	3.94E+00	6.71E+00	6.71E+00
Other/NA	2791000	144	1.77E+00	1.42E-03	5.47E-02	8.85E-02	2.06E-01	2.62E-01	5.31E-01	8.69E-01	1.96E+00	3.73E+00	6.21E+00	1.17E+01	1.17E+01
White	100912000	5346	1.74E+00	2.51E-04	0.00E+00	7.89E-02	1.86E-01	2.65E-01	5.08E-01	9.80E-01	1.99E+00	3.83E+00	5.69E+00	1.24E+01	7.02E+01
Regions															
Midwest	30141000	1657	1.81E+00	5.19E-04	0.00E+00	6.15E-02	1.71E-01	2.52E-01	5.18E-01	9.75E-01	1.94E+00	4.08E+00	6.39E+00	1.24E+01	7.02E+01
Northeast	27337000	1360	2.01E+00	6.97E-04	0.00E+00	7.43E-02	2.06E-01	3.11E-01	5.51E-01	1.04E+00	2.20E+00	4.33E+00	6.62E+00	1.26E+01	7.00E+01
South	36623000	1958	1.62E+00	3.72E-04	0.00E+00	9.16E-02	1.93E-01	2.55E-01	4.67E-01	9.20E-01	1.85E+00	3.60E+00	5.14E+00	1.01E+01	3.24E+01
West	23570000	1232	1.80E+00	5.71E-04	3.36E-02	8.78E-02	1.81E-01	2.53E-01	5.03E-01	9.77E-01	1.97E+00	3.89E+00	5.40E+00	1.60E+01	3.56E+01
Response to Questionnaire															
Do you garden?	46743000	2556	1.73E+00	4.34E-04	0.00E+00	8.41E-02	2.00E-01	2.64E-01	5.02E-01	9.47E-01	1.95E+00	3.75E+00	5.67E+00	1.12E+01	7.00E+01
Do you farm?	4826000	286	1.28E+00	6.00E-04	0.00E+00	5.57E-02	1.74E-01	2.48E-01	4.81E-01	8.61E-01	1.58E+00	2.78E+00	3.70E+00	7.14E+00	1.03E+01

Table 2-43. Intake of Total Peaches (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	33216000	1753	1.01E+00	2.74E-04	0.00E+00	3.50E-02	9.45E-02	1.55E-01	3.08E-01	5.95E-01	1.19E+00	2.22E+00	3.10E+00	6.34E+00	3.12E+01
Age															
< 01	1106000	60	1.56E+00	1.30E-03	0.00E+00	5.64E-02	1.82E-01	2.58E-01	5.72E-01	1.18E+00	2.11E+00	3.73E+00	4.09E+00	5.58E+00	6.33E+00
01-02	1533000	88	1.99E+00	1.28E-03	6.73E-02	6.73E-02	2.61E-01	5.12E-01	8.94E-01	1.68E+00	2.48E+00	4.38E+00	6.27E+00	7.72E+00	8.25E+00
03-05	1712000	90	1.70E+00	1.50E-03	1.04E-01	1.04E-01	1.34E-01	3.75E-01	6.10E-01	1.41E+00	2.04E+00	3.03E+00	3.98E+00	8.55E+00	2.23E+01
06-11	2898000	159	1.40E+00	9.07E-04	5.80E-02	6.65E-02	1.21E-01	3.04E-01	5.23E-01	9.04E-01	1.54E+00	3.19E+00	4.35E+00	8.53E+00	1.15E+01
12-19	2947000	170	8.30E-01	5.58E-04	3.95E-02	4.09E-02	9.45E-02	1.59E-01	2.69E-01	5.14E-01	9.15E-01	2.15E+00	3.34E+00	4.33E+00	4.33E+00
20-39	9440000	483	5.41E-01	1.99E-04	8.34E-03	1.68E-02	5.04E-02	8.54E-02	1.80E-01	3.64E-01	6.28E-01	1.16E+00	1.81E+00	2.94E+00	5.27E+00
40-69	9653000	508	9.38E-01	3.79E-04	0.00E+00	5.88E-02	1.38E-01	1.83E-01	3.26E-01	5.98E-01	1.12E+00	2.04E+00	2.65E+00	4.77E+00	1.23E+01
70 +	3927000	195	1.31E+00	1.57E-03	0.00E+00	1.27E-01	2.26E-01	2.82E-01	4.46E-01	8.54E-01	1.24E+00	1.79E+00	2.59E+00	9.76E+00	3.12E+01
Seasons															
Fall	6087000	218	7.94E-01	3.73E-04	1.45E-02	1.80E-02	6.95E-02	1.34E-01	2.80E-01	4.89E-01	1.00E+00	1.71E+00	2.55E+00	4.09E+00	8.55E+00
Spring	7587000	733	8.07E-01	4.41E-04	0.00E+00	3.35E-02	9.91E-02	1.44E-01	2.58E-01	4.99E-01	8.89E-01	1.75E+00	2.48E+00	6.19E+00	2.23E+01
Summer	13670000	426	1.34E+00	5.71E-04	1.68E-02	5.04E-02	1.40E-01	2.13E-01	4.16E-01	8.07E-01	1.52E+00	2.91E+00	3.90E+00	8.53E+00	3.12E+01
Winter	5872000	376	7.22E-01	2.98E-04	0.00E+00	1.88E-02	6.73E-02	1.04E-01	2.30E-01	4.59E-01	9.74E-01	1.62E+00	2.15E+00	3.52E+00	5.31E+00
Urbanization															
Central City	9001000	341	9.79E-01	3.98E-04	8.34E-03	1.88E-02	1.06E-01	1.81E-01	3.30E-01	6.21E-01	1.23E+00	2.04E+00	2.94E+00	4.63E+00	1.23E+01
Nonmetropolitan	8333000	547	9.16E-01	4.31E-04	0.00E+00	1.84E-02	9.13E-02	1.51E-01	2.92E-01	6.04E-01	1.04E+00	2.04E+00	2.80E+00	6.36E+00	2.23E+01
Surburban	15882000	865	1.07E+00	4.75E-04	1.68E-02	3.77E-02	9.17E-02	1.45E-01	2.95E-01	5.74E-01	1.24E+00	2.35E+00	3.51E+00	7.13E+00	3.12E+01
Race															
Black	3349000	163	9.29E-01	5.34E-04	3.35E-02	4.70E-02	1.41E-01	1.60E-01	2.84E-01	6.12E-01	1.23E+00	2.11E+00	2.80E+00	3.94E+00	6.51E+00
Native American	265000	13	6.04E-01	1.07E-03	1.49E-01	1.49E-01	1.61E-01	1.61E-01	3.59E-01	4.86E-01	5.24E-01	2.13E+00	2.13E+00	2.14E+00	2.14E+00
Other/NA	633000	31	9.56E-01	1.21E-03	2.25E-01	2.25E-01	2.25E-01	2.52E-01	3.87E-01	6.21E-01	1.25E+00	2.08E+00	3.06E+00	6.19E+00	6.19E+00
White	28969000	1546	1.02E+00	3.07E-04	0.00E+00	3.19E-02	9.00E-02	1.48E-01	3.08E-01	5.98E-01	1.19E+00	2.24E+00	3.19E+00	6.34E+00	3.12E+01
Regions															
Midwest	7850000	489	8.92E-01	3.96E-04	8.34E-03	4.82E-02	1.00E-01	1.89E-01	3.33E-01	5.74E-01	1.13E+00	1.87E+00	2.32E+00	4.33E+00	2.23E+01
Northeast	7981000	369	9.48E-01	3.81E-04	0.00E+00	1.68E-02	8.91E-02	1.58E-01	2.88E-01	5.61E-01	1.16E+00	2.55E+00	3.73E+00	4.52E+00	8.25E+00
South	9511000	522	1.04E+00	7.02E-04	0.00E+00	5.04E-02	9.67E-02	1.46E-01	2.87E-01	6.08E-01	1.13E+00	2.10E+00	2.80E+00	6.51E+00	3.12E+01
West	7874000	373	1.14E+00	5.55E-04	0.00E+00	1.88E-02	7.09E-02	1.45E-01	3.28E-01	6.29E-01	1.39E+00	2.55E+00	3.34E+00	9.76E+00	1.23E+01
Response to Questionnaire															
Do you garden?	14495000	829	1.02E+00	3.69E-04	3.52E-02	5.50E-02	1.04E-01	1.66E-01	3.14E-01	6.08E-01	1.15E+00	2.22E+00	3.13E+00	7.25E+00	2.23E+01
Do you farm?	1897000	110	1.37E+00	1.34E-03	3.77E-02	3.77E-02	6.65E-02	1.25E-01	3.21E-01	6.46E-01	1.83E+00	2.90E+00	3.86E+00	9.76E+00	9.76E+00

Table 2-44. Intake of Total Pears (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	24128000	1233	8.73E-01	4.60E-04	0.00E+00	3.73E-02	9.85E-02	1.45E-01	2.83E-01	5.18E-01	9.09E-01	1.78E+00	2.39E+00	4.82E+00	5.41E+01
Age															
<01	1084000	53	3.27E+00	9.30E-03	9.85E-02	9.85E-02	1.55E-01	2.66E-01	3.50E-01	9.83E-01	2.43E+00	4.29E+00	5.70E+00	5.41E+01	5.41E+01
01-02	1124000	65	1.97E+00	1.60E-03	2.44E-01	2.44E-01	3.83E-01	6.01E-01	8.25E-01	1.61E+00	2.30E+00	3.36E+00	5.21E+00	8.74E+00	8.74E+00
03-05	1159000	62	1.48E+00	1.05E-03	1.01E-01	1.01E-01	1.26E-01	1.91E-01	5.18E-01	1.31E+00	1.98E+00	3.09E+00	4.15E+00	4.85E+00	5.39E+00
06-11	1859000	95	1.07E+00	6.42E-04	5.83E-02	5.83E-02	1.08E-01	1.56E-01	6.09E-01	8.80E-01	1.26E+00	1.96E+00	2.50E+00	5.16E+00	5.16E+00
12-19	2206000	109	6.07E-01	3.59E-04	3.48E-02	3.48E-02	1.07E-01	1.27E-01	2.40E-01	4.69E-01	7.44E-01	1.35E+00	1.80E+00	2.64E+00	2.76E+00
20-39	7129000	364	5.40E-01	2.27E-04	1.98E-02	3.43E-02	5.59E-02	9.67E-02	1.77E-01	3.79E-01	6.46E-01	1.12E+00	1.49E+00	3.18E+00	4.46E+00
40-69	7170000	361	6.11E-01	1.88E-04	0.00E+00	3.19E-02	1.08E-01	1.63E-01	3.04E-01	4.54E-01	7.84E-01	1.13E+00	1.61E+00	2.42E+00	3.62E+00
70+	2397000	124	8.52E-01	4.01E-04	1.20E-01	1.20E-01	1.85E-01	2.37E-01	3.89E-01	7.36E-01	1.08E+00	1.71E+00	2.00E+00	2.88E+00	3.53E+00
Seasons															
Fall	7311000	237	1.15E+00	1.45E-03	2.02E-02	4.88E-02	1.00E-01	1.45E-01	2.89E-01	5.21E-01	1.84E+00	1.94E+00	3.14E+00	8.74E+00	5.41E+01
Spring	4901000	429	6.62E-01	3.52E-04	0.00E+00	3.80E-02	8.20E-02	1.10E-01	2.20E-01	4.43E-01	7.71E-01	1.45E+00	2.20E+00	4.23E+00	7.04E+00
Summer	5525000	174	8.03E-01	2.93E-04	2.61E-02	3.43E-02	1.19E-01	1.58E-01	2.81E-01	6.09E-01	1.04E+00	1.80E+00	2.33E+00	3.18E+00	3.62E+00
Winter	6391000	393	7.81E-01	3.17E-04	9.62E-03	3.73E-02	9.85E-02	1.66E-01	3.16E-01	5.83E-01	9.84E-01	1.68E+00	2.23E+00	4.82E+00	6.20E+00
Urbanization															
Central City	8383000	333	1.16E+00	1.27E-03	3.19E-02	4.43E-02	1.12E-01	1.62E-01	3.32E-01	6.65E-01	1.22E+00	1.94E+00	2.64E+00	6.47E+00	5.41E+01
Nonmetropolitan	4768000	297	6.68E-01	3.09E-04	0.00E+00	2.13E-02	8.52E-02	1.25E-01	2.68E-01	4.91E-01	8.49E-01	1.40E+00	1.86E+00	2.88E+00	7.04E+00
Surburban	10977000	603	7.46E-01	2.48E-04	9.62E-03	3.48E-02	9.08E-02	1.32E-01	2.56E-01	4.73E-01	9.02E-01	1.72E+00	2.40E+00	4.15E+00	6.20E+00
Race															
Asian	555000	30	1.28E+00	1.61E-03	2.39E-01	2.39E-01	3.14E-01	3.55E-01	4.50E-01	8.91E-01	1.42E+00	4.00E+00	4.29E+00	5.29E+00	5.29E+00
Black	1600000	86	9.59E-01	7.35E-04	3.19E-02	3.83E-02	1.08E-01	1.50E-01	3.84E-01	6.78E-01	1.35E+00	1.98E+00	2.45E+00	5.39E+00	6.20E+00
Native American	79000	7	2.27E-01	5.81E-04	4.70E-02	4.70E-02	4.70E-02	4.70E-02	1.22E-01	1.62E-01	2.98E-01	4.73E-01	5.98E-01	5.98E-01	5.98E-01
Other/NA	586000	21	4.98E+00	1.69E-02	1.91E-01	1.91E-01	3.01E-01	3.02E-01	6.01E-01	8.02E-01	2.64E+00	8.74E+00	5.41E+01	5.41E+01	5.41E+01
White	21308000	1089	7.46E-01	1.67E-04	0.00E+00	3.50E-02	9.15E-02	1.38E-01	2.68E-01	5.02E-01	9.31E-01	1.66E+00	2.30E+00	3.78E+00	7.04E+00
Regions															
Midwest	6783000	378	7.91E-01	2.84E-04	4.55E-02	5.72E-02	1.25E-01	2.05E-01	3.38E-01	5.61E-01	1.01E+00	1.60E+00	2.12E+00	4.23E+00	6.47E+00
Northeast	5407000	272	1.21E+00	1.94E-03	9.62E-03	4.68E-02	1.10E-01	1.49E-01	2.50E-01	4.87E-01	1.01E+00	2.23E+00	2.61E+00	8.74E+00	5.41E+01
South	5781000	285	6.81E-01	2.98E-04	1.98E-02	5.19E-02	1.07E-01	1.51E-01	2.51E-01	4.91E-01	8.13E-01	1.35E+00	1.96E+00	3.10E+00	7.04E+00
West	6157000	298	8.50E-01	3.75E-04	0.00E+00	2.13E-02	4.88E-02	1.01E-01	2.51E-01	5.21E-01	1.07E+00	1.85E+00	2.63E+00	4.97E+00	5.42E+00
Response to Questionnaire															
Do you garden?	10555000	568	6.96E-01	2.29E-04	1.98E-02	5.62E-02	1.01E-01	1.44E-01	2.49E-01	4.67E-01	8.37E-01	1.42E+00	2.17E+00	4.66E+00	5.16E+00
Do you farm?	1197000	74	7.95E-01	9.12E-04	1.98E-02	1.98E-02	4.25E-02	6.69E-02	2.78E-01	4.72E-01	9.84E-01	1.72E+00	2.76E+00	5.16E+00	5.16E+00

Table 2-45. Intake of Total Strawberries (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	17545000	1251	6.89E-01	2.19E-04	0.00E+00	3.44E-02	9.80E-02	1.34E-01	2.37E-01	4.61E-01	8.18E-01	1.44E+00	1.85E+00	4.72E+00	1.56E+01
Age															
< 01	153000	10	5.16E-01	1.56E-03	6.70E-02	6.70E-02	6.70E-02	6.70E-02	1.83E-01	3.57E-01	5.75E-01	1.08E+00	2.79E+00	2.79E+00	2.79E+00
01-02	708000	46	1.98E+00	1.54E-03	3.97E-01	3.97E-01	6.72E-01	7.04E-01	1.14E+00	1.68E+00	2.53E+00	4.27E+00	4.77E+00	7.20E+00	7.20E+00
03-05	657000	52	1.74E+00	3.37E-03	3.00E-01	3.00E-01	3.86E-01	5.15E-01	6.91E-01	9.03E-01	1.70E+00	3.34E+00	6.05E+00	1.56E+01	1.56E+01
06-11	1473000	124	9.17E-01	7.96E-04	6.07E-02	9.17E-02	1.85E-01	2.87E-01	4.29E-01	6.21E-01	9.92E-01	1.66E+00	2.43E+00	5.11E+00	7.43E+00
12-19	1922000	139	5.03E-01	2.75E-04	3.44E-02	8.17E-02	1.06E-01	1.44E-01	2.50E-01	3.86E-01	6.36E-01	1.07E+00	1.38E+00	1.66E+00	1.80E+00
20-39	4370000	304	4.44E-01	2.66E-04	0.00E+00	1.38E-02	7.88E-02	9.99E-02	1.61E-01	2.69E-01	5.29E-01	9.57E-01	1.15E+00	3.14E+00	6.62E+00
40-69	6517000	463	5.98E-01	2.48E-04	0.00E+00	3.44E-02	1.03E-01	1.45E-01	2.27E-01	4.18E-01	7.28E-01	1.30E+00	1.68E+00	2.85E+00	1.01E+01
70 +	1745000	113	7.49E-01	4.53E-04	2.70E-02	3.12E-02	1.35E-01	2.37E-01	4.04E-01	6.12E-01	8.66E-01	1.36E+00	1.98E+00	2.54E+00	5.49E+00
Seasons															
Fall	931000	30	7.17E-01	5.39E-04	0.00E+00	0.00E+00	1.47E-01	1.79E-01	3.15E-01	5.79E-01	1.00E+00	1.47E+00	1.66E+00	2.20E+00	2.20E+00
Spring	10256000	926	7.56E-01	3.34E-04	1.38E-02	4.90E-02	1.09E-01	1.57E-01	2.58E-01	4.76E-01	8.86E-01	1.59E+00	2.04E+00	5.01E+00	1.56E+01
Summer	2929000	87	5.87E-01	3.73E-04	5.98E-02	5.98E-02	1.13E-01	1.25E-01	2.12E-01	4.29E-01	7.00E-01	1.09E+00	1.70E+00	2.60E+00	5.11E+00
Winter	3429000	208	5.67E-01	3.47E-04	0.00E+00	2.70E-02	6.70E-02	9.99E-02	1.85E-01	3.82E-01	6.80E-01	1.26E+00	1.85E+00	2.90E+00	4.77E+00
Urbanization															
Central City	4943000	220	7.22E-01	4.78E-04	2.86E-02	4.15E-02	1.05E-01	1.59E-01	2.45E-01	5.04E-01	9.36E-01	1.44E+00	1.82E+00	2.60E+00	1.56E+01
Nonmetropolitan	4074000	370	7.57E-01	4.60E-04	0.00E+00	4.90E-02	8.65E-02	1.24E-01	2.22E-01	4.49E-01	9.02E-01	[illegible]	2.45E+00	5.01E+00	1.01E+01
Surburban	8528000	661	6.36E-01	2.70E-04	0.00E+00	3.01E-02	9.95E-02	1.29E-01	2.31E-01	4.49E-01	7.21E-01	1.30E+00	1.78E+00	4.77E+00	9.97E+00
Race															
Asian	191000	13	2.09E+00	1.00E-02	1.47E-01	1.47E-01	1.47E-01	2.08E-01	3.15E-01	6.68E-01	1.01E+00	1.43E+00	1.56E+01	1.56E+01	1.56E+01
Black	1206000	84	6.08E-01	7.11E-04	0.00E+00	3.44E-02	1.13E-01	1.49E-01	2.00E-01	3.57E-01	8.18E-01	1.17E+00	1.59E+00	4.27E+00	7.20E+00
Native American	159000	9	1.95E-01	3.28E-04	8.17E-02	8.17E-02	8.17E-02	8.17E-02	8.76E-02	1.81E-01	2.82E-01	5.13E-01	5.13E-01	5.13E-01	5.13E-01
Other/NA	488000	28	4.37E-01	7.08E-04	2.77E-02	2.77E-02	9.95E-02	1.13E-01	1.35E-01	1.79E-01	4.98E-01	1.42E+00	1.42E+00	1.85E+00	1.85E+00
White	15501000	1117	6.91E-01	2.02E-04	0.00E+00	3.44E-02	9.99E-02	1.42E-01	2.51E-01	4.76E-01	8.20E-01	1.45E+00	1.89E+00	4.20E+00	1.01E+01
Regions															
Midwest	5082000	376	7.23E-01	3.61E-04	2.44E-02	3.79E-02	1.03E-01	1.37E-01	2.28E-01	4.28E-01	9.35E-01	1.66E+00	2.06E+00	5.11E+00	5.81E+00
Northeast	4111000	272	6.98E-01	4.37E-04	0.00E+00	2.69E-02	1.11E-01	1.49E-01	2.54E-01	4.67E-01	8.42E-01	1.38E+00	1.83E+00	4.77E+00	9.97E+00
South	4950000	357	6.23E-01	2.82E-04	0.00E+00	2.86E-02	9.65E-02	1.36E-01	2.28E-01	5.15E-01	7.29E-01	1.24E+00	1.77E+00	2.90E+00	7.20E+00
West	3402000	246	7.22E-01	7.31E-04	2.70E-02	7.03E-02	8.76E-02	1.25E-01	2.22E-01	4.44E-01	7.62E-01	1.41E+00	1.79E+00	4.20E+00	1.56E+01
Response to Questionnaire															
Do you garden?	7416000	544	6.83E-01	3.57E-04	0.00E+00	3.44E-02	9.95E-02	1.33E-01	2.42E-01	4.41E-01	8.22E-01	1.47E+00	1.93E+00	3.14E+00	1.56E+01
Do you farm?	821000	71	6.54E-01	9.27E-04	0.00E+00	0.00E+00	3.48E-02	6.07E-02	1.78E-01	3.31E-01	7.21E-01	1.96E+00	2.58E+00	3.39E+00	4.72E+00

Table 2-46. Intake of Total Other Berries (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	8250000	411	4.36E-01	1.66E-04	0.00E+00	0.00E+00	3.28E-02	7.29E-02	1.63E-01	3.12E-01	5.18E-01	9.02E-01	1.29E+00	2.21E+00	4.64E+00
Age															
<01	186000	9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	268000	14	1.01E+00	1.48E-03	1.92E-01	1.92E-01	1.92E-01	2.35E-01	4.02E-01	1.01E+00	1.31E+00	2.72E+00	2.72E+00	2.72E+00	2.72E+00
03-05	431000	20	8.95E-01	9.47E-04	0.00E+00	0.00E+00	0.00E+00	1.95E-01	4.12E-01	8.77E-01	1.54E+00	1.72E+00	1.95E+00	2.41E+00	2.41E+00
06-11	551000	33	3.63E-01	2.88E-04	0.00E+00	0.00E+00	0.00E+00	1.27E-01	2.62E-01	3.46E-01	4.74E-01	6.51E-01	6.51E-01	1.22E+00	1.22E+00
12-19	625000	35	2.80E-01	2.90E-04	3.28E-02	3.28E-02	4.68E-02	7.29E-02	1.58E-01	2.19E-01	3.44E-01	5.79E-01	8.98E-01	1.20E+00	1.20E+00
20-39	2306000	109	3.53E-01	1.71E-04	4.94E-02	5.25E-02	7.34E-02	9.24E-02	1.34E-01	2.92E-01	4.82E-01	6.67E-01	8.90E-01	1.18E+00	1.20E+00
40-69	3175000	160	4.57E-01	3.03E-04	0.00E+00	0.00E+00	3.61E-02	7.69E-02	1.71E-01	3.24E-01	5.58E-01	9.28E-01	1.30E+00	2.21E+00	4.64E+00
70 +	708000	31	4.23E-01	5.59E-04	0.00E+00	0.00E+00	3.67E-02	5.43E-02	2.30E-01	3.45E-01	4.98E-01	5.51E-01	8.11E-01	3.09E+00	3.09E+00
Seasons															
Fall	2424000	81	4.26E-01	3.51E-04	0.00E+00	0.00E+00	1.70E-02	7.29E-02	1.35E-01	3.42E-01	4.84E-01	7.11E-01	1.31E+00	1.72E+00	4.64E+00
Spring	1517000	135	3.73E-01	2.78E-04	0.00E+00	0.00E+00	4.68E-02	5.55E-02	1.43E-01	2.83E-01	4.99E-01	8.11E-01	1.20E+00	1.45E+00	2.41E+00
Summer	2757000	88	4.36E-01	2.81E-04	0.00E+00	0.00E+00	1.24E-02	8.52E-02	1.63E-01	2.99E-01	4.83E-01	1.01E+00	1.31E+00	2.72E+00	2.72E+00
Winter	1552000	107	5.13E-01	3.80E-04	0.00E+00	0.00E+00	7.29E-02	1.32E-01	2.10E-01	3.89E-01	6.67E-01	1.06E+00	1.30E+00	3.09E+00	3.09E+00
Urbanization															
Central City	1972000	70	3.49E-01	2.48E-04	0.00E+00	0.00E+00	1.70E-02	4.94E-02	1.12E-01	2.80E-01	4.02E-01	7.56E-01	1.07E+00	1.72E+00	1.72E+00
Nonmetropolitan	1920000	127	5.53E-01	3.58E-04	0.00E+00	0.00E+00	8.02E-02	1.27E-01	2.31E-01	3.60E-01	7.11E-01	1.29E+00	1.63E+00	2.21E+00	2.41E+00
Surburban	4298000	212	4.29E-01	2.44E-04	0.00E+00	0.00E+00	5.23E-02	7.74E-02	1.63E-01	3.45E-01	5.08E-01	7.57E-01	1.06E+00	2.72E+00	4.64E+00
Race															
Asian	110000	4	8.12E-02	2.32E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.89E-02	1.35E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01
Black	122000	5	5.39E-01	6.39E-04	1.58E-01	1.58E-01	1.58E-01	1.58E-01	3.01E-01	5.89E-01	7.56E-01	7.56E-01	7.56E-01	7.56E-01	7.56E-01
Other/NA	30000	3	7.64E-01	3.01E-03	3.30E-01	3.30E-01	3.30E-01	3.30E-01	3.30E-01	3.94E-01	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00
White	7928000	397	4.41E-01	1.70E-04	0.00E+00	0.00E+00	4.68E-02	7.88E-02	1.72E-01	3.25E-01	5.14E-01	9.28E-01	1.29E+00	2.21E+00	4.64E+00
Regions															
Midwest	3149000	156	4.63E-01	2.65E-04	0.00E+00	0.00E+00	1.89E-02	7.29E-02	1.39E-01	3.45E-01	5.79E-01	1.01E+00	1.54E+00	2.21E+00	2.72E+00
Northeast	1532000	81	4.37E-01	3.90E-04	0.00E+00	0.00E+00	5.25E-02	9.75E-02	1.64E-01	2.60E-01	5.12E-01	1.08E+00	1.31E+00	3.09E+00	3.09E+00
South	1514000	79	4.17E-01	2.81E-04	0.00E+00	0.00E+00	9.24E-02	1.20E-01	1.98E-01	3.31E-01	4.82E-01	8.90E-01	1.28E+00	1.46E+00	2.41E+00
West	1995000	93	4.21E-01	3.94E-04	0.00E+00	0.00E+00	2.24E-02	5.43E-02	1.71E-01	3.30E-01	5.14E-01	7.24E-01	1.01E+00	4.64E+00	4.64E+00
Response to Questionnaire															
Do you garden?	4611000	239	4.46E-01	2.24E-04	0.00E+00	0.00E+00	2.24E-02	7.17E-02	1.35E-01	3.06E-01	5.51E-01	1.01E+00	1.46E+00	2.41E+00	3.09E+00
Do you farm?	449000	26	5.12E-01	8.17E-04	0.00E+00	0.00E+00	6.93E-02	7.17E-02	1.63E-01	4.12E-01	5.35E-01	1.79E+00	2.05E+00	2.05E+00	2.05E+00

Table 2-47. Intake of Total Asparagus (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11857000	751	5.76E-01	1.59E-04	0.00E+00	5.66E-02	1.13E-01	1.80E-01	2.67E-01	4.21E-01	6.89E-01	1.15E+00	1.63E+00	2.46E+00	6.35E+00
Age															
< 01	190000	12	7.21E-01	1.35E-03	7.70E-02	7.70E-02	7.70E-02	7.70E-02	4.66E-01	4.88E-01	1.18E+00	1.34E+00	1.34E+00	2.65E+00	2.65E+00
01-02	167000	11	1.33E+00	1.58E-03	5.08E-01	5.08E-01	5.08E-01	5.52E-01	7.89E-01	1.15E+00	1.84E+00	2.27E+00	2.27E+00	3.05E+00	3.05E+00
03-05	457000	30	7.14E-01	8.62E-04	1.68E-01	1.68E-01	2.39E-01	2.72E-01	4.20E-01	5.43E-01	6.26E-01	2.11E+00	2.11E+00	2.65E+00	2.65E+00
06-11	873000	61	6.87E-01	5.38E-04	4.22E-02	4.22E-02	1.35E-01	2.71E-01	3.27E-01	5.39E-01	8.39E-01	1.52E+00	2.00E+00	2.20E+00	2.20E+00
12-19	1159000	67	3.24E-01	2.42E-04	3.62E-02	3.62E-02	5.81E-02	7.51E-02	1.54E-01	2.56E-01	4.39E-01	7.22E-01	7.68E-01	1.17E+00	1.49E+00
20-39	3104000	180	5.15E-01	3.23E-04	0.00E+00	0.00E+00	1.04E-01	1.46E-01	2.31E-01	3.65E-01	5.68E-01	9.69E-01	1.34E+00	2.29E+00	6.35E+00
40-69	4531000	306	5.73E-01	2.19E-04	4.79E-02	6.28E-02	1.91E-01	2.17E-01	3.00E-01	4.20E-01	6.97E-01	1.09E+00	1.45E+00	2.10E+00	4.61E+00
70 +	1376000	84	7.03E-01	6.31E-04	1.01E-01	1.15E-01	1.46E-01	2.10E-01	3.20E-01	5.03E-01	8.31E-01	1.43E+00	1.92E+00	5.38E+00	5.38E+00
Seasons															
Fall	1963000	66	4.08E-01	1.89E-04	0.00E+00	0.00E+00	6.28E-02	1.45E-01	2.31E-01	3.27E-01	5.39E-01	7.43E-01	1.02E+00	1.22E+00	1.30E+00
Spring	5413000	460	6.66E-01	2.79E-04	0.00E+00	5.81E-02	1.00E-01	1.88E-01	3.02E-01	4.71E-01	8.57E-01	1.27E+00	1.75E+00	2.65E+00	6.35E+00
Summer	1107000	35	4.93E-01	3.57E-04	1.04E-01	1.04E-01	1.51E-01	2.04E-01	2.27E-01	3.91E-01	5.85E-01	8.30E-01	1.34E+00	2.20E+00	2.20E+00
Winter	3374000	190	5.55E-01	2.79E-04	4.79E-02	7.14E-02	1.28E-01	1.81E-01	2.52E-01	4.09E-01	6.26E-01	1.17E+00	1.83E+00	2.46E+00	3.22E+00
Urbanization															
Central City	3166000	146	6.01E-01	3.66E-04	3.62E-02	5.81E-02	8.73E-02	1.46E-01	2.56E-01	4.23E-01	6.54E-01	1.14E+00	1.67E+00	3.22E+00	5.38E+00
Nonmetropolitan	2178000	165	5.19E-01	2.93E-04	4.95E-02	4.95E-02	7.99E-02	1.41E-01	2.18E-01	3.56E-01	6.95E-01	1.12E+00	1.54E+00	1.92E+00	1.97E+00
Surburban	6513000	440	5.83E-01	2.06E-04	0.00E+00	4.79E-02	1.48E-01	2.01E-01	2.81E-01	4.40E-01	7.22E-01	1.15E+00	1.47E+00	2.29E+00	6.35E+00
Race															
Asian	198000	12	4.93E-01	4.95E-04	2.56E-01	2.56E-01	2.56E-01	2.56E-01	3.19E-01	3.51E-01	7.30E-01	8.61E-01	9.09E-01	9.09E-01	9.09E-01
Black	1007000	51	4.94E-01	4.35E-04	0.00E+00	0.00E+00	5.89E-02	7.51E-02	2.42E-01	3.36E-01	5.92E-01	1.22E+00	1.39E+00	2.11E+00	2.11E+00
Native American	178000	15	2.50E-01	4.27E-04	7.14E-02	7.14E-02	7.14E-02	8.69E-02	1.02E-01	2.18E-01	2.74E-01	6.77E-01	6.77E-01	6.77E-01	6.77E-01
Other/NA	162000	8	1.30E+00	1.52E-03	2.65E-01	2.65E-01	2.65E-01	4.18E-01	5.49E-01	1.65E+00	1.67E+00	1.67E+00	2.27E+00	2.27E+00	2.27E+00
White	10312000	665	5.80E-01	1.73E-04	0.00E+00	5.81E-02	1.38E-01	1.91E-01	2.71E-01	4.23E-01	6.89E-01	1.10E+00	1.52E+00	2.47E+00	6.35E+00
Regions															
Midwest	1770000	135	5.13E-01	2.29E-04	0.00E+00	1.10E-01	1.51E-01	2.10E-01	3.05E-01	4.48E-01	7.01E-01	9.04E-01	1.05E+00	1.62E+00	1.97E+00
Northeast	4199000	242	5.06E-01	1.96E-04	4.95E-02	5.81E-02	8.37E-02	1.38E-01	2.56E-01	3.88E-01	5.78E-01	1.07E+00	1.33E+00	1.89E+00	2.10E+00
South	3208000	176	5.37E-01	2.37E-04	3.62E-02	4.31E-02	1.44E-01	2.04E-01	2.64E-01	4.07E-01	6.54E-01	1.18E+00	1.46E+00	2.11E+00	2.27E+00
West	2680000	198	7.73E-01	5.28E-04	0.00E+00	4.79E-02	1.10E-01	2.04E-01	3.03E-01	5.14E-01	8.40E-01	1.78E+00	2.46E+00	5.38E+00	6.35E+00
Response to Questionnaire															
Do you garden?	5412000	369	5.25E-01	1.91E-04	4.79E-02	5.81E-02	1.13E-01	1.80E-01	2.60E-01	4.02E-01	6.05E-01	1.02E+00	1.43E+00	2.21E+00	3.22E+00
Do you farm?	367000	29	3.15E-01	2.84E-04	4.79E-02	4.79E-02	4.79E-02	1.13E-01	2.19E-01	2.81E-01	4.22E-01	5.68E-01	5.79E-01	8.66E-01	8.66E-01

Table 2-48. Intake of Total Beets (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11663000	626	4.78E-01	1.37E-04	1.90E-03	2.92E-02	6.92E-02	8.77E-02	1.84E-01	3.61E-01	6.01E-01	1.01E+00	1.34E+00	2.33E+00	4.08E+00
Age															
< 01	149000	8	1.15E+00	1.03E-03	6.93E-01	6.93E-01	6.93E-01	6.93E-01	8.67E-01	1.11E+00	1.15E+00	1.84E+00	2.10E+00	2.10E+00	2.10E+00
01-02	363000	23	1.18E+00	1.64E-03	1.78E-02	1.78E-02	3.93E-01	3.93E-01	4.59E-01	8.39E-01	1.32E+00	2.99E+00	3.69E+00	4.08E+00	4.08E+00
03-05	389000	22	1.27E+00	1.27E-03	2.55E-01	2.55E-01	2.55E-01	4.12E-01	6.10E-01	1.09E+00	2.29E+00	2.41E+00	2.41E+00	2.97E+00	2.97E+00
06-11	804000	48	6.72E-01	6.46E-04	1.15E-01	1.15E-01	1.92E-01	2.41E-01	3.15E-01	5.18E-01	7.77E-01	1.34E+00	1.73E+00	3.74E+00	3.74E+00
12-19	1042000	58	2.79E-01	1.96E-04	3.06E-02	3.06E-02	8.06E-02	1.02E-01	1.33E-01	2.26E-01	3.49E-01	4.94E-01	7.12E-01	9.49E-01	9.49E-01
20-39	2784000	144	3.24E-01	1.73E-04	1.90E-03	2.54E-02	5.60E-02	6.94E-02	1.20E-01	2.40E-01	4.38E-01	7.83E-01	8.73E-01	1.24E+00	2.12E+00
40-69	4424000	236	3.86E-01	1.47E-04	1.26E-02	2.87E-02	7.37E-02	8.75E-02	1.74E-01	2.96E-01	4.93E-01	8.33E-01	1.15E+00	1.45E+00	1.83E+00
70 +	1708000	87	6.12E-01	2.95E-04	3.21E-02	3.21E-02	1.64E-01	2.49E-01	3.59E-01	4.96E-01	8.82E-01	1.32E+00	1.45E+00	1.59E+00	1.59E+00
Seasons															
Fall	3043000	105	5.07E-01	3.02E-04	1.26E-02	2.54E-02	5.00E-02	6.94E-02	1.64E-01	3.64E-01	5.76E-01	1.24E+00	1.40E+00	2.41E+00	2.99E+00
Spring	2737000	252	5.02E-01	2.81E-04	2.92E-02	6.41E-02	8.25E-02	1.07E-01	1.81E-01	3.88E-01	6.64E-01	1.02E+00	1.32E+00	2.11E+00	4.08E+00
Summer	2973000	89	4.18E-01	1.99E-04	2.87E-02	4.25E-02	6.81E-02	8.83E-02	1.88E-01	3.59E-01	5.10E-01	8.93E-01	1.21E+00	1.59E+00	1.73E+00
Winter	2910000	180	4.87E-01	2.95E-04	1.90E-03	1.78E-02	7.31E-02	1.15E-01	2.05E-01	3.49E-01	6.24E-01	9.25E-01	1.32E+00	3.69E+00	3.74E+00
Urbanization															
Central City	3365000	132	4.74E-01	2.28E-04	3.04E-02	4.77E-02	8.25E-02	1.35E-01	2.29E-01	3.61E-01	5.77E-01	9.09E-01	1.21E+00	1.59E+00	3.69E+00
Nonmetropolitan	2254000	156	5.15E-01	3.24E-04	1.26E-02	1.26E-02	7.31E-02	8.81E-02	1.99E-01	3.89E-01	6.51E-01	1.03E+00	1.36E+00	2.84E+00	4.08E+00
Surburban	6044000	338	4.67E-01	1.97E-04	1.90E-03	2.87E-02	6.09E-02	8.01E-02	1.62E-01	3.12E-01	5.82E-01	1.02E+00	1.34E+00	2.41E+00	3.74E+00
Race															
Asian	88000	4	5.15E-01	5.43E-04	1.92E-01	1.92E-01	1.92E-01	1.92E-01	5.67E-01	5.67E-01	6.23E-01	6.23E-01	6.23E-01	6.23E-01	6.23E-01
Black	1012000	46	4.02E-01	4.81E-04	1.26E-02	1.26E-02	6.02E-02	7.92E-02	1.24E-01	2.76E-01	4.80E-01	8.43E-01	1.24E+00	3.74E+00	3.74E+00
Native American	93000	5	1.29E-01	1.60E-04	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02	1.17E-01	1.43E-01	2.04E-01	2.04E-01	2.04E-01	2.04E-01
Other/NA	159000	9	3.28E-01	5.55E-04	5.63E-02	5.63E-02	5.63E-02	7.98E-02	1.71E-01	3.08E-01	3.33E-01	6.51E-01	8.43E-01	8.43E-01	8.43E-01
White	10311000	562	4.91E-01	1.46E-04	1.90E-03	3.04E-02	6.94E-02	8.83E-02	1.92E-01	3.68E-01	6.11E-01	1.03E+00	1.35E+00	2.33E+00	4.08E+00
Regions															
Midwest	2616000	162	4.94E-01	3.26E-04	2.92E-02	4.12E-02	6.48E-02	8.58E-02	1.99E-01	3.66E-01	5.56E-01	1.03E+00	1.36E+00	2.99E+00	3.69E+00
Northeast	3130000	156	4.80E-01	2.22E-04	2.87E-02	4.25E-02	6.94E-02	1.20E-01	2.23E-01	3.65E-01	6.09E-01	9.85E-01	1.33E+00	2.10E+00	2.41E+00
South	3471000	183	4.89E-01	2.75E-04	1.26E-02	2.54E-02	7.46E-02	9.40E-02	1.86E-01	3.57E-01	5.71E-01	9.98E-01	1.33E+00	2.84E+00	4.08E+00
West	2446000	125	4.45E-01	2.61E-04	1.90E-03	1.78E-02	4.77E-02	7.31E-02	1.54E-01	2.86E-01	6.24E-01	1.09E+00	1.32E+00	1.73E+00	2.32E+00
Response to Questionnaire															
Do you garden?	5308000	307	4.97E-01	2.28E-04	2.21E-02	3.06E-02	6.09E-02	7.75E-02	1.80E-01	3.66E-01	5.88E-01	1.02E+00	1.41E+00	2.97E+00	4.08E+00
Do you farm?	385000	23	7.46E-01	1.26E-03	1.72E-01	1.72E-01	1.84E-01	1.88E-01	2.85E-01	3.86E-01	8.84E-01	2.33E+00	2.99E+00	2.99E+00	2.99E+00

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Table 2-49. Intake of Total Broccoli (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	58690000	3014	8.18E-01	1.76E-04	0.00E+00	4.35E-02	1.11E-01	1.60E-01	2.62E-01	5.02E-01	9.16E-01	1.67E+00	2.40E+00	5.43E+00	3.86E+01
Age															
< 01	929000	51	5.69E+00	7.11E-03	1.24E-01	1.24E-01	8.31E-01	1.25E+00	1.62E+00	3.53E+00	6.43E+00	1.27E+01	1.92E+01	3.86E+01	3.86E+01
01-02	1649000	91	1.81E+00	1.23E-03	2.16E-01	2.97E-01	3.88E-01	5.27E-01	7.89E-01	1.30E+00	2.06E+00	4.53E+00	5.13E+00	7.29E+00	8.67E+00
03-05	2708000	145	1.31E+00	8.56E-04	1.47E-01	1.47E-01	3.10E-01	3.76E-01	5.41E-01	8.13E-01	1.34E+00	3.64E+00	3.97E+00	6.83E+00	1.02E+01
06-11	5488000	305	7.98E-01	3.71E-04	1.19E-02	3.18E-02	1.32E-01	1.95E-01	3.05E-01	5.60E-01	9.67E-01	1.43E+00	2.50E+00	5.45E+00	5.56E+00
12-19	6026000	316	5.93E-01	2.30E-04	0.00E+00	3.92E-02	8.21E-02	1.52E-01	2.51E-01	4.02E-01	7.48E-01	1.16E+00	1.86E+00	2.95E+00	3.64E+00
20-39	17676000	866	6.26E-01	1.68E-04	0.00E+00	4.76E-02	1.00E-01	1.38E-01	2.22E-01	3.98E-01	7.56E-01	1.36E+00	1.86E+00	3.08E+00	7.37E+00
40-69	19721000	1010	6.80E-01	1.62E-04	0.00E+00	4.35E-02	1.04E-01	1.50E-01	2.48E-01	4.83E-01	8.36E-01	1.43E+00	1.96E+00	3.33E+00	9.58E+00
70 +	4493000	230	8.32E-01	3.31E-04	0.00E+00	9.05E-02	1.31E-01	2.03E-01	3.52E-01	5.99E-01	1.04E+00	1.84E+00	2.32E+00	3.08E+00	4.26E+00
Seasons															
Fall	14289000	459	9.40E-01	5.37E-04	0.00E+00	3.18E-02	8.82E-02	1.30E-01	2.31E-01	4.50E-01	1.03E+00	1.94E+00	2.87E+00	7.27E+00	3.86E+01
Spring	14274000	1205	8.55E-01	2.93E-04	0.00E+00	6.04E-02	1.37E-01	1.82E-01	2.95E-01	5.34E-01	9.99E-01	1.87E+00	2.54E+00	5.71E+00	1.42E+01
Summer	13927000	431	7.32E-01	2.11E-04	0.00E+00	5.65E-02	1.27E-01	1.81E-01	2.76E-01	5.17E-01	8.40E-01	1.42E+00	2.34E+00	4.58E+00	6.43E+00
Winter	16200000	919	7.51E-01	2.80E-04	0.00E+00	4.76E-02	1.02E-01	1.51E-01	2.52E-01	4.83E-01	8.66E-01	1.48E+00	2.17E+00	5.13E+00	1.92E+01
Urbanization															
Central City	17301000	654	9.49E-01	2.96E-04	1.19E-02	3.92E-02	1.01E-01	1.63E-01	2.96E-01	5.68E-01	1.10E+00	2.02E+00	2.91E+00	6.43E+00	1.42E+01
Nonmetropolitan	10130000	660	6.71E-01	3.71E-04	0.00E+00	4.50E-02	1.23E-01	1.56E-01	2.46E-01	4.24E-01	7.60E-01	1.30E+00	1.90E+00	3.57E+00	2.42E+01
Surburban	31259000	1700	7.92E-01	2.58E-04	0.00E+00	5.18E-02	1.09E-01	1.57E-01	2.54E-01	4.90E-01	8.71E-01	1.55E+00	2.24E+00	5.45E+00	3.86E+01
Race															
Asian	1055000	48	1.37E+00	2.59E-03	8.77E-02	8.77E-02	1.06E-01	1.47E-01	3.32E-01	5.07E-01	1.15E+00	1.73E+00	1.11E+01	1.42E+01	1.42E+01
Black	5595000	249	8.44E-01	6.95E-04	0.00E+00	6.08E-02	1.35E-01	1.62E-01	2.58E-01	4.46E-01	8.55E-01	1.82E+00	2.66E+00	7.27E+00	2.42E+01
Native American	232000	13	7.55E-01	2.72E-03	1.82E-01	1.82E-01	1.82E-01	2.21E-01	3.86E-01	4.22E-01	5.14E-01	5.66E-01	5.71E+00	5.71E+00	5.71E+00
Other/NA	1006000	46	9.76E-01	7.72E-04	9.65E-02	9.65E-02	2.22E-01	3.01E-01	3.49E-01	7.05E-01	1.40E+00	2.12E+00	2.76E+00	2.95E+00	3.25E+00
White	50802000	2658	8.01E-01	1.78E-04	0.00E+00	4.11E-02	1.09E-01	1.56E-01	2.59E-01	5.07E-01	9.04E-01	1.65E+00	2.36E+00	5.13E+00	3.86E+01
Regions															
Midwest	11399000	626	7.35E-01	3.38E-04	0.00E+00	3.92E-02	8.24E-02	1.25E-01	2.30E-01	4.32E-01	8.20E-01	1.49E+00	2.22E+00	4.81E+00	1.42E+01
Northeast	14518000	723	7.76E-01	2.38E-04	0.00E+00	4.11E-02	1.06E-01	1.63E-01	2.69E-01	5.27E-01	9.22E-01	1.49E+00	2.34E+00	4.79E+00	9.32E+00
South	19989000	973	8.72E-01	4.06E-04	0.00E+00	4.76E-02	1.27E-01	1.67E-01	2.75E-01	5.14E-01	8.93E-01	1.74E+00	2.48E+00	6.43E+00	3.86E+01
West	12784000	692	8.54E-01	2.85E-04	3.25E-02	8.33E-02	1.21E-01	1.64E-01	2.73E-01	5.20E-01	1.05E+00	1.95E+00	2.55E+00	5.57E+00	8.14E+00
Response to Questionnaire															
Do you garden?	23865000	1256	7.18E-01	2.16E-04	0.00E+00	4.27E-02	9.67E-02	1.42E-01	2.40E-01	4.43E-01	8.33E-01	1.45E+00	2.03E+00	5.13E+00	1.92E+01
Do you farm?	2872000	143	6.10E-01	4.06E-04	0.00E+00	7.48E-02	9.86E-02	1.18E-01	2.46E-01	3.69E-01	7.47E-01	1.45E+00	1.92E+00	3.08E+00	4.81E+00

Table 2-50. Intake of Total Cabbage (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	41856000	2266	1.30E+00	2.61E-04	0.00E+00	3.39E-02	9.66E-02	1.75E-01	3.94E-01	8.40E-01	1.56E+00	2.72E+00	3.90E+00	8.59E+00	2.39E+01
Age															
<01	767000	42	4.61E+00	6.12E-03	0.00E+00	0.00E+00	3.71E-01	3.84E-01	9.39E-01	3.13E+00	5.31E+00	1.20E+01	1.28E+01	2.39E+01	2.39E+01
01-02	1215000	65	2.78E+00	2.48E-03	3.10E-02	4.88E-02	1.94E-01	2.82E-01	8.17E-01	2.21E+00	3.10E+00	7.09E+00	1.04E+01	1.07E+01	1.07E+01
03-05	1567000	81	3.33E+00	2.99E-03	4.02E-02	1.31E-01	2.68E-01	4.45E-01	1.06E+00	2.40E+00	3.84E+00	7.14E+00	1.05E+01	1.60E+01	1.60E+01
06-11	3861000	206	1.63E+00	7.77E-04	0.00E+00	5.75E-02	1.20E-01	2.10E-01	6.17E-01	1.24E+00	2.10E+00	3.67E+00	4.72E+00	7.91E+00	7.91E+00
12-19	4341000	232	9.15E-01	4.50E-04	0.00E+00	0.00E+00	5.55E-02	1.19E-01	3.45E-01	7.17E-01	1.15E+00	1.91E+00	2.82E+00	3.90E+00	1.14E+01
20-39	11196000	562	8.81E-01	2.75E-04	0.00E+00	1.78E-02	7.24E-02	1.14E-01	2.81E-01	6.61E-01	1.19E+00	1.97E+00	2.35E+00	3.80E+00	1.06E+01
40-69	14476000	833	1.17E+00	3.37E-04	0.00E+00	4.90E-02	1.14E-01	1.94E-01	4.13E-01	8.09E-01	1.48E+00	2.36E+00	3.57E+00	7.50E+00	1.17E+01
70+	4433000	245	1.20E+00	4.74E-04	5.00E-02	9.16E-02	1.67E-01	2.10E-01	4.54E-01	9.33E-01	1.61E+00	2.55E+00	3.24E+00	4.53E+00	6.25E+00
Seasons															
Fall	10320000	347	1.32E+00	5.92E-04	0.00E+00	3.86E-02	9.62E-02	1.34E-01	3.06E-01	7.43E-01	1.49E+00	3.17E+00	4.53E+00	1.04E+01	1.60E+01
Spring	8408000	777	1.38E+00	6.10E-04	0.00E+00	3.84E-02	1.35E-01	2.09E-01	4.62E-01	8.74E-01	1.69E+00	2.96E+00	4.08E+00	8.93E+00	2.23E+01
Summer	10168000	328	1.35E+00	4.94E-04	0.00E+00	0.00E+00	8.89E-02	1.72E-01	3.70E-01	1.05E+00	1.75E+00	2.71E+00	3.63E+00	1.07E+01	1.15E+01
Winter	12960000	814	1.20E+00	4.22E-04	0.00E+00	3.97E-02	1.03E-01	1.98E-01	4.21E-01	8.25E-01	1.44E+00	2.56E+00	3.45E+00	7.66E+00	2.39E+01
Urbanization															
Central City	12371000	479	1.63E+00	5.99E-04	0.00E+00	0.00E+00	8.74E-02	1.94E-01	4.46E-01	1.03E+00	1.91E+00	3.60E+00	5.19E+00	1.15E+01	2.23E+01
Nonmetropolitan	10614000	752	1.17E+00	4.50E-04	0.00E+00	4.96E-02	1.14E-01	1.74E-01	3.72E-01	7.86E-01	1.48E+00	2.35E+00	3.21E+00	6.42E+00	2.39E+01
Surburban	18871000	1035	1.16E+00	3.32E-04	0.00E+00	3.86E-02	1.03E-01	1.71E-01	3.76E-01	7.58E-01	1.37E+00	2.34E+00	3.53E+00	8.27E+00	1.28E+01
Race															
Asian	1332000	63	2.64E+00	2.85E-03	1.39E-01	1.39E-01	3.71E-01	6.65E-01	8.74E-01	1.75E+00	2.94E+00	5.19E+00	1.05E+01	2.14E+01	2.23E+01
Black	6965000	379	1.90E+00	7.79E-04	0.00E+00	0.00E+00	1.24E-01	3.63E-01	8.11E-01	1.35E+00	2.21E+00	3.70E+00	6.12E+00	1.15E+01	1.60E+01
Native American	330000	30	2.25E+00	9.16E-03	2.15E-01	2.15E-01	2.31E-01	2.50E-01	3.47E-01	7.79E-01	1.64E+00	3.25E+00	2.39E+01	2.39E+01	2.39E+01
Other/NA	1197000	45	1.29E+00	9.46E-04	1.06E-01	1.33E-01	3.45E-01	3.77E-01	6.57E-01	9.83E-01	1.51E+00	3.09E+00	3.90E+00	4.18E+00	4.18E+00
White	32032000	1749	1.11E+00	2.38E-04	0.00E+00	3.86E-02	9.12E-02	1.59E-01	3.28E-01	7.17E-01	1.37E+00	2.30E+00	3.43E+00	7.66E+00	1.17E+01
Regions															
Midwest	9782000	533	1.26E+00	6.73E-04	0.00E+00	2.98E-02	8.82E-02	1.34E-01	2.71E-01	6.54E-01	1.42E+00	2.63E+00	4.08E+00	1.17E+01	2.23E+01
Northeast	8761000	413	1.29E+00	4.80E-04	0.00E+00	1.78E-02	8.96E-02	1.90E-01	4.58E-01	8.56E-01	1.54E+00	2.82E+00	4.26E+00	7.00E+00	1.00E+01
South	16538000	959	1.41E+00	3.74E-04	0.00E+00	3.39E-02	1.21E-01	2.18E-01	5.21E-01	9.93E-01	1.77E+00	2.86E+00	3.98E+00	7.91E+00	1.28E+01
West	6775000	361	1.12E+00	6.49E-04	4.21E-02	5.22E-02	1.03E-01	1.46E-01	3.40E-01	6.88E-01	1.35E+00	2.34E+00	3.52E+00	8.59E+00	2.39E+01
Response to Questionnaire															
Do you garden?	17754000	1020	1.16E+00	3.36E-04	0.00E+00	3.86E-02	9.66E-02	1.73E-01	3.66E-01	7.94E-01	1.44E+00	2.34E+00	3.43E+00	7.66E+00	1.60E+01
Do you farm?	2451000	157	1.01E+00	7.47E-04	0.00E+00	3.84E-02	8.58E-02	1.21E-01	2.50E-01	5.60E-01	1.45E+00	2.35E+00	2.84E+00	6.39E+00	7.09E+00

Table 2-51. Intake of Total Carrots (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	80660000	4217	5.51E-01	1.16E-04	0.00E+00	2.47E-02	6.29E-02	9.58E-02	1.85E-01	3.27E-01	5.86E-01	1.10E+00	1.55E+00	3.52E+00	3.24E+01
Age															
< 01	1660000	86	3.64E+00	3.00E-03	1.06E-01	1.06E-01	3.19E-01	8.32E-01	1.16E+00	2.15E+00	4.45E+00	9.01E+00	1.24E+01	1.80E+01	2.13E+01
01-02	2886000	156	1.83E+00	1.82E-03	2.58E-02	2.58E-02	2.72E-01	4.24E-01	8.29E-01	1.32E+00	2.06E+00	3.08E+00	3.52E+00	8.13E+00	3.24E+01
03-05	3765000	202	9.15E-01	3.93E-04	0.00E+00	1.21E-02	1.38E-01	2.33E-01	4.55E-01	7.44E-01	1.13E+00	1.73E+00	2.23E+00	4.09E+00	6.06E+00
06-11	7755000	421	5.93E-01	1.79E-04	0.00E+00	1.07E-02	1.21E-01	1.80E-01	2.80E-01	4.54E-01	7.50E-01	1.18E+00	1.52E+00	2.48E+00	3.88E+00
12-19	8467000	458	3.13E-01	1.03E-04	0.00E+00	4.77E-03	4.16E-02	6.68E-02	1.30E-01	2.27E-01	3.98E-01	6.19E-01	9.52E-01	1.56E+00	2.84E+00
20-39	23984000	1215	3.45E-01	7.25E-05	0.00E+00	2.16E-02	5.26E-02	7.16E-02	1.38E-01	2.48E-01	4.25E-01	6.88E-01	1.01E+00	1.69E+00	4.14E+00
40-69	25205000	1330	4.10E-01	7.47E-05	0.00E+00	3.17E-02	7.53E-02	1.03E-01	1.80E-01	3.04E-01	5.05E-01	8.22E-01	1.10E+00	1.91E+00	4.33E+00
70 +	6938000	349	5.47E-01	1.66E-04	2.38E-02	6.12E-02	1.42E-01	1.85E-01	2.72E-01	4.26E-01	6.35E-01	1.14E+00	1.43E+00	2.27E+00	2.57E+00
Seasons															
Fall	23304000	777	5.40E-01	2.34E-04	0.00E+00	2.58E-02	6.23E-02	9.09E-02	1.69E-01	3.08E-01	5.34E-01	1.03E+00	1.45E+00	4.45E+00	1.80E+01
Spring	17828000	1562	5.63E-01	2.23E-04	0.00E+00	8.55E-03	6.30E-02	1.02E-01	1.93E-01	3.39E-01	6.36E-01	1.11E+00	1.68E+00	3.88E+00	2.13E+01
Summer	17618000	556	5.38E-01	1.60E-04	0.00E+00	2.16E-02	6.81E-02	9.88E-02	1.95E-01	3.40E-01	6.27E-01	1.18E+00	1.57E+00	3.15E+00	7.24E+00
Winter	21910000	1322	5.63E-01	2.69E-04	0.00E+00	3.16E-02	6.21E-02	9.54E-02	1.83E-01	3.32E-01	5.93E-01	1.09E+00	1.65E+00	3.27E+00	3.24E+01
Urbanization															
Central City	23211000	899	6.62E-01	3.29E-04	0.00E+00	1.10E-02	6.35E-02	9.05E-02	1.81E-01	3.26E-01	6.52E-01	1.26E+00	2.04E+00	6.41E+00	3.24E+01
Nonmetropolitan	18190000	1247	5.21E-01	1.98E-04	0.00E+00	2.79E-02	5.93E-02	9.65E-02	1.94E-01	3.31E-01	5.67E-01	1.07E+00	1.48E+00	2.78E+00	1.44E+01
Surburban	39199000	2069	4.99E-01	1.03E-04	0.00E+00	3.20E-02	6.86E-02	9.91E-02	1.83E-01	3.24E-01	5.65E-01	1.03E+00	1.44E+00	2.75E+00	1.24E+01
Race															
Asian	1466000	63	5.61E-01	9.03E-04	3.08E-02	3.08E-02	5.41E-02	1.11E-01	1.71E-01	3.01E-01	5.56E-01	9.13E-01	1.71E+00	7.16E+00	7.16E+00
Black	4579000	215	5.39E-01	5.07E-04	0.00E+00	4.77E-03	1.16E-02	5.92E-02	1.22E-01	2.70E-01	5.40E-01	1.24E+00	2.13E+00	3.69E+00	1.44E+01
Native American	701000	53	1.84E+00	7.10E-03	3.62E-02	3.62E-02	4.57E-02	5.58E-02	1.31E-01	2.49E-01	5.44E-01	2.44E+00	8.10E+00	3.24E+01	3.24E+01
Other/NA	2152000	107	5.05E-01	3.19E-04	3.29E-02	4.12E-02	6.69E-02	7.45E-02	1.54E-01	3.78E-01	6.74E-01	1.26E+00	1.58E+00	2.02E+00	2.57E+00
White	71702000	3777	5.41E-01	1.03E-04	0.00E+00	2.95E-02	6.81E-02	9.88E-02	1.89E-01	3.32E-01	5.85E-01	1.09E+00	1.53E+00	3.18E+00	2.13E+01
Regions															
Midwest	18844000	1050	4.83E-01	1.68E-04	0.00E+00	5.63E-03	4.95E-02	8.00E-02	1.69E-01	3.09E-01	5.37E-01	1.05E+00	1.42E+00	3.18E+00	2.13E+01
Northeast	20455000	995	5.80E-01	1.87E-04	0.00E+00	3.80E-02	7.92E-02	1.06E-01	2.05E-01	3.76E-01	6.18E-01	1.17E+00	1.71E+00	3.61E+00	1.09E+01
South	22697000	1187	5.30E-01	2.73E-04	0.00E+00	3.20E-02	6.75E-02	9.77E-02	1.85E-01	3.03E-01	5.40E-01	9.94E-01	1.39E+00	3.15E+00	3.24E+01
West	18604000	983	6.15E-01	2.69E-04	1.06E-02	2.89E-02	6.29E-02	9.55E-02	1.86E-01	3.41E-01	6.59E-01	1.25E+00	1.94E+00	4.00E+00	1.80E+01
Response to Questionnaire															
Do you garden?	35477000	1892	4.49E-01	9.71E-05	0.00E+00	2.58E-02	6.35E-02	9.48E-02	1.77E-01	3.05E-01	5.10E-01	9.11E-01	1.24E+00	2.53E+00	1.09E+01
Do you farm?	3815000	224	4.25E-01	2.75E-04	0.00E+00	2.89E-02	5.36E-02	9.13E-02	1.79E-01	2.85E-01	5.01E-01	8.06E-01	1.16E+00	2.82E+00	7.31E+00

Table 2-52. Intake of Total Corn (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	93616000	5066	8.45E-01	1.19E-04	0.00E+00	4.92E-02	1.19E-01	1.67E-01	2.79E-01	4.99E-01	9.61E-01	1.75E+00	2.63E+00	5.79E+00	2.24E+01
Age															
<01	1677000	91	4.73E+00	3.17E-03	2.18E-01	2.18E-01	4.90E-01	6.61E-01	1.73E+00	3.30E+00	7.30E+00	1.11E+01	1.32E+01	1.97E+01	2.24E+01
01-02	3363000	199	1.62E+00	7.51E-04	1.58E-01	2.05E-01	3.19E-01	4.54E-01	7.51E-01	1.23E+00	2.13E+00	3.19E+00	4.13E+00	7.89E+00	8.97E+00
03-05	4799000	283	1.50E+00	5.64E-04	8.19E-02	1.18E-01	3.25E-01	4.43E-01	6.93E-01	1.11E+00	1.99E+00	2.99E+00	3.86E+00	6.80E+00	7.27E+00
06-11	10157000	570	1.04E+00	3.56E-04	0.00E+00	4.69E-02	1.68E-01	2.47E-01	4.16E-01	6.90E-01	1.21E+00	2.07E+00	3.13E+00	5.79E+00	1.18E+01
12-19	11634000	631	6.73E-01	2.03E-04	0.00E+00	2.26E-02	1.14E-01	1.51E-01	2.63E-01	4.31E-01	8.29E-01	1.40E+00	1.88E+00	3.57E+00	4.87E+00
20-39	30817000	1608	5.74E-01	1.03E-04	0.00E+00	3.04E-02	9.71E-02	1.40E-01	2.27E-01	3.87E-01	7.80E-01	1.24E+00	1.67E+00	2.86E+00	4.77E+00
40-69	25534000	1399	7.01E-01	1.57E-04	0.00E+00	7.10E-02	1.32E-01	1.67E-01	2.61E-01	4.40E-01	8.40E-01	1.46E+00	2.07E+00	3.55E+00	8.22E+00
70 +	5635000	285	8.05E-01	4.01E-04	3.91E-02	4.79E-02	1.48E-01	2.38E-01	3.61E-01	5.54E-01	9.29E-01	1.45E+00	2.20E+00	5.03E+00	9.23E+00
Seasons															
Fall	23727000	807	7.37E-01	2.16E-04	0.00E+00	5.15E-02	1.13E-01	1.52E-01	2.52E-01	4.54E-01	8.05E-01	1.42E+00	2.11E+00	5.69E+00	1.19E+01
Spring	21579000	1944	8.41E-01	2.51E-04	0.00E+00	7.14E-02	1.44E-01	1.84E-01	3.03E-01	5.29E-01	9.63E-01	1.74E+00	2.45E+00	4.77E+00	2.24E+01
Summer	24083000	770	1.14E+00	2.93E-04	0.00E+00	1.05E-02	1.15E-01	2.01E-01	3.50E-01	7.10E-01	1.39E+00	2.55E+00	3.53E+00	7.89E+00	1.51E+01
Winter	24227000	1545	6.61E-01	1.66E-04	0.00E+00	6.20E-02	1.18E-01	1.58E-01	2.44E-01	4.07E-01	7.62E-01	1.40E+00	2.05E+00	3.60E+00	1.49E+01
Urbanization															
Central City	24866000	965	8.79E-01	2.89E-04	0.00E+00	3.57E-02	1.18E-01	1.66E-01	2.75E-01	4.75E-01	9.39E-01	1.75E+00	2.71E+00	8.32E+00	2.24E+01
Nonmetropolitan	25389000	1734	9.02E-01	2.37E-04	0.00E+00	7.26E-02	1.19E-01	1.69E-01	2.91E-01	5.31E-01	9.92E-01	1.88E+00	3.04E+00	6.64E+00	1.49E+01
Surburban	43361000	2367	7.92E-01	1.40E-04	0.00E+00	4.79E-02	1.23E-01	1.66E-01	2.72E-01	4.96E-01	9.52E-01	1.72E+00	2.45E+00	4.25E+00	1.51E+01
Race															
Asian	889000	39	1.47E+00	2.32E-03	2.55E-01	2.55E-01	2.69E-01	3.21E-01	4.65E-01	9.35E-01	1.45E+00	2.45E+00	2.56E+00	1.19E+01	1.19E+01
Black	10823000	576	9.93E-01	3.99E-04	0.00E+00	0.00E+00	1.23E-01	1.72E-01	3.01E-01	5.86E-01	1.14E+00	2.04E+00	3.28E+00	7.31E+00	1.13E+01
Native American	955000	64	6.46E-01	1.04E-03	7.89E-02	7.92E-02	9.57E-02	1.56E-01	2.34E-01	3.79E-01	7.32E-01	1.06E+00	1.73E+00	7.30E+00	7.30E+00
Other/NA	2502000	124	9.96E-01	6.25E-04	1.41E-02	2.56E-02	1.16E-01	1.90E-01	3.55E-01	5.75E-01	1.33E+00	2.63E+00	3.57E+00	4.63E+00	4.63E+00
White	78447000	4263	8.15E-01	1.26E-04	0.00E+00	5.15E-02	1.18E-01	1.66E-01	2.74E-01	4.88E-01	9.29E-01	1.69E+00	2.57E+00	5.35E+00	2.24E+01
Regions															
Midwest	23795000	1372	8.10E-01	2.56E-04	0.00E+00	6.74E-02	1.19E-01	1.62E-01	2.60E-01	4.68E-01	8.54E-01	1.68E+00	2.59E+00	6.64E+00	2.24E+01
Northeast	20513000	1024	8.83E-01	2.58E-04	0.00E+00	4.69E-02	1.12E-01	1.64E-01	2.65E-01	4.95E-01	1.03E+00	1.88E+00	2.89E+00	7.27E+00	8.43E+00
South	32552000	1806	8.34E-01	1.88E-04	0.00E+00	4.97E-02	1.38E-01	1.86E-01	3.08E-01	5.39E-01	9.56E-01	1.70E+00	2.46E+00	4.82E+00	1.51E+01
West	16756000	864	8.69E-01	2.81E-04	0.00E+00	4.32E-02	1.05E-01	1.56E-01	2.69E-01	4.96E-01	1.03E+00	1.79E+00	2.83E+00	5.92E+00	1.51E+01
Response to Questionnaire															
Do you garden?	33143000	1907	7.50E-01	1.83E-04	0.00E+00	5.65E-02	1.08E-01	1.51E-01	2.47E-01	4.48E-01	8.55E-01	1.53E+00	2.23E+00	5.79E+00	1.51E+01
Do you farm?	3807000	233	1.04E+00	8.27E-04	3.43E-02	3.91E-02	5.65E-02	1.42E-01	2.44E-01	4.71E-01	1.06E+00	2.83E+00	3.94E+00	7.44E+00	1.49E+01

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Table 2-53. Intake of Total Cucumbers (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	40707000	2058	6.76E-01	1.74E-04	0.00E+00	7.45E-03	7.68E-02	1.29E-01	2.37E-01	4.35E-01	7.83E-01	1.34E+00	1.90E+00	3.76E+00	2.89E+01
Age															
< 01	327000	21	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	1364000	70	2.61E+00	3.32E-03	3.93E-01	3.93E-01	6.25E-01	7.52E-01	1.03E+00	1.86E+00	2.55E+00	4.67E+00	6.53E+00	2.89E+01	2.89E+01
03-05	1825000	102	1.17E+00	7.84E-04	3.07E-02	3.07E-02	2.57E-01	3.35E-01	5.08E-01	8.60E-01	1.41E+00	2.39E+00	3.08E+00	4.12E+00	8.32E+00
06-11	4109000	217	7.73E-01	2.89E-04	7.02E-02	8.40E-02	1.42E-01	2.27E-01	3.37E-01	5.63E-01	1.09E+00	1.62E+00	1.92E+00	2.78E+00	3.22E+00
12-19	4554000	232	5.48E-01	2.82E-04	0.00E+00	7.45E-03	5.58E-02	1.07E-01	2.05E-01	3.92E-01	6.63E-01	1.20E+00	1.55E+00	3.09E+00	4.18E+00
20-39	11031000	551	4.85E-01	1.44E-04	0.00E+00	3.32E-02	7.41E-02	1.07E-01	1.91E-01	3.45E-01	6.12E-01	1.02E+00	1.35E+00	2.23E+00	4.80E+00
40-69	14327000	730	6.10E-01	2.73E-04	0.00E+00	3.59E-02	7.96E-02	1.30E-01	2.23E-01	4.02E-01	6.82E-01	1.18E+00	1.53E+00	3.09E+00	1.37E+01
70 +	3170000	135	6.44E-01	2.31E-04	6.71E-02	7.79E-02	1.29E-01	1.78E-01	3.46E-01	5.51E-01	8.96E-01	1.25E+00	1.48E+00	1.73E+00	2.36E+00
Seasons															
Fall	7846000	253	5.02E-01	1.56E-04	0.00E+00	0.00E+00	4.16E-02	9.07E-02	1.95E-01	3.46E-01	6.99E-01	1.11E+00	1.38E+00	2.06E+00	2.50E+00
Spring	9327000	803	6.39E-01	2.44E-04	0.00E+00	0.00E+00	7.66E-02	1.32E-01	2.36E-01	4.35E-01	7.30E-01	1.26E+00	1.95E+00	4.12E+00	8.28E+00
Summer	13595000	432	8.34E-01	3.16E-04	0.00E+00	3.08E-02	1.15E-01	1.76E-01	2.98E-01	5.24E-01	1.03E+00	1.70E+00	2.29E+00	4.18E+00	1.37E+01
Winter	9939000	570	6.31E-01	4.97E-04	0.00E+00	3.68E-02	7.22E-02	1.06E-01	2.11E-01	3.81E-01	6.93E-01	1.14E+00	1.55E+00	3.17E+00	2.89E+01
Urbanization															
Central City	9813000	380	6.70E-01	4.99E-04	0.00E+00	0.00E+00	4.22E-02	8.40E-02	1.96E-01	3.82E-01	7.47E-01	1.40E+00	2.02E+00	3.76E+00	2.89E+01
Nonmetropolitan	7918000	510	8.91E-01	5.03E-04	0.00E+00	0.00E+00	9.48E-02	1.60E-01	2.86E-01	5.15E-01	1.08E+00	1.77E+00	2.45E+00	8.28E+00	1.37E+01
Surburban	22976000	1168	6.03E-01	1.37E-04	0.00E+00	2.02E-02	9.37E-02	1.39E-01	2.37E-01	4.27E-01	7.52E-01	1.25E+00	1.58E+00	3.16E+00	8.32E+00
Race															
Asian	937000	43	6.10E-01	6.99E-04	0.00E+00	0.00E+00	8.21E-02	1.07E-01	1.56E-01	3.47E-01	8.86E-01	1.37E+00	2.06E+00	4.12E+00	4.12E+00
Black	2932000	154	7.43E-01	4.45E-04	0.00E+00	0.00E+00	1.19E-01	1.84E-01	3.10E-01	5.06E-01	9.07E-01	1.60E+00	2.32E+00	3.05E+00	6.90E+00
Native American	699000	45	2.00E+00	6.27E-03	0.00E+00	0.00E+00	1.32E-01	1.62E-01	3.95E-01	7.02E-01	1.44E+00	2.19E+00	7.23E+00	2.89E+01	2.89E+01
Other/NA	876000	40	9.71E-01	1.07E-03	7.49E-02	7.49E-02	1.27E-01	1.50E-01	2.75E-01	5.00E-01	1.53E+00	2.12E+00	3.09E+00	4.18E+00	4.18E+00
White	35263000	1776	6.38E-01	1.46E-04	0.00E+00	7.45E-03	7.56E-02	1.25E-01	2.30E-01	4.28E-01	7.64E-01	1.27E+00	1.77E+00	3.27E+00	1.37E+01
Regions															
Midwest	8507000	421	5.91E-01	3.20E-04	0.00E+00	0.00E+00	3.08E-02	7.80E-02	1.70E-01	3.73E-01	7.15E-01	1.25E+00	1.86E+00	3.02E+00	1.34E+01
Northeast	13239000	618	6.81E-01	2.70E-04	0.00E+00	4.21E-02	9.07E-02	1.37E-01	2.51E-01	4.38E-01	7.81E-01	1.39E+00	2.02E+00	4.18E+00	1.37E+01
South	10895000	612	7.64E-01	4.65E-04	0.00E+00	0.00E+00	1.06E-01	1.53E-01	2.76E-01	5.04E-01	8.50E-01	1.36E+00	2.02E+00	4.50E+00	2.89E+01
West	8066000	407	6.36E-01	2.57E-04	0.00E+00	0.00E+00	8.67E-02	1.36E-01	2.31E-01	4.30E-01	7.70E-01	1.34E+00	1.80E+00	3.27E+00	8.32E+00
Response to Questionnaire															
Do you garden?	15765000	807	6.58E-01	2.73E-04	0.00E+00	8.29E-03	7.03E-02	1.07E-01	2.16E-01	4.10E-01	7.23E-01	1.30E+00	1.92E+00	3.85E+00	1.37E+01
Do you farm?	1602000	81	5.92E-01	3.96E-04	0.00E+00	0.00E+00	7.46E-02	1.54E-01	2.18E-01	3.71E-01	9.20E-01	1.46E+00	1.49E+00	2.09E+00	2.44E+00

Table 2-54. Intake of Total Lettuce (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	108769000	5768	5.16E-01	4.17E-05	0.00E+00	0.00E+00	6.95E-02	1.24E-01	2.40E-01	4.08E-01	6.54E-01	1.04E+00	1.32E+00	2.13E+00	5.64E+00
Age															
< 01	1618000	85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	3127000	174	1.16E+00	4.02E-04	2.91E-02	2.91E-02	3.47E-01	4.25E-01	6.55E-01	9.91E-01	1.53E+00	2.10E+00	2.50E+00	4.08E+00	5.51E+00
03-05	4948000	277	7.77E-01	2.03E-04	2.32E-02	5.08E-02	2.19E-01	3.02E-01	4.70E-01	7.22E-01	1.00E+00	1.34E+00	1.59E+00	2.37E+00	2.70E+00
06-11	10171000	577	5.91E-01	1.32E-04	4.49E-02	6.19E-02	1.29E-01	1.89E-01	3.19E-01	5.02E-01	7.43E-01	1.11E+00	1.31E+00	2.27E+00	3.40E+00
12-19	12809000	670	4.25E-01	8.43E-05	0.00E+00	8.14E-03	8.17E-02	1.24E-01	2.27E-01	3.48E-01	5.46E-01	7.86E-01	1.07E+00	1.42E+00	1.89E+00
20-39	33801000	1706	4.35E-01	6.13E-05	0.00E+00	1.67E-02	7.64E-02	1.17E-01	2.09E-01	3.48E-01	5.46E-01	8.39E-01	1.14E+00	1.75E+00	4.05E+00
40-69	34240000	1839	5.18E-01	7.33E-05	0.00E+00	3.66E-02	9.63E-02	1.39E-01	2.48E-01	4.19E-01	6.47E-01	1.00E+00	1.32E+00	1.91E+00	5.64E+00
70 +	8055000	420	5.88E-01	1.73E-04	1.07E-02	1.63E-02	6.68E-02	1.12E-01	2.73E-01	4.96E-01	7.48E-01	1.17E+00	1.42E+00	1.98E+00	4.49E+00
Seasons															
Fall	23974000	785	4.79E-01	7.67E-05	0.00E+00	0.00E+00	5.36E-02	1.05E-01	2.27E-01	4.12E-01	6.20E-01	9.42E-01	1.12E+00	1.88E+00	3.01E+00
Spring	28827000	2485	5.37E-01	8.17E-05	0.00E+00	0.00E+00	8.21E-02	1.39E-01	2.54E-01	4.34E-01	7.04E-01	1.05E+00	1.34E+00	2.13E+00	5.51E+00
Summer	28378000	889	5.27E-01	8.94E-05	0.00E+00	0.00E+00	6.27E-02	1.06E-01	2.35E-01	3.93E-01	6.64E-01	1.15E+00	1.41E+00	2.02E+00	5.64E+00
Winter	27590000	1609	5.13E-01	8.24E-05	0.00E+00	0.00E+00	8.83E-02	1.31E-01	2.37E-01	4.05E-01	6.22E-01	1.03E+00	1.32E+00	2.19E+00	4.55E+00
Urbanization															
Central City	30125000	1174	5.48E-01	9.24E-05	0.00E+00	0.00E+00	5.84E-02	1.16E-01	2.43E-01	4.28E-01	7.01E-01	1.12E+00	1.39E+00	2.38E+00	5.64E+00
Nonmetropolitan	24219000	1666	4.90E-01	7.93E-05	0.00E+00	0.00E+00	5.92E-02	1.20E-01	2.44E-01	4.05E-01	6.22E-01	9.80E-01	1.21E+00	1.89E+00	4.55E+00
Surburban	54425000	2928	5.09E-01	5.54E-05	0.00E+00	0.00E+00	8.12E-02	1.34E-01	2.37E-01	4.02E-01	6.56E-01	1.03E+00	1.32E+00	2.02E+00	5.51E+00
Race															
Asian	1177000	51	5.34E-01	3.72E-04	0.00E+00	0.00E+00	4.15E-02	1.43E-01	1.95E-01	4.45E-01	8.54E-01	1.02E+00	1.04E+00	2.03E+00	2.03E+00
Black	9386000	446	4.65E-01	1.30E-04	0.00E+00	0.00E+00	5.79E-02	9.87E-02	1.95E-01	3.46E-01	6.24E-01	9.51E-01	1.30E+00	1.88E+00	2.96E+00
Native American	967000	64	4.03E-01	3.71E-04	0.00E+00	0.00E+00	5.26E-02	9.90E-02	2.13E-01	3.01E-01	4.78E-01	7.65E-01	1.07E+00	2.38E+00	2.38E+00
Other/NA	3053000	141	6.34E-01	3.27E-04	0.00E+00	0.00E+00	1.38E-01	2.04E-01	3.35E-01	4.07E-01	7.47E-01	1.39E+00	1.70E+00	3.01E+00	3.01E+00
White	94186000	5066	5.18E-01	4.47E-05	0.00E+00	0.00E+00	7.08E-02	1.25E-01	2.43E-01	4.13E-01	6.56E-01	1.05E+00	1.32E+00	2.13E+00	5.64E+00
Regions															
Midwest	24742000	1430	4.94E-01	8.50E-05	0.00E+00	0.00E+00	4.93E-02	1.05E-01	2.24E-01	3.90E-01	6.44E-01	1.00E+00	1.25E+00	2.13E+00	5.51E+00
Northeast	25935000	1265	5.57E-01	9.78E-05	0.00E+00	0.00E+00	9.00E-02	1.40E-01	2.65E-01	4.44E-01	6.68E-01	1.12E+00	1.43E+00	2.28E+00	5.64E+00
South	34211000	1823	4.91E-01	6.70E-05	0.00E+00	0.00E+00	8.80E-02	1.31E-01	2.35E-01	3.97E-01	6.31E-01	9.50E-01	1.28E+00	1.95E+00	4.25E+00
West	23881000	1250	5.28E-01	8.78E-05	0.00E+00	0.00E+00	6.01E-02	1.13E-01	2.43E-01	4.11E-01	7.01E-01	1.11E+00	1.37E+00	2.02E+00	4.05E+00
Response to Questionnaire															
Do you garden?	41359000	2348	4.65E-01	5.67E-05	0.00E+00	0.00E+00	6.01E-02	1.10E-01	2.28E-01	3.86E-01	5.95E-01	9.21E-01	1.17E+00	1.70E+00	4.55E+00
Do you farm?	4106000	257	4.59E-01	1.57E-04	0.00E+00	0.00E+00	4.49E-02	1.29E-01	2.69E-01	3.83E-01	5.71E-01	8.93E-01	1.14E+00	1.44E+00	2.41E+00

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Table 2-55. Intake of Total Lima Beans (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	16766000	903	4.27E-01	8.84E-05	0.00E+00	0.00E+00	9.40E-02	1.30E-01	2.06E-01	3.18E-01	5.11E-01	8.61E-01	1.09E+00	1.86E+00	4.53E+00
Age															
< 01	182000	9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	609000	34	9.97E-01	7.37E-04	2.75E-01	2.75E-01	3.23E-01	3.83E-01	5.59E-01	8.29E-01	1.38E+00	2.10E+00	2.30E+00	2.30E+00	2.30E+00
03-05	766000	37	8.84E-01	7.46E-04	2.42E-01	2.42E-01	2.70E-01	3.09E-01	3.81E-01	8.16E-01	1.12E+00	1.63E+00	1.69E+00	4.53E+00	4.53E+00
06-11	1328000	72	3.92E-01	2.54E-04	0.00E+00	0.00E+00	8.48E-02	1.25E-01	2.07E-01	3.41E-01	4.69E-01	7.66E-01	8.70E-01	1.39E+00	2.25E+00
12-19	1849000	100	3.42E-01	1.67E-04	0.00E+00	0.00E+00	9.02E-02	1.26E-01	1.91E-01	2.90E-01	4.23E-01	7.45E-01	8.84E-01	1.02E+00	1.02E+00
20-39	4563000	227	3.59E-01	1.13E-04	0.00E+00	3.23E-02	9.64E-02	1.25E-01	1.90E-01	2.90E-01	4.56E-01	6.84E-01	8.89E-01	1.12E+00	1.35E+00
40-69	5690000	323	4.17E-01	1.36E-04	0.00E+00	2.06E-02	1.03E-01	1.36E-01	2.09E-01	3.03E-01	5.39E-01	8.29E-01	1.06E+00	1.71E+00	2.51E+00
70 +	1779000	101	3.96E-01	2.33E-04	5.33E-02	6.23E-02	9.79E-02	1.09E-01	2.23E-01	3.31E-01	4.47E-01	7.89E-01	9.22E-01	1.86E+00	1.86E+00
Seasons															
Fall	3893000	140	4.21E-01	1.78E-04	0.00E+00	1.22E-02	8.20E-02	1.09E-01	2.03E-01	3.16E-01	5.10E-01	8.49E-01	1.10E+00	2.10E+00	2.32E+00
Spring	3740000	348	4.32E-01	1.72E-04	0.00E+00	0.00E+00	9.87E-02	1.31E-01	2.16E-01	3.47E-01	5.57E-01	8.19E-01	1.02E+00	1.79E+00	2.41E+00
Summer	5759000	188	4.34E-01	1.56E-04	0.00E+00	0.00E+00	7.27E-02	1.30E-01	2.04E-01	3.20E-01	4.74E-01	8.89E-01	1.14E+00	1.86E+00	2.30E+00
Winter	3374000	227	4.15E-01	2.08E-04	0.00E+00	2.06E-02	9.53E-02	1.37E-01	2.02E-01	3.06E-01	5.12E-01	8.29E-01	1.05E+00	1.62E+00	4.53E+00
Urbanization															
Central City	3820000	153	4.70E-01	1.99E-04	0.00E+00	0.00E+00	0.00E+00	1.37E-01	2.26E-01	3.57E-01	6.12E-01	9.12E-01	1.27E+00	2.10E+00	2.32E+00
Nonmetropolitan	6256000	397	3.90E-01	1.33E-04	0.00E+00	5.33E-02	1.00E-01	1.34E-01	2.03E-01	2.97E-01	4.47E-01	8.03E-01	8.84E-01	1.62E+00	4.53E+00
Surburben	6690000	353	4.36E-01	1.43E-04	0.00E+00	0.00E+00	8.20E-02	1.25E-01	2.07E-01	3.21E-01	5.10E-01	9.15E-01	1.14E+00	1.86E+00	2.41E+00
Race															
Asian	141000	9	5.67E-01	9.18E-04	1.96E-01	1.96E-01	1.96E-01	2.61E-01	3.10E-01	5.57E-01	6.33E-01	6.33E-01	1.51E+00	1.51E+00	1.51E+00
Black	4385000	220	4.82E-01	2.19E-04	0.00E+00	0.00E+00	0.00E+00	9.51E-02	2.12E-01	3.57E-01	5.94E-01	9.66E-01	1.38E+00	2.25E+00	4.53E+00
Native American	23000	1	3.77E-01	0.00E+00	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01
Other/NA	177000	13	7.09E-01	9.88E-04	1.62E-01	1.62E-01	2.01E-01	2.48E-01	4.09E-01	6.36E-01	8.77E-01	1.34E+00	1.60E+00	1.60E+00	1.60E+00
White	12040000	660	4.01E-01	9.08E-05	0.00E+00	3.23E-02	9.79E-02	1.35E-01	2.03E-01	3.06E-01	4.77E-01	8.17E-01	9.90E-01	1.63E+00	2.51E+00
Regions															
Midwest	3607000	201	4.68E-01	2.10E-04	0.00E+00	0.00E+00	8.48E-02	1.07E-01	2.02E-01	3.61E-01	5.85E-01	9.37E-01	1.33E+00	2.10E+00	2.32E+00
Northeast	2456000	135	3.60E-01	1.66E-04	0.00E+00	0.00E+00	8.20E-02	1.29E-01	2.01E-01	2.86E-01	4.41E-01	6.75E-01	8.60E-01	1.51E+00	1.60E+00
South	9845000	514	4.32E-01	1.19E-04	0.00E+00	0.00E+00	9.65E-02	1.39E-01	2.08E-01	3.18E-01	5.15E-01	8.55E-01	1.10E+00	1.86E+00	4.53E+00
West	858000	53	3.89E-01	2.96E-04	7.79E-02	7.79E-02	9.65E-02	1.23E-01	1.99E-01	3.16E-01	4.47E-01	8.28E-01	1.01E+00	1.26E+00	1.26E+00
Response to Questionnaire															
Do you garden?	6992000	424	3.99E-01	1.29E-04	0.00E+00	5.33E-02	9.65E-02	1.30E-01	1.96E-01	2.93E-01	4.82E-01	8.19E-01	1.06E+00	1.86E+00	2.41E+00
Do you farm?	644000	44	2.86E-01	3.96E-04	3.23E-02	3.23E-02	9.45E-02	9.79E-02	1.08E-01	1.67E-01	3.44E-01	6.21E-01	7.48E-01	2.41E+00	2.41E+00

Table 2-56. Intake of Total Okra (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	6143000	277	4.00E-01	1.58E-04	0.00E+00	0.00E+00	5.03E-02	8.68E-02	1.48E-01	3.00E-01	4.97E-01	8.16E-01	1.18E+00	1.85E+00	3.27E+00
Age															
<01	98000	4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	117000	4	4.77E-01	1.10E-03	1.02E-01	1.02E-01	1.02E-01	1.02E-01	3.07E-01	3.07E-01	4.32E-01	1.15E+00	1.15E+00	1.15E+00	1.15E+00
03-05	364000	15	8.34E-01	1.43E-03	1.15E-01	1.15E-01	1.15E-01	1.76E-01	4.05E-01	4.76E-01	1.05E+00	1.39E+00	3.27E+00	3.27E+00	3.27E+00
06-11	659000	30	5.68E-01	6.56E-04	4.14E-02	4.14E-02	5.03E-02	6.38E-02	1.10E-01	3.42E-01	7.47E-01	1.53E+00	1.85E+00	1.85E+00	1.85E+00
12-19	799000	33	4.20E-01	3.52E-04	6.97E-02	6.97E-02	9.60E-02	1.14E-01	1.42E-01	3.75E-01	5.70E-01	7.22E-01	1.21E+00	1.33E+00	1.33E+00
20-39	1607000	68	3.27E-01	1.92E-04	2.69E-02	2.69E-02	7.28E-02	9.59E-02	1.44E-01	2.46E-01	4.82E-01	6.75E-01	8.16E-01	1.16E+00	1.25E+00
40-69	2018000	100	3.38E-01	1.87E-04	1.24E-02	1.24E-02	6.29E-02	9.45E-02	1.47E-01	2.73E-01	4.26E-01	7.04E-01	1.02E+00	1.33E+00	1.33E+00
70 +	481000	23	3.77E-01	3.79E-04	2.11E-02	2.11E-02	2.11E-02	9.98E-02	1.74E-01	3.47E-01	4.67E-01	7.62E-01	1.02E+00	1.11E+00	1.11E+00
Seasons															
Fall	982000	36	3.50E-01	2.45E-04	9.65E-02	9.65E-02	1.03E-01	1.25E-01	2.08E-01	2.80E-01	4.32E-01	5.62E-01	1.02E+00	1.14E+00	1.14E+00
Spring	1177000	89	3.68E-01	2.95E-04	0.00E+00	0.00E+00	2.98E-02	7.09E-02	1.42E-01	2.68E-01	5.28E-01	8.28E-01	1.11E+00	1.39E+00	1.39E+00
Summer	3295000	107	4.41E-01	2.53E-04	0.00E+00	1.24E-02	5.03E-02	9.41E-02	1.56E-01	3.32E-01	5.31E-01	8.79E-01	1.33E+00	3.27E+00	3.27E+00
Winter	689000	45	3.31E-01	3.53E-04	0.00E+00	0.00E+00	2.46E-02	4.14E-02	1.18E-01	2.34E-01	4.55E-01	7.62E-01	8.54E-01	1.25E+00	1.25E+00
Urbanization															
Central City	2302000	79	3.30E-01	1.73E-04	0.00E+00	0.00E+00	2.11E-02	7.09E-02	1.43E-01	2.71E-01	4.26E-01	7.22E-01	8.16E-01	1.33E+00	1.33E+00
Nonmetropolitan	2438000	130	3.80E-01	2.20E-04	0.00E+00	0.00E+00	6.29E-02	9.41E-02	1.48E-01	2.68E-01	4.67E-01	8.79E-01	1.21E+00	1.53E+00	1.53E+00
Surburban	1403000	68	5.51E-01	4.80E-04	0.00E+00	0.00E+00	9.65E-02	1.18E-01	1.72E-01	4.52E-01	5.95E-01	1.15E+00	1.39E+00	3.27E+00	3.27E+00
Race															
Asian	41000	1	1.44E-01	0.00E+00	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01
Black	2189000	93	3.48E-01	2.10E-04	0.00E+00	0.00E+00	2.11E-02	6.97E-02	1.30E-01	2.46E-01	4.60E-01	7.62E-01	9.92E-01	1.33E+00	1.39E+00
Other/NA	96000	6	6.98E-01	1.08E-03	3.89E-01	3.89E-01	3.89E-01	3.89E-01	4.21E-01	5.34E-01	1.05E+00	1.26E+00	1.26E+00	1.26E+00	1.26E+00
White	3817000	177	4.25E-01	2.19E-04	0.00E+00	0.00E+00	6.57E-02	9.60E-02	1.72E-01	3.20E-01	5.23E-01	8.62E-01	1.20E+00	1.85E+00	3.27E+00
Region															
Midwest	648000	24	2.75E-01	1.73E-04	0.00E+00	0.00E+00	0.00E+00	8.44E-02	1.68E-01	2.98E-01	3.27E-01	4.60E-01	5.47E-01	5.70E-01	5.70E-01
Northeast	422000	19	4.08E-01	6.07E-04	1.24E-02	1.24E-02	1.24E-02	1.24E-02	1.45E-01	3.49E-01	4.60E-01	1.26E+00	1.33E+00	1.33E+00	1.33E+00
South	4514000	207	4.11E-01	1.98E-04	0.00E+00	0.00E+00	6.29E-02	9.41E-02	1.44E-01	2.82E-01	5.28E-01	8.62E-01	1.20E+00	1.85E+00	3.27E+00
West	559000	27	4.52E-01	4.30E-04	7.09E-02	7.09E-02	7.28E-02	8.68E-02	1.91E-01	4.52E-01	5.62E-01	1.14E+00	1.14E+00	1.33E+00	1.33E+00
Response to Questionnaire															
Do you garden?	2706000	136	3.59E-01	1.94E-04	0.00E+00	0.00E+00	4.14E-02	9.59E-02	1.47E-01	2.71E-01	4.38E-01	7.33E-01	1.14E+00	1.53E+00	1.53E+00
Do you farm?	297000	18	5.98E-01	6.26E-04	0.00E+00	0.00E+00	0.00E+00	1.09E-01	3.46E-01	5.47E-01	7.04E-01	1.15E+00	1.20E+00	1.20E+00	1.20E+00

Table 2-57. Intake of Total Onions (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	101122000	5303	3.51E-01	4.09E-05	0.00E+00	3.62E-03	2.74E-02	5.21E-02	1.12E-01	2.28E-01	4.26E-01	7.94E-01	1.10E+00	1.88E+00	7.33E+00
Age															
< 01	1383000	73	1.13E-01	1.12E-04	0.00E+00	5.59E-03	8.86E-03	2.20E-02	3.90E-02	7.37E-02	1.33E-01	2.53E-01	3.24E-01	5.38E-01	1.18E+00
01-02	3127000	172	7.13E-01	5.19E-04	0.00E+00	6.33E-03	4.47E-02	1.06E-01	2.03E-01	4.22E-01	8.73E-01	1.66E+00	2.45E+00	4.23E+00	7.33E+00
03-05	4230000	241	4.98E-01	2.57E-04	0.00E+00	0.00E+00	5.46E-03	6.34E-02	1.59E-01	3.15E-01	6.49E-01	1.18E+00	1.62E+00	2.52E+00	3.04E+00
06-11	8862000	496	3.66E-01	1.23E-04	2.65E-03	4.62E-03	3.74E-02	5.63E-02	1.20E-01	2.58E-01	4.63E-01	8.01E-01	1.16E+00	1.80E+00	2.46E+00
12-19	11927000	611	2.92E-01	8.55E-05	0.00E+00	3.02E-03	2.93E-02	4.67E-02	9.47E-02	2.06E-01	3.59E-01	7.02E-01	9.12E-01	1.47E+00	1.90E+00
20-39	30700000	1541	3.20E-01	6.55E-05	0.00E+00	2.25E-03	2.65E-02	4.99E-02	1.05E-01	2.09E-01	3.97E-01	7.46E-01	9.97E-01	1.76E+00	4.29E+00
40-69	33168000	1783	3.39E-01	6.46E-05	0.00E+00	3.93E-03	2.43E-02	5.13E-02	1.12E-01	2.23E-01	4.23E-01	7.31E-01	1.07E+00	1.91E+00	3.19E+00
70 +	7725000	386	4.12E-01	1.68E-04	3.88E-03	1.84E-02	6.63E-02	8.39E-02	1.52E-01	2.87E-01	4.73E-01	8.80E-01	1.28E+00	2.68E+00	3.69E+00
Seasons															
Fall	26130000	857	3.39E-01	7.15E-05	0.00E+00	0.00E+00	2.38E-02	4.45E-02	1.13E-01	2.32E-01	4.33E-01	7.49E-01	1.00E+00	1.86E+00	3.11E+00
Spring	23380000	2076	3.60E-01	8.35E-05	0.00E+00	5.34E-03	3.26E-02	6.14E-02	1.18E-01	2.31E-01	4.43E-01	7.94E-01	1.17E+00	1.95E+00	4.29E+00
Summer	24485000	762	3.97E-01	9.27E-05	0.00E+00	4.64E-03	2.51E-02	5.33E-02	1.19E-01	2.50E-01	5.15E-01	9.60E-01	1.26E+00	2.07E+00	4.23E+00
Winter	27127000	1608	3.11E-01	7.84E-05	0.00E+00	4.22E-03	2.74E-02	5.21E-02	1.02E-01	2.02E-01	3.78E-01	6.58E-01	9.68E-01	1.79E+00	7.33E+00
Urbanization															
Central City	31226000	1196	3.53E-01	7.61E-05	0.00E+00	3.68E-03	2.55E-02	5.41E-02	1.13E-01	2.25E-01	4.28E-01	8.40E-01	1.10E+00	1.77E+00	7.33E+00
Nonmetropolitan	23498000	1586	3.20E-01	7.42E-05	0.00E+00	6.90E-03	3.74E-02	5.44E-02	1.05E-01	2.12E-01	3.88E-01	7.21E-01	9.82E-01	1.80E+00	3.69E+00
Surburban	46398000	2521	3.64E-01	6.23E-05	0.00E+00	2.42E-03	2.32E-02	5.04E-02	1.15E-01	2.37E-01	4.46E-01	7.98E-01	1.16E+00	2.07E+00	4.29E+00
Race															
Asian	1891000	88	5.48E-01	3.40E-04	2.69E-03	1.39E-02	5.73E-02	1.20E-01	2.42E-01	3.94E-01	6.89E-01	1.05E+00	1.61E+00	2.52E+00	2.74E+00
Black	12219000	612	3.22E-01	9.90E-05	0.00E+00	2.41E-03	2.63E-02	5.71E-02	1.20E-01	2.29E-01	3.83E-01	6.65E-01	9.49E-01	1.86E+00	3.30E+00
Native American	669000	36	7.22E-01	1.68E-03	3.82E-02	3.82E-02	3.87E-02	5.73E-02	6.69E-02	3.27E-01	6.93E-01	1.29E+00	2.30E+00	7.33E+00	7.33E+00
Other/NA	3068000	146	4.97E-01	3.32E-04	4.63E-03	6.05E-03	4.85E-02	9.72E-02	1.63E-01	3.04E-01	6.75E-01	1.09E+00	1.41E+00	3.57E+00	4.29E+00
White	83275000	4421	3.42E-01	4.27E-05	0.00E+00	3.93E-03	2.65E-02	5.09E-02	1.08E-01	2.22E-01	4.18E-01	7.80E-01	1.09E+00	1.84E+00	4.23E+00
Regions															
Midwest	23607000	1283	2.90E-01	6.58E-05	0.00E+00	4.75E-03	2.42E-02	4.22E-02	8.90E-02	1.80E-01	3.81E-01	6.65E-01	9.18E-01	1.47E+00	3.47E+00
Northeast	23827000	1186	3.90E-01	8.63E-05	0.00E+00	2.84E-03	3.45E-02	6.20E-02	1.36E-01	2.57E-01	4.73E-01	8.71E-01	1.22E+00	1.89E+00	3.57E+00
South	34754000	1848	3.91E-01	7.96E-05	0.00E+00	4.22E-03	4.13E-02	6.75E-02	1.32E-01	2.51E-01	4.61E-01	8.81E-01	1.25E+00	2.07E+00	7.33E+00
West	18934000	986	3.02E-01	8.46E-05	0.00E+00	2.42E-03	1.45E-02	3.64E-02	8.25E-02	1.92E-01	3.83E-01	6.82E-01	9.78E-01	1.85E+00	3.19E+00
Response to Questionnaire															
Do you garden?	40812000	2221	3.20E-01	5.72E-05	0.00E+00	2.52E-03	2.41E-02	4.73E-02	1.03E-01	2.13E-01	3.98E-01	6.98E-01	9.95E-01	1.84E+00	3.69E+00
Do you farm?	4358000	252	3.31E-01	1.43E-04	0.00E+00	0.00E+00	4.17E-02	5.73E-02	1.17E-01	2.30E-01	4.61E-01	7.70E-01	1.00E+00	1.34E+00	1.49E+00

Table 2-58. Intake of Total Peas (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	59855000	3290	5.17E-01	7.79E-05	0.00E+00	3.62E-02	8.82E-02	1.24E-01	2.04E-01	3.49E-01	6.17E-01	1.08E+00	1.48E+00	2.91E+00	8.33E+00
Age															
< 01	1210000	63	2.26E+00	1.77E-03	9.61E-02	9.61E-02	3.16E-01	4.79E-01	9.91E-01	1.66E+00	2.66E+00	4.45E+00	7.30E+00	8.33E+00	8.33E+00
01-02	2240000	125	1.27E+00	6.69E-04	1.43E-01	1.43E-01	3.02E-01	4.21E-01	6.46E-01	9.56E-01	1.59E+00	2.29E+00	3.67E+00	4.95E+00	6.06E+00
03-05	2774000	160	8.45E-01	3.85E-04	3.12E-02	9.52E-02	2.28E-01	2.84E-01	4.13E-01	6.49E-01	1.05E+00	1.74E+00	2.21E+00	3.16E+00	3.16E+00
06-11	5844000	320	6.44E-01	2.09E-04	4.23E-02	1.23E-01	1.60E-01	2.14E-01	3.18E-01	4.99E-01	7.61E-01	1.35E+00	1.66E+00	2.83E+00	3.84E+00
12-19	6558000	368	3.78E-01	1.30E-04	0.00E+00	4.39E-02	7.68E-02	1.21E-01	1.92E-01	2.85E-01	4.34E-01	7.41E-01	1.09E+00	2.01E+00	2.17E+00
20-39	18601000	968	3.59E-01	8.24E-05	0.00E+00	2.59E-02	7.08E-02	9.85E-02	1.62E-01	2.63E-01	4.21E-01	7.16E-01	9.40E-01	1.85E+00	5.49E+00
40-69	17968000	1033	4.34E-01	8.86E-05	0.00E+00	3.85E-02	9.13E-02	1.20E-01	1.93E-01	3.17E-01	5.56E-01	9.02E-01	1.11E+00	1.94E+00	4.05E+00
70 +	4652000	253	4.99E-01	1.66E-04	2.76E-02	3.48E-02	1.01E-01	1.47E-01	2.51E-01	3.97E-01	6.41E-01	1.04E+00	1.19E+00	1.74E+00	1.98E+00
Seasons															
Fall	16731000	542	5.02E-01	1.58E-04	0.00E+00	3.48E-02	8.63E-02	1.09E-01	1.93E-01	3.07E-01	5.76E-01	1.02E+00	1.44E+00	2.38E+00	8.33E+00
Spring	14127000	1284	4.98E-01	1.54E-04	0.00E+00	2.40E-02	8.80E-02	1.20E-01	2.03E-01	3.32E-01	5.64E-01	1.03E+00	1.40E+00	2.93E+00	7.46E+00
Summer	11651000	364	6.02E-01	1.91E-04	0.00E+00	3.87E-02	1.08E-01	1.49E-01	2.39E-01	3.87E-01	7.31E-01	1.18E+00	1.71E+00	3.16E+00	7.30E+00
Winter	17346000	1100	4.92E-01	1.28E-04	1.16E-02	4.53E-02	8.72E-02	1.23E-01	1.90E-01	3.31E-01	5.93E-01	1.04E+00	1.44E+00	2.58E+00	6.06E+00
Urbanization															
Central City	16477000	663	5.94E-01	1.98E-04	0.00E+00	2.59E-02	6.63E-02	1.07E-01	1.99E-01	3.50E-01	6.74E-01	1.32E+00	1.94E+00	3.93E+00	8.33E+00
Nonmetropolitan	14682000	1094	5.41E-01	1.52E-04	0.00E+00	5.69E-02	1.10E-01	1.54E-01	2.25E-01	3.69E-01	6.50E-01	1.08E+00	1.49E+00	2.94E+00	6.96E+00
Burburban	28696000	1533	4.62E-01	8.48E-05	0.00E+00	4.48E-02	8.72E-02	1.20E-01	1.94E-01	3.22E-01	5.71E-01	9.40E-01	1.23E+00	2.33E+00	6.08E+00
Race															
Asian	352000	20	3.40E-01	5.83E-04	1.24E-01	1.24E-01	1.24E-01	1.33E-01	1.53E-01	1.91E-01	3.94E-01	1.05E+00	1.30E+00	1.60E+00	1.60E+00
Black	7506000	430	6.82E-01	2.81E-04	2.39E-02	4.39E-02	1.02E-01	1.44E-01	2.53E-01	4.36E-01	7.94E-01	1.44E+00	2.08E+00	3.93E+00	7.30E+00
Native American	294000	20	1.16E+00	2.58E-03	7.94E-02	7.94E-02	1.99E-01	2.15E-01	3.39E-01	6.29E-01	1.14E+00	4.05E+00	4.95E+00	4.95E+00	4.95E+00
Other/NA	1189000	58	5.33E-01	5.43E-04	2.59E-02	2.59E-02	3.85E-02	3.89E-02	1.44E-01	3.17E-01	6.60E-01	1.39E+00	2.38E+00	2.38E+00	2.38E+00
White	50514000	2762	4.90E-01	7.88E-05	0.00E+00	3.62E-02	8.84E-02	1.21E-01	2.02E-01	3.29E-01	5.78E-01	1.01E+00	1.37E+00	2.66E+00	8.33E+00
Regions															
Midwest	13913000	830	5.04E-01	1.57E-04	0.00E+00	3.48E-02	9.95E-02	1.27E-01	2.03E-01	3.09E-01	5.78E-01	1.12E+00	1.53E+00	2.38E+00	7.30E+00
Northeast	13570000	701	5.02E-01	1.45E-04	0.00E+00	1.59E-02	7.08E-02	1.08E-01	1.88E-01	3.27E-01	6.02E-01	1.09E+00	1.48E+00	3.04E+00	4.67E+00
South	23355000	1294	5.58E-01	1.32E-04	0.00E+00	6.03E-02	1.08E-01	1.42E-01	2.33E-01	3.93E-01	6.73E-01	1.08E+00	1.46E+00	2.93E+00	8.33E+00
West	9017000	465	4.56E-01	2.07E-04	1.16E-02	3.37E-02	6.64E-02	9.57E-02	1.63E-01	2.81E-01	4.80E-01	9.33E-01	1.40E+00	2.83E+00	6.96E+00
Response to Questionnaire															
Do you garden?	23506000	1385	4.49E-01	9.24E-05	0.00E+00	3.87E-02	8.95E-02	1.20E-01	1.96E-01	3.16E-01	5.44E-01	9.01E-01	1.19E+00	2.36E+00	6.08E+00
Do you farm?	3106000	188	4.24E-01	2.54E-04	3.48E-02	3.48E-02	1.01E-01	1.26E-01	1.76E-01	2.54E-01	4.96E-01	9.18E-01	1.16E+00	2.53E+00	3.51E+00

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Table 2-59. Intake of Total Peppers (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	44580000	2269	2.63E-01	4.87E-05	0.00E+00	0.00E+00	2.70E-02	4.08E-02	8.02E-02	1.60E-01	3.05E-01	6.18E-01	8.83E-01	1.59E+00	3.31E+00
Age															
< 01	439000	31	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	1270000	74	6.35E-01	5.73E-04	1.05E-01	1.07E-01	1.17E-01	1.28E-01	2.25E-01	3.70E-01	8.97E-01	1.21E+00	1.81E+00	3.31E+00	3.31E+00
03-05	1762000	97	5.65E-01	3.59E-04	0.00E+00	0.00E+00	9.70E-02	1.49E-01	2.25E-01	4.59E-01	6.92E-01	1.11E+00	1.19E+00	2.64E+00	2.64E+00
06-11	3819000	212	2.65E-01	1.59E-04	0.00E+00	7.63E-03	3.03E-02	4.81E-02	9.24E-02	1.75E-01	3.08E-01	5.14E-01	7.92E-01	1.44E+00	2.96E+00
12-19	5093000	257	1.74E-01	7.76E-05	0.00E+00	7.08E-03	2.82E-02	3.84E-02	6.50E-02	1.13E-01	2.09E-01	4.13E-01	5.36E-01	7.14E-01	1.70E+00
20-39	13041000	631	2.30E-01	7.70E-05	0.00E+00	8.80E-03	2.58E-02	3.75E-02	7.14E-02	1.41E-01	2.53E-01	5.47E-01	8.07E-01	1.27E+00	2.48E+00
40-69	15580000	803	2.58E-01	7.98E-05	0.00E+00	1.59E-02	3.27E-02	4.52E-02	8.24E-02	1.60E-01	3.04E-01	5.46E-01	8.46E-01	1.82E+00	2.47E+00
70 +	3576000	164	2.79E-01	1.47E-04	9.22E-03	1.61E-02	2.48E-02	3.70E-02	1.07E-01	1.80E-01	3.22E-01	7.37E-01	9.39E-01	1.26E+00	1.54E+00
Seasons															
Fall	10444000	334	2.36E-01	8.49E-05	0.00E+00	0.00E+00	2.71E-02	3.67E-02	7.49E-02	1.60E-01	2.71E-01	5.03E-01	8.20E-01	1.26E+00	2.64E+00
Spring	9944000	852	2.43E-01	9.12E-05	0.00E+00	0.00E+00	2.98E-02	4.68E-02	8.43E-02	1.47E-01	2.89E-01	4.99E-01	7.92E-01	1.52E+00	2.47E+00
Summer	11882000	374	3.21E-01	1.10E-04	0.00E+00	6.63E-03	3.01E-02	4.63E-02	9.66E-02	1.96E-01	4.23E-01	7.90E-01	1.00E+00	1.81E+00	3.31E+00
Winter	12310000	709	2.45E-01	9.34E-05	0.00E+00	0.00E+00	2.32E-02	3.35E-02	6.91E-02	1.44E-01	2.86E-01	5.42E-01	7.90E-01	2.14E+00	2.96E+00
Urbanization															
Central City	11710000	462	2.71E-01	1.08E-04	0.00E+00	0.00E+00	2.01E-02	3.33E-02	7.36E-02	1.53E-01	3.04E-01	7.02E-01	9.40E-01	1.96E+00	3.31E+00
Nonmetropolitan	8685000	576	2.42E-01	1.06E-04	0.00E+00	0.00E+00	2.75E-02	3.96E-02	8.14E-02	1.58E-01	2.83E-01	4.90E-01	6.81E-01	2.14E+00	2.48E+00
Surburban	24125000	1229	2.67E-01	6.20E-05	0.00E+00	6.35E-03	3.08E-02	4.43E-02	8.52E-02	1.65E-01	3.16E-01	6.20E-01	8.99E-01	1.50E+00	2.96E+00
Race															
Asian	711000	32	2.72E-01	3.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-02	2.01E-01	4.27E-01	6.52E-01	1.05E+00	1.23E+00	1.23E+00
Black	3549000	176	2.23E-01	1.63E-04	0.00E+00	0.00E+00	3.17E-02	4.09E-02	6.78E-02	1.22E-01	2.12E-01	5.62E-01	8.07E-01	1.88E+00	1.96E+00
Native American	198000	15	2.97E-01	7.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-01	1.66E-01	4.32E-01	5.10E-01	1.26E+00	1.26E+00	1.26E+00
Other/NA	1418000	76	4.76E-01	5.30E-04	0.00E+00	1.22E-02	1.43E-02	4.79E-02	1.16E-01	2.16E-01	7.02E-01	1.05E+00	1.66E+00	3.31E+00	3.31E+00
White	38644000	1968	2.59E-01	4.95E-05	0.00E+00	7.08E-03	2.78E-02	4.14E-02	8.17E-02	1.62E-01	3.05E-01	5.87E-01	8.58E-01	1.50E+00	2.96E+00
Regions															
Midwest	9382000	453	2.38E-01	1.11E-04	0.00E+00	0.00E+00	2.20E-02	3.50E-02	6.46E-02	1.41E-01	2.85E-01	5.11E-01	7.62E-01	1.52E+00	3.31E+00
Northeast	12581000	623	3.11E-01	1.03E-04	0.00E+00	0.00E+00	3.92E-02	5.86E-02	9.54E-02	1.84E-01	3.69E-01	7.99E-01	1.00E+00	2.14E+00	2.96E+00
South	14492000	749	2.44E-01	7.50E-05	0.00E+00	7.63E-03	2.58E-02	4.03E-02	8.13E-02	1.58E-01	2.80E-01	5.26E-01	8.07E-01	1.59E+00	2.47E+00
West	8065000	442	2.52E-01	1.04E-04	0.00E+00	0.00E+00	2.57E-02	3.67E-02	7.70E-02	1.59E-01	3.02E-01	6.18E-01	7.93E-01	1.26E+00	2.64E+00
Response to Questionnaire															
Do you garden?	19509000	1011	2.41E-01	6.47E-05	0.00E+00	0.00E+00	2.85E-02	3.92E-02	7.53E-02	1.54E-01	2.89E-01	5.19E-01	7.92E-01	1.45E+00	2.96E+00
Do you farm?	1752000	77	2.66E-01	2.78E-04	0.00E+00	1.67E-02	2.70E-02	3.96E-02	7.11E-02	1.66E-01	3.18E-01	5.38E-01	8.45E-01	2.48E+00	2.48E+00

Table 2-60. Intake of Total Pumpkin (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12067000	540	8.51E-01	4.65E-04	3.41E-03	5.25E-03	6.85E-02	1.14E-01	2.56E-01	5.04E-01	1.06E+00	1.69E+00	2.24E+00	5.38E+00	2.54E+01
Age															
<01	525000	26	2.53E+00	8.73E-03	6.23E-02	6.23E-02	6.23E-02	1.46E-01	4.96E-01	7.19E-01	1.33E+00	1.68E+00	2.54E+01	2.54E+01	2.54E+01
01-02	437000	22	9.86E-01	1.42E-03	2.12E-02	2.12E-02	2.12E-02	2.09E-01	3.19E-01	6.89E-01	1.21E+00	2.15E+00	4.02E+00	4.02E+00	4.02E+00
03-05	615000	31	1.84E+00	2.04E-03	4.24E-02	4.24E-02	4.24E-02	1.49E-01	7.29E-01	1.64E+00	2.20E+00	4.48E+00	5.83E+00	5.83E+00	5.83E+00
06-11	1021000	40	6.26E-01	4.82E-04	5.25E-03	5.25E-03	3.88E-02	5.22E-02	2.54E-01	5.54E-01	9.28E-01	1.25E+00	1.56E+00	1.99E+00	1.99E+00
12-19	955000	44	2.11E-01	1.67E-04	3.41E-03	3.41E-03	4.03E-03	5.13E-03	1.12E-01	1.87E-01	2.96E-01	4.53E-01	5.94E-01	6.65E-01	6.65E-01
20-39	3370000	148	6.77E-01	4.97E-04	1.96E-02	1.96E-02	6.16E-02	9.18E-02	1.49E-01	3.77E-01	8.15E-01	1.52E+00	2.60E+00	5.38E+00	5.38E+00
40-69	3658000	166	7.65E-01	3.20E-04	2.06E-02	2.83E-02	1.74E-01	2.41E-01	3.44E-01	5.41E-01	1.06E+00	1.67E+00	2.10E+00	3.17E+00	3.17E+00
70+	1486000	63	9.80E-01	8.14E-04	1.09E-01	1.09E-01	1.32E-01	2.89E-01	4.21E-01	6.54E-01	1.28E+00	1.83E+00	2.98E+00	7.60E+00	7.60E+00
Seasons															
Fall	6461000	219	1.06E+00	8.19E-04	4.81E-02	6.85E-02	1.12E-01	1.49E-01	3.11E-01	5.94E-01	1.22E+00	2.01E+00	2.67E+00	5.83E+00	2.54E+01
Spring	1454000	119	5.20E-01	5.41E-04	3.41E-03	3.41E-03	5.13E-03	1.96E-02	8.73E-02	3.54E-01	6.62E-01	1.10E+00	1.45E+00	3.23E+00	3.23E+00
Summer	1692000	55	6.52E-01	5.28E-04	5.85E-02	5.85E-02	9.18E-02	1.03E-01	2.41E-01	5.04E-01	7.19E-01	1.47E+00	1.79E+00	4.02E+00	4.02E+00
Winter	2460000	147	6.37E-01	4.95E-04	1.65E-02	2.06E-02	5.22E-02	9.76E-02	2.41E-01	4.33E-01	7.44E-01	1.29E+00	1.90E+00	4.48E+00	7.60E+00
Urbanization															
Central City	3443000	121	7.91E-01	5.14E-04	3.41E-03	3.41E-03	1.96E-02	6.07E-02	2.45E-01	4.63E-01	1.11E+00	1.94E+00	2.23E+00	5.83E+00	7.60E+00
Nonmetropolitan	2907000	166	7.66E-01	5.24E-04	4.81E-02	6.85E-02	1.12E-01	1.45E-01	2.75E-01	5.05E-01	8.55E-01	1.52E+00	2.98E+00	4.48E+00	5.67E+00
Surburban	5717000	253	9.30E-01	8.92E-04	1.65E-02	3.88E-02	8.73E-02	1.19E-01	2.84E-01	5.21E-01	1.10E+00	1.64E+00	2.15E+00	5.38E+00	2.54E+01
Race															
Asian	208000	11	6.13E+00	2.00E-02	5.11E-01	5.11E-01	5.33E-01	5.33E-01	6.62E-01	1.25E+00	5.38E+00	2.54E+01	2.54E+01	2.54E+01	2.54E+01
Black	735000	35	5.97E-01	1.43E-03	3.41E-03	3.41E-03	4.03E-03	5.13E-03	2.12E-02	1.60E-01	7.02E-01	1.57E+00	3.23E+00	7.60E+00	7.60E+00
Native American	32000	4	5.90E-01	1.99E-03	8.73E-02	8.73E-02	8.73E-02	8.73E-02	8.73E-02	6.40E-01	1.02E+00	1.02E+00	1.02E+00	1.02E+00	1.02E+00
Other/NA	153000	6	6.35E-01	9.46E-04	1.87E-01	1.87E-01	1.87E-01	1.87E-01	2.98E-01	6.12E-01	1.14E+00	1.14E+00	1.14E+00	1.14E+00	1.14E+00
White	10939000	484	7.71E-01	2.44E-04	1.65E-02	3.88E-02	9.33E-02	1.27E-01	2.84E-01	5.15E-01	1.06E+00	1.67E+00	2.21E+00	4.02E+00	5.83E+00
Regions															
Midwest	4209000	170	7.49E-01	3.83E-04	3.41E-03	4.03E-03	2.12E-02	1.12E-01	2.62E-01	5.33E-01	1.08E+00	1.73E+00	2.15E+00	4.48E+00	5.83E+00
Northeast	3131000	146	1.02E+00	1.60E-03	4.81E-02	6.07E-02	9.33E-02	1.14E-01	2.17E-01	3.99E-01	8.20E-01	1.83E+00	2.60E+00	2.54E+01	2.54E+01
South	2453000	121	7.57E-01	6.00E-04	2.20E-02	5.44E-02	9.18E-02	1.19E-01	3.02E-01	4.94E-01	9.24E-01	1.42E+00	2.33E+00	5.67E+00	7.60E+00
West	2274000	103	9.14E-01	5.63E-04	1.65E-02	1.65E-02	5.45E-02	8.73E-02	3.16E-01	6.57E-01	1.34E+00	1.71E+00	2.98E+00	4.02E+00	4.02E+00
Response to Questionnaire															
Do you garden?	6878000	306	9.66E-01	7.70E-04	1.65E-02	2.83E-02	1.16E-01	1.61E-01	3.13E-01	5.51E-01	1.10E+00	1.73E+00	2.67E+00	5.83E+00	2.54E+01
Do you farm?	776000	36	5.61E-01	6.49E-04	1.65E-02	1.65E-02	3.88E-02	5.22E-02	1.49E-01	4.30E-01	9.35E-01	1.24E+00	1.38E+00	3.02E+00	3.02E+00

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Table 2-61. Intake of Total Snap Beans (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	87569000	4796	7.26E-01	9.82E-05	0.00E+00	5.28E-02	1.30E-01	1.76E-01	2.82E-01	4.83E-01	8.41E-01	1.40E+00	1.97E+00	4.61E+00	2.25E+01
Age															
<01	1659000	87	3.87E+00	2.05E-03	3.68E-01	3.68E-01	4.85E-01	8.57E-01	1.75E+00	3.43E+00	5.24E+00	8.32E+00	8.92E+00	1.17E+01	1.17E+01
01-02	2677000	162	1.60E+00	7.58E-04	1.24E-01	1.24E-01	3.80E-01	4.46E-01	7.51E-01	1.26E+00	1.96E+00	3.35E+00	4.46E+00	5.86E+00	7.87E+00
03-05	4295000	258	1.25E+00	4.64E-04	0.00E+00	1.27E-01	2.98E-01	3.99E-01	6.58E-01	9.94E-01	1.53E+00	2.27E+00	3.01E+00	6.08E+00	6.90E+00
06-11	9116000	523	7.70E-01	2.09E-04	0.00E+00	1.27E-01	2.17E-01	2.66E-01	3.76E-01	6.00E-01	9.36E-01	1.39E+00	1.87E+00	3.18E+00	7.44E+00
12-19	10299000	559	5.44E-01	1.50E-04	0.00E+00	3.40E-02	1.29E-01	1.68E-01	2.55E-01	4.10E-01	6.80E-01	1.12E+00	1.34E+00	2.72E+00	7.51E+00
20-39	25467000	1360	5.17E-01	8.86E-05	0.00E+00	4.65E-02	1.07E-01	1.50E-01	2.34E-01	3.85E-01	6.60E-01	1.03E+00	1.44E+00	2.05E+00	4.36E+00
40-69	26492000	1465	6.01E-01	1.57E-04	0.00E+00	5.66E-02	1.18E-01	1.63E-01	2.57E-01	4.35E-01	7.48E-01	1.18E+00	1.53E+00	2.65E+00	2.25E+01
70+	7564000	382	7.60E-01	2.71E-04	1.43E-02	5.65E-02	1.70E-01	2.33E-01	3.69E-01	5.71E-01	9.50E-01	1.36E+00	1.78E+00	3.43E+00	9.96E+00
Seasons															
Fall	21702000	732	7.17E-01	2.00E-04	0.00E+00	6.13E-02	1.14E-01	1.69E-01	2.74E-01	4.63E-01	8.01E-01	1.40E+00	1.97E+00	5.05E+00	1.07E+01
Spring	21041000	1947	7.63E-01	2.49E-04	0.00E+00	8.69E-02	1.41E-01	1.87E-01	2.79E-01	4.74E-01	8.50E-01	1.44E+00	2.25E+00	4.98E+00	2.25E+01
Summer	21178000	660	7.18E-01	1.88E-04	0.00E+00	0.00E+00	1.17E-01	1.60E-01	2.76E-01	5.00E-01	8.64E-01	1.34E+00	1.83E+00	4.87E+00	1.17E+01
Winter	23648000	1457	7.07E-01	1.44E-04	0.00E+00	7.19E-02	1.42E-01	1.89E-01	2.99E-01	4.93E-01	8.33E-01	1.49E+00	1.94E+00	3.54E+00	8.92E+00
Urbanization															
Central City	24867000	972	7.97E-01	2.08E-04	0.00E+00	1.46E-02	1.22E-01	1.73E-01	2.85E-01	4.99E-01	8.76E-01	1.70E+00	2.38E+00	5.40E+00	9.65E+00
Nonmetropolitan	22920000	1586	7.75E-01	1.95E-04	0.00E+00	8.44E-02	1.53E-01	2.03E-01	3.03E-01	5.33E-01	8.93E-01	1.51E+00	1.96E+00	4.88E+00	1.17E+01
Surburban	39712000	2236	6.52E-01	1.30E-04	0.00E+00	6.54E-02	1.24E-01	1.66E-01	2.71E-01	4.50E-01	7.83E-01	1.28E+00	1.77E+00	3.45E+00	2.25E+01
Race															
Asian	946000	45	9.79E-01	1.77E-03	7.64E-02	7.64E-02	1.53E-01	2.14E-01	4.02E-01	5.71E-01	9.09E-01	1.32E+00	1.70E+00	9.65E+00	9.65E+00
Black	11310000	606	9.24E-01	4.17E-04	0.00E+00	0.00E+00	1.42E-01	1.96E-01	3.28E-01	6.13E-01	1.01E+00	1.70E+00	2.59E+00	6.35E+00	2.25E+01
Native American	844000	54	8.05E-01	1.00E-03	1.69E-01	1.69E-01	2.33E-01	2.70E-01	3.60E-01	5.82E-01	7.65E-01	1.65E+00	2.16E+00	5.64E+00	5.64E+00
Other/NA	1868000	92	6.25E-01	4.80E-04	8.82E-03	8.95E-02	1.54E-01	1.93E-01	2.95E-01	4.36E-01	6.71E-01	9.80E-01	2.38E+00	3.54E+00	3.54E+00
White	72541000	3997	6.94E-01	9.42E-05	0.00E+00	5.65E-02	1.27E-01	1.72E-01	2.75E-01	4.64E-01	8.22E-01	1.37E+00	1.92E+00	4.12E+00	1.17E+01
Regions															
Midwest	21935000	1311	7.50E-01	2.09E-04	0.00E+00	3.40E-02	1.29E-01	1.67E-01	2.68E-01	4.70E-01	8.27E-01	1.52E+00	2.21E+00	5.40E+00	9.96E+00
Northeast	17175000	889	6.32E-01	1.71E-04	0.00E+00	6.95E-02	1.18E-01	1.58E-01	2.62E-01	4.32E-01	7.68E-01	1.30E+00	1.77E+00	3.43E+00	8.32E+00
South	32753000	1813	7.97E-01	1.76E-04	0.00E+00	4.76E-02	1.49E-01	2.05E-01	3.25E-01	5.58E-01	9.37E-01	1.52E+00	2.01E+00	4.46E+00	2.25E+01
West	15646000	781	6.47E-01	2.09E-04	0.00E+00	6.46E-02	1.25E-01	1.70E-01	2.57E-01	4.33E-01	7.21E-01	1.25E+00	1.74E+00	4.81E+00	1.07E+01
Response to Questionnaire															
Do you garden?	35025000	2034	6.95E-01	1.26E-04	0.00E+00	7.19E-02	1.29E-01	1.73E-01	2.79E-01	4.82E-01	8.30E-01	1.40E+00	1.92E+00	4.01E+00	9.96E+00
Do you farm?	4521000	279	7.31E-01	2.86E-04	5.65E-02	7.44E-02	1.33E-01	1.70E-01	3.21E-01	5.55E-01	9.31E-01	1.40E+00	1.79E+00	3.30E+00	4.23E+00

Table 2-62. Intake of Total Tomatoes (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	118755000	6255	9.03E-01	1.19E-04	0.00E+00	4.20E-02	1.03E-01	1.55E-01	2.73E-01	5.41E-01	1.04E+00	1.90E+00	2.85E+00	6.25E+00	2.88E+01
Age															
<01	1859000	98	5.61E+00	3.61E-03	0.00E+00	2.30E-01	7.56E-01	1.17E+00	2.45E+00	4.17E+00	7.02E+00	1.09E+01	1.80E+01	2.88E+01	2.88E+01
01-02	3504000	195	2.42E+00	1.16E-03	2.35E-01	2.71E-01	4.45E-01	6.10E-01	9.90E-01	1.67E+00	3.21E+00	5.48E+00	7.26E+00	1.07E+01	1.32E+01
03-05	4836000	283	1.56E+00	6.57E-04	1.49E-01	1.57E-01	2.37E-01	3.25E-01	6.08E-01	1.11E+00	2.02E+00	3.38E+00	4.57E+00	6.79E+00	9.82E+00
06-11	11174000	633	1.01E+00	3.23E-04	3.20E-02	8.30E-02	1.60E-01	2.14E-01	3.53E-01	6.96E-01	1.24E+00	2.17E+00	3.04E+00	6.39E+00	9.14E+00
12-19	12935000	694	5.56E-01	1.58E-04	0.00E+00	3.55E-02	7.90E-02	1.15E-01	2.05E-01	4.12E-01	6.75E-01	1.12E+00	1.61E+00	2.63E+00	7.23E+00
20-39	36720000	1848	5.93E-01	1.18E-04	0.00E+00	3.11E-02	7.56E-02	1.13E-01	2.08E-01	4.05E-01	7.29E-01	1.29E+00	1.79E+00	3.15E+00	1.93E+01
40-69	37925000	2023	8.16E-01	1.41E-04	0.00E+00	3.32E-02	1.19E-01	1.76E-01	2.92E-01	5.46E-01	1.01E+00	1.74E+00	2.40E+00	4.40E+00	8.63E+00
70 +	9802000	481	9.75E-01	2.84E-04	0.00E+00	1.01E-01	1.62E-01	2.36E-01	4.19E-01	7.18E-01	1.24E+00	1.85E+00	2.88E+00	4.43E+00	6.70E+00
Seasons															
Fall	27702000	921	9.43E-01	2.29E-04	0.00E+00	3.00E-02	1.07E-01	1.55E-01	2.75E-01	5.73E-01	1.11E+00	2.01E+00	3.04E+00	6.39E+00	1.09E+01
Spring	29323000	2534	7.98E-01	2.30E-04	0.00E+00	3.18E-02	9.02E-02	1.36E-01	2.44E-01	4.81E-01	8.99E-01	1.61E+00	2.31E+00	5.28E+00	2.17E+01
Summer	32250000	1017	1.03E+00	2.59E-04	0.00E+00	4.20E-02	1.18E-01	1.81E-01	3.29E-01	6.24E-01	1.20E+00	2.17E+00	3.28E+00	7.26E+00	2.88E+01
Winter	29480000	1783	8.30E-01	2.25E-04	0.00E+00	4.99E-02	9.70E-02	1.39E-01	2.60E-01	5.07E-01	9.63E-01	1.72E+00	2.56E+00	5.32E+00	2.03E+01
Urbanization															
Central City	33582000	1309	8.75E-01	2.18E-04	0.00E+00	4.90E-02	8.82E-02	1.41E-01	2.59E-01	5.07E-01	1.01E+00	1.84E+00	2.80E+00	7.26E+00	2.03E+01
Nonmetropolitan	28941000	1898	1.03E+00	2.76E-04	0.00E+00	4.59E-02	1.18E-01	1.83E-01	3.17E-01	6.14E-01	1.22E+00	2.12E+00	3.18E+00	6.27E+00	2.88E+01
Surburban	56232000	3048	8.56E-01	1.62E-04	0.00E+00	3.14E-02	1.03E-01	1.50E-01	2.68E-01	5.23E-01	9.85E-01	1.80E+00	2.59E+00	5.52E+00	2.17E+01
Race															
Asian	1861000	82	9.39E-01	1.08E-03	1.94E-02	1.94E-02	9.36E-02	1.48E-01	2.23E-01	5.02E-01	9.37E-01	2.00E+00	3.04E+00	9.99E+00	9.99E+00
Black	10914000	546	6.94E-01	3.05E-04	0.00E+00	3.55E-02	6.82E-02	1.16E-01	2.24E-01	4.13E-01	7.75E-01	1.41E+00	2.14E+00	4.70E+00	1.09E+01
Native American	767000	54	1.27E+00	3.66E-03	4.63E-02	4.63E-02	6.40E-02	1.08E-01	1.52E-01	3.90E-01	8.21E-01	1.84E+00	5.24E+00	2.03E+01	2.03E+01
Other/NA	3171000	154	7.86E-01	4.83E-04	0.00E+00	6.15E-02	1.20E-01	1.94E-01	2.89E-01	4.63E-01	9.14E-01	1.76E+00	2.91E+00	4.71E+00	5.48E+00
White	102042000	5419	9.26E-01	1.30E-04	0.00E+00	4.20E-02	1.08E-01	1.61E-01	2.84E-01	5.63E-01	1.07E+00	1.93E+00	2.88E+00	6.39E+00	2.88E+01
Regions															
Midwest	27233000	1533	1.00E+00	2.78E-04	0.00E+00	3.55E-02	1.14E-01	1.67E-01	2.90E-01	5.91E-01	1.12E+00	2.03E+00	3.39E+00	7.75E+00	1.93E+01
Northeast	28353000	1370	8.81E-01	2.32E-04	0.00E+00	3.32E-02	1.07E-01	1.55E-01	2.84E-01	5.45E-01	1.00E+00	1.79E+00	2.75E+00	6.63E+00	1.80E+01
South	39907000	2120	8.44E-01	1.96E-04	0.00E+00	3.39E-02	1.00E-01	1.52E-01	2.62E-01	5.17E-01	9.90E-01	1.79E+00	2.55E+00	5.35E+00	2.88E+01
West	23262000	1232	9.12E-01	2.66E-04	0.00E+00	4.90E-02	9.31E-02	1.41E-01	2.69E-01	5.20E-01	1.09E+00	1.97E+00	2.91E+00	6.27E+00	2.17E+01
Response to Questionnaire															
Do you garden?	46529000	2541	9.69E-01	1.83E-04	0.00E+00	4.59E-02	1.11E-01	1.62E-01	3.06E-01	6.03E-01	1.18E+00	2.06E+00	2.97E+00	6.25E+00	2.17E+01
Do you farm?	5245000	313	9.99E-01	5.53E-04	0.00E+00	1.34E-02	1.07E-01	1.65E-01	2.68E-01	5.67E-01	1.29E+00	2.34E+00	3.55E+00	6.82E+00	9.14E+00

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Table 2-63. Intake of Total White Potatoes (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	151813000	8093	1.71E+00	1.72E-04	0.00E+00	4.66E-02	1.58E-01	2.51E-01	5.57E-01	1.12E+00	2.08E+00	3.58E+00	5.17E+00	1.00E+01	5.25E+01
Age															
< 01	2159000	121	7.21E+00	4.31E-03	0.00E+00	2.22E-01	7.12E-01	1.11E+00	2.40E+00	6.01E+00	9.94E+00	1.68E+01	2.24E+01	2.89E+01	3.15E+01
01-02	4681000	262	4.61E+00	2.39E-03	1.25E-01	2.13E-01	5.62E-01	7.72E-01	1.49E+00	3.41E+00	5.67E+00	9.54E+00	1.24E+01	2.31E+01	5.25E+01
03-05	7080000	397	2.90E+00	8.53E-04	0.00E+00	1.10E-01	3.00E-01	5.05E-01	1.08E+00	2.39E+00	4.09E+00	6.25E+00	7.27E+00	9.32E+00	1.40E+01
06-11	14925000	838	2.35E+00	5.47E-04	0.00E+00	1.29E-01	2.69E-01	4.24E-01	9.20E-01	1.84E+00	3.03E+00	4.78E+00	6.12E+00	1.00E+01	2.63E+01
12-19	18181000	956	1.41E+00	3.11E-04	0.00E+00	2.69E-02	1.57E-01	2.45E-01	5.13E-01	1.08E+00	1.93E+00	2.93E+00	3.76E+00	5.90E+00	1.41E+01
20-39	47477000	2427	1.23E+00	1.86E-04	0.00E+00	3.42E-02	1.19E-01	1.92E-01	4.33E-01	9.12E-01	1.62E+00	2.59E+00	3.25E+00	6.23E+00	1.84E+01
40-69	45523000	2477	1.42E+00	2.18E-04	0.00E+00	4.99E-02	1.63E-01	2.56E-01	5.55E-01	1.02E+00	1.81E+00	2.86E+00	3.89E+00	8.11E+00	1.53E+01
70 +	11787000	615	1.44E+00	3.94E-04	0.00E+00	5.33E-02	1.88E-01	2.68E-01	5.82E-01	1.07E+00	2.00E+00	2.86E+00	3.92E+00	7.14E+00	1.08E+01
Seasons															
Fall	38567000	1291	1.64E+00	2.92E-04	0.00E+00	5.98E-02	1.72E-01	2.60E-01	5.55E-01	1.12E+00	2.06E+00	3.44E+00	4.76E+00	9.32E+00	2.15E+01
Spring	36372000	3201	1.70E+00	3.42E-04	0.00E+00	4.46E-02	1.45E-01	2.30E-01	5.30E-01	1.09E+00	2.12E+00	3.59E+00	5.10E+00	1.03E+01	2.89E+01
Summer	36024000	1139	1.82E+00	3.90E-04	0.00E+00	2.59E-02	1.58E-01	2.61E-01	5.74E-01	1.19E+00	2.12E+00	3.87E+00	5.73E+00	1.08E+01	3.15E+01
Winter	40850000	2462	1.67E+00	3.49E-04	0.00E+00	5.28E-02	1.59E-01	2.58E-01	5.76E-01	1.10E+00	2.04E+00	3.49E+00	4.87E+00	9.20E+00	5.25E+01
Urbanization															
Central City	44022000	1731	1.68E+00	3.70E-04	0.00E+00	3.57E-02	1.36E-01	2.18E-01	4.97E-01	1.05E+00	1.97E+00	3.49E+00	5.36E+00	1.08E+01	5.25E+01
Nonmetropolitan	37656000	2552	1.99E+00	3.57E-04	0.00E+00	3.89E-02	2.08E-01	3.35E-01	7.50E-01	1.42E+00	2.43E+00	4.04E+00	5.70E+00	9.99E+00	3.15E+01
Surburban	70075000	3808	1.57E+00	2.18E-04	0.00E+00	5.52E-02	1.58E-01	2.50E-01	5.24E-01	1.03E+00	1.93E+00	3.25E+00	4.66E+00	9.64E+00	2.31E+01
Race															
Asian	1802000	83	1.76E+00	1.60E-03	6.55E-02	6.55E-02	1.86E-01	1.97E-01	4.60E-01	9.99E-01	1.96E+00	4.28E+00	6.23E+00	1.00E+01	1.00E+01
Black	16779000	861	1.66E+00	5.08E-04	0.00E+00	2.55E-02	1.36E-01	2.25E-01	5.24E-01	1.05E+00	2.13E+00	3.49E+00	5.33E+00	9.00E+00	2.24E+01
Native American	1441000	89	4.20E+00	6.39E-03	9.70E-02	2.25E-01	4.15E-01	4.90E-01	7.87E-01	1.79E+00	4.42E+00	9.54E+00	1.31E+01	5.25E+01	5.25E+01
Other/NA	3385000	163	2.50E+00	1.79E-03	9.85E-02	2.20E-01	2.84E-01	3.58E-01	7.18E-01	1.44E+00	2.90E+00	5.90E+00	1.08E+01	1.53E+01	2.31E+01
White	128346000	6895	1.66E+00	1.69E-04	0.00E+00	4.96E-02	1.58E-01	2.51E-01	5.58E-01	1.12E+00	2.06E+00	3.48E+00	4.92E+00	9.64E+00	3.15E+01
Regions															
Midwest	39271000	2209	1.80E+00	3.40E-04	0.00E+00	3.51E-02	1.35E-01	2.36E-01	5.71E-01	1.20E+00	2.23E+00	3.80E+00	5.58E+00	1.01E+01	2.31E+01
Northeast	33411000	1663	1.55E+00	3.16E-04	0.00E+00	4.23E-02	1.51E-01	2.32E-01	4.80E-01	9.66E-01	1.91E+00	3.46E+00	4.76E+00	9.78E+00	1.80E+01
South	51373000	2771	1.75E+00	3.27E-04	0.00E+00	4.69E-02	1.72E-01	2.79E-01	5.95E-01	1.16E+00	2.15E+00	3.58E+00	5.26E+00	9.75E+00	5.25E+01
West	27698000	1448	1.67E+00	3.77E-04	0.00E+00	8.34E-02	1.88E-01	2.82E-01	5.63E-01	1.13E+00	1.98E+00	3.40E+00	4.79E+00	9.89E+00	2.48E+01
Response to Questionnaire															
Do you garden?	57753000	3235	1.67E+00	2.33E-04	0.00E+00	4.99E-02	1.75E-01	2.87E-01	5.98E-01	1.18E+00	2.14E+00	3.43E+00	4.63E+00	8.82E+00	2.29E+01
Do you farm?	6834000	416	2.16E+00	7.59E-04	0.00E+00	1.20E-01	2.29E-01	3.58E-01	8.79E-01	1.77E+00	2.80E+00	4.06E+00	6.16E+00	1.08E+01	1.99E+01

Table 2-64. Intake of Total Exposed Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	173091000	9123	2.67E+00	2.99E-04	0.00E+00	6.16E-02	2.50E-01	4.19E-01	8.45E-01	1.70E+00	3.24E+00	5.50E+00	7.72E+00	1.56E+01	1.23E+02
Age															
< 01	2678000	147	1.76E+01	1.17E-02	0.00E+00	4.44E-01	2.55E+00	3.18E+00	6.97E+00	1.19E+01	2.09E+01	3.59E+01	5.00E+01	1.23E+02	1.23E+02
01-02	5472000	304	6.15E+00	2.15E-03	1.86E-01	2.51E-01	6.19E-01	1.22E+00	2.60E+00	4.70E+00	8.31E+00	1.28E+01	1.61E+01	2.26E+01	2.64E+01
03-05	7600000	430	4.48E+00	1.37E-03	0.00E+00	1.55E-01	6.39E-01	9.42E-01	1.65E+00	3.40E+00	5.98E+00	9.51E+00	1.27E+01	1.80E+01	1.87E+01
06-11	15823000	884	2.94E+00	6.41E-04	0.00E+00	1.05E-01	4.22E-01	6.82E-01	1.19E+00	2.18E+00	3.82E+00	6.22E+00	8.28E+00	1.24E+01	1.75E+01
12-19	19162000	1017	1.77E+00	3.76E-04	0.00E+00	1.39E-02	2.33E-01	3.77E-01	6.91E-01	1.29E+00	2.22E+00	3.79E+00	5.00E+00	8.11E+00	1.59E+01
20-39	54780000	2751	1.72E+00	2.33E-04	0.00E+00	3.94E-02	1.82E-01	2.99E-01	6.15E-01	1.23E+00	2.24E+00	3.73E+00	4.85E+00	8.65E+00	2.29E+01
40-69	53067000	2856	2.47E+00	3.35E-04	0.00E+00	6.89E-02	2.97E-01	4.59E-01	9.53E-01	1.86E+00	3.24E+00	5.13E+00	6.67E+00	1.08E+01	2.99E+01
70 +	14501000	734	2.79E+00	5.84E-04	0.00E+00	1.24E-01	3.74E-01	5.70E-01	1.15E+00	2.21E+00	3.81E+00	5.87E+00	7.04E+00	1.05E+01	1.75E+01
Seasons															
Fall	43339000	1442	2.53E+00	7.20E-04	0.00E+00	2.44E-02	2.11E-01	3.44E-01	7.08E-01	1.44E+00	2.90E+00	5.06E+00	7.76E+00	1.80E+01	1.23E+02
Spring	41718000	3632	2.68E+00	5.68E-04	0.00E+00	6.07E-02	2.57E-01	4.27E-01	8.82E-01	1.76E+00	3.16E+00	5.54E+00	7.52E+00	1.79E+01	7.63E+01
Summer	42887000	1344	2.93E+00	5.78E-04	0.00E+00	6.10E-02	2.81E-01	5.00E-01	1.01E+00	1.97E+00	3.67E+00	6.06E+00	8.11E+00	1.54E+01	6.62E+01
Winter	45147000	2705	2.52E+00	5.06E-04	0.00E+00	9.39E-02	2.62E-01	4.43E-01	8.74E-01	1.68E+00	3.05E+00	5.10E+00	7.50E+00	1.38E+01	9.06E+01
Urbanization															
Central City	51106000	2005	2.88E+00	7.20E-04	0.00E+00	3.85E-02	2.22E-01	3.99E-01	8.75E-01	1.70E+00	3.30E+00	6.01E+00	9.08E+00	1.79E+01	1.23E+02
Nonmetropolitan	40985000	2769	2.55E+00	5.56E-04	0.00E+00	9.75E-02	2.52E-01	4.41E-01	8.60E-01	1.66E+00	3.16E+00	5.17E+00	6.92E+00	1.38E+01	9.06E+01
Surburban	80940000	4347	2.59E+00	3.50E-04	0.00E+00	6.54E-02	2.76E-01	4.20E-01	8.27E-01	1.73E+00	3.21E+00	5.46E+00	7.45E+00	1.53E+01	5.00E+01
Race															
Asian	2413000	114	6.43E+00	1.02E-02	6.69E-02	6.69E-02	5.67E-01	6.42E-01	1.39E+00	2.85E+00	5.72E+00	1.06E+01	1.58E+01	1.23E+02	1.23E+02
Black	19696000	1012	2.93E+00	1.02E-03	0.00E+00	0.00E+00	2.20E-01	4.04E-01	8.32E-01	1.78E+00	3.46E+00	6.09E+00	9.41E+00	1.87E+01	6.62E+01
Native American	1412000	89	3.93E+00	9.14E-03	2.49E-01	2.80E-01	5.37E-01	5.99E-01	9.39E-01	1.61E+00	2.66E+00	5.67E+00	1.12E+01	9.06E+01	9.06E+01
Other/NA	4400000	211	2.87E+00	1.79E-03	0.00E+00	2.71E-01	3.44E-01	6.24E-01	9.81E-01	1.77E+00	3.51E+00	6.11E+00	7.76E+00	1.07E+01	3.99E+01
White	145110000	7695	2.55E+00	2.58E-04	0.00E+00	6.54E-02	2.49E-01	4.11E-01	8.40E-01	1.68E+00	3.16E+00	5.32E+00	7.44E+00	1.45E+01	5.85E+01
Regions															
Midwest	42155000	2363	2.48E+00	7.99E-04	0.00E+00	3.43E-02	2.03E-01	3.32E-01	7.04E-01	1.38E+00	2.79E+00	4.95E+00	7.31E+00	1.61E+01	1.23E+02
Northeast	38729000	1902	2.80E+00	5.25E-04	0.00E+00	1.11E-01	3.07E-01	4.60E-01	9.12E-01	1.82E+00	3.38E+00	6.11E+00	8.65E+00	1.55E+01	5.00E+01
South	58705000	3137	2.69E+00	4.43E-04	0.00E+00	5.58E-02	2.55E-01	4.66E-01	8.96E-01	1.79E+00	3.35E+00	5.52E+00	7.42E+00	1.42E+01	5.85E+01
West	33442000	1719	2.70E+00	6.35E-04	0.00E+00	6.89E-02	2.73E-01	4.42E-01	9.09E-01	1.80E+00	3.36E+00	5.59E+00	7.72E+00	1.75E+01	9.06E+01
Response to Questionnaire															
Do you garden?	65258000	3593	2.66E+00	3.79E-04	0.00E+00	4.72E-02	2.80E-01	4.38E-01	9.05E-01	1.81E+00	3.43E+00	5.63E+00	7.54E+00	1.45E+01	5.00E+01
Do you farm?	6839000	404	2.72E+00	1.04E-03	0.00E+00	2.50E-02	2.99E-01	3.97E-01	9.74E-01	1.90E+00	3.81E+00	5.58E+00	7.54E+00	1.34E+01	2.04E+01

Table 2-65. Intake of Total Protected Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	139885000	7455	1.20E+00	1.36E-04	0.00E+00	7.06E-02	1.52E-01	2.17E-01	4.00E-01	7.61E-01	1.41E+00	2.56E+00	3.55E+00	7.14E+00	3.61E+01
Age															
< 01	2315000	126	6.55E+00	4.15E-03	3.06E-01	5.72E-01	7.86E-01	9.69E-01	1.85E+00	5.29E+00	8.64E+00	1.47E+01	1.63E+01	3.61E+01	3.61E+01
01-02	4608000	261	2.77E+00	1.04E-03	3.21E-01	3.70E-01	5.47E-01	7.79E-01	1.27E+00	2.22E+00	3.53E+00	5.19E+00	6.39E+00	1.24E+01	1.66E+01
03-05	6718000	385	2.20E+00	6.96E-04	1.60E-01	2.19E-01	3.70E-01	5.94E-01	1.03E+00	1.65E+00	2.96E+00	4.57E+00	5.24E+00	9.88E+00	1.30E+01
06-11	13792000	773	1.51E+00	4.05E-04	0.00E+00	4.69E-02	2.07E-01	3.18E-01	5.71E-01	1.03E+00	1.94E+00	3.08E+00	4.03E+00	7.71E+00	1.16E+01
12-19	16218000	858	9.41E-01	2.20E-04	0.00E+00	4.44E-02	1.46E-01	2.07E-01	3.60E-01	6.72E-01	1.20E+00	1.99E+00	2.51E+00	4.37E+00	6.87E+00
20-39	44065000	2260	8.51E-01	1.33E-04	0.00E+00	5.24E-02	1.28E-01	1.78E-01	3.20E-01	5.83E-01	1.10E+00	1.74E+00	2.37E+00	4.07E+00	1.20E+01
40-69	41024000	2225	9.78E-01	1.50E-04	0.00E+00	7.00E-02	1.51E-01	2.03E-01	3.79E-01	7.02E-01	1.21E+00	2.09E+00	2.76E+00	4.83E+00	9.96E+00
70 +	11145000	567	1.03E+00	3.05E-04	7.11E-02	1.02E-01	1.76E-01	2.46E-01	4.19E-01	7.24E-01	1.31E+00	2.10E+00	2.75E+00	5.00E+00	9.23E+00
Seasons															
Fall	36788000	1241	1.23E+00	3.10E-04	0.00E+00	7.00E-02	1.49E-01	2.12E-01	4.06E-01	7.65E-01	1.44E+00	2.36E+00	3.57E+00	7.57E+00	3.61E+01
Spring	32525000	2892	1.14E+00	2.35E-04	0.00E+00	8.86E-02	1.67E-01	2.24E-01	3.99E-01	7.55E-01	1.34E+00	2.38E+00	3.45E+00	6.30E+00	1.96E+01
Summer	33611000	1062	1.47E+00	3.18E-04	0.00E+00	4.69E-02	1.58E-01	2.65E-01	4.84E-01	9.69E-01	1.76E+00	3.06E+00	4.30E+00	9.23E+00	2.62E+01
Winter	36961000	2260	9.86E-01	1.95E-04	0.00E+00	6.73E-02	1.35E-01	1.89E-01	3.30E-01	6.14E-01	1.16E+00	2.14E+00	2.98E+00	5.77E+00	1.31E+01
Urbanization															
Central City	40091000	1568	1.22E+00	2.90E-04	0.00E+00	4.76E-02	1.39E-01	2.02E-01	3.56E-01	6.97E-01	1.35E+00	2.52E+00	3.92E+00	1.01E+01	2.62E+01
Nonmetropolitan	35751000	2413	1.32E+00	2.71E-04	0.00E+00	7.39E-02	1.59E-01	2.50E-01	4.64E-01	8.44E-01	1.59E+00	2.84E+00	4.00E+00	7.60E+00	2.22E+01
Surburban	64043000	3474	1.12E+00	1.78E-04	0.00E+00	7.08E-02	1.54E-01	2.13E-01	3.90E-01	7.49E-01	1.38E+00	2.38E+00	3.22E+00	5.88E+00	3.61E+01
Race															
Asian	1491000	69	2.45E+00	4.61E-03	1.33E-01	1.34E-01	1.83E-01	2.69E-01	4.75E-01	1.19E+00	1.94E+00	4.30E+00	5.17E+00	3.61E+01	3.61E+01
Black	17703000	891	1.38E+00	4.92E-04	0.00E+00	0.00E+00	1.43E-01	2.09E-01	3.82E-01	8.16E-01	1.52E+00	2.76E+00	4.38E+00	1.04E+01	2.62E+01
Native American	1274000	78	1.00E+00	1.22E-03	7.81E-02	7.81E-02	1.22E-01	1.98E-01	3.68E-01	6.20E-01	9.80E-01	1.93E+00	4.14E+00	8.99E+00	8.99E+00
Other/NA	3518000	173	1.78E+00	1.20E-03	8.79E-02	1.61E-01	2.75E-01	3.38E-01	5.72E-01	1.15E+00	2.01E+00	3.36E+00	7.24E+00	1.42E+01	1.42E+01
White	115899000	6244	1.14E+00	1.25E-04	0.00E+00	7.12E-02	1.52E-01	2.16E-01	3.97E-01	7.39E-01	1.39E+00	2.48E+00	3.43E+00	6.39E+00	2.22E+01
Regions															
Midwest	33722000	1939	1.19E+00	2.91E-04	0.00E+00	7.44E-02	1.57E-01	2.13E-01	3.79E-01	7.07E-01	1.39E+00	2.58E+00	3.68E+00	7.24E+00	2.62E+01
Northeast	30173000	1492	1.20E+00	3.45E-04	0.00E+00	5.63E-02	1.48E-01	2.06E-01	3.70E-01	7.05E-01	1.36E+00	2.46E+00	3.54E+00	7.14E+00	3.61E+01
South	50823000	2742	1.23E+00	2.00E-04	0.00E+00	4.96E-02	1.53E-01	2.36E-01	4.48E-01	8.37E-01	1.44E+00	2.61E+00	3.57E+00	7.43E+00	1.66E+01
West	25167000	1282	1.15E+00	2.85E-04	0.00E+00	8.65E-02	1.41E-01	2.04E-01	3.68E-01	7.08E-01	1.43E+00	2.50E+00	3.36E+00	6.69E+00	2.22E+01
Response to Questionnaire															
Do you garden?	52713000	2975	1.11E+00	2.13E-04	0.00E+00	7.80E-02	1.51E-01	2.04E-01	3.73E-01	7.12E-01	1.33E+00	2.36E+00	3.30E+00	6.27E+00	3.61E+01
Do you farm?	5838000	351	1.31E+00	6.02E-04	1.42E-02	1.05E-01	2.27E-01	2.85E-01	5.00E-01	8.61E-01	1.37E+00	2.85E+00	4.07E+00	7.44E+00	1.23E+01

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Table 2-66. Intake of Total Root Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	170940000	9846	2.16E+00	2.19E-04	0.00E+00	5.22E-02	1.84E-01	3.14E-01	7.00E-01	1.43E+00	2.63E+00	4.44E+00	6.33E+00	1.30E+01	9.35E+01
Age															
< 01	2682000	148	1.08E+01	5.69E-03	0.00E+00	2.58E-01	1.01E+00	1.85E+00	3.88E+00	7.65E+00	1.50E+01	2.68E+01	3.05E+01	3.86E+01	4.06E+01
01-02	5405000	302	5.98E+00	3.27E-03	7.01E-02	1.32E-01	6.26E-01	8.20E-01	2.08E+00	4.42E+00	7.39E+00	1.23E+01	1.52E+01	2.75E+01	9.35E+01
03-05	7764000	439	3.73E+00	1.01E-03	0.00E+00	5.34E-02	3.04E-01	6.14E-01	1.67E+00	3.06E+00	5.37E+00	7.67E+00	9.04E+00	1.27E+01	1.53E+01
06-11	15754000	885	2.95E+00	6.20E-04	0.00E+00	1.37E-01	3.70E-01	6.01E-01	1.30E+00	2.37E+00	3.95E+00	6.09E+00	7.24E+00	1.16E+01	2.93E+01
12-19	19339000	1022	1.75E+00	3.49E-04	0.00E+00	6.74E-02	2.23E-01	3.37E-01	7.02E-01	1.36E+00	2.31E+00	3.61E+00	4.39E+00	6.76E+00	1.49E+01
20-39	54606000	2739	1.45E+00	2.00E-04	0.00E+00	3.17E-02	1.28E-01	2.19E-01	4.92E-01	1.07E+00	1.93E+00	3.02E+00	4.08E+00	6.78E+00	1.88E+01
40-69	51391000	2776	1.79E+00	2.41E-04	0.00E+00	5.46E-02	1.90E-01	3.44E-01	7.19E-01	1.36E+00	2.32E+00	3.59E+00	4.78E+00	9.30E+00	1.55E+01
70 +	13999000	715	1.93E+00	4.35E-04	0.00E+00	8.57E-02	2.33E-01	3.77E-01	7.71E-01	1.56E+00	2.55E+00	3.77E+00	5.34E+00	7.94E+00	1.11E+01
Seasons															
Fall	43605000	1451	2.18E+00	4.06E-04	0.00E+00	5.34E-02	1.95E-01	3.21E-01	7.10E-01	1.50E+00	2.69E+00	4.47E+00	6.32E+00	1.32E+01	3.05E+01
Spring	41202000	3594	2.11E+00	4.13E-04	0.00E+00	6.33E-02	1.67E-01	2.76E-01	6.53E-01	1.37E+00	2.57E+00	4.43E+00	6.57E+00	1.35E+01	3.86E+01
Summer	40761000	1279	2.22E+00	4.58E-04	0.00E+00	2.12E-02	1.54E-01	2.86E-01	6.86E-01	1.45E+00	2.68E+00	4.70E+00	6.78E+00	1.32E+01	4.06E+01
Winter	45372000	2722	2.12E+00	4.68E-04	0.00E+00	8.39E-02	2.25E-01	3.67E-01	7.50E-01	1.42E+00	2.57E+00	4.26E+00	5.98E+00	1.23E+01	9.35E+01
Urbanization															
Central City	50628000	1995	2.20E+00	5.07E-04	0.00E+00	4.56E-02	1.54E-01	2.89E-01	6.75E-01	1.39E+00	2.58E+00	4.27E+00	6.32E+00	1.56E+01	9.35E+01
Nonmetropolitan	40881000	2754	2.42E+00	4.31E-04	0.00E+00	7.14E-02	2.27E-01	3.88E-01	8.58E-01	1.73E+00	3.02E+00	4.81E+00	6.83E+00	1.32E+01	4.06E+01
Surburban	79371000	4295	2.00E+00	2.61E-04	0.00E+00	5.41E-02	1.89E-01	3.04E-01	6.55E-01	1.32E+00	2.45E+00	4.31E+00	5.96E+00	1.20E+01	3.70E+01
Race															
Asian	2343000	112	2.98E+00	2.71E-03	6.55E-02	1.50E-01	1.94E-01	2.50E-01	6.26E-01	1.35E+00	2.98E+00	5.93E+00	8.28E+00	3.05E+01	3.05E+01
Black	19240000	993	2.06E+00	6.15E-04	0.00E+00	3.54E-02	1.77E-01	3.12E-01	6.41E-01	1.33E+00	2.46E+00	4.16E+00	6.09E+00	1.38E+01	2.85E+01
Native American	1449000	90	5.54E+00	1.06E-02	1.02E-01	1.96E-01	3.96E-01	6.09E-01	9.72E-01	2.07E+00	4.28E+00	9.49E+00	2.34E+01	9.35E+01	9.35E+01
Other/NA	4328000	205	2.79E+00	1.73E-03	5.14E-03	1.47E-02	2.31E-01	3.48E-01	7.96E-01	1.77E+00	3.28E+00	5.98E+00	1.04E+01	1.68E+01	2.75E+01
White	143520000	7644	2.11E+00	2.11E-04	0.00E+00	5.41E-02	1.84E-01	3.13E-01	7.07E-01	1.44E+00	2.63E+00	4.40E+00	6.15E+00	1.26E+01	4.06E+01
Regions															
Midwest	42443000	2371	2.22E+00	4.20E-04	0.00E+00	4.70E-02	1.54E-01	2.93E-01	6.89E-01	1.46E+00	2.75E+00	4.78E+00	6.83E+00	1.30E+01	3.05E+01
Northeast	38141000	1884	2.09E+00	4.18E-04	0.00E+00	5.49E-02	2.06E-01	3.29E-01	6.69E-01	1.38E+00	2.57E+00	4.37E+00	6.13E+00	1.27E+01	2.81E+01
South	57758000	3108	2.19E+00	4.29E-04	0.00E+00	5.80E-02	2.04E-01	3.42E-01	7.10E-01	1.47E+00	2.63E+00	4.44E+00	6.35E+00	1.38E+01	9.35E+01
West	32538000	1681	2.10E+00	4.53E-04	0.00E+00	5.34E-02	1.70E-01	2.97E-01	7.40E-01	1.43E+00	2.55E+00	4.26E+00	6.03E+00	1.17E+01	3.70E+01
Response to Questionnaire															
Do you garden?	63935000	3553	2.13E+00	2.85E-04	0.00E+00	6.70E-02	2.08E-01	3.61E-01	7.84E-01	1.55E+00	2.70E+00	4.39E+00	5.88E+00	1.14E+01	3.44E+01
Do you farm?	7199000	431	2.65E+00	9.41E-04	0.00E+00	8.79E-02	2.06E-01	3.89E-01	1.07E+00	2.13E+00	3.46E+00	4.89E+00	7.38E+00	1.17E+01	3.02E+01

Table 2-67. Intake of Total Exposed Fruits (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	144560000	7631	2.44E+00	3.16E-04	0.00E+00	5.98E-02	1.97E-01	3.16E-01	6.67E-01	1.38E+00	2.78E+00	5.31E+00	8.12E+00	1.78E+01	7.92E+01
Age															
< 01	2633000	145	1.33E+01	9.10E-03	0.00E+00	2.92E-01	9.00E-01	1.75E+00	3.56E+00	9.17E+00	1.73E+01	2.95E+01	4.27E+01	7.92E+01	7.92E+01
01-02	4915000	274	8.17E+00	2.98E-03	2.62E-01	5.30E-01	1.07E+00	1.63E+00	3.39E+00	6.34E+00	1.05E+01	1.77E+01	2.21E+01	2.94E+01	3.82E+01
03-05	6817000	382	5.44E+00	1.86E-03	0.00E+00	1.77E-01	5.74E-01	9.27E-01	1.99E+00	4.44E+00	7.15E+00	1.05E+01	1.46E+01	2.47E+01	3.47E+01
06-11	13577000	753	3.01E+00	7.29E-04	0.00E+00	1.38E-01	3.53E-01	5.94E-01	1.17E+00	2.27E+00	4.06E+00	6.45E+00	7.97E+00	1.25E+01	2.66E+01
12-19	15729000	836	1.69E+00	4.51E-04	0.00E+00	2.52E-02	1.70E-01	2.61E-01	5.81E-01	1.18E+00	2.11E+00	3.59E+00	5.08E+00	1.01E+01	1.23E+01
20-39	45222000	2270	1.46E+00	2.42E-04	0.00E+00	5.09E-02	1.56E-01	2.48E-01	5.08E-01	9.80E-01	1.88E+00	3.05E+00	4.09E+00	7.74E+00	1.94E+01
40-69	43209000	2338	1.80E+00	2.95E-04	0.00E+00	6.15E-02	1.96E-01	3.06E-01	6.13E-01	1.18E+00	2.30E+00	3.75E+00	5.49E+00	1.01E+01	1.80E+01
70 +	12458000	633	2.38E+00	7.86E-04	0.00E+00	1.06E-01	3.01E-01	4.46E-01	9.37E-01	1.77E+00	2.97E+00	4.87E+00	5.94E+00	1.05E+01	3.68E+01
Seasons															
Fall	37524000	1239	2.67E+00	8.01E-04	0.00E+00	5.09E-02	2.00E-01	3.19E-01	6.89E-01	1.39E+00	2.90E+00	5.69E+00	8.68E+00	2.01E+01	7.92E+01
Spring	34353000	3022	2.30E+00	5.98E-04	0.00E+00	6.25E-02	1.90E-01	2.96E-01	6.42E-01	1.28E+00	2.61E+00	4.83E+00	7.63E+00	1.88E+01	6.76E+01
Summer	33627000	1043	2.75E+00	6.23E-04	0.00E+00	3.79E-02	1.95E-01	3.43E-01	7.67E-01	1.69E+00	3.24E+00	6.18E+00	9.34E+00	1.78E+01	3.68E+01
Winter	39056000	2327	2.08E+00	4.51E-04	0.00E+00	6.85E-02	2.10E-01	3.09E-01	6.08E-01	1.23E+00	2.44E+00	4.54E+00	6.69E+00	1.45E+01	3.82E+01
Urbanization															
Central City	42748000	1674	2.68E+00	7.12E-04	0.00E+00	2.60E-02	1.74E-01	2.90E-01	6.50E-01	1.38E+00	2.90E+00	5.87E+00	9.14E+00	2.33E+01	7.92E+01
Nonmetropolitan	32751000	2196	2.12E+00	5.07E-04	0.00E+00	7.92E-02	2.03E-01	2.94E-01	6.24E-01	1.30E+00	2.38E+00	4.73E+00	6.79E+00	1.27E+01	4.27E+01
Surburban	69001000	3759	2.45E+00	4.29E-04	0.00E+00	7.56E-02	2.25E-01	3.44E-01	7.00E-01	1.41E+00	2.88E+00	5.26E+00	8.13E+00	1.67E+01	6.70E+01
Race															
Asian	1757000	82	5.27E+00	8.92E-03	2.25E-01	2.25E-01	2.59E-01	3.20E-01	7.19E-01	1.56E+00	3.47E+00	1.14E+01	2.35E+01	6.70E+01	6.70E+01
Black	14281000	734	2.64E+00	1.09E-03	0.00E+00	0.00E+00	1.18E-01	2.62E-01	6.66E-01	1.33E+00	2.81E+00	5.87E+00	9.55E+00	2.53E+01	3.82E+01
Native American	851000	51	1.68E+00	1.97E-03	2.09E-01	2.09E-01	2.75E-01	3.37E-01	4.41E-01	1.30E+00	1.88E+00	2.81E+00	6.21E+00	8.83E+00	8.83E+00
Other/NA	3491000	172	3.29E+00	4.63E-03	1.05E-01	1.25E-01	2.51E-01	3.28E-01	6.41E-01	1.21E+00	2.82E+00	5.64E+00	1.00E+01	7.92E+01	7.92E+01
White	124120000	6590	2.36E+00	2.92E-04	0.00E+00	6.91E-02	2.03E-01	3.21E-01	6.69E-01	1.39E+00	2.78E+00	5.20E+00	7.76E+00	1.66E+01	6.76E+01
Regions															
Midwest	36386000	2036	2.51E+00	6.34E-04	0.00E+00	3.79E-02	1.79E-01	2.99E-01	6.70E-01	1.39E+00	2.76E+00	5.49E+00	8.49E+00	1.89E+01	6.76E+01
Northeast	33210000	1658	2.74E+00	8.24E-04	0.00E+00	5.98E-02	2.00E-01	3.31E-01	7.23E-01	1.50E+00	3.03E+00	5.94E+00	9.68E+00	1.77E+01	7.92E+01
South	45430000	2413	2.10E+00	4.48E-04	0.00E+00	7.77E-02	2.06E-01	3.09E-01	6.03E-01	1.22E+00	2.49E+00	4.52E+00	6.67E+00	1.32E+01	3.82E+01
West	29474000	1522	2.55E+00	6.61E-04	0.00E+00	9.52E-02	2.17E-01	3.19E-01	6.96E-01	1.50E+00	2.94E+00	5.47E+00	8.49E+00	1.92E+01	4.27E+01
Response to Questionnaire															
Do you garden?	56339000	3097	2.42E+00	4.66E-04	0.00E+00	9.23E-02	2.33E-01	3.54E-01	7.08E-01	1.44E+00	2.87E+00	5.24E+00	7.88E+00	1.66E+01	6.70E+01
Do you farm?	6023000	358	2.25E+00	1.04E-03	0.00E+00	2.93E-02	2.14E-01	3.50E-01	7.12E-01	1.41E+00	2.89E+00	4.82E+00	6.13E+00	1.57E+01	1.88E+01

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Table 2-68. Intake of Total Protected Fruits (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	159257000	8402	3.77E+00	4.96E-04	0.00E+00	8.70E-02	2.97E-01	4.72E-01	9.80E-01	2.09E+00	4.26E+00	7.87E+00	1.23E+01	2.77E+01	1.33E+02
Age															
<01	2487000	136	2.02E+01	1.67E-02	0.00E+00	1.28E-01	8.09E-01	1.69E+00	4.53E+00	1.11E+01	2.29E+01	5.51E+01	7.69E+01	1.26E+02	1.33E+02
01-02	5142000	288	1.03E+01	5.35E-03	1.58E-01	2.28E-01	1.01E+00	1.98E+00	3.72E+00	6.24E+00	1.09E+01	2.59E+01	3.44E+01	6.96E+01	7.40E+01
03-05	6821000	389	7.12E+00	2.93E-03	0.00E+00	4.90E-01	9.21E-01	1.36E+00	2.23E+00	4.64E+00	9.00E+00	1.62E+01	2.07E+01	3.22E+01	5.87E+01
06-11	13853000	790	4.38E+00	1.26E-03	0.00E+00	1.18E-01	5.25E-01	8.11E-01	1.69E+00	3.04E+00	5.49E+00	8.91E+00	1.30E+01	2.53E+01	4.43E+01
12-19	17430000	924	2.90E+00	6.93E-04	0.00E+00	9.47E-02	3.23E-01	5.10E-01	1.07E+00	2.03E+00	3.53E+00	6.46E+00	8.58E+00	1.58E+01	2.28E+01
20-39	49807000	2499	2.39E+00	4.48E-04	0.00E+00	5.81E-02	2.32E-01	3.51E-01	7.02E-01	1.37E+00	2.84E+00	5.23E+00	7.46E+00	1.83E+01	3.56E+01
40-69	49764000	2672	3.35E+00	6.66E-04	0.00E+00	1.00E-01	2.98E-01	4.56E-01	9.66E-01	1.96E+00	3.88E+00	7.07E+00	1.11E+01	2.44E+01	4.96E+01
70 +	13953000	704	3.76E+00	1.08E-03	0.00E+00	1.81E-01	4.37E-01	7.64E-01	1.40E+00	2.71E+00	4.84E+00	7.74E+00	9.93E+00	1.71E+01	5.61E+01
Seasons															
Fall	41164000	1369	3.13E+00	8.65E-04	0.00E+00	1.17E-01	2.99E-01	4.66E-01	9.27E-01	1.85E+00	3.50E+00	6.38E+00	9.12E+00	2.11E+01	1.04E+02
Spring	38362000	3353	3.55E+00	8.74E-04	0.00E+00	9.29E-02	3.05E-01	4.87E-01	9.90E-01	1.99E+00	4.15E+00	7.88E+00	1.15E+01	2.24E+01	1.33E+02
Summer	37285000	1167	5.24E+00	1.49E-03	0.00E+00	2.21E-02	2.45E-01	4.09E-01	1.06E+00	2.46E+00	5.45E+00	1.28E+01	1.98E+01	4.24E+01	1.26E+02
Winter	42446000	2513	3.31E+00	6.04E-04	0.00E+00	1.40E-01	3.37E-01	5.22E-01	1.02E+00	2.16E+00	4.09E+00	7.22E+00	1.02E+01	1.80E+01	5.65E+01
Urbanization															
Central City	46996000	1851	4.26E+00	1.19E-03	0.00E+00	6.73E-02	2.87E-01	4.63E-01	9.92E-01	2.21E+00	4.53E+00	8.61E+00	1.41E+01	3.54E+01	1.26E+02
Nonmetropolitan	37450000	2508	3.20E+00	7.77E-04	0.00E+00	8.27E-02	2.40E-01	3.97E-01	8.14E-01	1.83E+00	3.74E+00	6.74E+00	9.93E+00	2.66E+01	5.61E+01
Surburban	74751000	4041	3.75E+00	6.36E-04	0.00E+00	1.17E-01	3.35E-01	5.48E-01	1.08E+00	2.15E+00	4.41E+00	8.09E+00	1.21E+01	2.49E+01	1.33E+02
Race															
Asian	2045000	97	6.41E+00	9.66E-03	2.17E-01	2.17E-01	4.83E-01	6.33E-01	1.19E+00	2.90E+00	6.23E+00	1.27E+01	1.97E+01	1.04E+02	1.04E+02
Black	17559000	903	4.67E+00	2.26E-03	0.00E+00	0.00E+00	2.73E-01	4.29E-01	9.91E-01	2.27E+00	4.74E+00	1.02E+01	1.53E+01	4.04E+01	1.26E+02
Native American	1213000	69	3.07E+00	5.83E-03	2.20E-01	2.20E-01	2.93E-01	3.45E-01	7.69E-01	1.77E+00	2.94E+00	5.79E+00	7.93E+00	5.01E+01	5.01E+01
Other/NA	3991000	195	5.26E+00	5.54E-03	4.04E-02	1.82E-01	3.17E-01	5.65E-01	1.16E+00	2.36E+00	4.95E+00	1.00E+01	1.68E+01	7.40E+01	7.69E+01
White	134389000	7136	3.58E+00	4.52E-04	0.00E+00	9.53E-02	2.99E-01	4.74E-01	9.78E-01	2.06E+00	4.16E+00	7.58E+00	1.15E+01	2.64E+01	1.33E+02
Regions															
Midwest	38187000	2168	3.84E+00	1.29E-03	0.00E+00	6.73E-02	2.57E-01	4.36E-01	8.79E-01	1.83E+00	3.81E+00	7.64E+00	1.32E+01	3.31E+01	1.26E+02
Northeast	37232000	1824	3.86E+00	9.50E-04	0.00E+00	1.62E-01	3.78E-01	5.90E-01	1.16E+00	2.31E+00	4.55E+00	7.84E+00	1.14E+01	2.50E+01	1.33E+02
South	52425000	2791	3.72E+00	7.81E-04	0.00E+00	8.90E-02	3.06E-01	4.53E-01	9.65E-01	2.07E+00	4.23E+00	8.34E+00	1.22E+01	2.75E+01	7.40E+01
West	31353000	1617	3.69E+00	9.60E-04	0.00E+00	1.01E-01	2.82E-01	4.45E-01	9.46E-01	2.10E+00	4.35E+00	7.71E+00	1.26E+01	2.46E+01	7.86E+01
Response to Questionnaire															
Do you garden?	59864000	3304	3.53E+00	6.41E-04	0.00E+00	1.18E-01	3.10E-01	5.29E-01	1.02E+00	2.06E+00	3.99E+00	7.62E+00	1.16E+01	2.64E+01	5.65E+01
Do you farm?	6134000	368	2.76E+00	1.40E-03	0.00E+00	9.64E-02	2.29E-01	3.92E-01	7.29E-01	1.60E+00	3.29E+00	6.60E+00	9.93E+00	1.80E+01	2.77E+01

Table 2-69. Intake of Total Dark Green Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	98161000	5105	8.00E-01	1.28E-04	0.00E+00	4.67E-03	4.72E-02	8.92E-02	2.16E-01	4.74E-01	9.42E-01	1.73E+00	2.45E+00	5.57E+00	3.57E+01
Age															
< 01	1450000	85	5.11E+00	5.04E-03	0.00E+00	1.05E-01	2.95E-01	4.46E-01	1.35E+00	2.68E+00	6.44E+00	1.23E+01	1.69E+01	3.57E+01	3.57E+01
01-02	2958000	165	1.69E+00	9.68E-04	7.78E-03	7.79E-03	1.25E-01	2.20E-01	5.90E-01	1.25E+00	2.17E+00	3.41E+00	5.67E+00	7.57E+00	8.93E+00
03-05	4255000	231	1.23E+00	6.74E-04	0.00E+00	0.00E+00	1.01E-01	1.42E-01	4.49E-01	7.57E-01	1.37E+00	3.18E+00	4.23E+00	6.27E+00	1.03E+01
06-11	8837000	490	8.47E-01	3.39E-04	0.00E+00	5.72E-03	5.66E-02	1.03E-01	2.49E-01	5.24E-01	1.07E+00	1.93E+00	2.67E+00	5.24E+00	6.88E+00
12-19	10240000	542	5.82E-01	2.07E-04	0.00E+00	2.46E-03	3.76E-02	6.38E-02	1.77E-01	3.87E-01	7.22E-01	1.24E+00	1.62E+00	3.87E+00	5.10E+00
20-39	30025000	1472	6.12E-01	1.37E-04	0.00E+00	2.45E-03	3.62E-02	7.41E-02	1.75E-01	3.84E-01	7.50E-01	1.41E+00	1.97E+00	3.65E+00	7.37E+00
40-69	31870000	1700	7.08E-01	1.42E-04	0.00E+00	1.13E-02	5.58E-02	9.56E-02	2.21E-01	4.83E-01	9.09E-01	1.56E+00	2.10E+00	4.17E+00	9.58E+00
70 +	8526000	420	7.69E-01	2.45E-04	0.00E+00	5.59E-03	4.73E-02	1.12E-01	2.51E-01	5.71E-01	1.05E+00	1.74E+00	2.30E+00	3.38E+00	5.06E+00
Seasons															
Fall	23036000	754	8.73E-01	3.66E-04	0.00E+00	0.00E+00	3.49E-02	7.25E-02	1.92E-01	4.38E-01	9.29E-01	2.02E+00	2.78E+00	6.88E+00	3.57E+01
Spring	23399000	2008	8.04E-01	2.27E-04	0.00E+00	1.19E-02	6.33E-02	1.04E-01	2.38E-01	4.88E-01	9.41E-01	1.73E+00	2.56E+00	5.06E+00	1.83E+01
Summer	24244000	754	7.98E-01	2.15E-04	0.00E+00	2.80E-03	4.22E-02	1.02E-01	2.40E-01	5.37E-01	9.60E-01	1.62E+00	2.43E+00	5.39E+00	1.23E+01
Winter	27482000	1589	7.38E-01	1.99E-04	0.00E+00	1.15E-02	4.96E-02	8.02E-02	1.93E-01	4.33E-01	9.19E-01	1.68E+00	2.27E+00	4.74E+00	1.85E+01
Urbanizations															
Central City	29600000	1156	9.82E-01	2.53E-04	0.00E+00	1.01E-02	5.16E-02	8.98E-02	2.43E-01	5.71E-01	1.19E+00	2.21E+00	3.47E+00	6.44E+00	1.83E+01
Nonmetropolitan	19329000	1308	6.10E-01	2.19E-04	0.00E+00	2.04E-03	3.62E-02	7.38E-02	1.79E-01	3.87E-01	7.52E-01	1.27E+00	1.87E+00	3.55E+00	2.34E+01
Surburban	49172000	2639	7.67E-01	1.83E-04	0.00E+00	6.26E-03	5.18E-02	9.81E-02	2.18E-01	4.69E-01	9.04E-01	1.62E+00	2.32E+00	5.34E+00	3.57E+01
Race															
Asian	1476000	71	1.59E+00	2.58E-03	6.62E-03	6.62E-03	5.05E-02	1.17E-01	3.78E-01	7.97E-01	1.12E+00	3.29E+00	6.72E+00	1.69E+01	1.83E+01
Black	12403000	614	1.14E+00	4.53E-04	0.00E+00	0.00E+00	6.82E-02	1.46E-01	3.19E-01	6.85E-01	1.34E+00	2.35E+00	3.87E+00	6.88E+00	2.34E+01
Native American	495000	36	6.53E-01	1.70E-03	7.36E-02	7.36E-02	8.71E-02	1.02E-01	1.53E-01	4.06E-01	6.34E-01	9.48E-01	2.28E+00	6.97E+00	6.97E+00
Other/NA	2165000	105	8.94E-01	6.80E-04	3.34E-02	3.69E-02	7.15E-02	1.16E-01	2.36E-01	5.99E-01	1.10E+00	2.38E+00	3.10E+00	5.34E+00	5.34E+00
White	81562000	4277	7.34E-01	1.26E-04	0.00E+00	4.77E-03	4.28E-02	8.40E-02	2.02E-01	4.45E-01	8.76E-01	1.59E+00	2.28E+00	4.90E+00	3.57E+01
Regions															
Midwest	20110000	1073	6.89E-01	2.87E-04	0.00E+00	4.67E-03	3.32E-02	6.19E-02	1.66E-01	3.60E-01	7.49E-01	1.42E+00	2.24E+00	5.42E+00	1.83E+01
Northeast	24306000	1203	8.40E-01	2.26E-04	0.00E+00	1.83E-03	5.50E-02	9.18E-02	2.25E-01	5.19E-01	1.04E+00	1.74E+00	2.48E+00	5.70E+00	1.23E+01
South	33802000	1770	8.52E-01	2.53E-04	0.00E+00	1.79E-02	5.96E-02	1.13E-01	2.43E-01	5.33E-01	9.85E-01	1.84E+00	2.56E+00	5.34E+00	3.57E+01
West	19883000	1057	7.78E-01	2.24E-04	0.00E+00	5.59E-03	4.76E-02	8.96E-02	2.12E-01	4.68E-01	9.52E-01	1.75E+00	2.48E+00	5.57E+00	1.22E+01
Response to Questionnaire															
Do you garden?	39074000	2104	7.15E-01	1.71E-04	0.00E+00	3.04E-03	3.76E-02	7.25E-02	1.87E-01	4.16E-01	8.41E-01	1.60E+00	2.20E+00	4.90E+00	1.85E+01
Do you farm?	3732000	192	6.72E-01	3.94E-04	0.00E+00	4.67E-03	2.64E-02	6.78E-02	2.41E-01	4.19E-01	8.10E-01	1.73E+00	2.08E+00	3.11E+00	5.67E+00

Table 2-70. Intake of Total Deep Yellow Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	84738000	4410	6.37E-01	1.52E-04	0.00E+00	2.72E-02	7.07E-02	1.05E-01	2.03E-01	3.69E-01	6.90E-01	1.28E+00	1.91E+00	4.31E+00	4.82E+01
Age															
<01	1763000	91	4.23E+00	5.45E-03	1.92E-01	1.92E-01	4.96E-01	7.14E-01	1.13E+00	2.08E+00	5.02E+00	8.04E+00	1.41E+01	4.82E+01	4.82E+01
01-02	3010000	162	1.64E+00	1.52E-03	5.24E-02	6.48E-02	2.34E-01	3.32E-01	6.58E-01	1.10E+00	1.96E+00	2.62E+00	4.23E+00	7.06E+00	2.76E+01
03-05	4060000	217	1.08E+00	5.07E-04	0.00E+00	1.14E-02	1.84E-01	2.34E-01	4.67E-01	7.77E-01	1.25E+00	2.09E+00	2.77E+00	5.56E+00	6.60E+00
06-11	8073000	433	6.43E-01	1.94E-04	0.00E+00	5.32E-02	1.22E-01	1.74E-01	2.78E-01	4.82E-01	7.72E-01	1.47E+00	1.73E+00	2.75E+00	3.75E+00
12-19	8862000	477	3.37E-01	1.10E-04	0.00E+00	1.58E-02	4.76E-02	6.84E-02	1.33E-01	2.32E-01	4.15E-01	7.44E-01	1.81E+00	1.58E+00	2.76E+00
20-39	25048000	1261	4.26E-01	9.87E-05	0.00E+00	2.81E-02	5.72E-02	8.36E-02	1.61E-01	2.79E-01	5.07E-01	8.90E-01	1.19E+00	2.67E+00	4.75E+00
40-69	26394000	1393	4.96E-01	9.90E-05	0.00E+00	3.24E-02	7.95E-02	1.06E-01	1.94E-01	3.42E-01	5.90E-01	1.04E+00	1.36E+00	2.70E+00	4.33E+00
70 +	7528000	376	7.05E-01	2.50E-04	2.38E-02	6.48E-02	1.59E-01	2.08E-01	3.25E-01	4.76E-01	8.62E-01	1.43E+00	1.94E+00	3.64E+00	7.60E+00
Seasons															
Fall	25273000	847	7.82E-01	4.26E-04	0.00E+00	2.99E-02	7.12E-02	1.05E-01	2.07E-01	3.85E-01	7.73E-01	1.60E+00	2.45E+00	6.04E+00	4.82E+01
Spring	18498000	1618	5.66E-01	1.97E-04	0.00E+00	1.97E-02	7.44E-02	1.06E-01	2.02E-01	3.47E-01	6.45E-01	1.15E+00	1.73E+00	3.75E+00	1.83E+01
Summer	18252000	577	5.67E-01	1.53E-04	0.00E+00	2.22E-02	7.00E-02	1.07E-01	2.11E-01	3.71E-01	6.69E-01	1.19E+00	1.73E+00	2.84E+00	5.80E+00
Winter	22715000	1368	5.91E-01	2.36E-04	0.00E+00	3.22E-02	6.79E-02	1.02E-01	1.92E-01	3.67E-01	6.56E-01	1.16E+00	1.76E+00	3.84E+00	2.76E+01
Urbanization															
Central City	24297000	943	7.13E-01	2.84E-04	0.00E+00	2.48E-02	6.90E-02	9.62E-02	2.02E-01	3.73E-01	7.51E-01	1.48E+00	2.27E+00	5.80E+00	2.76E+01
Nonmetropolitan	19240000	1306	5.96E-01	2.02E-04	0.00E+00	2.76E-02	6.70E-02	1.10E-01	2.05E-01	3.59E-01	6.49E-01	1.23E+00	1.79E+00	4.83E+00	1.41E+01
Surburban	41141000	2159	6.13E-01	2.47E-04	0.00E+00	3.64E-02	7.45E-02	1.09E-01	2.02E-01	3.70E-01	6.76E-01	1.20E+00	1.73E+00	3.75E+00	4.82E+01
Race															
Asian	1559000	68	1.80E+00	5.86E-03	3.15E-02	3.15E-02	6.62E-02	1.14E-01	1.94E-01	3.37E-01	6.43E-01	1.24E+00	4.75E+00	4.82E+01	4.82E+01
Black	4806000	230	5.85E-01	5.08E-04	0.00E+00	1.13E-02	3.86E-02	6.95E-02	1.53E-01	3.01E-01	6.13E-01	1.25E+00	2.22E+00	3.37E+00	1.41E+01
Native American	701000	53	1.67E+00	6.05E-03	3.80E-02	3.80E-02	4.62E-02	7.80E-02	1.33E-01	2.50E-01	8.20E-01	2.90E+00	6.90E+00	2.76E+01	2.76E+01
Other/NA	2174000	108	5.27E-01	3.46E-04	3.72E-02	4.16E-02	6.70E-02	7.63E-02	1.57E-01	3.85E-01	6.74E-01	1.25E+00	1.58E+00	2.20E+00	2.20E+00
White	75438000	3949	6.11E-01	9.86E-05	0.00E+00	3.53E-02	7.41E-02	1.09E-01	2.08E-01	3.76E-01	6.93E-01	1.28E+00	1.87E+00	3.97E+00	1.83E+01
Regions															
Midwest	20525000	1116	5.86E-01	1.74E-04	0.00E+00	1.58E-02	5.60E-02	9.59E-02	1.92E-01	3.57E-01	6.80E-01	1.33E+00	1.79E+00	3.97E+00	1.83E+01
Northeast	21153000	1037	7.28E-01	4.69E-04	0.00E+00	3.94E-02	8.37E-02	1.24E-01	2.21E-01	4.20E-01	7.09E-01	1.31E+00	2.10E+00	4.83E+00	4.82E+01
South	23607000	1236	5.68E-01	2.40E-04	0.00E+00	3.65E-02	7.26E-02	1.05E-01	1.93E-01	3.31E-01	6.11E-01	1.08E+00	1.58E+00	3.84E+00	2.76E+01
West	19393000	1019	6.79E-01	2.45E-04	1.29E-02	3.80E-02	6.91E-02	1.02E-01	2.04E-01	3.88E-01	7.85E-01	1.47E+00	2.06E+00	4.03E+00	1.57E+01
Response to Questionnaire															
Do you garden?	37486000	1987	6.13E-01	2.70E-04	0.00E+00	2.81E-02	6.95E-02	1.04E-01	1.97E-01	3.57E-01	6.39E-01	1.23E+00	1.76E+00	3.97E+00	4.82E+01
Do you farm?	4109000	237	4.90E-01	2.91E-04	0.00E+00	4.31E-02	8.63E-02	9.94E-02	1.97E-01	3.34E-01	5.49E-01	1.00E+00	1.34E+00	3.39E+00	6.23E+00

DRAFT
DO NOT QUOTE OR CITE

Table 2-71. Intake of Total Other Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	178717000	9431	2.81E+00	2.75E-04	0.00E+00	8.25E-02	2.91E-01	4.88E-01	9.80E-01	1.86E+00	3.36E+00	5.84E+00	7.99E+00	1.74E+01	9.16E+01
Ages															
< 01	2763000	153	1.53E+01	9.04E-03	0.00E+00	3.92E-01	1.56E+00	3.28E+00	6.72E+00	1.06E+01	1.84E+01	2.99E+01	5.03E+01	9.16E+01	9.16E+01
01-02	5471000	311	7.73E+00	2.58E-03	4.50E-01	5.02E-01	1.47E+00	2.01E+00	3.47E+00	6.16E+00	1.02E+01	1.47E+01	1.93E+01	2.95E+01	4.47E+01
03-05	7745000	443	5.67E+00	1.54E-03	0.00E+00	3.63E-01	1.06E+00	1.52E+00	2.81E+00	4.50E+00	7.26E+00	1.11E+01	1.54E+01	2.09E+01	2.44E+01
06-11	16168000	909	3.41E+00	7.42E-04	0.00E+00	9.05E-02	4.74E-01	7.80E-01	1.46E+00	2.67E+00	4.34E+00	6.97E+00	8.58E+00	1.36E+01	2.78E+01
12-19	19877000	1055	2.05E+00	3.87E-04	0.00E+00	4.48E-02	3.16E-01	4.81E-01	9.23E-01	1.56E+00	2.70E+00	4.10E+00	5.55E+00	8.42E+00	1.70E+01
20-39	57417000	2882	1.78E+00	2.29E-04	0.00E+00	6.48E-02	2.00E-01	3.57E-01	7.02E-01	1.30E+00	2.29E+00	3.78E+00	4.93E+00	8.17E+00	2.07E+01
40-69	54352000	2927	2.47E+00	3.20E-04	0.00E+00	8.25E-02	3.16E-01	5.28E-01	1.02E+00	1.88E+00	3.16E+00	5.04E+00	6.59E+00	1.10E+01	2.91E+01
70 +	14924000	751	2.75E+00	5.54E-04	3.74E-02	1.76E-01	4.52E-01	7.13E-01	1.23E+00	2.23E+00	3.68E+00	5.48E+00	6.77E+00	1.06E+01	1.85E+01
Seasons															
Fall	45295000	1504	2.64E+00	6.20E-04	0.00E+00	6.29E-02	2.37E-01	4.26E-01	8.33E-01	1.62E+00	3.10E+00	5.56E+00	7.66E+00	1.86E+01	9.16E+01
Spring	43552000	3767	2.82E+00	5.20E-04	0.00E+00	9.25E-02	3.16E-01	5.12E-01	9.97E-01	1.89E+00	3.38E+00	5.73E+00	8.33E+00	1.82E+01	5.03E+01
Summer	42917000	1345	3.23E+00	5.90E-04	0.00E+00	4.62E-02	3.19E-01	5.35E-01	1.16E+00	2.20E+00	3.97E+00	6.83E+00	8.69E+00	1.73E+01	5.75E+01
Winter	46953000	2815	2.59E+00	4.61E-04	0.00E+00	1.25E-01	3.45E-01	5.26E-01	9.74E-01	1.77E+00	3.11E+00	5.25E+00	7.36E+00	1.54E+01	6.92E+01
Urbanization															
Central City	53089000	2098	2.94E+00	6.46E-04	0.00E+00	6.53E-02	2.80E-01	4.84E-01	9.44E-01	1.75E+00	3.30E+00	5.88E+00	9.09E+00	1.93E+01	9.16E+01
Nonmetropolitan	42553000	2867	2.91E+00	3.42E-04	0.00E+00	1.03E-01	3.35E-01	5.46E-01	1.04E+00	1.98E+00	3.66E+00	5.83E+00	8.01E+00	1.58E+01	6.92E+01
Surburben	83015000	4464	2.68E+00	3.21E-04	0.00E+00	8.25E-02	2.86E-01	4.76E-01	9.74E-01	1.86E+00	3.29E+00	5.82E+00	7.61E+00	1.55E+01	3.75E+01
Race															
Asian	2413000	114	6.04E+00	7.63E-03	1.27E-01	1.27E-01	5.88E-01	6.70E-01	1.28E+00	3.02E+00	6.39E+00	1.10E+01	1.85E+01	9.16E+01	9.16E+01
Black	20708000	1058	3.27E+00	9.92E-04	0.00E+00	3.12E-02	3.24E-01	5.91E-01	1.09E+00	2.02E+00	3.64E+00	7.28E+00	9.86E+00	2.08E+01	5.75E+01
Native American	1412000	89	4.39E+00	8.22E-03	1.77E-01	3.64E-01	5.76E-01	7.07E-01	9.97E-01	2.01E+00	3.52E+00	7.44E+00	1.12E+01	6.92E+01	6.92E+01
Other/NA	4613000	221	3.66E+00	2.53E-03	4.37E-02	1.70E-01	3.41E-01	5.31E-01	1.11E+00	2.24E+00	4.59E+00	6.86E+00	9.67E+00	2.07E+01	5.26E+01
White	149511000	7937	2.65E+00	2.46E-04	0.00E+00	8.25E-02	2.83E-01	4.76E-01	9.65E-01	1.81E+00	3.27E+00	5.65E+00	7.63E+00	1.49E+01	4.44E+01
Regions															
Midwest	44375000	2485	2.61E+00	6.65E-04	0.00E+00	6.48E-02	2.25E-01	3.77E-01	7.81E-01	1.52E+00	3.02E+00	5.26E+00	7.78E+00	1.87E+01	9.16E+01
Northeast	39450000	1946	2.85E+00	5.33E-04	0.00E+00	9.14E-02	2.86E-01	5.25E-01	1.08E+00	1.93E+00	3.38E+00	5.96E+00	8.15E+00	1.73E+01	5.26E+01
South	60896000	3254	2.98E+00	4.33E-04	0.00E+00	1.07E-01	3.84E-01	5.98E-01	1.12E+00	2.05E+00	3.65E+00	6.09E+00	8.22E+00	1.74E+01	4.47E+01
West	33936000	1744	2.72E+00	5.98E-04	0.00E+00	1.14E-01	3.06E-01	4.93E-01	9.33E-01	1.78E+00	3.28E+00	5.86E+00	7.73E+00	1.55E+01	6.92E+01
Response to Questionnaire															
Do you garden?	66502000	3671	2.69E+00	3.44E-04	0.00E+00	8.25E-02	2.91E-01	5.12E-01	9.96E-01	1.91E+00	3.38E+00	5.73E+00	7.58E+00	1.36E+01	3.75E+01
Do you farm?	7313000	433	2.88E+00	1.09E-03	0.00E+00	1.79E-01	2.82E-01	4.88E-01	1.00E+00	1.98E+00	3.78E+00	6.21E+00	7.89E+00	1.51E+01	2.33E+01

Table 2-72. Intake of Total Citrus Fruits (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	136174000	7205	2.34E+00	2.99E-04	0.00E+00	6.69E-02	1.98E-01	3.21E-01	6.70E-01	1.39E+00	2.73E+00	5.84E+00	7.45E+00	1.56E+01	9.22E+01
Age															
<01	1924000	109	1.34E+01	1.09E-02	0.00E+00	1.05E-01	9.92E-01	1.24E+00	2.62E+00	9.02E+00	1.80E+01	2.71E+01	3.44E+01	9.22E+01	9.22E+01
01-02	4296000	241	5.58E+00	2.61E-03	1.28E-01	1.96E-01	7.03E-01	9.39E-01	2.01E+00	4.35E+00	7.29E+00	1.14E+01	1.54E+01	2.89E+01	3.62E+01
03-05	5707000	337	4.25E+00	1.90E-03	0.00E+00	2.62E-01	5.55E-01	7.39E-01	1.49E+00	3.00E+00	5.48E+00	9.55E+00	1.32E+01	1.84E+01	5.17E+01
06-11	12357000	701	2.74E+00	8.35E-04	0.00E+00	5.24E-02	3.41E-01	5.12E-01	9.89E-01	1.94E+00	3.42E+00	5.85E+00	7.49E+00	1.40E+01	3.47E+01
12-19	15620000	815	2.04E+00	5.24E-04	0.00E+00	9.69E-02	2.35E-01	3.60E-01	7.14E-01	1.50E+00	2.55E+00	4.33E+00	6.10E+00	1.06E+01	2.07E+01
20-39	41836000	2110	1.58E+00	2.87E-04	0.00E+00	5.52E-02	1.57E-01	2.37E-01	4.80E-01	9.80E-01	1.98E+00	3.53E+00	5.01E+00	9.07E+00	2.05E+01
40-69	42718000	2295	1.99E+00	3.78E-04	0.00E+00	6.91E-02	1.94E-01	3.22E-01	6.48E-01	1.30E+00	2.48E+00	4.21E+00	5.72E+00	1.23E+01	3.76E+01
70 +	11716000	597	2.42E+00	6.65E-04	0.00E+00	1.12E-01	2.87E-01	4.42E-01	8.17E-01	1.74E+00	3.08E+00	5.32E+00	7.47E+00	9.60E+00	1.57E+01
Seasons															
Fall	36208000	1192	2.24E+00	6.83E-04	0.00E+00	7.91E-02	2.00E-01	2.82E-01	6.00E-01	1.24E+00	2.52E+00	4.64E+00	6.91E+00	1.49E+01	9.22E+01
Spring	31894000	2808	2.29E+00	5.39E-04	0.00E+00	9.29E-02	2.17E-01	3.40E-01	6.83E-01	1.39E+00	2.77E+00	4.95E+00	7.17E+00	1.48E+01	4.39E+01
Summer	29376000	918	2.01E+00	5.29E-04	0.00E+00	0.00E+00	1.46E-01	2.71E-01	5.79E-01	1.16E+00	2.35E+00	4.07E+00	6.50E+00	1.56E+01	2.89E+01
Winter	38696000	2287	2.73E+00	5.77E-04	0.00E+00	8.94E-02	2.41E-01	4.01E-01	8.13E-01	1.75E+00	3.27E+00	5.98E+00	8.58E+00	1.64E+01	5.38E+01
Urbanization															
Central City	40431000	1589	2.66E+00	7.04E-04	0.00E+00	4.69E-02	1.84E-01	3.22E-01	7.05E-01	1.55E+00	2.98E+00	5.60E+00	8.93E+00	1.84E+01	9.22E+01
Nonmetropolitan	30939000	2106	2.06E+00	5.00E-04	0.00E+00	6.17E-02	1.94E-01	3.04E-01	5.99E-01	1.27E+00	2.59E+00	4.33E+00	6.41E+00	1.25E+01	5.38E+01
Surburban	64744000	3508	2.29E+00	3.79E-04	0,00E+00	8.88E-02	2.12E-01	3.30E-01	7.00E-01	1.37E+00	2.67E+00	5.09E+00	7.43E+00	1.43E+01	5.17E+01
Race															
Asian	1788000	82	5.23E+00	9.61E-03	1.86E-01	2.22E-01	3.19E-01	4.81E-01	6.97E-01	1.94E+00	5.04E+00	9.67E+00	1.47E+01	9.22E+01	9.22E+01
Black	16219000	828	2.81E+00	9.40E-04	0.00E+00	0.00E+00	2.14E-01	3.51E-01	7.35E-01	1.66E+00	3.29E+00	6.50E+00	9.83E+00	1.70E+01	5.08E+01
Native American	1057000	63	3.06E+00	6.85E-03	3.21E-01	3.21E-01	5.07E-01	6.07E-01	7.94E-01	1.77E+00	2.60E+00	4.90E+00	1.06E+01	5.38E+01	5.38E+01
Other/NA	3201000	162	2.31E+00	1.55E-03	1.01E-01	1.18E-01	1.82E-01	3.04E-01	7.18E-01	1.35E+00	2.62E+00	5.89E+00	7.45E+00	1.30E+01	1.88E+01
White	113849000	6068	2.23E+00	2.82E-04	0.00E+00	7.35E-02	1.95E-01	3.13E-01	6.54E-01	1.36E+00	2.67E+00	4.80E+00	6.92E+00	1.50E+01	5.17E+01
Regions															
Midwest	33156000	1875	2.19E+00	7.38E-04	0.00E+00	5.80E-02	1.58E-01	2.50E-01	5.57E-01	1.16E+00	2.40E+00	4.51E+00	7.02E+00	1.70E+01	9.22E+01
Northeast	33700000	1676	2.56E+00	5.55E-04	0.00E+00	4.31E-02	2.51E-01	4.46E-01	8.57E-01	1.64E+00	3.12E+00	5.52E+00	7.70E+00	1.54E+01	5.08E+01
South	44009000	2330	2.42E+00	4.47E-04	0.00E+00	7.58E-02	2.21E-01	3.53E-01	7.15E-01	1.51E+00	2.96E+00	5.39E+00	7.92E+00	1.52E+01	3.96E+01
West	25249000	1322	2.14E+00	7.06E-04	0.00E+00	9.64E-02	1.95E-01	2.94E-01	5.40E-01	1.22E+00	2.43E+00	4.54E+00	6.73E+00	1.59E+01	5.38E+01
Response to Questionnaire															
Do you garden?	52446000	2896	2.15E+00	4.10E-04	0.00E+00	7.35E-02	1.85E-01	3.11E-01	6.47E-01	1.28E+00	2.50E+00	4.64E+00	6.83E+00	1.44E+01	5.17E+01
Do you farm?	5408000	320	1.69E+00	9.75E-04	0.00E+00	9.64E-02	1.49E-01	2.47E-01	4.84E-01	8.79E-01	1.97E+00	3.75E+00	5.74E+00	1.18E+01	1.96E+01

Table 2-73. Intake of Total Other Fruit (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	159212000	8407	4.12E+00	5.80E-04	0.00E+00	1.02E-01	3.02E-01	4.96E-01	1.02E+00	2.12E+00	4.43E+00	8.96E+00	1.41E+01	3.32E+01	1.55E+02
Age															
< 01	2670000	147	2.35E+01	1.85E-02	0.00E+00	5.43E-01	1.24E+00	2.68E+00	6.95E+00	1.22E+01	2.50E+01	6.09E+01	8.37E+01	1.55E+02	1.55E+02
01-02	5228000	291	1.42E+01	6.25E-03	6.23E-01	8.90E-01	1.58E+00	2.75E+00	5.31E+00	9.37E+00	1.69E+01	3.00E+01	4.25E+01	7.81E+01	8.48E+01
03-05	7395000	416	8.84E+00	3.30E-03	0.00E+00	1.79E-01	8.86E-01	1.36E+00	3.26E+00	6.52E+00	1.10E+01	1.87E+01	2.41E+01	3.60E+01	7.70E+01
06-11	14560000	816	4.86E+00	1.35E-03	0.00E+00	2.00E-01	6.00E-01	9.25E-01	1.75E+00	3.46E+00	6.01E+00	9.51E+00	1.28E+01	2.81E+01	4.81E+01
12-19	17245000	920	2.61E+00	6.74E-04	0.00E+00	9.94E-02	2.69E-01	4.77E-01	9.61E-01	1.70E+00	3.11E+00	5.47E+00	8.41E+00	1.54E+01	1.89E+01
20-39	50182000	2518	2.41E+00	4.60E-04	0.00E+00	7.50E-02	2.33E-01	3.60E-01	7.27E-01	1.47E+00	2.88E+00	5.11E+00	7.02E+00	1.76E+01	4.39E+01
40-69	48009000	2595	3.37E+00	7.07E-04	0.00E+00	1.17E-01	3.19E-01	5.07E-01	9.60E-01	1.91E+00	3.81E+00	6.91E+00	1.11E+01	2.62E+01	6.76E+01
70 +	13923000	704	3.94E+00	1.23E-03	0.00E+00	2.32E-01	4.53E-01	8.40E-01	1.44E+00	2.85E+00	4.74E+00	7.65E+00	1.03E+01	2.11E+01	4.99E+01
Seasons															
Fall	40574000	1344	3.77E+00	1.20E-03	0.00E+00	7.50E-02	3.18E-01	5.07E-01	1.01E+00	1.93E+00	3.95E+00	7.54E+00	1.11E+01	2.81E+01	1.55E+02
Spring	38627000	3367	3.82E+00	9.82E-04	0.00E+00	1.43E-01	2.94E-01	4.62E-01	1.00E+00	2.07E+00	4.22E+00	8.32E+00	1.29E+01	2.89E+01	1.32E+02
Summer	37903000	1177	6.16E+00	1.66E-03	0.00E+00	4.44E-02	3.41E-01	5.87E-01	1.25E+00	3.02E+00	6.55E+00	1.47E+01	2.18E+01	4.81E+01	1.30E+02
Winter	42108000	2519	2.89E+00	5.58E-04	0.00E+00	1.52E-01	2.76E-01	4.46E-01	8.99E-01	1.77E+00	3.44E+00	6.31E+00	9.34E+00	1.78E+01	4.78E+01
Urbanization															
Central City	46668000	1848	4.62E+00	1.39E-03	0.00E+00	9.94E-02	2.61E-01	4.66E-01	9.83E-01	2.16E+00	4.76E+00	9.39E+00	1.64E+01	3.90E+01	1.55E+02
Nonmetropolitan	36628000	2456	3.54E+00	9.21E-04	0.00E+00	1.39E-01	3.09E-01	4.77E-01	9.52E-01	1.91E+00	3.70E+00	7.99E+00	1.19E+01	2.91E+01	8.37E+01
Surburban	75856000	4101	4.09E+00	7.39E-04	0.00E+00	1.17E-01	3.18E-01	5.34E-01	1.08E+00	2.19E+00	4.51E+00	9.04E+00	1.44E+01	3.02E+01	1.32E+02
Race															
Asian	2261000	107	6.24E+00	9.27E-03	2.22E-01	2.22E-01	2.76E-01	3.69E-01	7.19E-01	1.93E+00	4.36E+00	1.27E+01	2.51E+01	8.02E+01	8.02E+01
Black	16003000	831	4.75E+00	2.73E-03	0.00E+00	0.00E+00	2.00E-01	3.82E-01	9.21E-01	1.86E+00	4.53E+00	9.92E+00	1.83E+01	4.78E+01	1.30E+02
Native American	955000	55	2.16E+00	2.68E-03	2.35E-01	2.62E-01	3.02E-01	4.13E-01	6.80E-01	1.66E+00	2.39E+00	2.85E+00	8.52E+00	1.48E+01	1.48E+01
Other/NA	4044000	201	6.44E+00	8.55E-03	1.20E-01	2.50E-01	4.04E-01	5.57E-01	9.77E-01	2.30E+00	5.31E+00	1.15E+01	1.82E+01	8.11E+01	1.55E+02
White	135889000	7211	3.95E+00	5.17E-04	0.00E+00	1.30E-01	3.17E-01	5.08E-01	1.04E+00	2.15E+00	4.42E+00	8.81E+00	1.38E+01	2.95E+01	1.32E+02
Regions															
Midwest	39462000	2223	4.34E+00	1.37E-03	0.00E+00	1.01E-01	2.73E-01	4.58E-01	9.85E-01	2.04E+00	4.37E+00	9.12E+00	1.41E+01	4.17E+01	1.30E+02
Northeast	36016000	1795	4.25E+00	1.32E-03	0.00E+00	7.50E-02	3.18E-01	5.37E-01	1.14E+00	2.20E+00	4.55E+00	9.12E+00	1.49E+01	2.95E+01	1.55E+02
South	51159000	2728	3.72E+00	8.99E-04	0.00E+00	9.43E-02	2.88E-01	4.70E-01	9.23E-01	1.91E+00	3.90E+00	7.79E+00	1.24E+01	3.36E+01	8.37E+01
West	32515000	1659	4.34E+00	1.07E-03	0.00E+00	1.81E-01	3.53E-01	5.62E-01	1.11E+00	2.42E+00	5.00E+00	9.70E+00	1.52E+01	2.90E+01	7.21E+01
Response to Questionnaire															
Do you garden?	61462000	3377	3.94E+00	7.52E-04	0.00E+00	1.77E-01	3.30E-01	5.27E-01	1.07E+00	2.15E+00	4.34E+00	8.90E+00	1.37E+01	2.95E+01	7.39E+01
Do you farm?	6335000	374	3.42E+00	1.67E-03	0.00E+00	2.93E-02	2.64E-01	3.90E-01	8.94E-01	1.96E+00	4.04E+00	8.60E+00	1.23E+01	2.32E+01	2.92E+01

Table 2-74. Mean and Standard Error for the Per Capita Daily Intake of Food Class and Subclass by Region (grams "as consumed")

	US population	Northeast	North Central	South	West
Total Produce	282.6 ± 3.5	270.6 ± 6.9	282.4 ± 6.7	280.7 ± 5.6	303.1 ± 8.2
Leafy[a]	39.2 ± 0.8	38.1 ± 1.5	37.1 ± 1.5	38.4 ± 1.2	45.3 ± 1.8
Exposed[b]	86.0 ± 1.5	88.5 ± 3.0	87.8 ± 2.9	76.9 ± 2.4	95.5 ± 3.6
Protected[c]	150.4 ± 2.3	137.2 ± 4.5	150.1 ± 4.3	160.1 ± 3.6	152.5 ± 5.3
Other	7.0 ± 0.3	6.9 ± 0.6	7.3 ± 0.5	5.4 ± 0.4	9.8 ± 0.7
Total Grain	200.0 ± 3.0	203.5 ± 5.8	192.8 ± 5.6	202.2 ± 4.7	202.6 ± 6.9
Breads	147.3 ± 1.4	153.1 ± 2.8	150.9 ± 2.7	143.9 ± 2.3	139.5 ± 3.3
Cereals	29.9 ± 1.3	24.6 ± 2.5	28.7 ± 2.4	34.6 ± 2.0	30.9 ± 3.0
Other	22.9 ± 1.7	25.9 ± 3.3	13.3 ± 3.2	23.7 ± 2.7	32.1 ± 4.0

[a] Produce belonging to this category include: cabbage, cauliflower, broccoli, celery, lettuce, and spinach.
[b] Produce belonging to this category include: apples, pears, berries, cucumber, squash, grapes, peaches, apricots, plums, prunes, string beans, pea pods, and tomatoes.
[c] Produce belonging to this category include: carrots, beets, turnips, parsnips, citrus fruits, sweet corn, legumes (peas, beans, etc.), melons, onion, and potatoes.

Source: U.S. EPA, 1984e.

Table 2-75. Mean and Standard Error for the Daily Intake of Food Subclasses Per Capita by Age (grams "as consumed")

Age	Leafy produce[a]	Exposed produce[b]	Protected produce[c]	Other produce	Breads	Cereal	Other Grains
All Ages	39.2 ± 0.8	86.0 ± 1.5	150.4 ± 2.3	7.0 ± 0.3	147.3 ± 1.4	29.9 ± 1.3	22.9 ± 1.7
<1	3.2 ± 4.9	75.5 ± 9.8	50.8 ± 14.7	25.5 ± 1.8	16.2 ± 9.2	37.9 ± 8.2	1.8 ± 10.9
1-4	9.1 ± 2.4	55.6 ± 4.8	94.5 ± 7.2	5.1 ± 0.9	104.6 ± 4.5	38.4 ± 4.0	14.8 ± 5.4
5-9	20.1 ± 2.0	69.2 ± 4.8	128.9 ± 6.1	4.3 ± 0.8	154.3 ± 3.8	39.5 ± 3.4	22.7 ± 4.5
10-14	26.1 ± 1.9	76.8 ± 3.8	151.7 ± 5.7	8.1 ± 0.7	186.2 ± 3.6	36.4 ± 3.2	25.6 ± 4.2
15-19	31.4 ± 2.0	71.9 ± 4.0	156.6 ± 6.0	6.2 ± 0.7	188.5 ± 3.7	28.8 ± 3.3	27.8 ± 4.4
20-24	35.3 ± 2.6	65.6 ± 5.2	144.5 ± 7.8	5.0 ± 1.0	166.5 ± 4.9	20.2 ± 4.3	25.0 ± 5.8
25-29	41.4 ± 2.7	73.4 ± 5.3	149.8 ± 8.0	7.0 ± 1.0	170.0 ± 5.0	18.2 ± 4.4	26.6 ± 5.9
30-39	44.4 ± 2.1	77.1 ± 4.2	150.5 ± 6.3	6.1 ± 0.8	156.8 ± 3.9	24.7 ± 2.7	23.3 ± 3.6
40-59	51.3 ± 1.6	94.7 ± 3.3	162.9 ± 4.9	6.9 ± 0.6	144.4 ± 3.1	24.7 ± 2.7	23.3 ± 3.6
≥ 60	45.4 ± 1.8	114.2 ± 3.6	163.9 ± 5.5	7.6 ± 0.7	122.1 ± 3.4	42.5 ± 3.0	19.3 ± 4.0

[a] Produce belonging to this category include: cabbage, cauliflower, broccoli, celery, lettuce, and spinach.

[b] Produce belonging to this category include: apples, pears, berries, cucumber, squash, grapes, peaches, apricots, plums, prunes, string beans, pea pods, and tomatoes.

[c] Produce belonging to this category include: carrots, beets, turnips, parsnips, citrus fruits, sweet corn, legumes (peas, beans, etc.), melons, onion, and potatoes.

Source: U.S. EPA, 1984d.

Although the fruit and vegetable classifications used in the study are somewhat limited in number, they provide alternative food categories that may be useful to exposure assessors. Because this study was based on the USDA NFCS, the limitations discussed previously regarding short-term dietary recall data also apply to the intake rates reported here.

U.S. EPA - Office of Science and Technology - The U.S. EPA Office of Science and Technology (OST) within the Office of Water (formerly the Office of Water Regulations and Standards) used data from the FDA revision of the Total Diet Study Food Lists and Diets (Pennington, 1983) to calculate food intake rates. OST uses these consumption data in its risk assessment model for land application of municipal sludge. The FDA data used are based on the combined results of the USDA 1977-1978 NFCS and the second National Health and Nutrition Examination Survey (NHANES II), 1976-1980 (U.S. EPA, 1989). Because food items are listed as prepared complex foods in the FDA Total Diet Study, each item was broken down into its component parts so that the amount of raw commodities consumed could be determined. Table 2-76 presents intake rates of various fruit and vegetable categories for various age groups and estimated lifetime ingestion rates that have been derived by U.S. EPA. Note that these are per capita intake rates tabulated as grams dry weight/day. Therefore, these rates differ from those in the previous tables because Pao et al. (1982) and U.S. EPA (1984d, 1984e) report intake rates on an as consumed basis.

The EPA-OST analysis provides intake rates for additional food categories and estimates of lifetime average daily intake on a per capita basis. In contrast to the other analyses of USDA NFCS data, this study reports the data in terms of dry weight intake rates. Thus, conversion is not required when contaminants are required on a dry weight basis.

Canadian Department of National Health and Welfare Nutrition Canada Survey - The Nutrition Canada Survey was conducted between 1970 and 1972 to "(a) examine the mean consumption of selected food groups and their contribution to nutrient intakes of Canadians, (b) examine patterns of food consumption and nutrient intake at various times of the day, and (c) provide information on the changes in eating habits during pregnancy." (Canadian Department of National Health and Welfare, n.d.). The method used for collecting dietary intake data was 24-hour recall. The recall method relied on interview techniques in which the interviewee was asked to recall all foods and beverages consumed during the day preceding the interview. Intake

Table 2-76. Consumption of Foods (g dry weight/day) for Different Age Groups and Estimated Lifetime Average Daily Food Intakes for a US Citizen Calculated from the FDA Diet Data (averaged across sex)

	Age (in years)						Estimated[a] lifetime
	(0-1)	(1-5)	(6-13)	(14-19)	(20-44)	(45-70)	
Wheat	27.60	42.23	60.80	79.36	65.86	55.13	60.30
Corn	4.00	15.35	19.28	23.21	17.83	14.82	17.01
Rice	2.22	4.58	5.24	5.89	5.78	4.21	5.03
Oats	3.73	2.65	2.27	1.89	1.32	2.00	1.85
Other Grain	0.01	0.08	0.41	0.73	13.45	4.41	6.49
Total Grain	37.56	64.82	87.58	110.34	90.59	76.17	84.19
Potatoes	5.67	10.03	14.72	19.40	17.28	14.79	15.60
Leafy Veg.	0.84	0.49	0.85	1.22	2.16	2.65	1.97
Legume Veg.	3.81	4.56	6.51	8.45	9.81	9.50	8.75
Root Veg.	3.04	0.67	1.20	1.73	1.77	1.64	1.60
Garden fruits	0.66	1.67	2.57	3.47	4.75	4.86	4.15
Peanuts	0.34	2.21	2.56	2.91	2.43	1.91	2.25
Mushrooms	0.00	0.01	0.03	0.04	0.14	0.06	0.08
Veg. Oils	27.62	17.69	27.54	37.04	37.20	27.84	31.24

[a] The estimated lifetime dietary intakes were estimated by:

$$\text{Estimated lifetime} = \frac{\text{IR(0-1)} + \text{5yrs} * \text{IR (1-5)} + \text{8 yrs} * \text{IR (6-13)} + \text{6 yrs} * \text{IR (14-19)} + \text{25 yrs} * \text{IR (20-44)} + \text{25 yrs} * \text{IR (45-70)}}{\text{70 years}}$$

where IR = the intake rate for a specific age group.

Source: U.S. EPA, 1989.

rates were reported for various age/sex groups of the population and for pregnant women (Table 2-77). The report does not specify whether the values represent per capita or consumer-only intake rates. However, they appear to be consistent with the as consumed intake rates for consumers-only reported by USDA (1980, 1992). It should be noted that these data are also based on short-term dietary recall and are based on the Canadian population.

2.3.2.4. Conversion Between As Consumed and Dry Weight Intake Rates

As noted previously, intake rates may be reported in terms of units as consumed or units of dry weight. It is essential that exposure assessors be aware of this difference so that they may ensure consistency between the units used for intake rates and those used for concentration data (i.e., if the unit of food consumption is grams dry weight/day, then the unit for the amount of pollutant in the food should be grams dry weight). If necessary, as consumed intake rates may be converted to dry weight intake rates using the moisture content percentages presented in Table 2-78 and the following equation:

$$IR_{dw} = IR_{ac} * [(100-W)/100] \qquad \text{(Eqn. 2-2)}$$

"Dry weight" intake rates may be converted to "as consumed" rates by using:

$$IR_{ac} = IR_{dw}/[(100-W)/100] \qquad \text{(Eqn. 2-3)}$$

where:

IR_{dw} = dry weight intake rate;
IR_{ac} = as consumed intake rate; and
W = percent water content.

Table 2-77. Mean Daily Intake of Foods (Grams) Based on the Nutrition Canada Dietary Survey[a]

Age (yrs)	Sample Size	Fruit and Fruit Products	Vegetables Not Including Potatoes	Potatoes	Nuts and Legumes
Males and Females					
1-4	1031	258	56	75	6
5-11	1995	312	83	110	13
Males					
12-19	1070	237	94	185	20
20-39	999	244	155	189	15
40-64	1222	194	134	131	15
65+	881	165	118	124	8
Females					
12-19	1162	237	97	115	15
20-39	1347	204	134	99	8
40-64	1500	239	136	79	10
65+	818	208	103	80	5
Pregnant Females					
—	769	301	156	114	15

[a] Report does not specify whether means were calculated per capita or for consumers only. The reported values are consistent with the as consumed intake rates for consumers only reported by USDA (1980).

Source: Canadian Department of National Health and Welfare, n.d.

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Table 2-78. Mean Moisture Content of Selected Fruits, Vegetables, and Grains Expressed As Percentages of Edible Portions

Food	Moisture Content (Percent) Raw	Cooked	Comments
Fruit			
Apples - dried	31.76	84.13*	sulfured; *without added sugar
Apples -	83.93*	84.46**	*with skin; **without skin
Apples - juice		87.93	canned or bottled
Applesauce		88.35*	*unsweetened
Apricots	86.35	86.62*	*canned juice pack with skin
Apricots - dried	31.09	85.56*	sulfured; *without added sugar
Bananas	74.26		
Blackberries	85.64		
Blueberries	84.61	86.59*	*frozen unsweetened
Boysenberries	85.90		frozen unsweetened
Cantaloupes - unspecified	89.78		
Casabas	91.00		
Cherries - sweet	80.76	84.95*	*canned, juice pack
Crabapples	78.94		
Cranberries	86.54		
Cranberries - juice cocktail	85.00		bottled
Currants (red & white)	83.95		
Elderberries	79.80		
Grapefruit	90.89		
Grapefruit - juice	90.00	90.10*	*canned unsweetened
Grapefruit - unspecified	90.89		pink, red, white
Grapes - fresh	81.30		American type (slip skin)
Grapes - juice	84.12		canned or bottled
Grapes - raisins	15.42		seedless
Honeydew melons	89.66		
Kiwi fruit	83.05		
Kumquats	81.70		
Lemons - juice	90.73	92.46*	*canned or bottled
Lemons - peel	81.60		
Lemons - pulp	88.98		
Limes - juice	90.21	92.52*	*canned or bottled
Limes - unspecified	88.26		
Loganberries	84.61		
Mulberries	87.68		
Nectarines	86.28		
Oranges - unspecified	86.75		all varieties
Peaches	87.66	87.49*	*canned juice pack
Pears - dried	26.69	64.44*	sulfured; *without added sugar
Pears - fresh	83.81	86.47*	*canned juice pack
Pineapple	86.50	83.51*	*canned juice pack
Pineapple - juice		85.53	canned
Plums	85.20		

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Table 2-78. Mean Moisture Content of Selected Fruits, Vegetables, and Grains Expressed As Percentages of Edible Portions (Continued)

Food	Moisture Content (Percent) Raw	Cooked	Comments
Quinces	83.80		
Raspberries	86.57		
Strawberries	91.57	89.97*	*frozen unsweetened
Tangerine - juice	88.90	87.00*	*canned sweetened
Tangerines	87.60	89.51*	*canned juice pack
Watermelon	91.51		
Vegetables			
Alfalfa sprouts	91.14		
Artichokes - globe & French	84.38	86.50	boiled, drained
Artichokes - Jerusalem	78.01		
Asparagus	92.25	92.04	boiled, drained
Bamboo shoots	91.00	95.92	boiled, drained
Beans - dry			
Beans - dry - blackeye peas (cowpeas)	66.80	71.80	boiled, drained
Beans - dry - hyacinth (mature seeds)	87.87	86.90	boiled, drained
Beans - dry - navy (pea)	79.15	76.02	boiled, drained
Beans - dry - pinto	81.30	93.39	boiled, drained
Beans - lima	70.24	67.17	boiled, drained
Beans - snap - Italian - green - yellow	90.27	89.22	boiled, drained
Beets	87.32	90.90	boiled, drained
Beets - tops (greens)	92.15	89.13	boiled, drained
Broccoli	90.69	90.20	boiled, drained
Brussel sprouts	86.00	87.32	boiled, drained
Cabbage - Chinese/celery, including bok choy	95.32	95.55	boiled, drained
Cabbage - red	91.55	93.60	boiled, drained
Cabbage - savoy	91.00	92.00	boiled, drained
Carrots	87.79	87.38	boiled, drained
Cassava (yucca blanca)	68.51		
Cauliflower	92.26	92.50	boiled, drained
Celeriac	88.00	92.30	boiled, drained
Celery	94.70	95.00	boiled, drained
Chili peppers	87.74	92.50*	*canned solids & liquid
Chives	92.00		
Cole slaw	81.50		
Collards	93.90	95.72	boiled, drained
Corn - sweet	75.96	69.57	boiled, drained
Cress - garden - field	89.40	92.50	boiled, drained
Cress - garden	89.40	92.50	boiled, drained
Cucumbers	96.05		
Dandelion - greens	85.60	89.80	boiled, drained
Eggplant	91.93	91.77	boiled, drained
Endive	93.79		
Garlic	58.58		

Table 2-78. Mean Moisture Content of Selected Fruits, Vegetables, and Grains Expressed As Percentages of Edible Portions (Continued)

Food	Moisture Content (Percent) Raw	Cooked	Comments
Kale	84.46	91.20	boiled, drained
Kohlrabi	91.00	90.30	boiled, drained
Lambsquarter	84.30	88.90	boiled, drained
Leeks	83.00	90.80	boiled, drained
Lentils - whole	67.34	68.70	stir-fried
Lettuce - iceberg	95.89		
Lettuce - romaine	94.91		
Mung beans (sprouts)	90.40	93.39	boiled, drained
Mushrooms	91.81	91.08	boiled, drained
Mustard greens	90.80	94.46	boiled, drained
Okra	89.58	89.91	boiled, drained
Onions	90.82	92.24	boiled, drained
Onions - dehydrated or dried	3.93		
Parsley	88.31		
Parsley roots	88.31		
Parsnips	79.53	77.72	boiled, drained
Peas (garden) - mature seeds - dry	88.89	88.91	boiled, drained
Peppers - sweet - garden	92.77	94.70	boiled, drained
Potatoes (white) - peeled	78.96	75.42	baked
Potatoes (white) - whole	83.29	71.20	baked
Pumpkin	91.60	93.69	boiled, drained
Radishes - roots	94.84		
Rhubarb	93.61	67.79	frozen, cooked with added sugar
Rutabagas - unspecified	89.66	90.10	boiled, drained
Salsify (oyster plant)	77.00	81.00	boiled, drained
Shallots	79.80		
Soybeans - sprouted seeds	69.05	79.45	steamed
Spinach	91.58	91.21	boiled, drained
Squash - summer	93.68	93.70	all varieties; boiled, drained
Squash - winter	88.71	89.01	all varieties; baked
Sweetpotatoes (including yams)	72.84	71.85	baked in skin
Swiss chard	92.66	92.65	boiled, drained
Tapioca - pearl	10.99		dry
Taro - greens	85.66	92.15	steamed
Taro - root	70.64	63.80	
Tomatoes - juice		93.90	canned
Tomatoes - paste		74.06	canned
Tomatoes - puree		87.26	canned
Tomatoes - raw	93.95		
Tomatoes - whole	93.95	92.40	boiled, drained
Towelgourd	93.85	84.29	boiled, drained
Turnips - roots	91.87	93.60	boiled, drained
Turnips - tops	91.07	93.20	boiled, drained
Water chestnuts	73.46		
Yambean - tuber	89.15	87.93	boiled, drained

Table 2-78. Mean Moisture Content of Selected Fruits, Vegetables, and Grains Expressed As Percentages of Edible Portions (Continued)

Food	Moisture Content (Percent) Raw	Cooked	Comments
Grains			
Barley - pearled	10.09	68.80	
Corn - grain - endosperm	10.37		
Corn - grain - bran	3.71		crude
Millet	8.67	71.41	
Oats	8.22		
Rice - rough - white	11.62	68.72	
Rye - rough	10.95		
Rye - flour - medium	9.85		
Sorghum (including milo)	9.20		
Wheat - rough - hard white	9.57		
Wheat - germ	11.12		crude
Wheat - bran	9.89		crude
Wheat - flour - whole grain	10.27		

Source: USDA, 1979-1986.

2.3.2.5. Below Ground, Above Ground, Exposed, and Protected

For chemicals that contaminate fruits and vegetables via specific sources or media, it may be necessary to consider cultivation techniques and consumption patterns that affect the magnitude of exposure. Vegetables that are grown below ground may be contaminated by chemicals found in soil; airborne pollutants would be more likely to contaminate leafy or exposed vegetables grown above ground. Exposures may be limited for contaminants that are deposited on outer protective coverings (i.e., pods or rinds of fruits and vegetables that are removed before consumption).

Table 2-79 and 2-80 lists the percentages of fruits and vegetables that are grown above and below ground. These values were calculated using average daily intake rates for consumers-only from Pao et al. (1982) (Table 2-26) and average per capita intake rates from DRES (Table 2-27), respectively. It should be noted that the DRES data (Table 2-27) set includes a more comprehensive listing of fruits and vegetables than Pao et al. (1982) Table 2-26. Fruits and vegetables were categorized as (1) below ground; (2) above ground-exposed; and (3) above ground-protected, according to traditional or scientific definitions of the plant and on cultivation and food preparation information. Percentages were calculated for each category of fruits, vegetables, and fruits and vegetables combined by dividing the total intake rates for each category by the sum of the intakes for all categories combined. It should be noted that the Pao et al. (1982) data are based on consumers-only, but DRES data and U.S. EPA (1984e) data are per capita intake rates. Also, the DRES data set includes a more comprehensive listing of fruits and vegetables than Pao et al. (1982). This factor may account for the differences in percentages observed for above ground and below ground fruits and vegetables. The percentages from Tables 2-79 and 2-80 may be applied to the average total intake rates to estimate the intake rates for fruits and/or vegetables that are: (1) grown below ground; (2) grown above ground and are exposed; and (3) grown above ground and are protected.

2.3.3. Recommendations

The key studies described in this section were used in selecting recommended fruit and vegetable intake rates for the general population and various subgroups of the United States population. These studies were all based on USDA NFCS data, but used different analytical

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Table 2-79. Percentages of Total Fruits and Vegetables Consumed that are Grown Below or Above Ground (Consumers Only)

	Calculated from data from Pao et al. (1982)
Vegetables[a]	
below ground	22.6%
above ground	77.4%
exposed	57.5%
protected	19.9%
Fruits[a]	
below ground	0%
above ground	100%
exposed	47.1%
protected	52.9%
Fruits and Vegetables[a]	
below ground	10.5%
above ground	89.5%
exposed	52.0%
protected	37.5%

[a] Traditional definitions were used to categorize common fruits and vegetables. Unusual fruits and vegetables were categorized using scientific definitions.

Table 2-80. Percentages of Total Fruits and Vegetables Consumed that are Grown Below or Above Ground (Per Capita)

	Calculated from data generated by OPP for the Dietary Risk Evaluation System (DRES)[a,b]
Vegetables[c]	
below ground	38.1%
above ground	61.9%
exposed	46.8%
protected	15.1%
Fruits[c]	
below ground	0%
above ground	100%
exposed	42.3%
protected	57.7%
Fruits and Vegetables	
below ground	20.7%
above ground	79.3%
exposed	34.5%
protected	44.8%

[a] The DRES data set (Table 2-27) includes a more comprehensive listing of fruits and vegetables than Pao et al. (1982) (Table 2-26).
[b] Nuts, spices, grains, oils and sugars were not included in this analysis.
[c] Traditional definitions were used to categorize common fruits and vegetables. Unusual fruits and vegetables were categorized using scientific definitions.

methods for calculating intake, and/or evaluated different subpopulations or food groups. The general design of both key and relevant studies are summarized in Table 2-81. Based on the 1987/88 NFCS one-day per capita data, the recommended average fruit intake rate for the general population is 142 g/day and the recommended vegetable intake rate for the general population is 182 g/day. Mean per capita intake rates for specific food items, on a g/kg-day basis, may be taken from Table 2-27. Mean and upper-percentile consumer only intake rates for total fruits, total vegetables, or various individual fruits and vegetables from the distribution data presented in Tables 2-32 through 2-73 may be used to represent intake for the general population and various subpopulations. Upper-percentile per capita rates may be calculated using the consumer only distribution data in Tables 2-32 through 2-73 and the survey size data presented in Section 2.7. Intake rates for the homeproduced form of these fruit and vegetable products are presented in Section 2.7.

The advantage of using the USDA NFCS data set is that it is the largest publicly available data source on food intake patterns in the United States. Data are available for a wide variety of fruit and vegetable products and are intended to be representative of the U.S. population. However, it should be noted that the data collected by USDA NFCS are based on short-term dietary recall and may not accurately reflect long-term intake patterns. This is particularly true for the tails of the distribution of intake.

Table 2-81. Summary of Fruit and Vegetable Intake Studies

Study	Survey Population Used in Calculating Intake	Types of Data Used	Units	Food Items
Pao et al., 1982	Consumers only data provided; per capita intake calculated using fraction of individuals using the food	1977/78 NFCS 3-day individual intake data	g/day; as consumed	Intake rates for only a limited umber of products; intake rates for total fruits and vegetables not calculated
EPA's DRES	Per capita (i.e., consumers and nonconsumers)	1977/78 NFCS 3-day individual intake data	g/kg-day; as consumed	Intake for a wide variety of fruits and vegetables presented; complex food groups were disaggregated
USDA, 1980; 1992	Per capita and consumer only	1977/78 and 1987/88 NFCS 1-day individual intake data	g/day; as consumed	Total fruits and total vegetables
EPA Analysis of 1987/88 USDA Data	Consumers only; per capita data can be calculated	1987/88 NFCS data; Based on amount of food consumed by a household over a 7-day period; individual intake rates based on the estimated proportion of household food eaten by family members.	g/kg-day; as consumed	Major food groups; individual food items; exposed and protected fruits and vegetables; USDA food categories
U.S. EPA/ORP, 1984d; 1984e	Per capita	1977/78 NFCS Individual intake data	g/day; as consumed	Exposed, protected, and leafy produce
U.S. EPA/OST, 1989	Estimated lifetime dietary intake	Based on FDA Total Diet Study Food List which used 1977/78 NFCS data, and NHANES II data	g/day; dry weight	Various food groups; complex foods disaggregated
Canadian Department of National Health and Welfare, n.d.	Consumers only?	1970-72 survey based on 24-hour dietary recall	g/day; as consumed?	Fruit and fruit products, vegetables not including potatoes and nuts and legumes

2.4. CONSUMPTION OF MEAT, POULTRY, AND DAIRY PRODUCTS

Consumption of meat, poultry, and dairy products is a potential pathway of exposure to toxic chemicals. These food sources can become contaminated if animals consume contaminated soil, water, or feed crops.

2.4.1. Intake Studies

2.4.1.1. U.S. Department of Agriculture Nationwide Food Consumption Survey

USDA conducts the NFCS approximately every 10 years. The three most recent NFCSs were conducted in 1965-66, 1977-78, and 1987-88. The purpose of these surveys was to "analyze the food consumption behavior and dietary status of Americans" (USDA, 1992). The survey uses a statistical sampling technique designed to ensure that all seasons, geographic regions of the U.S., and demographic and socioeconomic groups are represented. There are two components of the NFCS. The household component collects information over a 7-day period on the socioeconomic and demographic characteristics of households, and the types, value, and sources of foods consumed. The individual component collects information on food intakes of individuals within each household over a 3-day period (USDA, 1993).

The same basic survey design was used for the three most recent NFCSs, but the sample sizes and statistical classifications used were somewhat different (USDA, 1992). In 1965-66, 10,000 households were surveyed (USDA, 1972). The sample size increased to 15,000 households (over 36,000 individuals) in 1977-78, but decreased to 4,500 households in 1987-88 because of budgetary constraints and a low response rate (37 percent). Data from the 1977-78 NFCS are presented in this Handbook because the data have been published by USDA in various publications and reanalyzed by various EPA offices according to the food items/groups commonly used to assess exposure. Published one-day data from the 1987-88 NFCS and the results of a recently conducted EPA analysis of the 1987-88 data are also presented.

Individual daily intake rates and average user and per capita intake rates calculated from NFCS data are based on averages of reported intakes over either one day or three consecutive days. Such short-term data are suitable for estimating average daily per capita intake rates representative of both short-term and long-term consumption. However, upper percentile individual intakes reported either as user intakes or per capita intakes are likely to be higher than the true long-term upper percentile daily average intakes because the results of short-term surveys are generally more variable than the results of long-term surveys. The individual upper percentile intakes rates represent intakes by users of the products over the three-day survey period. Long-term estimates require that the average intake over three days is the same as the average intake over 365 days for each individual, that is, the product is consumed every day of the year, resulting in the long-term overestimate.

2.4.1.2. Key Intake Studies Based on the USDA NFCS

Pao et al. (1982) - Foods Commonly Eaten by Individuals - Using data gathered in the 1977-78 USDA NFCS, Pao et al. (1982) calculated percentiles for the average quantities of meat, poultry, and dairy products consumed by members of the U.S. population over a 3-day period. The calculations made by Pao et al. (1982) were based only on individuals who reported consuming meat, poultry, and dairy products (i.e., consumer's only) during the survey period. The data were collected during NFCS home interviews of 37,874 respondents, who were asked to recall food intake for the day preceding the interview, and record food intake the day of the interview and the day after the interview.

The intake rates are presented for individuals using food at least once in 3-days (survey period) on an as consumed (g/day) basis. Mean intake rates for consumers, standard deviations, intake rates for consumers at various percentiles, maximum amounts consumed, percentages of individuals using the food in the 3-day study, quantities consumed per eating occasion, and per capita estimates presented in Tables 2-82. Per capita intake rates were estimated by multiplying the average intake rate for consumers by the fraction of individuals using the food over the 3-day survey period.

Although Pao et al. (1982) reported distributions of intake rates for total meat (i.e., beef, pork, lamb, and veal) individual meat and poultry items and dairy products, these tabulated data cannot be used to derive a distribution of intake rates for total meat, poultry, and dairy products. Obtaining a frequency distribution for all meat, poultry, and dairy products by summing the distributions for these individual food items is not appropriate because a person whose intake rate for meat falls in the 90th percentile may not have a 90th percentile intake rate of poultry or dairy products. Summing ingestion rates would also imply that all individuals consume all

Table 2-82. Quantity ("as consumed") of Meat, Poultry, and Dairy Products Consumed and the Percentage of Individuls Using These Foods in 3 Days

Food category	Consumers-only Three-Day Averages at Specified Percentiles (g/day)[a]							Maximum consumed in any one day (g/day)	Consumers-only Three-day Average quantity consumed (g/day)		Quantity consumed per eating occasion (g)		% Indiv. using food in 3 days	Per capita three-day average quantity consumed (g/day)[d]
	5	25	50	75	90	95	99		Average	Standard Deviation	Average	Standard Deviation		
Meat[a]	11	37	69	112	168	211	317	1,792	85	67	107	85	84.6	72
Beef	19	37	57	95	149	187	283	1,792	75	59	133	85	67.3	50.5
Pork	5	11	28	54	84	111	178	1,128	39	39	69	69	49.9	19.5
Lamb	15	36	46	73	93	112	149	864	54	33	146	84	1.5	0.81
Veal	15	28	38	59	90	95	144	448	49	27	130	71	2.3	1.13
Poultry	17	32	46	73	109	132	191	1,282	57	39	128	77	42.8	24.4
Chicken	17	32	45	70	102	129	185	1,282	56	36	131	76	38.7	21.7
Turkey	9	19	37	57	85	113	161	968	45	35	105	73	5.8	2.61
<u>Dairy Products</u>														
Eggs	15	21	40	61	92	109	165	728	47	33	82	44	54.3	25.5
Butter	2	2	5	9	19	26	47	341	8	10	12	13	31.4	2.5
Margarine	2	3	5	10	19	28	47	227	9	10	11	11	43.1	3.9
Milk[b]	31	122	248	470	692	833	1,221	4,410	328	270	203	134	82.5	271
Cheese[c]	5	9	19	28	46	57	95	700	22	19	41	28	40	8.8

[a] Meat - beef, pork, lamb, and veal.
[b] Milk - fluid milk, milk beverages, and milk-based infant formulas.
[c] Cheese - natural and processed cheese.
[d] Per-capita intakes were calculated by multiplying the average quantity consumed for consumers-only by the fraction of individuals using the food-item in 3 days.

Source: Pao et al., 1982.

of the meat, poultry, and dairy products listed in Table 2-82. Consequently, these data for individual food items should only be used in exposure assessments where the consumption of these individual food items is of interest.

The advantages of using these data are that they were derived from the USDA NFCS and are representative of the U.S. population. This data set provides distributions for a number of commonly eaten meat, poultry, and dairy products, but the list of foods is limited and does not account for meat, poultry, and dairy products included in complex food dishes. Also, these data are based on short-term dietary recall and may not accurately reflect long-term consumption patterns.

The U.S. EPA's Dietary Risk Evaluation System (DRES) - USEPA, Office of Pesticide Programs - The U.S. EPA, Office of Pesticide Programs (OPP) uses the Dietary Risk Evaluation System (formerly the Tolerance Assessment System) to assess the dietary risk of pesticide use as part of the pesticide registration process. OPP sets tolerances for specific pesticides on raw agricultural commodities based on estimates of dietary risk. These estimates are calculated using pesticide residue data for the food item of concern and relevant consumption data. Intake rates are based primarily on the USDA 1977-1978 NFCS although intake rates for some food items are based on estimations from production volumes or other data (i.e., some items were assigned an arbitrary value of 0.000001g (kg/day) (Kariya, 1992). OPP has calculated per capita intake rates of various items of meat, poultry, and dairy products for 22 subgroups (age, regional, and seasonal) of the population by determining the composition of NFCS food items and disaggregating complex food dishes into their component raw agricultural commodities (RACs) (White et al. 1983).

The DRES per capita, as consumed intake rates for all age/sex/demographic groups combined are presented in Table 2-83. These data are based on both consumers and non consumers of these food items. Data for specific subgroups of the population are not presented in this section, but are available through OPP via direct request. The data in Table 2-83 may be useful for estimating the risks of exposure associated with the consumption of the various meat, poultry, and dairy products presented. It should be noted that these data are indexed to the actual body weights of the survey respondents and are expressed in units of grams of food consumed per kg bodyweight per day. Consequently, use of these data in calculating potential

Table 2-83. Mean Per Capita Intake Rates for Meat, Poultry, and Dairy Products Based on All Sex/Age/Demographic Subgroups

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight/Day)	Standard Error
Milk-Non-Fat Solids	0.9033354	0.0134468
Milk-Non-Fat Solids***Foodadd.	0.9033354	0.0134468
Milk-Fat Solids	0.4297199	0.0060264
Milk-Fat Solids***Foodadd.	0.4297199	0.0060264
Milk Sugar (Lactose)	0.0374270	0.0033996
Beef-Meat Byproducts	0.0176621	0.0005652
Beef (Organ Meats) - Other	0.0060345	0.0007012
Beef - Dried	0.0025325	0.0004123
Beef (Boneless) - Fat (Beef Tallow)	0.3720755	0.0048605
Beef (Organ Meats) - Kidney	0.0004798	0.0003059
Beef (Organ Meats) - Liver	0.0206980	0.0014002
Beef (Boneless) - Lean (w/o Removeable Fat)	1.1619987	0.0159453
Goat-Meat Byproducts	0.0000000	*
Goat (Organ Meats) - Other	0.0000000	*
Goat (Boneless) - Fat	0.0000397	0.0000238
Goat (Organ Meats) - Kidney	0.0000000	*
Goat (Organ Meats) - Liver	0.0000000	*
Goat (Boneless) - Lean (w/o Removeable Fat)	0.0001891	0.0001139
Horse	0.0000000	*
Rabbit	0.0014207	0.00003544
Sheep - Meat Byproducts	0.0000501	0.0000381
Sheep (Organ Meats) - Other	0.0000109	0.0000197
Sheep (Boneless) - Fat	0.0042966	0.0005956
Sheep (Organ Meats) - Kidney	0.0000090	0.0000079
Sheep (Organ Meats) - Liver	0.0000000	*
Sheep (Boneless) - Lean (w/o Removeable Fat)	0.0124842	0.0015077
Pork - Meat Byproducts	0.0250792	0.0022720
Pork (Organ Meats) - Other	0.0038496	0.0003233
Pork (Boneless) - Fat (Including Lard)	0.2082022	0.0032032
Pork (Organ Meats) - Kidney	0.0000168	0.0000106
Pork (Organ Meats) - Liver	0.0048194	0.0004288

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Table 2-83. Mean Per Capita Intake Rates for Meat, Poultry, and Dairy Products Based on All Sex/Age/Demographic Subgroups (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight/Day)	Standard Error
Pork (Boneless) - Lean (w/o Removeable Fat)	0.3912467	0.0060683
Meat, Game	0.0063507	0.0010935
Turkey - Byproducts	0.0002358	0.0000339
Turkey - Giblets (Liver)	0.0000537	0.0000370
Turkey - Flesh (w/o Skin, w/o Bones)	0.0078728	0.0007933
Turkey - Flesh (+ Skin, w/o Bones)	0.0481655	0.0026028
Turkey - Unspecified	0.0000954	0.0000552
Poultry, Other - Byproducts	0.0000000	*
Poultry, Other - Giblets (Liver)	0.0002321	0.0001440
Poultry, Other - Flesh (+ Skin, w/o Bones)	0.0053882	0.0007590
Eggs - Whole	0.5645020	0.0076651
Eggs - White Only	0.0092044	0.0004441
Eggs - Yolk Only	0.0066323	0.0004295
Chicken - Byproducts	0.0000000	*
Chicken - Giblets (Liver)	0.0050626	0.0005727
Chicken - Flesh (w/o Skin, w/o Bones)	0.0601361	0.0021616
Chicken - Flesh (+ Skin, w/o Bones)	0.3793205	0.0104779

[a] Consumed in any raw or prepared form.

Source: DRES database.

dose does not require the body weight factor in the denominator of the average daily dose (ADD) equation. It should also be noted that conversion of these intake rates into units of g/day by multiplying by a single average body weight is not appropriate because the DRES data base did not rely on a single body weight for all individuals. Instead, DRES used the body weights reported by each individual surveyed to estimate consumption in units of g/kg-day.

The advantages of using these data are that complex food dishes have been disaggregated to provide intake rates for variety of meat, poultry, and dairy products. These data are also based on the individual body weights of the respondents. Therefore, the use of these data in calculating exposure to toxic chemicals may provide more representative estimates of potential dose per unit body weight. However, because the data are based on NFCS short-term dietary recall the same limitations discussed previously for other NFCS data sets also apply here.

Food and Nutrient Intakes of Individuals in One Day in the U.S., USDA (1992) - USDA (1992) calculated mean per capita intake rates for total meat, total poultry, and dairy products using NFCS data from 1987-88 (USDA, 1992). The mean intake rates for these food items are presented in Tables 2-84 and 2-85 grouped by age and sex. These values are based on intake data for one day for consumers and non-consumers from the 1987-88 USDA Nationwide Food Consumption Survey. Males 12 years and above had the highest total meat, poultry, and fish consumption rate, 252 g/day (Table 2-84). Males between the ages of 6-11 years had the largest consumption rate of total milk, 439 g/day (Table 2-85). Males 20 years and above had the highest consumption rates of cheese and eggs, 17 and 27 g/day, respectively (Table 2-85).

The advantages of using these data are that they provide intake estimates for all meat, poultry, and dairy products. The consumption estimates are based on short-term dietary data which may not reflect long-term consumption.

U.S. EPA Analysis of 1987/88 USDA NFCS Data - EPA analyzed data from the 1987-88 USDA NFCS to generate distributions of intake rates for various meat and dairy products. The meat and dairy products selected for analysis included total meats, total dairy, beef, game, pork, poultry, and eggs. Food items/groups were identified in the NFCS data base according to NFCS-defined food codes. Appendix 2-A presents the codes used to determine the various food groups. Intake rates for these food products represent intake of all forms of the product (i.e., homeproduced and commercially produced). The USDA data were adjusted by applying the

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Table 2-84. Mean Meat Intakes per Individual in a Day by Sex and Age (g/day)[a]

	Total Meat, Poultry and Fish	Beef	Pork	Lamb, Veal, Game	Total Poultry	Chicken Only	Meat Mixtures[b]
Males and Females							
5 and Under	92	10	9	<0.5	14	12	39
Males							
6-11	156	22	14	<0.5	27	24	74
12-19	252	38	17	1	27	20	142
20 and over	250	44	19	2	31	25	108
Females							
6-11	151	26	9	1	20	17	74
12-19	169	31	10	<0.5	17	13	80
20 and over	170	29	12	1	24	18	73
All individuals	193	32	14	1	26	20	86

[a] Based on USDA Nationwide Food Consumption Survey (1987 to 1988) data for one day.

[b] Includes mixtures containing meat, poultry, or fish as a main ingredient.

Source: USDA, 1992.

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Table 2-85. Mean Dairy Product Intakes per Individual in a Day, by Sex and Age (g/day)[a]

	Total Milk	Whole Milk	Lowfat/Skim Milk	Cheese	Eggs
Males and Females					
5 and under	347	177	129	7	11
Males					
6-11	439	224	159	10	17
12-19	392	183	168	12	17
20 and over	202	88	94	17	27
Females					
6-11	310	135	135	9	14
12-19	260	124	114	12	18
20 and over	148	55	81	15	17
All individuals	224	99	102	14	20

[a] Based on USDA Nationwide Food Consumption Survey (1987 to 1988) data for one day.

Source: USDA, 1992.

sample weights calculated by USDA to the data set prior to analysis. These weights were designed to "adjust for survey nonresponse and other vagaries of the sample selection process" (USDA, 1987/88). Intake rates were indexed to the body weight of the survey respondent and reported in units of g/kg-day. The food analysis was accomplished using the SAS statistical programming system (SAS, 1990).

Distributions of intake rates were determined by apportioning the amount of food used by a household among family members based on average serving sizes for specified age groups of the population and the number of weekly meals consumed by each family member. A detailed description of the methodology used to generate distributions of homegrown intake is presented in Section 2.7 (Intake Rates for Various Homeproduced Food Items) of this Handbook. The same method was used to determine the intake rates of all forms of meat (i.e., homeproduced and commercially prepared) and dairy products presented in this section

Intake rates for various subcategories of the population within census regions are presented in Tables 2-86 through 2-90 for total meat and Tables 2-91 through 2-95 for total dairy. Tables 2-96 through 2-100 present intake rates for beef, game, pork, poultry, and eggs. These distributions represent intake rates for consumers of the food item/group of interest. These data represent one-week average intake rates for family members from those surveyed households who reported eating the food item/group of interest during the survey period. The total number of individuals in the data set (i.e., both individuals who ate the food item and those who did not eat the food item during the survey period) are presented in Table 2-185 in Section 2.7.2. These total number of individuals surveyed may be used with the consumer only data presented here to calculate per capita intake rates for the survey population as shown in Section 2.7.2.

The advantages of these data are that they provide distributions for the various food items/groups. Also, the NFCS was designed to be representative of the U.S. population. However, these data are based on short-term dietary recall and may not accurately reflect long-term intake patterns. Additional advantages and limitations of this analysis are outlined in Section 2.7.4 of this Handbook.

Table 2-86. Intake of Total Meats (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	184337000	9685	4.69E+00	4.29E-04	0.00E+00	2.05E-01	6.74E-01	1.03E+00	1.83E+00	3.22E+00	5.48E+00	9.30E+00	1.32E+01	2.70E+01	1.36E+02
Age															
< 01	2805000	155	2.77E+01	1.34E-02	0.00E+00	6.22E-01	4.07E+00	7.41E+00	1.24E+01	2.31E+01	3.26E+01	5.13E+01	7.55E+01	1.23E+02	1.36E+02
01-02	5676000	319	1.20E+01	3.91E-03	6.81E-01	1.28E+00	2.76E+00	3.80E+00	6.08E+00	9.71E+00	1.56E+01	2.12E+01	2.76E+01	4.10E+01	9.21E+01
03-05	8073000	458	9.05E+00	2.21E-03	0.00E+00	6.12E-01	2.08E+00	3.35E+00	5.09E+00	7.90E+00	1.16E+01	1.57E+01	1.97E+01	3.04E+01	5.91E+01
06-11	16605000	927	6.55E+00	1.15E-03	0.00E+00	4.55E-01	1.35E+00	2.03E+00	3.27E+00	5.43E+00	8.43E+00	1.28E+01	1.58E+01	2.06E+01	3.65E+01
12-19	20354000	1075	3.94E+00	6.38E-04	0.00E+00	9.26E-02	8.20E-01	1.19E+00	1.97E+00	3.32E+00	5.18E+00	7.56E+00	8.99E+00	1.33E+01	5.06E+01
20-39	59744000	2982	3.31E+00	3.76E-04	0.00E+00	1.87E-01	5.57E-01	8.24E-01	1.47E+00	2.58E+00	4.20E+00	6.66E+00	8.54E+00	1.35E+01	4.28E+01
40-69	55583000	2991	3.71E+00	4.70E-04	0.00E+00	1.81E-01	6.45E-01	1.00E+00	1.72E+00	2.91E+00	4.57E+00	6.90E+00	9.36E+00	1.70E+01	5.96E+01
70 +	15497000	778	3.36E+00	6.89E-04	0.00E+00	2.17E-01	5.76E-01	8.83E-01	1.60E+00	2.77E+00	4.41E+00	6.61E+00	8.39E+00	1.25E+01	4.09E+01
Seasons															
Fall	47225000	1565	4.78E+00	9.73E-04	0.00E+00	1.67E-01	6.76E-01	9.52E-01	1.74E+00	3.07E+00	5.41E+00	9.65E+00	1.38E+01	2.76E+01	1.23E+02
Spring	44945000	3872	4.61E+00	8.57E-04	0.00E+00	1.92E-01	6.50E-01	1.03E+00	1.79E+00	3.12E+00	5.32E+00	9.04E+00	1.32E+01	2.90E+01	1.36E+02
Summer	44394000	1393	4.92E+00	8.29E-04	0.00E+00	8.74E-02	6.74E-01	1.10E+00	2.00E+00	3.41E+00	6.07E+00	9.89E+00	1.34E+01	2.57E+01	6.98E+01
Winter	47773000	2855	4.45E+00	7.59E-04	0.00E+00	2.47E-01	6.96E-01	1.04E+00	1.87E+00	3.24E+00	5.35E+00	8.74E+00	1.18E+01	2.18E+01	1.06E+02
Urbanization															
Central City	54971000	2172	5.40E+00	1.04E-03	0.00E+00	1.49E-01	6.14E-01	9.10E-01	1.75E+00	3.39E+00	6.36E+00	1.09E+01	1.60E+01	3.48E+01	1.36E+02
Nonmetropolitan	44324000	2956	4.68E+00	7.77E-04	0.00E+00	2.65E-01	8.20E-01	1.19E+00	2.08E+00	3.43E+00	5.62E+00	9.06E+00	1.20E+01	2.28E+01	8.90E+01
Surburban	84982000	4555	4.23E+00	4.94E-04	0.00E+00	2.05E-01	6.76E-01	1.02E+00	1.77E+00	3.00E+00	5.03E+00	8.47E+00	1.17E+01	2.28E+01	5.91E+01
Race															
Asian	2393000	112	8.38E+00	7.89E-03	8.04E-02	8.04E-02	8.60E-01	2.11E+00	2.88E+00	5.05E+00	9.17E+00	1.70E+01	2.54E+01	8.65E+01	9.20E+01
Black	21700000	1112	6.73E+00	1.72E-03	0.00E+00	0.00E+00	8.93E-01	1.43E+00	2.59E+00	4.55E+00	8.10E+00	1.34E+01	1.93E+01	4.59E+01	1.06E+02
Native American	1449000	90	7.89E+00	1.20E-02	2.15E-01	2.15E-01	1.27E+00	1.78E+00	2.93E+00	4.32E+00	7.03E+00	1.06E+01	2.30E+01	9.21E+01	9.21E+01
Other/NA	4718000	233	6.38E+00	5.18E-03	0.00E+00	1.19E-01	6.36E-01	1.33E+00	2.52E+00	3.94E+00	8.15E+00	1.22E+01	1.40E+01	2.98E+01	1.23E+02
White	154017000	8136	4.26E+00	3.81E-04	0.00E+00	2.19E-01	6.63E-01	9.86E-01	1.73E+00	3.02E+00	5.08E+00	8.48E+00	1.18E+01	2.28E+01	1.36E+02
Response to Questionnaire															
Do you raise animals	9987000	627	4.81E+00	1.47E-03	0.00E+00	2.46E-01	7.96E-01	1.10E+00	2.08E+00	3.64E+00	6.06E+00	9.37E+00	1.29E+01	2.25E+01	5.88E+01
Do you farm?	7284000	430	4.73E+00	1.58E-03	0.00E+00	1.68E-01	7.71E-01	1.38E+00	2.28E+00	3.37E+00	6.10E+00	9.37E+00	1.20E+01	2.25E+01	4.62E+01

Table 2-87. Intake of Total Meats (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	40574000	1981	4.59E+00	9.62E-04	0.00E+00	3.05E-01	7.55E-01	1.07E+00	1.81E+00	3.02E+00	5.35E+00	9.11E+00	1.34E+01	2.70E+01	1.23E+02
Age															
< 01	536000	28	3.33E+01	3.73E-02	0.00E+00	0.00E+00	7.41E+00	1.16E+01	2.04E+01	2.67E+01	3.48E+01	5.13E+01	1.23E+02	1.23E+02	1.23E+02
01-02	1062000	55	1.14E+01	8.96E-03	1.44E+00	1.44E+00	2.93E+00	4.58E+00	5.78E+00	8.68E+00	1.32E+01	2.20E+01	3.69E+01	4.10E+01	4.69E+01
03-05	1481000	91	8.02E+00	4.40E-03	2.34E-01	2.34E-01	2.35E+00	3.46E+00	4.35E+00	6.81E+00	9.31E+00	1.36E+01	1.69E+01	3.36E+01	3.73E+01
06-11	3573000	183	6.62E+00	2.39E-03	9.37E-01	9.43E-01	1.56E+00	2.00E+00	3.24E+00	5.61E+00	8.68E+00	1.17E+01	1.49E+01	2.60E+01	2.60E+01
12-19	4383000	207	3.79E+00	1.56E-03	0.00E+00	6.63E-01	1.02E+00	1.27E+00	1.97E+00	3.06E+00	4.37E+00	6.99E+00	8.82E+00	1.52E+01	5.06E+01
20-39	12394000	580	3.20E+00	8.30E-04	0.00E+00	2.70E-01	5.81E-01	8.92E-01	1.42E+00	2.39E+00	3.90E+00	6.29E+00	9.19E+00	1.39E+01	3.49E+01
40-69	13339000	662	3.73E+00	9.84E-04	9.40E-02	1.81E-01	7.15E-01	1.05E+00	1.65E+00	2.71E+00	4.49E+00	7.02E+00	1.10E+01	1.77E+01	4.80E+01
70 +	3806000	175	3.86E+00	1.55E-03	6.90E-02	2.30E-01	6.77E-01	9.28E-01	1.90E+00	3.09E+00	4.72E+00	8.00E+00	8.99E+00	1.44E+01	2.84E+01
Seasons															
Fall	9316000	275	5.10E+00	2.96E-03	0.00E+00	3.58E-01	8.00E-01	1.01E+00	1.74E+00	2.91E+00	5.38E+00	9.82E+00	1.57E+01	3.26E+01	1.23E+02
Spring	10119000	772	4.33E+00	1.75E-03	0.00E+00	9.92E-02	4.90E-01	9.68E-01	1.64E+00	2.78E+00	4.74E+00	8.51E+00	1.40E+01	3.49E+01	5.06E+01
Summer	9460000	275	4.67E+00	1.55E-03	3.60E-01	5.72E-01	9.14E-01	1.16E+00	2.00E+00	3.40E+00	6.10E+00	9.07E+00	1.17E+01	2.16E+01	5.13E+01
Winter	11679000	659	4.33E+00	1.30E-03	0.00E+00	3.87E-01	7.78E-01	1.17E+00	1.89E+00	3.12E+00	5.20E+00	8.78E+00	1.16E+01	2.15E+01	4.86E+01
Urbanization															
Central City	9499000	327	6.74E+00	3.17E-03	3.36E-01	5.82E-01	1.00E+00	1.31E+00	2.20E+00	4.31E+00	8.25E+00	1.39E+01	1.84E+01	4.86E+01	1.23E+02
Nonmetropolitan	5417000	360	4.08E+00	1.71E-03	0.00E+00	2.65E-01	7.72E-01	1.15E+00	2.07E+00	2.96E+00	4.75E+00	8.15E+00	1.07E+01	1.73E+01	4.69E+01
Surburban	25658000	1294	3.90E+00	8.49E-04	0.00E+00	2.30E-01	6.77E-01	9.99E-01	1.63E+00	2.82E+00	4.60E+00	7.23E+00	1.07E+01	2.31E+01	5.06E+01
Race															
Asian	313000	11	8.76E+00	1.67E-02	2.79E+00	2.79E+00	2.79E+00	2.88E+00	2.93E+00	4.18E+00	7.81E+00	2.70E+01	2.70E+01	3.49E+01	3.49E+01
Black	3542000	132	6.77E+00	3.29E-03	1.28E+00	1.33E+00	1.47E+00	1.64E+00	2.65E+00	4.69E+00	8.96E+00	1.39E+01	1.86E+01	2.91E+01	4.86E+01
Native American	38000	4	3.74E+00	6.23E-03	2.79E+00	2.79E+00	2.79E+00	2.79E+00	2.79E+00	3.36E+00	3.68E+00	6.18E+00	6.18E+00	6.18E+00	6.18E+00
Other/NA	1084000	51	1.01E+01	2.12E-02	1.01E-01	1.01E-01	1.45E-01	3.64E-01	2.11E+00	4.07E+00	9.68E+00	1.40E+01	2.98E+01	1.23E+02	1.23E+02
White	35597000	1783	4.17E+00	7.79E-04	0.00E+00	3.36E-01	7.25E-01	1.03E+00	1.70E+00	2.90E+00	4.94E+00	8.26E+00	1.10E+01	2.31E+01	5.13E+01
Response to Questionnaire															
Do you raise animals	1178000	70	4.65E+00	3.33E-03	7.55E-02	3.21E-01	1.27E+00	1.43E+00	2.26E+00	3.38E+00	6.16E+00	9.58E+00	1.07E+01	1.99E+01	2.53E+01
Do you farm?	785000	37	3.70E+00	2.73E-03	7.55E-02	7.55E-02	1.27E+00	1.35E+00	2.07E+00	2.71E+00	4.59E+00	7.14E+00	1.02E+01	1.09E+01	1.09E+01

Table 2-88. Intake of Total Meats (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	45647000	2556	4.78E+00	8.69E-04	0.00E+00	2.41E-01	7.15E-01	1.02E+00	1.90E+00	3.27E+00	5.53E+00	9.56E+00	1.36E+01	2.54E+01	1.36E+02
Age															
< 01	812000	44	2.79E+01	2.52E-02	7.96E-01	7.96E-01	4.07E+00	6.68E+00	1.24E+01	2.32E+01	3.71E+01	4.98E+01	8.65E+01	9.20E+01	1.36E+02
01-02	1757000	101	1.23E+01	4.81E-03	1.35E+00	1.35E+00	3.37E+00	4.69E+00	7.31E+00	1.11E+01	1.70E+01	2.11E+01	2.30E+01	3.05E+01	3.05E+01
03-05	2230000	131	9.50E+00	4.00E-03	1.06E+00	1.06E+00	1.60E+00	2.90E+00	5.53E+00	8.10E+00	1.22E+01	1.78E+01	2.04E+01	3.04E+01	3.04E+01
06-11	4225000	259	6.52E+00	2.24E-03	3.06E-01	7.20E-01	1.28E+00	1.89E+00	3.32E+00	5.25E+00	8.10E+00	1.28E+01	1.74E+01	1.92E+01	3.49E+01
12-19	5471000	308	3.85E+00	1.13E-03	0.00E+00	0.00E+00	6.70E-01	8.92E-01	1.94E+00	3.29E+00	5.48E+00	7.56E+00	8.44E+00	1.17E+01	2.96E+01
20-39	15223000	807	3.35E+00	7.20E-04	0.00E+00	2.19E-01	5.95E-01	8.98E-01	1.50E+00	2.64E+00	4.32E+00	6.60E+00	8.37E+00	1.40E+01	2.36E+01
40-69	12758000	730	3.41E+00	6.40E-04	0.00E+00	1.16E-01	6.88E-01	1.04E+00	1.88E+00	3.00E+00	4.31E+00	6.14E+00	7.64E+00	1.21E+01	2.38E+01
70 +	3171000	176	3.15E+00	1.66E-03	1.94E-01	2.56E-01	5.76E-01	7.49E-01	1.40E+00	2.37E+00	3.94E+00	6.25E+00	8.68E+00	1.22E+01	4.09E+01
Seasons															
Fall	14210000	491	4.57E+00	1.58E-03	0.00E+00	1.16E-01	7.15E-01	9.80E-01	1.70E+00	2.99E+00	5.35E+00	9.13E+00	1.35E+01	2.54E+01	8.65E+01
Spring	10568000	1017	4.89E+00	2.14E-03	0.00E+00	2.88E-01	6.96E-01	1.02E+00	1.83E+00	3.34E+00	5.54E+00	9.23E+00	1.40E+01	2.76E+01	1.36E+02
Summer	9922000	330	5.48E+00	1.99E-03	0.00E+00	8.04E-02	7.43E-01	1.23E+00	2.27E+00	3.64E+00	6.29E+00	1.17E+01	1.63E+01	2.84E+01	4.98E+01
Winter	10947000	718	4.33E+00	1.16E-03	1.25E-01	2.82E-01	6.70E-01	1.03E+00	1.94E+00	3.25E+00	5.52E+00	8.53E+00	1.20E+01	1.95E+01	3.30E+01
Urbanization															
Central City	17041000	671	5.62E+00	1.96E-03	0.00E+00	8.74E-02	5.95E-01	8.61E-01	1.80E+00	3.46E+00	6.51E+00	1.22E+01	1.82E+01	4.12E+01	1.36E+02
Nonmetropolitan	14073000	1038	4.19E+00	1.00E-03	0.00E+00	3.00E-01	7.94E-01	1.04E+00	1.90E+00	3.16E+00	5.21E+00	8.38E+00	1.11E+01	1.79E+01	4.09E+01
Surburban	14533000	847	4.38E+00	1.08E-03	0.00E+00	2.76E-01	8.75E-01	1.19E+00	2.01E+00	3.15E+00	5.25E+00	9.37E+00	1.27E+01	1.95E+01	5.07E+01
Race															
Asian	849000	37	1.18E+01	2.00E-02	8.04E-02	8.04E-02	7.20E-01	1.94E+00	3.69E+00	7.28E+00	1.22E+01	1.81E+01	2.98E+01	8.65E+01	9.20E+01
Black	2785000	125	1.03E+01	6.62E-03	0.00E+00	0.00E+00	1.60E+00	2.42E+00	3.54E+00	6.32E+00	1.11E+01	2.28E+01	4.12E+01	4.98E+01	4.98E+01
Native American	116000	6	3.76E+00	5.14E-03	1.54E+00	1.54E+00	1.54E+00	1.54E+00	2.36E+00	2.96E+00	5.78E+00	5.78E+00	5.78E+00	5.78E+00	5.78E+00
Other/NA	923000	36	5.85E+00	4.52E-03	3.15E-01	3.15E-01	1.26E+00	1.77E+00	2.77E+00	3.67E+00	9.09E+00	1.24E+01	1.40E+01	1.50E+01	1.50E+01
White	40974000	2352	4.24E+00	6.86E-04	0.00E+00	2.56E-01	7.02E-01	9.92E-01	1.79E+00	3.10E+00	5.11E+00	8.46E+00	1.21E+01	2.00E+01	1.36E+02
Response to Questionnaire															
Do you raise animals	3678000	245	4.78E+00	1.95E-03	2.82E-01	3.75E-01	7.96E-01	1.21E+00	2.13E+00	3.99E+00	6.53E+00	9.60E+00	1.29E+01	1.78E+01	2.25E+01
Do you farm?	2681000	173	5.13E+00	2.45E-03	3.75E-01	4.41E-01	7.15E-01	1.35E+00	2.50E+00	4.01E+00	6.78E+00	1.06E+01	1.36E+01	1.83E+01	2.25E+01

Table 2-89. Intake of Total Meats (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	63278000	3356	4.87E+00	7.04E-04	0.00E+00	1.81E-01	6.91E-01	1.09E+00	2.01E+00	3.43E+00	5.90E+00	9.75E+00	1.31E+01	2.98E+01	1.06E+02
Age															
<01	889000	51	2.55E+01	2.16E-02	6.22E-01	6.22E-01	3.51E+00	8.79E+00	1.17E+01	2.22E+01	3.00E+01	4.47E+01	7.15E+01	1.06E+02	1.06E+02
01-02	1792000	105	1.34E+01	9.09E-03	2.44E+00	2.46E+00	3.50E+00	3.86E+00	6.73E+00	1.03E+01	1.55E+01	2.57E+01	3.09E+01	9.21E+01	9.21E+01
03-05	2543000	140	9.26E+00	3.30E-03	6.74E-01	6.74E-01	2.69E+00	3.48E+00	5.90E+00	8.51E+00	1.17E+01	1.58E+01	1.90E+01	3.32E+01	3.67E+01
06-11	5217000	284	7.08E+00	2.11E-03	0.00E+00	0.00E+00	1.71E+00	2.17E+00	3.60E+00	5.95E+00	9.32E+00	1.37E+01	1.58E+01	2.23E+01	3.65E+01
12-19	6720000	369	4.47E+00	1.18E-03	0.00E+00	0.00E+00	9.36E-01	1.34E+00	2.35E+00	3.72E+00	6.13E+00	8.50E+00	9.98E+00	1.41E+01	2.08E+01
20-39	21229000	1050	3.54E+00	6.30E-04	0.00E+00	2.19E-01	6.21E-01	8.79E-01	1.67E+00	2.80E+00	4.49E+00	7.11E+00	8.83E+00	1.34E+01	4.28E+01
40-69	19391000	1069	3.97E+00	7.88E-04	0.00E+00	1.61E-01	5.71E-01	9.92E-01	1.82E+00	3.17E+00	5.01E+00	7.67E+00	9.96E+00	1.81E+01	3.60E+01
70+	5497000	288	3.44E+00	1.11E-03	0.00E+00	1.67E-01	6.36E-01	1.02E+00	1.66E+00	2.82E+00	4.50E+00	6.21E+00	8.93E+00	1.25E+01	1.55E+01
Seasons															
Fall	13118000	437	4.79E+00	1.43E-03	0.00E+00	2.02E-01	6.30E-01	1.04E+00	2.07E+00	3.38E+00	5.89E+00	9.81E+00	1.26E+01	2.53E+01	7.55E+01
Spring	16420000	1417	4.92E+00	1.39E-03	0.00E+00	1.88E-01	7.39E-01	1.13E+00	1.99E+00	3.44E+00	5.78E+00	9.77E+00	1.39E+01	2.95E+01	8.90E+01
Summer	17467000	553	4.79E+00	1.18E-03	0.00E+00	0.00E+00	6.45E-01	1.01E+00	1.86E+00	3.41E+00	6.22E+00	1.01E+01	1.29E+01	2.28E+01	6.98E+01
Winter	16273000	949	4.95E+00	1.61E-03	0.00E+00	2.47E-01	7.70E-01	1.12E+00	2.10E+00	3.48E+00	5.79E+00	9.36E+00	1.29E+01	2.61E+01	1.06E+02
Urbanization															
Central City	16960000	706	5.40E+00	1.78E-03	0.00E+00	0.00E+00	6.17E-01	9.15E-01	1.80E+00	3.50E+00	6.65E+00	1.03E+01	1.41E+01	3.67E+01	1.06E+02
Nonmetropolitan	18903000	1185	5.08E+00	1.26E-03	0.00E+00	2.90E-01	8.79E-01	1.30E+00	2.27E+00	3.76E+00	6.17E+00	9.89E+00	1.30E+01	2.28E+01	8.90E+01
Surburban	27415000	1465	4.39E+00	8.12E-04	0.00E+00	1.88E-01	6.83E-01	1.00E+00	1.95E+00	3.17E+00	5.46E+00	8.96E+00	1.19E+01	2.22E+01	5.83E+01
Race															
Asian	654000	32	6.75E+00	6.57E-03	4.46E-01	4.46E-01	8.60E-01	1.21E+00	2.29E+00	5.63E+00	9.77E+00	1.43E+01	1.95E+01	1.95E+01	1.95E+01
Black	13676000	770	6.03E+00	1.98E-03	0.00E+00	0.00E+00	7.47E-01	1.26E+00	2.48E+00	4.24E+00	7.19E+00	1.15E+01	1.59E+01	3.60E+01	1.06E+02
Native American	162000	8	2.47E+01	7.24E-02	3.12E+00	3.12E+00	3.12E+00	3.12E+00	4.83E+00	1.06E+01	2.30E+01	9.21E+01	9.21E+01	9.21E+01	9.21E+01
Other/NA	1545000	86	5.13E+00	2.54E-03	4.78E-01	8.34E-01	1.23E+00	1.36E+00	2.52E+00	4.52E+00	8.22E+00	9.52E+00	9.83E+00	1.32E+01	1.39E+01
White	47241000	2460	4.43E+00	6.66E-04	0.00E+00	2.02E-01	6.70E-01	1.03E+00	1.86E+00	3.20E+00	5.46E+00	8.87E+00	1.20E+01	2.18E+01	7.15E+01
Response to Questionnaire															
Do you raise animals	2557000	160	4.74E+00	2.72E-03	0.00E+00	0.00E+00	5.14E-01	8.20E-01	2.23E+00	3.60E+00	6.28E+00	8.86E+00	1.42E+01	1.55E+01	4.47E+01
Do you farm?	2232000	130	4.83E+00	3.18E-03	0.00E+00	0.00E+00	2.46E-01	8.87E-01	2.28E+00	3.83E+00	5.95E+00	9.27E+00	1.39E+01	2.50E+01	3.68E+01

Table 2-90. Intake of Total Meats (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	34778000	1790	4.35E+00	9.85E-04	0.00E+00	2.14E-01	5.44E-01	9.12E-01	1.62E+00	2.93E+00	4.95E+00	8.43E+00	1.27E+01	2.84E+01	7.89E+01
Age															
< 01	568000	32	2.57E+01	2.47E-02	3.01E+00	3.01E+00	3.97E+00	4.15E+00	1.16E+01	2.30E+01	3.39E+01	5.42E+01	6.09E+01	7.89E+01	7.89E+01
01-02	1065000	58	1.01E+01	7.14E-03	6.81E-01	6.81E-01	1.28E+00	2.16E+00	4.23E+00	9.18E+00	1.41E+01	2.05E+01	2.31E+01	3.57E+01	3.57E+01
03-05	1789000	95	9.22E+00	6.19E-03	6.12E-01	6.12E-01	2.01E+00	3.75E+00	4.94E+00	7.51E+00	1.11E+01	1.55E+01	1.99E+01	5.91E+01	5.91E+01
06-11	3560000	200	5.79E+00	2.43E-03	2.19E-01	2.74E-01	1.28E+00	1.80E+00	2.93E+00	4.78E+00	7.27E+00	9.31E+00	1.44E+01	2.69E+01	3.23E+01
12-19	3780000	191	3.31E+00	1.10E-03	2.26E-01	3.01E-01	6.79E-01	1.11E+00	1.71E+00	2.87E+00	4.23E+00	5.83E+00	8.16E+00	9.97E+00	1.23E+01
20-39	10898000	545	2.94E+00	9.08E-04	0.00E+00	4.54E-02	4.39E-01	6.32E-01	1.23E+00	2.16E+00	3.74E+00	5.81E+00	8.07E+00	1.21E+01	3.51E+01
40-69	10095000	530	3.54E+00	1.43E-03	9.75E-02	2.15E-01	5.57E-01	9.00E-01	1.58E+00	2.53E+00	4.29E+00	6.31E+00	8.77E+00	1.84E+01	5.96E+01
70 +	3023000	139	2.81E+00	1.16E-03	1.64E-01	2.17E-01	4.59E-01	6.73E-01	1.32E+00	2.16E+00	4.02E+00	5.59E+00	7.14E+00	9.12E+00	9.12E+00
Seasons															
Fall	10581000	362	4.74E+00	2.09E-03	0.00E+00	4.54E-02	5.71E-01	9.24E-01	1.56E+00	2.81E+00	4.98E+00	9.82E+00	1.55E+01	3.23E+01	6.09E+01
Spring	7838000	666	3.94E+00	1.48E-03	0.00E+00	2.98E-01	5.81E-01	9.59E-01	1.64E+00	2.90E+00	4.86E+00	7.74E+00	9.89E+00	2.05E+01	5.88E+01
Summer	7485000	233	4.85E+00	2.38E-03	2.91E-01	3.59E-01	6.32E-01	1.05E+00	1.79E+00	3.28E+00	5.24E+00	8.66E+00	1.44E+01	3.51E+01	5.91E+01
Winter	8874000	529	3.81E+00	1.69E-03	1.20E-01	1.90E-01	4.91E-01	7.37E-01	1.47E+00	2.74E+00	4.58E+00	7.38E+00	1.03E+01	1.77E+01	7.89E+01
Urbanization															
Central City	11471000	468	3.98E+00	1.52E-03	4.54E-02	1.66E-01	4.76E-01	6.94E-01	1.46E+00	2.61E+00	4.49E+00	8.20E+00	1.21E+01	2.40E+01	5.96E+01
Nonmetropolitan	5931000	373	5.08E+00	3.04E-03	1.64E-01	2.14E-01	9.13E-01	1.23E+00	1.90E+00	3.49E+00	5.66E+00	8.90E+00	1.31E+01	5.07E+01	7.89E+01
Surburban	17376000	949	4.34E+00	1.34E-03	0.00E+00	2.23E-01	5.53E-01	9.40E-01	1.63E+00	2.94E+00	4.97E+00	8.38E+00	1.27E+01	3.00E+01	5.91E+01
Race															
Asian	577000	32	5.01E+00	3.83E-03	7.93E-01	7.93E-01	2.16E+00	2.16E+00	2.79E+00	4.40E+00	6.10E+00	9.79E+00	1.21E+01	1.31E+01	1.31E+01
Black	1697000	85	6.43E+00	7.09E-03	0.00E+00	0.00E+00	7.10E-01	1.06E+00	1.94E+00	4.04E+00	6.92E+00	1.33E+01	1.47E+01	5.96E+01	5.96E+01
Native American	1133000	72	6.05E+00	9.28E-03	2.15E-01	2.15E-01	1.11E+00	1.67E+00	2.74E+00	4.14E+00	6.10E+00	8.90E+00	1.02E+01	7.89E+01	7.89E+01
Other/NA	1166000	60	4.98E+00	3.22E-03	0.00E+00	2.91E-01	4.05E-01	1.18E+00	2.82E+00	3.99E+00	6.95E+00	8.66E+00	1.22E+01	1.62E+01	1.62E+01
White	30205000	1541	4.13E+00	9.86E-04	0.00E+00	2.14E-01	5.33E-01	8.37E-01	1.56E+00	2.72E+00	4.65E+00	8.18E+00	1.21E+01	2.77E+01	6.09E+01
Response to Questionnaire															
Do you raise animals	2574000	152	4.98E+00	3.91E-03	5.91E-01	6.25E-01	9.34E-01	1.10E+00	1.84E+00	3.33E+00	5.46E+00	9.27E+00	1.44E+01	3.23E+01	5.88E+01
Do you farm?	1596000	90	4.44E+00	3.58E-03	5.91E-01	7.41E-01	1.13E+00	1.63E+00	2.18E+00	3.13E+00	4.95E+00	8.77E+00	1.20E+01	1.77E+01	4.62E+01

Table 2-91. Intake of Total Dairy (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	185772000	9756	8.85E+00	1.04E-03	0.00E+00	1.94E-01	8.02E-01	1.35E+00	2.61E+00	4.80E+00	9.42E+00	1.90E+01	2.93E+01	6.76E+01	2.61E+02
Age															
<01	2814000	156	6.76E+01	2.99E-02	0.00E+00	4.67E+00	1.51E+01	1.85E+01	3.23E+01	5.47E+01	8.63E+01	1.33E+02	1.79E+02	2.61E+02	2.61E+02
01-02	5672000	320	3.67E+01	1.19E-02	1.23E+00	1.49E+00	9.07E+00	1.29E+01	1.90E+01	3.00E+01	4.70E+01	6.32E+01	8.40E+01	1.21E+02	2.34E+02
03-05	8066000	460	2.18E+01	4.61E-03	0.00E+00	2.99E+00	5.81E+00	8.08E+00	1.21E+01	1.89E+01	2.81E+01	4.12E+01	4.79E+01	6.21E+01	7.83E+01
06-11	16674000	936	1.48E+01	2.59E-03	0.00E+00	6.52E-01	2.74E+00	3.99E+00	7.38E+00	1.24E+01	1.95E+01	2.77E+01	3.46E+01	4.81E+01	1.83E+02
12-19	20216000	1073	8.15E+00	1.51E-03	0.00E+00	0.00E+00	1.19E+00	1.99E+00	3.53E+00	6.73E+00	1.09E+01	1.62E+01	2.08E+01	2.63E+01	7.25E+01
20-39	60781000	3028	5.03E+00	6.84E-04	0.00E+00	1.61E-01	7.36E-01	1.19E+00	2.14E+00	3.80E+00	6.23E+00	9.89E+00	1.29E+01	2.15E+01	9.68E+01
40-69	55955000	3003	4.91E+00	7.55E-04	0.00E+00	1.24E-01	6.04E-01	9.85E-01	2.06E+00	3.69E+00	6.01E+00	9.64E+00	1.32E+01	2.30E+01	9.31E+01
70+	15594000	780	5.05E+00	1.00E-03	0.00E+00	3.73E-01	9.33E-01	1.35E+00	2.72E+00	4.17E+00	6.12E+00	9.32E+00	1.24E+01	1.89E+01	3.68E+01
Season															
Fall	46983000	1555	9.23E+00	2.32E-03	0.00E+00	1.29E-01	7.06E-01	1.21E+00	2.47E+00	4.70E+00	9.52E+00	1.94E+01	3.18E+01	7.62E+01	2.61E+02
Spring	45636000	3920	8.75E+00	2.28E-03	0.00E+00	2.36E-01	7.65E-01	1.35E+00	2.53E+00	4.69E+00	9.06E+00	1.86E+01	2.77E+01	7.03E+01	2.55E+02
Summer	44900000	1405	8.65E+00	1.92E-03	0.00E+00	1.09E-01	8.79E-01	1.47E+00	2.66E+00	4.75E+00	9.81E+00	1.95E+01	2.69E+01	6.32E+01	2.12E+02
Winter	48253000	2876	8.76E+00	1.78E-03	0.00E+00	3.32E-01	8.57E-01	1.40E+00	2.80E+00	5.01E+00	9.45E+00	1.82E+01	3.02E+01	6.32E+01	1.70E+02
Urbanization															
Central City	55640000	2192	9.34E+00	2.18E-03	0.00E+00	1.24E-01	6.90E-01	1.27E+00	2.41E+00	4.57E+00	9.37E+00	2.01E+01	3.32E+01	8.17E+01	2.61E+02
Nonmetropolitan	44461000	2971	8.70E+00	1.98E-03	0.00E+00	2.79E-01	8.99E-01	1.46E+00	2.80E+00	4.92E+00	9.53E+00	1.82E+01	2.76E+01	5.61E+01	2.12E+02
Surburban	85611000	4591	8.62E+00	1.44E-03	0.00E+00	2.44E-01	8.15E-01	1.35E+00	2.67E+00	4.89E+00	9.35E+00	1.85E+01	2.78E+01	6.13E+01	2.55E+02
Race															
Asian	2349000	110	1.14E+01	1.64E-02	6.51E-02	6.51E-02	6.53E-01	1.25E+00	2.41E+00	4.40E+00	8.79E+00	2.33E+01	4.38E+01	1.92E+02	1.92E+02
Black	21172000	1091	6.68E+00	2.77E-03	0.00E+00	0.00E+00	4.01E-01	7.00E-01	1.66E+00	3.33E+00	6.65E+00	1.44E+01	2.17E+01	6.57E+01	2.09E+02
Native American	1445000	90	8.88E+00	1.42E-02	1.40E-01	2.52E-01	5.61E-01	9.50E-01	2.20E+00	3.28E+00	7.86E+00	1.98E+01	2.85E+01	1.14E+02	1.14E+02
Other/NA	4679000	231	1.26E+01	1.20E-02	0.00E+00	2.22E-01	1.36E+00	1.72E+00	2.67E+00	4.65E+00	1.56E+01	2.61E+01	4.30E+01	8.17E+01	2.61E+02
White	156067000	8232	9.00E+00	1.09E-03	0.00E+00	2.77E-01	9.15E-01	1.49E+00	2.78E+00	5.01E+00	9.74E+00	1.92E+01	2.94E+01	6.53E+01	2.55E+02
Response to Questionnaire															
Do you raise animals?	10075000	630	9.40E+00	4.24E-03	0.00E+00	2.21E-01	5.93E-01	1.23E+00	2.78E+00	5.37E+00	1.10E+01	2.07E+01	3.12E+01	5.73E+01	2.32E+02
Do you farm?	7329000	435	9.37E+00	4.57E-03	0.00E+00	2.95E-01	5.62E-01	1.12E+00	3.04E+00	5.27E+00	1.09E+01	2.14E+01	3.11E+01	5.73E+01	1.29E+02

Table 2-92. Intake of Total Dairy (g/kg-day) - Northeast Region

Populattion Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	40795000	2004	9.23E+00	2.64E-03	0.00E+00	2.89E-01	9.69E-01	1.54E+00	2.83E+00	4.93E+00	9.42E+00	1.86E+01	2.88E+01	8.17E+01	2.61E+02
Age															
< 01	545000	29	7.86E+01	8.49E-02	0.00E+00	0.00E+00	1.23E+01	1.51E+01	5.12E+01	6.36E+01	8.46E+01	1.43E+02	2.61E+02	2.61E+02	2.61E+02
01-02	1070000	56	4.49E+01	4.58E-02	1.23E+00	1.23E+00	9.85E+00	1.01E+01	1.94E+01	2.95E+01	5.16E+01	8.56E+01	2.09E+02	2.34E+02	2.34E+02
03-05	1490000	92	2.15E+01	1.05E-02	5.81E+00	5.81E+00	8.20E+00	8.91E+00	1.24E+01	1.75E+01	2.74E+01	3.88E+01	4.84E+01	6.26E+01	7.03E+01
06-11	3589000	185	1.48E+01	4.92E-03	5.72E-02	2.40E+00	4.40E+00	5.37E+00	7.82E+00	1.18E+01	2.03E+01	2.69E+01	3.27E+01	4.26E+01	5.01E+01
12-19	4445000	210	9.57E+00	4.34E-03	0.00E+00	4.27E-01	1.60E+00	2.46E+00	4.39E+00	7.50E+00	1.21E+01	1.71E+01	2.20E+01	6.53E+01	7.25E+01
20-39	12537000	594	5.47E+00	1.83E-03	0.00E+00	2.18E-01	8.79E-01	1.41E+00	2.35E+00	3.91E+00	6.57E+00	1.11E+01	1.44E+01	2.35E+01	8.17E+01
40-69	13310000	663	5.26E+00	2.13E-03	7.72E-03	2.81E-01	7.02E-01	1.19E+00	2.23E+00	3.74E+00	5.76E+00	9.47E+00	1.33E+01	3.30E+01	9.31E+01
70 +	3809000	175	5.05E+00	1.72E-03	2.44E-01	3.75E-01	9.81E-01	1.54E+00	3.02E+00	4.36E+00	5.98E+00	8.98E+00	1.10E+01	1.63E+01	3.13E+01
Season															
Fall	9195000	271	9.33E+00	6.67E-03	0.00E+00	2.64E-01	8.79E-01	1.26E+00	2.51E+00	4.53E+00	8.51E+00	1.80E+01	2.74E+01	8.46E+01	2.61E+02
Spring	10400000	796	9.41E+00	6.39E-03	0.00E+00	3.52E-01	8.41E-01	1.40E+00	2.50E+00	4.89E+00	8.91E+00	1.70E+01	3.10E+01	6.53E+01	2.55E+02
Summer	9417000	274	8.50E+00	3.86E-03	2.15E-01	2.21E-01	1.15E+00	1.81E+00	2.80E+00	4.71E+00	1.02E+01	1.83E+01	2.46E+01	8.36E+01	9.31E+01
Winter	11783000	653	9.57E+00	3.90E-03	0.00E+00	3.04E-01	1.20E+00	1.82E+00	3.33E+00	5.42E+00	1.02E+01	2.03E+01	3.13E+01	8.17E+01	1.43E+02
Urbanization															
Central City	9633000	331	9.77E+00	6.77E-03	1.48E-01	2.89E-01	1.02E+00	1.81E+00	2.67E+00	4.71E+00	8.74E+00	1.73E+01	2.93E+01	9.31E+01	2.61E+02
Nonmetropolitan	5521000	369	9.37E+00	4.51E-03	0.00E+00	3.52E-01	8.39E-01	1.54E+00	3.21E+00	5.29E+00	1.20E+01	2.06E+01	3.01E+01	5.16E+01	1.06E+02
Surburban	25641000	1304	9.00E+00	3.20E-03	0.00E+00	2.88E-01	9.49E-01	1.49E+00	2.80E+00	4.93E+00	8.91E+00	1.86E+01	2.78E+01	6.91E+01	2.55E+02
Race															
Asian	333000	13	1.56E+01	3.58E-02	9.41E-01	9.41E-01	2.02E+00	2.41E+00	4.40E+00	7.15E+00	1.03E+01	6.60E+01	6.60E+01	6,60E+01	6.60E+01
Black	3507000	131	8.39E+00	9.58E-03	1.48E-01	3.95E-01	7.43E-01	1.76E+00	2.85E+00	4.18E+00	8.08E+00	1.49E+01	1.80E+01	8.46E+01	2.09E+02
Native American	38000	4	5.46E+00	2.25E-02	2.82E+00	2.82E+00	2.82E+00	2.82E+00	2.82E+00	3.72E+00	3.75E+00	1.47E+01	1.47E+01	1.47E+01	1.47E+01
Other/NA	1084000	51	2.05E+01	4.62E-02	2.15E-01	2.15E-01	1.75E+00	1.79E+00	3.02E+00	7.06E+00	1.58E+01	3.19E+01	8.17E+01	2.61E+02	2.61E+02
White	35833000	1805	8.91E+00	2.45E-03	0.00E+00	2.88E-01	9.49E-01	1.51E+00	2.83E+00	4.91E+00	9.38E+00	1.87E+01	2.81E+01	6.80E+01	2.55E+02
Response to Questionnaire															
Do you raise animals?	1178000	70	9.77E+00	1.13E-02	2.18E-01	2.18E-01	2.21E-01	4.37E-01	1.34E+00	5.21E+00	1.20E+01	2.22E+01	3.69E+01	6.35E+01	7.03E+01
Do you farm?	830000	42	7.77E+00	8.86E-03	3.32E-01	3.32E-01	6.71E-01	1.17E+00	2.50E+00	4.37E+00	1.11E+01	1.84E+01	2.52E+01	3.69E+01	3.69E+01

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Table 2-93. Intake of Total Dairy (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	45817000	2567	1.02E+01	2.39E-03	0.00E+00	2.54E-01	8.35E-01	1.47E+00	3.03E+00	5.50E+00	1.12E+01	2.20E+01	3.42E+01	8.14E+01	2.12E+02
Age															
< 01	812000	44	7.30E+01	5.76E-02	6.07E+00	6.07E+00	1.90E+01	2.29E+01	3.80E+01	5.66E+01	1.14E+02	1.53E+02	1.92E+02	2.12E+02	2.12E+02
01-02	1730000	100	3.87E+01	1.60E-02	4.61E+00	8.84E+00	1.19E+01	1.37E+01	1.92E+01	3.42E+01	4.90E+01	7.26E+01	8.63E+01	1.85E+02	1.18E+02
03-05	2251000	133	2.32E+01	7.99E-03	2.99E+00	4.26E+00	6.38E+00	9.06E+00	1.39E+01	2.16E+01	2.97E+01	4.24E+01	4.76E+01	4.79E+01	6.49E+01
06-11	4263000	263	1.66E+01	5.60E-03	1.12E+00	2.08E+00	2.90E+00	4.49E+00	8.72E+00	1.48E+01	2.02E+01	2.94E+01	3.73E+01	6.30E+01	1.83E+02
12-19	5387000	305	8.95E+00	2.68E-03	0.00E+00	0.00E+00	1.16E+00	2.11E+00	3.91E+00	7.86E+00	1.25E+01	1.76E+01	2.18E+01	2.63E+01	3.58E+01
20-39	15374000	814	5.74E+00	1.59E-03	0.00E+00	3.28E-01	8.45E-01	1.25E+00	2.70E+00	4.41E+00	7.08E+00	1.07E+01	1.46E+01	2.32E+01	9.68E+01
40-69	12835000	732	5.23E+00	1.51E-03	0.00E+00	9.42E-02	5.44E-01	9.96E-01	2.15E+00	3.94E+00	6.85E+00	1.07E+01	1.37E+01	2.04E+01	7.66E+01
70 +	3165000	176	4.92E+00	2.03E-03	6.58E-02	2.95E-01	6.56E-01	1.75E+00	2.82E+60	4.05E+00	6.09E+00	9.18E+00	1.02E+01	1.76E+01	2.75E+01
Season															
Fall	14242000	490	9.93E+00	3.97E-03	0.00E+00	2.54E-01	7.32E-01	1.24E+00	2.67E+00	5.47E+00	1.22E+01	2.31E+01	3.33E+01	5.74E+01	1.92E+02
Spring	10601000	1023	1.01E+01	4.65E-03	0.00E+00	2.44E-01	9.11E-01	1.50E+00	3.01E+00	5.51E+00	1.05E+01	2.12E+01	3.28E+01	8.46E+01	1.79E+02
Summer	10013000	331	1.18E+01	6.14E-03	0.00E+00	1.72E-01	7.10E-01	1.61E+00	3.06E+00	5.51E+00	1.26E+01	2.56E+01	4.46E+01	1.03E+02	2.12E+02
Winter	10961000	723	9.35E+00	3.77E-03	2.20E-02	6.12E-01	1.07E+00	1.69E+00	3.22E+00	5.64E+00	1.04E+01	1.91E+01	3.22E+01	5.74E+01	1.70E+02
Urbanization															
Central City	17227000	673	1.11E+01	4.29E-03	0.00E+00	2.77E-01	6.64E-01	1.36E+00	2.75E+00	5.50E+00	1.17E+01	2.52E+01	3.99E+01	9.01E+01	1.92E+02
Nonmetropolitan	14067000	1044	1.03E+01	4.27E-03	6.58E-02	4.46E-01	1.19E+00	1.93E+00	3.39E+00	5.66E+00	1.11E+01	2.17E+01	3.29E+01	7.59E+01	2.12E+02
Surburban	14523000	850	9.10E+00	3.10E-03	0.00E+00	1.49E-01	6.48E-01	1.24E+00	3.03E+00	5.34E+00	1.07E+01	1.97E+01	2.87E+01	5.66E+01	1.30E+02
Race															
Asian	785000	33	2.00E+01	4.39E-02	4.33E-01	4.33E-01	4.33E-01	3.92E+00	4.27E+00	6.11E+00	2.23E+01	3.99E+01	8.83E+01	1.92E+02	1.92E+02
Black	2764000	124	1.12E+01	1.26E-02	0.00E+00	0.00E+00	6.12E-01	8.12E-01	1.91E+00	3.42E+00	1.01E+01	2.48E+01	5.01E+01	1.21E+02	1.21E+02
Native American	116000	6	7.70E+00	6.28E-03	2.79E+00	2.79E+00	2.79E+00	5.43E+00	5.43E+00	7.86E+00	8.64E+00	1.08E+01	1.08E+01	1.08E+01	1.08E+01
Other/NA	858000	33	1.46E+01	1.59E-02	2.22E-01	2.22E-01	6.85E-01	1.06E+00	3.40E+00	6.62E+00	2.27E+01	4.40E+01	4.49E+01	4.98E+01	4.98E+01
White	41294000	2371	9.90E+00	2.23E-03	0.00E+00	2.77E-01	9.48E-01	1.54E+00	3.06E+00	5.51E+00	1.10E+01	2.09E+01	3.33E+01	7.44E+01	2.12E+02
Response to Questionnaire															
Do you raise animals?	3742000	247	1.02E+01	6.09E-03	1.24E-01	3.26E-01	6.85E-01	1.25E+00	3.17E+00	5.81E+00	1.37E+01	2.32E+01	3.29E+01	4.79E+01	1.18E+02
Do you farm?	2681000	173	1.08E+01	8.03E-03	1.24E-01	3.26E-01	5.62E-01	1.25E+00	3.32E+00	6.06E+00	1.48E+01	2.17E+01	3.74E+01	5.56E+01	1.18E+02

Table 2-94. Intake of Total Dairy (g/kg-day) - South Region

Populattion Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	63389000	3355	7.10E+00	1.33E-03	0.00E+00	9.40E-02	6.71E-01	1.08E+00	2.19E+00	4.13E+00	7.68E+00	1.46E+01	2.34E+01	5.47E+01	1.40E+02
Age															
< 01	889000	51	5.01E+01	3.61E-02	4.67E+00	4.67E+00	9.12E+00	1.69E+01	1.93E+01	3.75E+01	7.71E+01	1.04E+02	1.10E+02	1.40E+02	1.40E+02
01-02	1792000	105	3.07E+01	1.54E-02	1.49E+00	1.49E+00	7.07E+00	1.12E+01	1.59E+01	2.56E+01	4.20E+01	5.35E+01	7.62E+01	1.14E+02	1.21E+02
03-05	2506000	139	1.91E+01	8.27E-03	2.61E-01	3.53E+00	5.57E+00	7.46E+00	1.04E+01	1.52E+01	2.62E+01	3.66E+01	5.24E+01	5.86E+01	6.20E+01
06-11	5180000	283	1.16E+01	4.14E-03	0.00E+00	0.00E+00	2.40E+00	3.04E+00	5.31E+00	9.02E+00	1.50E+01	2.34E+01	2.89E+01	4.93E+01	5.72E+01
12-19	6625000	365	6.15E+00	1.83E-03	0.00E+00	0.00E+00	8.35E-01	1.60E+00	2.77E+00	4.98E+00	8.14E+00	1.14E+01	1.58E+01	2.12E+01	4.12E+01
20-39	21457000	1058	4.03E+00	7.49E-04	0.00E+00	1.00E-01	6.28E-01	9.49E-01	1.82E+00	3.14E+00	5.12E+00	8.27E+00	1.09E+01	1.57E+01	4.79E+01
40-69	19392000	1066	4.42E+00	1.00E-03	0.00E+00	5.19E-02	5.08E-01	7.81E-01	1.77E+00	3.49E+00	5.47E+00	8.94E+00	1.14E+01	2.25E+01	4.50E+01
70 +	5548000	288	5.30E+00	1.99E-03	0.00E+00	4.17E-01	9.10E-01	1.15E+00	2.60E+00	4.35E+00	6.57E+00	9.84E+00	1.43E+01	3.14E+01	3.68E+01
Season															
Fall	13065000	435	6.92E+00	2.70E-03	5.19E-02	1.29E-01	5.71E-01	1.04E+00	2.13E+00	4.15E+00	7.64E+00	1.44E+01	2.11E+01	5.74E+01	7.83E+01
Spring	16502000	1416	6.96E+00	2.74E-03	0.00E+00	4.43E-02	6.15E-01	1.03E+00	2.18E+00	4.06E+00	7.30E+00	1.42E+01	2.24E+01	5.53E+01	1.37E+02
Summer	17504000	554	6.82E+00	2.17E-03	0.00E+00	0.00E+00	6.79E-01	1.14E+00	2.28E+00	4.09E+00	7.96E+00	1.52E+01	2.34E+01	4.42E+01	1.40E+02
Winter	16318000	950	7.68E+00	2.95E-03	0.00E+00	2.72E-01	7.57E-01	1.19E+00	2.19E+00	4.31E+00	7.99E+00	1.51E+01	2.73E+01	5.72E+01	1.14E+02
Urbanization															
Central City	16868000	703	7.04E+00	2.85E-03	0.00E+00	0.00E+00	5.05E-01	8.68E-01	1.91E+00	3.74E+00	7.14E+00	1.49E+01	2.61E+01	6.94E+01	1.14E+02
Nonmetropolitan	18838000	1179	6.98E+00	2.26E-03	0.00E+00	1.94E-01	7.40E-01	1.17E+00	2.28E+00	4.18E+00	7.75E+00	1.47E+01	2.34E+01	4.50E+01	1.40E+02
Surburban	27683000	1473	7.22E+00	1.96E-03	0.00E+00	1.76E-01	7.08E-01	1.20E+00	2.39E+00	4.33E+00	7.99E+00	1.44E+01	2.23E+01	5.31E+01	1.37E+02
Race															
Asian	654000	32	4.64E+00	5.40E-03	6.53E-01	6.53E-01	1.06E+00	1.25E+00	2.13E+00	3.14E+00	5.35E+00	8.91E+00	1.48E+01	2.31E+01	2.31E+01
Black	13192000	750	5.27E+00	2.21E-03	0.00E+00	0.00E+00	3.47E-01	6.58E-01	1.35E+00	2.98E+00	5.85E+00	1.14E+01	1.83E+01	4.60E+01	1.10E+02
Native American	162000	8	2.94E+01	9.06E-02	4.10E+00	4.10E+00	4.10E+00	4.10E+00	4.49E+00	2.10E+01	2.85E+01	1.14E+02	1.14E+02	1.14E+02	1.14E+02
Other/NA	1545000	86	6.31E+00	6.61E-03	4.44E-01	6.71E-01	1.36E+00	1.71E+00	2.14E+00	3.37E+00	5.09E+00	1.30E+01	2.61E+01	4.24E+01	4.70E+01
White	47836000	2479	7.59E+00	1.58E-03	0.00E+00	1.37E-01	7.88E-01	1.35E+00	2.47E+00	4.44E+00	8.21E+00	1.52E+01	2.52E+01	5.61E+01	1.40E+02
Response to Questionnaire															
Do you raise animals?	2581000	161	7.27E+00	6.73E-03	0.00E+00	0.00E+00	4.58E-01	8.59E-01	2.25E+00	4.34E+00	8.59E+00	1.49E+01	2.24E+01	6.57E+01	1.14E+02
Do you farm?	2232000	130	6.60E+00	7.09E-03	0.00E+00	0.00E+00	4.17E-01	6.06E-01	2.19E+00	3.95E+00	6.75E+00	1.13E+01	2.43E+01	8.47E+01	8.47E+01

Table 2-95. Intake of Total Dairy (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	35711000	1828	9.77E+00	2.42E-03	0.00E+00	2.82E-01	9.44E-01	1.51E+00	2.70E+00	5.16E+00	1.10E+01	2.26E+01	3.30E+01	6.36E+01	2.32E+02
Age															
<01	568000	32	7.54E+01	6.35E-02	2.42E+01	2.42E+01	2.42E+01	2.92E+01	3.26E+01	5.47E+01	1.13E+02	1.34E+02	1.40E+02	2.32E+02	2.32E+02
01-02	1000000	59	3.52E+01	1.88E-02	6.03E+00	6.03E+00	1.05E+01	1.52E+01	2.12E+01	3.08E+01	4.33E+01	5.93E+01	7.52E+01	1.00E+02	1.00E+02
03-05	1789000	95	2.44E+01	1.03E-02	2.02E-01	2.02E-01	4.53E+00	8.42E+00	1.71E+01	2.22E+01	3.01E+01	4.21E+01	5.61E+01	6.46E+01	6.46E+01
06-11	3612000	204	1.73E+01	5.59E-03	4.71E-01	6.55E-01	2.78E+00	4.72E+00	9.00E+00	1.55E+01	2.29E+01	3.30E+01	3.97E+01	4.65E+01	5.44E+01
12-19	3759000	193	8.87E+00	3.35E-03	2.61E-01	4.31E-01	1.67E+00	2.20E+00	3.89E+00	7.43E+00	1.18E+01	1.80E+01	2.25E+01	2.95E+01	4.05E+01
20-39	11413000	562	5.47E+00	1.54E-03	0.00E+00	0.00E+00	9.68E-01	1.40E+00	2.29E+00	4.32E+00	6.88E+00	1.05E+01	1.36E+01	2.30E+01	7.61E+01
40-69	10418000	542	4.97E+00	1.42E-03	0.00E+00	3.34E-01	7.65E-01	1.18E+00	2.12E+00	3.60E+00	6.55E+00	9.33E+00	1.42E+01	2.37E+01	4.10E+01
70 +	3072000	141	4.73E+00	2.00E-03	4.99E-01	4.99E-01	9.33E-01	1.33E+00	2.56E+00	3.80E+00	5.53E+00	9.86E+00	1.25E+01	1.45E+01	2.54E+01
Season															
Fall	10481000	359	1.11E+01	5.68E-03	0.00E+00	7.60E-02	9.68E-01	1.42E+00	2.59E+00	4.78E+00	1.19E+01	2.38E+01	3.79E+01	1.25E+02	1.48E+02
Spring	8133000	685	9.84E+00	5.34E-03	0.00E+00	5.71E-01	1.24E+00	1.79E+00	2.89E+00	5.49E+00	1.09E+01	2.19E+01	2.83E+01	5.40E+01	2.32E+02
Summer	7906000	244	8.91E+00	3.48E-03	0.00E+00	5.05E-01	1.13E+00	1.70E+00	2.82E+00	5.43E+00	1.10E+01	2.20E+01	2.92E+01	4.65E+01	5.74E+01
Winter	9191000	540	8.94E+00	3.81E-03	1.05E-01	2.71E-01	6.60E-01	1.27E+00	2.59E+00	4.96E+00	9.96E+00	2.26E+01	3.18E+01	5.61E+01	1.29E+02
Urbanization															
Central City	11912000	485	9.67E+00	4.22E-03	1.61E-01	3.87E-01	1.05E+00	1.51E+00	2.63E+00	4.93E+00	1.01E+01	2.25E+01	3.30E+01	6.46E+01	1.89E+02
Nonmetropolitan	6035000	379	9.73E+00	6.59E-03	0.00E+00	3.83E-01	8.87E-01	1.70E+00	3.03E+00	5.24E+00	1.04E+01	1.96E+01	2.64E+01	1.01E+02	1.48E+02
Surburban	17764000	964	9.85E+00	3.25E-03	0.00E+00	1.62E-01	9.44E-01	1.46E+00	2.68E+00	5.24E+00	1.19E+01	2.32E+01	3.41E+01	5.73E+01	2.32E+02
Race															
Asian	577000	32	4.87E+00	9.11E-03	6.51E-02	6.51E-02	7.60E-02	2.02E-01	1.64E+00	2.82E+00	4.36E+00	1.10E+01	2.24E+01	4.10E+01	4.10E+01
Black	1709000	86	6.72E+00	7.28E-03	0.00E+00	0.00E+00	2.71E-01	3.97E-01	1.65E+00	3.03E+00	8.97E+00	1.78E+01	2.37E+01	6.32E+01	6.32E+01
Native American	1129000	72	6.16E+00	9.88E-03	1.40E-01	2.52E-01	5.52E-01	6.61E-01	1.79E+00	2.93E+00	6.56E+00	1.43E+01	1.98E+01	7.11E+01	7.11E+01
Other/NA	1192000	61	1.23E+01	1.18E-02	0.00E+00	1.13E+00	1.27E+00	1.78E+00	2.55E+00	6.60E+00	2.03E+01	2.35E+01	4.30E+01	5.74E+01	5.74E+01
White	31104000	1577	1.01E+01	2.67E-03	0.00E+00	4.99E-01	1.06E+00	1.61E+00	2.90E+00	5.44E+00	1.13E+01	2.30E+01	3.31E+01	6.46E+01	2.32E+02
Response to Questionnaire															
Do you raise animals?	2574000	152	1.01E+01	1.10E-02	4.31E-01	6.48E-01	1.37E+00	1.57E+00	3.05E+00	5.97E+00	9.83E+00	1.81E+01	3.62E+01	5.73E+01	2.32E+02
Do you farm?	1586000	90	1.17E+01	1.13E-02	4.78E-01	6.37E-01	1.01E+00	1.32E+00	4.18E+00	7.77E+00	1.53E+01	2.78E+01	3.08E+01	5.73E+01	1.29E+02

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Table 2-96. Intake of Total Beef (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	163247000	8659	1.95E+00	1.98E-04	0.00E+00	1.09E-01	2.58E-01	3.82E-01	6.96E-01	1.29E+00	2.31E+00	3.95E+00	5.63E+00	1.15E+01	6.46E+01
Age															
<01	2599000	144	9.76E+00	5.39E-03	0.00E+00	3.00E-01	1.01E+00	1.75E+00	3.90E+00	7.59E+00	1.29E+01	1.93E+01	2.58E+01	4.31E+01	6.13E+01
01-02	5366000	302	4.77E+00	2.39E-03	1.99E-01	3.61E-01	6.99E-01	1.08E+00	1.90E+00	3.48E+00	5.80E+00	9.28E+00	1.26E+01	2.28E+01	6.46E+01
03-05	7359000	420	3.50E+00	1.14E-03	0.00E+00	2.99E-01	6.30E-01	9.74E-01	1.67E+00	2.76E+00	4.51E+00	6.63E+00	8.97E+00	1.29E+01	3.08E+01
06-11	15660000	876	2.45E+00	5.31E-04	0.00E+00	1.79E-01	4.43E-01	6.01E-01	1.07E+00	1.85E+00	3.12E+00	4.91E+00	6.83E+00	1.14E+01	1.79E+01
12-19	18822000	992	1.67E+00	3.14E-04	0.00E+00	7.94E-02	2.43E-01	3.93E-01	6.95E-01	1.35E+00	2.14E+00	3.25E+00	4.48E+00	6.47E+00	9.22E+00
20-39	53123000	2685	1.47E+00	2.02E-04	0.00E+00	9.16E-02	2.31E-01	3.37E-01	5.84E-01	1.08E+00	1.86E+00	2.97E+00	3.91E+00	7.01E+00	2.04E+01
40-69	48291000	2623	1.56E+00	2.26E-04	0.00E+00	1.26E-01	2.49E-01	3.55E-01	6.37E-01	1.13E+00	1.97E+00	3.19E+00	4.20E+00	7.05E+00	2.56E+01
70+	12027000	617	1.54E+00	4.47E-04	0.00E+00	9.45E-02	1.87E-01	2.86E-01	5.80E-01	1.05E+00	2.02E+00	3.17E+00	4.22E+00	8.65E+00	1.36E+01
Seasons															
Fall	41572000	1386	1.85E+00	3.65E-04	0.00E+00	1.09E-01	2.56E-01	3.79E-01	6.78E-01	1.20E+00	2.19E+00	3.80E+00	5.36E+00	1.11E+01	3.59E+01
Spring	39497000	3451	1.97E+00	4.27E-04	0.00E+00	1.13E-01	2.66E-01	3.80E-01	7.05E-01	1.31E+00	2.26E+00	3.92E+00	5.80E+00	1.23E+01	6.13E+01
Summer	39353000	1245	2.17E+00	4.21E-04	0.00E+00	4.97E-02	2.65E-01	3.96E-01	7.29E-01	1.41E+00	2.60E+00	4.57E+00	6.64E+00	1.33E+01	3.10E+01
Winter	42825000	2577	1.83E+00	3.71E-04	0.00E+00	1.25E-01	2.47E-01	3.68E-01	6.72E-01	1.28E+00	2.27E+00	3.66E+00	4.87E+00	9.40E+00	6.46E+01
Urbanization															
Central City	45527000	1955	2.22E+00	4.75E-04	0.00E+00	1.09E-01	2.45E-01	3.62E-01	7.17E-01	1.36E+00	2.60E+00	4.64E+00	6.81E+00	1.37E+01	6.46E+01
Nonmetropolitan	39594000	2673	2.03E+00	3.66E-04	0.00E+00	1.37E-01	2.89E-01	4.16E-01	7.79E-01	1.41E+00	2.46E+00	4.11E+00	5.55E+00	1.08E+01	4.31E+01
Surburban	76766000	4121	1.75E+00	2.38E-04	0.00E+00	1.09E-01	2.56E-01	3.76E-01	6.44E-01	1.18E+00	2.08E+00	3.53E+00	4.89E+00	1.02E+01	3.75E+01
Race															
Asian	2094000	92	2.70E+00	1.98E-03	1.64E-02	1.64E-02	2.33E-01	6.11E-01	1.17E+00	2.36E+00	3.30E+00	4.88E+00	6.44E+00	1.47E+01	2.98E+01
Black	18877000	967	2.42E+00	6.77E-04	0.00E+00	0.00E+00	2.86E-01	4.11E-01	8.40E-01	1.51E+00	2.89E+00	5.36E+00	8.03E+00	1.36E+01	4.31E+01
Native American	1449000	90	3.76E+00	7.24E-03	1.26E-01	1.42E-01	2.03E-01	3.28E-01	1.13E+00	1.79E+00	3.13E+00	6.03E+00	1.00E+01	6.46E+01	6.46E+01
Other/NA	4439000	216	2.37E+00	1.69E-03	0.00E+00	2.41E-01	3.27E-01	4.72E-01	8.65E-01	1.52E+00	2.80E+00	4.65E+00	5.60E+00	1.17E+01	3.59E+01
White	136328000	7294	1.84E+00	1.92E-04	0.00E+00	1.15E-01	2.55E-01	3.74E-01	6.73E-01	1.25E+00	2.20E+00	3.76E+00	5.31E+00	1.03E+01	6.13E+01
Regions															
Midwest	41138000	2336	2.05E+00	3.82E-04	0.00E+00	1.12E-01	2.93E-01	4.04E-01	7.48E-01	1.37E+00	2.43E+00	4.12E+00	6.26E+00	1.22E+01	6.13E+01
Northeast	35386000	1740	1.72E+00	3.83E-04	0.00E+00	1.43E-01	2.40E-01	3.47E-01	6.10E-01	1.12E+00	2.00E+00	3.32E+00	5.04E+00	1.02E+01	3.59E+01
South	56221000	2999	2.07E+00	3.68E-04	0.00E+00	1.02E-01	2.52E-01	3.93E-01	7.53E-01	1.39E+00	2.48E+00	4.26E+00	5.91E+00	1.22E+01	6.46E+01
West	30442000	1584	1.86E+00	4.43E-04	0.00E+00	8.45E-02	2.27E-01	3.55E-01	6.63E-01	1.22E+00	2.29E+00	3.69E+00	4.95E+00	1.14E+01	3.25E+01
Response to Questionnaire															
Do you raise animals	9426000	602	2.18E+00	7.03E-04	7.24E-02	1.36E-01	3.20E-01	4.42E-01	8.94E-01	1.55E+00	2.73E+00	4.60E+00	6.36E+00	1.14E+01	2.09E+01
Do you farm?	6923000	415	2.23E+00	9.14E-04	0.00E+00	1.09E-01	2.74E-01	3.94E-01	8.30E-01	1.52E+00	2.70E+00	4.43E+00	6.96E+00	1.33E+01	1.94E+01

Table 2-97. Intake of Total Game (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12881000	757	7.35E-01	2.84E-04	0.00E+00	0.00E+00	1.01E-01	1.54E-01	2.74E-01	5.06E-01	8.84E-01	1.54E+00	2.84E+00	3.73E+00	2.27E+01
Age															
<01	228000	15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	375000	25	1.75E+00	3.96E-03	1.30E-01	1.30E-01	3.51E-01	4.44E-01	6.75E-01	1.00E+00	1.98E+00	3.73E+00	3.73E+00	1.45E+01	1.45E+01
03-05	494000	31	1.88E+00	4.74E-03	3.04E-01	3.04E-01	3.73E-01	3.77E-01	5.56E-01	1.19E+00	1.99E+00	3.05E+00	3.95E+00	2.27E+01	2.27E+01
06-11	1345000	82	7.47E-01	5.19E-04	3.86E-02	4.72E-02	1.20E-01	2.02E-01	3.55E-01	5.82E-01	8.92E-01	1.72E+00	1.95E+00	2.85E+00	2.90E+00
12-19	1690000	98	7.54E-01	4.95E-04	9.14E-02	1.00E-01	1.80E-01	2.10E-01	2.95E-01	5.55E-01	9.57E-01	1.57E+00	1.99E+00	3.13E+00	3.13E+00
20-39	3806000	217	7.26E-01	3.47E-04	3.57E-02	1.09E-01	1.52E-01	1.96E-01	3.10E-01	5.30E-01	8.84E-01	1.52E+00	1.82E+00	3.95E+00	5.88E+00
40-69	3790000	232	5.75E-01	2.79E-04	0.00E+00	5.19E-02	1.11E-01	1.41E-01	2.20E-01	4.19E-01	7.35E-01	1.16E+00	1.58E+00	3.19E+00	3.61E+00
70 +	1085000	57	6.11E-01	5.16E-04	3.44E-02	3.44E-02	7.27E-02	1.28E-01	2.33E-01	5.08E-01	7.40E-01	1.28E+00	1.89E+00	3.34E+00	3.34E+00
Seasons															
Fall	3286000	120	7.90E-01	4.12E-04	0.00E+00	0.00E+00	1.17E-01	1.58E-01	2.72E-01	5.55E-01	1.02E+00	1.78E+00	2.38E+00	3.19E+00	3.95E+00
Spring	3025000	290	6.27E-01	3.41E-04	0.00E+00	0.00E+00	1.00E-01	1.30E-01	2.52E-01	4.56E-01	8.52E-01	1.34E+00	1.69E+00	2.60E+00	5.70E+00
Summer	2879000	93	5.99E-01	3.27E-04	0.00E+00	0.00E+00	7.27E-02	1.36E-01	2.32E-01	4.80E-01	8.16E-01	1.06E+00	1.41E+00	2.94E+00	3.73E+00
Winter	3691000	254	8.81E-01	8.30E-04	0.00E+00	0.00E+00	1.24E-01	1.93E-01	3.34E-01	5.37E-01	9.44E-01	1.63E+00	2.15E+00	4.59E+00	2.27E+01
Urbanization															
Central City	3367000	145	7.07E-01	2.90E-04	0.00E+00	0.00E+00	0.00E+00	1.26E-01	2.94E-01	5.83E-01	9.26E-01	1.56E+00	1.63E+00	2.60E+00	2.65E+00
Nonmetropolitan	4711000	347	7.81E-01	6.74E-04	0.00E+00	0.00E+00	9.46E-02	1.51E-01	2.65E-01	4.61E-01	8.50E-01	1.50E+00	2.38E+00	4.99E+00	2.27E+01
Surburban	4803000	265	7.10E-01	3.15E-04	0.00E+00	6.90E-02	1.27E-01	1.60E-01	2.76E-01	4.98E-01	8.33E-01	1.57E+00	2.12E+00	3.13E+00	5.70E+00
Race															
Asian	192000	12	5.66E-01	1.49E-03	0.00E+00	0.00E+00	0.00E+00	2.05E-01	2.72E-01	3.50E-01	5.02E-01	1.78E+00	2.60E+00	2.60E+00	2.60E+00
Black	2694000	154	6.97E-01	3.76E-04	0.00E+00	0.00E+00	6.40E-02	1.58E-01	2.77E-01	5.05E-01	9.21E-01	1.57E+00	1.63E+00	2.65E+00	5.70E+00
Other/NA	584000	24	6.78E-01	4.20E-04	1.54E-01	1.54E-01	2.76E-01	3.30E-01	5.06E-01	6.75E-01	8.16E-01	8.67E-01	8.86E-01	2.48E+00	2.48E+00
White	9411000	567	7.53E-01	3.71E-04	0.00E+00	0.00E+00	1.01E-01	1.48E-01	2.65E-01	4.96E-01	8.92E-01	1.57E+00	2.19E+00	3.95E+00	2.27E+01
Regions															
Midwest	3148000	213	7.22E-01	4.08E-04	0.00E+00	0.00E+00	7.27E-02	1.60E-01	2.84E-01	5.02E-01	8.92E-01	1.51E+00	2.20E+00	3.95E+00	4.59E+00
Northeast	2505000	131	8.75E-01	1.18E-03	6.90E-02	1.01E-01	1.24E-01	1.77E-01	2.68E-01	4.76E-01	9.24E-01	1.63E+00	2.50E+00	5.88E+00	2.27E+01
South	5460000	324	7.04E-01	2.83E-04	0.00E+00	0.00E+00	5.19E-02	1.48E-01	2.92E-01	5.05E-01	8.88E-01	1.52E+00	1.99E+00	3.19E+00	5.70E+00
West	1768000	89	6.57E-01	3.83E-04	3.44E-02	7.69E-02	1.39E-01	1.74E-01	2.31E-01	5.68E-01	8.67E-01	1.52E+00	1.78E+00	2.12E+00	2.39E+00
Response to Questionnaire															
Do you hunt?	3702000	230	9.05E-01	4.16E-04	0.00E+00	0.00E+00	5.96E-02	1.88E-01	3.42E-01	6.40E-01	1.14E+00	2.04E+00	2.58E+00	3.19E+00	4.59E+00

Table 2-98. Intake of Total Pork (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	133902000	7206	1.25E+00	1.45E-04	0.00E+00	3.60E-02	1.10E-01	1.82E-01	3.69E-01	7.87E-01	1.53E+00	2.67E+00	3.75E+00	8.23E+00	3.79E+01
Age															
< 01	2090000	117	4.97E+00	3.48E-03	1.08E-01	1.08E-01	4.11E-01	6.94E-01	1.73E+00	3.39E+00	6.99E+00	1.05E+01	1.18E+01	2.23E+01	3.79E+01
01-02	4042000	232	2.87E+00	1.36E-03	1.04E-01	1.67E-01	3.21E-01	4.39E-01	1.01E+00	2.13E+00	3.50E+00	6.69E+00	8.29E+00	1.48E+01	1.58E+01
03-05	5936000	345	2.47E+00	1.06E-03	6.88E-02	1.23E-01	2.70E-01	3.94E-01	8.66E-01	1.71E+00	3.00E+00	5.38E+00	7.50E+00	1.24E+01	1.81E+01
06-11	13155000	741	1.74E+00	4.36E-04	2.94E-02	6.21E-02	1.70E-01	2.82E-01	5.96E-01	1.33E+00	2.29E+00	3.73E+00	4.75E+00	7.00E+00	1.37E+01
12-19	16074000	851	1.11E+00	3.48E-04	0.00E+00	2.72E-02	1.26E-01	1.88E-01	3.76E-01	8.00E-01	1.41E+00	2.39E+00	2.98E+00	5.36E+00	3.57E+01
20-39	42143000	2175	9.21E-01	1.63E-04	0.00E+00	3.10E-02	9.41E-02	1.46E-01	3.19E-01	6.24E-01	1.17E+00	1.92E+00	2.66E+00	4.83E+00	1.69E+01
40-69	40115000	2217	1.04E+00	2.18E-04	0.00E+00	3.09E-02	1.00E-01	1.67E-01	3.32E-01	7.01E-01	1.27E+00	2.09E+00	3.07E+00	5.63E+00	3.09E+01
70 +	10347000	528	9.53E-01	2.77E-04	0.00E+00	4.28E-02	1.09E-01	1.84E-01	3.21E-01	7.30E-01	1.30E+00	1.95E+00	2.52E+00	4.34E+00	9.94E+00
Seasons															
Fall	35251000	1167	1.23E+00	3.17E-04	0.00E+00	2.51E-02	9.38E-02	1.46E-01	3.23E-01	7.19E-01	1.42E+00	2.61E+00	3.78E+00	9.57E+00	2.23E+01
Spring	31965000	2866	1.33E+00	3.42E-04	0.00E+00	3.89E-02	1.19E-01	1.89E-01	3.69E-01	7.94E-01	1.56E+00	2.96E+00	4.18E+00	8.62E+00	3.79E+01
Summer	30725000	974	1.25E+00	2.64E-04	0.00E+00	4.83E-02	1.24E-01	1.93E-01	4.13E-01	8.37E-01	1.56E+00	2.47E+00	3.39E+00	8.06E+00	1.54E+01
Winter	35961000	2199	1.21E+00	2.29E-04	0.00E+00	4.40E-02	1.22E-01	1.86E-01	3.72E-01	7.97E-01	1.57E+00	2.68E+00	3.63E+00	6.90E+00	1.96E+01
Urbanization															
Central City	38139000	1524	1.46E+00	3.55E-04	0.00E+00	3.23E-02	1.08E-01	1.76E-01	3.82E-01	8.53E-01	1.67E+00	3.19E+00	4.80E+00	1.05E+01	3.79E+01
Nonmetropolitan	33923000	2302	1.21E+00	2.27E-04	0.00E+00	4.98E-02	1.32E-01	2.10E-01	3.89E-01	8.26E-01	1.58E+00	2.65E+00	3.53E+00	6.76E+00	1.48E+01
Surburban	61840000	3380	1.14E+00	1.87E-04	0.00E+00	3.36E-02	1.04E-01	1.70E-01	3.53E-01	7.26E-01	1.40E+00	2.48E+00	3.43E+00	6.63E+00	3.57E+01
Race															
Asian	1843000	87	1.97E+00	2.27E-03	6.41E-02	6.41E-02	1.24E-01	2.10E-01	5.23E-01	1.18E+00	2.23E+00	3.91E+00	4.70E+00	1.69E+01	3.29E+01
Black	17306000	900	2.01E+00	5.99E-04	0.00E+00	5.17E-02	1.51E-01	2.90E-01	5.71E-01	1.21E+00	2.39E+00	4.48E+00	7.00E+00	1.21E+01	2.13E+01
Native American	1199000	76	1.59E+00	1.35E-03	7.37E-02	7.37E-02	1.27E-01	2.29E-01	6.11E-01	1.08E+00	2.30E+00	3.25E+00	4.00E+00	7.99E+00	7.99E+00
Other/NA	3693000	177	1.60E+00	1.29E-03	2.28E-02	5.02E-02	1.82E-01	2.80E-01	5.61E-01	1.12E+00	1.73E+00	3.19E+00	4.82E+00	2.23E+01	2.23E+01
White	109861000	5966	1.11E+00	1.33E-04	0.00E+00	3.36E-02	1.04E-01	1.70E-01	3.42E-01	7.19E-01	1.37E+00	2.34E+00	3.28E+00	6.44E+00	3.79E+01
Regions															
Midwest	33443000	1960	1.29E+00	3.08E-04	0.00E+00	2.34E-02	1.27E-01	1.97E-01	3.72E-01	7.90E-01	1.54E+00	2.73E+00	3.86E+00	8.82E+00	3.79E+01
Northeast	28782000	1450	1.24E+00	3.44E-04	0.00E+00	3.60E-02	1.09E-01	1.67E-01	3.54E-01	7.36E-01	1.52E+00	2.67E+00	3.80E+00	7.48E+00	3.57E+01
South	47887000	2557	1.34E+00	2.26E-04	0.00E+00	4.67E-02	1.26E-01	2.14E-01	4.29E-01	9.01E-01	1.64E+00	2.95E+00	4.15E+00	8.06E+00	1.96E+01
West	23790000	1239	1.03E+00	3.14E-04	1.13E-02	4.90E-02	8.74E-02	1.31E-01	2.85E-01	6.20E-01	1.24E+00	2.23E+00	2.93E+00	7.25E+00	2.13E+01
Response to Questionnaire															
Do you raise animals?	7248000	469	1.10E+00	3.71E-04	0.00E+00	2.73E-02	1.26E-01	2.08E-01	3.86E-01	7.83E-01	1.46E+00	2.51E+00	3.19E+00	4.31E+00	8.30E+00
Do you farm?	5804000	347	1.13E+00	4.37E-04	0.00E+00	4.52E-02	1.08E-01	2.08E-01	3.99E-01	8.43E-01	1.46E+00	2.57E+00	3.28E+00	4.83E+00	8.01E+00

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Table 2-99. Intake of Total Poultry (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	140984000	7411	1.87E+00	2.18E-04	0.00E+00	5.80E-02	1.97E-01	3.14E-01	5.95E-01	1.14E+00	2.21E+00	3.87E+00	5.52E+00	1.22E+01	5.41E+01
Age															
< 01	2142000	117	9.85E+00	6.74E-03	1.56E-01	1.84E-01	8.09E-01	1.51E+00	3.86E+00	7.21E+00	1.24E+01	1.82E+01	2.88E+01	4.51E+01	5.41E+01
01-02	4740000	268	4.39E+00	1.88E-03	8.64E-02	1.02E-01	6.21E-01	9.21E-01	1.94E+00	3.25E+00	5.23E+00	8.91E+00	1.25E+01	2.00E+01	2.93E+01
03-05	6816000	378	3.51E+00	1.35E-03	0.00E+00	1.08E-01	4.15E-01	7.22E-01	1.55E+00	2.60E+00	4.05E+00	6.94E+00	1.05E+01	1.96E+01	2.57E+01
06-11	13395000	742	2.48E+00	6.89E-04	0.00E+00	4.80E-02	3.67E-01	5.60E-01	1.02E+00	1.82E+00	3.07E+00	5.08E+00	6.91E+00	1.16E+01	2.52E+01
12-19	15954000	833	1.30E+00	3.06E-04	0.00E+00	2.55E-02	1.88E-01	2.85E-01	5.70E-01	9.60E-01	1.59E+00	2.72E+00	3.75E+00	6.48E+00	1.51E+01
20-39	44799000	2254	1.30E+00	2.12E-04	0.00E+00	4.17E-02	1.65E-01	2.65E-01	4.74E-01	8.79E-01	1.60E+00	2.78E+00	3.76E+00	7.94E+00	1.44E+01
40-69	42354000	2279	1.58E+00	2.67E-04	0.00E+00	6.85E-02	1.96E-01	3.16E-01	5.62E-01	1.07E+00	2.00E+00	3.42E+00	4.49E+00	9.25E+00	1.86E+01
70 +	10784000	540	1.68E+00	5.08E-04	0.00E+00	1.16E-01	2.00E-01	3.76E-01	6.77E-01	1.19E+00	2.27E+00	3.43E+00	4.18E+00	8.32E+00	3.29E+01
Seasons															
Fall	35268000	1167	2.20E+00	5.79E-04	0.00E+00	3.20E-02	1.46E-01	2.70E-01	5.47E-01	1.14E+00	2.50E+00	4.96E+00	7.63E+00	1.63E+01	5.41E+01
Spring	34532000	2987	1.70E+00	3.45E-04	0.00E+00	6.12E-02	1.92E-01	3.08E-01	5.67E-01	1.10E+00	2.10E+00	3.66E+00	5.10E+00	1.01E+01	3.29E+01
Summer	35000000	1095	1.82E+00	4.09E-04	0.00E+00	4.96E-02	2.54E-01	3.73E-01	6.58E-01	1.18E+00	2.23E+00	3.61E+00	4.83E+00	1.21E+01	4.42E+01
Winter	36184000	2162	1.75E+00	3.64E-04	0.00E+00	9.05E-02	2.15E-01	3.18E-01	6.00E-01	1.13E+00	2.12E+00	3.75E+00	4.86E+00	1.12E+01	4.05E+01
Urbanization															
Central City	44187000	1735	2.21E+00	4.56E-04	0.00E+00	3.95E-02	1.66E-01	3.00E-01	6.18E-01	1.30E+00	2.66E+00	4.63E+00	7.27E+00	1.37E+01	4.51E+01
Nonmetropolitan	31355000	2136	1.81E+00	4.30E-04	0.00E+00	1.00E-01	2.66E-01	3.90E-01	7.18E-01	1.20E+00	2.13E+00	3.59E+00	5.09E+00	1.13E+01	5.41E+01
Surburban	65382000	3538	1.66E+00	2.85E-04	0.00E+00	6.62E-02	1.93E-01	2.94E-01	5.44E-01	1.02E+00	1.98E+00	3.50E+00	4.84E+00	1.03E+01	4.42E+01
Race															
Asian	2075000	100	4.06E+00	4.30E-03	8.62E-02	2.61E-01	5.07E-01	5.38E-01	1.11E+00	2.49E+00	4.45E+00	8.56E+00	1.25E+01	4.51E+01	4.51E+01
Black	19510000	1006	2.35E+00	7.00E-04	0.00E+00	0.00E+00	3.16E-01	4.69E-01	7.85E-01	1.53E+00	2.84E+00	4.81E+00	7.27E+00	1.28E+01	5.41E+01
Native American	847000	49	2.04E+00	3.53E-03	1.36E-01	1.36E-01	2.99E-01	3.10E-01	6.40E-01	1.02E+00	1.52E+00	3.77E+00	1.22E+01	1.51E+01	1.51E+01
Other/NA	3985000	200	2.10E+00	1.56E-03	4.87E-02	1.03E-01	2.38E-01	4.05E-01	7.41E-01	1.29E+00	2.40E+00	4.28E+00	6.14E+00	1.15E+01	2.88E+01
White	114507000	6054	1.74E+00	2.16E-04	0.00E+00	5.92E-02	1.86E-01	2.95E-01	5.62E-01	1.08E+00	2.08E+00	3.65E+00	5.05E+00	1.18E+01	4.42E+01
Regions															
Midwest	32296000	1803	1.81E+00	4.45E-04	0.00E+00	8.15E-02	2.05E-01	3.22E-01	5.70E-01	1.09E+00	2.18E+00	3.86E+00	5.55E+00	1.16E+01	4.51E+01
Northeast	32832000	1580	1.97E+00	4.38E-04	0.00E+00	8.94E-02	2.25E-01	3.30E-01	6.13E-01	1.15E+00	2.42E+00	4.19E+00	6.51E+00	1.22E+01	2.93E+01
South	49210000	2646	1.79E+00	3.35E-04	0.00E+00	4.96E-02	1.99E-01	3.19E-01	6.20E-01	1.16E+00	2.18E+00	3.61E+00	4.86E+00	1.16E+01	5.41E+01
West	26586000	1380	1.96E+00	6.03E-04	0.00E+00	4.17E-02	1.38E-01	2.81E-01	5.86E-01	1.15E+00	2.10E+00	3.94E+00	5.99E+00	1.87E+01	4.42E+01
Response to Questionnaire															
Do you raise animals?	7193000	452	1.939835565	0.001053764	0.018535941	0.044334233	0.209821183	0.381406054	0.62671761	1.162771215	2.1888289	4.00301119	5.332660774	16.95665794	28.2285125
Do you farm?	5316000	308	1.70E+00	8.21E-04	0.00E+00	3.91E-02	3.36E-01	4.35E-01	6.80E-01	1.13E+00	2.00E+00	3.88E+00	5.01E+00	1.17E+01	1.70E+01

Table 2-100. Intake of Total Eggs (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	163502000	8660	6.83E-01	6.83E-05	0.00E+00	3.07E-02	7.93E-02	1.24E-01	2.43E-01	4.45E-01	8.12E-01	1.45E+00	2.01E+00	3.97E+00	1.88E+01
Age															
< 01	2537000	139	3.50E+00	2.23E-03	1.42E-01	1.42E-01	3.75E-01	6.41E-01	1.27E+00	2.62E+00	4.20E+00	6.97E+00	9.62E+00	1.88E+01	1.88E+01
01-02	5381000	301	1.88E+00	5.59E-04	7.77E-02	1.69E-01	3.74E-01	5.12E-01	9.91E-01	1.65E+00	2.40E+00	3.56E+00	4.83E+00	6.21E+00	9.16E+00
03-05	7629000	434	1.41E+00	3.52E-04	0.00E+00	1.90E-01	3.13E-01	3.90E-01	6.86E-01	1.19E+00	1.88E+00	2.78E+00	3.46E+00	4.71E+00	5.95E+00
06-11	15507000	867	9.11E-01	1.73E-04	0.00E+00	7.42E-02	1.42E-01	2.30E-01	4.42E-01	7.45E-01	1.21E+00	1.76E+00	2.20E+00	3.25E+00	6.09E+00
12-19	18624000	990	5.36E-01	9.98E-05	0.00E+00	0.00E+00	7.32E-02	1.17E-01	2.51E-01	4.31E-01	7.08E-01	1.04E+00	1.39E+00	2.08E+00	3.94E+00
20-39	52017000	2631	4.78E-01	6.71E-05	0.00E+00	3.15E-02	6.60E-02	1.08E-01	2.06E-01	3.60E-01	6.16E-01	9.13E-01	1.25E+00	2.14E+00	9.18E+00
40-69	48381000	2619	5.23E-01	7.66E-05	0.00E+00	2.50E-02	6.86E-02	1.05E-01	2.10E-01	3.70E-01	6.46E-01	1.10E+00	1.46E+00	2.88E+00	5.71E+00
70 +	13426000	679	5.71E-01	1.32E-04	0.00E+00	5.80E-02	1.03E-01	1.52E-01	2.50E-01	4.17E-01	7.51E-01	1.15E+00	1.43E+00	2.24E+00	6.80E+00
Seasons															
Fall	42290000	1407	7.00E-01	1.59E-04	0.00E+00	3.85E-02	8.36E-02	1.36E-01	2.50E-01	4.40E-01	8.13E-01	1.46E+00	2.04E+00	3.79E+00	1.88E+01
Spring	38908000	3412	6.91E-01	1.39E-04	0.00E+00	2.66E-02	8.64E-02	1.33E-01	2.55E-01	4.53E-01	8.01E-01	1.40E+00	2.01E+00	4.13E+00	1.74E+01
Summer	39445000	1243	6.84E-01	1.29E-04	0.00E+00	1.61E-02	7.38E-02	1.16E-01	2.33E-01	4.48E-01	8.24E-01	1.51E+00	2.04E+00	4.16E+00	9.62E+00
Winter	42859000	2598	6.59E-01	1.15E-04	0.00E+00	3.50E-02	7.73E-02	1.23E-01	2.35E-01	4.35E-01	8.06E-01	1.39E+00	1.91E+00	3.85E+00	1.03E+01
Urbanization															
Central City	48746000	1925	7.82E-01	1.66E-04	0.00E+00	3.29E-02	8.13E-02	1.20E-01	2.47E-01	4.72E-01	8.66E-01	1.66E+00	2.52E+00	5.04E+00	1.88E+01
Nonmetropolitan	39556000	2659	6.89E-01	1.27E-04	0.00E+00	2.66E-02	8.69E-02	1.32E-01	2.60E-01	4.66E-01	8.26E-01	1.45E+00	1.92E+00	3.87E+00	1.74E+01
Surburban	75140000	4074	6.17E-01	7.63E-05	0.00E+00	3.16E-02	7.60E-02	1.25E-01	2.36E-01	4.18E-01	7.60E-01	1.32E+00	1.82E+00	3.36E+00	1.35E+01
Race															
Asian	2152000	103	1.34E+00	1.65E-03	3.17E-02	3.17E-02	1.63E-01	2.35E-01	4.41E-01	6.94E-01	1.32E+00	2.75E+00	4.08E+00	1.86E+01	1.86E+01
Black	20304000	1045	7.62E-01	2.19E-04	0.00E+00	0.00E+00	6.49E-02	1.06E-01	2.38E-01	4.71E-01	8.84E-01	1.62E+00	2.53E+00	4.78E+00	1.03E+01
Native American	1449000	90	9.21E-01	1.07E-03	4.17E-02	4.17E-02	1.10E-01	1.93E-01	3.72E-01	6.01E-01	8.47E-01	1.59E+00	3.28E+00	7.42E+00	7.42E+00
Other/NA	4395000	220	8.43E-01	8.77E-04	0.00E+00	4.44E-02	7.84E-02	1.08E-01	2.24E-01	4.33E-01	8.09E-01	1.52E+00	2.50E+00	4.95E+00	1.88E+01
White	135142000	7200	6.53E-01	6.35E-05	0.00E+00	3.23E-02	8.20E-02	1.28E-01	2.42E-01	4.36E-01	7.93E-01	1.40E+00	1.91E+00	3.63E+00	1.74E+01
Regions															
Midwest	39288000	2232	7.17E-01	1.55E-04	0.00E+00	3.15E-02	7.48E-02	1.19E-01	2.36E-01	4.39E-01	8.34E-01	1.59E+00	2.14E+00	3.97E+00	1.86E+01
Northeast	36704000	1802	6.56E-01	1.53E-04	0.00E+00	3.16E-02	7.70E-02	1.15E-01	2.39E-01	4.16E-01	7.81E-01	1.40E+00	2.01E+00	3.87E+00	1.88E+01
South	56284000	3007	6.63E-01	1.04E-04	0.00E+00	2.27E-02	7.95E-02	1.25E-01	2.40E-01	4.52E-01	7.93E-01	1.34E+00	1.89E+00	3.95E+00	1.74E+01
West	31166000	1617	7.11E-01	1.50E-04	0.00E+00	4.00E-02	9.08E-02	1.48E-01	2.65E-01	4.83E-01	8.51E-01	1.50E+00	2.00E+00	4.38E+00	1.35E+01
Response to Questionnaire															
Do you raise animals?	9260000	586	6.87E-01	2.58E-04	0.00E+00	4.15E-02	7.19E-02	1.48E-01	2.72E-01	4.84E-01	8.18E-01	1.50E+00	1.93E+00	3.04E+00	1.35E+01
Do you farm?	6403000	380	7.12E-01	2.82E-04	0.00E+00	2.07E-02	7.71E-02	1.47E-01	2.75E-01	5.40E-01	8.42E-01	1.60E+00	2.02E+00	2.80E+00	9.16E+00

2.4.1.3. Relevant Intake Studies

U.S. EPA - Office of Radiation Programs - The U.S. EPA Office of Radiation Programs (ORP) has also used the USDA 1977-1978 NFCS to estimate daily food intake. ORP uses food consumption data to assess human intake of radionuclides in foods (U.S. EPA, 1984d; 1984e). The 1977-1978 NFCS data have been reorganized by ORP, and food items have been classified according to the characteristics of radionuclide transport. The mean dietary intake of food sub classes (milk, other dairy products, eggs, beef, pork, poultry, and other meat) per capita grouped by age for the U.S. population are presented in Table 2-101. The mean daily intake rates of meat, poultry, and dairy products for the U.S. population grouped by regions are presented in Table 2-102. Because this study was based on the USDA NFCS, the limitations and advantages associated with the USDA-NFCS data also apply to these data set.

U.S. EPA - Office of Science and Technology - The U.S. EPA Office of Science and Technology (OST) within the Office of Water (formerly the Office of Water Regulations and Standards) used data from the FDA revision of the Total Diet Study Food Lists and Diets (Pennington, 1983) to calculate food intake rates. OST uses these consumption data in its risk assessment model for land application of municipal sludge. The FDA data used are based on the combined results of the USDA 1977-1978 NFCS and the second National Health and Nutrition Examination Survey (NHANES II), 1976-1980 (U.S. EPA, 1989). Because food items are listed as prepared complex foods in the FDA Total Diet Study, each item was broken down into its component parts so that the amount of raw commodities consumed could be determined. Table 2-103 presents intake rates for meat, poultry, and dairy products for various age groups. Estimated lifetime ingestion rates derived by U.S. EPA (1989) are also presented in Table 2-103. Note that these are per capita intake rates tabulated as grams dry weight/day. Therefore, these rates differ from those in the previous tables because Pao et al. (1982) and U.S. EPA (1984d, 1984e) report intake rates on an as consumed basis.

The EPA-OST analysis provides intake rates for additional food categories and estimates of lifetime average daily intake on a per capita basis. In contrast to the other analyses of USDA NFCS data, this study reports the data in terms of dry weight intake rates. Thus, conversion is not required when contaminants are provided on a dry weight basis.

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Table 2-101. Mean and Standard Error for the Dietary Intake of Food Sub Classes per Capita by Age (grams "as consumed")

Age	Fresh Cows' Milk	Other Dairy Products	Eggs	Beef	Pork	Poultry	Other Meat
All Ages	253.5 ± 4.9	55.1 ± 1.2	26.9 ± 0.5	87.6 ± 1.1	28.2 ± 0.6	31.3 ± 0.8	25.1 ± 0.4
<1	272.0 ± 31.9	296.7 ± 7.6	4.9 ± 3.2	18.4 ± 7.4	5.8 ± 3.6	18.4 ± 4.9	2.6 ± 2.8
1-4	337.3 ± 15.6	41.0 ± 3.7	19.8 ± 1.6	42.2 ± 3.7	13.6 ± 1.8	19.0 ± 2.4	17.6 ± 1.4
5-9	446.2 ± 13.1	47.3 ± 3.1	17.0 ± 1.3	63.4 ± 3.1	18.2 ± 1.5	24.7 ± 2.0	22.3 ± 1.2
10-14	456.0 ± 12.3	53.3 ± 2.9	19.3 ± 1.2	81.9 ± 2.9	22.2 ± 1.4	30.0 ± 1.9	26.1 ± 1.1
15-19	404.8 ± 12.9	52.9 ± 3.1	24.8 ± 1.3	99.5 ± 3.0	29.5 ± 1.5	33.0 ± 2.0	27.6 ± 1.1
20-24	264.3 ± 16.4	44.2 ± 4.0	28.3 ± 1.7	103.7 ± 3.9	29.6 ± 1.9	33.0 ± 2.6	28.8 ± 1.5
25-29	217.6 ± 17.2	51.5 ± 4.1	27.9 ± 1.7	103.8 ± 4.0	31.8 ± 2.0	33.8 ± 2.7	28.9 ± 1.5
30-39	182.9 ± 13.5	53.8 ± 3.2	30.1 ± 1.4	105.8 ± 3.2	33.0 ± 1.5	34.0 ± 2.1	28.4 ± 1.2
40-59	169.1 ± 10.5	52.0 ± 2.5	31.1 ± 1.0	99.0 ± 2.5	33.5 ± 1.2	33.8 ± 1.6	27.4 ± 0.9
≥60	192.4 ± 11.8	55.9 ± 2.8	28.7 ± 1.2	74.3 ± 2.8	27.5 ± 1.3	31.5 ± 1.8	21.1 ± 1.0

Source: U.S. EPA, 1984d.

Table 2-102. Mean and Standard Error for the Daily Intake of Food Class and Sub Class Region (grams "as consumed")

	US Population	Northeast	North Central	South	West
Dairy Products (Total)	308.6 ± 5.3	318.6 ± 10.4	336.1 ± 10.0	253.6 ± 8.4	348.1 ± 12.3
Fresh Cows Milk	253.5 ± 4.9	256.1 ± 9.7	279.7 ± 9.4	211.0 ± 7.8	283.5 ± 11.5
Other	55.1 ± 1.2	62.5 ± 2.3	56.5 ± 2.2	42.6 ± 1.9	64.6 ± 2.7
Eggs	26.9 ± 0.5	23.8 ± 1.0	23.5 ± 0.9	31.0 ± 0.8	29.1 ± 1.2
Meats (Total)	172.2 ± 1.6	169.9 ± 3.3	176.9 ± 3.1	171.9 ± 2.6	168.6 ± 3.9
Beef and Veal	87.6 ± 1.1	82.3 ± 2.3	92.9 ± 2.2	84.0 ± 1.8	92.9 ± 2.7
Pork	28.2 ± 0.6	28.8 ± 1.1	29.6 ± 1.1	30.1 ± 0.9	22.1 ± 1.3
Poultry	31.3 ± 0.8	31.7 ± 1.5	26.6 ± 1.4	36.5 ± 1.2	28.9 ± 1.8
Other	25.1 ± 0.4	27.1 ± 0.9	27.8 ± 0.8	21.3 ± 0.7	24.7 ± 1.0

Source: U.S. EPA, 1984e.

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Table 2-103. Consumption of Meat, Poultry, and Dairy Products for Different Age Groups (averaged across sex), and Estimated Lifetime Average Intakes for 70 Kg Adult Citizens Calculated from the FDA Diet Data.

Product	Baby (0-1 Yrs)	Toddler (1-6 Yrs)	Child (6-14 Yrs)	Teen (14-20 Yrs)	Adult (20-45 Yrs)	Old (45-70 Yrs)	Estimated Lifetime[a]
			g - dry weight/day				
Beef	3.99	9.66	15.64	21.62	23.28	18.34	19.25
Beef Liver	0.17	0.24	0.30	0.36	1.08	1.2	0.89
Lamb	0.14	0.08	0.06	0.05	0.30	0.21	0.20
Pork	1.34	4.29	6.57	8.86	10.27	9.94	9.05
Poultry	2.27	3.76	5.39	7.03	7.64	6.87	6.70
Dairy	40.70	32.94	38.23	43.52	27.52	22.41	28.87
Eggs	3.27	6.91	7.22	7.52	8.35	9.33	8.32
Beef Fat	2.45	6.48	11.34	16.22	20.40	14.07	15.50
Beef Liver Fat	0.05	0.07	0.08	0.10	0.29	0.33	0.25
Lamb Fat	0.14	0.08	0.07	0.06	0.31	0.22	0.21
Dairy Fat	38.99	16.48	20.46	24.43	18.97	14.51	18.13
Pork Fat	2.01	8.19	10.47	12.75	14.48	13.04	12.73
Poultry Fat	1.10	0.83	1.12	1.41	1.54	1.31	1.34

[a] The estimated lifetime dietary intakes were estimated by:

$$\text{Estimated lifetime} = \frac{CR(0.1) + 5yrs * CR(1\text{-}5) + 8\ yrs * CR(6\text{-}13) + 6\ yrs * CR(14\text{-}19) + 25\ yrs * CR(20\text{-}44) + 25\ yrs * CR(45\text{-}70)}{70\ \text{years}}$$

where CR = the consumption rate for a specific age group.

Source: U.S. EPA, 1989.

USDA, 1993 - Food Consumption, Prices, and Expenditures, 1970-92 - The USDA's Economic Research Service (ERS) calculates the amount of food available for human consumption in the United States annually. Supply and utilization balance sheets were generated. These were based on the flow of food items from production to end uses. Total available supply was estimated as the sum of production (i.e., some products were measured at the farm level or during processing), starting inventories, and imports (USDA, 1993). The availability of food for human use commonly termed as "food disappearance" was determined by subtracting exported foods, products used in industries, farm inputs (seed and feed) and end-of-the year inventories from the total available supply (USDA, 1993). USDA (1993) calculated the per capita food consumption by dividing the total food disappearance by the total U.S. population.

USDA (1993) estimated per capita consumption data for meat, poultry, and dairy products from 1970-1992 (1992 data are preliminary). In this section, the 1991 values, which are the most recent final data, are presented. The meat consumption data were reported as carcass weight, retail weight equivalent, and boneless weight equivalent. The poultry consumption data were reported as ready-to-cook (RTC) weight, retail weight, and boneless weight (USDA, 1993). USDA (1993) defined beef carcass weight as the chilled hanging carcass, which includes the kidney and attached internal fat (kidney, pelvic, and heart fat), excludes the skin, head feet, and unattached internal organs. The pork carcass weight includes the skin and feet but excludes the kidney and attached internal fat. Retail weight equivalents assumes all food were sold through retail foodstores, therefore, conversion factors (Table 2-104) were used to correct carcass or RTC to retail weight to account for trimming, shrinkage, or loss of meat and chicken at these retail outlets (USDA, 1993). Boneless equivalent values for meat (pork, veal, beef) and poultry excludes all bones but includes separable fat sold on retail cuts of red meat. Pet food was considered as an apparent source of food disappearance for poultry in boneless weight estimates, while pet food was excluded for beef, veal, and pork (USDA, 1993). Table 2-104 presents per capita consumption in 1991 for red meat (carcass weight, retail equivalent, and boneless trimmed equivalent) and poultry (RTC, retail equivalent for chicken only, and boneless trimmed equivalent). Per capita consumption estimates based on boneless weights appear to be the most appropriate data for use in exposure assessments, because boneless

Table [illegible]. Per Capita Consumption of Meat and Poultry in 1991

Food Item	Per Capita Consumption Carcass[b] Weight (g/day)[f]	Per Capita Consumption RTC[c] (g/day)[f]	Per Capita Consumption Retail Cut Equivalent[d] (g/day)[f]	Per Capita Consumption Boneless Trimmed Equivalent[e] (g/day)[f]
<u>Red Meat</u>				
Beef	118.3	---	82.8	78.4
Veal	1.5	---	1.2	0.99
Pork	8.0	---	62.1	58.3
Lamb and Mutton	2.0	---	1.7	1.2
Total[g]	201.7	---	147.9	139.1
<u>Poultry</u>				
Young Chicken	---	---	78.3	---
Other Chicken	---	---	1.7	---
Chicken	---	91.3	---	54.5[h,i]
Turkey	---	22.2	---	17.5[h]
Total[g]	---	109.2	77.0	72.1

a Includes processed meats and poultry in a fresh basis; excludes shipments to U.S. territories; uses U.S. total population, July 1, and does not include residents of the U.S. territories.

b Beef-Carcass-Weight is the weight of the chilled hanging carcass, which includes the kidney and attached internal fat [kidney, pelvic, and heart fat (kph)] but not head, feet, and unattached internal organs. Definitions of carcass weight for other red meats differ slightly.

c RTC - ready-to-cook poultry weight is the entire dressed bird which includes bones, skin, fat, liver, heart, gizzard, and neck.

d Retail equivalents in 1991 were converted from carcass weight by multiplying by a factor of 0.7, 0.83, 0.89, and 0.776 for beef, veal, lamb, and pork, respectively; 0.877 was the factor used each for young chicken and other chicken.

e Boneless equivalent for red meat derived from carcass weight in 1991 by using conversion factors of 0.663, 0.685, 0.658 and 0.729 for beef, veal, lamb, and pork, respectively; 0.597, 0.597 and 0.790 were the factors used for young chicken, other chicken, and turkey.

f Original data was presented in lbs for one year, conversion to g/day were obtained by multiplying by a factor of 453.6 and dividing by 365 days.

g Computed from unrounded data.

h Includes skin, neck, and giblets.

i Excludes amount of RTC chicken going to pet food as well as some water leakage that occurs when chicken is cut-up before packaging.

Source: USDA, 1993.

meats are more representative of what people would actually consume. Table 2-105 presents per capita consumption in 1991 for dairy products including eggs, milk, cheese, cream and sour cream.

One of the limitations of this study is that disappearance data do not account for losses from the food supply from waste spoilage or foods fed to pets. Thus, intake rates based on these data may overestimate daily consumption because they are based on the total quantity of marketable commodity utilized. It should also be noted that per capita estimates based on food disappearance is not a direct measure of actual consumption or quantity ingested, instead the data are used as indicators of changes in usage over time (USDA, 1993). An advantage of this study is that it provides per capita consumption rates for meat, poultry, and dairy products which are representative of long-term intake because disappearance data are generated annually. Daily per capita intake rates are generated by dividing annual consumption by 365 days/year.

National Live Stock and Meat Board, 1993 - Eating in America Today: A Dietary Pattern and Intake Report - The National Live Stock and Meat Board (1993) assessed the nutritional value of the current American diet based on two factors: (1) the composition of the foods consumed and (2) the amount of food consumed. Data used in this study were provided by MRCA Information Services, Inc. through MRCA's Nutritional Marketing Information Division. The survey conducted by MRCA consisted of 2,000 household panel of over 4,700 individuals. The survey sample was selected to be representative of the U.S. population. Information obtained from the survey by MRCA's Menu Census included food and beverage consumption over a period of 14 consecutive days. The head of the household recorded daily food and beverage consumption in-home and away-from-home in diaries for each household member. The survey period was from July 1, 1990 through June 30, 1991. This ensured that all days carried equal weights and provided a seasonally balanced data set. In addition, nutrient intake data calculated by the MCRA's Nutrient Intake Database (NID) (based on the 1987-88 USDA Food Intake Study) and information on food attitudes were also collected.

Table 2-106 presents the adult daily mean intake of meat and poultry grouped by region and gender. The adult population was defined as consumers ages 19 and above (National Live Stock and Meat Board, 1993). Beef consumption was high in all regions compared to other meats and poultry (Table 2-106). The average daily consumption of meat in the U.S. was 114.2

Table 2-105. Per Capita Consumption (g/day) of Dairy Products in 1991[a]

Food Item	Per Capita Consumption (g/day)[j]
Eggs	
Farm Weight[b,e]	37.8
Retail Weight[c,e]	37.3
Fluid Milk and Cream	289.7
Plain Whole Milk	105.3
Lowfat Plain Milk (2%)	98.1
Lowfat Plain Milk (1%)	25.8
Skim Plain Milk	29.7
Whole Flavored Milk and Drink	3.4
Lowfat Flavored Milk and Drink	8.5
Buttermilk (lowfat and skim)	4.2
Half and Half Cream	3.9
Light Cream	0.4
Heavy Cream	1.6
Sour Cream	3.2
Eggnog	0.5
Butter	5.2
Cheese	
American	
Cheddar	11.2
Other[d]	2.5
Italian	
Provolone	0.8
Romano	0.2
Parmesan	0.6
Mozzarella	9.0
Ricotta	1.0
Other	0.07
Miscellaneous	
Swiss[f]	1.5

Table 2-105. Per Capita Consumption (g) of Dairy Products in 1991[a] (continued)

Food Item	Per Capita Consumption (g/day)[j]
Brick	0.07
Muenster	0.5
Cream	1.9
Neufchatel	0.3
Blue[g]	0.2
Other	1.2
Processed Products	
Cheese	6.1
Foods and spreads	4.7
Cheese Content	8.5
Consumed as Natural	22.6
Cottage Cheese (lowfat)	1.6
Frozen Dairy Products	
Ice Cream	20.3
Ice Milk	9.2
Sherbet	1.5
Other Frozen Products[h]	5.3
Total[c]	36.4
Evaporated and Condensed Milk[i]	
Canned Whole Milk	2.6
Bulk Whole Milk	1.4
Bulk and Canned Skim Milk	6.2
Total[c]	10.2
Dry Milk Products[i]	
Dry Whole Milk	0.5
Nonfat Dry Milk	3.2
Dry Buttermilk	0.3
Total[c]	4.0
Dried Whey	4.5

Table 2-105. Per Capita Consumption (g) of Dairy Products in 1991[a] (continued)

Food Item	Per Capita Consumption (g/day)[j]
All Diary Products	
USDA Donations	17.1
Commercial Sales	685.2
Total	702.4

a All per capita consumption figures use U.S. total populations, except fluid milk and cream data, which are based on U.S. residential population. For eggs, excludes shipments to U.S. territories, uses U.S. total population, July 1, which does not include U.S. territories.
b A dozen eggs converted at 1.57 pounds.
c The factor for converting farm weight to retail weight was 0.97 in 1960 and was increased 0.003 per year until 0.985 was reached in 1990.
d Includes Colby, washed curd, Monterey, and Jack.
e Computed from unrounded data.
f Includes imports of Gruyere and Emmenthaler.
g Includes Gorgonzola.
h Includes mellorine, frozen yogurt beginning 1981, and other nonstandardized frozen diary products.
i Includes quantities used in other dairy products.
j Original data were presented in lbs, conversions to g/day were calculated by multiplying by a factor of 453.6 and dividing by 365 days.

Source: USDA, 1993.

Table 2-106. Adult Mean Daily Intake of Meat and Poultry Grouped by Region and Gender[a]

Food Item	Mean Daily Intake (g/day) Region: Pacific		Mountain		North Central		Northeast		South	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Beef	84.8	52.8	89.8	59.6	86.8	55.9	71.8	46.6	87.3	54.9
Pork	18.6	12.6	23.7	16.8	26.5	18.8	22.4	15.9	24.4	17.2
Lamb	1.3	1.2	0.5	0.3	0.4	0.4	1.3	1.0	0.5	0.3
Veal	0.4	0.2	0.2	0.2	0.4	0.4	2.8	1.5	0.3	0.3
Variety Meats/Game	11.1	7.9	9.1	7.4	11.9	8.0	8.1	6.8	9.4	7.8
Processed Meats	22.8	15.4	22.9	13.2	26.3	15.8	21.2	15.5	26.0	17.0
Poultry	67.3	56.1	51.0	45.2	51.7	44.7	56.2	49.2	57.7	50.2

[a] Adult population represents consumers ages 19 and above.

Source: National Livestock and Meat Board, 1993.

g/day which included beef (57%), veal (0.5%), lamb (0.5%), game/variety meats (8%), processed meats (18%), and pork (16%) (National Live Stock and Meat Board, 1993). Table 2-107 shows the amount of meat consumed by the adult population grouped as non meat eaters (1%), light meat eaters (30%), medium meat eaters (33%), and heavy meat eaters (36%).

2.4.2. Fat Content of Meat and Dairy Products

In some cases, the residue levels of contaminants in meat and dairy products are reported as the concentration of contaminant per gram of fat. When using these residue levels, the assessor should ensure consistency in the exposure assessment calculations by using consumption rates that are based on the amount of fat consumed for the meat or dairy product of interest. Alternately, residue levels for the "as consumed" portions of these products may be estimated by multiplying the levels based on fat by the fraction of fat per product as follows:

$$\frac{residue\ level}{g\text{-}product} = \frac{residue\ level}{g\text{-}fat} \times \frac{g\text{-}fat}{g\text{-}product} \qquad \text{(Eqn.2-4)}$$

The resulting residue levels may then be used in conjunction with "as consumed" consumption rates such as those tabulated in Tables 2-82 through 2-107. The percentages of lipid fat in meat and dairy products have been reported in various publications. USDA's Agricultural Handbook Number 8 (USDA, 1979-1984) provides composition data for agricultural products. It includes a listing of the total saturated, monounsaturated, and polyunsaturated fats for various meat and dairy items. Table 2-108 presents the total fat content for selected meat and dairy products taken from Handbook Number 8. The total percent fat content is based on the sum of saturated, monounsaturated, and polyunsaturated fats.

The National Livestock and Meat Board (NLMB) (1993) used data from Agricultural Handbook Number 8 and consumption data to estimate the fat contribution to the U.S. diet. Total fat content in grams, based on a 3-ounce (85.05 g) cooked serving size, was reported for several categories (retail composites) of meats. These data are presented in Table 2-109 along

Table 2-107. Amount of Meat Consumed by Adults Grouped by Frequency of Eatings[e]

		Percent of Eaters			
Frequency of Eatings	Percent of Total Eaters	Male	Female	Total Consumption for 14 Days (g)	Median Daily Intake (g/day)
Non-Meat Eaters[a]	1%	20	80	None	None
Light Meat Eaters[b]	30%	27	73	<1025	54
Medium Meat[c] Eaters	33%	39	61	1025-1584	93
Heavy Meat[d] Eaters	36%	73	27	>1548	144

[a] A female who is employed and on a diet. She lives alone or in a small household (without children).
[b] Female who may or may not be on a diet. There are probably 2-4 people in her household but that number is not likely to include children.
[c] This person may be of either sex, might be on a diet, and probably lives in a household of 2-4 people, which may include children.
[d] Male who is not on a diet and lives in a household of 2-4 individuals, which may include children.
[e] Adult population represents consumers ages 19 and above.

Source: National Livestock and Meat Board, 1993.

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Table 2-108. Percentage Lipid Fat Content and Mean Moisture Content (Expressed as Percentages of 100 Grams of Edible Portions) of Selected Meat and Dairy Products[a]

Product	Fat Percentage	Comment
<u>Meats</u>		
Beef		
Lean only	6.16	Raw
	9.91	Cooked
Lean and fat, 1/4 in. fat trim	19.24	Raw
	21.54	Cooked
Brisket (point half)		
Lean and fat	29.32	Raw
Brisket (flat half)		
Lean and fat	22.40	Raw
Lean only	4.03	Raw
Pork		
Lean only	5.88	Raw
	9.66	Cooked
Lean and fat	14.95	Raw
	17.18	Cooked
Cured shoulder, blade roll, lean and fat	20.02	Unheated
Cured ham, lean and fat	12.07	Center slice
Cured ham, lean only	7.57	Raw, center, country style
Sausage	38.24	Raw, fresh
Ham	4.55	Cooked, extra lean (5% fat)
Ham	9.55	Cooked, (11% fat)
Lamb		
Lean	5.25	Raw
	9.52	Cooked
Lean and fat	21.59	Raw
	20.94	Cooked
Veal		
Lean	2.87	Raw
	6.58	Cooked
Lean and fat	6.77	Raw
	11.39	Cooked
Rabbit		
Composite of cuts	5.55	Raw
	8.05	Cooked
Chicken		
Meat only	3.08	Raw
	7.41	Cooked
Meat and skin	15.06	Raw
	13.60	Cooked
Turkey		
Meat only	2.86	Raw
	4.97	Cooked
Meat and skin	8.02	Raw
	9.73	Cooked
Ground	6.66	Raw

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Table 2-108. Percentage Lipid Fat Content and Mean Moisture Content (Expressed as Percentages of 100 grams of Edible Portions)[a]

Food	Moisture Content Percent	Comments
Meat		
Beef	71.60	Raw, composite, trimmed, retail cuts
Beef liver	68.99	Raw
Chicken (light meat)	74.86	Raw, without skin
Chicken (dark meat)	75.99	Raw, without skin
Duck - domestic	73.77	Raw
Duck - wild	75.51	Raw
Goose - domestic	68.30	Raw
Ham - cured	66.92	Raw
Horse	72.63	Raw, roasted
	63.98	Cooked, roasted
Lamb	73.42	Raw, composite, trimmed, retail cuts
Lard	0.00	Raw
Pork	70.00	Raw
Rabbit - domestic	72.81	Raw, roasted
	69.11	Cooked, roasted
Turkey	74.16	Raw
Dairy Products		
Eggs	74.57	Raw
Butter	15.87	Regular
Cheese American pasteurized	39.16	
Cheddar	36.75	
Swiss	37.21	
Parmesan, hard	29.16	
Parmesan, grated	17.66	
Cream, whipping, heavy	57.71	
Cottage, lowfat	79.31	
Colby	38.20	
Blue	42.41	
Cream	53.75	
Yogurt		
Plain, lowfat	85.07	
Plain, with fat	87.90	Made from whole milk
Human milk - estimated from USDA Survey		
Human	87.50	Whole, mature, fluid
Skim	90.80	
Lowfat	90.80	1%

[a] Based on the lipid or water content in 100 grams, edible portion.

Source: USDA Agricultural Handbook, No. 8, 1979-1986.

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Table 2-108. Percentage Lipid Fat Content and Mean Moisture Content (Expressed as Percentages of 100 Grams of Edible Portions) of Selected Meat and Dairy Products[a]

Product	Fat Percentage	Comment
Dairy		
Milk		
Whole	3.16	3.3% fat, raw or pasteurized
Human	4.17	Whole, mature, fluid
Lowfat (1%)	0.83	Fluid
Lowfat (2%)	1.83	Fluid
Skim	0.17	Fluid
Cream		
Half and half	18.32	Table or coffee, fluid
Medium	23.71	25% fat, fluid
Heavy-whipping	35.09	Fluid
Sour	19.88	Cultured
Butter	76.93	Regular
Cheese		
American	29.63	Pasteurized
Cheddar	31.42	
Swiss	26.02	
Cream	33.07	
Parmesan	24.50; 28.46	Hard; grated
Cottage	1.83	Lowfat, 2% fat
Colby	30.45	
Blue	27.26	
Provolone	25.24	
Mozzarella	20.48	
Yogurt	1.47	Plain, lowfat
Eggs	8.35	Chicken, whole raw, fresh or frozen

Table 2-109. Fat Content of Meat Products

Meat Product 3-oz cooked serving (85.05 g)	Total Fat (g)	Percent Fat Content (%)
Beef, retail composite, lean only	8.4	9.9
Pork, retail composite, lean only	8.0	9.4
Lamb, retail composite, lean only	8.1	9.5
Veal, retail composite, lean only	5.6	6.6
Broiler chicken, flesh only	6.3	7.4
Turkey, flesh only	4.2	4.9

Source: National Livestock and Meat Board, 1993.

with the corresponding percent fat content values for each product. NLMB (1993) also reported that 0.17 grams of fat are consumed per gram of meat (i.e., beef, pork, lamb, veal, game, processed meats, and variety meats) (17 percent) and 0.8 grams of fat are consumed per gram of poultry (8 percent).

The average total fat content of the U.S. diet was reported to be 68.3 g/day. The meat group (meat, poultry, fish, dry beans, eggs, and nuts) was reported to contribute the most to the average total fat in the diet (41 percent) (NLMB, 1993). Meats (i.e., beef, pork, lamb, veal, game, processed meats, and variety meats) reportedly contributes less than 30 percent to the total fat of the average U.S. diet. The milk group contributes approximately 12 percent to the average total fat in the U.S. diet (NLMB, 1993). Fat intake rates and the contributions of the major food groups to fat intake for heavy, medium, and light meat eaters, and non meat eaters are presented in Table 2-110 (NLMB, 1993). NLMB (1993) also reported the average meat fat intake to be 19.4 g/day, with beef contributing about 50 percent of the fat to the diet from all meats. Processed meats contributed 31 percent; pork contributed 14 percent; game and variety meats contributed 4 percent; and lamb and veal contributed 1 percent the average meat fat intake.

The Center for Disease Control (CDC) (1994) used data from NHANES III to calculate daily total food energy intake (TFEI), total dietary fat intake, and saturated fat intake for the U.S. population during 1988 to 1991. The sample population comprised 20,277 individuals ages 2 months and above, of which 14,001 respondents (73% response rate) provided dietary information based on a 24-hour recall. TFEI was defined as all nutrients (i.e., protein, fat, carbohydrate, and alcohol) derived from consumption of foods and beverages (excluding plain drinking water) measured in kilocalories (kcal)." Total dietary fat intake was defined as "all fat (i.e., saturated and unsaturated) derived from consumption of foods and beverages measured in grams."

CDC (1994) estimated and provided data on the mean daily TFEI and the mean percentages of TFEI from total dietary fat grouped by age and gender. The overall mean daily TFEI was 2,095 kcal for the total population and 34 percent (or 82g) of their TFEI was from total dietary fat (CDC, 1994). Based on this information, the mean daily fat intake was calculated for the various age groups and genders (see Appendix 2B for detailed calculation).

Table 2-110. Fat Intake, Contribution of Various Food Groups to Fat Intake, and Percentage of the Population in Various Meat Eater Groups of the U.S. Population

	Total Population	Heavy Meat Eaters	Medium Meat Eaters	Light Meat Eaters	Non Meat Eaters
Average Fat Intake (g)	68.3	84.5	62.5	53.5	32.3
Percent of Population	100	36	33	30	1
Meat Group (%)[a]	41	44	40	37	33
Bread Group (%)	24	23	24	26	25
Milk Group (%)	12	11	13	14	14
Fruits (%)	1	1	1	1	1
Vegetables (%)	9	9	9	9	11
Fats/oil/sweets (%)	13	12	13	14	17

[a] Meat Group includes meat, poultry, dry beans, eggs, and nuts.

Source: National Livestock and MeatBoard, 1993.

Table 2-111 presents the grams of fat per day obtained from the daily consumption of foods and beverages grouped by age and gender for the U.S. population.

2.4.3. Conversion Between As Consumed and Dry Weight Intake Rates

As noted previously, intake rates may be reported in terms of units as consumed or units of dry weight. It is essential that exposure assessors be aware of this difference so that they may ensure consistency between the units used for intake rates and those used for concentration data (i.e., if the unit of food consumption is grams dry weight/day, then the unit for the amount of pollutant in the food should be grams dry weight). If necessary, as consumed intake rates may be converted to dry weight intake rates using the moisture content percentages of meat, poultry and dairy products presented in Table 2-108 and the following equation:

$$IR_{dw} = IR_{ac} * [(100-W)/100] \qquad \text{(Eqn. 2-5)}$$

"Dry weight" intake rates may be converted to "as consumed" rates by using:

$$IR_{ac} = IR_{dw}/[(100-W)/100] \qquad \text{(Eqn. 2-6)}$$

where:

IR_{dw} = dry weight intake rate;
IR_{ac} = as consumed intake rate; and
W = percent water content.

2.4.4. Recommendations

The key studies described in this section were used in selecting recommended meat, poultry, and dairy product intake rates for the general population and various subgroups of the United States population. These studies were all based on USDA NFCS data, but used different analytical methods for calculating intake, and/or evaluated different subpopulations or food groups. The general design of both key and relevant studies are summarized in Table 2-112. Based on the 1987/88 NFCS one-day per capita data, the recommended average intake rates for

Table 2-111. Mean Total Daily Dietary Fat Intake (g/day) Grouped by Age and Gender[a]

	Total		Males		Females	
Age (yrs)	N	Mean Fat Intake (g/day)	N	Mean Fat Intake (g/day)	N	Mean Fat Intake (g/day)
2-11 (months)	871	37.52	439	38.31	432	36.95
1-2	1,231	49.96	601	51.74	630	48.33
3-5	1,647	60.39	744	70.27	803	61.51
6-11	1,745	74.17	868	79.45	877	68.95
12-16	711	85.19	338	101.94	373	71.23
16-19	785	100.50	308	123.23	397	77.46
20-29	1,882	97.12	844	118.28	638	76.52
30-39	1,628	93.84	736	114.28	791	74.06
40-49	1,228	84.90	626	99.26	602	70.80
50-59	929	79.29	473	96.11	456	63.32
60-69	1,108	69.15	646	80.80	560	59.52
70-79	851	61.44	444	73.35	407	53.34
≥ 80	809	54.61	290	68.09	313	47.84
Total	14,801	81.91	7,322	97.18	7,479	67.52
≥ 2	13,314	82.77	6,594	98.74	8,720	68.06

[a] Total dietary fat intake includes all fat (i.e., saturated and unsaturated) derived from consumption of foods and beverages (excluding plain drinking water).

Source: Adapted from CDC, 1994.

Table 2-112. Summary of Meat, Poultry, and Dairy Intake Studies

Study	Survey Population Used in Calculating Intake	Types of Data Used	Units	Food Items
Pao et al., 1982	Consumers only data provided; per capita intake calculated using fraction of individuals using the food	1977/78 NFCS 3-day individual intake data	g/day; as consumed	Distributions of intake rates for meats, poultry, and diary products.
EPA's DRES	Per capita (i.e., consumers and nonconsumers)	1977/78 NFCS 3-day individual intake data	g/kg-day; as consumed	Intake for a wide variety of meats, poultry, and dairy products presented; complex food groups were disaggregated
USDA, 1992	Per capita and consumer only grouped by age and sex	1977/78 and 1987/88 NFCS 1-day individual intake data	g/day; as consumed	Total meat, poultry and fish, total poultry, total milk, cheese and eggs.
EPA Analysis of 1987/88 USDA Data	Consumers only; per capita data can be calculated	1987/88 NFCS data; Based on amount of food consumed by a household over a 7-day period; individual intake rates based on the estimated proportion of household food eaten by family members.	g/kg-day; as consumed	Distributions of intake rates for total meats and total dairy; individual food items; USDA food categories
U.S. EPA/ORP, 1984d; 1984e	Per capita	1977/78 NFCS Individual intake data	g/day; as consumed	Mean intake rates for total meats, total diary products, and individual food items.
U.S. EPA/OST, 1989	Estimated lifetime dietary intake	Based on FDA Total Diet Study Food List which used 1977/78 NFCS data, and NHANES II data	g/day; dry weight	Various food groups; complex foods disaggregated
USDA, 1993	Per capita consumption based on "food disappearance"	Based on food supply and utilization data which were provided by National Agricultural Statistics Service (NASS), Customs Service reports, and trade associations.	g/day; as consumed	Intake rates of meats, poultry, and diary products; intake rates of individual food items.

the general population are 32 g/day for beef; 14 g/day for pork; 1 g/day for lamb, veal, and game; 26 g/day for total poultry (20 g/day for chicken only); and 193 g/day for total meat, poultry, and fish. Mean per capita intake rates for specific food items, on a g/kg-day basis, may be taken from Table 2-83. Mean and upper-percentile consumer only intake rates for total meat, total dairy, or beef, game, pork, poultry, and eggs from the distribution data presented in Tables 2-86 through 2-100 may be used to represent intake for the general population and various subpopulations. Upper-percentile per capita rates may be calculated using the consumer only distribution data presented in Tables 2-86 through 2-100 and the survey size data presented in Section 2.7.Intake rates for the homeproduced form of these food items/groups are presented in Section 2.7. Also, the data presented in Table 2-82 may be used to represent mean and upper-percentile consumer only and per capita intake rates for various items of meat, poultry, and dairy products. These data were estimated based on the USDA-NFCS data, however, intake rates were calculated over a 3-day period. In situations where there is paucity of information, the 3-day data may also be used for acute exposure assessments.

The advantage of using the USDA NFCS data set is that it is the largest publicly available data source on food intake patterns in the United States. Data are available for a wide variety of meat, poultry, and dairy products and are intended to be representative of the U.S. population. However, it should be noted that the data collected by USDA NFCS are based on short-term dietary recall and may not accurately reflect long-term intake patterns. This is particularly true for the tails of the distribution of intake.

2.5. BREAST MILK INTAKE

2.5.1. Background

Breast milk is a potential source of exposure to toxic substances among nursing infants. Some chemical compounds accumulate in fatty tissues and may be transferred to breast-fed infants in the lipid portion of breast milk. Because nursing infants obtain most (if not all) of their dietary intake from breast milk, they are especially vulnerable to exposures to these compounds. Estimating the magnitude of the potential dose to infants from breast milk requires information on the quantity of breast milk consumed per day and the duration (months) over which breast-feeding occurs. Information on the fat content of breast milk is also needed for estimating dose from breast milk residue concentrations that have been indexed to lipid content.

Several studies have generated data on breast milk intake. Typically, breast milk intake has been measured over a 24-hour period by weighing the infant before and after each feeding without changing its clothing (test weighing). The sum of the difference between the measured weights over the 24-hour period is assumed to be equivalent to the amount of breast milk consumed daily. Intakes measured using this procedure are often corrected for evaporative water losses (insensible water losses) between infant weighings (NAS, 1991). Neville et al. (1988) evaluated the validity of the test weight approach among bottle-fed infants by comparing the weights of milk taken from bottles with the differences between the infants' weights before and after feeding. When test weight data were corrected for insensible water loss, they were not significantly different from bottle weights. Conversions between weight and volume of breast milk consumed are made using the density of human milk (approximately 1.03 g/mL) (NAS, 1991). Recently, techniques for measuring breast milk intake using stable isotopes have been developed. However, few data based on this new technique have been published (NAS, 1991).

Studies among nursing mothers in industrialized countries have shown that intakes among infants average approximately 750 to 800 g/day (728 to 777 mL/day) during the first 4 to 5 months of life with a range of 450 to 1,200 g/day (437 to 1,165 mL/day) (NAS, 1991). Similar intakes have also been reported for developing countries (NAS, 1991). Infant birth weight and nursing frequency have been shown to influence the rate of intake (NAS, 1991). Infants who are larger at birth and/or nurse more frequently have been shown to have higher intake rates.

Also, breast milk production among nursing mothers has been reported to be somewhat higher than the amount actually consumed by the infant (NAS, 1991).

The available studies on breast milk intake are summarized in the following sections. Studies on breast milk intake rates have been classified as either key studies or relevant studies based on their applicability to exposure assessment needs. Recommended intake rates are based on the results of key studies, but relevant studies are also presented to provide the reader with added perspective on the current state-of-knowledge pertaining to breast milk intake.

Relevant data on lipid content and fat intake, energy content and energy intake, breast-feeding duration and frequency, and the estimated percentage of the U.S. population that breast-feeds are also presented.

2.5.2. Key Studies on Breast Milk Intake

Pao et al. - Milk Intakes and Feeding Patterns of Breast-fed Infants - Pao et al. (1980) conducted a study of 22 healthy breast-fed infants to estimate breast milk intake rates. Infants were categorized as completely breast-fed or partially breast-fed. Breast feeding mothers were recruited through LaLeche League groups. Except for one black infant, all other infants were from white middle-class families in southwestern Ohio. The goal of the study was to enroll infants as close to one month of age as possible and to obtain records near one, three, six, and nine months of age (Pao et al., 1980). However, not all mother/infant pairs participated at each time interval. Data were collected for these 22 infants using the test weighing method. Records were collected for three consecutive 24-hour periods at each test interval. The weight of breast milk was converted to volume by assuming a density of 1.03 g/mL. Daily intake rates were calculated for each infant based on the mean of the three 24-hour periods. Mean daily breast milk intake rates for the infants surveyed at each time interval are presented in Table 2-113. For completely breast-fed infants, the mean intake rates were 600 mL/day at 1 month of age and 833 mL/day at 3 months of age. Partially breast-fed infants had mean intake rates of 485 mL/day, 467 mL/day, 395 mL/day, and 554 mL/day at 1, 3, 6, and 9 months of age, respectively. Pao et al. (1980) also noted that intake rates for boys in both groups was slightly higher than for girls.

Table 2-113. Daily Intakes of Breast Milk

Age	Number of Infants Surveyed at Each Time Period	Mean Intake (mL/day) [a]	Range of Daily Intake (mL/day)
Completely Breast-fed			
1 month	11	600 ± 159	426 - 989
3 months	2	833	645 - 1,000
6 months	1	682	616 - 786
Partially Breast-fed			
1 month	4	485 ± 79	398 - 655
3 months	11	467 ± 100	242 - 698
6 months	6	395 ± 175	147 - 684
9 months	3	<554	451 - 732

[a] Data expressed as mean ± standard deviation.

Source: Pao et al., 1980.

The advantage of this study is that data for both exclusively and partially breast-fed infants were collected for multiple time periods. Also, data for individual infants were collected over 3 consecutive days to account for individual variability. However, the number of infants in the study was relatively small and may not be entirely representative of the U.S. population.

Butte et al. - Human Milk Intake and Growth in Exclusively Breast-fed Infants - Breast milk intake was studied in exclusively breast-fed infants during the first 4 months of life (Butte et al., 1984). Breastfeeding mothers were recruited through the Baylor Milk Bank Program in Texas. Forty-five mothers/infant pairs participated in the study. However, data for some time periods (i.e., 1, 2, 3, or 4 months) were missing for some mothers as a result of illness or other factors. The mothers were from the middle- to upper-socioeconomic stratum and had a mean age of 28.0 $\pm$ 3.1 years. A total of 41 mothers were white, 2 were Hispanic, 1 was Asian, and 1 was West Indian. Infant growth progressed satisfactorily over the course of the study. The amount of milk ingested over a 24-hour period was determined using the test weighing procedure. Test weighing occurred over a 24-hour period for most participants, but intake among several infants was studied over longer periods (48 to 96 hours) to assess individual variation in intake. The study did not indicate whether the data were corrected for insensible water loss. Mean breast milk intake ranged from 723 g/day (702 mL/day) at 3 months to 751 g/day (729 mL/day) at 1 month, with an overall mean of 733 g/day (712 mL/day) for the entire study period (Table 2-114). Intakes were also calculated on the basis of body weight (Table 2-114). Based on the results of test weighings conducted over 48 to 96 hours, the mean variation in individual daily intake was estimated to be 7.9$\pm$3.6 percent.

The advantage of this study is that data for a larger number of exclusively breast-fed infants were collected than by Pao et al. (1980). However, data were collected over a shorter time period (i.e., 4 months compared to 6 months) and may not be representative of the U.S. population.

Neville et al., - Studies on Human Lactation - Neville et al. (1988) studied breast milk intake among 13 infants during the first year of life. The mothers were all multiparous, nonsmoking, Caucasian women of middle- to upper-socioeconomic status living in Denver, Colorado (Neville, et al., 1988). All women in the study practiced exclusive breast-feeding for at least 5 months. Solid foods were introduced at mean age of 7 months. Daily milk intake was

Table 2-114. Breast Milk Intake Among Exclusively Breast-fed Infants During the First 4 Months of Life

Age (months)	Number of Infants	Breast Milk Intake[a] (g/day)	Breast Milk Intake[a] (g/kg/day)
1	37	751.0 ± 130.0	159.0 ± 24.0
2	40	725.0 ± 131.0	129.0 ± 19.0
3	37	723.0 ± 114.0	117.0 ± 20.0
4	41	740.0 ± 128.0	111.0 ± 17.0

[a] Data expressed as mean ± standard deviation.

Source: Butte et al., 1984.

estimated by the test weighing method with corrections for insensible weight loss. Data were collected daily from birth to 14 days, weekly from weeks 3 through 8, and monthly until the study period ended at 1 year after inception. The estimated breast milk intakes for this study are listed in Table 2-115. Mean breast milk intakes were 770 g/day (748 mL/day), 734 g/day (713 mL/day), 766 g/day (744 mL/day), and 403 g/day (391 mL/day) at 1, 3, 6, and 12 months of age, respectively.

In comparison to the previously described studies, Neville et al. (1988) collected data on numerous days over a relatively long time period (12 months). However, the intake rates presented in Table 2-115 are estimated based on intake during only a 24-hour period. Consequently, these intake rates are based on short-term data that do not account for day-to-day variability among individual infants. Also, a smaller number of subjects was included than in the previous studies, and the population studied may not be representative of the U.S. population.

Dewey and Lõnnerdal - Milk and Nutrient Intakes of Breast-fed Infants - Dewey and Lõnnerdal (1983) monitored the dietary intake of 20 breast-fed infants between the ages of 1 and 6 months of age. Most of the infants in the study were exclusively breast-fed (five were given some formula, and several were given small amounts of solid foods after 3 months of age). According to Dewey and Lõnnerdal (1983), the mothers were all well educated and recruited via Lamaze childbirth classes from the Davis area of California. Breast milk intake volume was estimated based on two 24-hour test weighings per month. Breast milk intake rates for the various age groups are presented in Table 2-116. Breast milk intake averaged 673, 782, and 896 mL/day at 1, 3, and 6 months of age, respectively.

The advantage of this study is that it evaluated breast-fed infants for a period of 6 months based on two 24-hour observations per infant per month. Corrections for insensible water loss were apparently not made. Also, results of this study may not be representative of U.S. populations.

Dewey et al. - The DARLING Study - The Davis Area Research on Lactation, Infant Nutrition and Growth (DARLING) study was conducted in 1986 to evaluate growth patterns, nutrient intake, morbidity, and activity levels in infants who were breast-fed for at least the first 12 months of life (Dewey et al., 1991a; 1991b). Seventy-three infants were included in the

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Table 2-115. Breast Milk Intake

Age (days)	Number of Infants	Mean (g/day)	Standard Deviation (g/day)	Range (g/day)
1	7	44	71	-31-149 [a]
2	10	182	86	44-355
3	11	371	153	209-688
4	11	451	176	164-694
5	12	498	129	323-736
6	10	508	167	315-861
7	8	573	167	406-842
8	9	581	159	410-923
9	10	580	76	470-720
10	10	589	132	366-866
11	8	615	168	398-934
14	10	653	154	416-922
21	10	651	84	554-786
28	13	770	179	495-1144
35	12	668	117	465-930
42	12	711	111	554-896
49	10	709	115	559-922
56	13	694	98	556-859
90	12	734	114	613-942
120	13	711	100	570-847
150	13	838	134	688-1173
180	13	766	121	508-936
210	12	721	154	486-963
240	10	622	210	288-1002
270	12	618	220	223-871
300	11	551	234	129-894
330	9	554	240	120-860
360	9	403	250	65-770

[a] Negative value due to insensible water loss correction.

Source: Neville et al., 1988.

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Table 2-116. Breast Milk Intake for Infants Aged 1 to 6 Months

Age (months)	Number of Infants	Mean (mL/day)	SD (mL/day) [a]	Range (mL/day)
1	16	673	192	341-1,003
2	19	756	170	449-1,055
3	16	782	172	492-1,053
4	13	810	142	593-1,045
5	11	805	117	554-1,045
6	11	896	122	675-1,096

[a] Standard deviation.

Source: Dewey and Lönnerdal, 1983.

study at 3 months. The number of infants included in the study at subsequent time intervals was somewhat lower as a result of attrition. All infants in the study were healthy and of normal gestational age and weight at birth, and did not consume solid foods until after the first 4 months of age. The mothers were highly educated and of "relatively high socioeconomic status" from the Davis area of California (Dewey et al., 1991a; 1991b). Breast milk intake was estimated by weighing the infants before and after each feeding and correcting for insensible water loss. Test weighings were conducted over a 4-day period every 3 months. The results of the study indicate that breast milk intake declines over the first 12 months of life. Mean breast milk intake was estimated to be 812 g/day (788 mL/day) at 3 months and 448 g/day (435 mL/day) at 12 months (Table 2-117). Based on the estimated intakes at 3 months of age, variability between individuals (coefficient of variation (CV) = 16.3 percent) was higher than individual day-to-day variability (CV = 5.4 percent) for the infants in the study (Dewey et al., 1991a).

The advantages of this study are that data were collected over a relatively long-time (4 days) period at each test interval to account for day-to-day infant variability, and corrections for insensible water loss were made. However, the population studied may not be representative of the U.S. population.

2.5.3. Other Relevant Studies on Breast Milk Intake

Hofvander et al. - The Amount of Milk Consumed by 1-3 Month Old Infants - Hofvander et al. (1982) compared milk intake among breast-fed and bottle-fed infants at ages 1, 2, and 3 months of age. Intake of breast milk and breast milk substitutes was tabulated for 25 Swedish infants in each age group. Daily intake among breast-fed infants was estimated using the test weighing method. Test weighings were conducted over a 24-hour time period at each time interval. Daily milk intake among bottle-fed infants was estimated by measuring the volumetric differences in milk contained in bottles at the beginning and end of all feeding sessions in a 24-hour period. The mean intake rates for bottle-fed infants were slightly higher than for breast-fed infants for all age groups (Table 2-118). Also, boys consumed breast milk or breast milk substitutes at a slightly higher rate than girls (Table 2-119). Breast milk intake was estimated to be 656 g/day (637 mL/day) at 1 month and 776 g/day (753 mL/day) at 3 months.

Table 2-117. Breast Milk Intake Estimated by the DARLING Study

Age (months)	Number of Infants	Mean Intake (g/day)	Standard Deviation (g/day)
3	73	812	133
6	60	769	171
9	50	646	217
12	42	448	251

Source: Dewey et al. (1991b).

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Table 2-118. Milk Intake for Bottle- and Breast-fed Infants by Age Group

Age (months)	Breast Milk Substitutes Mean (g/day)[a]	Breast Milk Mean (g/day)[a]
1	713 (500-1,000)	656 (360-860)
2	811 (670-1,180)	773 (575-985)
3	853 (655-1,065)	776 (600-930)

[a] Range given in parentheses.

Source: Hofvander et al., 1982.

Table 2-119. Milk Intake for Boys and Girls

Age	Boys Mean (g/day)	Boys N	Girls Mean (g/day)	Girls N
Breast milk				
1	663	12	649	13
2	791	14	750	11
3	811	12	743	13
Breast milk substitute				
1	753	10	687	15
2	863	13	753	12
3	862	13	843	12

Source: Hofvander et al., 1982.

This study was conducted among Swedish infants, but the results are similar to those summarized previously for U.S. studies. Insensible water losses were apparently not considered in this study, and only short-term data were collected.

Köhler et al. - Food Intake and Growth of Infants - Köhler et al. (1984) evaluated breast milk and formula intake among normal infants between the ages of 6 and 26 weeks. The study included 25 fully breast-fed and 34 formula-fed infants from suburban communities in Sweden. Intake among breast-fed infants was estimated using the test weighing method over a 48-hour test period. Intake among formula-fed infants was estimated by feeding infants from bottles with known volumes of formula and recording the amount consumed over a 48-hour period. Table 2-120 presents the mean breast milk and formula intake rates for the infants studied. Data were collected for both cow's milk-based formula and soy-based formula. The results indicated that the daily intake for bottle-fed infants was greater than for breast-fed infants.

The advantages of this study are that it compares breast milk intake to formula intake and that test weightings were conducted over 2 consecutive days to account for variability in individual intake. Although the population studied was not representative of the U.S. population, similar intake rates were observed in the studies that were previously summarized.

Axelsson et al. - Protein and Energy Intake During Weaning - Axelsson et al. (1987) measured food consumption and energy intake in 30 healthy Swedish infants between the ages of 4 and 6 months. Both formula-fed and breast-fed infants were studied. All infants were fed supplemental foods (i.e., pureed fruits and vegetables after 4 months, and pureed meats and fish after 5 months). Milk intake among breast-fed infants was estimated by weighing the infants before and after each feeding over a 2-day period at each sampling interval. Breast milk intake averaged 765 mL/day at 4.5 months of age, and 715 mL/day at 5.5 months of age.

This study is based on short-term data and may not be representative of the U.S. population. However, the intake rates estimated by this study are similar to those generated by the U.S. studies that were summarized previously.

2.5.4. Key Studies on Lipid Content and Fat Intake from Breast Milk

Human milk contains over 200 constituents including various proteins, vitamins, carbohydrates, lipids, minerals, cells, and trace elements (NAS, 1991). The lipid content of

Table 2-120. Intake of Breast Milk and Formula

	Breast Milk			Cow's Formula			Soy Formula		
Age (wks)	N	Mean (g/d)	SD (g/d)	N	Mean (g/d)	SD (g/d)	N	Mean (g/d)	SD (g/d)
6	26	746	101	20	823	111	13	792	127
14	21	726	143	19	921	95	13	942	78
22	13	722	114	18	818	201	13	861	196
26	12	689	120	18	722	209	12	776	159

Source: Köhler et al., 1984.

breast milk varies according to the length of time that an infant nurses. Lipid content increases from the beginning to the end of a single nursing session (NAS, 1991). The lipid portion accounts for approximately 4 percent of human breast milk (39 ± 4.0 g/L) (NAS, 1991). This value is supported by various studies that evaluated lipid content from human breast milk. Several studies also estimated the quantity of lipid consumed by breast-feeding infants. These values are appropriate for use in conjunction with residue concentrations that are indexed to the fat portion of human breast milk.

Butte et al. - Human Milk Intake and Growth in Exclusively Breast-fed Infants - Butte et al., (1984) analyzed the lipid content of breast milk samples taken from women who participated in a study of breast milk intake among exclusively breast-fed infants. The study was conducted with over 40 women during a 4-month period. The mean lipid content of breast milk at various infants ages is presented in Table 2-121. The overall lipid content for the 4-month study period was 34.3 ± 6.9 mg/g (3.4 percent). Butte et al. (1984) also calculated lipid intakes from 24-hour breast milk intakes and the lipid content of the human milk samples. Lipid intake was estimated to range from 23.6 g/day (3.8 g/kg/day) to 28.0 g/day (5.9 g/kg/day).

A relatively large group of women were included in this study. However, these women were selected primarily from middle- to upper-socioeconomic classes. Thus, data on breast milk lipid content from this study may not be entirely representative of breast milk lipid content among the U.S. population. Also, these estimates are based on short-term data.

Maxwell and Burmaster - Simulation Model for Estimating a Distribution of Lipid Intake - Maxwell and Burmaster (1993) used a hypothetical population of 5,000 infants between birth and 1 year of age to simulate a distribution of daily lipid intake from breast milk. The hypothetical population represented both bottle-fed and breast-fed infants aged 1 to 365 days. A distribution of daily lipid intake was developed based on data in Dewey et al. (1991b) on breast milk intake for infants at 3, 6, 9, and 12 months and breast milk lipid content, and survey data in Ryan et al. (1991) on the percentage of breast-fed infants under the age of 12 months (i.e., approximately 22 percent). A model was used to simulate intake among 1,113 of the 5,000 infants that were expected to be breast-fed. The results of the model indicated that lipid intake among nursing infants under 12 months of age can be characterized by a normal distribution with a mean of 26.8 g/day and a standard deviation of 7.4 g/day (Table 2-122). The model assumes

Table 2-121. Lipid Content of Human Milk and Estimated Lipid Intake among Exclusively Breast-fed Infants

Age (months)	Number of Observations	Lipid Content (mg/g) [a]	Lipid Content (percent) [b]	Lipid Intake (g/day) [a]	Lipid Intake (g/kg-day) [a]
1	37	36.2 ± 7.5	3.6	28.0 ± 8.5	5.9 ± 1.7
2	40	34.4 ± 6.8	3.4	25.2 ± 7.1	4.4 ± 1.2
3	37	32.2 ± 7.8	3.2	23.6 ± 7.2	3.8 ± 1.2
4	41	34.8 ± 10.8	3.5	25.6 ± 8.6	3.8 ± 1.3

[a] Data expressed as means ± standard deviation.
[b] Percents calculated from lipid content reported in mg/g.

Source: Butte, et al., 1984.

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Table 2-122. Predicted Lipid Intakes for Breast-fed Infants Under 12 Months of Age

Statistic	Value
Number of Observations in Simulation	1,113
Minimum Lipid Intake	1.0 g/day
Maximum Lipid Intake	51.5 g/day
Arithmetic Mean Lipid Intake	26.8 g/day
Standard Deviation Lipid Intake	7.4 g/day

Source: Maxwell and Burmaster, 1993.

that nursing infants are completely breast-fed and does not account for infants who are breast-fed longer than 1 year. Based on data collected by Dewey et al. (1991b), Maxwell and Burmaster (1993) estimated the lipid content of breast milk to be 36.7 g/L at 3 months and 40.2 g/L at 12 months.

The advantage of this study is that it provides "snapshot" of daily lipid intake from breast milk for breast-fed infants. The estimated mean lipid intake rate represents the average daily intake for nursing infants under 12 months of age. These data are useful for performing exposure assessments when the age of the infant cannot be specified (i.e., 3 months or 6 months). Also, because intake rates are indexed to the lipid portion of the breast milk, they may be used in conjunction with residue concentrations indexed to fat content.

2.5.5. Other Factors

Other factors associated with breast milk intake include: the energy intake from breast-feeding, the frequency of breast-feeding sessions per day, the duration of breast-feeding per event, the duration of breast-feeding during childhood, and the magnitude and nature of the population that breast-feeds.

Energy Intake and Energy Content of Breast Milk and Infant Formula - The Food and Agriculture Organization/World Health Organization (FAO/WHO) recommends infant energy intakes of 116 kcal/kg/day for the first 3 months of life and 99 kcal/kg/day between the ages of 3-6 months (Butte, et al., 1990). Similarly, the Food and Nutrition Board's Recommended Dietary Allowance (RDA) for energy intake is 115 kcal/kg/day during the first 6 months of life (Montandon, et al., 1986; Butte, et al., 1984), and USDA's Nutrition Research Board recommends 115 kcal/kg/day at birth and 105 kcal/kg/day by the end of the first year (Butte et al., 1990). Several studies have estimated energy intakes among breast-feeding infants. However, Butte et al. (1984) observed energy intakes that were substantially less than the recommended values among healthy, well nourished, exclusively breast-fed infants (110 ± 24 kcal/kg-day at 1 month and 71 ± 17 kcal/kg/day at 4 months). In another study, Köhler et al. (1984) observed that energy intake for healthy breast-fed infants was lower than for healthy formula-fed infants (Table 2-123). According to Whitehead and Paul (1991), recent studies indicate that the energy intake from formula averages about 90 kcal/kg-day and energy intake

Table 2-123. Total Energy Intake

Age (wks)	Breast-fed Number of Infants	Breast-fed Mean (kcal/day)	Breast-fed SD (kcal/day)	Formula-fed Number of Infants	Formula-fed Mean (kcal/day)	Formula-fed SD (kcal/day)
6	26	525	71	33	594	131
14	21	595	100	32	715	108
22	13	638	98	31	699	141
26	12	663	85	30	695	124

Source: Köhler et al., 1984.

from breast milk averages about 85 kcal/kg-day. Based on several of these studies, Whitehead and Paul (1991) estimated the energy intake among exclusively breast-fed infants to be 114, 98, 92, and 86 kcal/kg/day at 1, 2, 3 and 4 months of age, respectively. Dewey and Lönnerdal (1983) estimated the energy intake from breast milk to be 113, 105, 93, 93, 85, and 89 kcal/kg/day (509, 564, 556, 596, 593, and 658 kcal/day) for infants 1, 2, 3, 4, 5, and 6 months of age, respectively. Table 2-124 presents energy intakes estimated by Dewey et al. (1991b) in a subsequent study. Using an assumed energy content of 65 kcal/mL for breast milk and measured breast milk intake rates, Axelsson et al. (1987) estimated energy intake among breast-fed infants to be 82.2±9.1 kcal/kg/day at 4 to 5 months of age and 76.9±9.4 kcal/kg/day at 5 to 6 months of age. Energy intake among bottle-fed infants was slightly higher. Bottle-fed infants consuming formula with an energy content of 72 kcal/mL had energy intakes of 104.3±12.4 kcal/kg-day at 4 to 5 months and 97.3±11.1 kcal/kg-day at 5 to 6 months. Bottle-fed infants consuming formula with an energy content of 69 kcal/mL had energy intakes of 95.6±13.2 kcal/kg-day at 4 to 5 months and 92.6± 15.0 kcal/kg-day at 5 to 6 months.

Prentice et al. (1988) estimated the energy requirements of 355 healthy children, ages 0 to 3 years of age, by using data on energy expenditure instead of energy intake. Data on measurements of energy expenditure using the doubly-labeled water method $^2H_2$ ^{18}O from the published literature were used. This method measures total energy expenditure by following the disappearance of stable isotopes taken as an oral dose. The energy requirements estimated by Prentice et al. (1988) are 110, 95, 85, 83, 83, 84, and 85 kcal/kg-day at 1, 3 ,6, 9, 12, 24, and 36 months, respectively.

Dewey and Lönnerdal (1983) estimated the energy content in human milk samples at 1 to 6 months post partum based on analyses of fat protein and lactose content. Mean energy content averaged 74 to 79 kcal/mL. Dewey et al (1991a) estimated that at 3 months the average energy content of breast milk is 72.8 ± 9.5 kcal/mL. Whitehead and Paul (1991) and Axelsson et al. (1987) assumed a breast milk energy content of 65 kcal/mL in their studies of the energy intake among breast-fed infants, and Köhler et al. (1984) estimated the energy contents of cow's milk-based and soy-based infant formulas to be 67 kcal/mL.

Frequency and Duration of Feeding - Hofvander et al. (1982) reported on the frequency of feeding among 25 bottle-fed and 25 breast-fed infants at ages 1, 2, and 3 months. The mean

Table 2-124. Energy Intake from Human Milk

Age (months)	Number of Observations	Energy Intake kcal/day [a]	Energy Intake kcal/kg/day [a]
3	71	569 (86)	91.4 (11.7)
6	56	549 (120)	71.6 (15.2)
9	46	466 (152)	54.3 (17.3)
12	40	322 (181)	34.7 (19.9)

[a] Expressed as means with standard deviation in parentheses.

Source: Dewey et al., 1991b.

number of meals for these age groups was approximately 5 meals/day (Table 2-125). Neville et al. (1988) reported slightly higher mean feed frequencies. The mean number of meals per day for exclusively breast-fed infants was 7.3 at ages 2 to 5 months and 8.2 at ages 2 weeks to 1 month. Neville et al. (1988) reported that for infants between the ages of 1-week and 5 months the average duration of a breast feeding session is 16-18 minutes.

Population of Nursing Infants and Duration of Breast-Feeding During Infancy - According to NAS (1991), the percentage of breast-feeding women has changed dramatically over the years. Between 1936 and 1940, approximately 77 percent of infants were breast fed, but the incidence of breast-feeding fell to approximately 22 percent in 1972. The duration of breast-feeding also dropped from about 4 months in the early 1930s to 2 months in the late 1950s. After 1972, the incidence of breast-feeding began to rise again, reaching its peak at approximately 61 percent in 1982. The duration of breast-feeding also increased between 1972 and 1982. Approximately 10 percent of the mothers who initiated breast-feeding continued for at least 3 months in 1972; however, in 1984, 37 percent continued breast-feeding beyond 3 months. In 1989, breast-feeding was initiated among 52.2 percent of newborn infants, and 40 percent continued for 3 months or longer (NAS, 1991). Based on the data for 1989, only about 20 percent of infants were still breast fed by age 5 to 6 months (NAS, 1991). Data on the actual length of time that infants continue to breast-feed beyond 5 or 6 months are limited (NAS, 1991). However, Maxwell and Burmaster (1993) estimated that approximately 22 percent of infants under 1 year of age are breast-fed. This estimate is based on a reanalysis of survey data in Ryan et al. (1991) collected by Ross Laboratories (Maxwell and Burmaster, 1993). Studies have also indicated that breast-feeding practices may differ among ethnic and socioeconomic groups and among regions of the United States. The percentages of mothers who breast feed, based on ethnic background and demographic variables, are presented in Table 2-126 (NAS, 1991).

Information on differences in the quality and quantity of breast milk consumed based on ethnic or socioeconomic characteristics of the population is limited. Lönnerdal et al. (1976) studied breast milk volume and composition (nitrogen, lactose, proteins) among underprivileged and privileged Ethiopian mothers. No significant differences were observed between the data for these two groups; and similar data for well-nourished Swedish mothers were observed.

Table 2-125. Number of Meals Per Day

Age (months)	Bottle-fed Infants (meals/day) [a]	Breast-fed (meals/day) [a]
1	5.4 (4-7)	5.8 (5-7)
2	4.8 (4-6)	5.3 (5-7)
3	4.7 (3-6)	5.1 (4-8)

[a] Data expressed as mean with range in parentheses.

Source: Hofvander et al., 1982.

Table 2-126. Percentage of Mothers Breast-feeding Newborn Infants in the Hospital and Infants at 5 or 6 Months of Age in the United States in 1989,[a] by Ethnic Background and Selected Demographic Variables[b]

	Total		White		Black		Hispanic[c]	
Category	Newborns	5-6 Mo Infants	Newborns	5-6 Mo Infants	Newborns	5-6 Mo Infants	Newborns	5-6 Mo Infants
All mothers	52.2	19.6	58.5	22.7	23.0	7.0	48.4	15.0
Parity								
Primiparous	52.6	16.6	58.3	18.9	23.1	5.9	49.9	13.2
Multiparous	51.7	22.7	58.7	26.8	23.0	7.9	47.2	16.5
Marital status								
Married	59.8	24.0	61.9	25.3	35.8	12.3	55.3	18.8
Unmarried	30.8	7.7	40.3	9.8	17.2	4.6	37.5	8.6
Maternal age								
<20 yr	30.2	6.2	36.8	7.2	13.5	3.6	35.3	6.9
20-24 yr	45.2	12.7	50.8	14.5	19.4	4.7	46.9	12.6
25-29 yr	58.8	22.9	63.1	25.0	29.9	9.4	56.2	19.5
30-34 yr	65.5	31.4	70.1	34.8	35.4	13.6	57.6	23.4
≥35 yr	66.5	36.2	71.9	40.5	35.6	14.3	53.9	24.4
Maternal education								
No college	42.1	13.4	48.3	15.6	17.6	5.5	42.6	12.2
College[d]	70.7	31.1	74.7	34.1	41.1	12.2	66.5	23.4
Family income								
<$7,000	28.8	7.9	36.7	9.4	14.5	4.3	35.3	10.3
$7,000-$14,999	44.0	13.5	49.0	15.2	23.5	7.3	47.2	13.0
$15,000-$24,999	54.7	20.4	57.7	22.3	31.7	8.7	52.6	16.5
≥$25,000	66.3	27.6	67.8	28.7	42.8	14.5	65.4	23.0
Maternal employment								
Full time	50.8	10.2	54.8	10.8	30.6	6.9	50.4	9.5
Part time	59.4	23.0	63.8	25.5	26.0	6.6	59.4	17.7
Not employed	51.0	23.1	58.7	27.5	19.3	7.2	46.0	16.7
U.S. census region								
New England	52.2	20.3	53.2	21.4	35.6	5.0	47.6	14.9
Middle Atlantic	47.4	18.4	52.4	21.8	30.6	9.7	41.4	10.8
East North Central	47.6	18.1	53.2	20.7	21.0	7.2	46.2	12.6
West North Central	55.9	19.9	58.2	20.7	27.7	7.9	50.8	22.8
South Atlantic	43.8	14.8	53.8	18.7	19.6	5.7	48.0	13.8
East South Central	37.9	12.4	45.1	15.0	14.2	3.7	23.5	5.0
West South Central	46.0	14.7	56.2	18.4	14.5	3.8	39.2	11.4
Mountain	70.2	30.4	74.9	33.0	31.5	11.0	53.9	18.2
Pacific	70.3	28.7	76.7	33.4	43.9	15.0	58.5	19.7

[a] Mothers were surveyed when their infants were 6 months of age. They were asked to recall the method of feeding the infa when in the hospital, at age 1 week, at months 1 through 5, and on the day preceding completion of the survey. Numbers the columns labeled "5-6 Mo Infants" are an average of the 5-month and previous day responses.

[b] Based on data from Ross Laboratories.

[c] Hispanic is not exclusive of white or black.

[d] College includes all women who reported completing at least 1 year of college.

Source: NAS, 1991.

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Lönnerdal et al. (1976) stated that these results indicate that breast milk quality and quantity are not affected by maternal malnutrition. However, Brown et al. (1986a; 1986b) noted that the lactational capacity and energy concentration of marginally-nourished women in Bangladesh were "modestly less than in better nourished mothers." Breast milk intake rates for infants of marginally-nourished women in this study were 690±122 g/day at 3 months, 722±105 g/day at 6 months, and 719±119 g/day at 9 months of age (Brown et al., 1986a). Brown et al. (1986a) observed that breast milk from women with larger measurements of arm circumference and triceps skinfold thickness had higher concentrations of fat and energy than mothers with less body fat. Positive correlations between maternal weight and milk fat concentrations were also observed. These results suggest that milk composition may be affected by maternal nutritional status.

2.5.6. Recommendations

The key studies described in this section were used in selecting recommended values for breast milk intake, fat content and fat intake, and other related factors. Although different survey designs, testing periods, and populations were utilized by the key and relevant studies to estimate intake, the mean and standard deviation estimates reported in these studies appear to be relatively consistent. The general design of both key and relevant studies and their limitations are summarized in Table 2-127. It should be noted that most of the intake studies cited in this report were based on the test weighing method. The validity of this method has been demonstrated by Neville et al. (1988). In addition, the population who participated in all the intake studies were well educated and with middle to upper socioeconomic status.

Breast milk intake - The breast milk intake rates for nursing infants that have been reported in the key studies described in this section are summarized in Table 2-128. Based on the combined results of these studies, 730 mL/day appears to represent an average breast milk intake rate, and 1,029 mL/day represents an upper-percentile intake rate (based on the mean plus 2 standard deviations) for infants between the ages of 1 and 6 months of age. This value is the mean of the average intakes at 1, 3, and 6 months from the key studies listed in Table 2-128. It is consistent with the average intake rate of 718 to 777 mL/day estimated by NAS (1991) for infants during the first 4 to 5 months of life. Intake among older infants is somewhat lower,

Table 2-127. Breast Milk Intake Studies

Study	Number of Individuals	Type of Feeding	Sampling Time and Interval	Population Studied	Comments
Axelsson et al., 1987	30	Breast-fed infants and infants fed formula with two different energy contents	Studied over 2-day periods at 4.5 and 5.5 months of age	Swedish infants	Energy intake calculated from analysis of milk composition and measured intake rates; not corrected for insensible water loss
Brown et al., 1986a; 1986b	58, 60	Breast-fed infants	Studied over 3 days at each interval	Bangledeshi infants; marginally nourished mothers	Measured milk and nutrient intake; not corrected for insensible water loss
Butte et al., 1984	45	Exclusively breast-fed for first 4 months	Most infants studied over 1 day only, at 1, 2, 3, 4 months some studied over 48 to 96 hours to study individual variability	Mid- to upper-socioeconomic stratum	Estimated breast milk intake and energy intake; corrected for insensible water loss
Dewey and Lönnerdal, 1983	20	Most infants exclusively breast-fed	Two test weighings per month for 6 months	Mid to upper class from Davis area of California	Estimated brest milk intake and energy intake; did not correct for insensible water loss
Dewey et al., 1991a; 1991b	73	Breast-fed for 12 months; exclusively breast-fed for at least first 4 months	Test weighing over 4-day period every 3 months for 1 year	Highly educated, high-socioeconomic class from Davis area of California	Estimated breast milk intake; corrected for insensible water loss
Hofvander et al., 1982	50	25 breast-fed and 25 formula-fed infants	Studied 24-hour period at 1, 2, and 3 months	Swedish infants	Estimated breast milk and formula intake; no corrections for insensible water loss among breast-fed infants; estimated frequency of feeding

Table 2-127. Breast Milk Intake Studies (continued)

Study	Number of Individuals	Type of Feeding	Sampling Time and Interval	Population Studied	Comments
Köhler et al., 1984	59	25 fully breast-fed and 34 formula-fed infants	Studied over 48-hour periods at 6, 14, 22, and 26 weeks of age	Swedish infants	Estimated breast milk and formula intake; no corrections for insensible water loss among breast-fed infants; estimated energy intake
Maxwell and Burmaster, 1993	1,113	Population of 1,113 breast-fed infants based on a hypothetical population of 5,000 breast-fed and bottle-fed infants	NA	NA	Simulated distribution of breast milk intake based on data from Dewey 1991a; estimated percent of breast-fed infants under 12 months of age
NAS, 1991	NA	Breast-fed infants	NA	NA	Summarizes current state-of-knowledge on breast milk volume, composition and breast-feeding populations
Neville et al., 1988	13	Exclusively breast-fed infants	Infants studied over 24-hour period at each sampling interval; numerous sampling intervals over first year of life	Nonsmoking Caucasian mothers; middle- to upper-socioeconomic status	Estimated breast milk intake and lipid intake; corrected for insensible water loss; estimated frequency and duration of feeding
Pao et al., 1980	22	Completely or partially breast-fed infants	Three consecutive days at 1, 3, 6, and 9 months	White middle class from southeastern Ohio	Estimated breast milk intake; did not correct for insensible water loss

Table 2-128. Breast Milk Intake Rates Derived From Key Studies

Mean (mL/day)	Upper Percentile (mL/day) (mean plus 2 standard deviations)	Reference
1 Month		
600	918	Pao et al., 1980
729	987	Butte et al., 1984
747	1,095	Neville et al., 1988
673	1,057	Dewey and Lönnerdal, 1983
ave = 687	1,014	
3 Months		
833	—	Pao et al., 1980
702	924	Butte et al., 1984
712	934	Neville et al., 1988
782	1,126	Dewey and Lönnerdal, 1983
788	1,046	Dewey et al., 1991b
ave = 763	1,008	
6 Months		
682	—	Pao et al., 1980
744	978	Neville et al., 1988
896	1,140	Dewey and Lönnerdal, 1983
747	1,079	Dewey et al., 1991b
ave = 739	1,065	
9 Months		
600	1,027	Neville et al., 1988
627	1,049	Dewey et al., 1991b
ave = 614	1,038	
12 Months		
391	877	Neville et al., 1988
435	923	Dewey et al., 1991a; 1991b
ave = 413	900	
12-MONTH TIME WEIGHTED AVERAGE		
678	1,022	

averaging 413 mL/day for 12-month olds (Neville et al. 1988; Dewey et al. 1991; 1991b). When a time weighted average is calculated for the 12-month period, average breast milk intake is approximately 678 mL/day, and upper-percentile intake is approximately 1,022 mL/day. Therefore, the recommended mean breast milk intake rate is 730 mL/day for infants under 6 months of age and 678 mL/day for infants under 1 year of age. The recommended upper-percentile breast milk intake rate is 1,029 mL/day for infants under 6 months and 1,022 mL/day at 12 months of age.

Lipid Content and Lipid Intake - Recommended lipid intake rates are based on data from Butte et al. (1984) and Maxwell and Burmaster (1993). Butte et al. (1984) estimated that average lipid intake ranges from 23.6 ± 7.2 g/day (22.9 ± 7.0 mL/day) to 28.0 ± 8.5 g/day (27.2 ± 8.3 mL/day) between 1 and 4 months of age. These intake rates are consistent with those observed by Burmaster and Maxwell (1993) for infants under 1 year of age [(26.8 ± 7.4 g/day (26.0 ± 7.2 mL/day)]. Therefore, the recommended breast milk lipid intake rate for infants under 1 year of age is 26.0 mL/day and the upper-percentile value is 40.4 mL/day (based on the mean plus 2 standard deviations). The recommended value for breast milk fat content is 4.0 percent based on data from NAS (1991) and Butte et al. (1984).

2.6. INTAKE OF FISH AND SHELLFISH

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2.6.1. Background

Contaminated fish and shellfish are potential sources of human exposure to toxic chemicals. Pollutants are carried in the surface waters, but may also be stored and accumulated in the sediments as a result of complex physical and chemical processes. Consequently, fish and shellfish are exposed to these pollutants and may become sources of contaminated food.

Accurately estimating exposure to a toxic chemical among a population that consumes fish from a polluted water body requires an estimation of intake rates of the caught fish by both fishermen and their families. Commercially caught fish are marketed widely, making the prediction of an individual's consumption from a particular commercial source difficult. Since the catch of recreational and subsistence fishermen is not "diluted" in this way, these individuals and their families represent the population that is most vulnerable to exposure by intake of contaminated fish from a specific location.

This section focuses on the intake rates of fish and shellfish. The following sections address intake rates for the general population, recreational, and subsistence fishermen. Data are presented for intake rates for both marine and freshwater fish when available. The available studies have been classified as either key or relevant studies based on the applicability of their survey designs to exposure assessment needs. Recommended intake rates are based on the results of key studies, but other relevant studies are also presented to provide the reader with added perspective on the current state-of-knowledge pertaining to fish intake.

Survey data on fish consumption has been collected using a number of different approaches which need to be considered in interpreting the survey results. Generally, surveys are either "creel" studies in which fishermen are interviewed while fishing or broader population surveys using either mailed questionnaires or phone interviews. Both types of data can be useful for exposure assessment purposes, but somewhat different applications and interpretations are needed.

Creel studies address individuals actively involved in recreational or subsistence fishing. In principle, a creel study can be thought of as a representative study of fishing effort, i.e., fishermen hours expended at a site.[1] As such, the respondents will tend to be relatively frequent fishermen who contribute substantially to the overall fishing effort in the survey area. For example, in a day long survey at a site, there will be an opportunity to interview everyone who fish there daily, but only a small fraction of the fishermen who fish there only once each year.

In contrast, general population surveys sample people without respect to their activity (or lack thereof) in fishing. For example, a survey conducted by random digit dialing would yield a sample of all people who have phones, most of whom will not be active fishermen, i.e., the median frequency of recreational fishing in the general population will be zero. Similarly, a mail survey of licensed fishermen will include all people who have legal permission to fish (some of whom may not be active fishermen). In some cases, the majority of licensed fishermen in a survey will fish only occasionally, e.g., the median fishing frequency would be very low. In such a case, the upper tail of the distribution (frequent fishermen) would contribute the majority of fishing effort.

Both creel and broadly-based population survey data can be applied in exposure assessments addressing fish consumption. For example, using creel survey data, individuals at or below the median fishing frequency can be thought of as contributing 50 percent to the overall fishing effort. Similarly, individuals at or above the 90th percentile fishing frequency would be those frequent fishermen who contributed 10 percent to the overall fishing effort.[1]

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[1]Note that the interpretation of creel surveys as representing fishing effort in an area, while conceptually useful may not correspond with practice in all creel surveys. If creel data are to be used as a statistical representation of fishing effort in an area: (1) A survey approach would need to achieve similar likelihood that individuals fishing in different areas in the region would be sampled. (2) Temporal representativeness also must be achieved. (3) A specified protocol is needed for individuals encountered on multiple survey visits. If individuals are only surveyed once, as the number of survey periods increases, the survey data will begin to resemble a population survey of all individuals who ever fish and will not represent fishing effort. Finally, if the survey obtains data on the current catch of respondents, it should be recognized that additional fish may be caught before the end of the fishing session, and that that day's catch may not be typical of the fisherman's usual catch.

Data from a general population survey or a survey of all licensed fishermen, can be particularly useful in an assessment that seeks to estimate the number of individuals in a population having specified fishing frequency or fish consumption rates. Direct use of percentile data from population surveys can be misleading because, as noted above, infrequent fishermen can represent the majority of a surveyed population but may contribute only modestly to the overall fishing effort (and fish consumption). Population survey data categorized by fishing frequency can be a useful assessment tool, and this approach is utilized in some of the analyses presented in this handbook.

The U.S. EPA has prepared a review of and an evaluation of five different survey methods used for obtaining fish consumption data. They are:

- Recall-Telephone Survey;
- Recall-Mail Survey;
- Recall-Personal Interview;
- Diary; and
- Creel Census.

The reader is referred to *U.S. EPA 1992-Consumption Surveys for Fish and Shellfish* for more detail on these survey methods and their advantages and limitations.

2.6.2. Key General Population Studies

Javitz - Seafood Consumption Analysis - Javitz (1980) investigated human fish consumption by evaluating the data in the balance sheets of the National Marine Fisheries Service (NMFS); 1965-1966 and 1977-1978 National Food Consumption Surveys (USDA-NFCS); 1969-1970 NMFS Market Facts Survey; and the Tuna Research Institute Survey (TRI) conducted by the National Purchase Diary (NPD). Of the 4 surveys, the most reliable data source was determined by Javitz to be the survey data funded by the TRI and conducted by NPD. Later, NMFS received permission from TRI to obtain the data. The TRI survey was conducted from September 1973 through August 1974. The sample included 6,980 families who were currently participating in a syndicated national purchase diary panel; 2,400 additional families where the head of household was female, and under 35 years old; and 210 additional Black families (Javitz, 1980). Of the 9,590 families in the total sample, 7,662 families (25,162 individuals) completed the questionnaire, a response rate of 80 percent. The survey questionnaire was designed to collect information for one month from each individual. The survey population was divided into 12 different sample segments and data were collected for each of the 12 months from a different sample segment.

The survey data included the date the fish meal was consumed, species of fish consumed, and how packaged (canned, frozen, fresh, dried, smoked) (Javitz, 1980). It also included whether fresh fish were recreationally or commercially caught, number of servings consumed by family and guest, amount of fish prepared, and the amount of fish not consumed. Additionally, meals eaten at home and away from home were also recorded. According to Javitz (1980), the amount of fish prepared was determined as follows: "For fresh fish, the weight was recorded in ounces and may have included the weight of the head and tail. For frozen fish, the weight was recorded in packaged ounces, and it was noted whether the fish was breaded or combined with other ingredients (e.g., TV dinners). For canned fish, the weight was recorded in packaged ounces and it was noted whether the fish was canned in water, oil, or with other ingredients (e.g., soups)."

Javitz (1980) calculated means and 95th percentiles of monthly fish consumption for fish consumers in the United States (assumed to be 94 percent of the population) using the data from the TRI survey. The overall mean intake rate was calculated at 14.3 g/day and the 95th percentile intake rate at 41.7 g/day (Javitz 1980) . The calculated intake rates represent consumption patterns of the respondents who consumed fish in their one month survey. These survey respondents are estimated to represent, on a weighted basis, 94.0 percent of the U.S. population (Javitz, 1980). The sample was weighted to represent the U.S. population based on a number of census-defined controls (i.e., census region, household size, income, children, race, and age). The calculation of means, percentiles, and percentages was performed on a weighted basis with each person contributing to the mean in proportion to his/her assigned survey weight (Javitz, 1980).

The weighted mean and 95th percentile total fish intake rates calculated by Javitz (1980) are presented by demographic variables (race, sex, age, and census region) in Table 2-129. The method used to calculate these data is presented in Appendix 2C. The mean consumption of fish by Asian-American people is higher (21 g/d) than that of other groups (Table 2-129). Other obvious differences in intake rates are those between gender

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Table 2-129. Total Fish Consumption by Demographic Variables[a]

Demographic category	Intake (g/person/day) Mean	95th percentile
Race		
Caucasian	14.2	41.2
Black	16.0	45.2
Oriental	21.0	67.3
Other	13.2	29.4
Sex		
Female	13.2	38.4
Male	15.6	44.8
Age (years)		
0- 9	6.2	16.5
10-19	10.1	26.8
20-29	14.5	38.3
30-39	15.8	42.9
40-49	17.4	48.1
50-59	20.9	53.4
60-69	21.7	55.4
70+	13.3	39.8
Census Region		
New England	16.3	46.5
Middle Atlantic	16.2	47.8
East North Central	12.9	36.9
West North Central	12.0	35.2
South Atlantic	15.2	44.1
East South Central	13.0	38.4
West South Central	14.4	43.6
Mountain	12.1	32.1
Pacific	14.2	39.6

[a] The calculations in this table are based upon the respondents to the TRI Survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0 percent of the population of U.S. residents (See Appendix 2B).

Source: Javitz, 1980.

and between age groups. While males eat (15.6 g/d) slightly more fish than females (13.2 g/d), and adults eat more fish than children, the corresponding difference in body weights would probably compensate for the different intake rates in exposure calculations (Javitz, 1980). There appeared to be no large differences in regional intake rates, although higher rates are shown in the New England and Middle Atlantic Census Regions (Javitz, 1980).

The average and 95th percentile intake rates by age and gender are presented in Table 2-130. Tables 2-131 and 2-132 present the distribution of fish consumption for females and males, respectively, by age. Data are presented by the percentage of females/males in an age bracket who consume, on average, a specified amount (grams) of fish per day. Tables 2-133 through Table 2-136 present estimates of average fish intake rates as mean and 95th percentile for females and males by age, race, and census region. Table 2-137 presents mean total fish consumption by species.

Although Javitz (1980) concluded that the TRI data used were the most reliable data, he noted that the Market Facts Survey results were useful in estimating mean consumption. Market Facts Inc., under contract with NMFS, conducted a fish consumption survey starting in February 1969. A total of 1,586 households (4,864 participants) were selected at random from a large panel designed to parallel the U.S. census data with respect to population density, degree or urbanization, geographic region, household income and age. The head of the household completed a diary of fish purchases twice a month for 12 months. The fish diaries reported included purchases of fish products by item and weight, numbers of fish meals eaten away from home by item, and the number of meals consumed at home prepared from sport fish species. Data on fish consumption for each individual in the household were not obtained. Instead, individual consumption was estimated by dividing the total household consumption by the number of household members. Using these data, the average mean per capita intake was calculated to be 16.8 g/day (Javitz, 1980). Higher intake rates were reported for Jews at 33.9 g/day and for Blacks at 28.7 g/day. These data are shown in Table 2-138. Limitations and advantages associated with the study of Javitz (1980) are inherent to the data of the TRI survey.

A limitation of the study is that the questionnaire was administered to one-twelfth of the sample during each of the 12 months of the survey. Therefore, the data are consumption

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Table 2-130. Average and 95th Percentile of Fish Consumption (g/day) by Sex and Age[a]

	Total Fish		
	Age (years)	Mean	95th Percentile
Female	0 - 9	6.1	17.3
	10 - 19	9.0	25.0
	20 - 19	13.4	34.5
	30 - 39	14.9	41.8
	40 - 49	16.7	49.6
	50 - 59	19.5	50.1
	60 - 69	19.0	46.3
	70+	10.7	31.7
Male	0 - 9	6.3	15.8
	10 - 19	11.2	29.1
	20 - 19	16.1	43.7
	30 - 39	17.0	45.6
	40 - 49	18.2	47.7
	50 - 59	22.8	57.5
	60 - 69	24.4	61.1
	70+	15.8	45.7
Overall		14.3	41.7

[a] The calculations in this table are based upon the respondents to the TRI survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0% of the population of U.S. residents.

Source: Javitz, 1980.

Table 2-131. Percent Distribution of Total Fish Consumption for Females by Age[a]

	Consumption Category (g/day)										
	0.0-5.0	5.1-10.0	10.1-15.0	15.1-20.0	20.1-25.0	25.1-30.0	30.1-37.5	37.6-47.5	47.6-60.0	60.1-122.5	over 122.5
Age (yrs)	Percentage										
0-9	55.5	26.8	11.0	3.7	1.0	1.1	0.7	0.3	0.0	0.0	0.0
10-19	17.8	31.4	15.4	6.9	3.5	2.4	1.2	0.7	0.2	0.4	0.0
20-29	28.1	26.1	20.4	11.8	6.7	3.5	4.4	2.2	0.9	0.9	0.0
30-39	22.4	23.6	18.0	12.7	8.3	4.8	3.8	2.8	1.9	1.7	0.1
40-49	17.5	21.9	20.7	13.2	9.3	4.5	4.6	2.8	3.4	2.1	0.2
50-59	17.0	17.4	16.8	15.5	10.5	8.5	6.8	5.2	4.2	2.0	0.2
60-69	11.5	16.9	20.6	15.9	9.1	9.2	6.0	6.1	2.4	2.1	0.2
70+	41.9	22.1	12.3	9.7	5.2	2.9	2.6	1.2	0.8	1.2	0.1
Overall	28.9	24.0	16.8	10.7	6.4	4.3	3.5	2.4	1.6	1.2	0.1

[a] The percentage of females in an age bracket who consume, on average, a specified amount (grams) of fish per day.

The calculations in this table are based upon the respondents to the TRI survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0% of the population of U.S. residents.

Source: Javitz, 1980.

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Table 2-132. Percent Distribution of Total Fish Consumption for Males by Age[a]

	Consumption Category (g/day)										
	0.0-5.0	5.1-10.0	10.1-15.0	15.1-20.0	20.1-25.0	25.1-30.0	30.1-37.5	37.6-47.5	47.6-60.0	60.1-122.5	over 122.5
Age (yrs)	Percentage										
0-9	52.1	30.1	11.9	3.1	1.2	0.6	0.7	0.1	0.2	0.1	0.0
10-19	27.8	29.3	19.0	10.4	6.0	3.2	1.7	1.7	0.4	0.5	0.0
20-29	16.7	22.9	19.6	14.5	8.8	6.2	4.4	3.1	1.9	1.9	0.1
30-39	16.6	21.2	19.2	13.2	9.5	7.3	5.2	3.2	1.3	2.2	0.0
40-49	11.9	22.3	18.6	14.7	8.4	8.5	5.3	5.2	3.3	1.7	0.1
50-59	9.9	15.2	15.4	14.4	10.4	9.7	8.7	7.6	4.3	4.1	0.2
60-69	7.4	15.0	15.6	12.8	11.4	8.5	9.9	8.3	5.5	5.5	0.1
70+	24.5	21.7	15.7	9.9	9.8	5.3	5.4	3.1	1.7	2.8	0.1
Overall	22.6	23.1	17.0	11.3	7.7	5.7	4.6	3.6	2.2	2.1	0.1

[a] The percentage of males in an age bracket who consume, on average, a specified amount (grams) of fish per day.

The calculations in this table are based upon the respondents to the TRI survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0% of the population of U.S. residents.

Source: Javitz, 1980.

Table 2-133. Average Fish Consumption (g/day) for Females[a]

Demographic Category	Age (years)							
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
Race								
Caucasian	6.0	8.7	12.9	14.7	16.5	19.3	19.0	10.7
Black	8.5	10.9	20.7	16.5	20.5	24.4	19.5	12.9
Oriental	9.1	24.0	17.4	27.7	22.5	18.4	8.3	—
Other	8.4	11.7	14.2	26.3	10.9	22.5	17.3	6.8
Census Region								
New England	7.2	9.8	14.0	15.8	20.8	24.1	22.1	12.7
Middle Atlantic	6.2	10.0	14.0	17.3	18.7	21.7	22.9	11.2
East North Central	5.9	8.0	12.9	14.2	14.8	17.9	16.8	10.1
West North Central	5.0	7.5	12.0	13.5	13.8	16.8	17.2	8.9
South Atlantic	6.2	9.0	14.1	14.4	18.9	21.3	18.8	11.4
East South Central	6.1	7.8	13.4	13.7	15.2	15.5	19.4	12.4
West South Central	6.4	11.2	13.3	16.7	17.6	17.6	16.8	11.7
Mountain	5.9	9.0	12.9	13.1	13.3	15.3	15.8	12.1
Pacific	6.4	8.7	13.5	13.6	15.2	20.3	18.5	9.2
Community Type								
Outside Central City 250K-500K	5.2	8.6	12.1	14.0	20.5	14.8	17.0	8.9
Central City 250K-500K	7.0	7.0	12.6	15.6	13.3	21.9	18.0	11.2
Rural, non-SMSA	5.5	7.7	11.9	13.2	14.2	15.2	18.1	11.5
Central City, 2M or more	9.0	11.7	17.5	17.0	21.7	26.7	22.7	11.1
Outside Central City, 2M or	6.8	11.4	16.3	16.9	20.1	20.4	18.5	10.4
more	6.8	9.3	13.5	17.0	16.8	24.6	23.7	12.1
Central City 1M-2M	6.3	8.7	12.9	13.7	14.7	20.7	22.7	11.2
Outside Central City 1M-2M	6.2	9.6	13.3	17.4	14.8	20.3	18.3	9.8
Central City 500K-1M	6.2	9.2	13.2	14.3	18.6	20.0	18.9	9.9
Outside Central City 500K-1M	5.5	7.5	14.9	16.3	16.1	15.3	18.4	9.7
Central City 50K-250K	3.8	5.2	12.7	12.8	11.0	16.9	15.8	9.8
Outside Central City 50K-250K	5.9	8.7	12.4	13.7	15.3	17.9	17.4	10.8
Other urban								

[a] The calculations in this table are based upon the respondents to the TRI survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0% of the population of U.S. residents.

Source: Javitz, 1980.

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Table 2-134. 95th Percentile of Fish Consumption (g/day) for Females[a]

Demographic Category	Age (years)							
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
<u>Race</u>								
Caucasian	16.5	23.7	33.5	41.1	48.1	49.3	46.3	31.7
Black	23.4	29.2	55.6	44.4	53.3	55.1	38.5	24.9
Oriental	17.6	74.5	42.5	135.9	151.6	55.1	10.8	—
Other	19.6	35.9	56.7	119.6	24.6	26.5	17.3	15.4
<u>Census Region</u>								
New England	18.9	23.5	31.3	40.2	46.8	55.9	60.3	30.8
Middle Atlantic	15.2	27.2	34.2	54.2	50.2	54.4	62.3	39.3
East North Central	21.5	20.9	34.1	42.2	46.6	49.4	38.7	30.2
West North Central	12.4	21.6	34.3	36.8	39.5	46.0	39.1	25.0
South Atlantic	15.8	23.7	36.0	39.7	52.6	52.4	42.6	32.9
East South Central	15.3	20.0	33.1	35.2	43.9	38.4	48.7	26.5
West South Central	16.8	31.9	31.6	48.4	54.9	44.5	46.3	40.2
Mountain	18.8	25.9	37.6	30.8	34.1	50.1	42.8	41.6
Pacific	18.4	20.7	38.4	31.6	46.5	46.0	46.2	23.9
<u>Community Type</u>								
Outside Central City 250K-500K	13.5	23.1	31.9	28.1	89.1	36.4	41.8	25.1
Central City 250K-500K	19.1	19.0	34.9	40.8	46.1	58.9	46.3	38.4
Rural, non-SMSA	14.5	21.9	30.4	41.8	38.8	39.7	48.9	35.4
Central City, 2M or more	30.8	34.3	50.6	42.2	54.5	64.2	52.9	54.1
Outside Central City, 2M or	17.5	31.3	41.8	48.6	61.5	50.3	46.1	33.6
more	20.6	25.3	32.5	53.6	40.5	52.5	50.2	34.1
Central City 1M-2M	17.6	21.1	37.6	37.2	34.9	46.0	42.7	34.2
Outside Central City 1M-2M	15.4	26.2	32.9	48.4	35.3	50.0	44.6	24.4
Central City 500K-1M	18.5	23.0	33.8	41.1	50.8	56.2	64.6	30.2
Outside Central City 500K-1M	14.5	21.8	36.2	53.7	44.5	43.1	38.7	30.8
Central City 50K-250K	12.3	14.6	25.9	28.7	34.1	33.1	38.4	31.7
Outside Central City 50K-250K	17.2	26.7	33.1	35.2	46.6	48.6	48.7	30.5
Other urban								

[a] The calculations in this table are based upon the respondents to the TRI survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0% of the population of U.S. residents.

Source: Javitz, 1980.Javitz, 1980.

Table 2-135. Average Fish Consumption (g/day) for Males[a]

Demographic Category	Age (years)							
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
Race								
Caucasian	6.1	11.1	15.8	16.9	17.9	22.7	24.3	15.8
Black	7.9	12.7	20.7	18.1	22.2	24.5	26.7	15.4
Oriental	13.8	12.9	17.0	24.8	34.6	24.6	46.3	20.8
Other	7.3	10.7	19.5	13.1	15.5	12.2	30.0	12.7
Census Region								
New England	6.3	13.7	18.6	17.4	19.9	27.3	32.7	17.4
Middle Atlantic	6.7	11.5	17.0	19.8	19.9	26.4	28.7	17.1
East North Central	6.3	10.1	14.2	14.7	15.1	20.3	21.6	16.0
West North Central	5.0	9.7	13.3	12.2	15.2	22.1	20.4	13.3
South Atlantic	6.3	12.4	16.6	18.5	21.1	22.3	25.4	17.5
East South Central	7.1	8.2	16.0	14.7	15.2	17.3	23.7	14.9
West South Central	6.7	12.9	19.1	19.2	18.9	18.3	19.9	16.0
Mountain	5.3	11.4	14.4	15.4	15.4	18.5	17.3	13.3
Pacific	6.1	10.7	16.7	17.0	20.0	25.8	24.6	13.4
Community Type								
Outside Central City 250K-500K	5.1	8.0	13.5	13.1	16.8	18.6	19.5	14.0
Central City 250K-500K	6.1	12.0	13.7	18.9	15.4	23.5	27.6	15.3
Rural, non-SMSA	5.9	10.1	16.3	16.2	17.8	19.1	21.1	16.3
Central City, 2M or more	8.4	11.9	18.3	20.2	19.2	28.9	32.1	18.6
Outside Central City, 2M or more	6.7	12.1	16.2	17.9	19.8	24.6	25.4	15.9
Central City 1M-2M	7.7	12.6	16.8	19.3	19.7	22.8	22.9	18.2
Outside Central City 1M-2M	6.6	11.8	17.4	14.7	18.3	24.5	31.0	13.8
Central City 500K-1M	5.8	12.8	15.6	18.1	19.2	24.2	22.6	15.7
Outside Central City 500K-1M	6.4	10.9	17.6	15.3	19.9	23.9	22.8	15.9
Central City 50K-250K	5.1	10.0	15.0	19.0	22.7	17.6	23.3	13.2
Outside Central City 50K-250K	5.6	9.7	12.2	13.2	11.9	17.4	20.6	14.3
Other urban	6.1	11.1	16.0	18.0	16.4	21.6	22.9	15.0

[a] The calculations in this table are based upon the respondents to the TRI survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0% of the population of U.S. residents.

Source: Javitz, 1980.Javitz, 1980.

Table 2-136. 95th Percentile of Fish Consumption (g/day) for Males[a]

Demographic Category	Age (years)							
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
Race								
Caucasian	15.2	28.8	39.9	45.6	46.6	55.6	61.1	45.3
Black	25.1	33.2	57.0	40.6	50.6	63.3	63.0	47.8
Oriental	52.8	40.2	37.7	108.9	171.6	67.3	82.2	49.0
Other	17.4	29.2	86.4	31.4	16.8	28.1	30.0	20.7
Census Region								
New England	12.7	41.2	55.9	47.6	54.6	57.8	75.3	60.2
Middle Atlantic	18.0	30.1	55.0	55.4	49.0	63.3	81.4	50.9
East North Central	16.5	25.3	35.7	34.8	35.4	48.0	60.9	46.9
West North Central	12.6	23.7	37.3	32.6	35.6	59.9	57.1	37.1
South Atlantic	15.4	29.6	37.8	48.2	57.6	58.4	59.7	44.6
East South Central	16.9	23.8	41.6	42.3	42.3	33.1	62.7	44.9
West South Central	21.3	39.2	50.7	48.6	52.0	54.1	57.3	45.2
Mountain	12.6	26.3	31.8	38.8	31.3	55.4	41.3	39.4
Pacific	14.9	26.0	42.7	39.3	49.4	60.1	56.4	45.7
Community Type								
Outside Central City 250K-500K	14.2	20.9	45.0	35.5	44.1	36.5	52.4	35.0
Central City 250K-500K	14.9	36.6	28.2	38.0	39.4	59.5	53.2	39.4
Rural, non-SMSA	13.8	24.9	45.0	50.1	47.6	56.9	53.8	48.5
Central City, 2M or more	35.3	29.1	64.7	48.1	49.0	74.1	82.6	55.8
Outside Central City, 2M or more	14.9	31.2	41.9	54.2	54.4	65.3	72.9	44.6
Central City 1M-2M	25.1	31.3	41.5	53.3	48.5	52.1	57.6	42.2
Outside Central City 1M-2M	18.3	28.9	46.7	36.7	42.5	60.2	64.7	38.6
Central City 500K-1M	15.2	35.5	37.0	44.9	50.1	63.1	55.1	48.9
Outside Central City 500K-1M	16.4	27.7	51.2	36.2	57.7	57.7	51.2	48.2
Central City 50K-250K	10.9	43.6	35.3	50.8	55.5	50.7	55.5	56.4
Outside Central City 50K-250K	12.2	29.1	54.4	35.1	27.8	39.1	43.1	36.2
Other Urban	15.2	25.9	39.2	48.0	42.1	48.9	63.0	49.9

[a] The calculations in this table are based upon the respondents to the TRI survey who consumed fish in the month of the survey. TRI estimates that these respondents represent, on a weighted basis, 94.0% of the population of U.S. residents.

Source: Javitz, 1980.Javitz, 1980.

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Table 2-137. Mean Total Fish Consumption by Species[a]

Species	Mean consumption (g/day)	Species	Mean consumption (g/day)
Not reported	1.173	Mullet[b]	0.029
Abalone	0.014	oysters[b]	0.291
Anchovies	0.010	Perch (Freshwater)[b]	0.062
Bass[b]	0.258	Perch (Marine)	0.773
Bluefish	0.070	Pike (Marine)[b]	0.154
Bluegills[b]	0.089	Pollock	0.266
Bonito[b]	0.035	Pompano	0.004
Buffalofish	0.022	Rockfish	0.027
Butterfish	0.010	Sablefish	0.002
Carp[b]	0.016	Salmon[b]	0.533
Catfish (Freshwater)[b]	0.292	Scallops[b]	0.127
Catfish (Marine)[b]	0.014	Scup[b]	0.014
Clams[b]	0.442	Sharks	0.001
Cod	0.407	Shrimp[b]	1.464
Crab, King	0.030	Smelt[b]	0.057
Crab, other than King[b]	0.254	Snapper	0.146
Crappie[b]	0.076	Snook[b]	0.005
Croaker[b]	0.028	Spot[b]	0.046
Dolphin[b]	0.012	Squid and Octopi	0.016
Drums	0.019	Sunfish	0.020
Flounders[b]	1.179	Swordfish	0.012
Groupers	0.026	Tilefish	0.003
Haddock	0.399	Trout (Freshwater)[b]	0.294
Hake	0.117	Trout (Marine)[b]	0.070
Halibut[b]	0.170	Tuna, light	3.491
Herring	0.224	Tuna, White Albacore	0.008
Kingfish	0.009	Whitefish[b]	0.141
Lobster (Northern)[b]	0.162	Other finfish[b]	0.403
Lobster (Spiny)	0.074	Other shellfish[b]	0.013
Mackerel, Jack	0.002		
Mackerel, other than Jack	0.172		

[a] The calculations in this table are based upon the respondents to the TRI survey who consumed during the month in which the survey was conducted. TRI estimates that these respondents represent, on a weighted basis, 94.0 percent of the population of U.S. residents.

[b] Designated as freshwater or estuarine species by Stephan (1980).

Source: Javitz, 1980. 1980.

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Table 2-138. Fish Consumption Estimates From the Market Facts Survey

	Mean Per Capita Consumption (g/day)[a]				
Demographic Characteristics	Fresh and Frozen Finfish	Canned Fish	Fresh and Frozen Shellfish	Specialty Items	Total Fish
Race					
Black	14.212	9.383	3.735	1.345	28.675
White	4.909	6.422	2.153	1.770	15.254
Other	4.907	6.524	7.214	1.381	20.026
Not Specified	2.302	3.616	1.021	2.177	9.116
Religion					
Catholic	4.952	6.567	2.728	1.999	16.246
Jewish	12.547	12.539	2.774	6.040	33.899
Protestant	5.152	6.350	2.067	1.758	15.327
Other	7.412	6.034	3.540	2.231	19.217
Not Specified	0.877	1.785	0.504	0.765	3.931
Total Per Capita	6.12	6.61	2.26	1.77	16.76

[a] Converted from lb/year as reported in Javitz, 1980.

Source: Javitz, 1980.

patterns for one month for each individual in the sample segment and may not accurately reflect long-term consumption patterns. Another limitation with the TRI data is that participants may not have reported all fish consumed during the month's survey period. In addition, the distinction between recreationally caught and purchased fish was not made in this study. An advantage of the TRI study is that it is one of the few diet studies where the data were collected over the entire year. Other advantages are that the survey dataset was large, geographically representative, and the response rate was good (80 percent).

Pao - Foods Commonly Eaten by Individuals - Pao et al. (1982) used consumption information obtained in the 1977-78 USDA Nationwide Food Consumption Survey (NFCS) to obtain frequency distributions for intake rates of various foods. The data were collected during home interviews in which the respondent was asked to recall food intake for the day of the interview, the day preceding, and the day after the interview. Therefore, if the food was eaten at least once in 3 days, the quantity consumed was recorded. Of 37,874 individuals with 3-day diet records, 24.5 percent had eaten fish and/or shellfish at least once in 3 days; 20.5 percent had eaten fish on only 1 of 3 days; 3.6 percent had eaten fish on only 2 or 3 days; and 0.4 percent had eaten fish on all 3 days (Pao et al., 1982).

The distribution for total consumption of fish and shellfish was calculated by Pao et al. (1982) using the 1977-78 USDA food consumption survey data and are presented in Table 2-139. The mean fish intake rate for persons who reported consuming fish at least once during the 3-day recall period was estimated as 48 g/day. The median value was reported as 37 g/day and 128 g/day for the 95th percentile. These intake rates are more than twice those calculated by Javitz (1980) from the TRI data and the mean per capita intake from the Market Facts survey. The advantages of this study is that the data were derived from the USDA-NFCS and are representative of the U.S. population. A disadvantage is that these data are based on short-term dietary recall and may not accurately reflect long-term consumption patterns and may not be useful in evaluating distributions for fish intake. Also, these studies may not be representative of those recreational fishermen who consume larger amounts of fish than the general population.

USDA—Nationwide Food Consumption Survey 1987-88—The USDA conducted a survey in 1987-88 in 4,500 households (USDA, 1992b). Individuals were asked to recall

Table 2-139. Consumption of Fish and Shellfish

Percentiles	Age Group 1-2 Male and Female 1045[a]		3-5 Male and Female 1,719[a]		6-8 Male and Female 1,841[a]		9-14 Male 2,089[a]		9-14 Female 2,158[a]		15-18 Male 1,394[a]		15-18 Female 1,473[a]	
	Ave/[b] day	Qty/[c] eating occassion	Ave/ day	Qty/ eating occassion	Ave/ day	Qty/ eating occassion	Ave/ day	Qty/ eating occassion	Ave/ day	Qty/ eating occassion	Ave/ day	Qty/ eating occassion	Ave/ day	Qty/ eating occassion
5	3	8	4	12	6	19	9	28	8	19	9	20	9	24
25	9	28	13	36	19	40	19	56	19	45	27	57	19	56
50	19	43	25	57	28	72	30	84	28	79	37	85	33	85
75	28	58	37	85	38	112	47	113	38	112	57	142	57	130
90	47	112	49	113	57	160	76	170	61	168	84	200	85	225
95	56	125	57	170	75	170	96	255	82	206	113	252	112	270
99	93	168	96	240	131	288	154	425	151	288	297	454	217	568
Mean (SD)[d]	22 (18)	52 (38)	27 (19)	70 (51)	32 (24)	81 (58)	40 (31)	101 (78)	33 (25)	86 (62)	46 (45)	417 (115)	45 (42)	111 (102)
% Consumers[e]	17.3		20.4		22.5		22.0		22.9		21.1		24.2	

Total Individuals[f]

Percentile	Average Per Day for Consumers (g/day as consumed)	Quantity Consumed Per Eating Occasion (grams)
5	8	20
25	20	57
50	37	85
75	57	152
90	94	227
95	128	284
99	215	456
Mean (SD)[d]	48 (42)	117 (98)

(Continued)

Table 2-139. Consumption of Fish and Shellfish (continued)

[a] Total number of individuals (weighted) in each age group with 3-day diet record.
[b] Ave/day - average per day for consumers (g/day as consumed) who ate fish at least once in 3 days.
[c] Qty/eating occassion - quantity consumed per eating occassion (grams).
[d] (SD) - standard deviation.
[e] Percentage of consumers using food at least once in 3 days.
[f] Total number of individuals (weighted) 37,874 - includes only individuals (adults and children) with 3-day diet record

Source: Pao et al., 1982.

foods eaten over the past 3 days. The survey response rate was 37 percent. The purpose of the survey was to "analyze the food consumption behavior and dietary status of Americans" (USDA, 1992). A statistical sampling design was used to ensure that all seasons, geographic regions of the U.S., demographics, and socioeconomic groups were represented.

The mean per capita intake rates and intake rates for consumers of fish and shellfish by gender and age are shown in Table 2-140. These data are based on the 1987-1988 USDA Nationwide Food Consumption Survey. Intake rates for consumers-only were calculated by dividing the per capita intake rate by the fraction of the population consuming fish and shellfish in one day.

An advantage of this study is that these USDA NFCS data is a large geographically and seasonally balanced survey of a representative sample of the U.S. population. However, the data are based on short-term recall (1 day) and may not necessarily reflect long-term consumption patterns. In addition, the survey response rate was low.

U.S. EPA Analysis of 1987/88 USDA NFCS Data - EPA analyzed data from the 1987-88 USDA NFCS to generate distributions of intake rates for fish and shellfish. Fish products were identified in the NFCS data base according to NFCS-defined food codes. Appendix 2-A presents the codes used to determine the various food groups. Intake rates for these fish and shellfish products represent intake of all forms of the product (i.e., homeproduced and commercially produced). The USDA data were adjusted by applying the sample weights calculated by USDA to the data set prior to analysis. These weights were designed to "adjust for survey nonresponse and other vagaries of the sample selection process" (USDA, 1987/88). Intake rates were indexed to the body weight of the survey respondent and reported in units of g/kg-day. The food analysis was accomplished using the SAS statistical programming system (SAS, 1990).

Distributions of intake rates were determined by apportioning the amount of fish and shellfish used by a household among family members based on average serving sizes for specified age groups of the population and the number of weekly meals consumed by each family member. A detailed description of the methodology used to generate distributions of homegrown intake is presented in Section 2.7 (Intake Rates for Various Homeproduced Food Items) of this Handbook. The same method was used to determine the intake rates of all

Table 2-140. Mean Fish and Shellfish Intake in a Day, by Sex and Age[a]

	Per capita intake (g/day)	Percent of population Consuming fish and Shellfish in 1 day	Intake (g/day) for Consumers only[b]
Males or Females			
5 and under	4	6.0	67
Males			
6-11	3	3.7	79
12-19	3	2.2	136
20 and over	15	10.9	138
Females			
6-11	7	7.1	99
12-19	9	9.0	100
20 and over	12	10.9	110
All individuals	11	9.4	117

[a] Based on USDA Nationwide Food Consumption Survey (1987 to 1988) data for one day.

[b] Intake for users only was calculated by dividing the per capita consumption rate by the fraction of the population using fish and shellfish in a day.

Source: USDA, 1992.

forms (i.e., homeproduced and commercially prepared) of fish and shellfish presented in this section.

Fish and shellfish intake rates for various subcategories of the population within census regions are presented in Tables 2-141 through 2-145. These distributions represent intake rates for consumers of fish and shellfish only. These data represent one-week average intake rates for family members from those surveyed households who reported eating the fish and shellfish during the survey period. The total number of individuals in the data set (i.e., both individuals who ate fish and shellfish and those who did not eat fish and shellfish during the survey period) are presented in Table 2-185 in Section 2.7.2. These total number of individuals surveyed may be used with the consumer only data presented here to calculate per capita fish and shellfish intake rates for the survey population as shown in Section 2.7.2.

The advantages of these data are that they provide distributions of fish and shellfish intake rates and the NFCS was designed to be representative of the U.S. population. However, these data are based on short-term dietary recall and may not accurately reflect long-term intake patterns. Additional advantages and limitations of this analysis are outlined in Section 2.7.4 of this Handbook.

2.6.3. Other Relevant General Population Studies

Ruffle et al. - Lognormal Distributions for Fish Consumption by the General Population - Ruffle et al. (1994) developed a lognormal distribution to fit to data that were collected in the 1973-1974 TRI survey. The National Marine Fisheries Service (NMFS) obtained permission from TRI and analyzed data on the consumption of saltwater and freshwater finfish and shellfish from all sources in 10 regions of the U.S. (Ruffle et al. 1994). These data were previously analyzed and published by Rupp et al. (1980) for selected percentiles, averages, maximums and sample size (Ruffle et al., 1994).

The intake rates were calculated using three age groups: children (ages 1-11 years); teens (ages 12-18 years); and adults (ages 19-98 years). The data used are from a survey sample pool of 23,213 participants. One-twelfth of the sample pool received the survey during each of the 12 months. Each participant recorded their age and fish consumption patterns as number of meals and serving sizes for each type of fish eaten for one month.

Table 2-141. Intake of Total Fish and Shellfish (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	98387000	5220	8.71E-01	1.63E-04	0.00E+00	3.08E-02	8.56E-02	1.20E-01	2.22E-01	4.55E-01	9.36E-01	1.81E+00	2.82E+00	6.98E+00	4.52E+01
Age															
< 01	1369000	78	3.69E+00	4.95E-03	4.94E-02	2.12E-01	2.27E-01	6.74E-01	8.89E-01	1.82E+00	3.86E+00	7.81E+00	9.52E+00	3.08E+01	3.76E+01
01-02	3342000	186	2.47E+00	2.28E-03	2.01E-02	1.33E-01	2.80E-01	3.68E-01	6.43E-01	1.35E+00	2.68E+00	5.22E+00	8.41E+00	2.42E+01	4.52E+01
03-05	4588000	259	1.30E+00	7.64E-04	0.00E+00	1.08E-02	1.76E-01	2.61E-01	4.48E-01	8.00E-01	1.63E+00	2.61E+00	3.60E+00	7.72E+00	1.47E+01
06-11	9271000	517	8.85E-01	4.43E-04	0.00E+00	2.29E-02	1.09E-01	1.69E-01	2.82E-01	5.12E-01	1.02E+00	1.81E+00	2.90E+00	5.68E+00	2.53E+01
12-19	10168000	549	6.00E-01	2.64E-04	0.00E+00	0.00E+00	6.53E-02	9.89E-02	1.71E-01	3.36E-01	6.91E-01	1.38E+00	1.91E+00	5.03E+00	8.44E+00
20-39	30963000	1568	6.36E-01	1.77E-04	0.00E+00	2.55E-02	7.33E-02	9.89E-02	-- 1.78E-01	3.45E-01	6.82E-01	1.34E+00	2.12E+00	4.86E+00	1.30E+01
40-69	31036000	1675	8.36E-01	2.40E-04	0.00E+00	4.46E-02	8.69E-02	1.19E-01	2.34E-01	4.58E-01	9.20E-01	1.76E+00	2.63E+00	6.52E+00	1.61E+01
70 +	7650000	388	8.49E-01	3.92E-04	0.00E+00	5.59E-02	1.11E-01	1.53E-01	2.90E-01	5.25E-01	9.95E-01	1.84E+00	2.55E+00	4.55E+00	1.19E+01
Seasons															
Fall	24659000	803	8.48E-01	3.54E-04	0.00E+00	2.44E-02	7.22E-02	9.98E-02	1.75E-01	3.90E-01	8.75E-01	1.80E+00	2.89E+00	8.09E+00	3.08E+01
Spring	23715000	2085	9.04E-01	4.18E-04	0.00E+00	3.85E-02	9.05E-02	1.27E-01	2.34E-01	4.60E-01	9.22E-01	1.72E+00	2.66E+00	8.29E+00	4.52E+01
Summer	23472000	729	9.19E-01	2.76E-04	0.00E+00	1.94E-02	9.58E-02	1.43E-01	2.54E-01	5.00E-01	1.02E+00	1.94E+00	3.19E+00	6.98E+00	1.47E+01
Winter	26541000	1603	8.21E-01	2.43E-04	0.00E+00	4.23E-02	8.35E-02	1.20E-01	2.37E-01	4.58E-01	9.48E-01	1.75E+00	2.57E+00	6.14E+00	2.42E+01
Urbanization															
Central City	31140000	1230	1.09E+00	3.41E-04	0.00E+00	4.69E-02	9.60E-02	1.47E-01	2.76E-01	5.29E-01	1.20E+00	2.47E+00	3.73E+00	7.90E+00	3.76E+01
Nonmetropolitan	20771000	1475	8.13E-01	4.17E-04	0.00E+00	2.22E-02	6.82E-02	9.96E-02	1.74E-01	3.61E-01	8.00E-01	1.59E+00	2.52E+00	6.66E+00	4.52E+01
Surburban	46416000	2513	7.52E-01	1.77E-04	0.00E+00	3.69E-02	8.56E-02	1.25E-01	2.25E-01	4.45E-01	8.40E-01	1.53E+00	2.27E+00	5.91E+00	2.59E+01
Race															
Asian	1751000	89	2.55E+00	3.51E-03	2.29E-01	2.37E-01	2.81E-01	3.65E-01	6.39E-01	1.27E+00	2.36E+00	5.68E+00	9.52E+00	3.08E+01	3.08E+01
Black	12224000	614	1.39E+00	6.00E-04	0.00E+00	0.00E+00	9.71E-02	1.78E-01	3.38E-01	7.75E-01	1.52E+00	3.10E+00	4.86E+00	9.13E+00	3.76E+01
Native American	360000	23	1.54E+00	5.63E-03	5.79E-02	5.79E-02	5.79E-02	7.73E-02	1.35E-01	3.24E-01	6.49E-01	6.27E+00	6.27E+00	1.98E+01	1.98E+01
Other/NA	1911000	102	1.35E+00	1.64E-03	3.69E-02	7.32E-02	1.21E-01	2.71E-01	4.62E-01	7.57E-01	1.50E+00	2.64E+00	3.98E+00	6.72E+00	2.59E+01
White	82081000	4390	7.44E-01	1.45E-04	0.00E+00	3.51E-02	8.44E-02	1.15E-01	2.06E-01	4.08E-01	8.15E-01	1.56E+00	2.23E+00	5.61E+00	4.52E+01
Response to Questionnaire															
Do you fish?	23340000	1313	1.04E+00	5.05E-04	0.00E+00	5.51E-03	6.80E-02	9.58E-02	1.89E-01	4.31E-01	9.68E-01	2.14E+00	3.73E+00	9.57E+00	4.52E+01

Table 2-142. Intake of Total Fish and Shellfish (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	25237000	1253	8.57E-01	2.28E-04	0.00E+00	6.04E-02	1.06E-01	1.50E-01	2.84E-01	4.94E-01	1.02E+00	1.86E+00	2.72E+00	5.10E+00	1.52E+01
Age															
<01	220000	13	3.47E+00	7.48E-03	7.30E-01	7.30E-01	7.34E-01	7.34E-01	1.24E+00	1.82E+00	5.75E+00	8.86E+00	1.07E+01	1.07E+01	1.07E+01
01-02	585000	31	1.80E+00	1.61E-03	3.66E-01	3.66E-01	3.66E-01	6.13E-01	7.48E-01	1.35E+00	2.65E+00	3.72E+00	3.72E+00	5.10E+00	5.10E+00
03-05	906000	59	1.34E+00	1.27E-03	2.09E-01	2.09E-01	2.95E-01	3.62E-01	5.23E-01	8.93E-01	1.86E+00	2.90E+00	4.19E+00	4.68E+00	4.68E+00
06-11	2116000	110	1.13E+00	7.31E-04	1.48E-01	1.52E-01	2.08E-01	2.84E-01	4.29E-01	6.83E-01	1.41E+00	2.82E+00	3.86E+00	4.35E+00	4.61E+00
12-19	2819000	139	6.66E-01	3.99E-04	0.00E+00	2.22E-02	1.14E-01	1.63E-01	2.34E-01	4.24E-01	8.13E-01	1.46E+00	2.39E+00	3.27E+00	3.27E+00
20-39	7489000	351	5.80E-01	2.45E-04	0.00E+00	1.59E-02	8.64E-02	1.16E-01	1.92E-01	3.63E-01	7.65E-01	1.30E+00	1.62E+00	2.57E+00	6.32E+00
40-69	8699000	443	9.20E-01	4.65E-04	4.73E-02	6.71E-02	1.01E-01	1.45E-01	3.08E-01	5.57E-01	1.05E+00	1.89E+00	2.53E+00	5.54E+00	1.52E+01
70 +	2403000	107	8.19E-01	5.35E-04	1.02E-01	1.11E-01	1.39E-01	1.90E-01	3.25E-01	5.38E-01	9.20E-01	1.84E+00	2.75E+00	4.55E+00	4.55E+00
Seasons															
Fall	6066000	178	1.01E+00	6.61E-04	0.00E+00	0.00E+00	9.44E-02	1.37E-01	2.23E-01	4.78E-01	1.24E+00	2.72E+00	3.65E+00	6.14E+00	1.52E+01
Spring	6172000	485	7.57E-01	3.01E-04	0.00E+00	3.84E-02	1.06E-01	1.50E-01	2.84E-01	5.18E-01	9.53E-01	1.58E+00	2.19E+00	4.04E+00	5.10E+00
Summer	5241000	145	8.82E-01	5.26E-04	8.41E-02	8.93E-02	1.41E-01	1.92E-01	3.21E-01	4.89E-01	8.74E-01	1.73E+00	3.27E+00	6.32E+00	8.86E+00
Winter	7758000	445	7.97E-01	3.08E-04	4.15E-02	6.28E-02	1.01E-01	1.41E-01	2.85E-01	5.34E-01	1.08E+00	1.82E+00	2.38E+00	3.31E+00	1.07E+01
Urbanization															
Central City	5962000	202	1.27E+00	6.86E-04	5.32E-02	9.44E-02	1.69E-01	2.20E-01	3.74E-01	7.48E-01	1.49E+00	2.86E+00	4.33E+00	6.32E+00	1.52E+01
Nonmetropolitan	3213000	235	5.88E-01	3.17E-04	0.00E+00	2.22E-02	9.37E-02	1.20E-01	1.86E-01	3.74E-01	8.13E-01	1.41E+00	1.62E+00	2.40E+00	4.17E+00
Surburban	16062000	816	7.57E-01	2.32E-04	0.00E+00	5.84E-02	1.00E-01	1.44E-01	2.73E-01	4.83E-01	9.09E-01	1.61E+00	2.24E+00	5.08E+00	1.07E+01
Race															
Asian	225000	8	1.49E+00	9.09E-04	6.48E-01	6.48E-01	6.48E-01	6.48E-01	1.50E+00	1.53E+00	1.90E+00	1.93E+00	1.93E+00	1.93E+00	1.93E+00
Black	2069000	76	1.30E+00	7.48E-04	1.51E-01	1.51E-01	1.78E-01	2.50E-01	3.86E-01	1.05E+00	1.52E+00	2.89E+00	3.86E+00	4.35E+00	5.10E+00
Native American	38000	4	1.48E+00	7.60E-03	3.66E-01	3.66E-01	3.66E-01	3.66E-01	3.66E-01	4.84E-01	2.40E+00	4.17E+00	4.17E+00	4.17E+00	4.17E+00
Other/NA	411000	25	1.09E+00	1.09E-03	3.21E-01	3.21E-01	3.21E-01	3.21E-01	5.47E-01	9.51E-01	1.23E+00	2.57E+00	2.57E+00	2.64E+00	2.64E+00
White	22494000	1140	8.05E-01	2.43E-04	0.00E+00	5.84E-02	1.01E-01	1.42E-01	2.62E-01	4.79E-01	9.19E-01	1.77E+00	2.38E+00	5.11E+00	1.52E+01
Response to Questionnaire															
Do you fish?	4149000	225	6.75E-01	4.35E-04	0.00E+00	5.57E-02	9.11E-02	1.14E-01	2.33E-01	4.24E-01	8.47E-01	1.47E+00	1.94E+00	2.62E+00	1.07E+01

Table 2-143. Intake of Total Fish and Shellfish (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	22179000	1305	8.06E-01	3.88E-04	0.00E+00	3.06E-02	7.59E-02	1.07E-01	1.89E-01	3.75E-01	7.36E-01	1.60E+00	2.76E+00	7.81E+00	3.08E+01
Age															
< 01	377000	23	5.91E+00	1.38E-02	4.94E-02	4.94E-02	2.20E-01	7.99E-01	8.67E-01	2.93E+00	7.81E+00	1.55E+01	3.08E+01	3.08E+01	3.08E+01
01-02	1013000	59	2.51E+00	2.69E-03	2.01E-02	2.01E-02	2.30E-01	4.50E-01	7.26E-01	1.73E+00	2.90E+00	6.38E+00	9.13E+00	1.10E+01	1.10E+01
03-05	1374000	79	1.06E+00	1.02E-03	1.08E-02	1.08E-02	1.51E-01	2.57E-01	4.03E-01	6.13E-01	1.53E+00	1.85E+00	3.13E+00	6.94E+00	6.94E+00
06-11	2514000	156	8.02E-01	1.24E-03	7.59E-03	3.77E-02	7.80E-02	1.31E-01	1.97E-01	3.36E-01	6.40E-01	1.54E+00	3.30E+00	5.68E+00	2.53E+01
12-19	2088000	133	3.92E-01	3.27E-04	3.06E-02	3.06E-02	6.71E-02	9.89E-02	1.53E-01	2.34E-01	4.27E-01	8.94E-01	1.16E+00	3.49E+00	4.29E+00
20-39	7696000	427	5.19E-01	2.94E-04	0.00E+00	2.44E-02	6.58E-02	8.98E-02	1.63E-01	2.98E-01	5.48E-01	1.06E+00	1.73E+00	3.24E+00	9.08E+00
40-69	6055000	354	6.69E-01	4.57E-04	3.15E-02	4.87E-02	7.75E-02	1.10E-01	1.89E-01	3.81E-01	6.97E-01	1.31E+00	2.02E+00	6.52E+00	1.61E+01
70 +	1062000	74	7.17E-01	6.92E-04	4.28E-02	4.28E-02	8.50E-02	1.40E-01	2.04E-01	4.76E-01	1.00E+00	1.88E+00	2.13E+00	2.92E+00	4.02E+00
Seasons															
Fall	6427000	220	9.46E-01	1.06E-03	2.77E-03	7.59E-03	5.72E-02	9.89E-02	1.57E-01	2.98E-01	5.84E-01	1.73E+00	3.24E+00	1.10E+01	3.08E+01
Spring	5002000	528	6.66E-01	7.41E-04	0.00E+00	4.17E-02	7.11E-02	1.04E-01	1.83E-01	3.27E-01	6.10E-01	1.30E+00	1.86E+00	5.10E+00	2.53E+01
Summer	4691000	154	8.50E-01	5.26E-04	4.18E-02	4.87E-02	1.09E-01	1.43E-01	2.40E-01	4.80E-01	8.94E-01	1.79E+00	2.99E+00	6.38E+00	7.81E+00
Winter	6059000	403	7.38E-01	4.60E-04	3.06E-02	4.01E-02	7.96E-02	1.06E-01	2.09E-01	3.86E-01	7.56E-01	1.70E+00	2.45E+00	5.71E+00	1.31E+01
Urbanization															
Central City	9222000	370	1.05E+00	7.78E-04	3.06E-02	6.52E-02	9.89E-02	1.36E-01	2.30E-01	4.44E-01	9.44E-01	2.17E+00	3.30E+00	9.52E+00	3.08E+01
Nonmetropolitan	6502000	520	6.90E-01	6.22E-04	2.77E-03	7.59E-03	4.34E-02	7.75E-02	1.50E-01	2.86E-01	6.47E-01	1.30E+00	2.13E+00	6.56E+00	2.53E+01
Surburban	6455000	415	5.76E-01	3.49E-04	0.00E+00	4.30E-02	7.96E-02	1.06E-01	1.83E-01	3.31E-01	6.20E-01	1.20E+00	1.76E+00	4.93E+00	9.08E+00
Race															
Asian	588000	27	4.70E+00	9.64E-03	2.57E-01	2.57E-01	2.57E-01	3.57E-01	3.75E-01	1.35E+00	5.68E+00	1.10E+01	3.08E+01	3.08E+01	3.08E+01
Black	1744000	69	1.54E+00	1.60E-03	1.40E-01	1.40E-01	2.01E-01	2.90E-01	3.81E-01	6.60E-01	1.55E+00	3.30E+00	7.81E+00	9.13E+00	9.13E+00
Native American	8000	1	1.37E+00	0.00E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00
Other/NA	165000	5	1.36E+00	3.87E-03	1.18E-01	1.18E-01	1.18E-01	1.18E-01	2.75E-01	5.46E-01	3.98E+00	3.98E+00	3.98E+00	3.98E+00	3.98E+00
White	19674000	1203	6.19E-01	2.44E-04	0.00E+00	3.06E-02	7.21E-02	1.01E-01	1.75E-01	3.36E-01	6.53E-01	1.38E+00	1.95E+00	5.65E+00	2.53E+01
Response to Questionnaire															
Do you fish?	6977000	420	1.02E+00	1.06E-03	0.00E+00	7.59E-03	5.21E-02	8.67E-02	1.57E-01	3.20E-01	7.28E-01	1.98E+00	3.96E+00	1.31E+01	3.08E+01

Table 2-144. Intake of Total Fish and Shellfish (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	31678000	1670	9.88E-01	3.32E-04	0.00E+00	2.75E-02	8.15E-02	1.19E-01	2.34E-01	4.84E-01	1.05E+00	2.16E+00	3.35E+00	7.89E+00	4.52E+01
Age															
<01	409000	23	3.38E+00	8.49E-03	2.27E-01	2.27E-01	2.27E-01	7.25E-01	1.45E+00	2.16E+00	4.24E+00	4.76E+00	6.15E+00	3.76E+01	3.76E+01
01-02	919000	53	3.17E+00	6.21E-03	1.33E-01	1.33E-01	2.62E-01	3.62E-01	6.54E-01	1.35E+00	5.01E+00	6.33E+00	8.41E+00	3.73E+01	4.52E+01
03-05	1276000	69	1.87E+00	2.19E-03	1.24E-01	1.24E-01	2.61E-01	2.88E-01	5.90E-01	1.14E+00	2.06E+00	2.96E+00	7.07E+00	1.47E+01	1.47E+01
06-11	2619000	139	9.06E-01	6.52E-04	0.00E+00	0.00E+00	8.63E-02	1.41E-01	3.04E-01	6.10E-01	1.07E+00	1.93E+00	3.19E+00	5.36E+00	7.85E+00
12-19	3315000	174	7.43E-01	6.34E-04	0.00E+00	0.00E+00	5.29E-02	9.43E-02	1.69E-01	3.51E-01	7.81E-01	1.74E+00	2.20E+00	6.77E+00	8.44E+00
20-39	9633000	481	7.44E-01	3.50E-04	0.00E+00	3.92E-02	7.26E-02	9.71E-02	1.87E-01	3.68E-01	8.03E-01	1.65E+00	2.58E+00	4.86E+00	1.30E+01
40-69	10858000	594	9.17E-01	4.64E-04	0.00E+00	2.20E-02	8.18E-02	1.18E-01	2.29E-01	4.53E-01	9.93E-01	1.99E+00	3.25E+00	8.06E+00	1.58E+01
70+	2649000	137	9.99E-01	8.98E-04	0.00E+00	8.26E-02	1.20E-01	1.84E-01	3.17E-01	6.22E-01	1.25E+00	1.77E+00	2.60E+00	1.19E+01	1.19E+01
Seasons															
Fall	6796000	220	7.48E-01	3.89E-04	2.09E-02	2.46E-02	6.12E-02	9.71E-02	2.16E-01	4.28E-01	8.31E-01	1.58E+00	2.78E+00	5.04E+00	8.09E+00
Spring	8082000	687	1.17E+00	1.01E-03	0.00E+00	4.00E-02	9.22E-02	1.25E-01	2.52E-01	5.01E-01	1.08E+00	2.25E+00	3.63E+00	1.43E+01	4.52E+01
Summer	8635000	278	1.09E+00	5.48E-04	0.00E+00	0.00E+00	8.72E-02	1.27E-01	2.30E-01	5.66E-01	1.31E+00	2.55E+00	3.72E+00	6.98E+00	1.47E+01
Winter	8165000	485	8.94E-01	4.59E-04	0.00E+00	4.23E-02	7.79E-02	1.12E-01	2.26E-01	4.66E-01	1.02E+00	1.76E+00	2.94E+00	7.07E+00	1.04E+01
Urbanization															
Central City	8745000	372	1.25E+00	6.85E-04	0.00E+00	0.00E+00	8.52E-02	1.20E-01	2.76E-01	6.22E-01	1.47E+00	2.94E+00	4.86E+00	7.89E+00	3.76E+01
Nonmetropolitan	9020000	577	1.03E+00	8.22E-04	0.00E+00	3.85E-02	7.51E-02	1.04E-01	1.93E-01	4.33E-01	1.03E+00	2.00E+00	3.27E+00	1.19E+01	4.52E+01
Surburban	13913000	721	7.98E-01	3.11E-04	0.00E+00	2.75E-02	8.18E-02	1.30E-01	2.34E-01	4.57E-01	8.95E-01	1.60E+00	2.60E+00	6.41E+00	1.30E+01
Race															
Asian	514000	28	1.57E+00	1.85E-03	2.29E-01	2.29E-01	2.37E-01	5.05E-01	6.74E-01	1.32E+00	1.49E+00	2.54E+00	5.22E+00	5.22E+00	5.22E+00
Black	7307000	416	1.38E+00	8.42E-04	0.00E+00	0.00E+00	7.89E-02	1.26E-01	3.11E-01	7.58E-01	1.57E+00	3.10E+00	5.01E+00	8.41E+00	3.76E+01
Native American	111000	5	4.03E+00	1.55E-02	2.77E-01	2.77E-01	2.77E-01	2.77E-01	6.49E-01	1.57E+00	6.27E+00	1.58E+01	1.58E+01	1.58E+01	1.58E+01
Other/NA	661000	36	1.56E+00	2.04E-03	3.69E-02	3.69E-02	1.17E-01	2.25E-01	2.72E-01	7.40E-01	2.21E+00	3.87E+00	6.33E+00	6.33E+00	6.33E+00
White	23085000	1185	8.19E-01	3.46E-04	0.00E+00	4.18E-02	7.92E-02	1.14E-01	2.10E-01	4.05E-01	8.26E-01	1.65E+00	2.64E+00	7.05E+00	4.52E+01
Response to Questionnaire															
Do you fish?	7495000	415	1.32E+00	1.03E-03	0.00E+00	0.00E+00	6.34E-02	9.95E-02	2.52E-01	5.86E-01	1.35E+00	3.19E+00	4.86E+00	1.03E+01	4.52E+01

Table 2-145. Intake of Total Fish and Shellfish (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	19233000	990	7.75E-01	3.26E-04	0.00E+00	3.08E-02	8.33E-02	1.11E-01	2.06E-01	4.28E-01	8.47E-01	1.60E+00	2.20E+00	6.01E+00	2.59E+01
Age															
< 01	363000	19	1.88E+00	2.72E-03	2.12E-01	2.12E-01	2.12E-01	3.39E-01	6.82E-01	1.26E+00	3.66E+00	5.17E+00	5.17E+00	6.01E+00	6.01E+00
01-02	825000	43	2.11E+00	4.93E-03	1.55E-01	1.55E-01	2.71E-01	2.86E-01	4.82E-01	8.45E-01	1.53E+00	3.35E+00	5.07E+00	2.59E+01	2.59E+01
03-05	1002000	51	9.06E-01	7.25E-04	8.78E-02	8.78E-02	1.68E-01	1.77E-01	3.12E-01	7.73E-01	1.36E+00	1.98E+00	2.12E+00	3.60E+00	3.60E+00
06-11	1992000	111	7.15E-01	6.45E-04	2.25E-02	1.16E-01	1.49E-01	1.69E-01	2.43E-01	4.96E-01	9.40E-01	1.39E+00	1.74E+00	8.28E+00	8.28E+00
12-19	1946000	103	4.83E-01	4.75E-04	1.84E-02	5.46E-02	6.53E-02	7.96E-02	1.32E-01	2.73E-01	6.76E-01	1.04E+00	1.57E+00	1.82E+00	5.91E+00
20-39	6145000	309	6.79E-01	5.10E-04	0.00E+00	2.03E-02	7.32E-02	9.89E-02	1.62E-01	3.40E-01	6.82E-01	1.34E+00	2.13E+00	9.34E+00	9.57E+00
40-69	5424000	284	7.24E-01	4.45E-04	3.08E-02	3.51E-02	9.21E-02	1.24E-01	2.25E-01	4.41E-01	8.54E-01	1.41E+00	2.20E+00	4.28E+00	1.12E+01
70 +	1536000	70	7.29E-01	6.59E-04	1.14E-02	1.14E-02	9.33E-02	1.27E-01	2.22E-01	4.41E-01	9.08E-01	1.77E+00	3.08E+00	3.73E+00	3.73E+00
Seasons															
Fall	5370000	185	6.74E-01	4.80E-04	0.00E+00	2.59E-02	5.86E-02	8.78E-02	1.49E-01	3.38E-01	8.00E-01	1.60E+00	2.03E+00	6.01E+00	1.12E+01
Spring	4459000	385	8.86E-01	8.25E-04	1.14E-02	2.42E-02	9.75E-02	1.32E-01	2.43E-01	4.61E-01	9.28E-01	1.55E+00	2.74E+00	8.78E+00	2.59E+01
Summer	4845000	150	7.26E-01	4.71E-04	1.94E-02	2.55E-02	1.00E-01	1.38E-01	2.27E-01	4.83E-01	8.28E-01	1.53E+00	1.94E+00	3.66E+00	9.57E+00
Winter	4559000	270	8.38E-01	8.17E-04	3.08E-02	4.04E-02	8.24E-02	1.25E-01	2.37E-01	4.55E-01	8.33E-01	1.75E+00	2.95E+00	5.17E+00	2.42E+01
Urbanization															
Central City	7211000	286	8.00E-01	3.87E-04	1.14E-02	3.51E-02	9.33E-02	1.27E-01	2.52E-01	4.85E-01	9.78E-01	1.79E+00	2.21E+00	4.28E+00	9.57E+00
Nonmetropolitan	2036000	143	6.01E-01	6.85E-04	5.79E-02	6.58E-02	7.96E-02	9.96E-02	1.49E-01	3.44E-01	6.26E-01	1.29E+00	1.69E+00	6.01E+00	8.88E+00
Surburban	9986000	561	7.93E-01	5.45E-04	0.00E+00	2.55E-02	7.58E-02	1.07E-01	1.91E-01	3.97E-01	8.33E-01	1.47E+00	2.13E+00	8.28E+00	2.59E+01
Race															
Asian	424000	26	1.32E+00	1.90E-03	2.81E-01	2.81E-01	2.81E-01	4.41E-01	7.02E-01	9.94E-01	1.34E+00	2.67E+00	3.60E+00	7.11E+00	7.11E+00
Black	1104000	53	1.40E+00	2.15E-03	0.00E+00	0.00E+00	9.06E-02	1.84E-01	2.71E-01	3.98E-01	1.37E+00	3.65E+00	8.28E+00	9.57E+00	9.57E+00
Native American	203000	13	1.97E-01	3.64E-04	5.79E-02	5.79E-02	5.79E-02	7.73E-02	8.06E-02	1.35E-01	3.24E-01	5.51E-01	5.51E-01	5.51E-01	5.51E-01
Other/NA	674000	36	1.30E+00	4.03E-03	7.32E-02	7.32E-02	2.75E-01	2.76E-01	4.94E-01	6.24E-01	8.65E-01	1.77E+00	2.70E+00	2.59E+01	2.59E+01
White	16828000	862	7.07E-01	2.96E-04	1.14E-02	3.48E-02	8.33E-02	1.08E-01	1.93E-01	4.04E-01	8.20E-01	1.45E+00	1.99E+00	4.43E+00	2.42E+01
Response to Questionnaire															
Do you fish?	4719000	253	9.23E-01	9.31E-04	1.84E-02	2.59E-02	6.67E-02	9.37E-02	1.77E-01	3.55E-01	8.90E-01	1.85E+00	3.49E+00	9.57E+00	2.42E+01

The 12-month duration of the survey was designed to account for seasonal variation (Ruffle et al. 1994).

Ruffle et al. (1994) converted annual NMFS intake rates that were calculated by Rupp et al. (1980) into daily intake rates and modeled the summary statistics to determine the best fit lognormal distribution. Ruffle et al. (1994) used three methods (Non-linear Optimization, First Probability Plot, and Second Probability Plot) to fit lognormal distributions to 89 datasets of fish consumption from the NMFS Survey. Ruffle et al. (1994) determined that the best fit was obtained from the nonlinear optimization method (NLO). Therefore, only the results of the NLO analysis are presented (See Table 2-146). This table presents the optimal values for the mean (μ) and the standard deviation (σ) from the NLO method, including the minimum value of the objective function (min SS). Also, Table 2-146 shows five relationships based on Daily Consumption Rate (DCR) DCR 50, DCR 90, DCR 99, DCR_{avg}, and DCR_{max} that were used to obtain values of μ and σ from the lognormal fit by the NLO method. Ruffle et al. (1994) observed that the NLO predicted DCR 50, DCR_{avg} and DCR_{max} were more accurate and less bias than other methods when the analysis was restricted to 77 data sets. Therefore, they concluded that the "results for 77 datasets fit by the "full information" NLO method with min SS <30 are well suited for risk assessment that focuses on the diet of people in the general population while the other 12 datasets may be appropriate for risk assessment when used with care and sensitivity analyses (Ruffle et al., 1994)." In addition, Ruffle et al. (1994) noted that there is an overall increase of about 25 percent in fish consumption since the survey was conducted. Therefore, adding 0.22 (ln 1.25) to each of the μ value obtained compensates for this increase in fish consumption in the U.S. (Ruffle et al., 1994).

Limitations and advantages of this study are those associated with the NMFS dataset used by Rupp et al. (1980). The NMFS data are from all sources (i.e., purchased, consumed in restaurants, gifts, etc.). The following limitations of the NMFS survey were noted by Ruffle et al: (1) the participants may not have reported all the fish that was consumed in the month and result in an underestimate of amount of fish consumed; (2) the participants may have over or-underestimated portion size; (3) the type of fish consumed may have been categorized improperly; (4) consumption of certain fish types on a long-term basis

Table 2-146. Best Fits of Lognormal Distributions Using the NonLinear Optimization (NLO) Method

	Adults	Teenagers	Children
Shellfish			
μ	1.37	-0.183	0.854
σ	0.858	1.092	0.730
(min SS)	27.57	1.19	16.06
Finfish (freshwater)			
μ	0.34	0.578	-0.559
σ	1.183	0.822	1.141
(min SS)	6.45	23.51	2.19
Finfish (saltwater)			
μ	2.311	1.691	0.881
σ	0.72	0.830	0.770
(min SS)	30.13	0.33	4.31

The following equations were may be used with the appropriate μ and σ value to obtain an average Daily Consumption Rate (DCR) and percentiles of the DCR distribution. These values have been adjusted to account for a 25% increase in consumption since Rupp's data were collected.

$$DCR50 = \exp(\mu)$$
$$DCR90 = \exp[\mu + z(0.90) \cdot \sigma]$$
$$DCR99 = \exp[\mu + z(0.99) \cdot \sigma]$$
$$DCR_{avg} = \exp[\mu + 0.5 \cdot \sigma^2]$$

Source: Ruffle et al. 1994

may have been underestimated; (5) the survey did not focus on the consumption patterns of sport anglers who catch and eat fish from particular waterbodies; and (6) because respondents reported on fish consumption for one month, a <10 percent chance exist for capturing participants who eat fish only once per year. Despite these limitations, Ruffle et al. (1994) suggests that the data of Rupp are an excellent basis for Monte Carlo analyses.

An advantage associated with the NMFs data is that the data are large regional sample and the survey was designed to capture fish consumption patterns over 1 year (Ruffle et al. 1994). The data are representative of the general U.S. population; it includes a subset of the general population eating > 150 g/day (i.e., large amounts of fish) (Ruffle et al., 1994).

2.6.4. Key Recreational (Marine Fish Studies)

Puffer et al. - Intake Rates of Potentially Hazardous Marine Fish Caught in the Metropolitan Los Angeles Area - Puffer et al. (1981) conducted a creel survey with sport fishermen in the Los Angeles area in 1980. The survey was conducted at 12 sites in the harbor and coastal areas to evaluate intake rates of potentially hazardous marine fish and shellfish by local, non-professional fishermen. In addition, it was used to identify and estimate the size of population subgroups with large fish intake rates. The survey was conducted for the full 1980 calendar year, although inclement weather in January, February, and March limited the interview days. Each site was surveyed an average of three times per month, on different days, and at a different time of the day. The survey questionnaire was designed to collect information on demographic characteristics; fishing patterns; species, number, and weights of fish caught; and fish consumption patterns. Interviews were conducted with 1,059 anglers who had caught fish, and the anglers were interviewed only once during the entire survey period. Sport fishermen kept 67 to 89 percent of the finfish and 97 percent of the shellfish catch. The cumulative distribution of estimated total fish and shellfish consumption by surveyed sport anglers in the Los Angeles area is presented in Table 2-147. The median fish and shellfish intake rate was reported to be approximately 37 g/day and the 90th percentile intake rate was approximately 225 g/day. Intake rates were calculated only for those fishermen who indicated that they eat the fish they catch. A mean value was not presented.

Table 2-147. Cumulative Distribution of Total Fish/Shellfish Consumption by Surveyed Sport Fishermen in the Metropolitan Los Angeles Area

Percentile	Intake rate[a] (g/person/day)
5	2.3
10	4.0
20	8.3
30	15.5
40	23.9
50	36.9
60	53.2
70	79.8
80	120.8
90	224.8
95	338.8

[a] Based on total grams of edible fish regardless of species.

Source: Puffer et al. (1981).

Puffer estimated daily consumption (grams/day-person) for each species using the following equation:

$$(K \times N \times W)/E \times (F/365) \qquad \text{(Eqn. 2-7)}$$

where:

K = edible proportion (by weight) of fish;
F = frequency of fishing/year;
E = number of fish eaters in family/living group;
W = average weight of (grams) fish in catch; and
N = number of fish in catch.

Assumptions associated with the calculation are: (1) Amount of fish and average weight of fish per catch is constant; (2) The frequency of fishing for each fisherman is constant throughout the year; (3) The number of family fish-eaters is constant (greater than zero), and the catch is shared evenly among family members; and (4) All of the catch is eaten, and 25 to 50 percent of the weight of the fish is edible (Puffer et al., 1981).

Data were obtained for successful fishermen. If fishermen who caught no fish were included, intake estimates would be somewhat lower. On the other hand, the survey assumed that the number of fish caught at the time of the interview was all that would be caught that day. If it were possible to interview fishermen at the conclusion of their fishing day, intake estimates could be potentially higher.

A description of consumption patterns for primary fish species kept, is presented in Table 2-148. Differences in the participation and intake rates of ethnic groups are shown in Table 2-149. Although Caucasians make up the largest percent of fishermen interviewed, the fish intake rate for Oriental/Samoan fishermen and their families is considerably higher than for other groups. Puffer et al. (1981) found similar median intake rates for seasons; 36.3 g/day for January through March, November and December; and 37.7 g/day for April through October.

It should be noted that in early Spring, fishing quarantines were imposed due to heavy sewage overflow (Puffer et al., 1981). An advantage to this study is that it provides direct information on fish consumption patterns for active fishermen in the Los Angeles coastal area.

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Table 2-148. Description of Consumption Patterns for Primary Fish Kept by Sport Fishermen (n = 1059)

Species	Percent of fishermen who consume / give away		% of Fishermen Who Caught
White Croaker	82%	15%	34
Pacific Mackerel	74%	15%	25
Pacific Bonito	77%	18%	18
Queenfish	79%	13%	17
Jacksmelt	78%	16%	13
Walleye Perch	83%	7%	10
Shiner Perch	67%	10%	7
Opaleye	87%	7%	6
Black Perch	89%	5%	5
Kelp Bass	78%	2%	5
California Halibut	86%	8%	4
Shellfish[a]	97%	0%	3

[a] Crab, mussels, lobster, abalone.

Source: Puffer et al., 1981.

Table 2-149. Median Intake Rates Based on Demographic Data of Sport ~~Fishermen and Their~~ Family/Living Group

	Percent of total interviewed	Median intake rates (g/person-day)
Ethnic Group		
Caucasian	42	46.0
Black	24	24.2
Mexican-American	16	33.0
Oriental/Samoan	13	70.6
Other	5	--[a]
Age		
< 17	11	27.2
18 - 40	52	32.5
41 - 65	28	39.0
> 65	9	113.0

[a] Not reported.

Source: Puffer et al., 1981.

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Pierce et al. - Commencement Bay Seafood Consumption Study - ~~Pierce et al. (1981)~~ performed a local creel survey to examine seafood consumption patterns and demographics of sportfishermen in Commencement Bay, Washington. The objectives of the survey conducted by Pierce et al (1981) included determining (1) seafood consumption habits and demographics of noncommercial anglers catching seafood; (2) the extent to which resident fish/crustacea were used as food; and (3) the method of preparation of the fish/crustacea to be consumed. An additional objective was to develop a health risk model for fish/crustacea consumers in Commencement Bay using U.S. EPA data for toxicant edible tissues. The first half of this survey was conducted from early July to mid-September, 1980. The second half of the survey was conducted mid-September through most of November. The fishermen were interviewed along Commencement Bay waterways in Tacoma, Washington, for 5 days in the summer and 4 days in the fall. There were 304 interviews in the summer and 204 in the fall; the total number of unique fishermen was calculated at 3,391. The interviews were conducted only with persons who had caught fish or shellfish. The anglers were interviewed only once during the survey period. Data were recorded for species; wet weight; size of the living group (family); place of residence; fishing frequency; planned uses of the fish; age; sex; and race (Pierce et al., 1981). A follow-up survey was conducted with survey participants with telephones to determine if fish caught had been eaten. The ethnic makeup of the fishermen surveyed by season is presented in Table 2-150. Table 2-151 contains catch data by species obtained from the survey. When comparing total weights between the specie of fish caught, the dominant species were Pacific Hake and Walleye Pollock (Table 2-151). Pierce et al. (1981) found that more than half of the fishermen caught and consumed fish weekly during both seasons (Table 2-152).

The U.S. EPA (1993) used data from Pierce et al. (1981) and calculated fish intake rates using the following equation (U.S. EPA, 1993):

$$\textit{Fish intake rate} = \frac{\dfrac{\textit{fishing frequency} \times \textit{weight of catch per trip (lb)} \times \textit{edible portion} \times 454\ g/lb}{\textit{no. of people per household}}}{365\ \textit{days}} \quad \text{(Eqn. 2-8)}$$

Table 2-150. Commencement Bay Ethnic Makeup of Fishermen Surveyed by Season

Ethnic group	Summer	Fall
White	58.9%	60.8%
Black	22.7%	15.2%
Oriental	15.5%	23.5%
Mexican	2.6%	0.5%
Indian	0.3%	0%

Source: Pierce et al., 1981.

Table 2-151. Total Weight of Catch in Commencement Bay, Washington Grouped by Species

Species	Summer[a] catch wt (kg)[c]	Fall[b] catch wt (kg)[c]
Pacific Hake	150.32	137.24
Walleye Pollock	121.97	433.03
Pile Perch	46.88	7.80
Pacific Cod	38.53	42.34
Pacific Tomcod	30.19	23.68
Rock Sole	10.66	5.44
Striped Seaperch	10.55	1.56
Speckled Sandab	10.11	18.59
Brown Rockfish	9.07	6.31
Sand Sole	7.85	3.08
English Sole	6.40	1.66
Big Skate	5.44	4.31
Copper Rockfish	3.11	6.12
Quillback Rockfish	2.77	5.33
Black Rockfish	2.72	23.50
Spiney Dogfish	2.72	2.86
Starry Flounder	2.29	3.67
White Spotted Greenling	1.93	0.32
Shiner Perch	1.59	9.90
Canary Rockfish	1.59	4.85
Red Irish Lord	1.13	1.84
Dover Sole	1.11	1.45
Boccaccia Rockfish	0.91	0.20
Flathead Sole	0.70	--
Pacific Sandab	0.54	4.76
Staghorn Sculpin	0.48	1.81
Petrale Sole	0.39	0.57
Butter Sole	0.23	--
Red Stripe Rockfish	--	1.11
Sablefish	--	0.82
Cabazon	--	0.68
Arrowtooth Flounder	--	0.64
Kelp Greenling	--	0.50
Buffalo Sculpin	--	0.36
Blenny	0.05	0.11
C-O	0.14	--

[a] Summer - July through September, survey was conducted over 5 days and it encompassed 4 survey areas (i.e., area #1, #2, #3 and #4).

[b] Fall - September through November, survey was conducted over 4 days, and it encompassed 5 survey areas (i.e., area #1, #2, #3, #4 and #5).

[c] Original data (fishweight) were presented in lbs, conversions were made to kg by multiplying by a factor of 0.4536.

Source: Pierce et al., 1981.

Table 2-152. Percent of Fishing Frequency During the Summer and Fall Seasons in Commencement Bay, Washington

Fishing Frequency	Frequency Percent in the Summer[a]	Frequency Percent in the Fall[b]	Frequency Percent in the Fall[c]
Daily	10.4	8.3	5.8
Weekly	50.3	52.3	51.0
Monthly	20.1	15.9	21.1
Bimonthly	6.7	3.8	4.2
Biyearly	4.4	6.1	6.3
Yearly	8.1	13.6	11.6

[a] Summer - July through September, includes 5 survey days and 4 survey areas (i.e., area #1, #2, #3 and #4)

[b] Fall - September through November, includes 4 survey days and 4 survey areas (i.e., area #1, #2, #3 and #4)

[c] Fall - September through November, includes 4 survey days described in footnote [b] plus an additional survey area (5 survey areas) (i.e., area #1, #2, #3, #4 and #5)

Source: Pierce et al., 1981.

The edible portion of fish consumed was assumed to be 50 percent. Most of the anglers surveyed consumed fish on a weekly basis, and consumed less than 10 g/day (U.S. EPA, 1993).

In the study conducted by Pierce et al. (1981) the fish intake rates obtained were 204 g/person-day in the summer and 454 g/person-day in the fall (U.S. EPA, 1993). These values are much higher than the values obtained in this study. For this study, U.S. EPA (1993) converted the group responses of (Pierce et al. 1981) into individual responses as well. The mean intake rate calculated for anglers based on individual responses was 39.1 g/day (Table 2-153) and the intake rate of anglers based on group responses was 46.9 g/day (Table 2-154). Fish intake rates for most respondents ranged between 1-10 g/day for the individual (42.5 percent) and group (30.4 percent) calculation with approximately 10 percent consuming more than 90 g/day (U.S. EPA, 1993).

An advantage of this survey is that the data do provide an indication of consumption patterns for that time period in the Commencement Bay area. However, the data may not reflect current consumption patterns, because fishing advisories were instituted due to local contamination.

Santa Monica Bay Restoration Project - Santa Monica Bay Seafood Consumption Study - A study was conducted by the Santa Monica Bay Restoration project (1994) to investigate the demographic characteristics of recreational anglers who fish in Santa Monica Bay, California. Food consumption patterns and rates of these anglers were assessed, ethnic subgroups of the population that have high rates of fish consumption were identified, and the fish species caught and consumed at the highest rates by these anglers were determined. The study was conducted between September 1991 and August 1992 at 29 sites around the Santa Monica Bay. The sampling period included summer months (September 1991 and June - August 1992), and fall, winter and spring months (October 1991 - May 1992). During the summer period, 12 surveys were conducted per month, and 6 surveys per month were conducted during the non-summer period. A stratified random approach was used to schedule and conduct the surveys. The survey design consisted of a creel census and questionnaires which were administered to anglers utilizing four different fishing modes: piers and jetties, private boats, party boats, or beaches and intertidal zones. Information

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Table 2-153. Percentile and Mean Intake Rates for Non-Commercial Anglers in Commencement Bay (Individual Responses)[a]

Percentile	Intake Rate (g/day)
25th	1.6
50th	9.7
75th	32.1
90th	78.4
95th	145.7
98th	283.8
100th	1,543.6
Mean	39.1

[a] Raw data are from Pierce et al. (1981).

Source: U.S. EPA, 1993.

Table 2-154. Percentile and Mean Consumption Rates for Non-Commercial Anglers in Commencement Bay (Group Responses)[a]

Percentile	Intake Rate (g/day)
25th	1.2
50th	12.2
75th	38.1
90th	132.0
95th	163.4
98th	267.5
100th	2,139.3
Mean	46.9

[a] Raw data are from Pierce et al. 1981.

Source: U.S. EPA, 1993.

collected included number of anglers that fish at the Santa Monica Bay; demographic characteristics of anglers (i.e. ethnicity, age, gender); fishing site characteristics; different species of fish caught; fishing frequency; fishing seasons; and seafood consumption patterns of anglers.

One of the two methods used in estimating seafood consumption rates was based on the respondents estimates of fish meal sizes relative to a balsa wood fillet model. The fillet model assumes 150 g is for the fish meal size considered standard (Santa Monica Bay Restoration Project, 1994). The fish consumption rate was calculated by multiplying the estimated fish species meal size relative to the fillet model by the frequency of fish species consumption four weeks prior to the interview. Also, for anglers that caught fish, the number 1 was added to their frequency of fish consumption (Santa Monica Bay Restoration Project, 1994).

The results obtained from the estimates based on the fillet model by ethnicity and income groups for all fish consumed by Santa Monica Bay anglers are presented in Table 2-155. The median and mean consumption rate for Santa Monica Bay anglers was 21 g/day and 50 g/day, respectively (Table 2-155). Table 2-155 also indicates that for the identifiable ethnic groups, median consumption rates were the highest for blacks, 24 g/day, while Asians had the highest 90th percentile estimate of 116 g/day. Anglers with annual household incomes less than $5,000 had the highest median consumption of 32.1 g/day, and anglers with household annual income greater than $50,000 had the highest 90th percentile estimate of 128.6 g/day.

A limitation in the approach used to calculate fish consumption rate is that the frequency of fish consumption was based on recall. This may somewhat bias the results obtained. An advantage of this study is that the random sampling approach employed minimized sampling biases that may be created. Also the method used to estimate fish consumption rate accounted for all anglers who consumed fish whether or not the fish was caught at the time of interview. Another advantage is that the survey accounted for fishing seasons that occurred all year round.

Table 2-155. Distribution of Seafood Consumption Rates of All Fish by Ethnic and Income Groups of Santa Monica Bay Anglers

Subgroup Population	Number of Anglers	Consumption Rates (g/day) Mean	50th Percentile	90th Percentile
Ethnicity				
White	217	58.1	21.4	112.5
Hispanic	137	28.2	16.1	64.3
Black	57	48.6	24.1	85.7
Asian	122	51.1	21.4	115.7
Other	14	137.3	85.7	173.6
Income				
< $5,000	20	42.1	32.1	64.3
$5,000 - $10,000	27	40.5	21.4	48.2
$10,000 - $25,000	90	40.4	21.4	80.4
$25,000 - $50,000	149	46.9	21.4	113.0
> $50,000	130	58.9	21.4	128.6
Total All Anglers	555	49.6	21.4	107.1

Source: Santa Monica Bay Restoration Project, 1994.

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2.6.5. Other Relevant Recreational Marine Studies

Price et al. - The Effect of Sampling Bias on Estimates of Angler Consumption Rates in Creel Surveys - Price et al. (1994) investigated the effect of sampling bias on estimates of fish consumption rates derived from the creel surveys of marine and estuarine anglers conducted by Puffer et al. (1981) and Pierce et al. (1981). A description of the original creel surveys conducted by Puffer et al. and Pierce et al. and the methodology employed to obtain fish consumption rates have been discussed earlier in this section. In their original surveys, Puffer et al. (1981) and Pierce et al. (1981) collected data on the size of fish caught, number of fish caught, angler's fishing frequency, and the number of individuals sharing the fish caught. Using these data, Puffer et al. (1981) estimated fish consumption rates for the individual anglers surveyed. However, Pierce et al. (1981) did not estimate fish consumption rates for the individual anglers (Price et al., 1994). In an effort to derive recommended rates for typical anglers, EPA calculated a distribution of fish consumption rates using the information obtained from the Pierce et al. (1981) survey (Price et al., 1994). Based on the arithmetic average of the median consumption rates from both surveys (i.e. Puffer et al., 1981, at 37 g/day; and EPA's estimate at 23 g/day), EPA recommended a consumption rate of 30 g/day for a typical angler. A value of 140 g/day was recommended as the "worst-case" consumption rate (Price et al., 1994).

Price et al. (1994) reanalyzed both survey data by weighting the individual survey responses by the inverse of the angler's self-reported fishing frequency to produce a more accurate characterization of the total angler population. Price et al. (1994) re-estimated Pierce's data to obtain a distribution of consumption rates in the total angler population using the equation presented below:

$$TN_A = N_{AF} \ x \ \frac{365}{F} \qquad \text{(Eqn. 2-9)}$$

where:

TN_A = total number of anglers with a consumption rate of A

N_{AF} = number of anglers with a consumption rate of A and fishing frequency F

Similarly, Price et al. (1994) re-estimated both Puffer and Pierce's data to obtain a distribution of fishing frequencies in the total angler population from the following equation:

$$TN_F = N_F \times \frac{365}{F} \qquad \text{(Eqn. 2-10)}$$

where:

TN_F = total number of anglers with a fishing frequency F

N_F = number of surveyed anglers with a fishing frequency F

Due to insufficient data, Price et al. (1994) used a different approach to estimate consumption rates from Puffer's survey. In this approach an average consumption rate per angling trip was calculated based on the anglers mean consumption rate and fishing frequency in the Puffer survey. This estimated average consumption rate per angling trip in conjunction with the distribution of fishing frequencies in the total angler population was used to develop a distribution of consumption rates.

Table 2-156 shows that the recalculated median consumption rate for the survey population in the Pierce et al. (1981) survey is 19 g/day, and the median rate for the total angler population is 1.0 g/day. In the Puffer et al. (1981) survey, the recalculated median consumption rate for the survey population is 37 g/day and the median rate for the total angler population is 2.9 g/day (Table 2-156). The average median consumption rate for the survey population is 29 g/day and 2.0 g/day for the total angler population (Table 2-156). The results obtained indicate that the total angler population using a given waterbody have much lower fishing and consumption rates than the surveyed populations. Therefore, using intake estimates obtained from creel surveys provide a biased estimate of the total angler population's intake (Price et al., 1994).

A limitation of this study is that some of the raw data obtained for use by Price et al. were incomplete. Therefore, assumptions made to eliminate unusable data may have affected the results obtained in this study. An advantage of this study is that it supports the

Table 2-156. Selected Percentile Consumption Estimates (g/d) for the Survey and Total Angler Populations Based on the Reanalysis of the Puffer and Pierce Data

	50th Percentile	90th Percentile
Puffer	37	225
Pierce	19	155
Average	28	190
Puffer	2.9[a]	35[b]
Pierce	1.0	13
Average	2.0	24

[a] Estimated based on the average intake for the 0 - 90th percentile anglers.
[b] Estimated based on the average intake for the 91st - 96th percentile anglers.

Source: Price et al., 1994.

limitations of using creel surveys (i.e., oversampling of frequent anglers, overestimation of consumption rates).

San Diego County - San Diego Bay Health Risk Study - The San Diego County Department of Health Services, Environmental Health Services, conducted a creel survey to investigate the potential human health risk from the consumption of fish caught from the San Diego Bay. Because of the potential health risk, the study was designed to determine the intake rates of fish caught from the Bay. Three hundred sixty-nine (369) anglers were interviewed over a one year period beginning October 1988 through October 1989 (San Diego County, 1990). Survey objectives were to identify the fish species most commonly caught in the Bay and the demographics of anglers that catch those fish; and characterize the fish consumption patterns of the anglers and others who may consume the fish (i.e., fishing frequency, fish meal size) (San Diego County, 1990). The anglers were interviewed at selected, but popular fishing locations such as piers and shorelines. The fish species were identified and the fish caught were weighed during the interview. The ratio of male anglers to female anglers was 10.5 to 1. The average fishing frequency of Bay anglers was about 6.4 times per month. Most anglers fished from <1 to 12 times per month. The most successful anglers fished more frequently.

Intake rates were calculated using the following equation (San Diego County, 1990):

$$\textit{Intake Rate} = \frac{(\textit{Fish Weight})(\textit{Edible Portion})}{(\textit{Number of Consumers})(\textit{Fishing Frequency})} \qquad \text{(Eqn. 2-11)}$$

For this calculation, San Diego County (1990) assumed 30 percent of the total fish weight caught on the survey day to be edible. The cumulative fish intake rate was estimated at 31.2 g/day for the total fish catch. Table 2-157 presents the species-specific average intake rates estimated from the survey data for four of the seven species targeted for the survey. To calculate the bay-wide average consumption rates of the species targeted, the individual rates were averaged, then adjusted to reflect the total population. Pacific Mackerel had the largest intake rate of 11.5 g/day representing about 38.8 percent (largest) of total fish caught from the bay. Table 2-158 shows the intake rates obtained for specific

Table 2-157. Estimated Species-Specific Consumption Rates of San Diego Bay Anglers

Species	N[a]	% of Total Catch	Average Intake Rate (grams/day)	Upper 95% CI[c]
Pacific mackerel	24	38.8	11.5	59.3
California lizardfish	11	19.4	4.7	56.9
Barred sand bass	5	10.2	1.3	23.3
Spotted sand bass	10	4.2	0.5	14.1
Overall	59	--	31.2[b]	73.4

a Number of angler interviews.
b Cumulative and species-specific consumption rates were estimated from angler survey data. A cumulative rate of 31.2 g/day was determined for the total fish catch. Individual rates were determined for 4 of the 7 targeted species, because these 4 species accounted for 74 percent of the total catch (San Diego County, 1990).
c CI - confidence of interval.

Source: San Diego County, 1990.

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Table 2-158. Intake Rates of San Diego Anglers by Ethnicity

Ethnicity	% of Total Anglers	No. of Interviews[a]	% of Total Consumers[b]	Average Intake Rate (grams/day)[c]	Lower and Upper 95% Confidence Interval of the Mean
Caucasian	42.0	20	24.0	10.8	0, 25.6
Filipino	20.1	26	32.6	49.5	6.3, 92.7
Hispanic	12.5	5	8.9	23.6	0, 270.4
Asian[d]	11.1	4	25.6	81.9	0, 102.3
Black	6.5	--[f]	4.7	NC[g]	--
Other[e]	7.8	--[f]	2.2	NC[g]	--
Total Population	100		100	31.2	

[a] It should be emphasized that limitations on sample size, especially for Hispanics and Asians, make comparison of these rates problematic (San Diego County, 1990).
[b] This distribution is based on sample size of 143 interviews, representing 490.5 potential consumers.
[c] These are average rates and a range of values exists for individuals within each group.
[d] Group includes Vietnamese, Laotian, Japanese, Cambodian, Korean and Thai.
[e] Group includes Indian, American Indian, Hawaiian, Polynesian, and Unidentified.
[f] No values were reported.
[g] NC - not calculated. Sample sizes for these groups were insufficient to allow calculations of consumption rates.

Source: San Diego County, 1990.

ethnic groups. The author notes that a comparison of intake rates by ethnic group may be difficult due to the limitations on sample size for Hispanics and Asians. In addition, the reported rates are average rates, and a range of values exists for individuals within each group (San Diego County, 1990).

A limitation associated with this study is the small sample size of anglers surveyed. Only 59 interviews (representing 195 potential consumers) were used to calculate the cumulative intake of 31.2 g/day for total fish catch from all species. Only 59 of the 369 interview questionnaires contained all the data necessary for calculating individual intake rates and subsets of this 59 used to calculate specie and ethnic consumption rates (San Diego County, 1990). This may somewhat bias the intake rate values reported. In addition, it was assumed that the fishing success rate on the interview day would be the same for future fishing trips. However, an advantage of this study is that on-site interviews were conducted which could minimize bias that would be associated with recall.

National Marine Fisheries Service - In 1985, the National Marine Fisheries Service (NMFS) collected national recreational catch data for coastal areas (NMFS, 1986a). Fishermen in the field were surveyed directly and households were surveyed by telephone. For the Atlantic and Gulf coasts, approximately 41,000 field interviews and 58,000 telephone interviews were conducted. For the Pacific coast, approximately 38,000 field interviews and 73,000 telephone interviews were conducted. Appendix 2D contains data on total catch size according to marine species, seasonal variations in catch size, and the number of sport fishermen in the Atlantic, Gulf, and Pacific Coast regions. Intake rates were not derived from these surveys.

2.6.6. Key Freshwater Recreational Studies

U.S. EPA - Fish Intake Study - EPA (1993) calculated arithmetic mean fish intake rates using raw data from six fish consumption surveys conducted during the 1980s. Surveys with appropriate data needed to estimate fish intake rates for recreational anglers were used for this study (U.S. EPA, 1993). The calculated arithmetic mean fish intake rates ranged from 3.1 to 24.2 g/day. Data from the five freshwater surveys were used to calculate fish intake rates for anglers and are summarized below.

The first dataset was from West et al. (1989) - *"Michigan Sport Anglers Fish Consumption Survey."* U.S. EPA (1993) calculated eating frequencies and intake rate for self-caught fish using the raw data of West (1989) discussed earlier in this section. The eating frequencies were different for the 7-day and 1-year recall period for anglers who included the percentage of self-caught fish. For example, 269 anglers consumed fish once a week during the 7-day recall period, while 92 anglers consumed fish weekly during the 1-year recall period (U.S. EPA, 1993). During the 7-day recall, 538 out of 1,062 anglers did not provide any information; 50.6 percent was believed to not eat fish (U.S. EPA, 1993). The estimated mean intake rate during the 7-day recall period for self-caught fish when zero responses (i.e. anglers that did not consume self-caught fish during this period) were not included was 49.0 g/day and the 95th percentile was 105.8 g/day (Table 2-159). In comparison, when zero responses were included in the analysis, the mean intake rate for anglers during the 7-day recall period was 24.2 g/day and the 95th percentile was 94 g/day (U.S. EPA, 1993).

U.S. EPA (1993) noted that comparison of the eating frequencies between the 1-year recall period data and the 7-day recall period data suggest that extrapolation of a short-term data to long-term data may result in inaccurate data results. A limitation of this reanalysis is that results based on 1-year recall were not presented.

The second dataset was from Smith and Enger (1988) - *A Survey of Attitudes and Fish Consumption of Anglers on the Lower Tittabawassee River.* Seven hundred and three (703) individuals participated in this survey, however, only 694 records were provided for this study. The creel survey was conducted from May 1 through August 31, 1987, through personal interviews with the participants along fishing sites. All responses were based on a 1-year recall period. The survey was designed to obtain information such as sociodemographic factors, fishing practices, frequency of fish meals, and awareness of fish advisories. The calculated mean intake rate was 6.5 g/day when zero responses (i.e., respondents that did not eat fish from the Tittabawassee River) were excluded from data analysis. U.S. EPA (1993) assumed 145 g to be the average meal size consumed by anglers (Table 2-160). This assumption is based on Pao (1982). Also, 85.4 percent of anglers surveyed consumed between a range of 1-10 g/day of fish from this river (U.S. EPA, 1993).

Table 2-159. Percentile Rankings and Mean Consumption Rates for Michigan Sport Anglers Fish Consumption Survey[a]

Percentile	Intake Rate (g/day)
25th	32.6
50th	32.6
75th	65.1
90th	93.6
95th	105.8
98th	122.1
100th	223.9
Mean	49.0

[a] Responses of zero (angler did not eat any self-caught fish) for 7-day consumption period not included. Raw data are from West et al. 1989.

Source: U.S. EPA, 1993.

Table 2-160. Percentile and Mean Intake Rates of Anglers Fishing on the Lower Tittabawassee River, Michigan[a]

Percentile	Intake Rate (g/day)
25th	2.4
50th	2.4
75th	4.8
90th	20.7
95th	20.7
98th	39.7
100th	39.7
Mean	6.5

[a] Zero responses (Person who stated they did not eat fish from this river) were excluded. Raw data are from Smith and Enger (1988).

Source: U.S. EPA, 1993.

Smith and Enger (1988) did not calculate fish intake rates, but reported that 7 percent of the anglers consumed one or more meals per week (U.S. EPA, 1993). A limitation of the survey is that consumption rates may be a reflection of lower angler activity due to fishing ban.

The third data set was from Connelly et al. (1990) - *New York Statewide Anglers Survey, 1988.* The mail survey was conducted from January through March, 1989 and the survey was designed to obtain general information including sociodemographic factors, angler effort and interest in particular species, boating patterns related to fishing, angler preferences for various New York fishing programs, and angler awareness of and adherence to health advisories related to the consumption of fish (U.S. EPA, 1993). The survey was based on 1-year recall.

The mean intake rate for the anglers surveyed was calculated at 18.0 g/day (Table 2-161). These values, however, represent fish consumption from all sources (i.e., fresh, marine, purchased, etc.) U.S. EPA (1993) used the responses from 4,573 respondents and assumed a meal size of 145g for each angler in their calculation. The mean fish intake rate for those respondents who caught fish from Lake Erie (343 respondents) was 4.8 g/day when zero responses were excluded (Table 2-162). The mean intake rate for those respondents who fished at Lake Ontario (1,167 respondents) was 3.3 g/day when zero responses were excluded (Table 2-163).

In comparison, Connelly et al. (1990) assumed a fish meal size of 1/2-pound (approximately 229g) (U.S. EPA (1993). Hence, the mean intake rate obtained by Connelly et al. (1990) was 27.6 g/day versus the 18.0 g/day calculated by U.S. EPA, 1993. A limitation of this study is that results may be a reflection of fish advisories in place. For example, 76 percent of respondents indicated not eating the species listed in the advisory and following the guidelines for maximum fish meal consumption.

The fourth dataset was from Cox et al. (1990) - T*he results of the 1989 - Guide to Eating Ontario Sport Fish.* The survey were designed to collect information for sociodemographic factors, fishing effort and locations, fish intake rates, meal sizes, and changes in fishing and fish consumption patterns due to health advisories (U.S. EPA, 1993). This survey was enclosed in the back of 100,000 of the 300,000 guides that were distributed

Table 2-161. Percentile and Mean Intake Rates for all Fish Meals Consumed by New York State Anglers[a]

Percentile	Intake Rate (g/day)
25th	7.9
50th	13.9
75th	20.7
90th	39.7
95th	43.78
98th	69.5
100th	396.9
Mean	18.0

[a] Raw data from Connelly et al. (1988).

Source: U.S. EPA, 1993.

Table 2-162. Percentile and Mean Consumption Rates for New York Anglers Who Caught Fish From Lake Erie[a]

Percentile	Intake Rate (g/day)
25th	0.8
50th	2.0
75th	4.8
90th	11.9
95th	19.9
98th	29.8
100th	119.2
Mean	4.8

[a] Zero respondents not included. Raw data from Connelly et al. (1990).

Source: U.S. EPA, 1993.

Table 2-163. Percentile Rankings and Mean Consumption Rates for New York Anglers Who Caught Fish From Lake Ontario

Percentile	Intake Rate (g/day)
25th	0.8
50th	2.0
75th	4.0
90th	7.9
95th	9.9
98th	15.9
100th	158.9
Mean	3.3

[a] Zero responses excluded. Raw data from Connelly (1990).

Source: U.S. EPA, 1993.

mainly to selected stores as well as some fishing license distributors. The survey was based on a 1-year recall. Only 913 individuals responded out of 100,000 questionnaires that were distributed (approximately 1 percent response rate). About 47 percent of these respondents ate fish either once a month or once every two weeks. Most of the anglers survey consumed less than 20 g/day of fish (U.S. EPA, 1993).

Cox et al. (1990) assumed a fish meal size of 227g for their intake rate estimation. Cox et al. (1990) calculated a mean fish intake rate of 20.19 g/day (U.S. EPA, 1993). The mean fish intake rate calculated by U.S. EPA (1993) using actual meal size from the survey was 19.2 g/day (Table 2-164).

The fifth dataset was from Fiore et al. (1989) - *Sport Fish Consumption and Body Burden Levels of Chlorinated Hydrocarbons: A Study of Wisconsin Anglers*. The survey was conducted to assess sociodemographic factors; sport fishing and fishing habits of anglers; evaluate the anglers comprehension of and compliance with the Wisconsin Fish Consumption Advisory; measure body burden levels of PCBs and DDE through analysis of blood serum samples; and examine the relationship between body burden levels and consumption of sport-caught fish (U.S. EPA, 1993). The survey was conducted during the summer of 1985 from a sample pool of 1,600 Wisconsin residents. Respondents from this sample comprised 801 individuals (50 percent response rate) 601 males and 200 females. Each participant had purchased fishing or sporting licenses within 10 counties adjacent to water bodies identified in the Wisconsin Fish Advisories (U.S. EPA, 1993).

U.S. EPA (1993) used the following equation used to calculate intake rate:

$$Intake\ rate = \frac{meals}{year} \times \frac{145g}{meal} \times \frac{year}{365days} \qquad \text{(Eqn. 2-12)}$$

A meal size of 145g (based on Pao, 1982) was assumed for these calculations. Most respondents reported eating less than one sport-caught meal of fish per month. Approximately 70 percent of the anglers had consumption rates in the 1-10 g/day range (U.S. EPA, 1993). U.S. EPA (1993) calculated mean intake rate of 7.3 g/day for sport caught fish (Table 2-165).

Table 2-164. Rankings and Mean Consumption Rates for Lake Ontario Anglers[a]

Percentile	Intake Rate (g/day)
25th	1.9
50th	7.6
75th	17.7
90th	48.4
95th	72.7
98th	169.5
100th	254.3
Mean	19.2

[a] Zero responses excluded. Raw data are from Cox et al., 1990.

Source: U.S. EPA, 1993.

Table 2-165. Percentile and Mean Intake Rates for Wisconsin Sport Anglers[a]

Percentile	Intake Rate (g/day)
25th	1.6
50th	4.0
75th	9.9
90th	19.9
95th	23.8
98th	39.7
100th	145.0
Mean	7.3

[a] Raw data are from Fiore et al. 1989.

Source: U.S. EPA, 1993.

In the study conducted by Fiore et al. (1989) fish intake rates were not estimated, but results from their survey showed that an average of 18 sport-caught and 24 other fish meals were consumed during the year. Fiore et al. (1989) assumed an average meal size of 227 g. The calculated mean daily sport-caught fish intake rate (based on the 227 g meal size) at 12.3 g (i.e. respondents that did not consume sport-caught fish were excluded), and the average daily intake for all fish meals was 26.1 g (U.S. EPA, 1993).

U.S. EPA (1993) calculated overall mean and percentile intake rates using the data from all five surveys. Estimated mean fish intake rates ranged from 3.1 g/day to 24.2 g/day for consumers and non consumers combined (Table 2-166). These data are based on all responses (i.e., zero responses included). The estimated fish intake rates for consumers only ranged from 3.3 g/day to 49 g/day. Mean values are larger than the median values (50th percentile). The 100th percentile rates represent maximum intake values of any one individual in a survey (U.S. EPA, 1993).

A brief description of the surveys and their limitations are summarized in Table 2-167. Accurate assessments of fish intake rates are dependent on obtaining actual data for two variables; (1) actual number of meals consumed per period of time and (2) the best estimate of amount of fish tissue consumed per meal (U.S. EPA, 1993). The raw data obtained from the surveys conducted by West et al. (1989) and Cox et al. (1990) appeared to give the most reasonable estimates for fish tissue consumption because in these studies an attempt was made to identify the individual's estimated fish serving portion size (U.S. EPA, 1993).

The limitations associated with this study are based in part on the limitations associated with the 5 surveys. Methods used to estimate weights of the amount of fish eaten by the respondents were for the most part subjective. Consequently, the derivation of meal sizes may be somewhat inaccurate. In addition, adult males were the predominant anglers for each survey (U.S. EPA, 1993). Therefore, using these data for exposure assessments for women and children may be somewhat biased. Also, most of the survey data were based on recall and/or successful anglers only. An advantage of this study is that the intake rates were calculated using a large database. However, U.S. EPA cautions the reader that these are preliminary results and that comparisons "across the board" of the surveys are very difficult

Table 2-166. Calculated Fish Consumption Rates Using Raw Data From All Five Surveys

Study	Mean Intake Rate	Percentile Rankings 50th	90th	95th	100th
Consumers and Nonconsumers					
West et al. (1989)[a]	24.2	0	65.1	93.6	223.9
Smith and Enger (1988)[a]	3.1	0	4.8	20.7	39.7
Connelly et al. (1990)[b]	18.0	13.9	39.7	43.7	396.9
Cox et al. (1990)[a]	19.2	7.6	48.4	72.7	254.3
Fiore et al. (1989)[b]	7.3	4.0	19.9	23.8	145.0
Consumers Only					
West et al. (1989)	49	32.6	93.7	105.8	223.9
Smith and Enger (1988)	6.5	2.4	10.7	20.7	39.7
Connelly et al. (1990) Lake Ontario	3.3	2.0	7.9	9.9	158.9
Lake Erie	4.8	2.0	11.9	19.9	119.2

[a] All responses included for these calculations (i.e., consumers and nonconsumers.
[b] Based on total fish meals, not only sport-caught fish meals.

Source: U.S. EPA, 1993.

Table 2-167. Summary of Fish Consumption Surveys

Study	No. Participants	Response Rate[a]	Objective of Study	Time Period/Survey Type	Population Surveyed	Comments
West et al. (1989)	1,104	47.3%	To obtain information that could be used to revise fish consumption advisories by examining fish consumption	Jan-May '88; during the past 1 year and 7 days - data based on recall	Sport fishing license holders	Obtained eating frequency of fish meals and fish meal size data based on 7-day recall and 1-yr recall
Smith and Enger (1988)	694	100%	To determine fish consumption habits of anglers who fished on the lower Tittabawassee River in Michigan	May 1-Aug 31 '87; Creel census	Recreational anglers	U.S. EPA assumed meal size of 145 g. Obtained information on frequency of self-caught fish meals; data based on 1 year recall.
Connelly et al. (1990)	10,314	62.4%	To determine fishing efforts expenditures and New York anglers attitudes and preference for fishing programs	Jan-Mar '89; mail survey and telephone survey of non-respondents	Resident and non-resident licensed sport fishermen	U.S. EPA assumed meal size of 145 g. Obtained information on total number of fish meals consumed and number of sport-caught fish meals from Lake Erie and Ontario. Data based on 1 year recall
Cox et al. (1990)	913	<1%	To determine fish consumption rates and changes in fishing and fish consumption patterns due to health advisories of Lake Ontario anglers	1989; questionnaires distributed in "Guide"	Lake Ontario anglers	Obtained information on eating frequency of sport-caught fish meals; meal size; data based on 1-year recall
Fiore et al. (1989)	801	50%	To assess the sport fishing and fish consumption habits of Wisconsin anglers	Summer '85; data collection	Sport fishing license holders	U.S. EPA assumed meal size of 145 g; also, data based on recall; eating frequency of sport-caught fish meals

[a] Estimated success rates presented in the individual reports.

Source: U.S. EPA, 1993.

at best, if not impossible. In addition, intake rates in certain areas are a reflection of fish advisories which are in place.

West et al. - Michigan Sport Anglers Fish Consumption Survey - West et al. (1989a) evaluated the fish consumption patterns among licensed sport fishermen in Michigan. A "stratified random sample" was drawn from the fish license records for the State of Michigan. The sample was stratified based on type of license and geographic residence (zip codes). Survey questionnaires were mailed to approximately 2,500 households, and the deliverable survey sample was 2,334 households. Only 1,104 households of the deliverable surveys responded, therefore, a final response rate of 47.3 percent. The survey was designed to gather information for fish consumption by species; average fish meal size; demographics of consumers; fish consumption by other household members; and consumption of fish from other sources (i.e., restaurant fish, purchased fish, gifts of fish). Additionally, to test for seasonal patterns of fishing and fish eating, survey respondents were asked information on the frequency of each pattern over the past year. The survey was based on a 7-day recall and was conducted from January through June 1988 (winter-spring season).

The meal size consumed was estimated by each respondent using a pictorial guide of about 1/2 pound (8 oz. or 227 g) of different types of fish meals. West et al. (1989a) estimated the meal size at 10 ounces when the respondents reported eating "more" fish and 5 ounces when the respondents reported eating "less" fish. The calculated average fish intake rate for all respondents including all household members who eat fish was 18.3 g/person-day for the January-June, 1988 period (winter-spring). These values represent fish consumption from all sources. The data are for all household members who ate fish, but also includes persons who eat fish, but did not eat fish in the seven-day recall survey period. Grams consumed per person over the 7-day period were divided by 7 to convert to grams/person-day (West et al. 1989a).

In addition, West et al. (1989a) calculated estimates for the frequency of fishing and fish-eating based on 1-year recall data. Results showed that the frequency of fishing was significantly greater in the summer-fall (peak season) when compared to the winter-spring (off fishing-season) (West et al. 1989a). However, the frequency of fish consumption was only somewhat greater in the summer-fall season than in the winter-spring season. In addition, West et al. (1989a), estimated the fish intake rates for both seasons by making conservative assumptions in converting the frequency of fish consumption ranges (based on 1-year recall) obtained for both seasons to point estimates (i.e., number of meals per 6 month period). Based on these assumptions, the estimated fish intake rate for the winter-spring season was 19.4 g/day and 21.2 g/day for the summer-fall season, the difference between both seasons was 1.8 g/day. Because the estimated winter-spring rate (19.4 g/day) was close to the calculated winter-spring consumption rate (18.3 g/day), the summer-fall consumption estimate was considered to be somewhat reliable (West et al., 1989a). Therefore, the 18.3 g/day (winter-spring rate) was adjusted by adding the 1.8 g difference, giving an adjusted intake rate of 20.1 g/person-day value for summer-fall. This value (20.1 g) was then averaged with the 18.3 g actual mean for winter-spring to get an adjusted yearly intake of 19.2 g/day (West et al., 1989a).

There are several limitations with this study. The data obtained were based on 7-day and 1-year recall. Also, the sampling period for the 7-day recall was between January through June (winter-spring season) instead of the peak fishing period of July through December (summer-fall season). The frequency of fishing and fish consumption during the peak period were estimated based on the 1-year recall data. The estimation of meal sizes by the respondents were based on more than or less than sizes shown in pictures, therefore subjective. These factors may affect the accuracy of the intake rates obtained in this study. Another limitation associated with this survey was the relatively low response (47.3 percent). This low response rate could impose some degree of non-return bias on the results obtained (West et al. 1989a). However, the data do represent fishing and fish-eating patterns for that area (Great Lakes) during that time period.

West et al. - Minority Anglers and Toxic Fish Consumption: Evidence From a State-Wide Survey of Michigan - West et al. (1993) investigated fish consumption patterns by minority, elderly sport anglers, and members of their household that consume fish in the State of Michigan. The fish intake rates of these subgroups of population were determined using the data obtained from West et al. (1989a). The study (previously described) was a mail survey of a stratified sample (2,500 households) of Michigan licensed anglers. The respondent anglers consisted of 69 Blacks, 139 Native Americans, 3,339 Whites, and 123 other minorities including Hispanics, mixed, and others. The sampling period was January through June 1988 (winter-spring period). Participants were asked to recall consumption patterns over the past 7 days. Fish meal consumption information was gathered from all household members that eat fish.

The results obtained from these data indicated that the fish intake rate for minority sport-anglers was 21.7 g/day (West et al. 1993). The fish intake rates calculated for different minority groups surveyed are presented in Table 2-168. Native American and Black sport-anglers had the highest fish intake rates of 24.3 and 20.3 g/day, respectively (Table 2-168). The intake rates obtained for Black and Native American minorities are higher than the average fish intake rate (18.3 g/day) determined for the general Michigan sport-anglers, in West et al. (1989a).

Table 2-169 presents data for the Michigan sports anglers by age. The data show that the older sport-anglers (65 and above) had the highest intake rate of 25.2 g/day. The anglers between the ages of 51-65 had the next highest intake rate of 24.0 g/day. Differences in intake by age were determined by West et al. (1993) to be statistically significant.

West et al. (1993) analyzed the data obtained to show the effects of a joint multivariate analysis of race and age on fish intake rates. The results obtained and presented in Table 2-170 show that Black anglers 51-91 years and older had the highest intake rate of 31.9 g/day. Native Americans within this same age category had the next highest intake rate of 21.7 g/day. For Native American anglers, the highest intake rate (30.6 g/person-day) was reported for persons between the ages of 31-50. The other minority groups (Hispanics, mixed, and other races) had the next highest rate in this age category. The data in Table 2-170 show the joint multivariate effects of race and age in an ANOVA. West et al. (1993), therefore, concluded that the interaction is not statistically significant but the main effects are (i.e., age and race).

Overall, the findings in this survey suggest that in Michigan, more fish is consumed by Native Americans (24.3 g/person-day) than Blacks (20.3 g/person-day), and both minority subgroups consume more fish than White sports anglers. However, the sample size is small

Table 2-168. Average Fish Consumption (g/person-day) by Race for Michigan Sport Anglers

Race	N	Average Fish Consumption (g/person-day)	SD	95% Confidence Interval[c] (g/person-day)	Maximum Value[a] (g/person-day)
Black	69	20.3	26.8	13.9-26.8	122.4
Native American	139	24.3	33.3	18.7-29.9	163.3
Other Minority[b]	123	19.8	24.5	15.4-24.2	138.8
White	3,339	17.9	26.5	17.0-18.8	224.5
Total	3,670	18.3	26.8	17.4-19.1	224.5

[a] Maximum value is the highest fish consumption (in grams/person/day) found for any individual in that age group. Few people in the same consume at this high level.

[b] Other includes Hispanic, mixed, and other.

[c] The confidence interval is a statistical measure of the probability of the population mean (as opposed to the sample mean) falling within these parameters.

Source: West et al., 1993.

Table 2-169. Average Fish Consumption (g/person-day) by Age Groups for Michigan Sport Anglers

Age	N	Average Fish Consumption (g/person/day)	SD	95% Confidence Interval[b] (g/person-day)	Maximum Value (g/person-day)
0-10	444	9.5	15.7	8.1 to 11.0	81.6
11-20	571	10.8	18.6	9.2 to 12.3	106.1
21-30	566	18.0	25.7	15.9 to 20.2	146.9
31-40	665	20.4	30.0	18.1 to 22.7	163.3
41-50	566	20.9	30.0	18.4 to 23.4	224.5
51-65	560	24.0	29.2	21.6 to 26.4	224.5
Over 65	269	25.2	28.5	21.7 to 28.6	138.7
Total	3,641	18.2[a]	26.6	17.3 to 19.0	224.5

[a] The overall mean consumption is somewhat different (.1 gram) than the main figure reported in Table Fish-35, due to missing data for the age variable. Note that the confidence limits for the overall mean consumption is between 17.3 and 19.0 grams/person/day (West et al. 1993).

[b] The confidence interval is a statistical measure of the probability of the population mean (as opposed to the sample mean) falling within these parameters.

Source: West et al., 1993.

Table 2-170. Average Fish Consumption (g/person-day) by Age and Race for Michigan Sports Anglers

	Consumption Rate (g/person-day) Age		
Race	1-30	31-50	51-91
Black	14.1 (26)[a]	19.8 (25)	31.9 (17)
Native American	16.9 (35)	30.6 (48)	21.7 (53)
Other Minority[b]	13.1 (56)	27.4 (37)	24.1 (24)
White	12.9 (1,463)	20.4 (1,120)	24.4 (730)

[a] ( ) = Subsample size.

[b] Includes Hispanic, mixed, and other.

Source: West et al., 1993.

and these differences between Black and Native American may not be significant. West et al. (1993) calculated intake rates based on race and income. Results showed that Black anglers with an income range between $15,000-$29,999 had the highest fish intake rates (30.5 g/person-day). The highest reported intake rate for Blacks (cities with population over 20,000) was 23.9 g/person-day (West et al. 1993).

A limitation of this study is that the population sample size for the minority sub-groups were small. This may affect the statistical data obtained. Other limitations and advantages associated with the data of West et al. (1989a) also apply, because the data used in this study were obtained from the survey of West et al. (1989a). These data were presented earlier in this section of the report.

West et al. - Michigan Sport Anglers Consumption Survey, Supplements I and II - A further investigation by West et al. (1989b) determined whether a non-response bias existed in the calculation of fish intake rates due to the low response rate (47.3 percent) experienced in the West et al. (1989a) survey. A stratified random sample was initially selected for the survey consisting of 1,260 households. Of these households, 580 households of respondents and 680 households of non-respondents were selected from the West et al. (1989a) mail survey. A follow-up phone survey was conducted, only 570 households could be reached by phone and 557 of these households granted complete phone interviews (44.2 percent of total survey sample). The phone survey was designed to obtain information on the frequency of fish meals (fish caught or bought in Michigan) consumed by the respondents of all household members. The participants were asked to recall their fish eating patterns over the previous seven days. The sampling was between January 1989 through June 1989. The phone survey results showed that 72.3 percent of the participants that did not respond to the original mailed survey did not eat fish. In comparison, 40.7 percent of participants who responded to the survey did not eat fish. Also, non-respondents to the mailed survey consumed less fish than those who responded, however, when the frequency of fish meals was greater than four meals over the seven-day recall period the converse was true.

Based on the results of the follow-up phone survey, West et al. (1986b) concluded that a non-response bias existed. West et al. (1989b) calculated an adjustment factor of 2.2 g/day. Based on these findings, West et al. (1989b) calculated an adjusted fish intake rate for non-response bias for the winter-spring season to be 16.1 g/day. The authors noted that the adjustment factor can only be used as a rough estimate for adjusting sub-groups intake rates. A summary of original and adjusted seasonal intake rate averages from the previous studies conducted by West et al. are presented in Table 2-171.

West et al. (1989b) investigated further by examining the stability of fish consumption data for the 1988 winter-spring season in comparison with data for the 1989 winter-spring season. The results indicated a decline in fish consumption from 1988 (58.6 percent) to 1989 (41.1 percent). The authors attributed the decline to three potential factors; (1) a real downward trend in fish consumption could have occurred; (2) more people responding to fish consumption advisories and media reports about toxics in fish; and (3) increased awareness by survey participants of risks associated with consumption of contaminated fish (West et al. 1989b).

2.6.7. Other Relevant Freshwater Recreational Studies

Chemrisk - Consumption of Freshwater Fish by Maine Anglers - Chemrisk (1991) conducted a study to characterize the rates of freshwater fish consumption among Maine residents. Since the only dietary source of local freshwater fish is recreational fish, the anglers in Maine were chosen as the survey population. About 2,500 randomly selected anglers were surveyed by mail and resulted in a usable sample of 1,612 Maine anglers (70 percent response rate). The survey was designed to gather information on the consumption of fish caught by anglers from flowing (rivers and streams) and standing (lakes and ponds) water bodies. Respondents were asked to recall the frequency of fishing trips during the 1989-1990 ice-fishing season and the 1990 open water season, the number of fish species caught during both seasons, and estimate the number of fish consumed from 15 fish species. The respondents were also asked to describe the number, species, and average length of each sport-caught fish caught and consumed that had been gifts from other members of their households or other households. All anglers were defined as "licensed anglers who fished either during the 1989-1990 ice-fishing season or 1990 open-water season (consumers and non-consumers), and licensed anglers who did not fish but consumed freshwater fish caught in Maine during these seasons" (Chemrisk, 1991). River anglers were defined as "survey

Table 2-171. Summary of Original and Adjusted Seasonal Consumption Rate Averages

Season	Original Consumption Rate (g/day)	Non-Response Adjusted Consumption Rate (g/day)
Winter-Spring	18.3	16.1
Summer-Fall	20.1	17.9
Year-Round	19.2	17.0

Note: Figures for summer-fall and year-round are only rough estimates, based on the actual data that was gathered in the winter-spring season.

Source: West et al., 1989b.

respondents (consumers and non consumers) who indicated that they fished on rivers or streams during the 1990 open water season." Consuming anglers were defined as " those anglers who consumed freshwater fish obtained from Maine sources during the 1989-1990 ice fishing or 1990 open water fishing season" (Chemrisk, 1991).

Data for 1,369 anglers (85 percent of total responses) were used to calculate fish intake rates. Table 2-172 presents the intake rates by ethnic groups for all waters. The highest mean intake rates reported are for native Americans (10 g/day) and French Canadian (7.4 g/day) Because there was a low number of respondents for Hispanic, Asian/Pacific Islander, or African American ancestry, the sample was not large enough to calculate intake rates within these subgroups (Chemrisk, 1991). The consumption by species of freshwater fish caught is presented in Table 2-173. The largest consumption was salmon for ice fishing (~292,000 grams); white perch (380,000 grams) for lakes and ponds; and Brooktrout (420,000 grams) for rivers and streams (Chemrisk, 1991). The median consumption rates for all anglers, all waters, was calculated at 1.1 g/day and the arithmetic mean value at 5.0 g/day. The median value reported for consuming anglers, all waters, was 2.0 g/day and the arithmetic mean, 6.4 g/day. The percentile data for this study are presented in Ebert et al. (1993), presented to follow in this section. Chemrisk (1991) reported that the fish consumption estimates obtained from the survey were conservative because of assumptions made in the analysis. The assumptions included: a 40 percent estimate as the edible portion of land locked and Atlantic salmon; inclusion of the intended number of future fishing trips and; it was assumed that the average success and consumption rates for the individual angler during the trips already taken would continue through future trips (Chemrisk, 1991).

However, the data collected for this study was based on recall and self-reporting which may have resulted in a biased estimate. The social desirability of the sport and frequency of fishing are also bias contributing factors; successful anglers are among the highest consumers of freshwater fish (Chemrisk, 1991). Overreporting appears to be correlated with skill level and the importance of the activity to the individual; it is likely that the higher consumption rates may be substantially overstated (Chemrisk, 1991). Additionally, fish advisories are in place in these areas and may affect the rate of fish consumption among anglers. An advantage of this study is that it presents area-specific

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Table 2-172. Analysis of Fish Consumption by Ethnic Groups for "All Waters" (grams/day)[a]

	Consuming Anglers[b]					
	French Canadian Heritage	Irish Heritage	Italian Heritage	Native American Heritage	Other White Non-Hispanic Heritage	Scandinavian Heritage
N of Cases	201	138	27	96	533	37
Median (50th percentile)[c,d]	2.3	2.4	1.8	2.3	1.9	1.3
66th percentile[c,d]	4.1	4.4	2.6	4.7	3.8	2.6
75th percentile[c,d]	6.2	6.0	5.0	6.2	5.7	4.9
Arithmetic Mean[c]	7.4	5.2	4.5	10	6.0	5.3
Percentile at the Mean[d]	80	70	74	83	76	78
90th percentile[c,d]	15	12	12	16	13	9.4
95th percentile[c,d]	27	20	21	51	24	25
Percentile at 6.5 g/day[d,e]	77	75	81	77	77	84

[a] "All Waters" based on fish obtained from all lakes, ponds, streams and rivers in Maine, from other household sources and from other non-household sources.

[b] "Consuming Anglers" refers to only those anglers who consumed freshwater fish obtained from Maine sources during the 1989-1990 ice fishing or 1990 open water fishing season.

[c] The average consumption per day by freshwater fish consumers in the household. Fish consumption rates under "All Waters" are based on reported consumption from all Maine sources, and estimated consumption during 1990 after the survey was completed. Rates summarized under "Rivers and Streams" are based on reported consumption from rivers and streams, estimated consumption during 1990 after the survey was completed, and estimated consumption from other household and non-household sources attributable to rivers and streams.

[d] Calculated by rank without any assumption of statistical distribution.

[e] Fish consumption rate recommended by EPA (1984) for use in establishing ambient water quality standards.

Source: Chemrisk, 1991.

Table 2-173. Total Consumption of Freshwater Fish Caught by All Survey Respondents During the 1990 Season

Species	Ice Fishing		Lakes and Ponds		Rivers and Streams	
	Quantity Consumed (#)	Grams ($x10^3$) Consumed	Quantity Consumed (#)	Grams ($x10^3$) Consumed	Quantity Consumed (#)	Grams ($x10^3$) Consumed
Landlocked salmon	832	290	928	340	305	120
Atlantic salmon	3	1.1	33	9.9	17	11
Togue (Lake trout)	483	200	459	160	33	2.7
Brook trout	1,309	100	3,294	210	10,185	420
Brown trout	275	54	375	56	338	23
Yellow perch	235	9.1	1,649	52	188	7.4
White perch	2,544	160	6,540	380	3,013	180
Bass (smallmouth and largemouth)	474	120	73	5.9	787	130
Pickerel	1,091	180	553	91	303	45
Lake whitefish	111	20	558	13	55	2.7
Hornpout (Catfish and bullheads)	47	8.2	1,291	100	180	7.8
Bottom fish (Suckers, carp and sturgeon)	50	81	62	22	100	6.7
Chub	0	0	252	35	219	130
Smelt	7,808	150	428	4.9	4,269	37
Other	201	210	90	110	54	45
TOTALS	15,463	1,583.4	16,587	1,590	20,046	1,168

Source: Chemrisk, 1991.

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consumption patterns. Also, the response rate from the mailed survey was considerably high which may have eliminated non-response bias.

Ebert et al. - Estimating Consumption of Fresh Water Fish Among Maine Anglers - A recent rulemaking process to set an ambient water quality standard for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in Maine rivers required estimations of fish intake rates from the rivers that receive TCDD discharge (Ebert et al., 1993). Since there are no commercial freshwater fisheries in the State of Maine, individuals can only be exposed to TCDD present in these rivers by consuming sport-caught fish. Ebert et al. (1993) evaluated data from a statewide survey of licensed resident anglers in Maine. The survey data used were data previously collected by Chemrisk (1991) (previously described).

Ebert et al. (1993) analyzed the survey data and found that of the 1,612 survey respondents, 1,251 reported that they fished either during the 1989-1990 ice-fishing or 1990 open-water seasons. In addition, 118 anglers reported that they did not fish, but consumed fish caught by other anglers during these seasons. Consequently, the "all anglers" used in the data analysis consist of 1,369 (1,251 + 118) respondents (85 percent of total responses) (Ebert et al., 1993). The median and arithmetic mean fish intake rates for consuming anglers who caught fish in all waters (rivers, streams, lakes, and ponds) were 2.0 g/day and 6.4 g/day, respectively. The median and arithmetic intake rates for consuming anglers who caught fish in flowing waters were 0.99 g/day and 3.7 g/day, respectively (Table 2-174). The arithmetic means represent the 77th percentile and 88th percentile of the consumption distribution for all waters and flowing waters, respectively (Ebert et al., 1993).

All waters represent rivers, streams, ponds, and lakes, and flowing waters represent rivers and streams only. Table 2-175 presents the fish intake rates based on how fish were shared among household members. The data varies depending on the sharing pattern. The median fish intake rate increased by a factor of 2.5 based on the assumption that only anglers (no sharing) consumed fish caught in all water bodies relative to when all household members share and consume fish equally (Ebert et al., 1993).

The data used in this study was obtained from the survey conducted by Chemrisk (1991). Therefore, the same advantages and limitations associated with Chemrisk (1991), are applicable to this study.

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Table 2-174. Estimates of Fish Intake Rates of Licensed Sport Anglers in Maine During the 1989-1990 Ice Fishing or 1990 Open-Water Seasons[a]

	Intake Rates (grams/day)			
Percentile Rankings	All Waters[b]		Rivers and Streams	
	All Anglers[c] (N = 1,369)	Consuming Anglers[d] (N = 1,053)	River Anglers[e] (N = 741)	Consuming Anglers[d] (N = 464)
50th (median)	1.1	2.0	0.19	0.99
66th	2.6	4.0	0.71	1.8
75th	4.2	5.8	1.3	2.5
90th	11.0	13.0	3.7	6.1
95th	21.0	26.0	6.2	12.0
Arithmetic Mean[f]	5.0	6.4	1.9	3.7
	[79]	[77]	[82]	[81]

[a] Estimates are based on rank except for those of arithmetic mean.
[b] All waters based on fish obtained from all lakes, ponds, strams and rivers in Maine, from other household sources and from other non-household sources.
[c] Licensed anglers who fished during the seasons studied and did or did not consume freshwater fish, and licensed anglers who did not fish but ate freshwater fish caught in Maine during those seasons.
[d] Licensed anglers who consumed freshwater fish caught in Maine during the seasons studied.
[e] Those of the "all anglers" who fished on rivers or streams (consumers and nonconsumers).
[f] Values in brackets [ ] are percentiles at the mean consumption rates.

Source: Ebert et al., 1993.

Table 2-175. Intake rates of Sport-Anglers in Maine Based on How Fish Was Shared Among Household Members

	All Household Consumers Share		Only Adults Share		Anglers Only; No Sharing	
Percentile Rankings	All Waters	Rivers & Streams	All Waters	Rivers & Streams	All Waters	Rivers & Streams
50th	2.0	0.99	2.3	1.2	5.0	2.5
66th	4.0	1.8	4.4	2.0	9.1	4.1
75th	5.8	2.5	6.6	3.0	13	6.1
90th	13	6.1	16	6.5	32	14
95th	26	12	28	20	57	27
Mean[a]	6.4 [77]	3.7 [81]	7.5 [78]	4.5 [83]	15 [78]	8.9 [83]

[a] Values in parentheses [ ] are percentiles at the mean intake rates.

Ebert et al., 1993.

2.6.8. Native American Freshwater Studies

Columbia River Inter-Tribal Fish Commission (CRITFC) - A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes of the Columbia River Basin - CRIFTC (1994) conducted a fish consumption survey among four Columbia Basin River Indian tribes at different reservations during the fall and winter of 1991-1992. The survey was based a stratified random sampling design where respondents were selected from patient registration files at Indian Health Service. The survey respondents consisted of 513 tribal members, 18 years old and above. Information for 204 children, 5 years old and less was provided by the participating adult respondent. The overall response rate was 69 percent.

Information requested consisted of age group; 24 hour dietary recall; seasonal, annual, and daily intake rates; species and part(s) of fish consumed; preparation method; changes in patterns of consumption over the last 20 years, and during ceremonies and festivals; and breast feeding practices (CRITFC, 1994). Foam sponge food models were provided approximating four, eight, and twelve ounce fish fillets for use in estimating amount of fish consumed (CRIFTC, 1994). The fish consumption rates were determined for each respondent followed by calculation of the average and distribution of these individual rates. The mean consumption rates were estimated using respondents who were fish and-non-fish consumers. These estimates represent the entire tribal population (CRIFTC, 1994).

Results of the survey are the following:

- Gender of respondents: 57.9 percent female and 42.1 percent male;
- Age of respondents: 58.7 percent, 13-39 years; 31.4 percent, 40-59 years; and 9.9 percent 60+ years;
- Adults: consumed an average of 1.71 fish meals/week and had an average intake rate of 58.7 grams/day;
- Fish Consumers: consumed an average of 1.85 fish meals/week and had a mean intake rate of 63.2 grams/day;
- Intake by gender: males averaged 63 grams/day and females 56 grams/day;

- Intake by Age: ages 18-39 had average intake rates of 57.6 grams/day; ages 40-59 had average intake rates of 55.8 grams/day; and ages 60+ had average intake rates of 74.4 grams/day;

- Intake by Location: respondents living on a reservation consumed more fish than ones living off-reservation;

- Seasonal Intake: 42 percent consumed more fish April-July, 18 percent eat the same amount each month; for months identified as high consumption months, the average intake rate was 87.9 grams/day;

- Dietary Recall: 19 percent had eaten fish within the 24 hours preceding the survey and their intake rate was 61.8 grams/day; 81.3 percent had not eaten fish during this period and their intake rate was 57.9 grams/day;

- Nursing Mothers: consumed an average of 59.1 grams/day;

- Consumption by Species: 92 percent of respondents ate more salmon than any other species; and

- Children: consumed an average off 1.17 meals/week with an intake rate of 19.6 grams/day.

The data for grams of fish consumed per day for all adult respondents are presented in Table 2-176 and for consumers-only in Table 2-177. Fish intake rates for children are presented in Table 2-178. Fish intake rates by gender, age and location are presented in Table 2-179. Although the data were gathered from four different tribes, the results presented represent all four tribes as a single population (CRITFC, 1994). The sample sizes for each tribe was essentially the same size, however the population sizes of the tribes varied quite a bit. Therefore, the data were weighted based on the population size of each tribe. The larger tribes were given more weight. The majority of the data reported have been weighted so that they reflect the fish consumption patterns and habits of the overall population (CRITFC, 1994). Fish consumption patterns and habits of children were not weighted because of the small sample size for children (CRITFC, 1994).

The author noted several limitations with the survey:

- It is possible that the sample population had some health related bias that affected their diet;

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Table 2-176. Number of Grams Per Day of Fish Consumed by All Adult Respondents (Consumers and Non-consumers) Combined - Throughout the Year

Number of Grams/Day	Cumulative Percent	Number of Grams/Day	Cumulative Percent
0.00	8.9%	77.0	81.4%
1.6	9.0%	81.0	83.3%
3.2	10.4%	97.2	89.3%
4.0	10.8%	130	92.2%
4.9	10.9%	146	93.7%
6.5	12.8%	162	94.4%
7.3	12.9%	170	94.8%
8.1	13.7%	194	97.2%
9.7	14.4%	243	97.3%
12.2	14.9%	259	97.4%
13.0	16.3%	292	97.6%
16.2	22.8%	324	98.3%
19.4	24.0%	340	98.7%
20.2	24.1%	389	99.0%
24.3	27.9%	486	99.6%
29.2	28.1%	648	99.7%
32.4	52.5%	778	99.9%
38.9	52.9%	972	100%
40.5	56.5%		
48.6	67.6%		
64.8	80.6%		
72.9	81.2%		

N = 500
Weighted Mean = 58.7 grams/day (gpd)
Weighted SW = 3.64
90th Percentile: 97.2 gpd < (90th) < 130 gpd
95th Percentile ≈ 170 gpd
99th Percentile = 389 gpd

Source: CRITFC, 1994.pd < (95th) < 194 gpd

Table 2-177. Number of Grams Per Day of Fish Consumed by Adult Fish Consumers Only

Number of Grams/Day	Weighted Cumulative Percent	Number of Grams/Day	Weighted Cumulative Percent
<1.0	1.8%	72.9	79.8%
1.6	1.9%	77.0	79.9%
3.2	3.4%	81.0	82.1%
4.1	3.9%	97.2	88.5%
4.9	4.0%	130	91.6%
6.5	6.0%	146	93.2%
7.3	6.1%	162	94.0%
8.1	6.9%	170	94.4%
9.8	7.8%	194	97.0%
12.2	8.2%	243	97.1%
13.0	9.7%	259	97.2%
16.2	16.8%	292	97.4%
19.4	18.0%	324	98.2%
20.2	18.2%	340	98.6%
24.3	22.3%	389	98.9%
29.2	22.5%	486	99.5%
32.4	48.9%	648	99.7%
38.9	49.2%	778	99.8%
40.5	53.1%	972	100%
48.6	65.1%		
64.8	79.1%		

N = 464
Weighted Mean = 63.2 grams/day (gpd)
Weighted SW = 3.84
90th Percentile: 97 gpd < (90th) < 130 gpd
95th Percentile: 170 gpd < (95th) < 194 gpd
99th Percentile ≈ 389 gpd

Source: CRITFC, 1994.

Table 2-178. Children's Fish Consumption Rates - Throughout Year

Number of Grams/Day	Unweighted Cumulative Percent
0.0	21.1%
0.4	21.6%
0.8	22.2%
1.6	24.7%
2.4	25.3%
3.2	28.4%
4.1	32.0%
4.9	33.5%
6.5	35.6%
8.1	47.4%
9.7	48.5%
12.2	51.0%
13.0	51.5%
16.2	72.7%
19.4	73.2%
20.3	74.2%
24.3	76.3%
32.4	87.1%
48.6	91.2%
64.8	94.3%
72.9	96.4%
81.0	97.4%
97.2	98.5%
162.0	100%

N = 194
Unweighted Mean = 19.6 grams/day (gpd)
Unweighted SW = 1.94

Source: CRITFC, 1994.

Table 2-179. Fish Intake Throughout the Year by Sex, Age, and Location by All Adult Respondents

	N	Weighted Mean (grams/day)	Weighted SE
Sex			
Female	278	55.8	4.78
Male	222	62.6	5.60
Total	500	58.7	3.64
Age			
18-39	287	57.6	4.87
40-59	155	55.8	4.88
60 & Older	58	74.4	15.3
Total	500	58.7	3.64
Location			
On Reservation	440	60.2	3.98
Off Reservation	60	47.9	8.25
Total	500	58.7	3.64

Source: CRITFC, 1994.

- It is possible that respondents living closer to the interview site were more willing to participate;

- More females were surveyed than males, although the intake rate for males was higher;

- The survey was conducted during the low fish consumption months and may have underestimated actual consumption;

- Rates of consumption are based on fish consumed from all sources (Columbia River and other sources);

- Some of the respondents provided the same information for their children as their own; and

- The percentage for non-consumers was very low and there is a possibility that overall fish intake rates for the whole population including non-consumers were overestimated.

Although the author has noted these limitations, this study does present information on fish consumption patterns and habits for the Native American subpopulation. It should be noted that the number of surveys that address subsistence subpopulations are very limited. Consumption patterns have also been affected by fish advisories and availability of fish.

Wolfe and Walker - Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts - Wolfe and Walker (1987) analyzed a dataset from 98 communities for harvests of fish, land mammals, marine mammals, and other wild resources. The analysis was performed to evaluate the distribution and productivity of subsistence harvests in Alaska during the 1980s. Harvest levels were used as a measure of productivity. Wolfe and Walker (1987) defined harvest to represent a single year's production from a complete seasonal round. The harvest levels were derived primarily from a compilation of data from subsistence studies conducted between 1980 to 1985 by various researchers in the Alaska Department of Fish and Game, Division of Subsistence. Additional information was gathered from 4 other research projects (Wolfe and Walker, 1987).

The harvests for most communities (94) were documented through detailed retrospective interviews with harvesters from a sample of households (Wolfe and Walker, 1987). Harvesters were asked to estimate the quantities of a particular species that were harvested and used by members of that household during the previous 12-month period (Wolfe and Walker, 1987).

Since the data used in of the analysis were from 94 different datasets with differing units of measure, harvests were converted to a common unit, pounds dressed weight per capita per year. This conversion consisted of multiplying the harvests of household within each community by standard factors; converting total pounds to dressed weight; summing across households; and then dividing by the total number of members in that household over the previous 12-month sampling period (Wolfe and Walker, 1987). Dressed weight varies among households, but was considered approximately 70 to 75 percent of pound weight for fish and was that portion brought into the kitchen for use (Wolfe and Walker, 1987). It represents an estimate of the pounds of useable wild resources harvested during the study year by the sample households (Wolfe and Walker, 1987).

Harvests for the other four populations were developed from a statewide dataset gathered by the Alaska Department of Fish and Game Divisions of Game and Sports Fish. Urban sport fish harvest estimates were derived from a survey that was mailed to a randomly selected statewide sample of anglers (Wolfe and Walker, 1987). Sports fish harvests were disaggregated by urban residency and the dataset was analyzed by converting the harvests into pounds and dividing by the 1983 urban population (Wolfe and Walker, 1987).

For the overall analysis, each of the 98 communities were treated as a single unit of analysis and the entire group of communities was assumed to be a sample of all communities in Alaska (Wolfe and Walker, 1987). Each community was weighted the same, regardless of the size of the population (Wolfe and Walker, 1987). Total annual per capita harvests were calculated for each community. The harvest amounts varied between the communities and ranged from 5 to 1,239 pounds per capita per day (6.2g/day to 1,541 g/day). In most of the 98 communities analyzed, resource harvests for fish were greater than the other wildlife harvests categories (land mammal, marine mammal, and others). The author noted that although the group of communities is large, it represents an incomplete sample of all Alaska communities.

A limitation of this study is that the data were based on 1-year recall and mail survey. An advantage of the study is that it is one of the few studies that presents fish harvest patterns for a subsistence population. Another limitation is that the data are harvest data and must be converted to intake rates.

2.6.9. Recommendations

The survey designs, data generated, and limitations/advantages of the studies described in this report are summarized and presented in Table 2-180. Fish consumption rates are recommended based on the survey results presented in the key studies described in the preceding sections. A large variation exists in the fish consumption rates obtained from these studies, and can be attributed to many factors including survey designs; type of waterbody (i.e., marine, estuarine, freshwater); characteristics of the survey population (i.e., general population, recreational anglers); and methods of data collection. Based on these study variations, it is not recommended to average data across the studies. The assessors should evaluate the individual study and select the mean or upper percentile value from the study that closely matches their needs. One should consider if the exposure being evaluated are long-term or short-term. In addition, regional, and seasonal variations should be considered. Recommendations for consumption rates were classified into the following categories:

- General Population - Per Capita;
- Recreational Marine Anglers;
- Recreational Freshwater Anglers; and
- Native American Freshwater Anglers.

For exposure assessment purposes, the selection of recommended fish consumption rates from these categories will depend on the exposure scenario being evaluated. It should be noted that the recommended rates are based on mean values which represent a typical intake or central tendency for fish consumers (i.e., low and high consumers); and the upper estimates (i.e., 90th-99th percentiles) represent the high end of fish consumers. However, in some of the key studies, mean consumption rates were not presented. The recommended fish

Table 2-180. Summary of Fish Intake Studies

Study	Population Surveyed	Survey Time Period/Type	Data Generated	Limitations/Advantages
General Population				
Javitz 1980	25,162 individuals - general population	Sept 1973-Aug. 1974 (1 year survey). Completed questionnaires on date of meal consumption, species of fish, packaging type, amount of fish prepared, number of servings consumed, etc.	Mean and distribution of fish consumption rates grouped by race, age, gender, census region, fish species, community type, and religion	High response rate (80%); population was large and geographically representative; however, consumption rates represented one month data for each sample segment because questionnaires were administered to 1/12th of survey population during each month of the 1 year survey period.
Pao et al., 1982	37,874 individuals - general population	Home interviews based in 3-day dietary recall	Distribution of fish and shellfish consumption rates for consumers only	Population was large and geographically representative; data were based on short-term dietary recall
USDA 1987-88	4,500 households - general population	Survey based on 3-day dietary recall	Mean intake rate per capita of fish and shellfish grouped by age and gender; mean intake rates for consumers only grouped by age and gender	Population was large geographically and seasonally balanced; data based on short-term dietary recall
Ruffle et al., 1994	23,213 participants - general population	Data based on NMFS[a] 1973-1974 survey (1 year period)	Mean and distributions of the daily consumption rates of shellfish, freshwater finfish, and saltwater finfish for adults, teenagers, and children	Population was large geographically and seasonally balanced; over or under reporting of fish consumed and portion size by survey respondents
National Marine Fisheries Service, 1986a	Atlantic and Gulf Coasts - 41,000 field interviews and 58,000 telephone interviews; Pacific Coast - 38,000 field interviews and 73,000 telephone interviews	Field and telephone interviews were conducted for National recreational fishermen	Intake rates were not calculated; total catch size grouped by marine species, seasons, and number of fishermen for each coastal region were presented	Population was large geographically and seasonally balanced; no houseful data was presented for exposure assessment purposes
Madeira and Penfield, 1985	39 panelists of staff, faculty and students at the University of Tennessee	Questionnaires were completed by fish consumers only	Distribution of intake rates were not presented; frequency of fish consumption data were presented for the respondents	Population size was small and does not represent the general U.S. population; data based on short-term recall

Table 2-180. Summary of Fish Intake Studies (continued)

Study	Population Surveyed	Survey Time Period/Type	Data Generated	Limitations/Advantages
Recreational-Marine Fish				
Puffer et al., 1981	1,067 anglers in the Los Angeles area	Creel surveys conducted for the full 1980 calendar year	Distribution of fish and shellfish intake rates for sport anglers (i.e., indicated eating the fish they caught) including their families/living groups grouped by age, ethnicity, and fish species were presented	Population was not representative of the U.S. population; assumptions made in the intake rate calculations may bias the results obtained; creel surveys tend to oversample frequent anglers
Pierce et al., 1981	3,391 fishermen in Commencement Bay, Washington	July-November 1980; creel survey interviews conducted consisting of 5 summer days and 4 fall days	Total weight of catch grouped by species were presented for only anglers that caught fish; percent of fishing frequency was presented for the summer and fall; mean intake rates calculated by the U.S. EPA (1993) were also presented for individual and group responses	Population does not represent general U.S. population; intake rates estimated were not seasonally balanced; fish advisories were in place, this may have affected fish consumption patterns among anglers
San Diego County, 1990	369 anglers in San Diego County, California	Oct. 1988-Oct. 1989; creel surveys were conducted over a 1-year period	Mean intake rates for San Diego Bay anglers grouped by ethnicity and species were presented; cumulative fish intake rate of the anglers was also reported	Population does not represent general U.S. population; also population size was small and usable data from this sample size was low (59 out of 369 interviews); on-site interviews were conducted which may minimize recall bias
Santa Monica Bay Restoration Project, 1994	555 anglers in Santa Monica Bay, California	Survey design consisted of creel census and questionnaires administered to anglers; sampling period consisted of summer months (Sept. 1991 and June-Aug. 1992), fall, winter and spring months (Oct. 1991-May 1992)	Mean and distributions of fish consumption rates grouped by ethnicity and income level were presented for Santa Monica Bay anglers	Population does not represent general U.S. population; frequency in fish consumption was based on recall; random sampling approach employed to conduct surveys may minimize sampling biases; survey accounted for all fishing seasons
Price et al., 1994	Based on Puffer et al. (1981) and Pierce et al. (1981) creel surveys	See Puffer et al. (1981) and Pierce et al. (1981) above	Recalculated median consumption rates for the surveyed population and the total angler population	Raw data obtained were incomplete; therefore, assumptions were made which may affect the results obtained; the findings of this study supports the limitations associated with creel surveys

Table 2-180. Summary of Fish Intake Studies (continued)

Study	Population Surveyed	Survey Time Period/Type	Data Generated	Limitations/Advantages
Recreational Fresh Water Fish				
U.S. EPA, 1993 - Based on six surveys a. West et al., 1989	1,104 sport-anglers	January-May, 1988; anglers completed questionnaires based on 7-day and 1-year recall	Mean intake rates of self-caught fish based on 7-day recall period for consumers only and for consumers and non-consumers in Michigan	Estimated weights of the amount of fish consumed were subjective in nature for the most part; predominant anglers were adult males, therefore, data for women and children may be biased; intake rates were calculated based on a large source of dataset
b. Smith and Enger, 1988	694 anglers	May-Aug., 1987; creel surveys conducted along fish sites; based on 1-year recall period; assumed meal size of 1,45g	Mean intake rates of the lower Tittabawassee anglers (consumers only and consumers and non-consumers)	
c. Connelly et al., 1990	4,573 respondents	January-March, 1989; responses were based on 1-year recall period; assumed meal size of 145g	Mean intake rates for New York State anglers; mean intake rates for Lake Erie and Lake Ontario anglers (consumers only and consumers and non-consumers)	
d. Cox et al., 1990	917 respondents	Completed questionnaires based on 1-year recall period	Mean intake rates of sport-caught fish	
e. Fiore et al., 1989	801 individuals with fish or sporting licenses	1985 summer; assumed meal size of 145g	Mean intake rates for sport-caught fish by Wisconsin anglers	
West et al., 1989a	1,104 households of licensed sport fishermen	Jan.-June, 1988; stratified random sampling approach; completed mailed questionnaires; based on 7-day recall period; fishing frequency based on 1-year recall period	Mean fish intake rate for all respondents including household members that consumed fish; adjusted yearly fish intake rate	Low response rate (47.3%); data based on recall; sampling period only reflected Winter-Spring season; sampling approach was random which may minimize sampling biases
West et al., 1993	3,670 individuals consisting of 69 Blacks; 139 Native Americans; 3,339 Whites; and 123 other minority groups	Jan.-June, 1988; consumption patterns based on 7-day recall; mail survey based on stratified random approach	Mean fish intake rates for Michigan sport anglers grouped by race and age	Sampling size of each population sub-group was small; same limitations/advantages as West et al. (1989a) apply to these dataset because data used was obtained from West et al. (1989a) survey
West et al., 1989b Supplement I	1,260 households of respondents and non-respondents from West et al. (1989a) survey	Jan-June 1989; follow-up phone survey; based on 7-day recall period	Adjusted consumption rates based on non-response bias	

Table 2-180. Summary of Fish Intake Studies (continued)

Study	Population Surveyed	Survey Time Period/Type	Data Generated	Limitations/Advantages
Supplement II	307 respondents	Comparison of data from Winter-Spring, 1988 (West et al., 1989a) and Winter-Spring 1989 data	Indicated a decline in fish consumption rate from 1988 to 1989	Fish advisories in place; participation of respondents to mail survey may have increased awareness of risks associated with fish consumption
Chemrisk, 1991	1,612 Maine anglers	1989-1990 ice fishing season and 1990 open water season; frequency of fishing trips and number of fish species caught were based on recall	Mean and distribution of fish consumption rates by ethnic groups; total consumption of freshwater fish caught by survey respondents	Does not represent general U.S. population; data based on recall and self-reporting; high response rate; area-specific consumption patterns
Ebert et al., 1993	1,369 anglers	Survey data based on Chemrisk (1991)	Mean and distribution of intake rates for licensed sport anglers in Maine during ice-fishing or open water season grouped by all anglers (consumers and non-consumers) and consuming anglers	Same limitations/advantages with Chemrisk (1991) apply to dataset
Subsistence Freshwater Studies				
Columbia River Intertribal Fish Commission (CRIFTC), 1994	513 tribal members; 18 years old and above; 204 children, 5 years old and less	Fall and Winter of 1991-1992; stratified random sampling approach; 24-hour dietary recall	Weighted mean intake rates grouped by all adult respondents (consumers and non-consumers), adult consumers only, age, gender, children (consumers and non-consumers)	Survey was conducted during low fish consumption seasons; respondents provided same information for their children as their own; data was based on recall; study provides consumption and habits for subsistence subpopulation group
Wolfe and Walker, 1987	Dataset based on 94 communities in Alaska by various researchers	Surveys conducted between 1980 to 1985; data based on 1-year recall period	Range of total annual per capita harvests[b]	Author noted that sample of Alaska communities were incomplete; data based on 1-year recall; data provided are harvest data that must be converted to intake rates

[a] NFMS - National Marine Fisheries Services.

[b] Harvest was defined as a single years production of fish, land mammals, marine mammals, and other wild resources from a complete seasonal round.

intake rates based on means and upper-percentile values are presented accordingly:

General Population - Per Capita

Arithmetic Mean (g/day)	Upper Percentile (g/day)	Reference
17	--	Javitz, 1980 (NMFS)
14	42 (95th percentile)	Javitz, 1980 (TRI)
11	--	USDA, 1992
12	--	Pao, 1982

The key studies (Javitz, 1980; USDA, 1992; Pao, 1982) provided per capita intake rates for numerous fish species from all waterbodies (i.e., marine, estuarine, freshwater) for the general population (consumer and non-consumers). The studies shown above support values of an average per capita intake for the general U.S. population ranging between 11-17 g/day. It is important to note that these values apply to consumption of fish from all sources (e.g., store-bought, canned, self caught, etc.). Javitz reported a 95th percentile value of 42 g/day based on the TRI data. Although the TRI survey focused on consumption patterns over the period of one month, it may not reflect the individual's usual long term consumption. However, the period of observation in the TRI survey (i.e., one month) is longer than the typical food consumption surveys (e.g., few days). It should be noted that the TRI results presented by Javitz are based on the 94 percent of the population consuming fish during the survey period. Distribution data are also available from Javitz, 1980 and are presented in Tables 2-131 and 2-132. In addition, Ruffle, 1994 developed a lognormal distribution to fit the TRI data. Parameters for this distribution are presented in Table 2-146.

General Population - Consumers-Only

Arithmetic Mean (g/day)	Upper Percentile (g/day)	Reference
124	284 (95th percentile)[1]	Pao et al., 1982
117	--	USDA, 1992

[1] This value is the 95th percentile serving size.

The studies presented above (Pao et al., 1982; USDA, 1992) are based on one day data and may be useful for acute exposure assessments. Although upper percentile estimates were not presented in these studies, these may be more appropriate for acute exposures.

Recreational Marine Anglers

Arithmetic Mean/Median (g/day)	Upper Percentile (g/day)	Reference
37 (median)	339 (95th percentile)	Puffer et al., 1981
50 (mean); 21 (median)	107 (90th percentile)	Santa Monica, 1994
39 (mean)	146 (95th percentile)	U.S. EPA, 1993 (Pierce)

The data presented above for recreational marine anglers are based on results from creel surveys. As discussed earlier, this survey methodology targets the population of active fishermen. The studies presented above suggest that for that population of active fishermen, a central estimate of consumption rate is in the range of 37-50 g/day. Puffer presents a 95th percentile value of 339 g/day, which is much higher than the values presented in the other studies. The methodology used by Puffer, however, assumes that fishermen will catch the same amount of fish caught on the day of the interview other fishing trips. This methodology will tend to overestimate consumption rate. Therefore, considering the limitations of the data, 100 g/day is a reasonable estimate of the 95th percentile.

Recreational Freshwater Anglers

Arithmetic Mean (g/day)	Upper Percentile (g/day)	Reference
24 (West et al., 1989)	94 (95th percentile)	U.S. EPA, 1993
7 (Smith and Enger, 1988)	21 (95th percentile)	U.S. EPA, 1993
4 (Connelly et al., 1990)	15 (95th percentile)	U.S. EPA, 1993
19 (Cox et al., 1990)	73 (95th percentile)	U.S. EPA, 1993
7 (Fiore et al., 1989)	24 (95th percentile)	U.S. EPA, 1993

The data presented above, with the exception of Smith and Enger, are based on mail surveys. The data obtained from the Smith and Enger were from a creel survey conducted in the lower Tittabawassee River. These data may be a reflection of the low angler activity due to the long history of industrial pollution, the resulting decrease in fishing population in the river, and the fishing ban. Focusing on the mail surveys, the studies summarized above suggest that the average intake rate for recreational freshwater anglers ranges between 4-24 g/day. Upper percentile values range from 15-94 g/day.

Based on the data presented above for recreational anglers (both marine and freshwater), it appears that consumption of recreational freshwater fish is less than consumption of marine fish. It is important to note that these differences may be a result of several factors. First, marine fish are generally more abundant than freshwater fish. Second, intake rates of freshwater fish may be a reflection of fish advisories. Third, the survey methodology used in the studies presented for recreational marine anglers (i.e., creel surveys) targets the population of active anglers resulting in higher estimates of fish consumption.

Native American Freshwater Anglers

Arithmetic Mean (g/day)	Upper Percentile (g/day)	Reference
63	170	CRIFTC, 1994
305	913	Wolfe and Walker, 1987

Data for fish consumption rates for the native American population of freshwater anglers are very limited. However, based on the studies summarized above, the mean fish consumption rate for this subpopulation of freshwater anglers range between 63-305 g/day. The upper percentile estimate ranges between 170-913 g/day. It is important to note that the values calculated from Wolfe and Walker may be used to represent a subsistence population. However, these values are based on harvest data and therefore may overestimate the actual amount consumed.

It should be noted that the average recommended fish consumption rates for the various categories (general population, recreational marine anglers, recreational freshwater anglers, and subsistence freshwater anglers) are based on available data in which many of the surveys were site limited. Although, these rates are recommended in order to be applied to exposure assessments in any area with widespread contamination; the EPA has recommended that site or region specific consumption estimates be used wherever possible (Ebert et al., 1994). However, site specific information may not always be available. Therefore, representative consumption rates selected should be derived from studies consistent with the type of waterbody and target population being evaluated (Ebert et al., 1994). Hence the rates recommended in this report for the various categories are to be considered.

Other factors to consider when using the data include location, climate, season, and ethnicity of the angler or consumer population. In addition, other factors to be considered in exposure assessment studies in determining potential risk to a target population are the parts of fish consumed and the methods of preparation. For example, individuals who consume a greater portion of the fish internal organs may be at a greater health risk. Some studies have indicated that there is a significant decrease of contaminants in cooked fish when compared with raw fish (San Diego County, 1990). In addition, some contaminants have the affinity to accumulate more in certain tissues such as the fatty tissue as well as in certain internal organs.

In some cases, the residue levels of contaminants in fish are reported as the concentration of contaminant per gram of fat. When using these residue levels, the assessor should ensure consistency in the exposure assessment calculations by using consumption rates that are based on the amount of fat consumed for the fish species of interest. Alternately, residue levels for the "as consumed" portions of fish may be estimated by multiplying the levels based on fat by the fraction of fat per product as follows:

$$\text{residue level/g product} = \left[\frac{\text{residue level}}{\text{g-fat}}\right] \times \left[\frac{\text{g-fat}}{\text{g-product}}\right] \qquad \text{(Eqn. 2-13)}$$

The resulting residue levels may then be used in conjunction with "as consumed" consumption rates. Table 2-181 presents the total fat content for selected fish species.

Additionally, intake rates may be reported in terms of units as consumed or units of dry weight. It is essential that exposure assessors be aware of this difference so that they

Table 2-181. Percent Moisture and Fat Content for Selected Species[a]

Food	Moisture Content (%)	Total Fat Content (%)[b]	Comments
FINFISH			
Anchovy, European	73.37	4.101	Raw
	50.30	8.535	Canned in oil, drained solids
Bass	75.66	3.273	Freshwater, mixed species, raw
Bass, Striped	79.22	1.951	Raw
Bluefish	70.86	3.768	Raw
Butterfish	74.13	NA	Raw
Carp	76.31	4.842	Raw
	69.63	6.208	Cooked, dry heat
Catfish	76.39	3.597	Channel, raw
	58.81	12.224	Channel, cooked, breaded and fried
Cod, Atlantic	81.22	0.456	Atlantic, raw
	75.61	0.582	Canned, solids and liquids
	75.92	0.584	Cooked, dry heat
	16.14	1.608	Dried and salted
Cod, Pacific	81.28	0.407	Raw
Croaker, Atlantic	78.03	2.701	Raw
	59.76	11.713	Cooked, breaded and fried
Dolphinfish, Mahimahi	77.55	0.474	Raw
Drum, Freshwater	77.33	4.463	Raw
Flatfish, Flounder and Sole species	79.06	0.845	Raw
	73.16	1.084	Cooked, dry heat
Grouper	79.22	0.756	Raw, mixed species
	73.36	0.970	Cooked, dry heat
Haddock	79.92	0.489	Raw
	74.25	0.627	Cooked, dry heat
	71.48	0.651	Smoked
Halibut, Atlantic & Pacific	77.92	1.812	Raw
	71.69	2.324	Cooked, dry heat
Halibut, Greenland	70.27	12.164	Raw

Table 2-181. Percent Moisture and Fat Content for Selected Species (continued)

Food	Moisture Content (%)	Total Fat Content (%)[b]	Comments
Herring, Atlantic & Turbot, domestic species	72.05	7.909	Raw
	64.16	10.140	Cooked, dry heat
	59.70	10.822	Kippered
	55.22	16.007	Pickled
Herring, Pacific	71.52	12.552	Raw
Mackerel, Atlantic	63.55	9.076	Raw
	53.27	15.482	Cooked, dry heat
Mackerel, Jack	69.17	4.587	Canned, drained solids
Mackerel, King	75.85	1.587	Raw
Mackerel, Pacific & Jack	70.15	6.816	Canned, drained solids
Mackerel, Spanish	71.67	5.097	Raw
	68.46	5.745	Cooked, dry heat
Monkfish	83.24	NA	Raw
Mullet, Striped	77.01	2.909	Raw
	70.52	3.730	Cooked, dry heat
Ocean Perch, Atlantic	78.70	1.296	Raw
	72.69	1.661	Cooked, dry heat
Perch, Mixed species	79.13	0.705	Raw
	73.25	0.904	Cooked, dry heat
Pike, Northern	78.92	0.477	Raw
	72.97	0.611	Cooked, dry heat
Pike, Walleye	79.31	0.990	Raw
Pollock, Alaska & Walleye	81.56	0.701	Raw
	74.06	0.929	Cooked, dry heat
Pollock, Atlantic	78.18	0.730	Raw
Rockfish, Pacific, mixed species	79.26	1.182	Raw (Mixed species)
	73.41	1.515	Cooked, dry heat (mixed species)
Roughy, Orange	75.90	3.630	Raw
Salmon, Atlantic	68.50	5.625	Raw
Salmon, Chinook	73.17	9.061	Raw
	72.00	3.947	Smoked

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Table 2-181. Percent Moisture and Fat Content for Selected Species (continued)

Food	Moisture Content (%)	Total Fat Content (%)[b]	Comments
Salmon, Chum	75.38	3.279	Raw
	70.77	4.922	Canned, drained solids with bone
Salmon, Coho	72.63	4.908	Raw
	65.35	6.213	Cooked, moist heat
Salmon, Pink	76.35	2.845	Raw
	68.81	5.391	Canned, solids with bone and liquid
Salmon, Red & Sockeye	70.24	4.560	Raw
	68.72	6.697	Canned, drained solids with bone
	61.84	9.616	Cooked, dry heat
Sardine, Atlantic	59.61	10.545	Canned in oil, drained solids with bone
Sardine, Pacific	68.30	11.054	Canned in tomato sauce, drained solids with bone
Sea Bass, mixed species	78.27	1.678	Cooked, dry heat
	72.14	2.152	Raw
Seatrout, mixed species	78.09	2.618	Raw
Shad, American	68.19	NA	Raw
Shark, mixed species	73.58	3.941	Raw
	60.09	12.841	Cooked, batter-dipped and fried
Snapper, mixed species	76.87	0.995	Raw
	70.35	1.275	Cooked, dry heat
Sole, Spot	75.95	3.870	Raw
Sturgeon, mixed species	76.55	3.544	Raw
	69.94	4.544	Cooked, dry heat
	62.50	3.829	Smoked
Sucker, white	79.71	1.965	Raw
Sunfish, Pumpkinseed	79.50	0.502	Raw
Swordfish	75.62	3.564	Raw
	68.75	4.569	Cooked, dry heat
Trout, mixed species	71.42	5.901	Raw
Trout, Rainbow	71.48	2.883	Raw

Table 2-181. Percent Moisture and Fat Content for Selected Species (continued)

Food	Moisture Content (%)	Total Fat Content (%)[b]	Comments
	63.43	3.696	Cooked, dry heat
Tuna, light meat	59.83	7.368	Canned in oil, drained solids
	74.51	0.730	Canned in water, drained solids
Tuna, white meat	64.02	NA	Canned in oil
	69.48	2.220	Canned in water, drained solids
Tuna, Bluefish, fresh	68.09	4.296	Raw
	59.09	5.509	Cooked, dry heat
Turbot, European	76.95	NA	Raw
Whitefish, mixed species	72.77	5.051	Raw
	70.83	0.799	Smoked
Whiting, mixed species	80.27	0.948	Raw
	74.71	1.216	Cooked, dry heat
Yellowtail, mixed species	74.52	NA	Raw
SHELLFISH			
Crab, Alaska King	79.57	NA	Raw
	77.55	0.854	Cooked, moist heat
			Imitation, made from surimi
Crab, Blue	79.02	0.801	Raw
	79.16	0.910	Canned (dry pack or drained solids of wet pack)
	77.43	1.188	Cooked, moist heat
	71.00	6.571	Crab cakes
Crab, Dungeness	79.18	0.616	Raw
Crab, Queen	80.58	0.821	Raw
Crayfish, mixed species	80.79	0.732	Raw
	75.37	0.939	Cooked, moist heat
Lobster, Northern	76.76	NA	Raw
	76.03	0.358	Cooked, moist heat
Shrimp, mixed species	75.86	1.250	Raw
	72.56	1.421	Canned (dry pack or drained solids of wet pack)
	52.86	10.984	Cooked, breaded and fried

Table 2-181. Percent Moisture and Fat Content for Selected Species (continued)

Food	Moisture Content (%)	Total Fat Content (%)[b]	Comments
	77.28	0.926	Cooked, moist heat
Spiny Lobster, mixed species	74.07	1.102	Imitation made from surimi, raw
Clam, mixed species	81.82	0.456	Raw
	63.64	0.912	Canned, drained solids
	97.70	NA	Canned, liquid
	61.55	10.098	Cooked, breaded and fried
	63.64	0.912	Cooked, moist heat
Mussel, Blue	80.58	1.538	Raw
	61.15	3.076	Cooked, moist heat
Octopus, common	80.25	0.628	Raw
Oyster, Eastern	85.14	1.620	Raw
	85.14	1.620	Canned (Solids and liquid based) raw
	64.72	11.212	Cooked, breaded and fried
	70.28	3.240	Cooked, moist heat
Oyster, Pacific	82.06	1.752	Raw
Scallop, mixed species	78.57	0.377	Raw
	58.44	10.023	Cooked, breaded and fried
	73.82	NA	Imitation, made from Surimi
Squid	78.55	0.989	Raw
	64.54	6.763	Cooked, fried

[a] Data are reported as is in the Handbook
[b] Total Fat Content - saturated, monosaturated and polyunsaturated
NA = Not available

Source: U.S.D.A., 1979-1984 - U.S. Agricultural Handbook No. 8

may ensure consistency between the units used for intake rates and those used for concentration data (i.e., if the unit of food consumption is grams dry weight/day, then the unit for the amount of pollutant in the food should be grams dry weight). If necessary, as consumed intake rates may be converted to dry weight intake rates using the moisture content percentages of fish presented in Table 2-181 and the following equation:

$$IR_{dw} = IR_{ac} * [(100\text{-}W)/100] \qquad \text{(Eqn. 2-14)}$$

"Dry weight" intake rates may be converted to "as consumed" rates by using:

$$IR_{ac} = IR_{dw}/[(100\text{-}W)/100] \qquad \text{(Eqn. 2-15)}$$

where:

IR_{dw} = dry weight intake rate;
IR_{ac} = as consumed intake rate; and
W = percent water content.

The moisture content (%) and total fat content (%) measured and/or calculated in various fish forms (i.e., raw, cooked, smoked, etc.) for selected fish species are presented in Table 2-181 based on data from USDA (1979-1984). The total percent fat content is based on the sum of saturated, monounsaturated, and polyunsaturated fat. The moisture content is based on the percent of water present.

2.7. INTAKE RATES FOR VARIOUS HOMEPRODUCED FOOD ITEMS

2.7.1. Background

Ingestion of contaminated foods is a potential pathway of exposure to toxic chemicals. Consumers of homeproduced food products may be of particular concern because exposure resulting from local site contamination may be higher for this subpopulation. According to a survey by the National Gardening Association (1987), a total of 34 million (or 38 percent) U.S. households participated in vegetable gardening in 1986. Table 2-182 contains demographic data on vegetable gardening in 1986 by region/section, community size, and household size. Table 2-183 contains information on the types of vegetables grown by home gardeners in 1986. Tomatoes, peppers, onions, cucumbers, lettuce, beans, carrots, and corn are among the vegetables grown by the largest percentage of gardeners. Homeproduced foods can become contaminated in a variety of ways. Ambient pollutants in the air may be deposited on plants, adsorbed or absorbed by the plants, or dissolved in rainfall or irrigation waters that contact the plants. Pollutants may also be adsorbed through plants roots from contaminated soil and water. Finally, the addition of pesticides, soil additives, and fertilizers to crops or gardens may result in contamination of food products. Meat and dairy products can become contaminated if animals consume contaminated soil, water, or feed crops. Intake rates for homeproduced food products are needed to assess exposure to local contaminants present in homegrown or home caught foods. Recently, EPA analyzed data from the U.S. Department of Agriculture's (USDA) Nationwide Food Consumption Survey (NFCS) to generate distributions of intake rates for homeproduced foods. The methods used and the results of these analyses are presented below.

2.7.2. Methods

NFCS data were used to generate intake rates for homeproduced foods. USDA conducts the NFCS every 10 years to analyze the food consumption behavior and dietary status of Americans (USDA, 1992). The most recent NFCS was conducted in 1987-88. The survey used a statistical sampling technique designed to ensure that all seasons, geographic regions of the 48 coterminous States in the U.S., and socioeconomic and demographic groups were represented (USDA, 1994). There were two components of the NFCS. The household component collected information over a seven-day period on the socioeconomic and demographic characteristics of

Table 2-182. 1986 Vegetable Gardening by Demographic Factors

	Percentage of total households that have gardens (%)	Number of households (million)
Total	38	34
Region/section		
East	33	7.3
New England	37	1.9
Mid-Atlantic	32	5.4
Midwest	50	11.0
East Central	50	6.6
West Central	50	4.5
South	33	9.0
Deep South	44	3.1
Rest of South	29	5.9
West	37	6.2
Rocky Mountain	53	2.3
Pacific	32	4.2
Size of community		
City	26	6.2
Suburb	33	10.2
Small town	32	3.4
Rural	61	14.0
Household size		
Single, separated, divorced, widowed	54	8.5
Married, no children	45	11.9
Married, with children	44	13.2

Source: National Gardening Association, 1987.

Table 2-183. Percentage of Gardening Households Growing Different Vegetables in 1986

Vegetable	Percent
Artichokes	0.8
Asparagus	8.2
Beans	43.4
Beets	20.6
Broccoli	19.6
Brussel sprouts	5.7
Cabbage	29.6
Carrots	34.9
Cauliflower	14.0
Celery	5.4
Chard	3.5
Corn	34.4
Cucumbers	49.9
Dried peas	2.5
Dry beans	8.9
Eggplant	13.0
Herbs	9.8
Kale	3.1
Kohlrabi	3.0
Leeks	1.2
Lettuce	41.7
Melons	21.9
Okra	13.6
Onions	50.3
Oriental vegetables	2.1
Parsnips	2.2
Peanuts	1.9
Peas	29.0
Peppers	57.7
Potatoes	25.5
Pumpkins	10.2
Radishes	30.7
Rhubarb	12.2
Spinach	10.2
Summer squash	25.7
Sunflowers	8.2
Sweet potatoes	5.7
Tomato	85.4
Turnips	10.7
Winter squash	11.1

Source: National Gardening Association, 1987.

households, and the types, value, and sources of foods consumed by the household (USDA, 1994). The individual component collected information on food intakes of individuals within each household over a three-day period (USDA, 1993). The sample size for the 1987-88 survey was approximately 4,300 households (over 10,000 individuals). This is a decrease over the previous survey conducted in 1977-78 which sampled approximately 15,000 households (over 36,000 individuals) (USDA, 1994). The sample size was lower in the 1987-88 survey as a result of budgetary constraints and low response rate (i.e., 38 percent for the household survey and 31 percent for the individual survey) (USDA, 1993). However, NFCS data from 1987-88 were used to generate homegrown intake rates because they were the most recent data available and were believed to be more reflective of current eating patterns among the U.S. population. For the purposes of this study, homeproduced foods were defined as homegrown fruits and vegetables, meat and dairy products derived from consumer-raised livestock or game meat, and home caught fish. The food items/groups selected for analysis included major food groups (i.e., total fruits, total vegetables, total meats, total dairy, total fish and shellfish), individual food items for which >30 households reported eating the homeproduced form of the item, fruits and vegetables categorized as exposed, protected, and roots, and various USDA fruit and vegetable subcategories (i.e., dark green vegetables, citrus fruits, etc.). Food items/groups were identified in the NFCS data base according to NFCS-defined food codes. Appendix 2-A presents the codes used to determine the various food groups. The food intake analysis was accomplished using the SAS statistical programming system (SAS, 1990).

The analytical method used to determine the daily homegrown intake of each food item/group was based on the quantity of food used in the household that was reported as homegrown, the number of meals eaten by each member of the household, and the average serving sizes for the food items/groups being evaluated. The USDA household data were used to determine (1) the amount of homegrown food used during a week by family members and guests and (2) the number of meals eaten by each household member. Average serving sizes for individuals in specified age groups of the population were calculated separately from the USDA individual intake survey data for each food item/group.

Homegrown household food usage was attributed to the family members only. The USDA household survey data contains information on the number of member and guest meals consumed during the week. The portion of the household food item/group attributed to the family members was determined by multiplying the fraction of meals consumed by family members only by the reported household amount. The fraction of meals consumed by household members was determined by dividing the number of meals consumed in the household by the total number of meals eaten in the household (i.e., including meals eaten by household guests). The following equation was used to calculate the fraction of meals consumed by household members:

$$W_f = W_T \cdot \left[\frac{MEAL_{members}}{MEAL_{total}} \right] \qquad \text{(Eqn. 2-16)}$$

where:

W_f	=	Amount of food item/group used by family members only (g/week);
W_T	=	Amount of food item/group reported for the household (g/week);
$MEAL_{member}$	=	Number of household member meals; and
$MEAL_{total}$	=	Total number of meals, including guest meals.

Age-specific serving sizes in grams/day were calculated based on the USDA individual survey data. The age categories used in the analysis included: <1 year; 1 to 2 years; 3 to 5 years; 6 to 11 years; 12 to 19 years; 20 to 39 years; 40 to 69 years; and over 70 years. These serving sizes were used during subsequent analysis to generate homegrown intake rates for household members. Assuming that the proportion of the household quantity of each homegrown food item/group was a function of the number of meals and the mean age-specific serving size for each family member, individual intakes were calculated for all members of the survey population. The following general equation was used for calculating homegrown intake for family members:

$$w_i = W_f \cdot \left[\frac{m_i q_i}{\sum_{i=1}^{n} m_i q_i} \right] \qquad \text{(Eqn. 2-17)}$$

where:

w_i = Homegrown amount of food item/group attributed to member i during the week (g/week);

W_f = Total quantity of homegrown food item/group used by the family members (g/week);

m_i = Number of meals of household food consumed by member i during the week (meals/week); and

q_i = Serving size for an individual within the age and sex category of the member (g/meal).

Daily intake of a homegrown food item/group was determined by dividing the weekly value (w_i) by seven. The USDA data were adjusted by applying the sample weights calculated by USDA to the data set prior to analysis. The USDA sample weights were designed to "adjust for survey nonresponse and other vagaries of the sample selection process" (USDA, 1987-88). Also, the USDA weights are calculated "so that the weighted sample total equals the known population total, in thousands, for several characteristics thought to be correlated with eating behavior" (USDA, 1987-88). Intake rates were indexed to the body weight of the survey respondent and reported in units of g/kg-day. The results were then combined into a data set and homegrown mean intake values and quantile distributions were calculated using SAS. Both weighted and unweighted sample numbers were also tabulated for each data set.

Data for each of the major food groups were analyzed for the entire dataset and according to subcategories within each of the four census regions and for all regions combined. Subcategories included various age groups, urbanization categories, seasons, racial classifications, and responses to selected survey questions. Table 2-184 presents the codes, definitions, and a description of the data included in each of the subcategories.

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Table 2-184. Sub-category Codes and Definitions

Code	Definition	Description
		Region[a]
1	Northeast	Includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont
2	Midwest	Includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin
3	South	Includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia
4	West	Includes Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming
		Urbanization
1	Central City	Cities with populations of 50,000 or more that is the main city within the metropolitan statistical area (MSA).
2	Suburban	An area that is generally within the boundaries of an MSA, but is not within the legal limit of the central city.
3	Nonmetropolitan	An area that is not within an MSA.
		Race
1	--	White (Caucasian)
2	--	Black
3	--	Asian and Pacific Islander
4	--	Native American, Aleuts, and Eskimos
5, 8, 9	Other/NA	Don't know, no answer, some other race
		Responses to Survey Questions
Grow	Question 75	Did anyone in the household grow any vegetables or fruit for use in the household?
Raise Animals	Question 76	Did anyone in the household produce any animal products such as milk, eggs, meat, or poultry for home use in your household?
Fish/Hunt	Question 77	Did anyone in the household catch any fish or shoot game for home use?
Farm	Question 79	Did anyone in the household operate a farm or ranch?
		Season
Spring	-	April, May, June
Summer	-	July, August, September
Fall	-	October, November, December
Winter	-	January, February, March

[a] Alaska and Hawaii were not included.

Source: USDA 1987-88.

Seasonally/regionally adjusted values were also calculated for the major food groups to account for the impact of seasonal/regional variability on the intake of homegrown foods. To calculate a distribution of annual intake rates based on seasonal/regional intake, the per capita distribution of intake was determined within each region, for each season. First, seasonal intake rates at each percentile of the distribution for each region were averaged to calculate annual intake rates. This method assumes that a person's position in the distribution of homegrown intake is the same for all seasons. For example, a person at the pth percentile during one season is also assumed to be at the pth percentile during all other seasons. Next, the annual intake rates for each region were averaged to calculate the per capita seasonally/regionally-adjusted intake rates.

For individual food items for which 30 or more households reported usage of the homeproduced food, distributions were generated based on the following subcategories of the entire data set: age groups, urbanization categories, seasons, racial classifications, regions, and responses to the questionnaire. Intake rates were not calculated for food items/groups for which less than 30 households reported homeproduced usage because the number of observations may be inadequate for generating distributions that would be representative of that segment of consumers. Fruit and vegetables were also classified as exposed, protected, or roots, as shown in Appendix 2A of this document. Exposed foods are those that are grown above ground and are likely to be contaminated by pollutants deposited on surfaces that are eaten. Protected products are those that have outer protective coatings that are typically removed before consumption. Distributions of intake were tabulated for these food classes for the same subcategories listed above. Distributions were also tabulated for the following USDA food classifications: dark green vegetables, deep yellow vegetables, other vegetables, citrus fruits, and other fruits. Finally, the percentages of mean total intake of the food items/groups consumed within survey households that can be attributed to home production were tabulated. The percentage of intake that was homegrown was calculated as the ratio of total intake of the homegrown food item/group by the survey population to the total intake of all forms of the food by the survey population.

It should be noted that, except for the seasonally/regionally adjusted values, intake distributions were calculated for consumers of the homeproduced item/group of interest. These data represent one-week average intake rates for family members of those survey households who reported eating the homeproduced food item/group of interest during the survey period. Seasonally/regionally adjusted intake rates for the major food groups were calculated on a per capita basis. The number of individuals consuming any form of the product (i.e., both homeproduced and commercially-produced) are presented in Tables 2-32 through 2-73 in Section 2.3, Tables 2-86 through 2-100 in Section 2.4, and Tables 2-141 through 2-145 in Section 2.6. The total number of individuals in the data set (i.e., both individuals who ate the food item and those who did not eat the food item during the survey period) were also tabulated. These data are presented in Table 2-185. It should be noted that the total unweighted number of observations in Table 2-185 is 9,852. This is somewhat lower than the number of observations reported by USDA because this study only used observations for family members for which age and body weight were specified. The intake data for consumers of homeproduced foods and the total number of individuals surveyed may be used to calculate per capita intake rates for the survey population as follows:

> Assuming that w_p is the homegrown amount of food item/group at the p^{th} percentile, N_H is the weighted number of households who are users of the homegrown food item, and N_A is the weighted number of all households surveyed; then, $(N_A - N_H)$ is the weighted number of households who reported zero homegrown consumption. There are $(p/100) \times N_H$ households below the p^{th} percentile. Therefore, w_p is the

$$\frac{\left[\frac{p}{100} \times N_H\right] + (N_A - N_H)}{N_A} \; percentile \qquad \text{(Eqn. 2-18)}$$

of the per capita distribution of homegrown food consumption.

2.7.3. Results

Intake rates are presented in Tables 2-186 through 2-190 for total homeproduced fruits; Tables 2-191 through 2-195 for total homeproduced vegetables; Tables 2-196 through 2-200 for total homeproduced meats; Tables 2-201 through 2-205 for homeproduced dairy products; and Tables 2-206 through 2-210 for home caught fish and shellfish. These tables are presented at the end of Section 2.7. The intake rates for the major food groups vary according to region, age, urbanization code, race, and response to survey questions. In general, intake rates of homeproduced foods are higher among populations in nonmetropolitan and suburban areas and lowest in central city areas. Results of the regional analyses indicate that intake of homegrown fruits and vegetables and meat and dairy products is generally highest for individuals in the Midwest and South and lowest for those in the Northeast regions of the United States. Intake rates for homecaught fish in the South was generally greater than the intake rate of consumers in the other regions. Homegrown intake varied according to the specific food item/group and region for the various racial subpopulations. Homegrown intake was generally higher among individuals who indicated that they operate a farm, grow their own vegetables, raise animals, and catch their own fish. The results of the seasonal analyses for all regions combined indicated that, in general, homegrown fruits and vegetables were eaten at a higher rate in summer, and home caught fish was consumed at a higher rate in spring. Seasonal intake varied based on individual regions. Seasonally/regionally-adjusted per capita intake rate distributions for the major food groups are presented in Table 2-211.

Tables 2-212 through 2-238 present distributions of intake for individual homeproduced food items for households that reported consuming the homegrown form of the food during the survey period. Distributions of intake rates and demographic data for the population consuming homegrown foods categorized as exposed fruits and vegetables, protected fruits and vegetables, and root vegetables are presented in Tables 2-239 through 2-243. Intake rates and demographic data for the population consuming the foods items in various USDA classifications are presented in Tables 2-244 through 2-248. Table 2-249 presents the percentage of household intake attributed to homeproduced forms of the food items/groups evaluated for households using the food items/groups during the survey period.

2.7.4. Advantages and Limitations

The USDA NFCS data set is the largest publicly available source of information on food consumption habits in the United States. The advantages of using this data set are that it is expected to be representative of the U.S. population and that it provides information on a wide variety of food groups. However, the data collected by the USDA NFCS are based on short-term dietary recall and may not accurately reflect long-term intake patterns. This is particularly true for the tails of the distributions of homegrown intake. Also, the two survey components (i.e., household and individual) do not define food items/groups in a consistent manner. As a result, some biases may be introduced into analyses such as these because the two survey components are linked. The results of these data may also be biased by assumptions that are inherent to the analytical methods used to generate intake rates from the NFCS data. For example, the household data used are based on the amount of homeproduced food used during the survey week. This amount may not be the actual amount consumed. Factors for spoilage and waste are not incorporated into the data. The analytical method used may not capture high-end consumers within a household because average serving sizes are used in the calculations to represent the proportion of homegrown food consumed by each household member. Therefore, individuals with serving sizes in the upper-percentile of the distribution who also reside in households where household consumption is high may not be well represented in the distribution of homegrown intake. Also, the analyses assume that all family members consume a portion of the homeproduced food used within the household. However, the homeproduced food may not be consumed by all family members and serving sizes may not be entirely representative of the portion of household foods consumed by all family members.

2.7.5. Recommendations

The distribution data presented in this study may be used to assess exposure to contaminants in foods grown, raised, or caught at a specific site. The data presented here for consumers of homeproduced foods represents average daily intake rates of food items/groups over the seven-day survey period and does not account for variations in eating habits during the rest of the year. Thus, these data may not necessarily represent long-term intake patterns. For assessing exposure to contaminants in homeproduced foods among specific subpopulations, the assessor should refer to Tables 2-186 through 2-210. Intake rates for individual food items or classes of foods should be selected from Tables 2-212 through 2-248.

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Table 2-185. Weighted and Unweighted Number of Observations for NFCS Data Used in Analysis of Food Intake

	All Regions		Northeast		Midwest		South		West	
	wgtd	unwgtd	wgtd	unwgtd	wgtd	unwgtd	wgtd	unwgtd	wgtd	unwgtd
Total	188019000	9852	41167000	2018	46395000	2592	64331000	3399	36066000	1841
Age										
< 01	2814000	156	545000	29	812000	44	889000	51	568000	32
01-02	5699000	321	1070000	56	1757000	101	1792000	105	1080000	59
03-05	8103000	461	1490000	92	2251000	133	2543000	140	1789000	95
06-11	16711000	937	3589000	185	4263000	263	5217000	284	3612000	204
12-19	20488000	1084	4445000	210	5490000	310	6720000	369	3833000	195
20-39	61606000	3058	12699000	600	15627000	823	21786000	1070	11494000	565
40-69	56718000	3039	13500000	670	13006000	740	19635000	1080	10577000	549
70 +	15880000	796	3829000	176	3189000	178	5749000	300	3113000	142
Season										
Fall	47667000	1577	9386000	277	14399000	496	13186000	439	10696000	365
Spring	46155000	3954	10538000	803	10657000	1026	16802000	1437	8158000	688
Summer	45485000	1423	9460000	275	10227000	338	17752000	562	7986000	246
Winter	48712000	2898	11783000	663	11112000	732	16591000	961	9226000	542
Urbanization										
Central City	56352000	2217	9668000	332	17397000	681	17245000	715	12042000	489
Nonmetropolitan	45023000	3001	5521000	369	14296000	1053	19100000	1197	6106000	382
Surburban	86584000	4632	25978000	1317	14702000	858	27986000	1487	17918000	970
Race										
Asian	2413000	114	333000	13	849000	37	654000	32	577000	32
Black	21746000	1116	3542000	132	2794000	126	13701000	772	1709000	86
Native American	1482000	91	38000	4	116000	6	162000	8	1166000	73
Other/NA	4787000	235	1084000	51	966000	37	1545000	86	1192000	61
White	157531000	8294	36170000	1818	41670000	2386	48269000	2501	31422000	1589
Response to Questionnaire										
Do you garden?	68152000	3744	12501000	667	22348000	1272	20518000	1136	12725000	667
Do you raise animals?	10097000	631	1178000	70	3742000	247	2603000	162	2574000	152
Do you hunt?	20216000	1148	3418000	194	6948000	411	6610000	366	3240000	177
Do you fish?	39733000	2194	5950000	321	12621000	725	13595000	756	7567000	392
Do you farm?	7329000	435	830000	42	2681000	173	2232000	130	1586000	90

Source: USDA 1987-88.

Table 2-186. Intake of Homegrown Fruits (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	14744000	817	2.68E+00	1.40E-03	0.00E+00	6.26E-02	1.68E-01	2.78E-01	4.97E-01	1.07E+00	2.37E+00	5.97E+00	1.11E+01	2.40E+01	6.06E+01
Age Group															
< 01	185000	11	6.08E+00	1.11E-02	5.11E-01	5.11E-01	1.78E+00	2.12E+00	2.50E+00	4.58E+00	7.05E+00	1.43E+01	1.43E+01	1.43E+01	1.43E+01
01-02	360000	23	8.74E+00	2.48E-02	9.59E-01	9.59E-01	1.09E+00	1.30E+00	1.64E+00	3.48E+00	7.98E+00	1.93E+01	6.06E+01	6.06E+01	6.06E+01
03-05	550000	34	4.07E+00	1.17E-02	0.00E+00	0.00E+00	0.00E+00	3.62E-01	9.77E-01	1.92E+00	2.73E+00	6.02E+00	8.91E+00	4.83E+01	4.83E+01
06-11	1044000	75	3.59E+00	5.73E-03	0.00E+00	0.00E+00	1.91E-01	4.02E-01	6.97E-01	1.31E+00	3.08E+00	1.18E+01	1.58E+01	3.22E+01	3.22E+01
12-19	1189000	67	1.94E+00	2.74E-03	8.74E-02	8.74E-02	1.27E-01	2.67E-01	4.41E-01	6.61E-01	2.35E+00	6.76E+00	8.34E+00	1.85E+01	1.85E+01
20-39	3163000	164	1.95E+00	2.40E-03	5.60E-02	8.14E-02	1.28E-01	2.04E-01	3.74E-01	7.03E-01	1.77E+00	4.17E+00	6.84E+00	1.61E+01	3.70E+01
40-69	5633000	309	2.66E+00	2.25E-03	2.57E-02	6.26E-02	1.91E-01	2.86E-01	4.69E-01	1.03E+00	2.33E+00	5.81E+00	1.30E+01	2.38E+01	5.33E+01
70 +	2620000	134	2.25E+00	1.68E-03	4.15E-02	4.41E-02	2.24E-01	3.80E-01	6.11E-01	1.18E+00	2.35E+00	5.21E+00	8.69E+00	1.17E+01	1.53E+01
Season															
Fall	3137000	108	1.57E+00	9.34E-04	2.63E-01	2.63E-01	3.04E-01	3.90E-01	5.70E-01	1.04E+00	1.92E+00	3.48E+00	4.97E+00	1.06E+01	1.06E+01
Spring	2963000	301	1.58E+00	1.38E-03	6.45E-02	8.89E-02	1.98E-01	2.54E-01	4.23E-01	8.57E-01	1.70E+00	4.07E+00	5.10E+00	8.12E+00	3.17E+01
Summer	4356000	145	3.86E+00	3.69E-03	0.00E+00	0.00E+00	9.18E-02	1.56E-01	4.45E-01	1.26E+00	3.31E+00	1.09E+01	1.46E+01	5.33E+01	6.06E+01
Winter	4288000	263	3.08E+00	2.67E-03	2.57E-02	4.41E-02	1.72E-01	2.69E-01	5.56E-01	1.15E+00	2.61E+00	8.04E+00	1.53E+01	2.49E+01	4.83E+01
Urbanization															
Central City	3668000	143	2.31E+00	1.65E-03	4.15E-02	4.41E-02	1.82E-01	3.33E-01	5.67E-01	1.08E+00	2.46E+00	5.34E+00	1.05E+01	1.43E+01	1.93E+01
Nonmetropolitan	4118000	278	2.41E+00	2.54E-03	2.57E-02	6.26E-02	1.27E-01	2.32E-01	4.50E-01	1.15E+00	2.42E+00	4.46E+00	8.34E+00	2.40E+01	5.33E+01
Surburban	6898000	394	3.07E+00	2.43E-03	3.33E-02	1.25E-01	2.30E-01	2.95E-01	4.91E-01	9.93E-01	2.33E+00	7.26E+00	1.52E+01	3.70E+01	6.06E+01
Race															
Black	450000	20	1.87E+00	5.68E-03	1.32E-01	1.32E-01	2.84E-01	4.55E-01	6.08E-01	1.13E+00	1.53E+00	2.29E+00	2.29E+00	1.93E+01	1.93E+01
Other/NA	49000	2	5.51E-01	1.51E-03	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	1.31E+00	1.31E+00	1.31E+00	1.31E+00
White	14185000	793	2.73E+00	1.45E-03	2.57E-02	7.22E-02	1.82E-01	2.82E-01	5.10E-01	1.07E+00	2.46E+00	6.10E+00	1.17E+01	2.40E+01	6.06E+01
Questionnaire Response															
Do you garden?	12742000	709	2.79E+00	1.57E-03	0.00E+00	5.60E-02	1.84E-01	2.87E-01	5.30E-01	1.12E+00	2.50E+00	6.10E+00	1.18E+01	2.49E+01	6.06E+01
Do you farm?	1917000	112	2.58E+00	1.98E-03	5.60E-02	7.22E-02	2.76E-01	4.13E-01	7.53E-01	1.61E+00	3.62E+00	5.97E+00	7.82E+00	1.58E+01	1.58E+01

Table 2-187. Intake of Homegrown Fruits (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1279000	72	9.29E-01	1.65E-03	7.91E-02	7.91E-02	8.48E-02	1.61E-01	3.11E-01	4.85E-01	7.82E-01	1.29E+00	2.16E+00	1.17E+01	1.17E+01
Age Group															
01-02	14000	1	2.75E+00	0.00E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00
03-05	35000	3	1.30E+00	2.13E-03	9.36E-01	9.36E-01	9.36E-01	9.36E-01	1.00E+00	1.00E+00	1.79E+00	1.79E+00	1.79E+00	1.79E+00	1.79E+00
06-11	91000	6	9.83E-01	8.27E-04	5.66E-01	5.66E-01	5.66E-01	7.82E-01	7.82E-01	8.93E-01	1.20E+00	1.38E+00	1.38E+00	1.38E+00	1.38E+00
12-19	193000	10	4.16E-01	5.01E-04	8.74E-02	8.74E-02	8.74E-02	1.27E-01	1.27E-01	4.42E-01	5.42E-01	6.12E-01	8.81E-01	8.81E-01	8.81E-01
20-39	252000	16	5.67E-01	6.02E-04	1.68E-01	1.68E-01	1.84E-01	2.13E-01	3.90E-01	5.12E-01	6.29E-01	1.03E+00	1.03E+00	1.56E+00	1.56E+00
40-69	495000	22	4.18E-01	2.93E-04	7.91E-02	7.91E-02	7.91E-02	8.48E-02	2.93E-01	4.62E-01	5.69E-01	7.53E-01	7.53E-01	8.91E-01	8.91E-01
70 +	199000	14	2.94E+00	9.16E-03	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.62E-01	8.75E-01	2.16E+00	1.17E+01	1.17E+01	1.17E+01	1.17E+01
Season															
Fall	260000	8	6.04E-01	3.83E-04	3.53E-01	3.53E-01	3.53E-01	3.53E-01	4.69E-01	5.70E-01	7.53E-01	1.03E+00	1.03E+00	1.03E+00	1.03E+00
Spring	352000	31	8.80E-01	2.18E-03	8.74E-02	8.74E-02	1.61E-01	1.68E-01	2.87E-01	4.85E-01	8.79E-01	1.83E+00	2.16E+00	7.13E+00	7.13E+00
Summer	271000	9	1.63E+00	6.96E-03	7.91E-02	7.91E-02	7.91E-02	7.91E-02	8.48E-02	4.42E-01	4.62E-01	1.17E+01	1.17E+01	1.17E+01	1.17E+01
Winter	396000	24	7.10E-01	8.82E-04	1.84E-01	1.84E-01	2.07E-01	2.30E-01	2.93E-01	5.42E-01	8.81E-01	1.38E+00	1.79E+00	2.75E+00	2.75E+00
Urbanization															
Central City	50000	3	1.45E-01	1.81E-04	8.74E-02	8.74E-02	8.74E-02	8.74E-02	8.74E-02	1.61E-01	1.82E-01	1.82E-01	1.82E-01	1.82E-01	1.82E-01
Nonmetropolitan	176000	10	4.38E-01	1.55E-03	7.91E-02	7.91E-02	7.91E-02	7.91E-02	8.48E-02	1.27E-01	2.62E-01	1.83E+00	2.16E+00	2.16E+00	2.16E+00
Surburban	1053000	59	1.05E+00	1.97E-03	1.84E-01	1.84E-01	2.30E-01	2.93E-01	4.37E-01	5.43E-01	8.12E-01	1.29E+00	2.75E+00	1.17E+01	1.17E+01
Race															
White	1279000	72	9.29E-01	1.65E-03	7.91E-02	7.91E-02	8.48E-02	1.61E-01	3.11E-01	4.85E-01	7.82E-01	1.29E+00	2.16E+00	1.17E+01	1.17E+01
Questionnaire Response															
Do you garden?	983000	59	1.04E+00	2.04E-03	8.74E-02	8.74E-02	1.82E-01	2.13E-01	3.75E-01	5.43E-01	8.81E-01	1.38E+00	2.75E+00	1.17E+01	1.17E+01
Do you farm?	132000	4	7.45E-01	4.84E-04	5.70E-01	5.70E-01	5.70E-01	5.70E-01	5.99E-01	6.91E-01	8.90E-01	1.03E+00	1.03E+00	1.03E+00	1.03E+00

Table 2-188. Intake of Homegrown Fruits (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4683000	302	3.01E+00	3.32E-03	2.57E-02	4.41E-02	1.25E-01	2.35E-01	4.68E-01	1.03E+00	2.31E+00	6.76E+00	1.39E+01	5.33E+01	6.06E+01
Age															
< 01	53000	4	2.54E+00	4.83E-03	5.11E-01	5.11E-01	5.11E-01	5.11E-01	2.12E+00	2.72E+00	2.72E+00	4.47E+00	4.47E+00	4.47E+00	4.47E+00
01-02	199000	12	1.13E+01	4.25E-02	1.30E+00	1.30E+00	1.30E+00	1.37E+00	1.72E+00	3.48E+00	1.09E+01	6.06E+01	6.06E+01	6.06E+01	6.06E+01
03-05	214000	15	3.59E+00	1.24E-02	2.81E-01	2.81E-01	2.81E-01	3.62E-01	1.79E+00	1.92E+00	4.25E+00	5.33E+00	5.33E+00	3.17E+01	3.17E+01
06-11	265000	29	2.12E+00	5.38E-03	1.32E-01	1.32E-01	1.72E-01	1.91E-01	4.02E-01	1.79E+00	3.01E+00	3.47E+00	4.35E+00	1.60E+01	1.60E+01
12-19	401000	24	2.49E+00	4.49E-03	1.08E-01	1.08E-01	1.46E-01	3.78E-01	4.88E-01	7.64E-01	2.53E+00	7.15E+00	8.34E+00	8.34E+00	8.34E+00
20-39	1190000	74	2.89E+00	6.04E-03	5.60E-02	7.22E-02	9.73E-02	1.28E-01	3.00E-01	5.37E-01	1.68E+00	1.09E+01	1.61E+01	3.70E+01	3.70E+01
40-69	1627000	104	2.96E+00	5.73E-03	2.57E-02	6.26E-02	1.01E-01	2.67E-01	4.77E-01	1.08E+00	1.90E+00	4.43E+00	1.39E+01	5.33E+01	5.33E+01
70 +	734000	40	1.56E+00	2.48E-03	4.15E-02	4.15E-02	4.41E-02	3.89E-01	5.67E-01	8.78E-01	1.58E+00	3.94E+00	4.42E+00	1.05E+01	1.05E+01
Season															
Fall	1138000	43	1.54E+00	1.15E-03	2.63E-01	2.63E-01	3.04E-01	4.74E-01	6.11E-01	1.07E+00	1.92E+00	3.48E+00	4.34E+00	5.33E+00	5.33E+00
Spring	1154000	133	1.69E+00	2.96E-03	6.45E-02	8.89E-02	2.09E-01	2.62E-01	4.23E-01	9.23E-01	1.72E+00	2.89E+00	4.47E+00	1.60E+01	3.17E+01
Summer	1299000	44	7.03E+00	1.08E-02	6.26E-02	6.26E-02	9.18E-02	1.25E-01	4.28E-01	1.55E+00	8.34E+00	1.61E+01	3.70E+01	6.06E+01	6.06E+01
Winter	1092000	82	1.18E+00	1.56E-03	2.57E-02	2.57E-02	5.60E-02	1.46E-01	3.62E-01	6.09E-01	1.42E+00	2.61E+00	3.73E+00	1.09E+01	1.09E+01
Urbanization															
Central City	1058000	42	1.84E+00	2.48E-03	4.15E-02	4.15E-02	1.01E-01	2.63E-01	5.21E-01	1.07E+00	1.90E+00	2.82E+00	9.74E+00	1.09E+01	1.09E+01
Nonmetropolitan	1920000	147	2.52E+00	4.76E-03	2.57E-02	5.60E-02	1.08E-01	1.46E-01	3.96E-01	1.03E+00	2.07E+00	4.43E+00	6.84E+00	5.33E+01	5.33E+01
Surburban	1705000	113	4.29E+00	7.10E-03	6.45E-02	9.18E-02	2.04E-01	3.10E-01	4.81E-01	7.64E-01	3.01E+00	1.39E+01	1.80E+01	6.06E+01	6.06E+01
Race															
White	4683000	302	3.01E+00	3.32E-03	2.57E-02	4.41E-02	1.25E-01	2.35E-01	4.68E-01	1.03E+00	2.31E+00	6.76E+00	1.39E+01	5.33E+01	6.06E+01
Response to Questionnaire															
Do you garden?	4060000	267	3.27E+00	3.80E-03	2.57E-02	4.41E-02	1.01E-01	2.04E-01	4.48E-01	1.07E+00	2.37E+00	7.15E+00	1.46E+01	5.33E+01	6.06E+01
Do you farm?	694000	57	2.59E+00	2.73E-03	5.60E-02	5.60E-02	1.91E-01	4.08E-01	1.26E+00	1.63E+00	3.89E+00	6.76E+00	8.34E+00	1.11E+01	1.11E+01

Table 2-189. Intake of Homegrown Fruits (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4148000	208	2.97E+00	2.12E-03	3.33E-02	1.12E-01	2.42E-01	3.55E-01	5.97E-01	1.35E+00	3.01E+00	8.18E+00	1.41E+01	2.38E+01	2.40E+01
Age															
< 01	80000	3	1.01E+01	1.64E-02	4.58E+00	4.58E+00	4.58E+00	4.58E+00	4.58E+00	1.43E+01	1.43E+01	1.43E+01	1.43E+01	1.43E+01	1.43E+01
01-02	81000	5	2.73E+00	7.75E-03	1.09E+00	1.09E+00	1.09E+00	1.09E+00	1.09E+00	1.64E+00	3.97E+00	7.82E+00	7.82E+00	7.82E+00	7.82E+00
03-05	71000	4	2.77E+00	6.63E-03	8.84E-01	8.84E-01	8.84E-01	8.84E-01	8.84E-01	2.56E+00	4.46E+00	6.02E+00	6.02E+00	6.02E+00	6.02E+00
06-11	147000	8	5.73E+00	1.59E-02	5.94E-01	5.94E-01	5.94E-01	5.94E-01	1.13E+00	1.31E+00	1.18E+01	1.58E+01	1.58E+01	1.58E+01	1.58E+01
12-19	270000	15	7.20E-01	1.48E-03	1.12E-01	1.12E-01	1.55E-01	2.67E-01	3.55E-01	4.41E-01	6.18E-01	2.83E+00	2.83E+00	2.83E+00	2.83E+00
20-39	775000	31	1.88E+00	1.98E-03	8.14E-02	8.14E-02	1.56E-01	2.84E-01	5.57E-01	1.31E+00	1.98E+00	4.91E+00	5.97E+00	6.10E+00	6.10E+00
40-69	1783000	93	3.25E+00	3.97E-03	3.33E-02	1.32E-01	2.73E-01	3.57E-01	5.78E-01	1.20E+00	2.87E+00	1.04E+01	1.55E+01	2.40E+01	2.40E+01
70 +	941000	49	2.98E+00	3.29E-03	1.99E-01	1.99E-01	3.77E-01	4.46E-01	8.34E-01	1.82E+00	3.53E+00	8.18E+00	1.06E+01	1.53E+01	1.53E+01
Season															
Fall	896000	29	1.99E+00	2.50E-03	3.92E-01	3.92E-01	4.27E-01	4.46E-01	6.50E-01	1.13E+00	1.96E+00	4.97E+00	8.18E+00	1.06E+01	1.06E+01
Spring	620000	59	2.05E+00	2.49E-03	1.55E-01	1.55E-01	2.82E-01	3.11E-01	4.50E-01	1.06E+00	4.09E+00	5.01E+00	6.58E+00	7.05E+00	7.05E+00
Summer	1328000	46	2.84E+00	3.83E-03	8.14E-02	8.14E-02	1.56E-01	2.67E-01	4.41E-01	1.31E+00	2.83E+00	6.10E+00	1.43E+01	2.40E+01	2.40E+01
Winter	1304000	74	4.21E+00	4.91E-03	3.33E-02	1.12E-01	2.36E-01	3.82E-01	8.92E-01	1.88E+00	3.71E+00	1.41E+01	1.97E+01	2.38E+01	2.38E+01
Urbanization															
Central City	1066000	39	3.33E+00	3.26E-03	2.36E-01	2.36E-01	3.92E-01	4.55E-01	8.34E-01	2.55E+00	4.77E+00	8.18E+00	1.06E+01	1.43E+01	1.43E+01
Nonmetropolitan	1548000	89	2.56E+00	2.93E-03	8.14E-02	8.14E-02	2.67E-01	3.38E-01	6.12E-01	1.40E+00	2.83E+00	5.97E+00	1.04E+01	2.40E+01	2.40E+01
Surburban	1534000	80	3.14E+00	4.35E-03	3.33E-02	1.12E-01	1.56E-01	2.84E-01	5.08E-01	1.10E+00	2.29E+00	1.18E+01	1.55E+01	2.38E+01	2.38E+01
Race															
Black	332000	12	1.05E+00	1.11E-03	1.32E-01	1.32E-01	1.32E-01	2.84E-01	6.08E-01	8.20E-01	1.46E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00
White	3816000	196	3.14E+00	2.29E-03	3.33E-02	1.12E-01	2.42E-01	3.55E-01	5.97E-01	1.38E+00	3.37E+00	8.69E+00	1.43E+01	2.38E+01	2.40E+01
Response to Questionnaire															
Do you garden?	3469000	174	2.82E+00	2.08E-03	3.33E-02	1.56E-01	2.84E-01	3.84E-01	6.50E-01	1.39E+00	2.94E+00	6.10E+00	1.41E+01	2.11E+01	2.40E+01
Do you farm?	296000	16	5.31E+00	8.22E-03	3.57E-01	3.57E-01	3.78E-01	3.84E-01	2.87E+00	4.17E+00	6.10E+00	1.18E+01	1.58E+01	1.58E+01	1.58E+01

Table 2-190. Intake of Homegrown Fruits (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4574000	233	2.62E+00	2.19E-03	7.14E-02	1.50E-01	2.75E-01	3.33E-01	6.17E-01	1.20E+00	2.42E+00	5.39E+00	1.09E+01	2.49E+01	4.83E+01
Age															
< 01	52000	4	3.56E+00	7.12E-03	1.78E+00	1.78E+00	1.78E+00	1.78E+00	2.50E+00	2.50E+00	5.47E+00	5.77E+00	5.77E+00	5.77E+00	5.77E+00
01-02	66000	5	9.81E+00	2.67E-02	9.59E-01	9.59E-01	9.59E-01	9.59E-01	4.41E+00	9.52E+00	1.93E+01	1.93E+01	1.93E+01	1.93E+01	1.93E+01
03-05	200000	11	6.13E+00	2.83E-02	7.28E-01	7.28E-01	8.30E-01	9.77E-01	1.04E+00	1.82E+00	2.32E+00	8.91E+00	4.83E+01	4.83E+01	4.83E+01
06-11	511000	31	4.41E+00	9.91E-03	3.75E-01	3.75E-01	4.83E-01	5.32E-01	9.76E-01	1.61E+00	4.96E+00	7.98E+00	2.49E+01	3.22E+01	3.22E+01
12-19	325000	18	3.19E+00	7.38E-03	4.88E-01	4.88E-01	4.88E-01	5.75E-01	7.10E-01	1.53E+00	3.52E+00	1.11E+01	1.11E+01	1.85E+01	1.85E+01
20-39	946000	43	1.19E+00	1.28E-03	1.67E-01	1.83E-01	1.96E-01	2.64E-01	4.04E-01	7.54E-01	1.54E+00	2.22E+00	2.96E+00	8.04E+00	8.04E+00
40-69	1728000	90	2.40E+00	2.58E-03	1.50E-01	1.50E-01	2.75E-01	2.91E-01	5.18E-01	1.20E+00	2.34E+00	5.81E+00	1.09E+01	1.30E+01	1.81E+01
70 +	746000	31	1.80E+00	1.90E-03	7.14E-02	7.14E-02	1.00E-01	3.80E-01	7.33E-01	9.71E-01	2.64E+00	5.00E+00	5.30E+00	5.39E+00	5.39E+00
Season															
Fall	843000	28	1.47E+00	1.44E-03	2.91E-01	2.91E-01	2.91E-01	2.95E-01	4.83E-01	1.04E+00	2.15E+00	2.99E+00	4.65E+00	5.39E+00	5.39E+00
Spring	837000	78	1.37E+00	1.53E-03	1.67E-01	1.73E-01	1.96E-01	2.51E-01	5.10E-01	9.81E-01	1.61E+00	2.95E+00	5.29E+00	6.68E+00	7.02E+00
Summer	1398000	44	2.47E+00	2.65E-03	1.86E-01	1.86E-01	2.75E-01	4.04E-01	6.17E-01	1.28E+00	3.14E+00	7.26E+00	1.09E+01	1.30E+01	1.30E+01
Winter	1496000	83	4.10E+00	5.89E-03	7.14E-02	7.14E-02	2.96E-01	3.33E-01	7.74E-01	1.51E+00	3.74E+00	1.11E+01	1.85E+01	4.83E+01	4.83E+01
Urbanization															
Central City	1494000	59	1.99E+00	2.66E-03	7.14E-02	7.14E-02	2.35E-01	3.42E-01	5.26E-01	8.63E-01	2.04E+00	4.63E+00	9.52E+00	1.93E+01	1.93E+01
Nonmetropolitan	474000	32	2.24E+00	4.31E-03	1.84E-01	1.84E-01	2.76E-01	4.24E-01	6.25E-01	7.68E-01	2.64E+00	4.25E+00	1.09E+01	1.09E+01	1.09E+01
Surburban	2606000	142	3.04E+00	3.41E-03	1.67E-01	1.83E-01	2.75E-01	3.14E-01	7.10E-01	1.39E+00	3.14E+00	5.81E+00	1.03E+01	3.22E+01	4.83E+01
Race															
Black	118000	8	4.16E+00	2.00E-02	5.18E-01	5.18E-01	5.18E-01	5.18E-01	6.08E-01	1.48E+00	1.53E+00	1.93E+01	1.93E+01	1.93E+01	1.93E+01
Other/NA	49000	2	5.51E-01	1.51E-03	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	1.31E+00	1.31E+00	1.31E+00	1.31E+00
White	4407000	223	2.60E+00	2.20E-03	7.14E-02	1.50E-01	2.75E-01	3.14E-01	6.25E-01	1.20E+00	2.47E+00	5.39E+00	1.03E+01	2.49E+01	4.83E+01
Response to Questionnaire															
Do you garden?	4170000	207	2.76E+00	2.39E-03	7.14E-02	1.00E-01	2.75E-01	3.14E-01	6.29E-01	1.20E+00	2.54E+00	5.81E+00	1.09E+01	2.49E+01	4.83E+01
Do you farm?	795000	35	1.85E+00	1.72E-03	2.75E-01	2.75E-01	2.76E-01	5.98E-01	7.10E-01	1.26E+00	2.50E+00	4.63E+00	5.00E+00	6.81E+00	6.81E+00

Table 2-191. Intake of Homegrown Vegetables (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	34392000	1855	2.08E+00	4.97E-04	0.00E+00	4.79E-03	1.10E-01	1.80E-01	4.47E-01	1.11E+00	2.47E+00	5.20E+00	7.54E+00	1.55E+01	2.70E+01
Age															
< 01	466000	24	7.40E+00	8.78E-03	2.59E-01	2.59E-01	5.13E-01	7.22E-01	2.77E+00	5.85E+00	9.75E+00	1.70E+01	1.87E+01	1.89E+01	1.89E+01
01-02	951000	53	5.20E+00	6.32E-03	2.32E-02	2.32E-02	2.45E-01	3.82E-01	1.23E+00	3.27E+00	5.83E+00	1.31E+01	1.96E+01	2.70E+01	2.70E+01
03-05	1235000	76	2.46E+00	2.19E-03	0.00E+00	0.00E+00	4.94E-02	3.94E-01	7.13E-01	1.25E+00	3.91E+00	6.35E+00	7.74E+00	1.06E+01	1.28E+01
06-11	3024000	171	2.02E+00	1.91E-03	0.00E+00	5.95E-03	1.00E-01	1.60E-01	4.00E-01	8.86E-01	2.21E+00	4.64E+00	6.16E+00	1.76E+01	2.36E+01
12-19	3293000	183	1.48E+00	1.01E-03	0.00E+00	0.00E+00	6.46E-02	1.45E-01	3.22E-01	8.09E-01	1.83E+00	3.71E+00	6.03E+00	7.71E+00	9.04E+00
20-39	8593000	437	1.47E+00	6.84E-04	1.48E-03	1.69E-02	7.77E-02	1.57E-01	2.73E-01	7.61E-01	1.91E+00	3.44E+00	4.92E+00	1.05E+01	2.06E+01
40-69	12828000	700	2.07E+00	7.53E-04	0.00E+00	5.13E-03	1.19E-01	2.14E-01	5.26E-01	1.18E+00	2.47E+00	5.12E+00	6.94E+00	1.49E+01	2.29E+01
70 +	4002000	211	2.51E+00	1.41E-03	4.23E-03	5.21E-03	1.51E-01	2.39E-01	5.81E-01	1.37E+00	3.69E+00	6.35E+00	8.20E+00	1.25E+01	1.55E+01
Seasons															
Fall	11026000	394	1.88E+00	7.67E-04	0.00E+00	4.98E-02	1.13E-01	1.80E-01	4.13E-01	9.83E-01	2.11E+00	4.88E+00	6.94E+00	1.25E+01	1.89E+01
Spring	6540000	661	1.36E+00	7.27E-04	0.00E+00	2.44E-03	4.47E-02	1.35E-01	3.21E-01	7.04E-01	1.63E+00	3.37E+00	5.21E+00	8.35E+00	2.36E+01
Summer	11081000	375	2.86E+00	1.12E-03	0.00E+00	6.93E-02	1.57E-01	2.24E-01	7.12E-01	1.62E+00	3.44E+00	6.99E+00	9.75E+00	1.87E+01	2.70E+01
Winter	5745000	425	1.79E+00	9.80E-04	0.00E+00	3.73E-03	4.49E-02	1.56E-01	4.69E-01	1.05E+00	2.27E+00	3.85E+00	6.01E+00	1.06E+01	2.06E+01
Urbanizations															
Central City	6183000	228	1.40E+00	7.47E-04	0.00E+00	1.01E-02	6.59E-02	1.50E-01	3.00E-01	7.50E-01	1.67E+00	3.83E+00	4.67E+00	9.96E+00	1.66E+01
Nonmetropolitan	13808000	878	2.68E+00	9.50E-04	0.00E+00	2.12E-02	1.58E-01	2.58E-01	5.99E-01	1.45E+00	3.27E+00	6.35E+00	9.33E+00	1.75E+01	2.70E+01
Surburban	14341000	747	1.82E+00	6.58E-04	0.00E+00	3.34E-03	1.10E-01	1.63E-01	3.94E-01	9.63E-01	2.18E+00	4.32E+00	6.78E+00	1.25E+01	2.06E+01
Race															
Asian	184000	8	1.74E+00	5.92E-03	4.28E-02	4.28E-02	4.66E-02	1.71E-01	1.71E-01	5.66E-01	8.37E-01	6.78E+00	6.78E+00	6.78E+00	6.78E+00
Black	1872000	111	1.78E+00	1.79E-03	0.00E+00	0.00E+00	7.77E-02	1.39E-01	4.38E-01	9.32E-01	2.06E+00	4.68E+00	5.70E+00	8.20E+00	1.89E+01
Native American	28000	1	6.80E-01	0.00E+00	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01
Other/NA	331000	19	3.31E+00	5.20E-03	9.80E-03	9.80E-03	2.04E-01	2.69E-01	3.50E-01	3.59E+00	6.03E+00	6.67E+00	9.04E+00	9.04E+00	9.04E+00
White	31917000	1714	2.10E+00	5.20E-04	0.00E+00	7.34E-03	1.13E-01	1.84E-01	4.54E-01	1.12E+00	2.48E+00	5.18E+00	7.68E+00	1.55E+01	2.70E+01
Response to Questionnaire															
Do you garden?	30217000	1643	2.17E+00	5.23E-04	0.00E+00	5.21E-03	1.11E-01	1.85E-01	4.84E-01	1.18E+00	2.68E+00	5.35E+00	7.72E+00	1.55E+01	2.36E+01
Do you farm?	4319000	262	3.29E+00	1.95E-03	0.00E+00	0.00E+00	1.61E-01	2.92E-01	8.46E-01	1.67E+00	3.61E+00	8.88E+00	1.18E+01	1.76E+01	2.36E+01

Table 2-192. Intake of Homegrown Vegetables (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4883000	236	1.78E+00	1.17E-03	0.00E+00	2.18E-03	8.27E-02	1.43E-01	2.80E-01	7.47E-01	1.89E+00	6.03E+00	7.82E+00	1.27E+01	1.49E+01
Age															
< 01	83000	3	7.76E+00	7.45E-03	2.81E+00	2.81E+00	2.81E+00	6.78E+00	6.78E+00	6.78E+00	9.75E+00	9.75E+00	9.75E+00	9.75E+00	9.75E+00
01-02	75000	3	1.23E+00	8.59E-04	6.05E-01	6.05E-01	6.05E-01	6.05E-01	1.26E+00	1.26E+00	1.36E+00	1.36E+00	1.36E+00	1.36E+00	1.36E+00
03-05	39000	2	1.57E+00	1.69E-03	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.81E+00	1.81E+00	1.81E+00	1.81E+00	1.81E+00	1.81E+00
06-11	254000	13	1.53E+00	3.02E-03	2.72E-01	2.72E-01	2.72E-01	5.94E-01	5.97E-01	8.86E-01	2.04E+00	3.63E+00	6.16E+00	6.16E+00	6.16E+00
12-19	621000	31	1.43E+00	3.08E-03	0.00E+00	0.00E+00	2.93E-02	1.45E-01	2.86E-01	4.84E-01	7.48E-01	6.03E+00	6.67E+00	9.04E+00	9.04E+00
20-39	1233000	52	8.74E-01	1.14E-03	2.44E-03	4.47E-02	1.14E-01	1.58E-01	1.83E-01	3.33E-01	8.99E-01	2.18E+00	3.22E+00	8.44E+00	8.44E+00
40-69	2055000	104	2.30E+00	2.14E-03	1.63E-03	2.00E-03	9.15E-02	1.37E-01	4.54E-01	1.07E+00	2.77E+00	6.80E+00	1.02E+01	1.49E+01	1.49E+01
70 +	523000	28	1.54E+00	2.62E-03	4.23E-03	4.23E-03	5.21E-03	5.51E-03	1.90E-01	1.06E+00	2.26E+00	4.82E+00	6.35E+00	6.78E+00	6.78E+00
Seasons															
Fall	1396000	41	1.49E+00	2.20E-03	8.27E-02	8.27E-02	1.34E-01	1.74E-01	2.69E-01	5.81E-01	1.17E+00	6.64E+00	9.97E+00	1.02E+01	1.02E+01
Spring	1204000	102	8.18E-01	9.85E-04	0.00E+00	0.00E+00	2.89E-03	4.47E-02	1.72E-01	4.55E-01	9.52E-01	2.26E+00	3.11E+00	6.52E+00	6.78E+00
Summer	1544000	48	2.83E+00	2.61E-03	1.11E-01	1.11E-01	1.45E-01	1.59E-01	7.38E-01	1.29E+00	3.63E+00	7.82E+00	9.75E+00	1.49E+01	1.49E+01
Winter	739000	45	1.67E+00	2.14E-03	3.23E-03	3.23E-03	4.23E-03	9.15E-02	2.56E-01	1.25E+00	2.77E+00	3.63E+00	6.10E+00	8.44E+00	8.44E+00
Urbanizations															
Central City	380000	14	9.89E-01	9.50E-04	2.24E-01	2.24E-01	2.24E-01	2.52E-01	4.08E-01	1.02E+00	1.12E+00	2.39E+00	2.39E+00	2.39E+00	2.39E+00
Nonmetropolitan	787000	48	3.05E+00	4.23E-03	0.00E+00	0.00E+00	4.68E-02	1.14E-01	2.02E-01	2.18E+00	4.61E+00	9.04E+00	1.27E+01	1.49E+01	1.49E+01
Surburban	3716000	174	1.59E+00	1.19E-03	1.63E-03	2.44E-03	8.27E-02	1.42E-01	2.75E-01	7.18E-01	1.64E+00	4.82E+00	6.80E+00	1.02E+01	1.02E+01
Race															
Asian	74000	2	3.76E+00	1.11E-02	7.47E-01	7.47E-01	7.47E-01	7.47E-01	7.47E-01	3.76E+00	6.78E+00	6.78E+00	6.78E+00	6.78E+00	6.78E+00
Other/NA	145000	5	5.99E+00	4.90E-03	3.59E+00	3.59E+00	3.59E+00	3.59E+00	4.61E+00	6.03E+00	6.67E+00	9.04E+00	9.04E+00	9.04E+00	9.04E+00
White	4664000	229	1.61E+00	1.14E-03	0.00E+00	2.18E-03	8.27E-02	1.42E-01	2.69E-01	7.11E-01	1.75E+00	3.63E+00	6.80E+00	1.27E+01	1.49E+01
Response to Questionnaire															
Do you garden?	4381000	211	1.92E+00	1.28E-03	0.00E+00	2.18E-03	8.27E-02	1.42E-01	3.10E-01	8.83E-01	2.18E+00	6.16E+00	7.82E+00	1.27E+01	1.49E+01
Do you farm?	352000	19	1.88E+00	3.81E-03	1.63E-03	1.63E-03	2.18E-03	2.89E-03	1.80E-01	1.18E+00	1.84E+00	5.95E+00	6.10E+00	8.44E+00	8.44E+00

Table 2-193. Intake of Homegrown Vegetables (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12160000	699	2.26E+00	9.09E-04	0.00E+00	1.59E-02	7.77E-02	1.80E-01	4.88E-01	1.15E+00	2.58E+00	5.64E+00	7.74E+00	1.75E+01	2.36E+01
Age															
< 01	181000	11	8.35E+00	1.54E-02	2.59E-01	2.59E-01	2.59E-01	2.59E-01	3.06E+00	5.85E+00	1.31E+01	1.87E+01	1.87E+01	1.87E+01	1.87E+01
01-02	433000	26	5.72E+00	9.64E-03	2.32E-02	2.32E-02	1.81E-01	2.45E-01	1.22E+00	3.53E+00	1.09E+01	1.66E+01	1.96E+01	2.36E+01	2.36E+01
03-05	581000	39	2.99E+00	3.73E-03	3.84E-02	3.84E-02	4.14E-01	5.33E-01	7.50E-01	1.66E+00	4.88E+00	7.18E+00	7.74E+00	1.28E+01	1.28E+01
06-11	1108000	69	2.10E+00	2.81E-03	2.12E-02	2.52E-02	1.19E-01	1.60E-01	5.03E-01	1.15E+00	2.10E+00	4.63E+00	8.12E+00	1.44E+01	1.44E+01
12-19	1080000	64	1.54E+00	1.89E-03	0.00E+00	0.00E+00	2.14E-02	6.59E-02	3.27E-01	8.59E-01	1.65E+00	3.89E+00	7.54E+00	7.71E+00	7.71E+00
20-39	3513000	189	1.70E+00	1.18E-03	1.84E-03	1.69E-02	6.05E-02	1.43E-01	3.92E-01	9.37E-01	2.29E+00	4.08E+00	5.34E+00	9.96E+00	2.06E+01
40-69	4274000	246	2.15E+00	1.50E-03	5.13E-03	1.01E-02	1.39E-01	2.01E-01	4.97E-01	1.13E+00	2.32E+00	5.19E+00	6.99E+00	1.75E+01	2.29E+01
70 +	990000	55	2.61E+00	2.48E-03	1.04E-01	1.04E-01	1.51E-01	3.02E-01	7.85E-01	1.83E+00	3.94E+00	6.85E+00	7.19E+00	1.16E+01	1.16E+01
Seasons															
Fall	4914000	180	1.84E+00	1.06E-03	0.00E+00	1.01E-02	6.51E-02	1.60E-01	4.16E-01	1.03E+00	2.10E+00	5.27E+00	6.88E+00	1.31E+01	1.31E+01
Spring	2048000	246	1.65E+00	1.64E-03	2.75E-02	6.04E-02	1.53E-01	2.21E-01	4.59E-01	9.13E-01	1.72E+00	4.49E+00	5.83E+00	1.28E+01	2.36E+01
Summer	3319000	115	3.38E+00	2.28E-03	7.02E-02	1.05E-01	1.62E-01	3.02E-01	8.47E-01	2.07E+00	3.94E+00	7.72E+00	1.40E+01	1.96E+01	2.29E+01
Winter	1879000	158	2.05E+00	2.42E-03	1.84E-03	2.41E-03	2.14E-02	6.59E-02	3.62E-01	8.77E-01	2.13E+00	5.32E+00	7.83E+00	1.67E+01	2.06E+01
Urbanizations															
Central City	3177000	113	1.36E+00	1.14E-03	0.00E+00	0.00E+00	6.05E-02	1.10E-01	2.45E-01	7.13E-01	1.67E+00	3.94E+00	5.50E+00	9.96E+00	1.66E+01
Nonmetropolitan	5344000	379	2.73E+00	1.57E-03	5.13E-03	2.12E-02	1.13E-01	2.61E-01	5.98E-01	1.31E+00	3.15E+00	7.19E+00	1.06E+01	1.75E+01	2.36E+01
Surburban	3639000	207	2.35E+00	1.63E-03	1.84E-03	3.26E-02	1.54E-01	2.22E-01	6.36E-01	1.39E+00	2.75E+00	4.87E+00	7.18E+00	1.96E+01	2.06E+01
Race															
Black	376000	14	8.51E-01	1.18E-03	0.00E+00	0.00E+00	0.00E+00	7.77E-02	1.39E-01	5.33E-01	1.83E+00	1.85E+00	1.90E+00	1.90E+00	1.90E+00
White	11784000	685	2.30E+00	9.34E-04	1.84E-03	2.12E-02	1.05E-01	1.85E-01	4.92E-01	1.16E+00	2.61E+00	5.78E+00	7.74E+00	1.75E+01	2.36E+01
Response to Questionnaire															
Do you garden?	10927000	632	2.33E+00	9.66E-04	0.00E+00	1.59E-02	1.04E-01	1.76E-01	5.03E-01	1.18E+00	2.74E+00	5.81E+00	7.75E+00	1.67E+01	2.36E+01
Do you farm?	1401000	104	3.97E+00	3.71E-03	7.69E-02	1.40E-01	3.35E-01	5.51E-01	8.67E-01	2.18E+00	5.24E+00	1.06E+01	1.44E+01	1.75E+01	2.36E+01

Table 2-194. Intake of Homegrown Vegetables (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11254000	618	2.19E+00	8.93E-04	0.00E+00	2.92E-02	1.60E-01	2.41E-01	5.63E-01	1.24E+00	2.69E+00	4.92E+00	7.43E+00	1.70E+01	2.70E+01
Age															
< 01	158000	7	7.65E+00	1.68E-02	7.22E-01	7.22E-01	7.22E-01	7.22E-01	3.44E+00	3.77E+00	1.70E+01	1.89E+01	1.89E+01	1.89E+01	1.89E+01
01-02	348000	19	5.51E+00	1.12E-02	3.82E-01	3.82E-01	3.82E-01	7.46E-01	1.80E+00	3.76E+00	5.73E+00	7.68E+00	2.70E+01	2.70E+01	2.70E+01
03-05	358000	20	2.54E+00	2.79E-03	3.94E-01	3.94E-01	5.88E-01	5.88E-01	9.33E-01	2.79E+00	3.91E+00	4.85E+00	5.18E+00	5.18E+00	5.18E+00
06-11	922000	48	2.65E+00	4.92E-03	1.00E-01	1.11E-01	1.34E-01	1.91E-01	3.50E-01	8.46E-01	2.66E+00	5.99E+00	1.76E+01	2.36E+01	2.36E+01
12-19	1056000	61	1.62E+00	1.41E-03	0.00E+00	0.00E+00	1.08E-01	1.77E-01	4.60E-01	1.20E+00	2.34E+00	3.71E+00	5.27E+00	6.14E+00	6.14E+00
20-39	2661000	138	1.63E+00	1.36E-03	1.41E-02	3.46E-02	1.25E-01	1.75E-01	3.90E-01	8.63E-01	2.00E+00	3.49E+00	5.46E+00	1.18E+01	1.18E+01
40-69	4261000	238	2.02E+00	1.14E-03	0.00E+00	1.02E-02	1.61E-01	2.74E-01	6.78E-01	1.30E+00	2.40E+00	4.31E+00	5.64E+00	1.15E+01	1.55E+01
70 +	1490000	87	2.36E+00	1.91E-03	5.08E-02	5.08E-02	2.33E-01	3.57E-01	6.35E-01	1.29E+00	3.69E+00	4.92E+00	8.10E+00	9.70E+00	9.70E+00
Seasons															
Fall	2875000	101	2.07E+00	1.67E-03	9.59E-02	9.59E-02	1.13E-01	1.91E-01	5.24E-01	1.14E+00	2.69E+00	4.48E+00	6.02E+00	1.55E+01	1.89E+01
Spring	2096000	214	1.55E+00	1.14E-03	1.02E-02	1.41E-02	9.21E-02	2.61E-01	5.33E-01	9.35E-01	2.07E+00	3.58E+00	4.81E+00	8.35E+00	1.03E+01
Summer	4273000	151	2.73E+00	1.88E-03	0.00E+00	1.10E-01	1.72E-01	2.50E-01	6.15E-01	1.54E+00	3.15E+00	5.99E+00	9.70E+00	2.36E+01	2.70E+01
Winter	2010000	152	1.88E+00	1.19E-03	0.00E+00	3.03E-03	1.63E-01	3.53E-01	6.40E-01	1.37E+00	2.69E+00	3.79E+00	5.35E+00	7.47E+00	8.36E+00
Urbanizations															
Central City	1144000	45	1.10E+00	1.02E-03	1.02E-02	1.10E-02	9.59E-02	1.50E-01	2.63E-01	6.15E-01	1.37E+00	2.79E+00	3.70E+00	4.21E+00	4.58E+00
Nonmetropolitan	6565000	386	2.78E+00	1.41E-03	0.00E+00	5.08E-02	2.23E-01	3.50E-01	7.12E-01	1.66E+00	3.31E+00	5.99E+00	9.56E+00	1.89E+01	2.70E+01
Surburban	3545000	187	1.44E+00	8.21E-04	0.00E+00	0.00E+00	1.13E-01	1.99E-01	3.96E-01	9.33E-01	1.72E+00	3.61E+00	5.26E+00	8.20E+00	8.20E+00
Race															
Asian	83000	3	4.71E-01	8.27E-04	1.71E-01	1.71E-01	1.71E-01	1.71E-01	1.71E-01	5.66E-01	5.66E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01
Black	1289000	82	2.09E+00	2.45E-03	0.00E+00	2.92E-02	1.99E-01	3.05E-01	4.60E-01	9.77E-01	2.21E+00	5.26E+00	7.33E+00	1.89E+01	1.89E+01
Other/NA	130000	10	4.91E-01	1.31E-03	2.04E-01	2.04E-01	2.04E-01	2.13E-01	2.69E-01	3.50E-01	3.82E-01	7.62E-01	1.98E+00	1.98E+00	1.98E+00
White	9752000	523	2.24E+00	9.75E-04	0.00E+00	1.41E-02	1.60E-01	2.39E-01	5.93E-01	1.29E+00	2.81E+00	4.92E+00	7.43E+00	1.70E+01	2.70E+01
Response to Questionnaire															
Do you garden?	9447000	522	2.27E+00	9.08E-04	0.00E+00	3.46E-02	1.61E-01	2.62E-01	6.10E-01	1.37E+00	3.02E+00	5.18E+00	7.43E+00	1.55E+01	2.36E+01
Do you farm?	1609000	91	3.34E+00	3.44E-03	0.00E+00	0.00E+00	1.32E-01	2.33E-01	1.03E+00	1.72E+00	3.15E+00	9.56E+00	1.18E+01	2.36E+01	2.36E+01

Table 2-195. Intake of Homegrown Vegetables (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	6035000	300	1.81E+00	9.70E−04	1.48E−03	7.35E−03	9.85E−02	1.66E−01	3.79E−01	9.01E−01	2.21E+00	4.64E+00	6.21E+00	1.14E+01	1.55E+01
Age															
< 01	44000	3	1.92E+00	3.60E−03	5.13E−01	5.13E−01	5.13E−01	5.13E−01	1.89E+00	2.48E+00	2.48E+00	2.48E+00	2.48E+00	2.48E+00	2.48E+00
01−02	95000	5	4.80E+00	1.52E−02	9.08E−01	9.08E−01	9.08E−01	9.08E−01	1.23E+00	1.94E+00	1.14E+01	1.14E+01	1.14E+01	1.14E+01	1.14E+01
03−05	227000	14	1.44E+00	4.39E−03	7.34E−03	7.34E−03	1.31E−01	2.49E−01	4.21E−01	8.26E−01	1.25E+00	2.81E+00	8.16E+00	8.16E+00	8.16E+00
06−11	710000	40	1.32E+00	1.70E−03	5.95E−03	5.95E−03	7.70E−02	2.10E−01	3.38E−01	6.14E−01	2.21E+00	4.19E+00	4.64E+00	4.68E+00	4.68E+00
12−19	536000	27	1.16E+00	1.73E−03	9.80E−03	9.80E−03	9.83E−02	1.95E−01	2.59E−01	3.94E−01	1.85E+00	3.18E+00	3.18E+00	5.80E+00	5.80E+00
20−39	1186000	58	1.05E+00	1.06E−03	1.48E−03	3.42E−03	7.39E−02	1.46E−01	2.44E−01	5.74E−01	1.32E+00	2.95E+00	3.13E+00	5.30E+00	5.30E+00
40−69	2238000	112	1.83E+00	1.32E−03	3.31E−03	7.35E−03	1.04E−01	2.04E−01	4.69E−01	1.12E+00	2.76E+00	4.85E+00	5.95E+00	8.60E+00	8.60E+00
70 +	999000	41	3.13E+00	3.85E−03	4.67E−03	1.10E−01	1.91E−01	3.00E−01	5.81E−01	1.53E+00	4.13E+00	1.08E+01	1.25E+01	1.55E+01	1.55E+01
Seasons															
Fall	1841000	72	2.01E+00	1.83E−03	6.73E−02	9.83E−02	1.50E−01	2.04E−01	4.81E−01	1.21E+00	2.21E+00	4.85E+00	7.72E+00	1.25E+01	1.25E+01
Spring	1192000	99	1.06E+00	1.58E−03	1.48E−03	3.31E−03	7.35E−03	4.66E−02	1.95E−01	3.56E−01	9.08E−01	3.37E+00	5.54E+00	8.60E+00	8.60E+00
Summer	1885000	59	2.39E+00	2.08E−03	6.93E−02	6.93E−02	1.04E−01	2.46E−01	5.45E−01	1.37E+00	3.23E+00	4.67E+00	8.36E+00	1.55E+01	1.55E+01
Winter	1117000	70	1.28E+00	1.36E−03	1.11E−02	1.29E−02	1.52E−01	1.99E−01	4.83E−01	7.65E−01	1.43E+00	2.81E+00	5.12E+00	7.57E+00	7.98E+00
Urbanizations															
Central City	1482000	56	1.80E+00	1.70E−03	8.53E−03	2.58E−02	7.39E−02	1.57E−01	4.81E−01	1.10E+00	2.95E+00	4.64E+00	4.85E+00	1.14E+01	1.14E+01
Nonmetropolitan	1112000	65	1.52E+00	1.71E−03	1.48E−03	3.42E−03	9.80E−03	2.04E−01	2.69E−01	6.75E−01	2.13E+00	4.13E+00	5.12E+00	8.16E+00	8.16E+00
Surburban	3441000	179	1.90E+00	1.43E−03	3.31E−03	1.29E−02	1.04E−01	1.52E−01	3.94E−01	9.32E−01	2.20E+00	4.63E+00	7.98E+00	1.25E+01	1.55E+01
Race															
Asian	27000	3	1.02E−01	4.92E−04	4.28E−02	4.28E−02	4.28E−02	4.28E−02	4.28E−02	4.66E−02	2.16E−01	2.16E−01	2.16E−01	2.16E−01	2.16E−01
Black	207000	15	1.55E+00	3.74E−03	9.83E−02	9.83E−02	9.83E−02	9.85E−02	1.42E−01	7.93E−01	1.96E+00	3.44E+00	5.80E+00	5.80E+00	5.80E+00
Native American	28000	1	6.80E−01	0.00E+00	6.80E−01	6.80E−01	6.80E−01	6.80E−01	6.80E−01	6.80E−01	6.80E−01	6.80E−01	6.80E−01	6.80E−01	6.80E−01
Other/NA	56000	4	2.92E+00	1.05E−02	9.80E−03	9.80E−03	9.80E−03	9.80E−03	3.22E−01	1.45E+00	5.54E+00	5.54E+00	5.54E+00	5.54E+00	5.54E+00
White	5717000	277	1.82E+00	1.01E−03	1.48E−03	7.34E−03	1.10E−01	1.99E−01	3.91E−01	9.23E−01	2.21E+00	4.63E+00	6.94E+00	1.14E+01	1.55E+01
Response to Questionnaire															
Do you garden?	5402000	276	1.91E+00	1.04E−03	1.48E−03	8.53E−03	1.04E−01	1.66E−01	4.33E−01	1.07E+00	2.37E+00	4.67E+00	6.21E+00	1.25E+01	1.55E+01
Do you farm?	957000	48	2.73E+00	3.32E−03	1.17E−01	1.17E−01	4.14E−01	4.69E−01	7.65E−01	1.42E+00	3.27E+00	6.94E+00	1.09E+01	1.55E+01	1.55E+01

Table 2-196. Intake of Homeproduced Meats (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	9257000	569	2.21E+00	8.37E-04	1.81E-02	1.21E-01	2.37E-01	3.74E-01	6.60E-01	1.39E+00	2.89E+00	4.89E+00	6.78E+00	1.40E+01	2.32E+01
Age															
< 01	204000	13	7.16E+00	1.61E-02	4.24E-01	4.24E-01	4.24E-01	4.24E-01	1.36E+00	5.79E+00	7.20E+00	2.23E+01	2.23E+01	2.32E+01	2.32E+01
01-02	276000	22	3.65E+00	5.44E-03	3.85E-01	3.85E-01	9.49E-01	9.49E-01	1.19E+00	2.66E+00	4.72E+00	8.68E+00	1.00E+01	1.15E+01	1.15E+01
03-05	396000	26	3.61E+00	4.13E-03	8.01E-01	8.01E-01	8.01E-01	1.51E+00	2.17E+00	2.82E+00	3.72E+00	7.84E+00	9.13E+00	1.30E+01	1.30E+01
06-11	1064000	65	3.65E+00	3.52E-03	3.11E-01	3.72E-01	6.52E-01	7.21E-01	1.28E+00	2.09E+00	4.71E+00	8.00E+00	1.40E+01	1.53E+01	1.53E+01
12-19	1272000	78	1.70E+00	1.31E-03	1.90E-01	1.90E-01	3.20E-01	4.70E-01	6.23E-01	1.23E+00	2.35E+00	3.66E+00	4.34E+00	6.78E+00	7.51E+00
20-39	2732000	158	1.82E+00	1.17E-03	1.21E-01	1.23E-01	1.85E-01	2.95E-01	5.28E-01	1.11E+00	2.65E+00	4.52E+00	6.23E+00	9.17E+00	1.09E+01
40-69	2872000	179	1.72E+00	8.75E-04	1.81E-02	1.81E-02	2.12E-01	3.43E-01	5.84E-01	1.17E+00	2.38E+00	3.67E+00	5.16E+00	5.90E+00	7.46E+00
70 +	441000	28	1.39E+00	1.86E-03	9.26E-02	9.26E-02	9.26E-02	1.25E-01	5.47E-01	1.01E+00	1.81E+00	2.82E+00	3.48E+00	7.41E+00	7.41E+00
Seasons															
Fall	2852000	107	1.57E+00	8.50E-04	1.23E-01	1.23E-01	2.10E-01	3.52E-01	5.21E-01	1.11E+00	2.27E+00	3.19E+00	4.41E+00	6.78E+00	7.84E+00
Spring	1726000	197	2.37E+00	1.62E-03	1.93E-01	2.44E-01	3.20E-01	4.46E-01	7.76E-01	1.69E+00	3.48E+00	5.00E+00	6.67E+00	1.01E+01	1.30E+01
Summer	2368000	89	3.10E+00	2.34E-03	1.81E-02	1.81E-02	1.85E-01	4.06E-01	8.52E-01	1.77E+00	4.34E+00	7.01E+00	1.05E+01	2.23E+01	2.23E+01
Winter	2311000	176	1.98E+00	1.52E-03	3.70E-02	1.35E-01	2.37E-01	3.67E-01	6.48E-01	1.33E+00	2.43E+00	3.96E+00	6.40E+00	1.09E+01	2.32E+01
Urbanizations															
Central City	736000	28	1.15E+00	1.13E-03	1.82E-01	1.82E-01	1.85E-01	2.10E-01	4.42E-01	7.21E-01	1.58E+00	2.69E+00	3.40E+00	3.64E+00	3.64E+00
Nonmetropolitan	4932000	315	2.70E+00	1.41E-03	9.26E-02	1.23E-01	2.63E-01	4.06E-01	7.49E-01	1.63E+00	3.41E+00	6.06E+00	8.47E+00	1.53E+01	2.32E+01
Surburban	3589000	226	1.77E+00	8.18E-04	1.81E-02	2.90E-02	2.87E-01	3.67E-01	6.80E-01	1.33E+00	2.49E+00	3.66E+00	4.71E+00	7.20E+00	1.01E+01
Race															
Black	128000	6	6.52E-01	1.94E-03	1.52E-01	1.52E-01	1.52E-01	1.52E-01	2.12E-01	3.90E-01	7.51E-01	2.11E+00	2.11E+00	2.11E+00	2.11E+00
Native American	24000	3	1.24E+00	5.55E-03	4.25E-01	4.25E-01	4.25E-01	4.25E-01	4.25E-01	8.70E-01	2.43E+00	2.43E+00	2.43E+00	2.43E+00	2.43E+00
Other/NA	110000	4	8.06E-01	8.73E-04	5.35E-01	5.35E-01	5.35E-01	5.35E-01	5.35E-01	6.58E-01	1.07E+00	1.07E+00	1.49E+00	1.49E+00	1.49E+00
White	8995000	556	2.26E+00	8.57E-04	1.81E-02	9.26E-02	2.57E-01	3.86E-01	6.80E-01	1.41E+00	2.91E+00	5.00E+00	7.01E+00	1.40E+01	2.32E+01
Response to Questionnaire															
Do you raise anim:	5256000	343	2.80E+00	1.17E-03	1.35E-01	2.12E-01	3.86E-01	6.23E-01	1.03E+00	1.94E+00	3.49E+00	5.90E+00	7.84E+00	1.40E+01	2.32E+01
Do you farm?	3842000	243	2.86E+00	1.47E-03	1.35E-01	1.97E-01	4.45E-01	5.98E-01	8.94E-01	1.84E+00	3.64E+00	6.09E+00	8.00E+00	1.40E+01	2.32E+01

Table 2-197. Intake of Homeproduced Meats (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1113000	52	1.46E+00	1.43E-03	2.92E-01	2.92E-01	3.40E-01	3.52E-01	6.44E-01	8.94E-01	1.87E+00	2.68E+00	2.89E+00	1.09E+01	1.09E+01
Age															
01-02	30000	2	1.90E+00	4.27E-03	1.11E+00	1.11E+00	1.11E+00	1.11E+00	1.11E+00	2.60E+00	2.60E+00	2.60E+00	2.60E+00	2.60E+00	2.60E+00
03-05	58000	3	2.10E+00	3.15E-03	8.07E-01	8.07E-01	8.07E-01	8.07E-01	2.34E+00	2.34E+00	2.82E+00	2.82E+00	2.82E+00	2.82E+00	2.82E+00
06-11	85000	3	1.47E+00	9.65E-04	1.11E+00	1.11E+00	1.11E+00	1.11E+00	1.11E+00	1.48E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00
12-19	149000	7	1.37E+00	2.34E-03	4.70E-01	4.70E-01	4.70E-01	4.70E-01	7.70E-01	1.05E+00	2.18E+00	2.89E+00	2.89E+00	2.89E+00	2.89E+00
20-39	456000	18	1.42E+00	2.75E-03	2.92E-01	2.92E-01	3.14E-01	3.52E-01	6.44E-01	8.52E-01	1.62E+00	2.68E+00	2.93E+00	1.09E+01	1.09E+01
40-69	319000	17	1.44E+00	2.71E-03	3.40E-01	3.40E-01	3.40E-01	3.43E-01	4.30E-01	1.38E+00	1.87E+00	2.58E+00	3.61E+00	7.46E+00	7.46E+00
70 +	16000	2	7.23E-01	4.22E-04	6.70E-01	6.70E-01	6.70E-01	6.70E-01	6.70E-01	7.23E-01	7.76E-01	7.76E-01	7.76E-01	7.76E-01	7.76E-01
Seasons															
Fall	569000	18	1.30E+00	1.14E-03	3.43E-01	3.43E-01	3.43E-01	3.52E-01	6.44E-01	8.65E-01	2.12E+00	2.68E+00	2.89E+00	2.89E+00	2.89E+00
Spring	66000	8	1.41E+00	4.27E-03	4.39E-01	4.39E-01	4.39E-01	4.39E-01	6.88E-01	7.76E-01	2.58E+00	3.61E+00	3.61E+00	3.61E+00	3.61E+00
Summer	176000	6	1.05E+00	1.10E-03	3.40E-01	3.40E-01	3.40E-01	3.40E-01	8.52E-01	9.65E-01	1.41E+00	1.80E+00	1.80E+00	1.80E+00	1.80E+00
Winter	302000	20	2.02E+00	4.53E-03	2.92E-01	2.92E-01	3.14E-01	4.30E-01	6.19E-01	1.11E+00	2.38E+00	2.93E+00	7.46E+00	1.09E+01	1.09E+01
Urbanizations															
Nonmetropolitan	391000	17	1.43E+00	3.57E-03	3.40E-01	3.40E-01	3.40E-01	3.43E-01	6.44E-01	7.70E-01	1.05E+00	1.80E+00	7.46E+00	1.09E+01	1.09E+01
Surburban	722000	35	1.49E+00	1.07E-03	2.92E-01	2.92E-01	3.52E-01	4.30E-01	6.80E-01	1.39E+00	2.34E+00	2.68E+00	2.89E+00	3.61E+00	3.61E+00
Race															
White	1113000	52	1.46E+00	1.43E-03	2.92E-01	2.92E-01	3.40E-01	3.52E-01	6.44E-01	8.94E-01	1.87E+00	2.68E+00	2.89E+00	1.09E+01	1.09E+01
Response to Questionnaire															
Do you raise anima	509000	25	2.03E+00	2.70E-03	6.19E-01	6.19E-01	6.46E-01	6.46E-01	8.78E-01	1.62E+00	2.38E+00	2.93E+00	7.46E+00	1.09E+01	1.09E+01
Do you farm?	373000	15	2.00E+00	3.58E-03	6.19E-01	6.19E-01	6.46E-01	6.46E-01	8.78E-01	1.61E+00	2.12E+00	2.65E+00	7.46E+00	1.09E+01	1.09E+01

Table 2-198. Intake of Homeproduced Meats (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3974000	266	2.55E+00	1.48E-03	9.26E-02	1.25E-01	2.57E-01	3.85E-01	6.60E-01	1.40E+00	3.39E+00	5.75E+00	7.20E+00	1.53E+01	2.23E+01
Age															
< 01	159000	9	6.86E+00	1.80E-02	4.24E-01	4.24E-01	4.24E-01	4.24E-01	1.36E+00	6.15E+00	7.20E+00	2.23E+01	2.23E+01	2.23E+01	2.23E+01
01-02	190000	14	4.16E+00	7.43E-03	3.85E-01	3.85E-01	3.85E-01	9.49E-01	1.19E+00	2.92E+00	5.80E+00	8.68E+00	1.00E+01	1.15E+01	1.15E+01
03-05	154000	11	4.24E+00	8.55E-03	8.01E-01	8.01E-01	8.01E-01	8.01E-01	2.43E+00	3.03E+00	5.77E+00	1.01E+01	1.30E+01	1.30E+01	1.30E+01
06-11	479000	33	4.00E+00	5.72E-03	3.11E-01	3.11E-01	3.72E-01	6.52E-01	1.09E+00	3.54E+00	5.02E+00	7.79E+00	1.40E+01	1.53E+01	1.53E+01
12-19	482000	30	1.97E+00	2.53E-03	2.44E-01	2.44E-01	4.38E-01	4.78E-01	6.95E-01	1.23E+00	3.38E+00	4.34E+00	5.75E+00	6.78E+00	6.78E+00
20-39	1249000	79	1.90E+00	1.68E-03	1.21E-01	1.82E-01	2.10E-01	2.86E-01	4.95E-01	1.19E+00	2.89E+00	4.01E+00	5.42E+00	9.17E+00	9.17E+00
40-69	1112000	81	2.02E+00	1.57E-03	1.93E-01	2.37E-01	3.53E-01	4.96E-01	6.98E-01	1.17E+00	2.87E+00	5.18E+00	5.52E+00	5.90E+00	5.90E+00
70 +	149000	9	8.16E-01	1.83E-03	9.26E-02	9.26E-02	9.26E-02	9.26E-02	1.25E-01	4.08E-01	1.58E+00	1.81E+00	1.81E+00	1.81E+00	1.81E+00
Seasons															
Fall	1261000	49	1.76E+00	1.44E-03	2.10E-01	2.10E-01	2.57E-01	3.72E-01	4.95E-01	1.19E+00	2.66E+00	3.49E+00	6.06E+00	6.78E+00	6.78E+00
Spring	940000	116	2.58E+00	2.49E-03	1.93E-01	2.44E-01	3.11E-01	4.08E-01	7.33E-01	1.98E+00	3.67E+00	5.14E+00	7.79E+00	1.15E+01	1.30E+01
Summer	930000	38	4.10E+00	4.76E-03	9.26E-02	9.26E-02	1.25E-01	5.78E-01	8.93E-01	2.87E+00	5.42E+00	8.93E+00	1.53E+01	2.23E+01	2.23E+01
Winter	843000	63	2.00E+00	2.08E-03	1.21E-01	1.21E-01	2.37E-01	3.28E-01	6.48E-01	1.36E+00	2.69E+00	4.11E+00	5.30E+00	8.10E+00	1.22E+01
Urbanizations															
Central City	460000	18	1.13E+00	1.30E-03	1.82E-01	1.82E-01	2.10E-01	2.10E-01	4.32E-01	8.14E-01	1.58E+00	2.43E+00	2.92E+00	3.04E+00	3.04E+00
Nonmetropolitan	2477000	175	3.15E+00	2.17E-03	9.26E-02	9.26E-02	2.95E-01	4.25E-01	8.16E-01	2.38E+00	4.34E+00	6.15E+00	9.17E+00	1.53E+01	2.23E+01
Surburban	1037000	73	1.75E+00	1.67E-03	1.93E-01	2.87E-01	3.65E-01	4.08E-01	6.60E-01	1.11E+00	2.03E+00	4.16E+00	5.39E+00	7.20E+00	1.01E+01
Race															
White	3974000	266	2.55E+00	1.48E-03	9.26E-02	1.25E-01	2.57E-01	3.85E-01	6.60E-01	1.40E+00	3.39E+00	5.75E+00	7.20E+00	1.53E+01	2.23E+01
Response to Questionnaire															
Do you raise anim:	2165000	165	3.20E+00	1.95E-03	1.93E-01	2.56E-01	3.86E-01	5.78E-01	1.07E+00	2.56E+00	4.42E+00	6.06E+00	9.13E+00	1.53E+01	1.53E+01
Do you farm?	1483000	108	3.32E+00	2.48E-03	3.65E-01	3.65E-01	5.43E-01	5.89E-01	1.07E+00	2.75E+00	4.71E+00	6.78E+00	9.17E+00	1.53E+01	1.53E+01

Table 2-199. Intake of Homeproduced Meats (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2355000	146	2.24E+00	1.53E-03	1.81E-02	1.81E-02	1.56E-01	2.97E-01	7.21E-01	1.53E+00	3.07E+00	5.07E+00	6.71E+00	1.40E+01	1.40E+01
Age															
< 01	36000	3	4.50E+00	9.11E-03	2.61E+00	2.61E+00	2.61E+00	2.61E+00	2.61E+00	5.43E+00	6.40E+00	6.40E+00	6.40E+00	6.40E+00	6.40E+00
01-02	19000	2	2.41E+00	8.48E-03	1.04E+00	1.04E+00	1.04E+00	1.04E+00	1.04E+00	3.41E+00	3.41E+00	3.41E+00	3.41E+00	3.41E+00	3.41E+00
03-05	141000	9	3.53E+00	5.60E-03	1.51E+00	1.51E+00	1.51E+00	1.87E+00	2.00E+00	2.92E+00	4.58E+00	7.84E+00	7.84E+00	7.84E+00	7.84E+00
06-11	216000	14	4.33E+00	1.01E-02	5.63E-01	5.63E-01	5.63E-01	7.21E-01	1.28E+00	1.94E+00	7.32E+00	1.40E+01	1.40E+01	1.40E+01	1.40E+01
12-19	242000	21	1.50E+00	3.49E-03	1.90E-01	1.90E-01	1.90E-01	1.90E-01	5.98E-01	7.77E-01	1.95E+00	3.07E+00	6.71E+00	7.51E+00	7.51E+00
20-39	636000	37	2.30E+00	2.67E-03	1.23E-01	1.23E-01	1.56E-01	2.80E-01	6.13E-01	1.53E+00	3.79E+00	6.09E+00	6.23E+00	8.47E+00	8.47E+00
40-69	873000	49	1.71E+00	1.55E-03	1.81E-02	1.81E-02	2.90E-02	1.95E-01	5.84E-01	1.27E+00	2.38E+00	3.55E+00	5.07E+00	5.16E+00	5.16E+00
70 +	192000	11	1.67E+00	2.04E-03	2.63E-01	2.63E-01	2.63E-01	5.47E-01	1.01E+00	1.40E+00	2.13E+00	2.82E+00	3.71E+00	3.71E+00	3.71E+00
Seasons															
Fall	758000	28	1.81E+00	1.74E-03	1.23E-01	1.23E-01	1.56E-01	1.90E-01	8.19E-01	1.53E+00	2.38E+00	3.19E+00	4.41E+00	7.84E+00	7.84E+00
Spring	511000	53	2.33E+00	2.71E-03	1.93E-01	1.93E-01	2.97E-01	4.99E-01	7.52E-01	1.80E+00	2.82E+00	5.16E+00	6.71E+00	7.51E+00	7.51E+00
Summer	522000	18	3.26E+00	5.02E-03	1.81E-02	1.81E-02	1.81E-02	2.90E-02	5.98E-01	2.07E+00	5.07E+00	6.23E+00	1.05E+01	1.40E+01	1.40E+01
Winter	564000	47	1.80E+00	2.24E-03	3.70E-02	3.70E-02	1.97E-01	2.51E-01	7.16E-01	1.40E+00	2.17E+00	3.55E+00	4.58E+00	8.47E+00	8.47E+00
Urbanizations															
Central City	40000	1	4.60E-01	0.00E+00	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.60E-01
Nonmetropolitan	1687000	97	2.45E+00	1.97E-03	1.23E-01	1.23E-01	1.90E-01	4.02E-01	7.77E-01	1.61E+00	3.19E+00	6.09E+00	7.84E+00	1.40E+01	1.40E+01
Surburban	628000	48	1.79E+00	2.01E-03	1.81E-02	1.81E-02	2.90E-02	3.70E-02	6.28E-01	1.40E+00	2.31E+00	4.56E+00	4.61E+00	6.40E+00	6.40E+00
Race															
Black	44000	2	1.43E+00	3.23E-03	7.51E-01	7.51E-01	7.51E-01	7.51E-01	7.51E-01	1.43E+00	2.11E+00	2.11E+00	2.11E+00	2.11E+00	2.11E+00
White	2311000	144	2.26E+00	1.55E-03	1.81E-02	1.81E-02	1.56E-01	2.80E-01	7.21E-01	1.53E+00	3.07E+00	5.07E+00	6.71E+00	1.40E+01	1.40E+01
Response to Questionnaire															
Do you raise anim:	1222000	74	3.16E+00	2.46E-03	2.11E-01	2.63E-01	6.67E-01	8.35E-01	1.34E+00	2.11E+00	3.79E+00	6.67E+00	8.47E+00	1.40E+01	1.40E+01
Do you farm?	1228000	72	2.85E+00	2.48E-03	1.95E-01	1.95E-01	4.99E-01	5.98E-01	1.01E+00	1.93E+00	3.48E+00	6.23E+00	8.47E+00	1.40E+01	1.40E+01

Table 2-200. Intake of Homeproduced Meats (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1815000	105	1.89E+00	1.61E-03	1.35E-01	1.52E-01	2.25E-01	3.90E-01	6.58E-01	1.42E+00	2.49E+00	3.66E+00	4.71E+00	8.00E+00	2.32E+01
Age															
< 01	9000	1	2.32E+01	0.00E+00	2.32E+01	2.32E+01	2.32E+01	2.32E+01	2.32E+01	2.32E+01	2.32E+01	2.32E+01	2.32E+01	2.32E+01	2.32E+01
01-02	37000	4	3.11E+00	5.52E-03	2.40E+00	2.40E+00	2.40E+00	2.40E+00	2.40E+00	2.69E+00	2.69E+00	4.97E+00	4.97E+00	4.97E+00	4.97E+00
03-05	43000	3	3.67E+00	6.79E-03	1.55E+00	1.55E+00	1.55E+00	1.55E+00	3.72E+00	3.72E+00	3.72E+00	5.67E+00	5.67E+00	5.67E+00	5.67E+00
06-11	284000	15	3.21E+00	3.71E-03	9.86E-01	9.86E-01	9.86E-01	1.07E+00	1.55E+00	2.91E+00	4.44E+00	4.71E+00	8.00E+00	8.00E+00	8.00E+00
12-19	399000	20	1.60E+00	1.58E-03	3.15E-01	3.15E-01	3.67E-01	4.67E-01	6.58E-01	1.49E+00	2.35E+00	2.89E+00	3.66E+00	3.66E+00	3.66E+00
20-39	391000	24	1.27E+00	2.49E-03	1.52E-01	1.52E-01	1.52E-01	1.85E-01	3.91E-01	7.40E-01	1.56E+00	2.71E+00	7.02E+00	7.02E+00	7.02E+00
40-69	568000	32	1.32E+00	1.24E-03	1.35E-01	1.35E-01	2.12E-01	2.99E-01	5.21E-01	1.09E+00	1.77E+00	3.27E+00	3.30E+00	3.37E+00	3.37E+00
70 +	84000	6	1.90E+00	7.09E-03	7.80E-01	7.80E-01	7.80E-01	7.80E-01	7.80E-01	9.82E-01	1.42E+00	7.41E+00	7.41E+00	7.41E+00	7.41E+00
Seasons															
Fall	264000	12	5.64E-01	5.97E-04	1.52E-01	1.52E-01	1.52E-01	2.12E-01	3.30E-01	5.21E-01	7.80E-01	9.86E-01	1.03E+00	1.03E+00	1.03E+00
Spring	209000	20	1.86E+00	2.22E-03	2.99E-01	2.99E-01	4.25E-01	8.70E-01	1.22E+00	1.56E+00	2.43E+00	3.48E+00	4.20E+00	4.20E+00	4.20E+00
Summer	740000	27	2.20E+00	1.92E-03	1.85E-01	1.85E-01	4.06E-01	5.35E-01	1.07E+00	1.69E+00	3.27E+00	4.44E+00	4.71E+00	8.00E+00	8.00E+00
Winter	602000	46	2.11E+00	3.98E-03	1.35E-01	1.35E-01	3.56E-01	4.28E-01	6.72E-01	1.19E+00	2.35E+00	3.64E+00	7.02E+00	2.32E+01	2.32E+01
Urbanizations															
Central City	236000	9	1.30E+00	2.34E-03	1.85E-01	1.85E-01	1.85E-01	1.85E-01	5.35E-01	7.85E-01	2.35E+00	3.40E+00	3.64E+00	3.64E+00	3.64E+00
Nonmetropolitan	377000	26	2.10E+00	5.82E-03	3.30E-01	3.30E-01	3.30E-01	4.06E-01	6.72E-01	1.19E+00	1.77E+00	3.72E+00	4.97E+00	2.32E+01	2.32E+01
Surburban	1202000	70	1.95E+00	1.52E-03	1.35E-01	1.52E-01	2.25E-01	3.67E-01	7.80E-01	1.52E+00	2.71E+00	4.20E+00	4.71E+00	8.00E+00	8.00E+00
Race															
Black	84000	4	2.45E-01	3.04E-04	1.52E-01	1.52E-01	1.52E-01	1.52E-01	1.82E-01	2.18E-01	3.07E-01	3.90E-01	3.90E-01	3.90E-01	3.90E-01
Native American	24000	3	1.24E+00	5.55E-03	4.25E-01	4.25E-01	4.25E-01	4.25E-01	4.25E-01	8.70E-01	2.43E+00	2.43E+00	2.43E+00	2.43E+00	2.43E+00
Other/NA	110000	4	8.06E-01	8.73E-04	5.35E-01	5.35E-01	5.35E-01	5.35E-01	5.35E-01	6.58E-01	1.07E+00	1.07E+00	1.49E+00	1.49E+00	1.49E+00
White	1597000	94	2.07E+00	1.78E-03	1.35E-01	1.85E-01	3.30E-01	4.06E-01	7.85E-01	1.55E+00	2.70E+00	3.72E+00	4.97E+00	8.00E+00	2.32E+01
Response to Questionnaire															
Do you raise anima	1360000	79	2.12E+00	2.02E-03	1.35E-01	1.52E-01	2.25E-01	3.90E-01	8.15E-01	1.56E+00	2.71E+00	4.20E+00	4.97E+00	8.00E+00	2.32E+01
Do you farm?	758000	48	2.41E+00	3.39E-03	1.35E-01	1.35E-01	3.30E-01	4.67E-01	7.85E-01	1.55E+00	2.91E+00	4.71E+00	7.02E+00	2.32E+01	2.32E+01

Table 2-201. Intake of Homeproduced Dairy (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1409000	89	1.40E+01	1.29E-02	1.80E-01	1.80E-01	4.46E-01	5.08E-01	3.18E+00	1.02E+01	1.95E+01	3.42E+01	4.40E+01	7.26E+01	1.11E+02
Age															
< 01	20000	2	5.96E+01	7.52E-02	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01
01-02	79000	6	4.02E+01	1.08E-01	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.04E+01	2.89E+01	4.68E+01	8.01E+01	1.11E+02	1.11E+02	1.11E+02
03-05	57000	5	1.07E+01	3.71E-02	1.82E+00	1.82E+00	1.82E+00	1.82E+00	2.71E+00	1.02E+01	1.15E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01
06-11	264000	16	2.66E+01	2.24E-02	5.87E+00	5.87E+00	6.74E+00	1.18E+01	1.37E+01	3.14E+01	3.49E+01	4.40E+01	4.40E+01	4.40E+01	4.40E+01
12-19	84000	5	1.67E+01	2.78E-02	2.80E-01	2.80E-01	2.80E-01	2.80E-01	1.67E+01	1.90E+01	1.96E+01	2.51E+01	2.51E+01	2.51E+01	2.51E+01
20-39	612000	36	7.41E+00	7.81E-03	2.05E-01	2.05E-01	3.96E-01	4.46E-01	1.89E+00	6.46E+00	1.21E+01	1.54E+01	1.95E+01	2.30E+01	2.30E+01
40-69	216000	16	7.86E+00	6.96E-03	1.80E-01	1.80E-01	1.80E-01	5.36E+00	6.13E+00	8.43E+00	9.14E+00	1.21E+01	1.29E+01	1.60E+01	1.60E+01
70 +	77000	3	1.82E+00	5.35E-03	5.08E-01	5.08E-01	5.08E-01	5.08E-01	5.08E-01	9.58E-01	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00
Seasons															
Fall	211000	7	1.73E+01	3.11E-02	2.16E+00	2.16E+00	2.16E+00	2.16E+00	6.13E+00	1.08E+01	3.14E+01	4.40E+01	4.40E+01	4.40E+01	4.40E+01
Spring	253000	27	1.78E+01	4.41E-02	6.28E-01	6.28E-01	6.54E-01	6.72E-01	5.06E+00	1.22E+01	1.95E+01	5.09E+01	8.01E+01	1.11E+02	1.11E+02
Summer	549000	22	1.53E+01	1.73E-02	4.46E-01	4.46E-01	4.46E-01	5.08E-01	5.36E+00	1.06E+01	2.51E+01	3.49E+01	3.67E+01	4.68E+01	4.68E+01
Winter	396000	33	8.08E+00	1.82E-02	1.80E-01	1.80E-01	2.05E-01	2.80E-01	7.36E-01	5.47E+00	1.15E+01	1.98E+01	2.04E+01	7.26E+01	7.26E+01
Urbanizations															
Central City	115000	7	1.21E+00	2.87E-03	1.80E-01	1.80E-01	1.80E-01	1.80E-01	2.05E-01	6.72E-01	2.16E+00	2.16E+00	2.71E+00	2.71E+00	2.71E+00
Nonmetropolitan	988000	59	1.68E+01	1.63E-02	4.79E-01	4.79E-01	9.58E-01	1.89E+00	6.74E+00	1.08E+01	2.04E+01	3.49E+01	4.40E+01	8.01E+01	1.11E+02
Surburban	306000	23	9.86E+00	2.06E-02	3.96E-01	3.96E-01	3.96E-01	4.46E-01	5.71E-01	5.36E+00	1.31E+01	2.81E+01	2.89E+01	5.09E+01	5.09E+01
Race															
Asian	27000	3	1.34E+00	5.90E-03	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.72E-01	2.71E+00	2.71E+00	2.71E+00	2.71E+00	2.71E+00
White	1382000	86	1.43E+01	1.31E-02	1.80E-01	1.80E-01	4.46E-01	5.08E-01	3.82E+00	1.03E+01	1.95E+01	3.42E+01	4.40E+01	8.01E+01	1.11E+02
Response to Questionnaire															
Do you raise anim:	1228000	80	1.59E+01	1.40E-02	1.80E-01	1.80E-01	3.96E-01	1.89E+00	6.13E+00	1.08E+01	1.96E+01	3.49E+01	4.40E+01	8.01E+01	1.11E+02
Do you farm?	1020000	63	1.71E+01	1.56E-02	3.96E-01	3.96E-01	7.36E-01	3.18E+00	9.06E+00	1.21E+01	2.04E+01	3.49E+01	4.40E+01	8.01E+01	1.11E+02

Table 2-202. Intake of Homeproduced Dairy (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	312000	16	1.15E+01	1.65E-02	3.96E-01	3.96E-01	3.96E-01	5.71E-01	6.13E+00	1.02E+01	1.31E+01	2.04E+01	3.42E+01	3.42E+01	3.42E+01
Age															
01-02	19000	1	2.04E+01	0.00E+00	2.04E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01
03-05	19000	1	1.02E+01	0.00E+00	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01
06-11	29000	1	3.42E+01	0.00E+00	3.42E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01
12-19	29000	1	1.90E+01	0.00E+00	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01
20-39	141000	7	5.99E+00	1.25E-02	3.96E-01	3.96E-01	3.96E-01	3.96E-01	5.71E-01	3.18E+00	1.06E+01	1.06E+01	1.31E+01	1.31E+01	1.31E+01
40-69	75000	5	8.43E+00	7.49E-03	6.13E+00	6.13E+00	6.13E+00	6.13E+00	6.13E+00	9.12E+00	9.71E+00	1.21E+01	1.21E+01	1.21E+01	1.21E+01
Seasons															
Fall	48000	2	7.92E+00	8.16E-03	6.13E+00	6.13E+00	6.13E+00	6.13E+00	6.13E+00	7.92E+00	9.71E+00	9.71E+00	9.71E+00	9.71E+00	9.71E+00
Spring	36000	4	1.03E+01	1.31E-02	6.80E+00	6.80E+00	6.80E+00	6.80E+00	7.96E+00	1.06E+01	1.26E+01	1.31E+01	1.31E+01	1.31E+01	1.31E+01
Summer	116000	4	1.85E+01	2.84E-02	1.03E+01	1.03E+01	1.03E+01	1.03E+01	1.04E+01	1.48E+01	2.66E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01
Winter	112000	6	6.28E+00	2.15E-02	3.96E-01	3.96E-01	3.96E-01	3.96E-01	5.71E-01	3.18E+00	1.02E+01	2.04E+01	2.04E+01	2.04E+01	2.04E+01
Urbanizations															
Nonmetropolitan	240000	10	1.34E+01	1.91E-02	2.23E+00	2.23E+00	2.23E+00	3.18E+00	6.13E+00	1.03E+01	1.90E+01	3.42E+01	3.42E+01	3.42E+01	3.42E+01
Surburban	72000	6	5.39E+00	1.94E-02	3.96E-01	3.96E-01	3.96E-01	3.96E-01	4.84E-01	3.69E+00	1.06E+01	1.31E+01	1.31E+01	1.31E+01	1.31E+01
Race															
White	312000	16	1.15E+01	1.65E-02	3.96E-01	3.96E-01	3.96E-01	5.71E-01	6.13E+00	1.02E+01	1.31E+01	2.04E+01	3.42E+01	3.42E+01	3.42E+01
Response to Questionnaire															
Do you raise anim	312000	16	1.15E+01	1.65E-02	3.96E-01	3.96E-01	3.96E-01	5.71E-01	6.13E+00	1.02E+01	1.31E+01	2.04E+01	3.42E+01	3.42E+01	3.42E+01
Do you farm?	312000	16	1.15E+01	1.65E-02	3.96E-01	3.96E-01	3.96E-01	5.71E-01	6.13E+00	1.02E+01	1.31E+01	2.04E+01	3.42E+01	3.42E+01	3.42E+01

Table 2-203. Intake of Homeproduced Dairy (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	594000	36	1.86E+01	2.45E-02	4.46E-01	4.46E-01	4.46E-01	1.97E+00	8.27E+00	1.24E+01	2.30E+01	4.40E+01	4.68E+01	1.11E+02	1.11E+02
Age															
< 01	8000	1	7.26E+01	0.00E+00	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01	7.26E+01
01-02	37000	3	6.53E+01	1.33E-01	4.68E+01	4.68E+01	4.68E+01	4.68E+01	4.68E+01	4.68E+01	8.01E+01	1.11E+02	1.11E+02	1.11E+02	1.11E+02
06-11	99000	5	3.41E+01	2.90E-02	1.37E+01	1.37E+01	1.37E+01	1.98E+01	3.14E+01	3.67E+01	4.40E+01	4.40E+01	4.40E+01	4.40E+01	4.40E+01
12-19	40000	3	2.12E+01	1.67E-02	1.67E+01	1.67E+01	1.67E+01	1.67E+01	1.96E+01	1.96E+01	2.51E+01	2.51E+01	2.51E+01	2.51E+01	2.51E+01
20-39	304000	16	9.52E+00	1.25E-02	4.46E-01	4.46E-01	4.46E-01	4.46E-01	2.16E+00	1.21E+01	1.33E+01	1.95E+01	1.95E+01	2.30E+01	2.30E+01
40-69	106000	8	8.84E+00	8.86E-03	5.36E+00	5.36E+00	5.36E+00	5.36E+00	5.36E+00	9.06E+00	9.14E+00	1.29E+01	1.60E+01	1.60E+01	1.60E+01
Seasons															
Fall	163000	5	2.00E+01	3.75E-02	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	1.95E+01	3.14E+01	4.40E+01	4.40E+01	4.40E+01	4.40E+01
Spring	94000	12	2.45E+01	1.02E-01	6.54E-01	6.54E-01	6.54E-01	1.97E+00	8.27E+00	1.60E+01	1.95E+01	8.01E+01	1.11E+02	1.11E+02	1.11E+02
Summer	252000	11	1.60E+01	2.77E-02	4.46E-01	4.46E-01	4.46E-01	4.46E-01	5.36E+00	1.21E+01	1.96E+01	3.67E+01	4.68E+01	4.68E+01	4.68E+01
Winter	85000	8	1.70E+01	6.30E-02	4.25E+00	4.25E+00	4.25E+00	5.47E+00	9.14E+00	1.21E+01	1.37E+01	1.98E+01	7.26E+01	7.26E+01	7.26E+01
Urbanizations															
Central City	43000	1	2.16E+00	0.00E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00	2.16E+00
Nonmetropolitan	463000	31	2.33E+01	2.78E-02	4.25E+00	4.25E+00	8.27E+00	9.06E+00	1.21E+01	1.60E+01	3.14E+01	4.40E+01	4.68E+01	1.11E+02	1.11E+02
Surburban	88000	4	2.13E+00	7.39E-03	4.46E-01	4.46E-01	4.46E-01	4.46E-01	4.46E-01	6.54E-01	5.36E+00	5.36E+00	5.36E+00	5.36E+00	5.36E+00
Race															
White	594000	36	1.86E+01	2.45E-02	4.46E-01	4.46E-01	4.46E-01	1.97E+00	8.27E+00	1.24E+01	2.30E+01	4.40E+01	4.68E+01	1.11E+02	1.11E+02
Response to Questionnaire															
Do you raise anim:	490000	32	2.23E+01	2.69E-02	4.25E+00	4.25E+00	5.36E+00	8.27E+00	1.08E+01	1.54E+01	3.14E+01	4.40E+01	4.68E+01	1.11E+02	1.11E+02
Do you farm?	490000	32	2.23E+01	2.69E-02	4.25E+00	4.25E+00	5.36E+00	8.27E+00	1.08E+01	1.54E+01	3.14E+01	4.40E+01	4.68E+01	1.11E+02	1.11E+02

Table 2-204. Intake of Homeproduced Dairy (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	242000	17	1.04E+01	2.28E-02	4.79E-01	4.79E-01	6.28E-01	6.72E-01	1.89E+00	5.87E+00	9.86E+00	3.49E+01	3.49E+01	3.49E+01	3.49E+01
Age															
01-02	11000	1	2.49E+00	0.00E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00	2.49E+00
03-05	28000	3	4.86E+00	2.51E-02	1.82E+00	1.82E+00	1.82E+00	1.82E+00	1.82E+00	2.71E+00	1.15E+01	1.15E+01	1.15E+01	1.15E+01	1.15E+01
06-11	68000	4	2.48E+01	4.21E-02	5.87E+00	5.87E+00	5.87E+00	5.87E+00	2.61E+01	2.61E+01	3.49E+01	3.49E+01	3.49E+01	3.49E+01	3.49E+01
20-39	108000	8	5.20E+00	1.34E-02	4.79E-01	4.79E-01	4.79E-01	4.79E-01	6.72E-01	1.89E+00	9.64E+00	9.86E+00	9.86E+00	9.86E+00	9.86E+00
70 +	27000	1	3.82E+00	0.00E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00
Seasons															
Spring	27000	3	1.34E+00	5.90E-03	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.72E-01	2.71E+00	2.71E+00	2.71E+00	2.71E+00	2.71E+00
Summer	131000	5	1.68E+01	3.23E-02	3.82E+00	3.82E+00	3.82E+00	3.82E+00	9.64E+00	9.86E+00	2.61E+01	3.49E+01	3.49E+01	3.49E+01	3.49E+01
Winter	84000	9	3.37E+00	1.13E-02	4.79E-01	4.79E-01	4.79E-01	4.79E-01	7.36E-01	1.89E+00	5.87E+00	6.74E+00	1.15E+01	1.15E+01	1.15E+01
Urbanizations															
Central City	27000	3	1.34E+00	5.90E-03	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.72E-01	2.71E+00	2.71E+00	2.71E+00	2.71E+00	2.71E+00
Nonmetropolitan	215000	14	1.15E+01	2.46E-02	4.79E-01	4.79E-01	4.79E-01	7.36E-01	2.49E+00	9.64E+00	1.15E+01	3.49E+01	3.49E+01	3.49E+01	3.49E+01
Race															
Asian	27000	3	1.34E+00	5.90E-03	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.28E-01	6.72E-01	2.71E+00	2.71E+00	2.71E+00	2.71E+00	2.71E+00
White	215000	14	1.15E+01	2.46E-02	4.79E-01	4.79E-01	4.79E-01	7.36E-01	2.49E+00	9.64E+00	1.15E+01	3.49E+01	3.49E+01	3.49E+01	3.49E+01
Response to Questionnaire															
Do you raise anim:	215000	14	1.15E+01	2.46E-02	4.79E-01	4.79E-01	4.79E-01	7.36E-01	2.49E+00	9.64E+00	1.15E+01	3.49E+01	3.49E+01	3.49E+01	3.49E+01
Do you farm?	148000	8	1.46E+01	3.25E-02	4.79E-01	4.79E-01	4.79E-01	7.36E-01	2.49E+00	9.86E+00	2.61E+01	3.49E+01	3.49E+01	3.49E+01	3.49E+01

Table 2-205. Intake of Homeproduced Dairy (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	261000	20	1.00E+01	2.41E−02	1.80E−01	1.80E−01	1.80E−01	2.05E−01	5.08E−01	6.10E+00	1.33E+01	2.81E+01	2.89E+01	5.09E+01	5.09E+01
Age															
< 01	12000	1	5.09E+01	0.00E+00	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01
01−02	12000	1	2.89E+01	0.00E+00	2.89E+01	2.89E+01	2.89E+01	2.89E+01	2.89E+01	2.89E+01	2.89E+01	2.89E+01	2.89E+01	2.89E+01	2.89E+01
03−05	10000	1	2.81E+01	0.00E+00	2.81E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01
06−11	68000	6	1.43E+01	1.27E−02	1.07E+01	1.07E+01	1.07E+01	1.07E+01	1.18E+01	1.27E+01	1.69E+01	2.01E+01	2.01E+01	2.01E+01	2.01E+01
12−19	15000	1	2.80E−01	0.00E+00	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01
20−39	59000	5	4.03E+00	9.44E−03	2.05E−01	2.05E−01	2.05E−01	2.05E−01	2.05E−01	4.99E+00	5.06E+00	6.46E+00	6.46E+00	6.46E+00	6.46E+00
40−69	35000	3	3.64E+00	1.60E−02	1.80E−01	1.80E−01	1.80E−01	1.80E−01	1.80E−01	6.10E+00	6.37E+00	6.37E+00	6.37E+00	6.37E+00	6.37E+00
70 +	50000	2	7.33E−01	1.01E−03	5.08E−01	5.08E−01	5.08E−01	5.08E−01	5.08E−01	7.33E−01	9.58E−01	9.58E−01	9.58E−01	9.58E−01	9.58E−01
Seasons															
Spring	96000	8	1.88E+01	4.58E−02	4.94E+00	4.94E+00	4.94E+00	4.94E+00	8.42E+00	1.45E+01	2.45E+01	5.09E+01	5.09E+01	5.09E+01	5.09E+01
Summer	50000	2	7.33E−01	1.01E−03	5.08E−01	5.08E−01	5.08E−01	5.08E−01	5.08E−01	7.33E−01	9.58E−01	9.58E−01	9.58E−01	9.58E−01	9.58E−01
Winter	115000	10	6.69E+00	2.31E−02	1.80E−01	1.80E−01	1.80E−01	1.80E−01	2.05E−01	6.10E+00	1.07E+01	1.33E+01	2.81E+01	2.81E+01	2.81E+01
Urbanizations															
Central City	45000	3	2.22E−01	2.01E−04	1.80E−01	1.80E−01	1.80E−01	1.80E−01	1.80E−01	2.05E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01	2.80E−01
Nonmetropolitan	70000	4	2.30E+00	9.42E−03	5.08E−01	5.08E−01	5.08E−01	5.08E−01	5.08E−01	9.58E−01	6.10E+00	6.37E+00	6.37E+00	6.37E+00	6.37E+00
Surburban	146000	13	1.67E+01	3.35E−02	4.94E+00	4.94E+00	4.94E+00	4.99E+00	6.46E+00	1.22E+01	2.01E+01	2.89E+01	5.09E+01	5.09E+01	5.09E+01
Race															
White	261000	20	1.00E+01	2.41E−02	1.80E−01	1.80E−01	1.80E−01	2.05E−01	5.08E−01	6.10E+00	1.33E+01	2.81E+01	2.89E+01	5.09E+01	5.09E+01
Response to Questionnaire															
Do you raise anim:	211000	18	1.22E+01	2.77E−02	1.80E−01	1.80E−01	1.80E−01	2.05E−01	4.94E+00	6.46E+00	1.69E+01	2.89E+01	5.09E+01	5.09E+01	5.09E+01
Do you farm?	70000	7	1.09E+01	2.85E−02	4.99E+00	4.99E+00	4.99E+00	4.99E+00	6.10E+00	6.46E+00	1.33E+01	2.81E+01	2.81E+01	2.81E+01	2.81E+01

Table 2-206. Intake of Home Caught Fish and Shellfish (g/kg-day) - All Regions Combined

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3914000	239	2.07E+00	1.86E-03	8.16E-02	9.11E-02	1.95E-01	2.28E-01	4.31E-01	9.97E-01	2.17E+00	4.68E+00	7.83E+00	1.55E+01	4.52E+01
Age															
< 01	26000	3	7.74E+00	3.34E-02	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	5.89E+00	1.55E+01	1.55E+01	1.55E+01	1.55E+01	1.55E+01
01-02	82000	6	1.03E+01	5.38E-02	1.21E+00	1.21E+00	1.21E+00	1.21E+00	1.21E+00	2.78E+00	5.61E+00	3.73E+01	4.52E+01	4.52E+01	4.52E+01
03-05	142000	11	2.58E+00	6.88E-03	5.63E-01	5.63E-01	5.63E-01	6.03E-01	1.07E+00	1.76E+00	2.32E+00	4.87E+00	1.04E+01	1.04E+01	1.04E+01
06-11	382000	29	2.78E+00	7.31E-03	1.60E-01	1.60E-01	1.84E-01	2.28E-01	5.47E-01	1.03E+00	3.67E+00	7.05E+00	7.85E+00	2.53E+01	2.53E+01
12-19	346000	21	1.52E+00	3.17E-03	1.95E-01	1.95E-01	1.95E-01	1.95E-01	3.11E-01	9.84E-01	1.79E+00	4.68E+00	6.67E+00	8.44E+00	8.44E+00
20-39	962000	59	1.91E+00	2.62E-03	8.16E-02	8.16E-02	9.11E-02	1.18E-01	4.43E-01	1.06E+00	2.18E+00	4.46E+00	9.57E+00	1.30E+01	1.30E+01
40-69	1574000	86	1.79E+00	1.92E-03	9.47E-02	9.47E-02	2.10E-01	2.75E-01	3.45E-01	9.85E-01	1.99E+00	4.43E+00	6.56E+00	1.06E+01	1.61E+01
70 +	450000	24	1.22E+00	1.68E-03	9.88E-02	9.88E-02	2.33E-01	2.33E-01	5.68E-01	7.64E-01	1.56E+00	3.73E+00	3.73E+00	5.12E+00	5.12E+00
Season															
Fall	1220000	45	1.31E+00	1.31E-03	1.84E-01	1.84E-01	1.96E-01	2.10E-01	3.18E-01	9.16E-01	1.79E+00	2.64E+00	3.73E+00	6.56E+00	6.56E+00
Spring	1112000	114	3.08E+00	5.62E-03	9.88E-02	1.16E-01	3.08E-01	3.40E-01	5.59E-01	1.27E+00	2.64E+00	6.68E+00	1.08E+01	3.73E+01	4.52E+01
Summer	911000	29	1.88E+00	2.39E-03	8.16E-02	8.16E-02	9.11E-02	2.04E-01	3.01E-01	7.64E-01	3.19E+00	4.43E+00	5.65E+00	9.57E+00	9.57E+00
Winter	671000	51	2.05E+00	3.21E-03	9.47E-02	9.47E-02	1.11E-01	1.60E-01	5.10E-01	1.06E+00	2.09E+00	5.89E+00	7.85E+00	1.31E+01	1.31E+01
Urbanization															
Central City	999000	46	1.79E+00	2.31E-03	9.47E-02	9.47E-02	1.60E-01	2.84E-01	6.08E-01	1.07E+00	1.85E+00	3.73E+00	9.57E+00	9.57E+00	1.55E+01
Nonmetropolitan	1174000	94	3.15E+00	5.14E-03	9.88E-02	1.16E-01	3.10E-01	3.62E-01	5.68E-01	1.88E+00	3.86E+00	6.52E+00	7.83E+00	3.73E+01	4.52E+01
Surburban	1741000	99	1.50E+00	1.74E-03	8.16E-02	8.16E-02	1.84E-01	2.01E-01	2.86E-01	5.87E-01	1.38E+00	4.37E+00	7.05E+00	1.08E+01	1.30E+01
Race															
Asian	16000	2	8.19E+00	5.78E-02	8.82E-01	8.82E-01	8.82E-01	8.82E-01	8.82E-01	8.19E+00	1.55E+01	1.55E+01	1.55E+01	1.55E+01	1.55E+01
Black	593000	41	1.81E+00	3.11E-03	1.84E-01	1.84E-01	2.01E-01	2.86E-01	3.18E-01	9.84E-01	2.17E+00	4.68E+00	9.57E+00	9.57E+00	9.57E+00
Native American	22000	3	2.40E+00	6.82E-03	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	2.19E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00
Other/NA	55000	5	2.80E+00	5.49E-03	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.61E+00	2.25E+00	3.67E+00	4.87E+00	4.87E+00	4.87E+00	4.87E+00
White	3228000	188	2.07E+00	2.14E-03	8.16E-02	8.16E-02	1.60E-01	2.27E-01	3.93E-01	9.97E-01	2.16E+00	4.99E+00	6.68E+00	1.61E+01	4.52E+01
Response to Questionnaire															
Do you fish?	3553000	220	2.22E+00	2.03E-03	8.16E-02	8.16E-02	1.84E-01	2.27E-01	4.66E-01	1.09E+00	2.23E+00	5.61E+00	7.85E+00	1.61E+01	4.52E+01

Table 2-207. Intake of Home Caught Fish and Shellfish (g/kg-day) - Northeast Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	334000	12	5.45E-01	1.06E-03	9.11E-02	9.11E-02	9.11E-02	9.11E-02	2.33E-01	3.76E-01	7.64E-01	9.16E-01	1.06E+00	3.80E+00	3.80E+00
Age															
06-11	7000	1	3.80E+00	0.00E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00
12-19	35000	1	1.95E-01	0.00E+00	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01
20-39	58000	2	3.25E-01	1.72E-03	9.11E-02	9.11E-02	9.11E-02	9.11E-02	9.11E-02	9.11E-02	9.11E-02	1.06E+00	1.06E+00	1.06E+00	1.06E+00
40-69	116000	5	5.04E-01	1.31E-03	2.82E-01	2.82E-01	2.82E-01	2.82E-01	2.82E-01	3.76E-01	3.93E-01	7.27E-01	2.19E+00	2.19E+00	2.19E+00
70 +	118000	3	6.05E-01	8.52E-04	2.33E-01	2.33E-01	2.33E-01	2.33E-01	2.33E-01	7.64E-01	9.16E-01	9.16E-01	9.16E-01	9.16E-01	9.16E-01
Season															
Fall	135000	4	4.29E-01	7.35E-04	1.95E-01	1.95E-01	1.95E-01	1.95E-01	1.95E-01	2.82E-01	3.93E-01	9.16E-01	9.16E-01	9.16E-01	9.16E-01
Spring	14000	2	2.99E+00	6.82E-03	2.19E+00	2.19E+00	2.19E+00	2.19E+00	2.19E+00	2.99E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00
Summer	132000	3	3.63E-01	7.97E-04	9.11E-02	9.11E-02	9.11E-02	9.11E-02	9.11E-02	2.33E-01	7.64E-01	7.64E-01	7.64E-01	7.64E-01	7.64E-01
Winter	53000	3	6.50E-01	1.24E-03	3.76E-01	3.76E-01	3.76E-01	3.76E-01	3.76E-01	7.27E-01	1.06E+00	1.06E+00	1.06E+00	1.06E+00	1.06E+00
Urbanization															
Nonmetropolitan	42000	4	1.59E+00	5.38E-03	7.27E-01	7.27E-01	7.27E-01	7.27E-01	7.27E-01	1.06E+00	2.19E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00
Suburban	292000	8	3.95E-01	4.99E-04	9.11E-02	9.11E-02	9.11E-02	9.11E-02	1.95E-01	2.82E-01	7.64E-01	9.16E-01	9.16E-01	9.16E-01	9.16E-01
Race															
Native American	14000	2	2.99E+00	6.82E-03	2.19E+00	2.19E+00	2.19E+00	2.19E+00	2.19E+00	2.99E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.80E+00
White	320000	10	4.38E-01	5.27E-04	9.11E-02	9.11E-02	9.11E-02	9.11E-02	2.33E-01	3.76E-01	7.64E-01	9.16E-01	9.16E-01	1.06E+00	1.06E+00
Response to Questionnaire															
Do you fish?	334000	12	5.45E-01	1.06E-03	9.11E-02	9.11E-02	9.11E-02	9.11E-02	2.33E-01	3.76E-01	7.64E-01	9.16E-01	1.06E+00	3.80E+00	3.80E+00

Table 2-208. Intake of Home Caught Fish and Shellfish (g/kg-day) - Midwest Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1113000	71	2.13E+00	3.34E-03	8.16E-02	8.16E-02	1.96E-01	2.27E-01	4.71E-01	1.03E+00	1.95E+00	6.10E+00	6.56E+00	1.61E+01	2.53E+01
Age															
< 01	18000	2	1.02E+01	3.56E-02	5.89E+00	5.89E+00	5.89E+00	5.89E+00	5.89E+00	5.89E+00	1.55E+01	1.55E+01	1.55E+01	1.55E+01	1.55E+01
01-02	33000	2	3.14E+00	2.97E-03	2.78E+00	2.78E+00	2.78E+00	2.78E+00	2.78E+00	2.78E+00	3.96E+00	3.96E+00	3.96E+00	3.96E+00	3.96E+00
03-05	39000	3	1.46E+00	2.29E-03	6.03E-01	6.03E-01	6.03E-01	6.03E-01	1.43E+00	1.76E+00	1.76E+00	1.76E+00	1.76E+00	1.76E+00	1.76E+00
06-11	65000	7	6.79E+00	3.51E-02	3.30E-01	3.30E-01	3.30E-01	3.30E-01	8.21E-01	1.03E+00	1.31E+01	2.53E+01	2.53E+01	2.53E+01	2.53E+01
12-19	13000	1	2.09E+00	0.00E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00	2.09E+00
20-39	312000	20	1.16E+00	3.03E-03	8.16E-02	8.16E-02	8.16E-02	8.16E-02	1.96E-01	5.04E-01	1.37E+00	2.16E+00	6.10E+00	7.83E+00	7.83E+00
40-69	505000	27	2.13E+00	4.04E-03	2.27E-01	2.27E-01	2.27E-01	3.18E-01	5.33E-01	1.07E+00	1.91E+00	6.52E+00	6.56E+00	1.61E+01	1.61E+01
70 +	128000	9	9.56E-01	2.00E-03	2.84E-01	2.84E-01	2.84E-01	2.84E-01	2.84E-01	5.68E-01	1.86E+00	2.13E+00	2.26E+00	2.26E+00	2.26E+00
Season															
Fall	362000	13	1.95E+00	3.56E-03	1.96E-01	1.96E-01	1.96E-01	2.27E-01	3.18E-01	1.11E+00	2.16E+00	6.52E+00	6.56E+00	6.56E+00	6.56E+00
Spring	224000	27	3.45E+00	1.34E-02	1.16E-01	1.16E-01	1.18E-01	3.10E-01	4.87E-01	8.21E-01	1.67E+00	1.55E+01	1.61E+01	2.53E+01	2.53E+01
Summer	264000	8	1.00E+00	3.07E-03	8.16E-02	8.16E-02	8.16E-02	8.16E-02	2.84E-01	4.66E-01	5.68E-01	1.28E+00	5.65E+00	5.65E+00	5.65E+00
Winter	263000	23	2.38E+00	4.98E-03	5.10E-01	5.10E-01	5.10E-01	5.48E-01	1.03E+00	1.56E+00	2.13E+00	5.89E+00	6.10E+00	1.31E+01	1.31E+01
Urbanization															
Central City	190000	9	1.43E+00	6.84E-03	2.84E-01	2.84E-01	2.84E-01	2.84E-01	5.68E-01	6.08E-01	1.28E+00	1.69E+00	1.69E+00	1.55E+01	1.55E+01
Nonmetropolitan	501000	40	3.42E+00	6.41E-03	1.16E-01	1.16E-01	3.30E-01	4.66E-01	5.33E-01	1.88E+00	5.65E+00	6.56E+00	1.31E+01	2.53E+01	2.53E+01
Surburban	422000	22	9.09E-01	1.30E-03	8.16E-02	8.16E-02	8.16E-02	1.96E-01	3.01E-01	5.48E-01	1.28E+00	2.09E+00	2.78E+00	3.73E+00	3.73E+00
Race															
Asian	16000	2	8.19E+00	5.78E-02	8.82E-01	8.82E-01	8.82E-01	8.82E-01	8.82E-01	8.19E+00	1.55E+01	1.55E+01	1.55E+01	1.55E+01	1.55E+01
Native American	8000	1	1.37E+00	0.00E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00
White	1089000	68	2.05E+00	3.23E-03	8.16E-02	8.16E-02	1.18E-01	2.27E-01	4.66E-01	1.03E+00	1.93E+00	5.89E+00	6.56E+00	1.61E+01	2.53E+01
Response to Questionnaire															
Do you fish?	956000	60	2.35E+00	3.84E-03	8.16E-02	8.16E-02	1.18E-01	2.27E-01	4.66E-01	1.12E+00	2.16E+00	6.52E+00	6.56E+00	2.53E+01	2.53E+01

Table 2-209. Intake of Home Caught Fish and Shellfish (g/kg-day) - South Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1440000	101	2.74E+00	3.99E−03	9.47E−02	9.47E−02	2.04E−01	2.86E−01	5.07E−01	1.48E+00	3.37E+00	5.61E+00	8.44E+00	3.73E+01	4.52E+01
Age															
< 01	8000	1	2.29E+00	0.00E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00
01−02	16000	2	4.12E+01	3.10E−02	3.73E+01	3.73E+01	3.73E+01	3.73E+01	3.73E+01	4.12E+01	4.52E+01	4.52E+01	4.52E+01	4.52E+01	4.52E+01
03−05	85000	7	3.42E+00	1.05E−02	5.63E−01	5.63E−01	5.63E−01	5.63E−01	2.06E+00	2.06E+00	4.87E+00	1.04E+01	1.04E+01	1.04E+01	1.04E+01
06−11	175000	13	2.81E+00	5.65E−03	1.60E−01	1.60E−01	1.60E−01	1.60E−01	3.62E−01	2.57E+00	4.28E+00	7.05E+00	7.85E+00	7.85E+00	7.85E+00
12−19	147000	12	1.80E+00	6.40E−03	3.08E−01	3.08E−01	3.08E−01	3.11E−01	3.11E−01	7.81E−01	1.85E+00	6.67E+00	8.44E+00	8.44E+00	8.44E+00
20−39	283000	21	2.54E+00	5.02E−03	2.85E−01	2.85E−01	3.87E−01	5.07E−01	9.83E−01	2.18E+00	2.40E+00	4.46E+00	8.29E+00	1.30E+01	1.30E+01
40−69	628000	39	2.11E+00	3.05E−03	9.47E−02	9.47E−02	1.11E−01	2.04E−01	3.18E−01	1.14E+00	3.55E+00	4.43E+00	8.33E+00	1.08E+01	1.08E+01
70 +	98000	6	1.72E+00	3.62E−03	7.27E−01	7.27E−01	7.27E−01	7.27E−01	7.27E−01	1.48E+00	2.49E+00	2.49E+00	5.12E+00	5.12E+00	5.12E+00
Season															
Fall	274000	11	9.78E−01	1.34E−03	2.86E−01	2.86E−01	2.86E−01	2.86E−01	3.18E−01	9.84E−01	1.38E+00	2.06E+00	2.49E+00	2.49E+00	2.49E+00
Spring	538000	58	4.00E+00	9.78E−03	3.08E−01	3.08E−01	3.87E−01	4.46E−01	8.74E−01	1.94E+00	3.71E+00	8.33E+00	1.30E+01	4.52E+01	4.52E+01
Summer	376000	14	2.41E+00	2.38E−03	2.04E−01	2.04E−01	2.04E−01	2.75E−01	1.14E+00	2.23E+00	3.75E+00	4.28E+00	4.43E+00	4.43E+00	4.43E+00
Winter	252000	18	2.42E+00	6.40E−03	9.47E−02	9.47E−02	9.47E−02	1.11E−01	2.28E−01	6.35E−01	4.37E+00	7.85E+00	8.44E+00	1.04E+01	1.04E+01
Urbanization															
Central City	281000	16	1.58E+00	2.50E−03	9.47E−02	9.47E−02	9.47E−02	1.11E−01	2.28E−01	1.14E+00	2.64E+00	3.75E+00	3.75E+00	3.75E+00	3.75E+00
Nonmetropolitan	550000	41	3.33E+00	9.14E−03	2.85E−01	2.85E−01	3.38E−01	5.07E−01	1.12E+00	1.94E+00	3.19E+00	4.43E+00	6.67E+00	4.52E+01	4.52E+01
Surburban	609000	44	2.73E+00	4.24E−03	2.04E−01	2.04E−01	2.75E−01	2.86E−01	4.26E−01	1.08E+00	4.37E+00	8.33E+00	1.04E+01	1.30E+01	1.30E+01
Race															
Black	428000	32	1.07E+00	1.15E−03	2.86E−01	2.86E−01	2.86E−01	3.11E−01	4.93E−01	9.20E−01	1.38E+00	2.32E+00	2.60E+00	3.71E+00	3.71E+00
Other/NA	55000	5	2.80E+00	5.49E−03	1.58E+00	1.58E+00	1.58E+00	1.58E+00	1.61E+00	2.25E+00	3.67E+00	4.87E+00	4.87E+00	4.87E+00	4.87E+00
White	957000	64	3.48E+00	5.81E−03	9.47E−02	9.47E−02	1.60E−01	2.28E−01	5.18E−01	2.17E+00	4.17E+00	7.85E+00	1.04E+01	3.73E+01	4.52E+01
Response to Questionnaire															
Do you fish?	1280000	95	3.00E+00	4.43E−03	9.47E−02	9.47E−02	2.04E−01	2.80E−01	7.06E−01	1.93E+00	3.67E+00	6.68E+00	8.44E+00	3.73E+01	4.52E+01

Table 2-210. Intake of Home Caught Fish and Shellfish (g/kg-day) - West Region

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1027000	55	1.57E+00	1.99E-03	9.88E-02	1.60E-01	2.01E-01	2.38E-01	4.43E-01	8.38E-01	1.79E+00	3.73E+00	5.67E+00	9.57E+00	9.57E+00
Age															
01-02	33000	2	2.41E+00	1.08E-02	1.21E+00	1.21E+00	1.21E+00	1.21E+00	1.21E+00	1.21E+00	5.61E+00	5.61E+00	5.61E+00	5.61E+00	5.61E+00
03-05	18000	1	1.07E+00	0.00E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00
06-11	135000	8	7.55E-01	9.91E-04	1.84E-01	1.84E-01	1.84E-01	1.84E-01	5.47E-01	6.08E-01	9.64E-01	1.09E+00	1.68E+00	1.68E+00	1.68E+00
12-19	151000	7	1.50E+00	3.26E-03	2.01E-01	2.01E-01	2.01E-01	2.01E-01	8.07E-01	9.97E-01	1.79E+00	4.68E+00	4.68E+00	4.68E+00	4.68E+00
20-39	309000	16	2.38E+00	5.53E-03	1.60E-01	1.60E-01	3.40E-01	4.41E-01	5.95E-01	7.12E-01	1.85E+00	9.57E+00	9.57E+00	9.57E+00	9.57E+00
40-69	275000	15	9.60E-01	1.60E-03	2.10E-01	2.10E-01	2.10E-01	2.10E-01	2.86E-01	4.33E-01	1.45E+00	2.21E+00	2.69E+00	2.69E+00	2.69E+00
70 +	106000	6	1.78E+00	4.79E-03	9.88E-02	9.88E-02	9.88E-02	2.42E-01	5.71E-01	7.57E-01	3.73E+00	3.73E+00	3.73E+00	3.73E+00	3.73E+00
Season															
Fall	449000	17	1.27E+00	1.51E-03	1.84E-01	1.84E-01	2.01E-01	2.10E-01	5.87E-01	1.09E+00	1.85E+00	2.21E+00	3.73E+00	3.73E+00	3.73E+00
Spring	336000	27	1.35E+00	2.64E-03	9.88E-02	9.88E-02	2.38E-01	3.27E-01	4.43E-01	6.08E-01	1.68E+00	4.68E+00	5.61E+00	5.67E+00	5.67E+00
Summer	139000	4	3.55E+00	1.09E-02	3.45E-01	3.45E-01	3.45E-01	3.45E-01	7.57E-01	1.45E+00	9.57E+00	9.57E+00	9.57E+00	9.57E+00	9.57E+00
Winter	103000	7	9.78E-01	1.62E-03	1.60E-01	1.60E-01	1.60E-01	1.60E-01	5.71E-01	1.00E+00	1.54E+00	1.57E+00	1.57E+00	1.57E+00	1.57E+00
Urbanization															
Central City	528000	21	2.03E+00	3.31E-03	3.27E-01	3.27E-01	4.33E-01	5.29E-01	7.12E-01	1.45E+00	1.85E+00	3.73E+00	9.57E+00	9.57E+00	9.57E+00
Nonmetropolitan	81000	9	1.08E+00	6.11E-03	9.88E-02	9.88E-02	9.88E-02	1.60E-01	1.60E-01	5.61E-01	6.71E-01	5.67E+00	5.67E+00	5.67E+00	5.67E+00
Surburban	418000	25	1.09E+00	1.93E-03	1.84E-01	1.84E-01	2.01E-01	2.10E-01	3.08E-01	5.87E-01	1.21E+00	2.90E+00	4.68E+00	5.61E+00	5.61E+00
Race															
Black	165000	9	3.73E+00	9.22E-03	1.84E-01	1.84E-01	1.84E-01	2.01E-01	2.18E-01	2.69E+00	9.57E+00	9.57E+00	9.57E+00	9.57E+00	9.57E+00
White	862000	46	1.16E+00	1.13E-03	9.88E-02	1.60E-01	2.10E-01	3.08E-01	5.29E-01	8.07E-01	1.54E+00	2.21E+00	3.73E+00	5.67E+00	5.67E+00
Response to Questionnaire															
Do you fish?	983000	53	1.63E+00	2.06E-03	9.88E-02	1.60E-01	2.01E-01	2.18E-01	5.47E-01	9.64E-01	1.79E+00	3.73E+00	5.67E+00	9.57E+00	9.57E+00

Table 2-211. Seasonally Adjusted Homegrown Per Capita Intake Rates (g/kg-day)

	Mean	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total Fruits	0.21462193	0	0	0	0	0	0	0	0.16173552	0.87817648	5.34938313	16.89300
Total Vegetables	0.3657913	0	0	0	0	0	0	0.07337184	0.93010498	2.05988803	6.78436291	14.35318
Total Meats	0.10911165	0	0	0	0	0	0	0	0	0.49178472	2.88187144	9.22850
Total Dairy	0.10782335	0	0	0	0	0	0	0	0	0	1.87397677	30.07558
Total Fish	0.03858881	0	0	0	0	0	0	0	0	0	0.95563983	8.76312

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Table 2-212. Intake of Homegrown Apples (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5306000	272	1.19E+00	5.43E-04	5.57E-02	8.34E-02	2.30E-01	2.84E-01	4.50E-01	8.17E-01	1.47E+00	2.38E+00	3.40E+00	5.42E+00	1.01E+01
Age															
< 01	70000	4	3.05E+00	2.36E-03	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.75E+00	2.84E+00	2.91E+00	4.77E+00	4.77E+00	4.77E+00	4.77E+00
01-02	199000	12	3.15E+00	5.63E-03	1.18E+00	1.18E+00	1.18E+00	1.18E+00	1.47E+00	2.27E+00	2.92E+00	5.87E+00	1.01E+01	1.01E+01	1.01E+01
03-05	291000	16	1.77E+00	1.27E-03	8.81E-01	8.81E-01	8.81E-01	9.98E-01	1.06E+00	1.82E+00	2.27E+00	2.69E+00	2.69E+00	3.48E+00	3.48E+00
06-11	402000	25	1.28E+00	1.49E-03	4.72E-01	4.72E-01	4.72E-01	5.63E-01	7.40E-01	9.56E-01	1.29E+00	2.98E+00	4.00E+00	4.00E+00	4.00E+00
12-19	296000	12	8.06E-01	1.23E-03	1.18E-01	1.18E-01	1.18E-01	1.18E-01	3.79E-01	4.25E-01	1.19E+00	2.19E+00	2.19E+00	2.19E+00	2.19E+00
20-39	1268000	61	7.95E-01	7.40E-04	1.85E-01	1.85E-01	2.30E-01	2.56E-01	3.04E-01	6.02E-01	9.22E-01	1.55E+00	1.97E+00	5.42E+00	5.42E+00
40-69	1719000	90	9.61E-01	9.89E-04	5.57E-02	5.57E-02	8.94E-02	2.55E-01	3.98E-01	6.48E-01	1.08E+00	1.59E+00	2.38E+00	9.83E+00	9.83E+00
70 +	1061000	52	1.45E+00	9.86E-04	1.99E-01	1.99E-01	2.60E-01	4.46E-01	6.27E-01	1.18E+00	1.82E+00	3.40E+00	3.62E+00	4.20E+00	4.20E+00
Season															
Fall	1707000	60	1.28E+00	7.34E-04	2.56E-01	2.56E-01	2.95E-01	3.20E-01	5.83E-01	1.03E+00	1.66E+00	2.69E+00	3.40E+00	4.25E+00	4.25E+00
Spring	639000	74	9.50E-01	1.23E-03	1.94E-01	1.94E-01	2.38E-01	2.84E-01	3.76E-01	5.67E-01	1.10E+00	2.00E+00	2.78E+00	5.87E+00	5.87E+00
Summer	1935000	68	1.12E+00	1.00E-03	5.57E-02	5.57E-02	8.94E-02	1.86E-01	3.98E-01	6.92E-01	1.41E+00	2.29E+00	2.98E+00	9.83E+00	9.83E+00
Winter	1025000	70	1.30E+00	1.47E-03	1.85E-01	1.85E-01	2.30E-01	3.23E-01	5.71E-01	8.81E-01	1.59E+00	2.75E+00	3.40E+00	1.01E+01	1.01E+01
Urbanization															
Central City	912000	30	1.24E+00	1.49E-03	2.31E-01	2.31E-01	2.56E-01	3.92E-01	5.10E-01	9.17E-01	1.59E+00	2.19E+00	2.26E+00	1.01E+01	1.01E+01
Nonmetropolitan	2118000	122	1.27E+00	9.56E-04	5.57E-02	5.57E-02	1.18E-01	2.49E-01	4.11E-01	9.00E-01	1.55E+00	2.92E+00	3.48E+00	9.83E+00	9.83E+00
Surburban	2276000	120	1.09E+00	6.65E-04	1.85E-01	1.86E-01	2.37E-01	2.91E-01	4.37E-01	7.74E-01	1.29E+00	2.29E+00	3.40E+00	5.42E+00	5.42E+00
Race															
Black	84000	4	1.88E+00	1.67E-03	5.59E-01	5.59E-01	5.59E-01	1.61E+00	1.61E+00	1.84E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00
White	5222000	268	1.18E+00	5.49E-04	5.57E-02	8.34E-02	2.30E-01	2.79E-01	4.48E-01	7.98E-01	1.41E+00	2.38E+00	3.40E+00	5.42E+00	1.01E+01
Region															
Midwest	2044000	123	1.38E+00	1.13E-03	1.94E-01	2.16E-01	2.85E-01	3.04E-01	5.20E-01	9.23E-01	1.61E+00	2.69E+00	3.40E+00	9.83E+00	1.01E+01
Northeast	442000	18	5.05E-01	5.14E-04	8.34E-02	8.34E-02	8.34E-02	8.94E-02	1.85E-01	4.58E-01	7.71E-01	1.00E+00	1.00E+00	1.67E+00	1.67E+00
South	1310000	65	1.10E+00	7.52E-04	1.99E-01	1.99E-01	2.38E-01	3.01E-01	4.39E-01	9.17E-01	1.38E+00	1.90E+00	2.98E+00	4.00E+00	4.91E+00
West	1510000	66	1.20E+00	8.51E-04	5.57E-02	5.57E-02	1.86E-01	2.64E-01	4.72E-01	7.89E-01	1.82E+00	2.75E+00	3.62E+00	4.25E+00	4.25E+00
Response to Questionnaire															
Do you garden?	4707000	246	1.21E+00	5.94E-04	5.57E-02	1.27E-01	2.49E-01	2.95E-01	4.70E-01	8.17E-01	1.47E+00	2.38E+00	3.40E+00	5.87E+00	1.01E+01
Do you farm?	1299000	68	1.39E+00	9.48E-04	5.57E-02	5.57E-02	3.57E-01	5.36E-01	7.03E-01	9.56E-01	1.58E+00	2.99E+00	4.00E+00	4.91E+00	5.87E+00

Table 2-213. Intake of Homegrown Peaches (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2941000	193	1.67E+00	1.38E-03	3.52E-02	5.20E-02	1.65E-01	2.25E-01	4.74E-01	8.97E-01	1.88E+00	3.79E+00	6.36E+00	1.23E+01	2.23E+01
Age															
< 01	20000	2	2.69E+00	2.10E-02	2.58E-01	2.58E-01	2.58E-01	2.58E-01	2.58E-01	2.58E-01	6.33E+00	6.33E+00	6.33E+00	6.33E+00	6.33E+00
01-02	103000	8	2.40E+00	3.60E-03	2.30E-01	2.30E-01	2.30E-01	2.30E-01	1.39E+00	2.66E+00	3.22E+00	3.83E+00	3.86E+00	3.86E+00	3.86E+00
03-05	65000	6	6.01E+00	2.45E-02	2.18E+00	2.18E+00	2.18E+00	2.18E+00	3.06E+00	3.56E+00	4.69E+00	2.23E+01	2.23E+01	2.23E+01	2.23E+01
06-11	329000	26	3.11E+00	5.62E-03	9.75E-02	9.75E-02	1.01E-01	1.40E-01	6.25E-01	1.13E+00	6.36E+00	8.53E+00	8.53E+00	1.15E+01	1.15E+01
12-19	177000	13	1.60E+00	3.33E-03	1.76E-01	1.76E-01	3.56E-01	3.61E-01	5.03E-01	8.95E-01	3.34E+00	3.90E+00	3.90E+00	3.90E+00	3.90E+00
20-39	573000	35	1.17E+00	1.36E-03	5.07E-02	5.07E-02	5.50E-02	2.25E-01	4.74E-01	8.09E-01	1.30E+00	2.92E+00	2.99E+00	5.27E+00	5.27E+00
40-69	1076000	70	1.53E+00	2.29E-03	3.52E-02	5.87E-02	1.90E-01	2.39E-01	5.56E-01	8.92E-01	1.61E+00	2.63E+00	4.43E+00	1.23E+01	1.23E+01
70 +	598000	33	1.01E+00	1.46E-03	9.13E-02	9.13E-02	1.38E-01	1.79E-01	2.82E-01	8.22E-01	1.19E+00	1.60E+00	3.79E+00	7.13E+00	7.13E+00
Season															
Fall	485000	19	9.01E-01	1.23E-03	1.38E-01	1.38E-01	1.38E-01	1.79E-01	2.62E-01	6.43E-01	1.19E+00	2.63E+00	2.63E+00	3.06E+00	3.06E+00
Spring	756000	91	1.67E+00	3.34E-03	5.07E-02	5.07E-02	5.87E-02	1.01E-01	2.76E-01	7.74E-01	1.45E+00	4.44E+00	6.77E+00	2.23E+01	2.23E+01
Summer	1081000	35	2.26E+00	2.72E-03	1.65E-01	1.65E-01	2.25E-01	3.61E-01	5.67E-01	1.12E+00	2.99E+00	6.36E+00	8.53E+00	1.23E+01	1.23E+01
Winter	619000	48	1.25E+00	9.04E-04	3.52E-02	3.52E-02	2.39E-01	5.56E-01	7.79E-01	1.04E+00	1.71E+00	2.35E+00	2.60E+00	3.56E+00	3.56E+00
Urbanization															
Central City	429000	12	1.79E+00	5.44E-03	1.38E-01	1.38E-01	1.38E-01	1.79E-01	2.59E-01	5.26E-01	1.14E+00	1.23E+01	1.23E+01	1.23E+01	1.23E+01
Nonmetropolitan	1110000	99	1.87E+00	2.45E-03	5.50E-02	5.87E-02	2.62E-01	3.93E-01	6.46E-01	1.02E+00	2.18E+00	3.86E+00	6.36E+00	1.15E+01	2.23E+01
Surburban	1402000	82	1.47E+00	1.34E-03	3.52E-02	5.07E-02	1.40E-01	2.04E-01	4.61E-01	9.20E-01	1.87E+00	3.79E+00	4.43E+00	7.37E+00	7.37E+00
Race															
Black	39000	1	1.46E+00	0.00E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00
Other/NA	41000	1	2.25E-01	0.00E+00	2.25E-01	2.25E-01	2.25E-01	2.25E-01	2.25E-01	2.25E-01	2.25E-01	2.25E-01	2.25E-01	2.25E-01	2.25E-01
White	2861000	191	1.70E+00	1.41E-03	3.52E-02	5.20E-02	1.65E-01	2.30E-01	5.03E-01	8.97E-01	1.96E+00	3.79E+00	6.36E+00	1.23E+01	2.23E+01
Region															
Midwest	824000	75	1.39E+00	2.78E-03	6.79E-02	1.76E-01	2.20E-01	2.59E-01	4.60E-01	7.40E-01	1.19E+00	3.06E+00	3.56E+00	1.15E+01	2.23E+01
Northeast	75000	5	2.72E+00	7.63E-03	2.04E-01	2.04E-01	2.04E-01	2.04E-01	8.75E-01	3.79E+00	3.79E+00	7.13E+00	7.13E+00	7.13E+00	7.13E+00
South	852000	51	1.67E+00	1.99E-03	3.52E-02	3.52E-02	1.38E-01	1.79E-01	6.43E-01	1.02E+00	1.96E+00	3.83E+00	6.36E+00	8.53E+00	8.53E+00
West	1190000	62	1.80E+00	2.35E-03	5.07E-02	5.07E-02	1.40E-01	2.25E-01	4.68E-01	8.63E-01	1.94E+00	4.43E+00	7.37E+00	1.23E+01	1.23E+01
Response to Questionnaire															
Do you garden?	2660000	174	1.75E+00	1.49E-03	3.52E-02	5.20E-02	1.66E-01	2.59E-01	5.26E-01	9.25E-01	1.96E+00	3.79E+00	6.36E+00	1.23E+01	2.23E+01
Do you farm?	769000	54	1.56E+00	2.09E-03	6.79E-02	6.79E-02	1.76E-01	2.26E-01	4.61E-01	9.02E-01	2.02E+00	2.99E+00	6.36E+00	8.53E+00	8.53E+00

Table 2-214. Intake of Homegrown Pears (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1513000	94	9.37E-01	7.63E-04	1.01E-01	1.01E-01	1.84E-01	2.38E-01	4.28E-01	6.82E-01	1.09E+00	1.60E+00	2.76E+00	5.16E+00	5.16E+00
Age															
01-02	24000	3	3.27E+00	8.46E-03	1.83E+00	1.83E+00	1.83E+00	1.83E+00	1.83E+00	2.54E+00	4.79E+00	4.79E+00	4.79E+00	4.79E+00	4.79E+00
03-05	45000	3	2.19E+00	2.59E-03	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.86E+00	2.57E+00	2.57E+00	2.57E+00	2.57E+00	2.57E+00	2.57E+00
06-11	145000	10	2.09E+00	4.74E-03	7.19E-01	7.19E-01	7.19E-01	7.65E-01	8.13E-01	1.09E+00	4.82E+00	5.16E+00	5.16E+00	5.16E+00	5.16E+00
12-19	121000	7	8.84E-01	2.44E-03	1.82E-01	1.82E-01	1.82E-01	1.82E-01	4.72E-01	4.97E-01	8.64E-01	2.76E+00	2.76E+00	2.76E+00	2.76E+00
20-39	365000	23	6.19E-01	5.10E-04	1.13E-01	1.13E-01	3.18E-01	3.79E-01	4.28E-01	5.03E-01	6.82E-01	1.22E+00	1.24E+00	1.24E+00	1.24E+00
40-69	557000	33	6.57E-01	4.26E-04	1.01E-01	1.01E-01	1.08E-01	3.33E-01	4.23E-01	6.45E-01	9.22E-01	1.10E+00	1.13E+00	1.51E+00	1.51E+00
70 +	256000	15	9.34E-01	1.53E-03	1.84E-01	1.84E-01	1.84E-01	1.84E-01	2.38E-01	8.41E-01	1.18E+00	1.56E+00	2.88E+00	2.88E+00	2.88E+00
Season															
Fall	308000	11	1.04E+00	1.54E-03	1.84E-01	1.84E-01	1.84E-01	1.84E-01	3.52E-01	7.29E-01	1.33E+00	2.57E+00	2.88E+00	2.88E+00	2.88E+00
Spring	355000	39	6.87E-01	8.27E-04	1.01E-01	1.01E-01	1.13E-01	1.82E-01	3.38E-01	6.02E-01	8.66E-01	1.15E+00	1.83E+00	2.54E+00	2.54E+00
Summer	474000	16	6.22E-01	3.62E-04	3.56E-01	3.56E-01	3.56E-01	3.89E-01	4.23E-01	5.03E-01	8.11E-01	1.09E+00	1.18E+00	1.18E+00	1.18E+00
Winter	376000	28	1.48E+00	2.39E-03	1.08E-01	1.08E-01	1.08E-01	3.79E-01	6.45E-01	9.49E-01	1.38E+00	4.82E+00	5.16E+00	5.16E+00	5.16E+00
Urbanization															
Central City	222000	11	1.64E+00	3.64E-03	1.84E-01	1.84E-01	1.84E-01	1.84E-01	2.38E-01	9.84E-01	2.76E+00	4.82E+00	5.16E+00	5.16E+00	5.16E+00
Nonmetropolitan	634000	44	7.81E-01	7.10E-04	3.33E-01	3.33E-01	3.52E-01	4.19E-01	4.43E-01	5.70E-01	8.13E-01	1.56E+00	1.86E+00	2.88E+00	2.88E+00
Surburban	657000	39	8.50E-01	8.98E-04	1.01E-01	1.01E-01	1.08E-01	1.82E-01	3.89E-01	7.29E-01	1.10E+00	1.50E+00	2.57E+00	4.79E+00	4.79E+00
Race															
Black	51000	3	1.32E-01	1.58E-04	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.01E-01	1.13E-01	1.82E-01	1.82E-01	1.82E-01	1.82E-01	1.82E-01
White	1462000	91	9.65E-01	7.79E-04	1.08E-01	1.08E-01	2.38E-01	3.52E-01	4.43E-01	7.01E-01	1.09E+00	1.60E+00	2.88E+00	5.16E+00	5.16E+00
Region															
Midwest	688000	57	8.71E-01	8.64E-04	2.22E-01	2.22E-01	3.38E-01	3.76E-01	4.43E-01	6.45E-01	1.04E+00	1.60E+00	2.57E+00	4.79E+00	4.79E+00
Northeast	18000	2	8.70E-01	4.73E-03	2.35E-01	2.35E-01	2.35E-01	2.35E-01	2.35E-01	8.70E-01	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00
South	377000	13	8.32E-01	1.05E-03	1.84E-01	1.84E-01	1.84E-01	2.38E-01	4.28E-01	7.29E-01	1.09E+00	1.56E+00	2.88E+00	2.88E+00	2.88E+00
West	430000	22	1.14E+00	2.07E-03	1.01E-01	1.01E-01	1.08E-01	1.13E-01	3.56E-01	7.52E-01	1.13E+00	2.76E+00	4.82E+00	5.16E+00	5.16E+00
Response to Questionnaire															
Do you garden?	1312000	85	9.45E-01	8.40E-04	1.01E-01	1.01E-01	1.82E-01	3.52E-01	4.31E-01	6.75E-01	1.09E+00	1.56E+00	2.88E+00	5.16E+00	5.16E+00
Do you farm?	528000	35	1.09E+00	1.71E-03	1.08E-01	1.08E-01	2.22E-01	3.76E-01	4.28E-01	6.14E-01	1.09E+00	2.76E+00	4.82E+00	5.16E+00	5.16E+00

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Table 2-215. Intake of Homegrown Strawberries (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2057000	139	6.52E-01	4.23E-04	2.44E-02	4.15E-02	8.16E-02	1.18E-01	2.55E-01	4.67E-01	8.20E-01	1.47E+00	1.77E+00	2.72E+00	4.83E+00
Age															
< 01	9000	1	1.84E-01	0.00E+00	1.84E-01	1.84E-01	1.84E-01	1.84E-01	1.84E-01	1.84E-01	1.84E-01	1.84E-01	1.84E-01	1.84E-01	1.84E-01
01-02	30000	2	1.33E+00	2.74E-03	7.04E-01	7.04E-01	7.04E-01	7.04E-01	7.04E-01	1.69E+00	1.69E+00	1.69E+00	1.69E+00	1.69E+00	1.69E+00
03-05	66000	6	1.40E+00	6.07E-03	3.00E-01	3.00E-01	3.00E-01	3.00E-01	3.86E-01	5.15E-01	2.97E+00	4.83E+00	4.83E+00	4.83E+00	4.83E+00
06-11	153000	15	1.02E+00	1.87E-03	1.82E-01	1.82E-01	1.82E-01	2.46E-01	4.37E-01	8.08E-01	1.46E+00	2.43E+00	2.54E+00	2.54E+00	2.54E+00
12-19	201000	11	6.35E-01	9.72E-04	8.92E-02	8.92E-02	8.92E-02	1.06E-01	4.16E-01	5.69E-01	8.65E-01	1.33E+00	1.33E+00	1.33E+00	1.33E+00
20-39	316000	22	3.21E-01	5.35E-04	7.92E-02	7.92E-02	8.16E-02	1.05E-01	1.18E-01	2.05E-01	4.59E-01	8.20E-01	9.73E-01	1.56E+00	1.56E+00
40-69	833000	55	6.44E-01	5.17E-04	2.44E-02	2.44E-02	6.53E-02	1.75E-01	3.55E-01	5.83E-01	9.41E-01	1.42E+00	1.47E+00	2.37E+00	2.37E+00
70 +	449000	27	6.36E-01	8.57E-04	4.15E-02	4.15E-02	4.41E-02	8.64E-02	2.62E-01	4.69E-01	7.00E-01	1.66E+00	1.89E+00	2.72E+00	2.72E+00
Season															
Fall	250000	8	1.09E+00	6.64E-04	6.54E-01	6.54E-01	6.54E-01	6.77E-01	8.12E-01	1.00E+00	1.33E+00	1.47E+00	1.66E+00	1.66E+00	1.66E+00
Spring	598000	66	8.30E-01	1.09E-03	7.92E-02	7.92E-02	8.92E-02	1.80E-01	2.75E-01	4.69E-01	9.73E-01	1.93E+00	2.54E+00	4.83E+00	4.83E+00
Summer	388000	11	3.91E-01	3.43E-04	6.53E-02	6.53E-02	6.53E-02	6.53E-02	1.25E-01	4.28E-01	5.97E-01	6.21E-01	6.96E-01	6.96E-01	6.96E-01
Winter	821000	54	5.13E-01	5.20E-04	2.44E-02	2.44E-02	4.41E-02	1.05E-01	2.07E-01	3.86E-01	6.01E-01	1.27E+00	1.46E+00	2.37E+00	2.37E+00
Urbanization															
Central City	505000	23	7.54E-01	8.27E-04	4.15E-02	4.15E-02	4.41E-02	8.92E-02	3.82E-01	4.88E-01	1.33E+00	1.47E+00	1.69E+00	2.37E+00	2.37E+00
Nonmetropolitan	664000	52	6.18E-01	9.29E-04	2.44E-02	2.44E-02	6.53E-02	8.16E-02	1.25E-01	3.85E-01	8.14E-01	1.66E+00	2.16E+00	4.83E+00	4.83E+00
Surburban	888000	64	6.20E-01	5.00E-04	7.92E-02	7.92E-02	1.81E-01	2.21E-01	3.45E-01	5.30E-01	6.96E-01	1.27E+00	1.56E+00	2.97E+00	2.97E+00
Race															
White	2057000	139	6.52E-01	4.23E-04	2.44E-02	4.15E-02	8.16E-02	1.18E-01	2.55E-01	4.67E-01	8.20E-01	1.47E+00	1.77E+00	2.72E+00	4.83E+00
Region															
Midwest	1123000	76	6.85E-01	6.82E-04	2.44E-02	2.44E-02	6.53E-02	8.16E-02	1.82E-01	4.16E-01	1.00E+00	1.66E+00	1.93E+00	2.97E+00	4.83E+00
Northeast	382000	25	6.35E-01	8.21E-04	8.92E-02	8.92E-02	1.59E-01	1.82E-01	2.55E-01	4.67E-01	8.65E-01	1.46E+00	1.83E+00	2.16E+00	2.16E+00
South	333000	23	6.69E-01	6.99E-04	1.33E-01	1.33E-01	2.05E-01	3.77E-01	5.15E-01	6.21E-01	6.96E-01	1.00E+00	1.00E+00	2.72E+00	2.72E+00
West	219000	15	4.90E-01	5.22E-04	8.64E-02	8.64E-02	1.71E-01	1.80E-01	2.33E-01	5.30E-01	7.00E-01	8.12E-01	8.12E-01	9.71E-01	9.71E-01
Response to Questionnaire															
Do you garden?	1843000	123	6.37E-01	4.48E-04	2.44E-02	4.15E-02	7.92E-02	1.18E-01	2.28E-01	4.53E-01	8.20E-01	1.46E+00	1.77E+00	2.54E+00	4.83E+00
Do you farm?	87000	9	3.51E-01	5.96E-04	1.33E-01	1.33E-01	1.33E-01	1.33E-01	2.05E-01	2.83E-01	5.15E-01	7.04E-01	7.04E-01	7.04E-01	7.04E-01

Table 2-216. Intake of Homegrown Other Berries (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1626000	99	4.80E-01	3.31E-04	0.00E+00	0.00E+00	4.68E-02	9.24E-02	2.32E-01	3.84E-01	5.89E-01	1.07E+00	1.28E+00	2.21E+00	2.21E+00
Age															
< 01	8000	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	41000	2	1.57E+00	1.81E-03	1.31E+00	1.31E+00	1.31E+00	1.31E+00	1.31E+00	1.31E+00	2.08E+00	2.08E+00	2.08E+00	2.08E+00	2.08E+00
03-05	53000	3	6.71E-01	3.63E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00	1.95E+00
06-11	106000	10	3.27E-01	8.83E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-01	5.69E-01	6.23E-01	9.02E-01	9.02E-01	9.02E-01
12-19	79000	5	3.56E-01	8.31E-04	4.68E-02	4.68E-02	4.68E-02	4.68E-02	4.68E-02	2.91E-01	5.79E-01	5.89E-01	5.89E-01	5.89E-01	5.89E-01
20-39	309000	20	3.90E-01	5.08E-04	7.95E-02	7.95E-02	9.18E-02	9.18E-02	1.25E-01	3.30E-01	5.52E-01	7.94E-01	1.07E+00	1.07E+00	1.07E+00
40-69	871000	51	4.89E-01	4.38E-04	7.69E-02	7.69E-02	1.01E-01	1.34E-01	2.48E-01	3.89E-01	6.12E-01	7.68E-01	1.28E+00	2.21E+00	2.21E+00
70 +	159000	7	4.45E-01	4.72E-04	2.58E-01	2.58E-01	2.58E-01	3.31E-01	3.51E-01	3.84E-01	5.35E-01	5.35E-01	1.07E+00	1.07E+00	1.07E+00
Season															
Fall	379000	13	4.44E-01	2.28E-04	2.67E-01	2.67E-01	2.67E-01	2.91E-01	3.42E-01	3.95E-01	4.69E-01	6.73E-01	7.68E-01	7.68E-01	7.68E-01
Spring	287000	29	3.06E-01	4.13E-04	4.68E-02	4.68E-02	4.68E-02	7.69E-02	1.84E-01	2.54E-01	4.08E-01	5.40E-01	7.24E-01	1.07E+00	1.07E+00
Summer	502000	18	5.56E-01	7.91E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-01	5.14E-01	7.24E-01	1.31E+00	2.21E+00	2.21E+00	2.21E+00
Winter	458000	39	5.35E-01	6.82E-04	0.00E+00	0.00E+00	1.02E-01	1.59E-01	2.32E-01	3.89E-01	6.23E-01	1.07E+00	1.95E+00	2.08E+00	2.08E+00
Urbanization															
Central City	378000	15	4.15E-01	4.65E-04	4.68E-02	4.68E-02	4.68E-02	7.69E-02	1.05E-01	3.95E-01	6.73E-01	7.24E-01	1.07E+00	1.07E+00	1.07E+00
Nonmetropolitan	466000	37	6.43E-01	7.98E-04	0.00E+00	0.00E+00	9.24E-02	1.02E-01	2.51E-01	4.39E-01	1.02E+00	1.31E+00	2.21E+00	2.21E+00	2.21E+00
Surburban	722000	45	4.48E-01	4.20E-04	9.18E-02	9.18E-02	1.25E-01	1.58E-01	2.58E-01	3.84E-01	5.35E-01	5.89E-01	9.02E-01	2.08E+00	2.08E+00
Race															
Black	76000	4	4.07E-01	6.68E-04	1.58E-01	1.58E-01	1.58E-01	1.58E-01	2.30E-01	4.40E-01	5.84E-01	5.89E-01	5.89E-01	5.89E-01	5.89E-01
White	1490000	93	5.03E-01	3.50E-04	0.00E+00	4.68E-02	9.18E-02	1.01E-01	2.51E-01	3.95E-01	6.04E-01	1.07E+00	1.31E+00	2.21E+00	2.21E+00
Region															
Midwest	736000	56	4.57E-01	5.46E-04	0.00E+00	0.00E+00	7.69E-02	9.18E-02	1.25E-01	3.00E-01	5.87E-01	1.12E+00	1.28E+00	2.21E+00	2.21E+00
Northeast	211000	11	6.50E-01	1.18E-03	2.34E-01	2.34E-01	2.52E-01	3.08E-01	3.53E-01	4.69E-01	5.43E-01	1.95E+00	2.08E+00	2.08E+00	2.08E+00
South	204000	12	5.47E-01	8.78E-04	9.24E-02	9.24E-02	9.24E-02	9.24E-02	2.25E-01	4.83E-01	6.32E-01	1.31E+00	1.31E+00	1.31E+00	1.31E+00
West	415000	18	4.71E-01	2.78E-04	1.34E-01	1.34E-01	1.84E-01	2.51E-01	3.31E-01	3.95E-01	6.73E-01	7.24E-01	7.68E-01	7.68E-01	7.68E-01
Response to Questionnaire															
Do you garden?	1333000	84	4.72E-01	3.83E-04	0.00E+00	0.00E+00	0.00E+00	9.18E-02	2.00E-01	3.53E-01	5.52E-01	1.07E+00	1.28E+00	2.21E+00	2.21E+00
Do you farm?	219000	16	5.76E-01	8.30E-04	0.00E+00	0.00E+00	7.95E-02	1.02E-01	2.91E-01	5.14E-01	7.24E-01	1.28E+00	1.28E+00	1.28E+00	1.28E+00

Table 2-217. Intake of Homegrown Asparagus (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	763000	66	5.59E-01	4.76E-04	1.00E-01	1.00E-01	1.41E-01	1.91E-01	2.75E-01	4.00E-01	7.07E-01	1.12E+00	1.63E+00	1.97E+00	1.97E+00
Age															
01-02	8000	1	5.52E-01	0.00E+00	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01	5.52E-01
03-05	25000	3	1.05E+00	4.33E-03	2.76E-01	2.76E-01	2.76E-01	2.76E-01	2.76E-01	9.31E-01	1.97E+00	1.97E+00	1.97E+00	1.97E+00	1.97E+00
06-11	31000	3	7.18E-01	2.05E-03	3.05E-01	3.05E-01	3.05E-01	3.05E-01	3.82E-01	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00	1.07E+00
12-19	70000	5	4.22E-01	6.66E-04	1.68E-01	1.68E-01	1.68E-01	2.21E-01	2.75E-01	3.34E-01	4.40E-01	7.01E-01	7.01E-01	7.01E-01	7.01E-01
20-39	144000	11	5.96E-01	8.16E-04	1.00E-01	1.00E-01	1.00E-01	1.57E-01	3.03E-01	5.77E-01	9.29E-01	9.69E-01	1.12E+00	1.12E+00	1.12E+00
40-69	430000	38	4.65E-01	5.06E-04	1.10E-01	1.10E-01	1.13E-01	1.81E-01	2.34E-01	4.00E-01	5.96E-01	8.84E-01	1.24E+00	1.75E+00	1.75E+00
70 +	55000	5	1.06E+00	2.99E-03	2.10E-01	2.10E-01	2.10E-01	2.10E-01	2.10E-01	1.12E+00	1.63E+00	1.92E+00	1.92E+00	1.92E+00	1.92E+00
Season															
Fall	62000	2	3.14E-01	3.45E-04	2.28E-01	2.28E-01	2.28E-01	2.28E-01	2.28E-01	3.14E-01	4.00E-01	4.00E-01	4.00E-01	4.00E-01	4.00E-01
Spring	608000	59	6.12E-01	5.67E-04	1.00E-01	1.00E-01	1.57E-01	1.91E-01	2.98E-01	4.46E-01	8.84E-01	1.18E+00	1.63E+00	1.97E+00	1.97E+00
Winter	93000	5	3.76E-01	7.12E-04	1.10E-01	1.10E-01	1.10E-01	1.10E-01	2.10E-01	4.00E-01	7.07E-01	7.07E-01	7.07E-01	7.07E-01	7.07E-01
Urbanization															
Central City	190000	9	5.83E-01	6.88E-04	2.28E-01	2.28E-01	2.28E-01	2.28E-01	4.00E-01	4.00E-01	9.29E-01	9.29E-01	1.07E+00	1.07E+00	1.07E+00
Nonmetropolitan	215000	27	7.59E-01	1.34E-03	1.00E-01	1.00E-01	1.13E-01	1.41E-01	2.30E-01	5.43E-01	1.24E+00	1.75E+00	1.92E+00	1.97E+00	1.97E+00
Surburban	358000	30	4.27E-01	3.70E-04	1.10E-01	1.10E-01	1.69E-01	1.81E-01	2.75E-01	3.65E-01	5.79E-01	7.01E-01	9.31E-01	1.12E+00	1.12E+00
Race															
White	763000	66	5.59E-01	4.76E-04	1.00E-01	1.00E-01	1.41E-01	1.91E-01	2.75E-01	4.00E-01	7.07E-01	1.12E+00	1.63E+00	1.97E+00	1.97E+00
Region															
Midwest	368000	33	4.78E-01	6.15E-04	1.00E-01	1.00E-01	1.10E-01	1.41E-01	2.28E-01	4.00E-01	6.14E-01	9.31E-01	1.12E+00	1.97E+00	1.97E+00
Northeast	270000	20	7.17E-01	8.60E-04	1.81E-01	1.81E-01	2.34E-01	2.34E-01	3.65E-01	5.96E-01	9.29E-01	1.24E+00	1.63E+00	1.92E+00	1.92E+00
South	95000	9	2.76E-01	1.49E-04	1.68E-01	1.68E-01	1.68E-01	1.91E-01	2.81E-01	3.02E-01	3.05E-01	3.15E-01	3.15E-01	3.15E-01	3.15E-01
West	30000	4	1.04E+00	1.86E-03	7.33E-01	7.33E-01	7.33E-01	7.33E-01	7.33E-01	7.94E-01	1.18E+00	1.54E+00	1.54E+00	1.54E+00	1.54E+00
Response to Questionnaire															
Do you garden?	669000	59	5.33E-01	5.17E-04	1.00E-01	1.00E-01	1.41E-01	1.81E-01	2.75E-01	4.00E-01	6.99E-01	1.12E+00	1.63E+00	1.97E+00	1.97E+00
Do you farm?	157000	16	3.18E-01	3.44E-04	1.00E-01	1.00E-01	1.00E-01	1.13E-01	2.30E-01	3.03E-01	4.22E-01	5.52E-01	5.79E-01	5.79E-01	5.79E-01

Table 2-218. Intake of Homegrown Beets (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2214000	125	5.12E-01	3.73E-04	3.21E-02	3.21E-02	7.37E-02	1.09E-01	1.88E-01	3.97E-01	5.87E-01	1.03E+00	1.36E+00	3.69E+00	4.08E+00
Age															
01-02	27000	2	3.81E+00	1.07E-03	3.69E+00	3.69E+00	3.69E+00	3.69E+00	3.69E+00	3.69E+00	4.08E+00	4.08E+00	4.08E+00	4.08E+00	4.08E+00
03-05	51000	4	1.84E+00	4.68E-03	4.47E-01	4.47E-01	4.47E-01	4.47E-01	4.47E-01	2.32E+00	2.84E+00	2.97E+00	2.97E+00	2.97E+00	2.97E+00
06-11	167000	10	3.67E-01	2.30E-04	1.92E-01	1.92E-01	2.39E-01	2.39E-01	2.65E-01	3.66E-01	4.31E-01	5.18E-01	5.18E-01	5.18E-01	5.18E-01
12-19	227000	13	3.81E-01	6.08E-04	8.06E-02	8.06E-02	8.06E-02	1.11E-01	1.80E-01	2.73E-01	5.77E-01	9.49E-01	9.49E-01	9.49E-01	9.49E-01
20-39	383000	22	3.81E-01	4.74E-04	7.57E-02	7.57E-02	7.57E-02	1.22E-01	1.43E-01	2.85E-01	5.56E-01	9.99E-01	9.99E-01	1.12E+00	1.12E+00
40-69	951000	51	4.28E-01	3.18E-04	5.00E-02	5.00E-02	7.31E-02	7.46E-02	2.05E-01	3.97E-01	5.49E-01	9.25E-01	1.15E+00	1.40E+00	1.40E+00
70 +	408000	23	5.80E-01	6.61E-04	3.21E-02	3.21E-02	3.21E-02	4.76E-02	2.71E-01	4.49E-01	9.09E-01	1.36E+00	1.36E+00	1.59E+00	1.59E+00
Season															
Fall	562000	21	5.45E-01	5.72E-04	3.21E-02	3.21E-02	4.76E-02	5.00E-02	2.57E-01	3.56E-01	9.49E-01	1.36E+00	1.36E+00	1.40E+00	1.40E+00
Spring	558000	55	4.70E-01	8.92E-04	7.46E-02	7.46E-02	8.06E-02	1.09E-01	1.43E-01	2.73E-01	4.47E-01	8.73E-01	1.59E+00	4.08E+00	4.08E+00
Summer	676000	22	3.85E-01	2.59E-04	7.57E-02	7.57E-02	1.20E-01	1.22E-01	1.84E-01	3.97E-01	5.49E-01	6.24E-01	9.09E-01	9.09E-01	9.09E-01
Winter	418000	27	7.30E-01	1.24E-03	7.31E-02	7.31E-02	7.31E-02	7.37E-02	2.80E-01	5.20E-01	8.28E-01	1.13E+00	2.32E+00	3.69E+00	3.69E+00
Urbanization															
Central City	651000	27	5.18E-01	7.38E-04	1.11E-01	1.11E-01	1.35E-01	1.83E-01	2.57E-01	4.01E-01	5.49E-01	9.09E-01	1.12E+00	3.69E+00	3.69E+00
Nonmetropolitan	758000	51	5.77E-01	7.43E-04	5.00E-02	5.00E-02	7.31E-02	7.37E-02	1.80E-01	3.86E-01	6.61E-01	1.36E+00	1.40E+00	4.08E+00	4.08E+00
Surburban	805000	47	4.45E-01	4.41E-04	3.21E-02	3.21E-02	4.76E-02	8.06E-02	1.43E-01	3.97E-01	5.56E-01	9.25E-01	9.99E-01	2.32E+00	2.32E+00
Race															
Native American	28000	1	7.37E-02	0.00E+00	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02	7.37E-02
White	2186000	124	5.18E-01	3.76E-04	3.21E-02	3.21E-02	7.46E-02	1.13E-01	2.05E-01	3.97E-01	5.87E-01	1.03E+00	1.36E+00	3.69E+00	4.08E+00
Region															
Midwest	885000	53	6.30E-01	6.14E-04	5.00E-02	5.00E-02	1.13E-01	1.83E-01	3.15E-01	4.54E-01	9.09E-01	1.15E+00	1.36E+00	3.69E+00	3.69E+00
Northeast	230000	13	4.81E-01	8.54E-04	8.27E-02	8.27E-02	1.20E-01	1.20E-01	1.38E-01	3.97E-01	5.87E-01	9.99E-01	1.32E+00	1.59E+00	1.59E+00
South	545000	31	4.51E-01	8.85E-04	7.46E-02	7.46E-02	7.57E-02	8.06E-02	1.80E-01	2.64E-01	4.84E-01	6.61E-01	9.44E-01	4.08E+00	4.08E+00
West	554000	28	3.96E-01	5.51E-04	3.21E-02	3.21E-02	4.76E-02	7.31E-02	1.21E-01	2.86E-01	5.49E-01	6.24E-01	7.04E-01	2.32E+00	2.32E+00
Response to Questionnaire															
Do you garden?	2107000	120	5.26E-01	3.89E-04	3.21E-02	3.21E-02	7.37E-02	9.56E-02	2.05E-01	4.01E-01	6.06E-01	1.03E+00	1.36E+00	3.69E+00	4.08E+00
Do you farm?	229000	11	3.96E-01	4.84E-04	1.84E-01	1.84E-01	1.84E-01	1.84E-01	2.85E-01	2.86E-01	4.98E-01	5.20E-01	1.03E+00	1.03E+00	1.03E+00

Table 2-219. Intake of Homegrown Broccoli (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1745000	80	4.20E-01	3.22E-04	4.50E-02	7.61E-02	8.24E-02	1.56E-01	1.96E-01	2.90E-01	4.59E-01	8.15E-01	9.74E-01	2.48E+00	3.02E+00
Age															
03-05	13000	1	4.24E-01	0.00E+00	4.24E-01	4.24E-01	4.24E-01	4.24E-01	4.24E-01	4.24E-01	4.24E-01	4.24E-01	4.24E-01	4.24E-01	4.24E-01
06-11	187000	9	4.27E-01	5.48E-04	1.78E-01	1.78E-01	1.78E-01	1.78E-01	2.75E-01	4.03E-01	6.61E-01	8.86E-01	8.86E-01	8.86E-01	8.86E-01
12-19	102000	4	6.25E-01	1.01E-03	1.75E-01	1.75E-01	1.75E-01	1.75E-01	1.75E-01	7.37E-01	9.74E-01	9.74E-01	9.74E-01	9.74E-01	9.74E-01
20-39	486000	19	3.18E-01	3.34E-04	7.61E-02	7.61E-02	7.99E-02	7.99E-02	1.72E-01	2.44E-01	3.79E-01	7.47E-01	9.19E-01	9.19E-01	9.19E-01
40-69	761000	37	4.12E-01	4.53E-04	8.24E-02	8.24E-02	1.06E-01	1.64E-01	2.22E-01	3.51E-01	4.61E-01	6.14E-01	8.15E-01	3.02E+00	3.02E+00
70 +	196000	10	5.94E-01	1.86E-03	4.50E-02	4.50E-02	1.86E-01	1.86E-01	2.03E-01	2.31E-01	2.90E-01	2.48E+00	2.48E+00	2.48E+00	2.48E+00
Season															
Fall	624000	20	2.87E-01	2.09E-04	7.99E-02	7.99E-02	7.99E-02	8.24E-02	1.75E-01	2.31E-01	3.79E-01	4.52E-01	5.29E-01	8.15E-01	8.15E-01
Spring	258000	27	5.43E-01	1.21E-03	4.50E-02	4.50E-02	1.54E-01	1.70E-01	2.65E-01	3.31E-01	5.89E-01	1.25E+00	2.37E+00	3.02E+00	3.02E+00
Summer	682000	22	5.08E-01	5.96E-04	7.61E-02	7.61E-02	1.29E-01	1.78E-01	2.15E-01	3.99E-01	6.61E-01	8.86E-01	9.74E-01	2.48E+00	2.48E+00
Winter	181000	11	3.75E-01	6.66E-04	1.06E-01	1.06E-01	1.06E-01	1.15E-01	2.23E-01	2.31E-01	4.40E-01	9.19E-01	9.19E-01	9.19E-01	9.19E-01
Urbanization															
Central City	165000	5	3.60E-01	7.21E-04	1.64E-01	1.64E-01	1.64E-01	1.64E-01	1.86E-01	2.03E-01	2.88E-01	9.19E-01	9.19E-01	9.19E-01	9.19E-01
Nonmetropolitan	647000	34	4.23E-01	3.05E-04	4.50E-02	4.50E-02	1.29E-01	1.70E-01	2.23E-01	3.69E-01	5.89E-01	7.47E-01	8.86E-01	9.74E-01	9.74E-01
Surburban	933000	41	4.29E-01	5.48E-04	7.99E-02	7.99E-02	8.24E-02	1.44E-01	2.13E-01	2.44E-01	4.41E-01	6.84E-01	2.37E+00	2.48E+00	3.02E+00
Race															
Other/NA	26000	1	3.09E-01	0.00E+00	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01
White	1719000	79	4.22E-01	3.26E-04	4.50E-02	7.61E-02	8.24E-02	1.56E-01	1.96E-01	2.88E-01	4.59E-01	8.15E-01	9.74E-01	2.48E+00	3.02E+00
Region															
Midwest	792000	38	2.63E-01	4.06E-04	7.61E-02	7.61E-02	7.99E-02	8.24E-02	1.75E-01	2.13E-01	2.75E-01	3.44E-01	4.03E-01	3.02E+00	3.02E+00
Northeast	427000	19	5.30E-01	8.75E-04	4.50E-02	4.50E-02	1.44E-01	1.70E-01	2.23E-01	3.99E-01	4.59E-01	8.15E-01	2.48E+00	2.48E+00	2.48E+00
South	373000	16	6.14E-01	4.00E-04	2.23E-01	2.23E-01	2.23E-01	3.62E-01	4.34E-01	6.14E-01	7.47E-01	9.74E-01	9.74E-01	1.25E+00	1.25E+00
West	153000	7	4.55E-01	6.78E-04	2.12E-01	2.12E-01	2.31E-01	2.31E-01	2.77E-01	3.09E-01	4.79E-01	9.19E-01	9.19E-01	9.19E-01	9.19E-01
Response to Questionnaire															
Do you garden?	1729000	78	4.22E-01	3.24E-04	4.50E-02	7.61E-02	8.24E-02	1.64E-01	1.96E-01	2.90E-01	4.59E-01	8.15E-01	9.74E-01	2.48E+00	3.02E+00
Do you farm?	599000	29	4.66E-01	5.83E-04	4.50E-02	4.50E-02	7.61E-02	1.54E-01	1.95E-01	3.10E-01	6.61E-01	8.86E-01	9.74E-01	3.02E+00	3.02E+00

Table 2-220. Intake of Homegrown Cabbage (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2019000	89	1.03E+00	6.65E-04	3.20E-02	1.07E-01	2.03E-01	3.17E-01	4.21E-01	7.76E-01	1.33E+00	1.97E+00	2.35E+00	5.43E+00	5.43E+00
Age															
< 01	29000	1	2.77E+00	0.00E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00	2.77E+00
01-02	14000	2	1.70E+00	2.35E-03	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.42E+00	1.70E+00	1.98E+00	1.98E+00	1.98E+00	1.98E+00	1.98E+00
03-05	29000	1	1.45E+00	0.00E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00
06-11	61000	3	4.54E-01	4.77E-04	3.51E-01	3.51E-01	3.51E-01	3.51E-01	3.51E-01	4.71E-01	4.71E-01	7.05E-01	7.05E-01	7.05E-01	7.05E-01
12-19	203000	9	8.45E-01	6.46E-04	4.12E-01	4.12E-01	4.12E-01	5.55E-01	6.70E-01	7.76E-01	1.05E+00	1.43E+00	1.43E+00	1.43E+00	1.43E+00
20-39	391000	16	9.20E-01	1.01E-03	1.07E-01	1.07E-01	2.01E-01	2.01E-01	4.49E-01	6.83E-01	1.24E+00	1.97E+00	2.35E+00	2.35E+00	2.35E+00
40-69	966000	44	1.14E+00	1.22E-03	3.20E-02	2.17E-01	2.22E-01	3.25E-01	4.08E-01	7.13E-01	1.41E+00	1.82E+00	5.29E+00	5.43E+00	5.43E+00
70 +	326000	13	8.48E-01	9.39E-04	1.86E-01	1.86E-01	1.86E-01	1.86E-01	4.54E-01	7.88E-01	1.37E+00	1.56E+00	1.97E+00	1.97E+00	1.97E+00
Season															
Fall	570000	21	1.28E+00	1.96E-03	1.86E-01	1.86E-01	1.86E-01	2.03E-01	3.85E-01	5.42E-01	1.49E+00	5.29E+00	5.43E+00	5.43E+00	5.43E+00
Spring	126000	15	1.02E+00	1.66E-03	2.46E-01	2.46E-01	2.46E-01	4.08E-01	5.25E-01	9.22E-01	1.46E+00	1.98E+00	2.17E+00	2.17E+00	2.17E+00
Summer	1142000	39	9.65E-01	5.47E-04	2.01E-01	2.01E-01	2.22E-01	3.25E-01	5.55E-01	8.28E-01	1.24E+00	1.79E+00	2.35E+00	2.77E+00	2.77E+00
Winter	181000	14	7.01E-01	1.33E-03	3.20E-02	3.20E-02	1.07E-01	1.07E-01	3.67E-01	5.53E-01	8.50E-01	1.97E+00	1.97E+00	1.97E+00	1.97E+00
Urbanization															
Central City	157000	5	5.61E-01	1.51E-03	1.86E-01	1.86E-01	1.86E-01	1.86E-01	2.03E-01	3.85E-01	5.09E-01	1.97E+00	1.97E+00	1.97E+00	1.97E+00
Nonmetropolitan	1079000	48	9.37E-01	5.89E-04	2.01E-01	2.01E-01	3.17E-01	3.40E-01	4.54E-01	7.13E-01	1.33E+00	1.79E+00	2.35E+00	2.77E+00	2.77E+00
Surburban	783000	36	1.26E+00	1.43E-03	3.20E-02	3.20E-02	2.22E-01	3.25E-01	4.49E-01	1.05E+00	1.37E+00	2.17E+00	5.29E+00	5.43E+00	5.43E+00
Race															
Black	7000	1	2.17E+00	0.00E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00	2.17E+00
Other/NA	145000	5	6.99E-01	5.66E-04	4.10E-01	4.10E-01	4.10E-01	4.10E-01	5.59E-01	7.00E-01	7.76E-01	1.05E+00	1.05E+00	1.05E+00	1.05E+00
White	1867000	83	1.05E+00	7.13E-04	3.20E-02	1.07E-01	2.03E-01	2.46E-01	4.13E-01	7.88E-01	1.37E+00	1.97E+00	2.35E+00	5.43E+00	5.43E+00
Region															
Midwest	884000	37	7.42E-01	4.76E-04	1.07E-01	1.07E-01	1.86E-01	2.22E-01	3.55E-01	5.95E-01	1.10E+00	1.29E+00	1.49E+00	1.82E+00	1.98E+00
Northeast	277000	11	1.91E+00	3.51E-03	2.46E-01	2.46E-01	4.10E-01	4.10E-01	7.00E-01	1.05E+00	2.17E+00	5.43E+00	5.43E+00	5.43E+00	5.43E+00
South	616000	32	1.11E+00	9.67E-04	3.20E-02	3.20E-02	2.01E-01	2.17E-01	4.49E-01	8.50E-01	1.79E+00	2.17E+00	2.35E+00	2.77E+00	2.77E+00
West	242000	9	9.04E-01	7.49E-04	4.13E-01	4.13E-01	4.13E-01	4.13E-01	5.55E-01	9.22E-01	1.15E+00	1.56E+00	1.56E+00	1.56E+00	1.56E+00
Response to Questionnaire															
Do you garden?	1921000	86	1.07E+00	6.90E-04	3.20E-02	1.07E-01	2.03E-01	3.17E-01	4.54E-01	7.88E-01	1.37E+00	1.97E+00	2.35E+00	5.43E+00	5.43E+00
Do you farm?	546000	26	9.96E-01	7.97E-04	2.01E-01	2.01E-01	2.06E-01	3.51E-01	5.87E-01	8.28E-01	1.37E+00	1.79E+00	2.35E+00	2.35E+00	2.35E+00

Table 2-221. Intake of Homegrown Carrots (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4322000	193	4.38E-01	2.87E-04	3.90E-02	4.12E-02	6.35E-02	9.23E-02	1.79E-01	3.28E-01	5.25E-01	7.95E-01	1.08E+00	2.21E+00	7.79E+00
Age															
< 01	65000	3	3.60E+00	1.03E-02	1.71E+00	1.71E+00	1.71E+00	1.71E+00	1.71E+00	1.71E+00	7.79E+00	7.79E+00	7.79E+00	7.79E+00	7.79E+00
01-02	51000	4	1.00E+00	4.37E-03	2.72E-01	2.72E-01	2.72E-01	2.72E-01	2.72E-01	2.72E-01	2.11E+00	2.94E+00	2.94E+00	2.94E+00	2.94E+00
03-05	53000	3	6.91E-01	8.12E-04	5.43E-01	5.43E-01	5.43E-01	5.43E-01	5.43E-01	7.07E-01	7.07E-01	1.05E+00	1.05E+00	1.05E+00	1.05E+00
06-11	299000	14	4.27E-01	6.20E-04	7.96E-02	7.96E-02	7.96E-02	1.79E-01	1.94E-01	2.85E-01	6.27E-01	7.95E-01	1.10E+00	1.59E+00	1.59E+00
12-19	389000	17	2.82E-01	3.50E-04	6.15E-02	6.15E-02	6.15E-02	6.35E-02	6.81E-02	2.00E-01	4.26E-01	5.65E-01	6.19E-01	1.01E+00	1.01E+00
20-39	1043000	46	2.83E-01	2.30E-04	4.47E-02	4.47E-02	5.02E-02	8.00E-02	1.20E-01	1.99E-01	4.09E-01	5.64E-01	7.56E-01	1.19E+00	1.19E+00
40-69	1848000	82	4.25E-01	2.28E-04	3.90E-02	3.90E-02	6.74E-02	1.23E-01	2.15E-01	3.67E-01	5.50E-01	7.76E-01	1.01E+00	1.53E+00	2.21E+00
70 +	574000	24	4.44E-01	3.55E-04	7.39E-02	7.39E-02	1.79E-01	1.96E-01	2.60E-01	3.70E-01	5.39E-01	9.64E-01	1.08E+00	1.08E+00	1.08E+00
Season															
Fall	1810000	66	4.61E-01	5.90E-04	9.09E-02	9.09E-02	1.10E-01	1.20E-01	1.99E-01	3.08E-01	5.09E-01	7.76E-01	1.08E+00	1.71E+00	7.79E+00
Spring	267000	28	5.55E-01	1.03E-03	1.39E-01	1.39E-01	1.49E-01	2.02E-01	2.16E-01	3.92E-01	6.09E-01	9.94E-01	2.11E+00	2.94E+00	2.94E+00
Summer	1544000	49	3.88E-01	2.22E-04	4.12E-02	4.12E-02	5.02E-02	6.74E-02	1.64E-01	3.76E-01	5.13E-01	8.40E-01	9.64E-01	1.19E+00	1.19E+00
Winter	701000	50	4.44E-01	6.29E-04	3.90E-02	3.90E-02	4.34E-02	6.35E-02	1.56E-01	2.25E-01	6.40E-01	1.05E+00	1.53E+00	3.06E+00	3.06E+00
Urbanization															
Central City	963000	29	2.82E-01	2.12E-04	3.90E-02	3.90E-02	6.35E-02	8.00E-02	1.63E-01	2.09E-01	3.85E-01	5.25E-01	5.88E-01	9.64E-01	9.64E-01
Nonmetropolitan	1675000	94	5.18E-01	6.73E-04	4.12E-02	4.12E-02	5.36E-02	6.81E-02	2.00E-01	3.28E-01	5.13E-01	9.55E-01	1.19E+00	7.79E+00	7.79E+00
Suburban	1684000	70	4.48E-01	2.59E-04	6.74E-02	6.74E-02	9.09E-02	1.16E-01	2.02E-01	3.77E-01	6.35E-01	7.95E-01	1.09E+00	1.71E+00	1.71E+00
Race															
Asian	74000	2	9.13E-01	2.92E-03	1.20E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01	9.13E-01	1.71E+00	1.71E+00	1.71E+00	1.71E+00	1.71E+00
Black	107000	7	1.56E+00	8.59E-03	9.11E-02	9.11E-02	9.11E-02	9.11E-02	1.62E-01	2.54E-01	4.09E-01	7.79E+00	7.79E+00	7.79E+00	7.79E+00
Other/NA	171000	6	1.13E-01	2.88E-04	4.12E-02	4.12E-02	4.12E-02	4.12E-02	5.36E-02	6.15E-02	9.23E-02	3.92E-01	3.92E-01	3.92E-01	3.92E-01
White	3970000	178	4.13E-01	1.73E-04	3.90E-02	4.34E-02	7.96E-02	1.11E-01	1.94E-01	3.33E-01	5.27E-01	7.76E-01	1.01E+00	1.59E+00	3.06E+00
Region															
Midwest	2001000	97	4.57E-01	2.78E-04	3.90E-02	3.90E-02	8.00E-02	1.37E-01	2.00E-01	3.73E-01	5.39E-01	9.55E-01	1.10E+00	2.11E+00	3.06E+00
Northeast	735000	29	4.05E-01	5.52E-04	4.12E-02	4.12E-02	5.36E-02	6.15E-02	9.34E-02	1.49E-01	6.35E-01	1.09E+00	1.71E+00	2.21E+00	2.21E+00
South	378000	20	6.27E-01	2.62E-03	4.47E-02	4.47E-02	4.47E-02	5.02E-02	1.49E-01	2.72E-01	4.09E-01	5.02E-01	9.94E-01	7.79E+00	7.79E+00
West	1208000	47	3.68E-01	2.02E-04	6.74E-02	6.74E-02	9.11E-02	1.43E-01	1.90E-01	3.33E-01	4.59E-01	7.56E-01	8.40E-01	9.64E-01	9.64E-01
Response to Questionnaire															
Do you garden?	4054000	182	4.04E-01	1.79E-04	3.90E-02	4.12E-02	6.81E-02	9.34E-02	1.79E-01	3.28E-01	5.09E-01	7.62E-01	1.08E+00	1.71E+00	3.06E+00
Do you farm?	833000	40	3.60E-01	4.12E-04	9.09E-02	9.09E-02	9.34E-02	1.10E-01	1.79E-01	2.28E-01	4.59E-01	6.19E-01	1.19E+00	2.11E+00	2.94E+00

Table 2-222. Intake of Homegrown Corn (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	6891000	421	8.92E-01	5.06E-04	3.91E-02	5.15E-02	1.22E-01	1.65E-01	2.44E-01	4.80E-01	9.07E-01	1.88E+00	3.37E+00	7.44E+00	9.23E+00
Age															
< 01	105000	6	3.82E+00	4.19E-03	1.82E+00	1.82E+00	1.82E+00	3.04E+00	3.04E+00	3.38E+00	3.94E+00	5.69E+00	6.68E+00	6.68E+00	6.68E+00
01-02	205000	13	2.33E+00	6.00E-03	2.49E-01	2.49E-01	2.49E-01	2.49E-01	6.53E-01	1.48E+00	2.28E+00	8.97E+00	8.97E+00	8.97E+00	8.97E+00
03-05	313000	24	1.25E+00	2.25E-03	3.25E-01	3.25E-01	3.25E-01	4.00E-01	5.98E-01	1.00E+00	1.21E+00	1.67E+00	5.35E+00	5.35E+00	5.35E+00
06-11	689000	43	9.32E-01	1.31E-03	1.10E-01	1.10E-01	1.19E-01	1.89E-01	2.52E-01	5.13E-01	1.08E+00	3.13E+00	3.37E+00	4.52E+00	4.52E+00
12-19	530000	32	5.92E-01	7.43E-04	9.87E-02	9.87E-02	1.05E-01	1.35E-01	2.12E-01	3.43E-01	7.11E-01	1.55E+00	1.88E+00	1.88E+00	1.88E+00
20-39	1913000	108	5.97E-01	4.51E-04	6.59E-02	6.59E-02	1.41E-01	1.52E-01	2.08E-01	3.71E-01	7.08E-01	1.53E+00	2.04E+00	3.70E+00	3.70E+00
40-69	2265000	142	8.64E-01	8.35E-04	1.08E-01	1.13E-01	1.52E-01	1.66E-01	2.55E-01	5.16E-01	8.83E-01	1.42E+00	3.22E+00	7.44E+00	7.44E+00
70 +	871000	53	9.43E-01	2.02E-03	3.91E-02	3.91E-02	5.15E-02	1.05E-01	1.88E-01	3.64E-01	7.57E-01	1.34E+00	6.49E+00	9.23E+00	9.23E+00
Season															
Fall	2458000	89	5.44E-01	5.04E-04	3.91E-02	3.91E-02	1.05E-01	1.42E-01	1.88E-01	3.17E-01	5.46E-01	1.27E+00	1.42E+00	5.35E+00	5.69E+00
Spring	1380000	160	6.35E-01	6.00E-04	9.87E-02	1.42E-01	1.68E-01	1.93E-01	2.64E-01	4.48E-01	7.68E-01	1.21E+00	1.57E+00	5.15E+00	6.68E+00
Summer	1777000	62	1.82E+00	1.55E-03	6.59E-02	6.59E-02	1.78E-01	3.43E-01	6.44E-01	9.36E-01	2.13E+00	4.52E+00	6.84E+00	9.23E+00	9.23E+00
Winter	1276000	110	5.45E-01	4.34E-04	1.08E-01	1.14E-01	1.20E-01	1.49E-01	2.22E-01	4.05E-01	6.14E-01	1.16E+00	1.47E+00	2.04E+00	3.94E+00
Urbanization															
Central City	748000	27	7.37E-01	8.47E-04	3.91E-02	3.91E-02	3.91E-02	5.15E-02	1.77E-01	5.46E-01	9.29E-01	2.04E+00	2.23E+00	3.04E+00	3.04E+00
Nonmetropolitan	4122000	268	9.63E-01	6.60E-04	6.59E-02	7.40E-02	1.22E-01	1.66E-01	2.49E-01	5.31E-01	1.00E+00	2.13E+00	3.38E+00	7.44E+00	8.97E+00
Surburban	2021000	126	8.04E-01	1.03E-03	9.87E-02	1.05E-01	1.53E-01	1.66E-01	2.39E-01	3.96E-01	6.47E-01	1.34E+00	1.71E+00	9.23E+00	9.23E+00
Race															
Black	188000	9	1.07E+00	3.56E-03	2.99E-01	2.99E-01	2.99E-01	3.37E-01	3.37E-01	3.56E-01	9.35E-01	1.40E+00	5.69E+00	5.69E+00	5.69E+00
White	6703000	412	8.87E-01	5.11E-04	3.91E-02	5.15E-02	1.22E-01	1.63E-01	2.37E-01	4.80E-01	8.84E-01	1.88E+00	3.22E+00	7.44E+00	9.23E+00
Region															
Midwest	2557000	188	9.34E-01	8.35E-04	3.91E-02	3.91E-02	1.19E-01	1.68E-01	2.47E-01	4.56E-01	9.29E-01	2.28E+00	3.22E+00	6.84E+00	7.44E+00
Northeast	586000	33	6.14E-01	6.32E-04	9.87E-02	9.87E-02	1.66E-01	1.86E-01	2.44E-01	3.81E-01	8.83E-01	1.34E+00	1.71E+00	1.71E+00	1.71E+00
South	2745000	153	8.73E-01	7.10E-04	6.59E-02	7.40E-02	1.22E-01	1.66E-01	2.83E-01	5.61E-01	9.35E-01	1.55E+00	3.37E+00	5.69E+00	8.97E+00
West	1003000	47	9.99E-01	1.89E-03	1.05E-01	1.05E-01	1.47E-01	1.52E-01	1.77E-01	3.96E-01	7.45E-01	2.23E+00	6.49E+00	9.23E+00	9.23E+00
Response to Questionnaire															
Do you garden?	6233000	387	8.75E-01	4.97E-04	3.91E-02	5.15E-02	1.35E-01	1.65E-01	2.44E-01	5.02E-01	9.14E-01	1.82E+00	3.13E+00	6.84E+00	9.23E+00
Do you farm?	1739000	114	1.20E+00	1.43E-03	3.91E-02	3.91E-02	1.08E-01	1.66E-01	2.29E-01	3.81E-01	9.74E-01	3.37E+00	6.49E+00	9.23E+00	9.23E+00

Table 2-223 Intake of Homegrown Cucumbers (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3994000	141	1.02E+00	9.21E-04	0.00E+00	3.08E-02	6.71E-02	1.08E-01	2.40E-01	5.40E-01	1.13E+00	2.11E+00	2.79E+00	1.34E+01	1.37E+01
Age															
01-02	132000	5	2.19E+00	3.63E-03	6.51E-01	6.51E-01	6.51E-01	6.51E-01	1.21E+00	2.13E+00	2.29E+00	4.50E+00	4.50E+00	4.50E+00	4.50E+00
03-05	107000	4	8.91E-01	7.60E-04	5.64E-01	5.64E-01	5.64E-01	5.64E-01	8.33E-01	8.33E-01	1.28E+00	1.28E+00	1.28E+00	1.28E+00	1.28E+00
06-11	356000	12	3.45E-01	4.55E-04	8.40E-02	8.40E-02	8.40E-02	8.40E-02	1.35E-01	2.34E-01	4.94E-01	6.47E-01	1.08E+00	1.08E+00	1.08E+00
12-19	254000	10	1.35E+00	2.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-01	5.01E-01	2.79E+00	4.18E+00	4.18E+00	4.18E+00	4.18E+00
20-39	864000	29	5.04E-01	5.37E-04	3.08E-02	3.08E-02	5.45E-02	6.31E-02	1.83E-01	3.09E-01	6.17E-01	1.35E+00	1.49E+00	2.12E+00	2.12E+00
40-69	1882000	68	1.33E+00	1.81E-03	4.16E-02	4.16E-02	7.46E-02	1.76E-01	3.93E-01	6.84E-01	1.29E+00	2.11E+00	3.27E+00	1.37E+01	1.37E+01
70 +	399000	13	7.30E-01	8.28E-04	1.78E-01	1.78E-01	1.78E-01	1.80E-01	3.47E-01	5.40E-01	1.27E+00	1.73E+00	1.73E+00	1.73E+00	1.73E+00
Season															
Fall	370000	12	5.82E-01	8.43E-04	4.16E-02	4.16E-02	4.16E-02	4.80E-02	1.35E-01	4.32E-01	1.09E+00	1.43E+00	1.48E+00	1.48E+00	1.48E+00
Spring	197000	15	1.21E+00	2.30E-03	1.90E-01	1.90E-01	2.32E-01	2.40E-01	3.93E-01	6.84E-01	2.11E+00	3.27E+00	3.27E+00	3.27E+00	3.27E+00
Summer	3427000	114	1.06E+00	1.06E-03	0.00E+00	0.00E+00	7.46E-02	1.08E-01	2.42E-01	5.18E-01	1.13E+00	2.12E+00	2.79E+00	1.34E+01	1.37E+01
Urbanization															
Central City	640000	18	2.95E-01	2.96E-04	3.08E-02	3.08E-02	3.08E-02	4.16E-02	8.40E-02	1.80E-01	5.40E-01	6.07E-01	7.01E-01	7.01E-01	7.01E-01
Nonmetropolitan	1530000	64	1.74E+00	2.22E-03	1.01E-01	1.01E-01	1.21E-01	1.90E-01	3.86E-01	1.06E+00	1.67E+00	3.09E+00	4.50E+00	1.37E+01	1.37E+01
Surburban	1824000	59	6.71E-01	4.28E-04	0.00E+00	0.00E+00	7.46E-02	1.62E-01	2.78E-01	4.99E-01	8.33E-01	1.34E+00	1.73E+00	3.27E+00	3.27E+00
Race															
Asian	13000	1	8.37E-01	0.00E+00	8.37E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01
Black	86000	2	1.53E+00	6.82E-04	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.53E+00	1.73E+00	1.73E+00	1.73E+00	1.73E+00	1.73E+00
Other/NA	171000	6	2.64E+00	2.08E-03	1.53E+00	1.53E+00	1.53E+00	1.53E+00	2.11E+00	2.79E+00	3.09E+00	4.18E+00	4.18E+00	4.18E+00	4.18E+00
White	3724000	132	9.35E-01	9.64E-04	0.00E+00	3.08E-02	6.31E-02	1.01E-01	2.22E-01	5.01E-01	1.03E+00	1.49E+00	2.40E+00	1.34E+01	1.37E+01
Region															
Midwest	969000	31	1.00E+00	2.22E-03	3.08E-02	3.08E-02	4.16E-02	5.45E-02	1.35E-01	4.53E-01	1.03E+00	2.35E+00	2.45E+00	1.34E+01	1.34E+01
Northeast	689000	22	1.92E+00	3.83E-03	2.33E-01	2.33E-01	2.78E-01	2.78E-01	4.75E-01	6.84E-01	1.53E+00	4.18E+00	1.17E+01	1.37E+01	1.37E+01
South	1317000	54	8.85E-01	6.75E-04	0.00E+00	0.00E+00	1.21E-01	1.83E-01	2.87E-01	7.53E-01	1.28E+00	1.73E+00	2.13E+00	4.50E+00	4.50E+00
West	1019000	34	6.01E-01	6.13E-04	6.71E-02	6.71E-02	7.46E-02	1.01E-01	2.09E-01	4.30E-01	7.01E-01	1.29E+00	2.11E+00	3.27E+00	3.27E+00
Response to Questionnaire															
Do you garden?	3465000	123	1.05E+00	1.04E-03	3.08E-02	3.08E-02	6.71E-02	1.01E-01	2.78E-01	5.18E-01	1.13E+00	2.11E+00	2.79E+00	1.34E+01	1.37E+01
Do you farm?	710000	29	6.99E-01	6.86E-04	0.00E+00	0.00E+00	0.00E+00	1.43E-01	1.88E-01	3.86E-01	1.27E+00	1.49E+00	1.71E+00	2.09E+00	2.09E+00

Table 2-224. Intake of Homegrown Lettuce (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1520000	80	3.87E-01	2.31E-04	0.00E+00	0.00E+00	4.49E-02	9.43E-02	1.70E-01	2.84E-01	5.45E-01	8.36E-01	1.03E+00	1.05E+00	1.28E+00
Age															
< 01	16000	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	54000	4	5.83E-01	5.96E-04	3.37E-01	3.37E-01	3.37E-01	3.37E-01	4.69E-01	5.98E-01	5.98E-01	8.36E-01	8.36E-01	8.36E-01	8.36E-01
03-05	25000	2	6.06E-01	1.84E-03	3.87E-01	3.87E-01	3.87E-01	3.87E-01	3.87E-01	3.87E-01	9.94E-01	9.94E-01	9.94E-01	9.94E-01	9.94E-01
06-11	173000	7	2.85E-01	4.44E-04	4.49E-02	4.49E-02	4.49E-02	4.49E-02	4.93E-02	3.27E-01	4.06E-01	5.45E-01	5.45E-01	5.45E-01	5.45E-01
12-19	71000	3	2.64E-01	1.13E-03	9.43E-02	9.43E-02	9.43E-02	9.43E-02	9.43E-02	9.68E-02	9.68E-02	7.98E-01	7.98E-01	7.98E-01	7.98E-01
20-39	379000	17	2.51E-01	2.23E-04	1.98E-02	1.98E-02	1.98E-02	3.35E-02	2.01E-01	2.29E-01	2.75E-01	4.80E-01	5.38E-01	5.38E-01	5.38E-01
40-69	485000	26	4.84E-01	4.45E-04	1.15E-01	1.15E-01	1.15E-01	1.24E-01	2.21E-01	4.91E-01	6.84E-01	8.86E-01	1.05E+00	1.28E+00	1.28E+00
70 +	317000	20	4.52E-01	5.69E-04	5.04E-02	5.04E-02	6.71E-02	1.12E-01	2.23E-01	2.88E-01	5.68E-01	1.03E+00	1.03E+00	1.03E+00	1.03E+00
Season															
Fall	214000	8	6.87E-01	6.94E-04	1.56E-01	1.56E-01	1.56E-01	1.56E-01	4.60E-01	6.84E-01	1.03E+00	1.05E+00	1.05E+00	1.05E+00	1.05E+00
Spring	352000	35	4.52E-01	4.84E-04	5.04E-02	5.04E-02	6.71E-02	1.24E-01	1.99E-01	4.53E-01	5.79E-01	7.98E-01	9.94E-01	1.28E+00	1.28E+00
Summer	856000	30	3.02E-01	2.35E-04	1.98E-02	1.98E-02	3.35E-02	4.93E-02	1.42E-01	2.30E-01	4.24E-01	5.98E-01	8.14E-01	8.86E-01	8.86E-01
Winter	98000	7	2.36E-01	5.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-01	2.20E-01	3.87E-01	4.83E-01	4.83E-01	4.83E-01	4.83E-01
Urbanization															
Central City	268000	8	5.26E-01	5.80E-04	2.01E-01	2.01E-01	2.01E-01	2.01E-01	2.84E-01	5.68E-01	9.42E-01	1.03E+00	1.03E+00	1.03E+00	1.03E+00
Nonmetropolitan	566000	36	3.67E-01	3.81E-04	1.98E-02	1.98E-02	3.35E-02	4.49E-02	1.23E-01	2.88E-01	5.45E-01	8.14E-01	8.86E-01	1.28E+00	1.28E+00
Surburban	686000	36	3.49E-01	3.13E-04	0.00E+00	0.00E+00	9.43E-02	9.68E-02	1.53E-01	2.30E-01	4.91E-01	7.67E-01	9.94E-01	1.05E+00	1.05E+00
Race															
Asian	9000	1	1.74E-01	0.00E+00	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01
Black	51000	3	5.90E-01	6.54E-04	4.80E-01	4.80E-01	4.80E-01	4.80E-01	4.80E-01	4.91E-01	7.98E-01	7.98E-01	7.98E-01	7.98E-01	7.98E-01
Other/NA	26000	1	4.94E-01	0.00E+00	4.94E-01	4.94E-01	4.94E-01	4.94E-01	4.94E-01	4.94E-01	4.94E-01	4.94E-01	4.94E-01	4.94E-01	4.94E-01
White	1434000	75	3.79E-01	2.41E-04	0.00E+00	0.00E+00	4.49E-02	9.43E-02	1.56E-01	2.75E-01	5.45E-01	8.86E-01	1.03E+00	1.05E+00	1.28E+00
Region															
Midwest	630000	33	3.83E-01	4.01E-04	1.98E-02	1.98E-02	3.35E-02	4.49E-02	1.56E-01	2.34E-01	5.68E-01	9.42E-01	1.03E+00	1.03E+00	1.03E+00
Northeast	336000	16	3.85E-01	4.94E-04	9.43E-02	9.43E-02	9.43E-02	9.68E-02	1.42E-01	3.15E-01	6.25E-01	6.84E-01	1.05E+00	1.05E+00	1.05E+00
South	305000	20	3.52E-01	4.65E-04	0.00E+00	0.00E+00	0.00E+00	1.27E-01	1.64E-01	2.75E-01	4.83E-01	5.79E-01	1.04E+00	1.28E+00	1.28E+00
West	249000	11	4.42E-01	4.13E-04	1.74E-01	1.74E-01	2.01E-01	2.01E-01	2.29E-01	4.80E-01	5.98E-01	7.67E-01	7.98E-01	7.98E-01	7.98E-01
Responses to Questionnaire															
Do you garden?	1506000	78	3.90E-01	2.32E-04	0.00E+00	0.00E+00	4.49E-02	9.43E-02	1.74E-01	2.84E-01	5.45E-01	8.36E-01	1.03E+00	1.05E+00	1.28E+00
Do you farm?	304000	18	3.88E-01	6.05E-04	1.98E-02	1.98E-02	1.98E-02	3.35E-02	4.93E-02	2.75E-01	5.45E-01	8.86E-01	1.04E+00	1.28E+00	1.28E+00

Table 2-225. Intake of Homegrown Lima Beans (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1917000	109	4.53E-01	3.10E-04	0.00E+00	0.00E+00	9.19E-02	1.21E-01	1.88E-01	2.90E-01	5.45E-01	9.90E-01	1.69E+00	1.86E+00	1.91E+00
Age															
< 01	35000	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	62000	3	1.09E+00	1.46E-03	7.69E-01	7.69E-01	7.69E-01	7.69E-01	7.69E-01	8.61E-01	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00
03-05	35000	2	1.15E+00	1.58E-03	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	1.69E+00	1.69E+00	1.69E+00	1.69E+00
06-11	95000	7	2.87E-01	2.72E-04	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.07E-01	2.39E-01	3.96E-01	4.09E-01	4.32E-01	4.32E-01	4.32E-01
12-19	108000	6	2.19E-01	4.92E-04	9.02E-02	9.02E-02	9.02E-02	9.02E-02	9.43E-02	1.56E-01	3.10E-01	5.24E-01	5.24E-01	5.24E-01	5.24E-01
20-39	464000	20	3.84E-01	4.51E-04	3.23E-02	3.23E-02	1.08E-01	1.30E-01	1.77E-01	2.34E-01	4.87E-01	9.37E-01	1.10E+00	1.10E+00	1.10E+00
40-69	757000	44	4.54E-01	4.80E-04	9.19E-02	9.19E-02	1.06E-01	1.21E-01	2.04E-01	2.93E-01	5.60E-01	8.69E-01	1.71E+00	1.91E+00	1.91E+00
70 +	361000	25	5.23E-01	8.77E-04	8.20E-02	8.20E-02	1.86E-01	1.88E-01	2.25E-01	2.86E-01	6.38E-01	1.86E+00	1.86E+00	1.86E+00	1.86E+00
Season															
Fall	375000	14	3.07E-01	4.39E-04	9.19E-02	9.19E-02	9.19E-02	1.06E-01	1.86E-01	2.12E-01	3.57E-01	4.16E-01	1.10E+00	1.10E+00	1.10E+00
Spring	316000	39	4.19E-01	6.11E-04	8.20E-02	8.20E-02	9.02E-02	1.31E-01	2.32E-01	3.06E-01	5.45E-01	7.48E-01	1.31E+00	1.91E+00	1.91E+00
Summer	883000	29	4.99E-01	5.55E-04	0.00E+00	0.00E+00	9.43E-02	1.21E-01	1.72E-01	2.90E-01	4.87E-01	1.53E+00	1.71E+00	1.86E+00	1.86E+00
Winter	343000	27	5.27E-01	5.54E-04	0.00E+00	0.00E+00	3.23E-02	1.08E-01	3.05E-01	5.39E-01	7.58E-01	8.61E-01	8.69E-01	1.69E+00	1.69E+00
Urbanization															
Central City	204000	8	3.29E-01	2.02E-04	2.45E-01	2.45E-01	2.45E-01	2.45E-01	2.85E-01	2.99E-01	3.57E-01	3.57E-01	5.60E-01	6.09E-01	6.09E-01
Nonmetropolitan	1075000	69	2.99E-01	2.58E-04	0.00E+00	3.23E-02	9.43E-02	1.21E-01	1.71E-01	2.12E-01	3.20E-01	4.87E-01	7.69E-01	1.69E+00	1.91E+00
Surburban	638000	32	7.53E-01	6.80E-04	0.00E+00	0.00E+00	8.20E-02	9.19E-02	3.20E-01	6.78E-01	9.90E-01	1.71E+00	1.86E+00	1.86E+00	1.86E+00
Race															
Black	213000	9	1.02E+00	1.44E-03	2.98E-01	2.98E-01	2.98E-01	2.98E-01	2.99E-01	8.55E-01	1.71E+00	1.86E+00	1.86E+00	1.86E+00	1.86E+00
White	1704000	100	3.83E-01	2.50E-04	0.00E+00	0.00E+00	9.19E-02	1.08E-01	1.77E-01	2.54E-01	4.87E-01	8.61E-01	9.90E-01	1.53E+00	1.91E+00
Region															
Midwest	588000	36	4.28E-01	4.83E-04	0.00E+00	0.00E+00	0.00E+00	1.06E-01	2.53E-01	3.06E-01	4.15E-01	9.90E-01	1.53E+00	1.69E+00	1.69E+00
Northeast	68000	6	3.33E-01	9.00E-04	8.20E-02	8.20E-02	8.20E-02	8.20E-02	9.02E-02	2.73E-01	5.26E-01	7.09E-01	7.09E-01	7.09E-01	7.09E-01
South	1261000	67	4.72E-01	4.09E-04	3.23E-02	3.23E-02	1.03E-01	1.30E-01	1.77E-01	2.49E-01	6.34E-01	1.10E+00	1.71E+00	1.86E+00	1.91E+00
Response to Questionnaire															
Do you garden?	1610000	97	4.47E-01	3.49E-04	0.00E+00	3.23E-02	9.43E-02	1.21E-01	1.77E-01	2.85E-01	5.26E-01	9.37E-01	1.71E+00	1.86E+00	1.91E+00
Do you farm?	62000	6	3.07E-01	1.20E-03	3.23E-02	3.23E-02	3.23E-02	3.23E-02	3.23E-02	1.08E-01	7.48E-01	8.19E-01	8.19E-01	8.19E-01	8.19E-01

Table 2-226. Intake of Homegrown Okra (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1696000	82	3.91E-01	2.65E-04	0.00E+00	0.00E+00	5.03E-02	9.59E-02	1.48E-01	2.99E-01	4.58E-01	7.81E-01	1.21E+00	1.53E+00	1.53E+00
Age															
< 01	29000	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	53000	2	6.16E-01	2.27E-03	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.15E+00	1.15E+00	1.15E+00	1.15E+00	1.15E+00
03-05	68000	3	2.38E-01	7.65E-04	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.15E-01	1.76E-01	1.76E-01	6.64E-01	6.64E-01	6.64E-01	6.64E-01
06-11	218000	11	7.23E-01	1.14E-03	5.03E-02	5.03E-02	5.03E-02	5.03E-02	3.68E-01	5.53E-01	1.53E+00	1.53E+00	1.53E+00	1.53E+00	1.53E+00
12-19	194000	9	4.93E-01	7.77E-04	9.60E-02	9.60E-02	9.60E-02	1.15E-01	2.57E-01	3.75E-01	6.00E-01	1.21E+00	1.21E+00	1.21E+00	1.21E+00
20-39	417000	18	2.10E-01	2.02E-04	2.69E-02	2.69E-02	2.69E-02	8.48E-02	1.16E-01	1.48E-01	2.82E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01
40-69	587000	32	4.00E-01	3.49E-04	6.57E-02	6.57E-02	1.11E-01	1.37E-01	2.47E-01	3.07E-01	4.62E-01	7.81E-01	1.14E+00	1.14E+00	1.14E+00
70 +	130000	6	3.00E-01	2.58E-04	1.74E-01	1.74E-01	1.74E-01	1.74E-01	2.27E-01	3.13E-01	3.47E-01	4.58E-01	4.58E-01	4.58E-01	4.58E-01
Season															
Fall	228000	9	4.50E-01	6.45E-04	1.83E-01	1.83E-01	1.83E-01	1.83E-01	2.47E-01	3.13E-01	5.23E-01	1.14E+00	1.14E+00	1.14E+00	1.14E+00
Spring	236000	24	3.87E-01	6.27E-04	2.98E-02	2.98E-02	4.58E-02	6.57E-02	1.10E-01	4.10E-01	5.95E-01	7.81E-01	9.99E-01	1.07E+00	1.07E+00
Summer	1144000	41	3.86E-01	3.44E-04	0.00E+00	0.00E+00	5.03E-02	9.59E-02	1.44E-01	2.99E-01	4.38E-01	1.15E+00	1.53E+00	1.53E+00	1.53E+00
Winter	88000	8	3.18E-01	4.85E-04	1.67E-01	1.67E-01	1.67E-01	2.27E-01	2.53E-01	2.82E-01	3.30E-01	6.64E-01	6.64E-01	6.64E-01	6.64E-01
Urbanization															
Central City	204000	6	2.52E-01	2.10E-04	1.37E-01	1.37E-01	1.37E-01	1.37E-01	1.44E-01	2.98E-01	3.07E-01	3.75E-01	3.75E-01	3.75E-01	3.75E-01
Nonmetropolitan	1043000	55	3.65E-01	3.62E-04	0.00E+00	0.00E+00	2.69E-02	8.48E-02	1.48E-01	2.57E-01	4.38E-01	7.81E-01	1.53E+00	1.53E+00	1.53E+00
Surburban	449000	21	5.14E-01	4.76E-04	6.57E-02	6.57E-02	9.60E-02	1.11E-01	3.13E-01	4.62E-01	6.00E-01	1.14E+00	1.15E+00	1.15E+00	1.15E+00
Race															
Asian	41000	1	1.44E-01	0.00E+00	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01	1.44E-01
Black	236000	13	2.22E-01	2.56E-04	2.98E-02	2.98E-02	4.58E-02	5.03E-02	1.16E-01	2.98E-01	3.02E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01
White	1419000	68	4.26E-01	3.05E-04	0.00E+00	0.00E+00	6.57E-02	9.60E-02	1.76E-01	3.30E-01	5.23E-01	1.14E+00	1.21E+00	1.53E+00	1.53E+00
Region															
Midwest	113000	7	3.53E-01	2.71E-04	2.98E-01	2.98E-01	2.98E-01	2.98E-01	2.99E-01	3.07E-01	4.05E-01	5.40E-01	5.70E-01	5.70E-01	5.70E-01
South	1443000	70	3.73E-01	2.93E-04	0.00E+00	0.00E+00	5.03E-02	8.48E-02	1.44E-01	2.59E-01	4.38E-01	7.47E-01	1.21E+00	1.53E+00	1.53E+00
West	140000	5	6.02E-01	8.79E-04	1.91E-01	1.91E-01	1.91E-01	1.91E-01	4.00E-01	5.23E-01	5.62E-01	1.14E+00	1.14E+00	1.14E+00	1.14E+00
Response to Questionnaire															
Do you garden?	1564000	77	3.84E-01	2.84E-04	0.00E+00	0.00E+00	5.03E-02	9.59E-02	1.48E-01	2.98E-01	4.52E-01	1.07E+00	1.21E+00	1.53E+00	1.53E+00
Do you farm?	233000	14	5.84E-01	6.02E-04	2.26E-01	2.26E-01	2.26E-01	3.13E-01	3.46E-01	5.76E-01	7.04E-01	1.15E+00	1.15E+00	1.15E+00	1.15E+00

Table 2-227. Intake of Homegrown Onions (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	6718000	370	2.96E-01	1.39E-04	2.01E-03	3.68E-03	9.09E-03	2.90E-02	8.81E-02	2.06E-01	3.77E-01	6.09E-01	9.12E-01	1.49E+00	3.11E+00
Age															
< 01	61000	3	7.93E-02	1.66E-04	3.70E-02	3.70E-02	3.70E-02	3.70E-02	3.70E-02	1.03E-01	1.24E-01	1.24E-01	1.24E-01	1.24E-01	1.24E-01
01-02	291000	17	4.21E-01	5.57E-04	1.06E-01	1.06E-01	1.06E-01	1.81E-01	2.76E-01	3.53E-01	5.09E-01	8.18E-01	8.18E-01	1.77E+00	1.77E+00
03-05	178000	9	3.48E-01	6.33E-04	9.75E-02	9.75E-02	9.75E-02	9.75E-02	1.68E-01	2.46E-01	4.36E-01	6.03E-01	1.01E+00	1.05E+00	1.05E+00
06-11	530000	31	3.03E-01	4.29E-04	9.80E-03	9.80E-03	1.08E-02	2.76E-02	1.06E-01	2.28E-01	3.83E-01	6.09E-01	1.36E+00	1.36E+00	1.36E+00
12-19	652000	37	2.11E-01	2.75E-04	5.14E-03	5.14E-03	8.36E-03	8.58E-03	5.97E-02	1.42E-01	2.55E-01	5.74E-01	7.59E-01	9.12E-01	9.12E-01
20-39	1566000	78	2.88E-01	2.40E-04	9.05E-03	9.09E-03	3.80E-02	5.80E-02	9.40E-02	1.91E-01	3.04E-01	6.38E-01	9.35E-01	1.49E+00	1.49E+00
40-69	2402000	143	2.50E-01	1.60E-04	2.01E-03	3.03E-03	4.59E-03	1.11E-02	7.66E-02	1.72E-01	3.58E-01	5.52E-01	6.90E-01	1.11E+00	1.41E+00
70 +	1038000	52	4.33E-01	6.27E-04	4.76E-03	4.76E-03	6.68E-03	2.68E-02	1.35E-01	2.86E-01	4.61E-01	5.63E-01	2.68E+00	3.11E+00	3.11E+00
Season															
Fall	1557000	59	3.75E-01	4.26E-04	3.68E-03	3.68E-03	2.55E-02	5.80E-02	1.23E-01	2.55E-01	4.36E-01	6.03E-01	7.83E-01	3.11E+00	3.11E+00
Spring	1434000	147	1.95E-01	1.99E-04	2.01E-03	2.01E-03	5.47E-03	2.68E-02	5.73E-02	1.06E-01	2.59E-01	4.26E-01	5.23E-01	1.41E+00	1.77E+00
Summer	2891000	101	3.06E-01	1.72E-04	8.36E-03	8.58E-03	1.68E-02	4.22E-02	1.08E-01	2.28E-01	3.76E-01	6.90E-01	9.69E-01	1.49E+00	1.49E+00
Winter	836000	63	2.88E-01	3.35E-04	3.03E-03	3.03E-03	4.59E-03	5.04E-03	3.06E-02	1.99E-01	4.60E-01	6.42E-01	9.16E-01	1.36E+00	1.36E+00
Urbanization															
Central City	890000	37	2.16E-01	1.84E-04	4.76E-03	4.76E-03	1.02E-02	2.55E-02	6.60E-02	1.93E-01	2.96E-01	5.18E-01	5.63E-01	5.63E-01	5.63E-01
Nonmetropolitan	2944000	177	3.24E-01	1.60E-04	2.24E-03	8.12E-03	3.14E-02	6.75E-02	1.42E-01	2.55E-01	4.33E-01	6.30E-01	9.12E-01	1.49E+00	1.77E+00
Surburban	2884000	156	2.92E-01	2.72E-04	2.01E-03	3.03E-03	5.20E-03	1.10E-02	5.85E-02	1.30E-01	3.56E-01	6.35E-01	9.69E-01	3.11E+00	3.11E+00
Race															
Black	253000	16	1.34E-01	3.12E-04	4.59E-03	4.59E-03	5.04E-03	9.43E-03	2.76E-02	7.09E-02	1.49E-01	2.67E-01	6.21E-01	6.21E-01	6.21E-01
Native American	28000	1	1.02E-01	0.00E+00	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01	1.02E-01
Other/NA	171000	8	1.31E-01	1.44E-04	5.14E-03	5.14E-03	7.06E-02	7.06E-02	9.86E-02	1.28E-01	1.59E-01	1.92E-01	2.88E-01	2.88E-01	2.88E-01
White	6266000	345	3.08E-01	1.47E-04	2.01E-03	3.57E-03	9.09E-03	3.06E-02	9.16E-02	2.24E-01	3.86E-01	6.18E-01	9.35E-01	1.77E+00	3.11E+00
Region															
Midwest	2487000	143	2.70E-01	1.47E-04	3.68E-03	4.25E-03	4.02E-02	5.73E-02	1.02E-01	2.24E-01	3.43E-01	5.63E-01	7.24E-01	1.34E+00	1.34E+00
Northeast	876000	52	2.32E-01	3.41E-04	2.01E-03	2.01E-03	3.73E-03	8.36E-03	1.08E-02	1.08E-01	3.53E-01	6.35E-01	1.05E+00	1.36E+00	1.41E+00
South	1919000	107	3.32E-01	2.19E-04	3.03E-03	4.79E-03	2.76E-02	3.70E-02	1.46E-01	2.51E-01	3.93E-01	6.90E-01	1.08E+00	1.49E+00	1.77E+00
West	1436000	68	3.32E-01	4.74E-04	2.24E-03	3.57E-03	6.68E-03	1.68E-02	5.68E-02	1.52E-01	3.86E-01	5.49E-01	9.69E-01	3.11E+00	3.11E+00
Response to Questionnaire															
Do you garden?	6441000	356	3.00E-01	1.43E-04	2.01E-03	3.68E-03	9.09E-03	3.06E-02	9.11E-02	2.13E-01	3.81E-01	6.09E-01	9.16E-01	1.77E+00	3.11E+00
Do you farm?	1390000	81	3.75E-01	2.93E-04	2.34E-02	3.00E-02	4.04E-02	5.15E-02	1.11E-01	2.78E-01	5.15E-01	9.35E-01	1.11E+00	1.49E+00	1.49E+00

DRAFT
DO NOT QUOTE OR CITE

Table 2-228. Intake of Homegrown Peas (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4252000	226	5.05E-01	2.35E-04	3.48E-02	4.58E-02	1.02E-01	1.40E-01	2.28E-01	3.21E-01	6.22E-01	1.04E+00	1.46E+00	2.66E+00	2.89E+00
Age															
< 01	112000	4	1.81E+00	2.66E-03	6.00E-01	6.00E-01	6.00E-01	6.00E-01	6.00E-01	1.60E+00	2.66E+00	2.66E+00	2.89E+00	2.89E+00	2.89E+00
01-02	163000	9	9.67E-01	9.60E-04	3.54E-01	3.54E-01	3.54E-01	3.54E-01	8.80E-01	9.13E-01	1.06E+00	1.60E+00	1.60E+00	1.60E+00	1.60E+00
03-05	140000	7	6.21E-01	6.66E-04	2.28E-01	2.28E-01	2.28E-01	2.28E-01	6.31E-01	6.33E-01	7.83E-01	9.09E-01	1.04E+00	1.04E+00	1.04E+00
06-11	515000	26	6.05E-01	6.33E-04	1.54E-01	1.54E-01	1.54E-01	2.18E-01	3.04E-01	3.87E-01	9.00E-01	1.35E+00	1.40E+00	2.06E+00	2.06E+00
12-19	377000	22	4.08E-01	3.27E-04	5.81E-02	5.81E-02	1.33E-01	1.58E-01	2.35E-01	3.58E-01	5.02E-01	7.10E-01	8.22E-01	8.22E-01	8.22E-01
20-39	1121000	52	4.08E-01	4.23E-04	9.96E-02	9.96E-02	1.15E-01	1.40E-01	1.80E-01	2.54E-01	4.06E-01	8.47E-01	1.36E+00	2.71E+00	2.71E+00
40-69	1366000	80	4.58E-01	3.53E-04	6.73E-02	6.78E-02	1.02E-01	1.20E-01	2.26E-01	3.04E-01	6.10E-01	9.95E-01	1.30E+00	2.36E+00	2.36E+00
70 +	458000	26	3.34E-01	4.20E-04	3.48E-02	3.48E-02	3.48E-02	4.58E-02	1.84E-01	2.73E-01	3.72E-01	9.95E-01	9.95E-01	1.46E+00	1.46E+00
Season															
Fall	1239000	41	3.03E-01	1.71E-04	3.48E-02	3.48E-02	4.58E-02	1.15E-01	2.09E-01	2.62E-01	3.53E-01	5.99E-01	7.14E-01	9.95E-01	9.95E-01
Spring	765000	78	4.38E-01	4.30E-04	5.81E-02	5.81E-02	1.08E-01	1.18E-01	1.90E-01	3.26E-01	5.16E-01	9.19E-01	1.40E+00	2.06E+00	2.06E+00
Summer	1516000	51	5.85E-01	4.27E-04	6.78E-02	6.78E-02	1.27E-01	1.74E-01	2.24E-01	3.87E-01	8.22E-01	1.35E+00	1.60E+00	2.66E+00	2.66E+00
Winter	732000	56	7.53E-01	7.75E-04	1.17E-01	1.17E-01	1.84E-01	2.12E-01	2.73E-01	5.44E-01	9.48E-01	1.54E+00	2.36E+00	2.89E+00	2.89E+00
Urbanization															
Central City	558000	19	5.73E-01	1.12E-03	3.48E-02	3.48E-02	3.48E-02	4.58E-02	1.49E-01	2.38E-01	4.02E-01	2.66E+00	2.66E+00	2.71E+00	2.71E+00
Nonmetropolitan	2028000	126	4.81E-01	2.80E-04	5.81E-02	8.42E-02	1.36E-01	1.74E-01	2.48E-01	3.53E-01	5.79E-01	1.04E+00	1.36E+00	1.89E+00	2.89E+00
Surburban	1666000	81	5.13E-01	3.23E-04	6.78E-02	6.78E-02	1.15E-01	1.34E-01	2.29E-01	3.87E-01	6.84E-01	9.95E-01	1.30E+00	2.28E+00	2.36E+00
Race															
Asian	29000	1	1.74E-01	0.00E+00	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01	1.74E-01
Black	355000	19	6.78E-01	9.98E-04	1.66E-01	1.66E-01	2.09E-01	2.76E-01	2.98E-01	3.21E-01	9.95E-01	1.36E+00	2.28E+00	2.36E+00	2.36E+00
Other/NA	84000	3	3.41E-01	7.42E-05	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.54E-01	3.56E-01	3.56E-01	3.56E-01	3.56E-01	3.56E-01
White	3784000	203	4.95E-01	2.45E-04	3.48E-02	3.48E-02	1.02E-01	1.33E-01	2.18E-01	3.26E-01	6.00E-01	9.99E-01	1.40E+00	2.66E+00	2.89E+00
Region															
Midwest	1004000	55	4.03E-01	5.36E-04	3.48E-02	3.48E-02	4.58E-02	9.96E-02	1.40E-01	2.52E-01	3.53E-01	8.80E-01	1.54E+00	2.71E+00	2.89E+00
Northeast	241000	14	6.01E-01	8.13E-04	5.81E-02	5.81E-02	6.73E-02	8.42E-02	2.54E-01	5.02E-01	9.95E-01	1.09E+00	1.30E+00	1.30E+00	1.30E+00
South	2449000	132	5.67E-01	3.16E-04	1.27E-01	1.27E-01	1.74E-01	1.96E-01	2.62E-01	3.72E-01	6.82E-01	1.24E+00	1.60E+00	2.66E+00	2.66E+00
West	558000	25	3.77E-01	3.82E-04	6.78E-02	6.78E-02	6.78E-02	1.02E-01	2.18E-01	2.73E-01	4.79E-01	9.00E-01	9.40E-01	1.40E+00	1.40E+00
Response to Questionnaire															
Do you garden?	3980000	214	5.13E-01	2.48E-04	3.48E-02	3.48E-02	1.02E-01	1.40E-01	2.28E-01	3.21E-01	6.28E-01	1.04E+00	1.54E+00	2.66E+00	2.89E+00
Do you farm?	884000	55	4.59E-01	4.60E-04	3.48E-02	3.48E-02	4.58E-02	8.65E-02	2.08E-01	3.53E-01	5.16E-01	9.00E-01	1.40E+00	1.60E+00	2.89E+00

Table 2-229. Intake of Homegrown Peppers (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5153000	208	2.42E-01	1.37E-04	0.00E+00	0.00E+00	2.25E-02	3.50E-02	7.60E-02	1.52E-01	2.73E-01	4.90E-01	9.24E-01	1.81E+00	2.48E+00
Age															
< 01	47000	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
01-02	163000	6	5.18E-01	1.43E-03	1.69E-01	1.69E-01	1.69E-01	1.69E-01	2.21E-01	2.72E-01	3.70E-01	1.81E+00	1.81E+00	1.81E+00	1.81E+00
03-05	108000	5	1.14E-01	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.66E-02	1.60E-01	2.88E-01	2.88E-01	2.88E-01	2.88E-01
06-11	578000	26	2.26E-01	2.74E-04	0.00E+00	0.00E+00	0.00E+00	3.03E-02	8.99E-02	1.62E-01	2.98E-01	4.25E-01	7.70E-01	8.45E-01	8.45E-01
12-19	342000	16	1.90E-01	4.94E-04	1.47E-02	1.47E-02	1.99E-02	4.25E-02	5.98E-02	1.00E-01	1.93E-01	2.45E-01	1.20E+00	1.53E+00	1.53E+00
20-39	1048000	40	2.24E-01	3.77E-04	1.74E-02	1.74E-02	3.26E-02	5.66E-02	8.55E-02	1.19E-01	2.18E-01	3.97E-01	6.24E-01	2.48E+00	2.48E+00
40-69	2221000	88	2.50E-01	1.75E-04	0.00E+00	5.32E-03	3.40E-02	4.52E-02	7.58E-02	1.66E-01	3.21E-01	4.77E-01	7.44E-01	1.50E+00	1.50E+00
70 +	646000	25	2.56E-01	3.87E-04	1.73E-02	1.73E-02	2.15E-02	2.30E-02	7.47E-02	1.38E-01	2.39E-01	9.24E-01	9.39E-01	1.07E+00	1.07E+00
Season															
Fall	1726000	53	1.97E-01	1.39E-04	0.00E+00	0.00E+00	3.26E-02	4.05E-02	8.55E-02	1.66E-01	2.39E-01	3.49E-01	3.97E-01	1.07E+00	1.07E+00
Spring	255000	28	2.95E-01	7.49E-04	0.00E+00	0.00E+00	1.73E-02	3.86E-02	6.93E-02	1.47E-01	3.21E-01	1.09E+00	1.20E+00	1.53E+00	1.53E+00
Summer	2672000	94	2.77E-01	2.29E-04	0.00E+00	0.00E+00	2.70E-02	3.55E-02	8.58E-02	1.52E-01	3.17E-01	6.00E-01	9.73E-01	1.81E+00	2.48E+00
Winter	500000	33	1.81E-01	2.88E-04	0.00E+00	0.00E+00	1.47E-02	1.74E-02	4.14E-02	1.10E-01	2.81E-01	4.55E-01	4.77E-01	1.25E+00	1.25E+00
Urbanization															
Central City	865000	30	2.46E-01	2.49E-04	3.86E-02	3.86E-02	5.66E-02	6.72E-02	1.10E-01	1.84E-01	2.73E-01	3.61E-01	9.39E-01	1.10E+00	1.10E+00
Nonmetropolitan	1982000	89	2.42E-01	2.63E-04	0.00E+00	5.32E-03	2.22E-02	3.34E-02	6.93E-02	1.19E-01	2.72E-01	5.37E-01	7.70E-01	2.48E+00	2.48E+00
Surburban	2246000	87	2.47E-01	1.87E-04	0.00E+00	0.00E+00	2.70E-02	3.50E-02	8.55E-02	1.60E-01	2.91E-01	4.90E-01	9.73E-01	1.50E+00	1.53E+00
Race															
Asian	74000	2	1.09E-01	4.01E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-01	2.18E-01	2.18E-01	2.18E-01	2.18E-01	2.18E-01
Black	127000	6	2.41E-01	8.11E-04	0.00E+00	0.00E+00	0.00E+00	1.13E-01	1.22E-01	1.99E-01	2.58E-01	2.58E-01	1.25E+00	1.25E+00	1.25E+00
White	4892000	198	2.47E-01	1.42E-04	0.00E+00	1.74E-02	2.96E-02	4.05E-02	8.55E-02	1.54E-01	2.91E-01	4.90E-01	9.24E-01	1.81E+00	2.48E+00
Region															
Midwest	1790000	74	2.34E-01	2.61E-04	0.00E+00	5.32E-03	2.22E-02	3.26E-02	5.98E-02	1.47E-01	2.57E-01	3.90E-01	8.45E-01	2.48E+00	2.48E+00
Northeast	786000	31	3.34E-01	4.16E-04	0.00E+00	0.00E+00	3.40E-02	4.52E-02	1.41E-01	2.17E-01	3.69E-01	9.73E-01	1.50E+00	1.53E+00	1.53E+00
South	1739000	72	2.30E-01	1.86E-04	0.00E+00	3.34E-02	6.74E-02	7.60E-02	1.07E-01	1.66E-01	2.73E-01	4.25E-01	5.26E-01	1.81E+00	1.81E+00
West	778000	29	2.13E-01	3.08E-04	1.73E-02	1.73E-02	2.30E-02	2.70E-02	4.05E-02	8.58E-02	2.53E-01	5.37E-01	9.24E-01	1.07E+00	1.07E+00
Response to Questionnaire															
Do you garden?	4898000	199	2.35E-01	1.33E-04	0.00E+00	0.00E+00	2.22E-02	3.40E-02	7.58E-02	1.54E-01	2.85E-01	4.77E-01	8.45E-01	1.50E+00	2.48E+00
Do you farm?	867000	35	3.03E-01	4.77E-04	0.00E+00	0.00E+00	2.70E-02	2.96E-02	7.11E-02	1.66E-01	3.55E-01	6.00E-01	8.45E-01	2.48E+00	2.48E+00

Table 2-230. Intake of Homegrown Pumpkin (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2041000	87	7.78E-01	4.46E-04	1.25E-01	1.25E-01	1.84E-01	2.41E-01	3.18E-01	5.55E-01	1.07E+00	1.47E+00	1.79E+00	3.02E+00	4.48E+00
Age															
<01	32000	1	1.33E+00	0.00E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00	1.33E+00
01-02	73000	4	1.40E+00	1.07E-03	1.12E+00	1.12E+00	1.12E+00	1.12E+00	1.21E+00	1.21E+00	1.79E+00	1.79E+00	1.79E+00	1.79E+00	1.79E+00
03-05	18000	2	3.13E+00	1.12E-02	1.45E+00	1.45E+00	1.45E+00	1.45E+00	1.45E+00	4.48E+00	4.48E+00	4.48E+00	4.48E+00	4.48E+00	4.48E+00
06-11	229000	9	4.96E-01	6.79E-04	2.41E-01	2.41E-01	2.41E-01	2.41E-01	2.62E-01	3.08E-01	5.72E-01	9.28E-01	1.07E+00	1.46E+00	1.46E+00
12-19	244000	10	2.86E-01	2.54E-04	1.25E-01	1.25E-01	1.25E-01	1.65E-01	1.89E-01	2.40E-01	4.01E-01	4.53E-01	4.53E-01	6.65E-01	6.65E-01
20-39	657000	26	8.01E-01	8.11E-04	1.76E-01	1.76E-01	1.84E-01	3.01E-01	3.77E-01	4.77E-01	1.03E+00	1.73E+00	2.67E+00	2.67E+00	2.67E+00
40-69	415000	20	8.22E-01	1.09E-03	2.86E-01	2.86E-01	2.86E-01	3.16E-01	3.71E-01	5.23E-01	9.62E-01	1.47E+00	3.02E+00	3.02E+00	3.02E+00
70 +	373000	15	8.99E-01	5.53E-04	2.47E-01	2.47E-01	4.21E-01	4.25E-01	5.72E-01	9.40E-01	1.24E+00	1.35E+00	1.38E+00	1.38E+00	1.38E+00
Season															
Fall	1345000	49	8.19E-01	5.38E-04	1.25E-01	1.25E-01	1.76E-01	2.81E-01	3.71E-01	6.14E-01	1.17E+00	1.73E+00	1.79E+00	3.02E+00	3.02E+00
Spring	48000	6	7.22E-01	1.71E-03	2.47E-01	2.47E-01	2.47E-01	2.47E-01	4.59E-01	6.89E-01	8.00E-01	1.45E+00	1.45E+00	1.45E+00	1.45E+00
Summer	405000	13	5.17E-01	6.12E-04	1.84E-01	1.84E-01	1.84E-01	2.40E-01	2.41E-01	3.77E-01	5.79E-01	1.21E+00	1.47E+00	1.47E+00	1.47E+00
Winter	243000	19	9.96E-01	1.82E-03	2.88E-01	2.88E-01	3.49E-01	3.67E-01	4.28E-01	7.44E-01	1.21E+00	2.24E+00	2.24E+00	4.48E+00	4.48E+00
Urbanization															
Central City	565000	20	6.29E-01	6.41E-04	1.84E-01	1.84E-01	1.84E-01	2.41E-01	2.81E-01	3.77E-01	9.40E-01	1.24E+00	1.33E+00	2.24E+00	2.24E+00
Nonmetropolitan	863000	44	6.44E-01	6.88E-04	1.25E-01	1.25E-01	1.65E-01	1.89E-01	3.10E-01	5.10E-01	6.65E-01	1.22E+00	1.45E+00	4.48E+00	4.48E+00
Surburban	613000	23	1.10E+00	8.20E-04	2.86E-01	2.86E-01	2.88E-01	3.01E-01	4.67E-01	1.04E+00	1.47E+00	1.79E+00	2.67E+00	2.67E+00	2.67E+00
Race															
Black	22000	1	4.38E-01	0.00E+00	4.38E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01	4.38E-01
White	2019000	86	7.82E-01	4.50E-04	1.25E-01	1.25E-01	1.84E-01	2.41E-01	3.16E-01	5.55E-01	1.10E+00	1.47E+00	1.79E+00	3.02E+00	4.48E+00
Region															
Midwest	1370000	54	8.21E-01	6.08E-04	1.25E-01	1.25E-01	2.34E-01	2.41E-01	3.18E-01	5.72E-01	1.04E+00	1.73E+00	2.67E+00	3.02E+00	4.48E+00
Northeast	15000	1	4.21E-01	0.00E+00	4.21E-01	4.21E-01	4.21E-01	4.21E-01	4.21E-01	4.21E-01	4.21E-01	4.21E-01	4.21E-01	4.21E-01	4.21E-01
South	179000	10	4.54E-01	6.81E-04	1.65E-01	1.65E-01	1.65E-01	1.65E-01	3.10E-01	3.92E-01	4.38E-01	8.00E-01	1.22E+00	1.22E+00	1.22E+00
West	477000	22	7.87E-01	6.56E-04	1.76E-01	1.76E-01	1.89E-01	3.08E-01	3.71E-01	7.44E-01	1.17E+00	1.47E+00	1.51E+00	1.51E+00	1.51E+00
Response to Queitionnaire															
Do you garden?	1987000	85	7.70E-01	4.53E-04	1.25E-01	1.25E-01	1.84E-01	2.41E-01	3.16E-01	5.55E-01	1.04E+00	1.46E+00	1.79E+00	3.02E+00	4.48E+00
Do you farm?	449000	18	7.99E-01	9.33E-04	1.76E-01	1.76E-01	1.89E-01	2.40E-01	3.08E-01	5.79E-01	1.10E+00	1.38E+00	1.38E+00	3.02E+00	3.02E+00

Table 2-231. Intake of Homegrown Snap Beans (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12308000	739	8.00E-01	2.34E-04	0.00E+00	5.65E-02	1.49E-01	1.88E-01	3.38E-01	5.69E-01	1.04E+00	1.58E+00	2.01E+00	3.90E+00	9.96E+00
Age															
< 01	129000	7	2.91E+00	4.98E-03	1.04E+00	1.04E+00	1.04E+00	1.04E+00	1.72E+00	2.38E+00	3.23E+00	4.82E+00	7.88E+00	7.88E+00	7.88E+00
01-02	246000	17	1.69E+00	2.24E-03	4.62E-01	4.62E-01	4.62E-01	4.62E-01	9.80E-01	1.34E+00	1.93E+00	3.35E+00	3.35E+00	5.98E+00	5.98E+00
03-05	455000	32	1.49E+00	1.99E-03	0.00E+00	0.00E+00	0.00E+00	3.49E-01	9.01E-01	1.16E+00	1.66E+00	3.20E+00	4.88E+00	6.90E+00	6.90E+00
06-11	862000	62	8.97E-01	9.77E-04	0.00E+00	0.00E+00	1.99E-01	2.21E-01	3.21E-01	6.42E-01	1.21E+00	1.79E+00	2.75E+00	4.81E+00	5.66E+00
12-19	1151000	69	6.38E-01	4.72E-04	0.00E+00	0.00E+00	1.61E-01	2.22E-01	3.20E-01	5.04E-01	8.11E-01	1.34E+00	1.79E+00	2.72E+00	2.72E+00
20-39	2677000	160	6.13E-01	3.16E-04	7.05E-02	7.05E-02	1.31E-01	1.57E-01	2.60E-01	4.96E-01	7.85E-01	1.24E+00	1.64E+00	2.05E+00	4.26E+00
40-69	4987000	292	7.19E-01	2.45E-04	9.67E-02	9.99E-02	1.61E-01	2.28E-01	3.62E-01	5.61E-01	8.59E-01	1.45E+00	1.77E+00	2.70E+00	4.23E+00
70 +	1801000	100	9.15E-01	8.61E-04	5.33E-02	5.65E-02	7.44E-02	1.51E-01	3.69E-01	6.38E-01	1.22E+00	1.70E+00	2.01E+00	9.96E+00	9.96E+00
Season															
Fall	3813000	137	8.12E-01	4.91E-04	5.65E-02	5.65E-02	1.50E-01	1.83E-01	2.72E-01	5.39E-01	1.18E+00	1.52E+00	2.01E+00	4.82E+00	9.96E+00
Spring	2706000	288	9.00E-01	5.61E-04	0.00E+00	2.93E-02	1.51E-01	2.19E-01	3.70E-01	5.91E-01	1.11E+00	1.72E+00	2.85E+00	5.66E+00	6.90E+00
Summer	2946000	98	6.33E-01	2.78E-04	0.00E+00	0.00E+00	1.18E-01	1.57E-01	3.31E-01	5.04E-01	8.50E-01	1.30E+00	1.70E+00	2.05E+00	2.63E+00
Winter	2843000	216	8.64E-01	4.61E-04	5.33E-02	1.14E-01	1.80E-01	2.44E-01	4.24E-01	6.20E-01	1.12E+00	1.72E+00	2.02E+00	3.85E+00	7.88E+00
Urbanization															
Central City	2205000	78	5.97E-01	3.32E-04	5.65E-02	5.65E-02	7.44E-02	1.59E-01	2.56E-01	5.12E-01	7.12E-01	1.23E+00	1.54E+00	1.93E+00	3.35E+00
Nonmetropolitan	5696000	404	9.61E-01	4.26E-04	0.00E+00	9.35E-02	1.77E-01	2.29E-01	3.67E-01	6.75E-01	1.19E+00	1.89E+00	2.70E+00	4.88E+00	9.96E+00
Surburban	4347000	255	7.04E-01	2.88E-04	8.47E-02	9.67E-02	1.39E-01	1.88E-01	3.41E-01	5.20E-01	9.32E-01	1.36E+00	1.77E+00	2.98E+00	6.08E+00
Race															
Asian	41000	1	1.53E-01	0.00E+00	1.53E-01	1.53E-01	1.53E-01	1.53E-01	1.53E-01	1.53E-01	1.53E-01	1.53E-01	1.53E-01	1.53E-01	1.53E-01
Black	634000	36	7.55E-01	1.07E-03	2.51E-01	2.51E-01	2.51E-01	2.79E-01	2.99E-01	4.78E-01	1.04E+00	1.30E+00	1.34E+00	5.98E+00	5.98E+00
Other/NA	54000	6	6.27E-01	2.18E-03	2.14E-01	2.14E-01	2.14E-01	2.14E-01	2.17E-01	3.20E-01	8.04E-01	1.53E+00	1.53E+00	1.53E+00	1.53E+00
White	11519000	694	8.10E-01	2.42E-04	0.00E+00	7.05E-02	1.50E-01	1.89E-01	3.49E-01	5.73E-01	1.06E+00	1.63E+00	2.01E+00	3.90E+00	9.96E+00
Region															
Midwest	4651000	307	8.60E-01	4.96E-04	5.65E-02	7.44E-02	1.54E-01	1.89E-01	3.36E-01	5.50E-01	9.88E-01	1.70E+00	2.47E+00	4.88E+00	9.96E+00
Northeast	990000	52	5.66E-01	4.80E-04	0.00E+00	0.00E+00	9.66E-02	1.06E-01	1.81E-01	4.91E-01	8.15E-01	1.28E+00	1.36E+00	1.97E+00	3.09E+00
South	4755000	286	8.82E-01	3.13E-04	5.33E-02	1.33E-01	2.13E-01	2.51E-01	3.98E-01	6.75E-01	1.22E+00	1.72E+00	2.01E+00	3.23E+00	5.98E+00
West	1852000	92	5.92E-01	3.06E-04	7.05E-02	7.05E-02	1.43E-01	1.83E-01	2.72E-01	5.14E-01	7.41E-01	1.20E+00	1.52E+00	2.19E+00	2.19E+00
Response to Questionnaire															
Do you garden?	11843000	700	7.90E-01	2.37E-04	0.00E+00	5.65E-02	1.49E-01	1.87E-01	3.31E-01	5.63E-01	1.02E+00	1.60E+00	2.01E+00	3.85E+00	9.96E+00
Do you farm?	2591000	157	7.95E-01	3.72E-04	5.65E-02	5.65E-02	1.27E-01	1.89E-01	4.05E-01	6.59E-01	1.12E+00	1.54E+00	1.98E+00	2.96E+00	4.23E+00

DRAFT DO NOT QUOTE OR CITE

Table 2-232. Intake of Homegrown Tomatoes (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	16737000	743	1.18E+00	3.50E-04	0.00E+00	7.57E-02	1.52E-01	2.34E-01	3.92E-01	7.43E-01	1.46E+00	2.50E+00	3.54E+00	7.26E+00	1.93E+01
Age															
< 01	229000	10	5.21E+00	7.04E-03	3.43E-01	3.43E-01	3.43E-01	1.32E+00	1.76E+00	4.74E+00	6.87E+00	1.09E+01	1.09E+01	1.09E+01	1.09E+01
01-02	572000	26	3.14E+00	3.58E-03	7.26E-01	7.26E-01	8.55E-01	9.34E-01	1.23E+00	1.66E+00	4.00E+00	7.26E+00	1.07E+01	1.07E+01	1.07E+01
03-05	516000	26	1.61E+00	1.88E-03	4.96E-01	4.96E-01	5.07E-01	5.07E-01	7.54E-01	1.25E+00	1.65E+00	3.00E+00	6.25E+00	6.25E+00	6.25E+00
06-11	1093000	51	1.63E+00	1.83E-03	2.17E-01	2.17E-01	3.10E-01	3.92E-01	5.30E-01	7.55E-01	1.66E+00	5.20E+00	5.70E+00	9.14E+00	9.14E+00
12-19	1411000	61	7.15E-01	5.60E-04	0.00E+00	0.00E+00	0.00E+00	1.82E-01	2.68E-01	5.21E-01	8.50E-01	1.67E+00	1.94E+00	3.39E+00	3.39E+00
20-39	4169000	175	8.54E-01	6.65E-04	6.34E-02	7.32E-02	1.31E-01	1.47E-01	2.54E-01	5.15E-01	1.00E+00	1.83E+00	2.10E+00	5.52E+00	1.93E+01
40-69	6758000	305	1.05E+00	3.51E-04	0.00E+00	1.13E-01	1.73E-01	2.81E-01	3.97E-01	7.46E-01	1.41E+00	2.40E+00	3.05E+00	4.50E+00	5.00E+00
70 +	1989000	89	1.26E+00	6.28E-04	1.13E-01	1.13E-01	2.36E-01	2.98E-01	4.82E-01	1.14E+00	1.77E+00	2.51E+00	2.99E+00	3.67E+00	3.67E+00
Season															
Fall	5516000	201	1.02E+00	5.16E-04	0.00E+00	7.32E-02	1.35E-01	2.23E-01	3.43E-01	5.95E-01	1.34E+00	2.24E+00	2.87E+00	6.25E+00	1.07E+01
Spring	1264000	127	8.39E-01	6.27E-04	7.25E-02	1.36E-01	1.89E-01	2.39E-01	3.73E-01	6.31E-01	1.11E+00	1.75E+00	2.00E+00	3.79E+00	5.28E+00
Summer	8122000	279	1.30E+00	5.13E-04	0.00E+00	1.05E-01	1.66E-01	2.36E-01	4.08E-01	8.03E-01	1.55E+00	3.05E+00	4.05E+00	7.26E+00	1.09E+01
Winter	1835000	136	1.37E+00	1.52E-03	0.00E+00	9.07E-02	2.07E-01	2.85E-01	4.97E-01	8.29E-01	1.49E+00	2.48E+00	3.38E+00	8.29E+00	1.93E+01
Urbanization															
Central City	2680000	90	1.10E+00	7.33E-04	0.00E+00	0.00E+00	1.52E-01	2.25E-01	3.54E-01	7.54E-01	1.51E+00	2.16E+00	2.95E+00	7.26E+00	8.29E+00
Nonmetropolitan	7389000	378	1.26E+00	5.26E-04	0.00E+00	1.13E-01	2.16E-01	2.62E-01	4.23E-01	7.62E-01	1.47E+00	2.77E+00	3.85E+00	6.87E+00	1.07E+01
Surburban	6668000	275	1.13E+00	5.87E-04	0.00E+00	7.57E-02	1.35E-01	1.78E-01	3.70E-01	6.68E-01	1.38E+00	2.35E+00	3.32E+00	5.52E+00	1.93E+01
Race															
Asian	115000	3	7.03E-01	2.15E-03	1.45E-01	1.45E-01	1.45E-01	1.45E-01	1.45E-01	2.53E-01	1.76E+00	1.76E+00	1.76E+00	1.76E+00	1.76E+00
Black	743000	28	6.14E-01	5.28E-04	0.00E+00	0.00E+00	0.00E+00	7.32E-02	2.36E-01	5.07E-01	9.02E-01	1.18E+00	1.55E+00	1.66E+00	1.66E+00
Native American	28000	1	5.05E-01	0.00E+00	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01
Other/NA	193000	8	5.19E-01	8.12E-04	2.48E-01	2.48E-01	2.48E-01	2.48E-01	2.73E-01	3.50E-01	5.25E-01	1.11E+00	1.47E+00	1.47E+00	1.47E+00
White	15658000	703	1.22E+00	3.71E-04	0.00E+00	1.05E-01	1.68E-01	2.41E-01	4.06E-01	7.55E-01	1.49E+00	2.55E+00	3.59E+00	7.26E+00	1.93E+01
Region															
Midwest	6747000	322	1.18E+00	6.16E-04	0.00E+00	6.34E-02	1.45E-01	2.06E-01	3.62E-01	6.82E-01	1.41E+00	2.51E+00	3.69E+00	6.87E+00	1.93E+01
Northeast	2480000	87	1.17E+00	9.70E-04	7.57E-02	7.57E-02	1.35E-01	1.48E-01	3.50E-01	7.51E-01	1.38E+00	2.44E+00	3.52E+00	1.09E+01	1.09E+01
South	4358000	202	1.15E+00	6.17E-04	0.00E+00	0.00E+00	2.07E-01	2.53E-01	4.23E-01	7.46E-01	1.43E+00	2.32E+00	3.67E+00	6.82E+00	9.14E+00
West	3152000	132	1.23E+00	6.41E-04	1.64E-01	1.80E-01	2.39E-01	2.84E-01	4.11E-01	7.65E-01	1.84E+00	2.78E+00	3.08E+00	7.26E+00	7.26E+00
Response to Questionnaire															
Do you garden?	14791000	661	1.21E+00	3.81E-04	0.00E+00	7.57E-02	1.52E-01	2.34E-01	4.06E-01	7.58E-01	1.50E+00	2.51E+00	3.52E+00	7.26E+00	1.93E+01
Do you farm?	2269000	112	1.42E+00	1.11E-03	0.00E+00	0.00E+00	1.80E-01	2.26E-01	4.23E-01	7.66E-01	1.86E+00	3.55E+00	5.20E+00	9.14E+00	9.14E+00

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Table 2-233. Intake of Homegrown White Potatoes (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5895000	281	1.66E+00	7.28E−04	0.00E+00	0.00E+00	1.87E−01	3.08E−01	5.50E−01	1.27E+00	2.07E+00	3.11E+00	4.76E+00	9.52E+00	1.28E+01
Age															
< 01	70000	4	6.25E+00	1.08E−02	1.97E+00	1.97E+00	1.97E+00	1.97E+00	5.25E+00	5.87E+00	9.43E+00	9.43E+00	9.43E+00	9.43E+00	9.43E+00
01−02	147000	10	3.68E+00	6.40E−03	1.36E+00	1.36E+00	1.36E+00	1.47E+00	2.27E+00	2.62E+00	4.58E+00	8.74E+00	8.74E+00	8.74E+00	8.74E+00
03−05	119000	6	2.39E+00	5.42E−03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.15E+00	3.77E+00	4.76E+00	4.76E+00	4.76E+00	4.76E+00
06−11	431000	24	2.19E+00	2.87E−03	0.00E+00	0.00E+00	0.00E+00	4.10E−01	7.20E−01	1.76E+00	3.10E+00	5.94E+00	6.52E+00	6.52E+00	6.52E+00
12−19	751000	31	1.26E+00	1.19E−03	6.67E−02	6.67E−02	1.87E−01	2.59E−01	3.84E−01	1.22E+00	1.80E+00	2.95E+00	3.11E+00	4.14E+00	4.14E+00
20−39	1501000	66	1.24E+00	8.00E−04	1.41E−01	1.64E−01	1.64E−01	1.96E−01	4.77E−01	1.00E+00	1.62E+00	2.54E+00	3.08E+00	4.29E+00	5.09E+00
40−69	1855000	95	1.86E+00	1.64E−03	1.05E−01	1.27E−01	2.62E−01	3.50E−01	6.99E−01	1.31E+00	2.04E+00	3.43E+00	5.29E+00	1.28E+01	1.28E+01
70 +	1021000	45	1.27E+00	8.11E−04	2.06E−01	2.06E−01	2.17E−01	3.57E−01	5.50E−01	1.21E+00	1.69E+00	2.35E+00	2.88E+00	3.92E+00	3.92E+00
Season															
Fall	2267000	86	1.63E+00	1.37E−03	1.64E−01	1.64E−01	2.23E−01	2.65E−01	4.61E−01	1.13E+00	1.79E+00	3.43E+00	4.14E+00	1.28E+01	1.28E+01
Spring	527000	58	1.23E+00	1.34E−03	6.67E−02	6.67E−02	1.05E−01	1.96E−01	4.10E−01	8.55E−01	1.91E+00	2.86E+00	3.08E+00	4.28E+00	4.28E+00
Summer	2403000	81	1.63E+00	1.06E−03	0.00E+00	0.00E+00	1.87E−01	3.19E−01	6.20E−01	1.32E+00	2.09E+00	3.08E+00	5.29E+00	9.43E+00	9.43E+00
Winter	698000	56	2.17E+00	1.77E−03	1.41E−01	1.41E−01	3.95E−01	4.97E−01	8.64E−01	2.02E+00	2.95E+00	4.26E+00	5.40E+00	6.00E+00	6.00E+00
Urbanization															
Central City	679000	25	9.60E−01	9.17E−04	1.64E−01	1.64E−01	1.64E−01	1.75E−01	3.75E−01	5.55E−01	1.52E+00	2.07E+00	2.25E+00	2.54E+00	2.54E+00
Nonmetropolitan	3046000	159	1.96E+00	1.12E−03	1.64E−01	1.84E−01	2.65E−01	3.68E−01	7.67E−01	1.50E+00	2.38E+00	3.55E+00	5.64E+00	1.28E+01	1.28E+01
Surburban	2110000	95	1.49E+00	1.12E−03	6.67E−02	1.05E−01	1.87E−01	3.19E−01	5.40E−01	9.29E−01	1.68E+00	3.11E+00	4.76E+00	9.43E+00	9.43E+00
Race															
Black	140000	5	1.36E+00	4.03E−03	4.25E−01	4.25E−01	4.25E−01	4.25E−01	6.84E−01	7.22E−01	1.05E+00	5.25E+00	5.25E+00	5.25E+00	5.25E+00
Other/NA	145000	5	1.99E+00	1.50E−03	1.27E+00	1.27E+00	1.27E+00	1.27E+00	1.58E+00	1.97E+00	2.18E+00	2.95E+00	2.95E+00	2.95E+00	2.95E+00
White	5550000	269	1.67E+00	7.61E−04	6.67E−02	1.41E−01	2.06E−01	3.08E−01	5.50E−01	1.28E+00	2.09E+00	3.11E+00	4.76E+00	9.52E+00	1.28E+01
Region															
Midwest	2587000	133	1.77E+00	1.05E−03	1.41E−01	1.75E−01	2.36E−01	3.39E−01	6.41E−01	1.35E+00	2.15E+00	3.77E+00	5.29E+00	9.43E+00	9.43E+00
Northeast	656000	31	1.28E+00	1.40E−03	6.67E−02	6.67E−02	1.27E−01	1.67E−01	3.48E−01	8.64E−01	1.97E+00	2.95E+00	3.80E+00	5.09E+00	5.09E+00
South	1796000	84	2.08E+00	1.63E−03	1.64E−01	1.64E−01	3.50E−01	4.61E−01	9.24E−01	1.56E+00	2.40E+00	3.44E+00	5.64E+00	1.28E+01	1.28E+01
West	796000	31	7.61E−01	6.53E−04	1.64E−01	1.64E−01	2.16E−01	2.59E−01	4.11E−01	5.43E−01	9.63E−01	1.40E+00	1.95E+00	3.11E+00	3.11E+00
Response to Questionnaire															
Do you garden?	5291000	250	1.65E+00	7.46E−04	0.00E+00	0.00E+00	2.06E−01	3.08E−01	5.55E−01	1.28E+00	2.09E+00	3.10E+00	4.28E+00	9.52E+00	1.28E+01
Do you farm?	1082000	62	1.83E+00	1.35E−03	6.67E−02	6.67E−02	2.06E−01	5.76E−01	9.24E−01	1.46E+00	2.31E+00	3.80E+00	5.09E+00	6.52E+00	6.52E+00

Table 2-234. Intake of Homeproduced Beef (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4958000	304	2.45E+00	1.17E-03	3.93E-02	1.83E-01	3.74E-01	4.65E-01	8.78E-01	1.61E+00	3.07E+00	5.29E+00	7.24E+00	1.33E+01	1.94E+01
Age															
< 01	90000	5	1.08E+01	2.08E-02	5.25E+00	5.25E+00	5.25E+00	5.25E+00	6.06E+00	6.06E+00	1.87E+01	1.91E+01	1.94E+01	1.94E+01	1.94E+01
01-02	110000	8	4.37E+00	7.45E-03	1.12E+00	1.12E+00	1.12E+00	1.12E+00	2.79E+00	4.41E+00	4.81E+00	8.39E+00	8.39E+00	8.39E+00	8.39E+00
03-05	234000	13	3.98E+00	4.86E-03	7.47E-01	7.47E-01	7.47E-01	7.47E-01	2.46E+00	3.51E+00	5.30E+00	8.44E+00	8.62E+00	9.28E+00	9.28E+00
06-11	695000	38	3.77E+00	4.39E-03	3.54E-01	3.54E-01	6.63E-01	7.53E-01	1.32E+00	2.11E+00	4.43E+00	1.14E+01	1.25E+01	1.33E+01	1.33E+01
12-19	656000	41	1.72E+00	1.29E-03	3.78E-01	3.78E-01	4.78E-01	5.13E-01	8.96E-01	1.51E+00	2.44E+00	3.53E+00	3.57E+00	4.28E+00	4.28E+00
20-39	1495000	83	2.06E+00	1.49E-03	2.69E-01	2.69E-01	3.52E-01	3.94E-01	6.80E-01	1.59E+00	2.73E+00	4.88E+00	6.50E+00	8.26E+00	8.26E+00
40-69	1490000	105	1.84E+00	1.18E-03	3.93E-02	1.83E-01	3.61E-01	4.55E-01	8.33E-01	1.52E+00	2.38E+00	4.10E+00	5.39E+00	5.90E+00	5.90E+00
70 +	188000	11	9.58E-01	1.42E-03	1.02E-01	1.02E-01	1.02E-01	1.02E-01	5.47E-01	8.64E-01	1.40E+00	2.07E+00	2.07E+00	2.12E+00	2.12E+00
Season															
Fall	1404000	55	1.55E+00	1.09E-03	1.83E-01	1.83E-01	3.52E-01	3.61E-01	5.17E-01	1.33E+00	2.01E+00	2.86E+00	3.90E+00	7.24E+00	7.24E+00
Spring	911000	108	2.32E+00	1.77E-03	2.02E-01	2.70E-01	3.90E-01	5.10E-01	1.04E+00	1.96E+00	3.29E+00	4.22E+00	5.23E+00	8.62E+00	9.28E+00
Summer	1755000	69	3.48E+00	2.59E-03	1.02E-01	1.02E-01	6.08E-01	7.45E-01	1.02E+00	2.44E+00	4.43E+00	7.51E+00	1.14E+01	1.87E+01	1.87E+01
Winter	888000	72	1.95E+00	2.47E-03	3.93E-02	3.93E-02	3.75E-01	3.94E-01	6.74E-01	1.33E+00	2.14E+00	4.23E+00	5.39E+00	1.94E+01	1.94E+01
Urbanization															
Central City	100000	5	8.30E-01	1.31E-03	3.13E-01	3.13E-01	3.13E-01	3.13E-01	3.94E-01	8.96E-01	1.23E+00	1.32E+00	1.32E+00	1.32E+00	1.32E+00
Nonmetropolitan	3070000	194	2.80E+00	1.73E-03	1.02E-01	1.83E-01	3.77E-01	4.99E-01	8.64E-01	1.81E+00	3.57E+00	6.03E+00	8.44E+00	1.87E+01	1.94E+01
Surburban	1788000	105	1.93E+00	1.15E-03	3.93E-02	2.67E-01	3.75E-01	4.16E-01	9.07E-01	1.52E+00	2.44E+00	4.06E+00	5.10E+00	7.51E+00	9.28E+00
Race															
Other/NA	8000	1	1.50E+00	0.00E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00
White	4950000	303	2.45E+00	1.17E-03	3.93E-02	1.83E-01	3.74E-01	4.65E-01	8.78E-01	1.61E+00	3.07E+00	5.29E+00	7.24E+00	1.33E+01	1.94E+01
Region															
Midwest	2261000	161	2.83E+00	1.95E-03	1.83E-01	1.83E-01	3.54E-01	4.16E-01	8.47E-01	2.01E+00	3.66E+00	5.90E+00	8.39E+00	1.87E+01	1.87E+01
Northeast	586000	25	1.44E+00	1.39E-03	3.52E-01	3.52E-01	3.52E-01	4.73E-01	7.42E-01	1.06E+00	1.68E+00	2.62E+00	2.62E+00	6.03E+00	6.03E+00
South	1042000	61	2.45E+00	2.65E-03	3.93E-02	1.02E-01	3.90E-01	5.84E-01	8.16E-01	1.59E+00	2.41E+00	6.36E+00	7.24E+00	1.33E+01	1.33E+01
West	1069000	57	2.20E+00	2.07E-03	3.13E-01	3.13E-01	3.80E-01	5.56E-01	1.04E+00	1.60E+00	2.86E+00	4.06E+00	4.42E+00	7.51E+00	1.94E+01
Response to Questionnaire															
Do you raise animals?	3699000	239	2.66E+00	1.29E-03	1.02E-01	1.83E-01	3.88E-01	6.63E-01	1.04E+00	1.83E+00	3.48E+00	5.39E+00	7.51E+00	1.25E+01	1.94E+01
Do you farm?	2850000	182	2.63E+00	1.57E-03	1.83E-01	2.70E-01	3.94E-01	5.85E-01	8.96E-01	1.64E+00	3.25E+00	5.39E+00	7.51E+00	1.33E+01	1.94E+01

Table 2-235. Intake of Homecaught Game (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2707000	185	9.67E-01	5.08E-04	0.00E+00	0.00E+00	1.17E-01	2.10E-01	3.97E-01	7.09E-01	1.22E+00	2.27E+00	2.67E+00	3.61E+00	4.59E+00
Age															
01-02	89000	8	1.12E+00	2.38E-03	1.40E-01	1.40E-01	1.40E-01	3.51E-01	7.70E-01	9.67E-01	1.27E+00	2.34E+00	2.34E+00	2.34E+00	2.34E+00
03-05	94000	8	1.81E+00	1.97E-03	7.74E-01	7.74E-01	7.74E-01	7.74E-01	1.39E+00	1.93E+00	2.15E+00	2.20E+00	3.05E+00	3.05E+00	3.05E+00
06-11	362000	28	1.09E+00	1.27E-03	1.16E-01	1.16E-01	2.31E-01	4.28E-01	6.33E-01	7.61E-01	1.48E+00	2.67E+00	2.85E+00	2.90E+00	2.90E+00
12-19	462000	27	1.04E+00	1.06E-03	2.10E-01	2.10E-01	2.10E-01	2.91E-01	6.30E-01	8.46E-01	1.22E+00	1.99E+00	3.13E+00	3.13E+00	3.13E+00
20-39	844000	59	8.24E-01	9.04E-04	7.53E-02	1.04E-01	1.17E-01	1.88E-01	3.01E-01	6.31E-01	1.09E+00	1.57E+00	2.50E+00	4.59E+00	4.59E+00
40-69	694000	41	9.64E-01	1.08E-03	1.24E-01	1.24E-01	1.72E-01	2.87E-01	3.42E-01	5.10E-01	1.41E+00	2.51E+00	3.19E+00	3.61E+00	3.61E+00
70 +	74000	7	1.45E+00	2.12E-03	5.56E-01	5.56E-01	5.56E-01	5.56E-01	7.76E-01	1.75E+00	1.99E+00	1.99E+00	1.99E+00	1.99E+00	1.99E+00
Season															
Fall	876000	31	9.97E-01	9.31E-04	1.17E-01	1.17E-01	1.48E-01	2.18E-01	4.28E-01	6.33E-01	1.19E+00	2.50E+00	3.13E+00	3.19E+00	3.19E+00
Spring	554000	68	9.06E-01	9.72E-04	0.00E+00	0.00E+00	1.04E-01	1.72E-01	4.43E-01	7.46E-01	1.22E+00	1.75E+00	2.52E+00	3.61E+00	3.61E+00
Summer	273000	9	6.30E-01	7.19E-04	1.88E-01	1.88E-01	1.88E-01	1.88E-01	3.20E-01	6.30E-01	7.74E-01	1.41E+00	1.41E+00	1.41E+00	1.41E+00
Winter	1004000	77	1.07E+00	9.19E-04	0.00E+00	0.00E+00	0.00E+00	1.65E-01	3.88E-01	8.18E-01	1.52E+00	2.20E+00	2.67E+00	4.59E+00	4.59E+00
Urbanization															
Central City	506000	20	6.89E-01	7.99E-04	0.00E+00	0.00E+00	0.00E+00	1.88E-01	2.77E-01	6.30E-01	7.74E-01	1.48E+00	1.99E+00	2.34E+00	2.34E+00
Nonmetropolitan	1259000	101	9.45E-01	7.98E-04	0.00E+00	0.00E+00	1.17E-01	1.65E-01	3.20E-01	6.59E-01	1.19E+00	2.27E+00	3.05E+00	4.59E+00	4.59E+00
Surburban	942000	64	1.15E+00	8.53E-04	0.00E+00	0.00E+00	2.56E-01	3.97E-01	5.21E-01	8.18E-01	1.52E+00	2.51E+00	2.85E+00	3.13E+00	3.61E+00
Race															
Other/NA	102000	3	6.95E-01	1.87E-04	6.30E-01	6.30E-01	6.30E-01	6.30E-01	6.30E-01	6.82E-01	7.74E-01	7.74E-01	7.74E-01	7.74E-01	7.74E-01
White	2605000	182	9.77E-01	5.26E-04	0.00E+00	0.00E+00	1.17E-01	2.02E-01	3.76E-01	7.29E-01	1.38E+00	2.34E+00	2.85E+00	3.61E+00	4.59E+00
Region															
Midwest	1321000	97	8.83E-01	7.13E-04	0.00E+00	0.00E+00	7.53E-02	2.18E-01	3.42E-01	6.12E-01	1.10E+00	1.99E+00	2.51E+00	4.59E+00	4.59E+00
Northeast	394000	20	1.13E+00	1.54E-03	2.87E-01	2.87E-01	2.87E-01	3.21E-01	4.30E-01	7.74E-01	1.41E+00	3.13E+00	3.13E+00	3.61E+00	3.61E+00
South	609000	47	1.26E+00	1.13E-03	0.00E+00	0.00E+00	1.17E-01	1.48E-01	6.32E-01	1.09E+00	1.93E+00	2.38E+00	3.19E+00	3.19E+00	3.19E+00
West	383000	21	6.28E-01	5.34E-04	1.24E-01	1.24E-01	1.51E-01	1.88E-01	3.97E-01	6.33E-01	7.74E-01	1.12E+00	1.22E+00	1.52E+00	1.52E+00
Response to Questionnaire															
Do you hunt?	2357000	158	1.04E+00	5.60E-04	0.00E+00	0.00E+00	1.40E-01	2.77E-01	4.42E-01	7.46E-01	1.44E+00	2.38E+00	2.90E+00	3.61E+00	4.59E+00

Table 2-236. Intake of Homeproduced Pork (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1732000	121	1.23E+00	8.05E-04	9.26E-02	9.26E-02	1.40E-01	3.05E-01	5.41E-01	8.96E-01	1.71E+00	2.73E+00	3.37E+00	4.93E+00	7.41E+00
Age															
01-02	38000	5	2.10E+00	4.17E-03	1.08E+00	1.08E+00	1.08E+00	1.08E+00	1.47E+00	2.05E+00	2.45E+00	3.37E+00	3.37E+00	3.37E+00	3.37E+00
03-05	26000	3	2.52E+00	5.71E-03	1.46E+00	1.46E+00	1.46E+00	1.46E+00	1.46E+00	2.68E+00	3.68E+00	3.68E+00	3.68E+00	3.68E+00	3.68E+00
06-11	129000	11	1.81E+00	3.07E-03	5.03E-01	5.03E-01	5.03E-01	5.89E-01	9.80E-01	1.56E+00	2.73E+00	3.28E+00	3.73E+00	3.73E+00	3.73E+00
12-19	291000	20	1.28E+00	2.01E-03	3.05E-01	3.05E-01	3.23E-01	3.37E-01	5.24E-01	8.85E-01	1.75E+00	3.69E+00	3.69E+00	4.29E+00	4.29E+00
20-39	511000	32	1.21E+00	1.43E-03	1.11E-01	1.11E-01	2.83E-01	4.09E-01	5.52E-01	7.89E-01	1.43E+00	2.90E+00	3.08E+00	4.93E+00	4.93E+00
40-69	557000	38	1.02E+00	9.51E-04	1.19E-01	1.19E-01	1.81E-01	2.22E-01	4.05E-01	8.11E-01	1.71E+00	1.78E+00	2.28E+00	3.16E+00	3.16E+00
70 +	180000	12	1.04E+00	3.68E-03	9.26E-02	9.26E-02	9.26E-02	9.26E-02	1.25E-01	8.74E-01	9.66E-01	2.29E+00	4.85E+00	7.41E+00	7.41E+00
Season															
Fall	362000	13	1.41E+00	1.52E-03	4.09E-01	4.09E-01	4.09E-01	5.66E-01	6.46E-01	1.26E+00	1.69E+00	3.28E+00	3.69E+00	3.69E+00	3.69E+00
Spring	547000	59	1.13E+00	1.34E-03	1.11E-01	1.11E-01	1.40E-01	2.22E-01	3.52E-01	8.96E-01	1.50E+00	2.68E+00	3.68E+00	4.29E+00	4.29E+00
Summer	379000	15	9.93E-01	1.13E-03	9.26E-02	9.26E-02	9.26E-02	1.25E-01	5.24E-01	7.17E-01	1.71E+00	1.78E+00	2.44E+00	2.44E+00	2.44E+00
Winter	444000	34	1.40E+00	2.09E-03	1.26E-01	1.26E-01	2.58E-01	3.77E-01	5.03E-01	8.83E-01	2.21E+00	3.08E+00	4.93E+00	7.41E+00	7.41E+00
Urbanization															
Central City	90000	2	8.71E-01	1.09E-03	5.43E-01	5.43E-01	5.43E-01	5.43E-01	5.43E-01	8.71E-01	1.20E+00	1.20E+00	1.20E+00	1.20E+00	1.20E+00
Nonmetropolitan	1178000	77	1.39E+00	1.06E-03	9.26E-02	9.26E-02	2.15E-01	4.05E-01	6.17E-01	9.66E-01	1.75E+00	3.16E+00	3.69E+00	4.93E+00	7.41E+00
Surburban	464000	42	8.77E-01	1.14E-03	1.11E-01	1.11E-01	1.19E-01	1.81E-01	3.31E-01	5.89E-01	1.10E+00	2.28E+00	2.73E+00	2.90E+00	2.90E+00
Race															
White	1732000	121	1.23E+00	8.05E-04	9.26E-02	9.26E-02	1.40E-01	3.05E-01	5.41E-01	8.96E-01	1.71E+00	2.73E+00	3.37E+00	4.93E+00	7.41E+00
Region															
Midwest	844000	64	1.06E+00	1.04E-03	9.26E-02	9.26E-02	1.19E-01	2.13E-01	5.02E-01	6.72E-01	1.20E+00	2.68E+00	3.37E+00	3.69E+00	3.73E+00
Northeast	97000	5	2.22E+00	4.82E-03	6.46E-01	6.46E-01	6.46E-01	6.46E-01	6.46E-01	2.21E+00	3.16E+00	4.93E+00	4.93E+00	4.93E+00	4.93E+00
South	554000	32	1.35E+00	1.11E-03	1.81E-01	1.81E-01	2.58E-01	3.37E-01	8.11E-01	1.26E+00	1.75E+00	2.44E+00	3.08E+00	4.29E+00	4.29E+00
West	237000	20	1.15E+00	2.84E-03	1.26E-01	1.26E-01	3.23E-01	3.77E-01	4.40E-01	7.29E-01	1.10E+00	1.75E+00	2.73E+00	7.41E+00	7.41E+00
Response to Questionnaire															
Do you raise animals?	1428000	100	1.34E+00	8.25E-04	1.26E-01	1.40E-01	3.23E-01	4.05E-01	5.89E-01	9.66E-01	1.75E+00	2.90E+00	3.37E+00	4.29E+00	4.93E+00
Do you farm?	1218000	82	1.30E+00	9.14E-04	1.26E-01	2.15E-01	3.42E-01	4.08E-01	5.85E-01	9.24E-01	1.71E+00	3.08E+00	3.69E+00	4.93E+00	4.93E+00

Table 2-237. Intake of Homeproduced Poultry (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1816000	105	1.57E+00	8.72E-04	1.73E-01	1.95E-01	3.03E-01	4.18E-01	6.37E-01	1.23E+00	2.19E+00	3.17E+00	3.83E+00	5.33E+00	6.17E+00
Age															
< 01	34000	2	2.44E+00	1.49E-02	4.07E-01	4.07E-01	4.07E-01	4.07E-01	4.07E-01	4.07E-01	6.17E+00	6.17E+00	6.17E+00	6.17E+00	6.17E+00
01-02	91000	8	3.15E+00	2.62E-03	2.45E+00	2.45E+00	2.45E+00	2.45E+00	2.63E+00	2.71E+00	3.47E+00	3.86E+00	5.33E+00	5.33E+00	5.33E+00
03-05	70000	5	3.01E+00	3.49E-03	1.72E+00	1.72E+00	1.72E+00	1.72E+00	2.55E+00	2.95E+00	3.06E+00	4.83E+00	4.83E+00	4.83E+00	4.83E+00
06-11	205000	12	1.76E+00	1.39E-03	4.80E-01	4.80E-01	5.85E-01	5.85E-01	1.19E+00	2.10E+00	2.19E+00	2.29E+00	2.34E+00	2.34E+00	2.34E+00
12-19	194000	12	1.18E+00	1.64E-03	2.28E-01	2.28E-01	2.28E-01	4.18E-01	6.07E-01	1.06E+00	1.51E+00	2.23E+00	2.23E+00	3.29E+00	3.29E+00
20-39	574000	33	1.17E+00	1.11E-03	1.73E-01	1.73E-01	4.02E-01	4.02E-01	5.57E-01	1.15E+00	1.37E+00	1.80E+00	2.93E+00	4.59E+00	4.59E+00
40-69	568000	30	1.51E+00	1.76E-03	1.95E-01	1.95E-01	1.97E-01	3.03E-01	4.91E-01	7.74E-01	2.69E+00	3.29E+00	4.60E+00	5.15E+00	5.15E+00
70 +	80000	3	1.89E+00	2.12E-04	1.83E+00	1.83E+00	1.83E+00	1.83E+00	1.83E+00	1.87E+00	1.97E+00	1.97E+00	1.97E+00	1.97E+00	1.97E+00
Season															
Fall	562000	23	1.52E+00	1.12E-03	4.07E-01	4.07E-01	4.18E-01	4.60E-01	8.11E-01	1.39E+00	2.23E+00	2.69E+00	3.17E+00	3.17E+00	3.17E+00
Spring	374000	34	1.87E+00	2.66E-03	1.73E-01	1.73E-01	2.28E-01	3.03E-01	5.22E-01	1.38E+00	3.29E+00	4.60E+00	5.15E+00	5.33E+00	5.33E+00
Summer	312000	11	1.36E+00	1.55E-03	4.02E-01	4.02E-01	4.02E-01	4.02E-01	6.72E-01	8.80E-01	1.97E+00	2.19E+00	3.29E+00	3.29E+00	3.29E+00
Winter	568000	37	1.55E+00	1.61E-03	1.95E-01	1.95E-01	1.97E-01	4.33E-01	5.95E-01	1.23E+00	2.18E+00	2.95E+00	3.47E+00	6.17E+00	6.17E+00
Urbanization															
Central City	230000	8	1.04E+00	1.37E-03	4.60E-01	4.60E-01	4.60E-01	4.60E-01	4.72E-01	5.95E-01	1.44E+00	2.18E+00	2.34E+00	2.34E+00	2.34E+00
Nonmetropolitan	997000	56	1.48E+00	9.88E-04	1.73E-01	1.95E-01	2.82E-01	4.07E-01	6.72E-01	1.19E+00	2.10E+00	3.17E+00	3.29E+00	3.86E+00	5.33E+00
Surburban	589000	41	1.94E+00	1.92E-03	2.28E-01	2.28E-01	2.67E-01	4.33E-01	6.24E-01	1.59E+00	2.69E+00	4.59E+00	4.83E+00	6.17E+00	6.17E+00
Race															
Black	44000	2	1.43E+00	3.23E-03	7.51E-01	7.51E-01	7.51E-01	7.51E-01	7.51E-01	1.43E+00	2.11E+00	2.11E+00	2.11E+00	2.11E+00	2.11E+00
White	1772000	103	1.57E+00	8.90E-04	1.73E-01	1.95E-01	3.03E-01	4.18E-01	6.24E-01	1.23E+00	2.19E+00	3.17E+00	3.86E+00	5.33E+00	6.17E+00
Region															
Midwest	765000	41	1.60E+00	1.02E-03	4.07E-01	4.07E-01	4.18E-01	5.57E-01	9.79E-01	1.39E+00	2.19E+00	2.70E+00	3.17E+00	3.86E+00	5.33E+00
Northeast	64000	4	1.92E+00	3.62E-03	7.09E-01	7.09E-01	7.09E-01	7.09E-01	1.04E+00	2.00E+00	2.79E+00	2.95E+00	2.95E+00	2.95E+00	2.95E+00
South	654000	38	1.67E+00	1.91E-03	1.73E-01	1.73E-01	1.97E-01	3.03E-01	4.60E-01	9.08E-01	2.11E+00	4.59E+00	4.83E+00	6.17E+00	6.17E+00
West	333000	22	1.24E+00	1.46E-03	2.67E-01	2.67E-01	2.67E-01	4.27E-01	5.60E-01	1.02E+00	1.89E+00	2.45E+00	2.93E+00	2.93E+00	2.93E+00
Response to Questionnaire															
Do you raise animals?	1333000	81	1.58E+00	9.21E-04	1.73E-01	2.28E-01	4.07E-01	4.72E-01	7.09E-01	1.37E+00	2.19E+00	2.93E+00	3.29E+00	5.33E+00	6.17E+00
Do you farm?	917000	59	1.54E+00	1.44E-03	1.73E-01	1.95E-01	2.28E-01	3.03E-01	5.95E-01	1.06E+00	2.18E+00	3.47E+00	4.83E+00	6.17E+00	6.17E+00

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Table 2-238. Intake of Homeproduced Eggs (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2075000	124	7.31E-01	7.74E-04	7.16E-02	7.16E-02	1.50E-01	1.75E-01	2.68E-01	4.66E-01	9.02E-01	1.36E+00	1.69E+00	6.58E+00	1.35E+01
Age															
< 01	20000	2	6.42E+00	4.09E-02	1.69E+00	1.69E+00	1.69E+00	1.69E+00	1.69E+00	1.69E+00	1.35E+01	1.35E+01	1.35E+01	1.35E+01	1.35E+01
01-02	21000	3	5.70E+00	2.25E-02	1.34E+00	1.34E+00	1.34E+00	1.34E+00	1.34E+00	6.58E+00	9.16E+00	9.16E+00	9.16E+00	9.16E+00	9.16E+00
03-05	20000	2	2.28E+00	5.67E-03	1.62E+00	1.62E+00	1.62E+00	1.62E+00	1.62E+00	1.62E+00	3.26E+00	3.26E+00	3.26E+00	3.26E+00	3.26E+00
06-11	170000	12	1.32E+00	1.09E-03	5.70E-01	5.70E-01	6.80E-01	6.80E-01	1.18E+00	1.19E+00	1.65E+00	1.85E+00	2.07E+00	2.22E+00	2.22E+00
12-19	163000	14	6.00E-01	7.80E-04	1.96E-01	1.96E-01	1.96E-01	1.96E-01	4.11E-01	5.75E-01	6.91E-01	1.08E+00	1.08E+00	1.49E+00	1.49E+00
20-39	474000	30	6.32E-01	7.34E-04	7.16E-02	7.16E-02	7.16E-02	2.15E-01	3.00E-01	4.16E-01	8.14E-01	1.32E+00	1.93E+00	2.50E+00	2.50E+00
40-69	718000	43	5.91E-01	4.47E-04	1.37E-01	1.37E-01	1.41E-01	1.52E-01	3.17E-01	5.14E-01	8.44E-01	1.30E+00	1.36E+00	1.38E+00	1.38E+00
70 +	489000	18	3.63E-01	4.27E-04	1.50E-01	1.50E-01	1.57E-01	1.65E-01	2.06E-01	2.60E-01	3.32E-01	1.05E+00	1.22E+00	1.22E+00	1.22E+00
Seasons															
Fall	542000	18	4.72E-01	5.07E-04	1.52E-01	1.52E-01	1.52E-01	1.65E-01	2.08E-01	2.72E-01	8.14E-01	1.05E+00	1.22E+00	1.33E+00	1.33E+00
Spring	460000	54	1.31E+00	3.12E-03	1.57E-01	1.57E-01	3.25E-01	3.94E-01	5.02E-01	6.66E-01	1.31E+00	2.10E+00	3.26E+00	1.35E+01	1.35E+01
Summer	723000	26	4.96E-01	4.88E-04	7.16E-02	7.16E-02	1.37E-01	1.41E-01	2.60E-01	3.32E-01	5.41E-01	1.36E+00	1.51E+00	1.65E+00	1.65E+00
Winter	350000	26	8.60E-01	8.19E-04	1.67E-01	1.67E-01	1.75E-01	2.15E-01	4.03E-01	7.51E-01	1.17E+00	1.62E+00	1.93E+00	1.93E+00	1.93E+00
Urbanization															
Central City	251000	9	3.53E-01	3.74E-04	1.65E-01	1.65E-01	1.65E-01	1.65E-01	2.17E-01	3.29E-01	3.39E-01	7.45E-01	7.57E-01	7.57E-01	7.57E-01
Nonmetropolitan	1076000	65	7.34E-01	9.58E-04	7.16E-02	7.16E-02	1.41E-01	1.67E-01	2.60E-01	4.74E-01	9.16E-01	1.34E+00	1.65E+00	6.58E+00	9.16E+00
Surburban	748000	50	8.54E-01	1.62E-03	1.37E-01	1.37E-01	1.50E-01	2.06E-01	3.80E-01	5.88E-01	1.17E+00	1.36E+00	1.85E+00	1.35E+01	1.35E+01
Race															
Black	63000	9	4.20E-01	1.34E-03	1.57E-01	1.57E-01	1.57E-01	1.57E-01	2.31E-01	3.37E-01	4.07E-01	1.34E+00	1.34E+00	1.34E+00	1.34E+00
White	2012000	115	7.41E-01	7.97E-04	7.16E-02	7.16E-02	1.50E-01	1.75E-01	2.68E-01	4.82E-01	9.03E-01	1.36E+00	1.69E+00	6.58E+00	1.35E+01
Region															
Midwest	665000	37	7.93E-01	1.46E-03	7.16E-02	7.16E-02	1.37E-01	1.41E-01	2.17E-01	3.39E-01	1.08E+00	1.51E+00	2.10E+00	9.16E+00	9.16E+00
Northeast	87000	7	1.02E+00	2.89E-03	1.75E-01	1.75E-01	1.75E-01	1.88E-01	6.53E-01	8.14E-01	8.30E-01	2.07E+00	3.26E+00	3.26E+00	3.26E+00
South	823000	44	5.36E-01	4.73E-04	1.52E-01	1.52E-01	1.77E-01	1.96E-01	2.60E-01	3.60E-01	5.99E-01	1.18E+00	1.62E+00	1.93E+00	1.93E+00
West	500000	36	9.21E-01	2.33E-03	1.67E-01	1.67E-01	2.06E-01	2.08E-01	4.58E-01	6.66E-01	1.05E+00	1.36E+00	1.36E+00	1.35E+01	1.35E+01
Response to Questionnaire															
Do you raise animals?	1824000	113	7.46E-01	8.74E-04	7.16E-02	7.16E-02	1.50E-01	1.65E-01	2.56E-01	4.82E-01	9.02E-01	1.36E+00	1.85E+00	6.58E+00	1.35E+01
Do you farm?	741000	44	8.98E-01	1.31E-03	1.52E-01	1.52E-01	1.65E-01	1.77E-01	2.72E-01	6.66E-01	1.19E+00	1.65E+00	1.85E+00	6.58E+00	9.16E+00

Table 2-239. Intake of Homegrown Exposed Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	28762000	1511	1.52E+00	3.69E-04	0.00E+00	3.25E-03	9.15E-02	1.72E-01	3.95E-01	8.60E-01	1.83E+00	3.55E+00	5.12E+00	1.03E+01	2.06E+01
Age															
< 01	334000	17	5.75E+00	7.19E-03	2.97E-01	2.97E-01	2.97E-01	8.05E-01	2.81E+00	4.29E+00	1.03E+01	1.19E+01	1.22E+01	1.49E+01	1.49E+01
01-02	815000	43	3.48E+00	3.73E-03	2.28E-02	2.28E-02	2.39E-01	8.34E-01	1.20E+00	1.89E+00	4.23E+00	1.07E+01	1.19E+01	1.21E+01	1.21E+01
03-05	1069000	62	1.74E+00	1.68E-03	0.00E+00	0.00E+00	7.23E-03	4.85E-02	5.79E-01	1.16E+00	2.53E+00	3.47E+00	6.29E+00	7.36E+00	8.86E+00
06-11	2454000	134	1.39E+00	1.30E-03	0.00E+00	0.00E+00	4.44E-02	9.42E-02	3.12E-01	6.43E-01	1.60E+00	3.22E+00	5.47E+00	1.33E+01	1.33E+01
12-19	2611000	143	1.07E+00	6.98E-04	0.00E+00	0.00E+00	2.92E-02	1.42E-01	3.04E-01	6.56E-01	1.46E+00	2.35E+00	3.78E+00	5.67E+00	5.67E+00
20-39	6969000	348	1.05E+00	5.75E-04	1.50E-03	8.20E-03	6.56E-02	1.17E-01	2.55E-01	5.58E-01	1.26E+00	2.33E+00	3.32E+00	7.57E+00	2.06E+01
40-69	10993000	579	1.60E+00	6.04E-04	0.00E+00	3.25E-03	1.41E-01	2.44E-01	4.79E-01	9.81E-01	1.92E+00	3.59E+00	5.22E+00	8.99E+00	1.90E+01
70 +	3517000	185	1.68E+00	8.80E-04	4.23E-03	5.21E-03	1.51E-01	2.39E-01	5.22E-01	1.13E+00	2.38E+00	4.08E+00	4.96E+00	6.96E+00	1.02E+01
Season															
Fall	8865000	314	1.31E+00	5.83E-04	0.00E+00	5.24E-02	1.11E-01	1.80E-01	3.33E-01	6.49E-01	1.56E+00	3.13E+00	4.45E+00	8.92E+00	1.22E+01
Spring	4863000	487	1.14E+00	6.35E-04	0.00E+00	2.35E-03	4.53E-02	1.53E-01	3.38E-01	6.58E-01	1.39E+00	2.76E+00	4.02E+00	7.51E+00	1.07E+01
Summer	10151000	348	2.03E+00	7.40E-04	0.00E+00	2.17E-03	1.13E-01	2.04E-01	6.07E-01	1.30E+00	2.52E+00	4.32E+00	6.35E+00	1.27E+01	1.90E+01
Winter	4883000	362	1.21E+00	8.18E-04	0.00E+00	4.23E-03	2.28E-02	1.37E-01	3.70E-01	6.67E-01	1.42E+00	2.76E+00	3.69E+00	8.86E+00	2.06E+01
Urbanization															
Central City	4859000	173	1.11E+00	6.12E-04	0.00E+00	1.01E-02	6.04E-02	8.02E-02	2.83E-01	7.01E-01	1.43E+00	2.49E+00	3.29E+00	8.34E+00	1.21E+01
Nonmetropolitan	11577000	711	1.87E+00	6.89E-04	0.00E+00	1.65E-02	1.72E-01	2.52E-01	5.01E-01	1.16E+00	2.20E+00	4.12E+00	6.10E+00	1.22E+01	1.90E+01
Surburban	12266000	625	1.35E+00	5.00E-04	0.00E+00	2.93E-03	9.68E-02	1.56E-01	3.55E-01	7.44E-01	1.58E+00	3.22E+00	5.22E+00	8.61E+00	2.06E+01
Race															
Asian	155000	7	1.82E+00	6.06E-03	4.23E-02	4.23E-02	4.23E-02	4.61E-02	5.58E-01	5.88E-01	8.37E-01	6.07E+00	6.07E+00	6.07E+00	6.07E+00
Black	1713000	100	1.23E+00	9.72E-04	0.00E+00	0.00E+00	7.74E-02	1.41E-01	3.52E-01	8.93E-01	1.51E+00	3.32E+00	3.92E+00	5.55E+00	7.19E+00
Native American	28000	1	5.05E-01	0.00E+00	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01	5.05E-01
Other/NA	255000	15	2.87E+00	3.61E-03	4.73E-03	4.73E-03	2.14E-01	2.68E-01	1.42E+00	2.92E+00	4.18E+00	5.67E+00	5.67E+00	5.67E+00	5.67E+00
White	26551000	1386	1.53E+00	3.91E-04	0.00E+00	4.67E-03	9.74E-02	1.77E-01	3.95E-01	8.59E-01	1.82E+00	3.48E+00	5.12E+00	1.03E+01	2.06E+01
Region															
Midwest	10402000	570	1.48E+00	6.59E-04	0.00E+00	1.00E-02	7.14E-02	1.57E-01	3.88E-01	8.06E-01	1.69E+00	3.55E+00	4.67E+00	1.19E+01	2.06E+01
Northeast	4050000	191	1.65E+00	1.22E-03	0.00E+00	2.35E-03	8.05E-02	1.38E-01	2.61E-01	6.65E-01	1.75E+00	5.58E+00	6.80E+00	1.27E+01	1.49E+01
South	9238000	503	1.55E+00	5.75E-04	0.00E+00	5.20E-02	1.63E-01	2.61E-01	5.18E-01	9.99E-01	1.92E+00	3.19E+00	4.52E+00	9.92E+00	1.33E+01
West	5012000	245	1.43E+00	7.13E-04	1.50E-03	3.25E-03	2.61E-02	1.45E-01	3.91E-01	7.63E-01	2.13E+00	3.45E+00	4.84E+00	7.51E+00	8.34E+00
Response to Questionnaire															
Do you garden?	25737000	1361	1.57E+00	3.99E-04	0.00E+00	3.25E-03	8.87E-02	1.68E-01	4.13E-01	8.89E-01	1.97E+00	3.63E+00	5.45E+00	1.03E+01	2.06E+01
Do you farm?	3596000	207	2.17E+00	1.22E-03	0.00E+00	0.00E+00	1.84E-01	3.72E-01	6.47E-01	1.38E+00	2.81E+00	6.01E+00	6.83E+00	1.03E+01	1.33E+01

Table 2-240. Intake of Homegrown Protected Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11428000	656	1.01E+00	3.57E-04	1.42E-02	1.03E-01	1.54E-01	1.94E-01	3.22E-01	6.25E-01	1.20E+00	2.24E+00	3.05E+00	6.49E+00	9.42E+00
Age															
< 01	191000	10	3.61E+00	3.27E-03	1.49E+00	1.49E+00	1.49E+00	1.66E+00	2.57E+00	2.83E+00	4.78E+00	4.95E+00	5.73E+00	6.39E+00	6.39E+00
01-02	348000	21	2.46E+00	3.81E-03	3.15E-01	3.15E-01	3.15E-01	5.38E-01	1.36E+00	1.94E+00	2.96E+00	3.88E+00	9.42E+00	9.42E+00	9.42E+00
03-05	440000	32	1.30E+00	1.82E-03	2.33E-01	2.33E-01	2.33E-01	3.22E-01	4.80E-01	1.04E+00	1.48E+00	2.51E+00	5.10E+00	5.31E+00	5.31E+00
06-11	1052000	63	1.10E+00	1.04E-03	1.18E-01	1.89E-01	2.08E-01	3.18E-01	3.87E-01	7.91E-01	1.31E+00	2.14E+00	3.12E+00	5.40E+00	5.40E+00
12-19	910000	51	7.76E-01	6.52E-04	5.88E-02	5.88E-02	1.61E-01	2.39E-01	3.54E-01	5.83E-01	8.24E-01	1.85E+00	2.20E+00	2.69E+00	2.69E+00
20-39	3227000	164	7.62E-01	4.30E-04	1.42E-02	1.13E-01	1.52E-01	1.71E-01	2.41E-01	5.06E-01	9.67E-01	1.73E+00	2.51E+00	3.63E+00	4.76E+00
40-69	3818000	226	9.30E-01	5.63E-04	6.70E-02	6.87E-02	1.35E-01	1.66E-01	3.16E-01	6.03E-01	1.11E+00	1.87E+00	3.04E+00	6.84E+00	7.44E+00
70 +	1442000	89	1.05E+00	1.27E-03	8.20E-02	1.19E-01	2.10E-01	2.42E-01	3.57E-01	5.72E-01	1.21E+00	1.86E+00	3.05E+00	9.23E+00	9.23E+00
Season															
Fall	3907000	143	8.51E-01	4.25E-04	1.13E-01	1.19E-01	1.61E-01	2.04E-01	3.22E-01	5.68E-01	1.10E+00	1.73E+00	2.51E+00	4.78E+00	5.31E+00
Spring	2086000	236	7.02E-01	4.76E-04	1.42E-02	5.88E-02	1.35E-01	1.70E-01	2.66E-01	4.90E-01	9.08E-01	1.44E+00	1.86E+00	3.74E+00	5.73E+00
Summer	3559000	118	1.40E+00	8.99E-04	6.87E-02	1.03E-01	1.77E-01	2.33E-01	3.81E-01	7.81E-01	1.69E+00	3.05E+00	5.40E+00	9.23E+00	9.42E+00
Winter	1876000	159	9.30E-01	7.09E-04	1.09E-01	1.18E-01	1.42E-01	1.82E-01	3.12E-01	6.01E-01	1.20E+00	2.32E+00	3.06E+00	4.76E+00	6.39E+00
Urbanization															
Central City	1342000	49	9.96E-01	9.10E-04	1.12E-01	1.19E-01	1.53E-01	1.67E-01	3.18E-01	7.21E-01	1.18E+00	2.36E+00	2.83E+00	4.78E+00	4.78E+00
Nonmetropolitan	5934000	391	1.07E+00	5.16E-04	5.88E-02	1.14E-01	1.66E-01	2.14E-01	3.53E-01	6.48E-01	1.30E+00	2.51E+00	3.55E+00	6.84E+00	9.42E+00
Surburban	4152000	216	9.26E-01	5.75E-04	1.42E-02	6.87E-02	1.50E-01	1.88E-01	2.94E-01	5.64E-01	1.15E+00	1.85E+00	2.67E+00	6.49E+00	9.23E+00
Race															
Asian	29000	1	1.81E-01	0.00E+00	1.81E-01	1.81E-01	1.81E-01	1.81E-01	1.81E-01	1.81E-01	1.81E-01	1.81E-01	1.81E-01	1.81E-01	1.81E-01
Black	479000	27	1.50E+00	1.69E-03	1.62E-01	1.62E-01	2.64E-01	3.31E-01	8.66E-01	9.35E-01	2.20E+00	3.05E+00	3.23E+00	4.95E+00	4.95E+00
Other/NA	84000	3	3.27E-01	6.92E-05	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.15E-01	3.54E-01	3.54E-01	3.54E-01	3.54E-01	3.54E-01
White	10836000	625	9.93E-01	3.66E-04	1.42E-02	1.03E-01	1.53E-01	1.92E-01	3.21E-01	6.10E-01	1.20E+00	2.17E+00	3.04E+00	6.49E+00	9.42E+00
Region															
Midwest	4359000	273	1.01E+00	5.84E-04	8.65E-02	1.13E-01	1.71E-01	2.31E-01	3.26E-01	5.72E-01	1.08E+00	2.45E+00	3.68E+00	6.84E+00	7.44E+00
Northeast	807000	48	7.01E-01	6.93E-04	5.88E-02	5.88E-02	1.50E-01	1.68E-01	2.65E-01	5.09E-01	9.91E-01	1.71E+00	2.33E+00	2.77E+00	2.77E+00
South	4449000	253	1.08E+00	5.40E-04	1.42E-02	1.29E-01	1.71E-01	2.14E-01	3.76E-01	7.12E-01	1.38E+00	2.32E+00	3.05E+00	5.40E+00	9.42E+00
West	1813000	82	9.57E-01	1.09E-03	6.87E-02	6.87E-02	1.19E-01	1.52E-01	2.08E-01	4.79E-01	1.01E+00	1.86E+00	3.12E+00	9.23E+00	9.23E+00
Response to Questionnaire															
Do you garden?	10286000	602	1.01E+00	3.62E-04	1.42E-02	1.03E-01	1.53E-01	1.92E-01	3.36E-01	6.42E-01	1.21E+00	2.32E+00	3.05E+00	6.49E+00	9.23E+00
Do you farm?	2325000	142	1.30E+00	1.13E-03	1.42E-02	8.65E-02	1.66E-01	2.09E-01	3.37E-01	5.99E-01	1.40E+00	3.55E+00	5.40E+00	9.23E+00	9.23E+00

Table 2-241. Intake of Homegrown Root Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	13750000	743	1.16E+00	4.29E-04	0.00E+00	4.72E-03	3.64E-02	1.12E-01	2.51E-01	6.66E-01	1.47E+00	2.81E+00	3.71E+00	9.52E+00	1.28E+01
Age															
< 01	167000	8	4.77E+00	1.23E-02	1.14E-01	1.14E-01	1.14E-01	6.89E-01	1.18E+00	1.80E+00	1.19E+01	1.23E+01	1.23E+01	1.23E+01	1.23E+01
01-02	371000	22	2.52E+00	4.70E-03	1.66E-01	1.66E-01	1.66E-01	2.19E-01	3.59E-01	9.20E-01	3.67E+00	7.25E+00	1.04E+01	1.04E+01	1.04E+01
03-05	390000	23	1.28E+00	2.49E-03	0.00E+00	0.00E+00	0.00E+00	1.17E-01	2.25E-01	4.62E-01	1.68E+00	4.26E+00	4.73E+00	4.73E+00	4.73E+00
06-11	1106000	67	1.32E+00	1.67E-03	0.00E+00	0.00E+00	1.39E-02	3.64E-02	2.32E-01	5.23E-01	1.63E+00	3.83E+00	5.59E+00	7.47E+00	7.47E+00
12-19	1465000	76	9.37E-01	8.59E-04	5.01E-03	7.59E-03	8.00E-03	6.84E-02	2.69E-01	5.65E-01	1.37E+00	2.26E+00	3.32E+00	5.13E+00	5.13E+00
20-39	3252000	164	8.74E-01	5.25E-04	8.53E-03	1.21E-02	5.35E-02	9.93E-02	2.00E-01	5.64E-01	1.24E+00	2.11E+00	3.08E+00	4.64E+00	6.03E+00
40-69	4903000	276	1.13E+00	7.40E-04	2.06E-03	3.34E-03	3.29E-02	1.17E-01	2.51E-01	6.75E-01	1.27E+00	2.74E+00	3.56E+00	9.52E+00	1.28E+01
70 +	2096000	107	1.22E+00	7.28E-04	5.34E-03	1.73E-02	2.90E-02	1.69E-01	3.76E-01	8.51E-01	1.71E+00	2.86E+00	3.21E+00	4.01E+00	4.77E+00
Season															
Fall	4026000	153	1.42E+00	9.43E-04	3.37E-02	5.15E-02	1.38E-01	1.72E-01	3.09E-01	9.20E-01	1.67E+00	3.26E+00	3.85E+00	1.23E+01	1.28E+01
Spring	2552000	260	6.87E-01	6.13E-04	2.06E-03	3.34E-03	1.73E-02	3.00E-02	1.44E-01	3.65E-01	7.69E-01	1.69E+00	2.80E+00	4.24E+00	7.69E+00
Summer	5011000	169	1.19E+00	6.97E-04	0.00E+00	0.00E+00	4.76E-02	1.32E-01	2.77E-01	7.26E-01	1.51E+00	2.74E+00	3.64E+00	1.04E+01	1.19E+01
Winter	2161000	161	1.17E+00	1.03E-03	3.03E-03	3.23E-03	8.57E-03	4.34E-02	2.38E-01	5.57E-01	1.56E+00	3.08E+00	4.14E+00	6.21E+00	1.13E+01
Urbanization															
Central City	2385000	96	7.49E-01	5.33E-04	1.02E-02	2.68E-02	3.90E-02	1.43E-01	2.23E-01	4.26E-01	9.16E-01	1.91E+00	2.70E+00	3.56E+00	3.93E+00
Nonmetropolitan	6094000	366	1.43E+00	7.60E-04	2.27E-03	8.57E-03	6.87E-02	1.29E-01	2.78E-01	7.58E-01	1.85E+00	3.32E+00	4.24E+00	1.13E+01	1.28E+01
Suburban	5211000	279	1.06E+00	6.31E-04	2.06E-03	3.73E-03	1.21E-02	7.17E-02	2.32E-01	7.34E-01	1.19E+00	2.34E+00	3.26E+00	6.29E+00	1.19E+01
Race															
Asian	83000	3	5.97E-01	1.82E-03	4.18E-02	4.18E-02	4.18E-02	4.18E-02	1.47E-01	1.47E-01	1.18E+00	1.18E+00	1.18E+00	1.18E+00	1.18E+00
Black	521000	31	8.83E-01	3.03E-03	4.72E-03	4.72E-03	9.28E-03	3.64E-02	8.82E-02	5.42E-01	7.65E-01	1.06E+00	1.25E+00	1.23E+01	1.23E+01
Native American	28000	1	1.76E-01	0.00E+00	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01
Other/NA	197000	9	1.69E+00	2.33E-03	5.01E-03	5.01E-03	2.03E-01	2.70E-01	3.92E-01	1.71E+00	2.45E+00	3.32E+00	3.32E+00	3.32E+00	3.32E+00
White	12861000	697	1.18E+00	4.39E-04	2.06E-03	7.79E-03	4.58E-02	1.29E-01	2.61E-01	6.80E-01	1.50E+00	2.82E+00	3.72E+00	9.52E+00	1.28E+01
Region															
Midwest	5572000	314	1.31E+00	7.16E-04	1.73E-02	3.37E-02	7.48E-02	1.66E-01	2.69E-01	7.39E-01	1.67E+00	3.23E+00	4.26E+00	1.04E+01	1.19E+01
Northeast	1721000	92	8.38E-01	7.53E-04	2.06E-03	3.23E-03	7.79E-03	8.69E-03	1.43E-01	4.81E-01	1.18E+00	2.05E+00	2.77E+00	4.78E+00	6.03E+00
South	3842000	205	1.38E+00	1.01E-03	3.03E-03	1.10E-02	5.35E-02	1.32E-01	2.77E-01	6.90E-01	1.70E+00	3.32E+00	3.83E+00	1.23E+01	1.28E+01
West	2555000	130	7.68E-01	4.58E-04	2.27E-03	4.72E-03	2.24E-02	1.14E-01	2.38E-01	5.70E-01	9.77E-01	1.69E+00	2.45E+00	3.72E+00	3.72E+00
Response to Questionnaire															
Do you garden?	12578000	682	1.15E+00	4.21E-04	0.00E+00	4.79E-03	3.64E-02	1.17E-01	2.58E-01	6.74E-01	1.50E+00	2.81E+00	3.64E+00	7.47E+00	1.28E+01
Do you farm?	2367000	136	1.39E+00	9.53E-04	7.07E-02	1.11E-01	1.58E-01	1.84E-01	3.65E-01	8.83E-01	1.85E+00	3.11E+00	4.58E+00	7.47E+00	7.69E+00

Table 2-242. Intake of Homegrown Exposed Fruits (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11770000	679	1.49E+00	6.17E-04	0.00E+00	4.41E-02	1.37E-01	2.55E-01	4.46E-01	8.33E-01	1.70E+00	3.16E+00	4.78E+00	1.20E+01	3.25E+01
Age															
< 01	105000	8	3.19E+00	5.28E-03	5.24E-01	5.24E-01	5.24E-01	1.81E+00	2.13E+00	2.76E+00	4.52E+00	5.57E+00	7.16E+00	7.16E+00	7.16E+00
01-02	306000	19	4.00E+00	5.28E-03	1.14E+00	1.14E+00	1.14E+00	1.35E+00	1.70E+00	3.63E+00	5.40E+00	8.27E+00	1.13E+01	1.15E+01	1.15E+01
03-05	470000	30	2.60E+00	6.22E-03	0.00E+00	0.00E+00	0.00E+00	3.73E-01	1.00E+00	1.82E+00	2.64E+00	5.41E+00	6.07E+00	3.25E+01	3.25E+01
06-11	915000	68	2.52E+00	3.65E-03	0.00E+00	0.00E+00	1.71E-01	3.73E-01	6.19E-01	1.11E+00	2.91E+00	6.98E+00	1.17E+01	1.57E+01	1.59E+01
12-19	896000	50	1.33E+00	1.54E-03	8.46E-02	8.46E-02	1.23E-01	2.58E-01	4.04E-01	6.09E-01	2.27E+00	3.41E+00	4.78E+00	5.90E+00	5.90E+00
20-39	2521000	139	1.09E+00	1.07E-03	5.60E-02	7.93E-02	1.30E-01	1.67E-01	3.04E-01	6.15E-01	1.07E+00	2.00E+00	3.58E+00	1.29E+01	1.29E+01
40-69	4272000	247	1.25E+00	8.39E-04	2.62E-02	6.46E-02	1.64E-01	2.54E-01	4.39E-01	7.19E-01	1.40E+00	2.61E+00	3.25E+00	1.30E+01	1.30E+01
70 +	2285000	118	1.39E+00	8.38E-04	4.15E-02	4.41E-02	2.07E-01	2.82E-01	5.71E-01	9.57E-01	1.66E+00	3.73E+00	4.42E+00	5.39E+00	7.13E+00
Season															
Fall	2877000	100	1.37E+00	6.86E-04	2.59E-01	2.59E-01	2.91E-01	3.42E-01	5.43E-01	1.03E+00	1.88E+00	2.88E+00	4.25E+00	5.41E+00	5.41E+00
Spring	2466000	265	1.49E+00	1.57E-03	6.49E-02	8.91E-02	1.98E-01	2.54E-01	4.32E-01	8.56E-01	1.65E+00	2.91E+00	4.67E+00	8.27E+00	3.25E+01
Summer	3588000	122	1.75E+00	1.46E-03	0.00E+00	0.00E+00	8.66E-02	1.30E-01	3.89E-01	6.41E-01	1.76E+00	4.29E+00	6.12E+00	1.30E+01	1.57E+01
Winter	2839000	192	1.27E+00	8.72E-04	2.62E-02	4.15E-02	1.04E-01	2.31E-01	4.59E-01	8.29E-01	1.55E+00	2.61E+00	4.66E+00	8.16E+00	1.13E+01
Urbanization															
Central City	2552000	99	1.34E+00	1.23E-03	4.15E-02	4.41E-02	1.01E-01	2.59E-01	4.46E-01	8.63E-01	1.60E+00	2.37E+00	2.88E+00	1.30E+01	1.30E+01
Nonmetropolitan	3891000	269	1.78E+00	1.39E-03	2.62E-02	6.46E-02	1.04E-01	1.67E-01	4.15E-01	9.42E-01	1.94E+00	4.07E+00	5.98E+00	1.57E+01	3.25E+01
Surburban	5267000	309	1.36E+00	6.89E-04	3.45E-02	9.18E-02	2.07E-01	2.93E-01	4.69E-01	7.73E-01	1.65E+00	3.16E+00	4.67E+00	7.29E+00	1.29E+01
Race															
Black	250000	12	1.14E+00	1.41E-03	1.38E-01	1.38E-01	1.38E-01	2.92E-01	5.99E-01	1.18E+00	1.61E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00
Other/NA	49000	2	5.45E-01	1.44E-03	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	1.27E+00	1.27E+00	1.27E+00	1.27E+00
White	11411000	663	1.51E+00	6.35E-04	2.62E-02	6.49E-02	1.55E-01	2.59E-01	4.49E-01	8.56E-01	1.72E+00	3.31E+00	4.78E+00	1.20E+01	3.25E+01
Region															
Midwest	4429000	293	1.60E+00	1.15E-03	2.62E-02	4.41E-02	1.25E-01	2.23E-01	4.23E-01	8.78E-01	1.88E+00	3.58E+00	4.78E+00	1.20E+01	3.25E+01
Northeast	1219000	69	7.55E-01	8.85E-04	8.08E-02	8.08E-02	8.66E-02	1.65E-01	3.00E-01	4.74E-01	7.84E-01	1.39E+00	2.86E+00	5.21E+00	7.13E+00
South	2532000	141	1.51E+00	1.37E-03	3.45E-02	7.93E-02	2.32E-01	3.01E-01	5.08E-01	9.16E-01	1.63E+00	2.63E+00	5.98E+00	1.57E+01	1.57E+01
West	3530000	174	1.60E+00	1.00E-03	7.14E-02	1.00E-01	2.40E-01	3.17E-01	5.69E-01	9.57E-01	1.97E+00	3.72E+00	5.00E+00	1.30E+01	1.30E+01
Response to Questionnaire															
Do you garden?	10197000	596	1.55E+00	6.97E-04	0.00E+00	4.15E-02	1.58E-01	2.58E-01	4.49E-01	8.78E-01	1.73E+00	3.41E+00	5.00E+00	1.29E+01	3.25E+01
Do you farm?	1917000	112	2.32E+00	1.91E-03	5.60E-02	7.21E-02	2.76E-01	3.71E-01	6.81E-01	1.30E+00	3.14E+00	5.00E+00	6.12E+00	1.57E+01	1.57E+01

Table 2-243. Intake of Homegrown Protected Fruits (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3855000	173	5.74E+00	4.19E−03	1.12E−01	1.50E−01	2.66E−01	3.35E−01	9.33E−01	2.34E+00	7.45E+00	1.60E+01	1.97E+01	4.73E+01	5.36E+01
Age															
< 01	80000	3	1.16E+01	1.94E−02	5.38E+00	5.38E+00	5.38E+00	5.38E+00	5.38E+00	1.66E+01	1.66E+01	1.66E+01	1.66E+01	1.66E+01	1.66E+01
01–02	79000	5	2.43E+01	7.38E−02	9.08E−01	9.08E−01	9.08E−01	9.08E−01	9.23E+00	1.88E+01	5.36E+01	5.36E+01	5.36E+01	5.36E+01	5.36E+01
03–05	80000	4	1.27E+01	6.18E−02	1.86E+00	1.86E+00	1.86E+00	1.86E+00	2.44E+00	2.44E+00	8.91E+00	4.73E+01	4.73E+01	4.73E+01	4.73E+01
06–11	181000	9	8.05E+00	2.55E−02	4.52E−01	4.52E−01	4.52E−01	4.52E−01	7.67E−01	1.16E+00	1.60E+01	2.53E+01	3.28E+01	3.28E+01	3.28E+01
12–19	377000	20	2.96E+00	7.23E−03	1.17E−01	1.17E−01	1.60E−01	2.83E−01	3.93E−01	1.23E+00	2.84E+00	7.44E+00	1.14E+01	1.91E+01	1.91E+01
20–39	755000	29	4.51E+00	6.72E−03	1.81E−01	1.81E−01	3.62E−01	4.87E−01	1.22E+00	1.88E+00	4.47E+00	1.46E+01	1.61E+01	2.41E+01	2.41E+01
40–69	1702000	77	5.65E+00	5.82E−03	1.12E−01	1.12E−01	2.44E−01	2.87E−01	6.69E−01	2.22E+00	9.36E+00	1.55E+01	2.12E+01	4.13E+01	4.13E+01
70 +	601000	26	4.44E+00	4.55E−03	2.62E−01	2.62E−01	2.62E−01	2.85E−01	1.95E+00	3.29E+00	7.06E+00	8.97E+00	9.97E+00	1.52E+01	1.52E+01
Season															
Fall	394000	12	2.46E+00	4.50E−03	2.62E−01	2.62E−01	2.62E−01	2.85E−01	4.50E−01	1.16E+00	4.97E+00	6.94E+00	8.97E+00	8.97E+00	8.97E+00
Spring	497000	36	2.08E+00	2.96E−03	1.60E−01	1.60E−01	1.81E−01	2.55E−01	3.78E−01	1.22E+00	4.08E+00	5.10E+00	6.57E+00	6.79E+00	6.79E+00
Summer	1425000	47	7.39E+00	8.33E−03	1.12E−01	1.12E−01	2.66E−01	3.93E−01	1.25E+00	3.06E+00	1.03E+01	1.66E+01	2.41E+01	5.36E+01	5.36E+01
Winter	1539000	78	6.24E+00	6.48E−03	1.17E−01	1.50E−01	3.02E−01	3.76E−01	1.39E+00	2.65E+00	8.23E+00	1.78E+01	2.12E+01	4.73E+01	4.73E+01
Urbanization															
Central City	1312000	50	3.94E+00	3.58E−03	1.50E−01	1.50E−01	2.62E−01	3.33E−01	8.34E−01	3.01E+00	5.01E+00	9.23E+00	9.97E+00	1.88E+01	1.88E+01
Nonmetropolitan	506000	19	6.04E+00	1.33E−02	1.06E+00	1.06E+00	1.06E+00	1.18E+00	1.63E+00	2.31E+00	5.38E+00	1.07E+01	4.13E+01	4.13E+01	4.13E+01
Surburban	2037000	104	6.83E+00	6.70E−03	1.12E−01	1.12E−01	2.53E−01	2.92E−01	5.94E−01	2.01E+00	1.03E+01	1.79E+01	2.38E+01	5.36E+01	5.36E+01
Race															
Black	200000	8	2.73E+00	1.20E−02	4.50E−01	4.50E−01	4.50E−01	4.50E−01	6.44E−01	8.18E−01	1.50E+00	1.02E+01	1.88E+01	1.88E+01	1.88E+01
White	3655000	165	5.91E+00	4.35E−03	1.12E−01	1.17E−01	2.62E−01	3.33E−01	1.06E+00	2.44E+00	7.46E+00	1.60E+01	2.12E+01	4.73E+01	5.36E+01
Region															
Midwest	657000	24	1.07E+01	1.57E−02	2.53E−01	2.53E−01	2.62E−01	2.85E−01	1.18E+00	7.44E+00	1.46E+01	2.41E+01	4.13E+01	5.36E+01	5.36E+01
Northeast	105000	5	2.57E+00	9.76E−03	3.78E−01	3.78E−01	3.78E−01	3.78E−01	4.87E−01	5.68E−01	7.45E+00	7.45E+00	7.45E+00	7.45E+00	7.45E+00
South	1805000	74	4.77E+00	4.14E−03	1.17E−01	1.60E−01	3.64E−01	4.50E−01	1.23E+00	2.54E+00	5.10E+00	1.52E+01	1.66E+01	2.38E+01	2.40E+01
West	1288000	70	4.85E+00	6.83E−03	1.12E−01	1.12E−01	1.81E−01	2.68E−01	4.94E−01	1.84E+00	5.34E+00	1.23E+01	1.88E+01	4.73E+01	4.73E+01
Response to Questionnaire															
Do you garden?	3360000	146	5.90E+00	4.59E−03	1.12E−01	1.17E−01	2.65E−01	3.35E−01	1.16E+00	2.42E+00	7.46E+00	1.60E+01	1.91E+01	4.73E+01	5.36E+01
Do you farm?	357000	14	1.41E+00	1.61E−03	1.12E−01	1.12E−01	1.12E−01	2.44E−01	4.52E−01	1.31E+00	2.28E+00	2.34E+00	3.26E+00	3.26E+00	3.26E+00

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Table 2-244. Intake of Homegrown Dark Green Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	8855000	428	3.91E-01	2.05E-04	0.00E+00	2.01E-03	4.28E-03	1.01E-02	8.70E-02	2.11E-01	4.35E-01	9.19E-01	1.25E+00	3.53E+00	5.82E+00
Age															
< 01	56000	3	2.81E+00	4.92E-03	3.44E-01	3.44E-01	3.44E-01	3.44E-01	2.35E+00	3.53E+00	3.53E+00	3.53E+00	3.53E+00	3.53E+00	3.53E+00
01-02	180000	8	4.84E-01	1.26E-03	2.01E-02	2.01E-02	2.01E-02	1.68E-01	2.05E-01	2.51E-01	3.48E-01	1.69E+00	1.69E+00	1.69E+00	1.69E+00
03-05	226000	12	1.76E-01	4.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.54E-03	4.27E-02	2.26E-01	5.90E-01	6.32E-01	6.32E-01	6.32E-01
06-11	826000	39	3.05E-01	3.56E-04	0.00E+00	0.00E+00	6.34E-03	2.42E-02	9.00E-02	1.81E-01	3.87E-01	9.48E-01	1.04E+00	1.28E+00	1.28E+00
12-19	628000	32	4.20E-01	1.05E-03	4.92E-03	4.92E-03	5.38E-03	6.65E-03	5.62E-02	2.03E-01	3.73E-01	9.24E-01	1.64E+00	4.86E+00	4.86E+00
20-39	1976000	87	3.36E-01	4.04E-04	1.63E-03	2.21E-03	3.74E-03	1.00E-02	8.70E-02	1.76E-01	3.79E-01	6.69E-01	9.19E-01	2.94E+00	4.29E+00
40-69	3710000	184	4.01E-01	2.98E-04	0.00E+00	2.25E-03	3.67E-03	2.60E-02	8.19E-02	2.33E-01	4.80E-01	9.79E-01	1.25E+00	3.29E+00	5.82E+00
70 +	1253000	63	4.08E-01	5.16E-04	2.84E-03	2.84E-03	4.23E-03	5.68E-03	1.10E-01	2.31E-01	4.69E-01	9.29E-01	1.08E+00	3.45E+00	3.45E+00
Season															
Fall	2683000	88	4.41E-01	4.25E-04	1.01E-02	1.01E-02	4.46E-02	8.70E-02	1.45E-01	2.38E-01	4.59E-01	7.90E-01	1.08E+00	3.86E+00	4.29E+00
Spring	1251000	127	5.59E-01	7.96E-04	1.62E-03	1.63E-03	3.66E-03	5.72E-03	1.01E-01	3.09E-01	5.38E-01	1.28E+00	2.81E+00	4.86E+00	5.82E+00
Summer	3580000	124	3.39E-01	2.42E-04	0.00E+00	0.00E+00	2.84E-03	5.68E-03	6.34E-02	1.51E-01	4.05E-01	9.79E-01	1.15E+00	2.48E+00	2.48E+00
Winter	1341000	89	2.72E-01	3.19E-04	0.00E+00	2.01E-03	3.97E-03	5.21E-03	2.30E-02	1.51E-01	3.71E-01	6.59E-01	1.17E+00	2.04E+00	2.18E+00
Urbanization															
Central City	1298000	48	2.69E-01	2.24E-04	2.84E-03	2.84E-03	4.71E-03	1.01E-02	1.06E-01	2.05E-01	3.24E-01	6.32E-01	9.19E-01	1.07E+00	1.07E+00
Nonmetropolitan	3218000	167	3.31E-01	2.55E-04	0.00E+00	2.21E-03	4.67E-03	1.70E-02	6.86E-02	1.72E-01	4.52E-01	7.52E-01	1.00E+00	2.48E+00	5.82E+00
Surburban	4279000	211	4.79E-01	3.67E-04	1.62E-03	2.25E-03	5.21E-03	2.15E-02	9.22E-02	2.33E-01	4.59E-01	1.15E+00	2.18E+00	3.86E+00	4.86E+00
Race															
Asian	74000	2	2.01E+00	5.58E-03	4.92E-01	4.92E-01	4.92E-01	4.92E-01	4.92E-01	2.01E+00	3.53E+00	3.53E+00	3.53E+00	3.53E+00	3.53E+00
Black	724000	49	1.04E+00	1.48E-03	0.00E+00	0.00E+00	1.00E-01	1.13E-01	2.21E-01	5.52E-01	1.17E+00	3.29E+00	3.86E+00	4.86E+00	4.86E+00
Other/NA	34000	2	2.37E-01	6.99E-04	4.92E-03	4.92E-03	4.92E-03	4.92E-03	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01
White	7963000	373	3.21E-01	1.50E-04	1.62E-03	2.25E-03	4.67E-03	1.01E-02	7.75E-02	1.99E-01	3.79E-01	7.76E-01	1.07E+00	2.37E+00	5.82E+00
Region															
Midwest	2668000	121	2.81E-01	2.38E-04	2.01E-03	2.84E-03	4.77E-03	6.26E-03	6.34E-02	2.11E-01	3.58E-01	4.96E-01	9.79E-01	2.48E+00	3.02E+00
Northeast	1554000	76	5.08E-01	6.39E-04	1.62E-03	2.17E-03	2.80E-03	4.23E-03	5.62E-02	1.96E-01	4.92E-01	1.25E+00	1.93E+00	3.53E+00	5.82E+00
South	2945000	148	4.78E-01	3.59E-04	0.00E+00	3.64E-02	6.83E-02	9.23E-02	1.45E-01	2.87E-01	6.43E-01	9.24E-01	1.28E+00	3.86E+00	4.29E+00
West	1628000	81	3.18E-01	5.11E-04	1.63E-03	2.25E-03	3.37E-03	6.34E-03	3.50E-02	1.10E-01	3.09E-01	6.59E-01	9.29E-01	4.86E+00	4.86E+00
Response to Questionnaire															
Do you garden?	8521000	412	3.95E-01	2.11E-04	0.00E+00	1.63E-03	4.23E-03	1.05E-02	8.76E-02	2.12E-01	4.48E-01	9.19E-01	1.25E+00	3.53E+00	5.82E+00
Do you farm?	1450000	66	3.80E-01	4.10E-04	0.00E+00	1.62E-03	4.67E-03	5.38E-03	6.68E-02	2.31E-01	4.84E-01	9.48E-01	1.25E+00	2.48E+00	3.02E+00

Table 2-245. Intake of Homegrown Deep Yellow Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5467000	245	6.43E-01	2.97E-04	3.90E-02	4.34E-02	6.70E-02	1.26E-01	2.22E-01	4.17E-01	7.74E-01	1.44E+00	2.03E+00	2.67E+00	6.63E+00
Age															
< 01	97000	4	2.76E+00	6.10E-03	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00	2.23E+00	2.57E+00	6.63E+00	6.63E+00	6.63E+00	6.63E+00
01-02	124000	8	1.48E+00	2.41E-03	2.13E-01	2.13E-01	2.13E-01	2.13E-01	7.08E-01	1.67E+00	2.41E+00	2.60E+00	2.60E+00	2.60E+00	2.60E+00
03-05	61000	4	1.31E+00	5.62E-03	5.13E-01	5.13E-01	5.13E-01	5.13E-01	5.13E-01	6.62E-01	1.42E+00	4.37E+00	4.37E+00	4.37E+00	4.37E+00
06-11	382000	17	6.70E-01	8.93E-04	7.74E-02	7.74E-02	7.74E-02	1.90E-01	3.32E-01	4.78E-01	7.19E-01	1.63E+00	1.89E+00	2.23E+00	2.23E+00
12-19	493000	21	4.73E-01	5.99E-04	6.05E-02	6.05E-02	6.05E-02	6.29E-02	9.07E-02	3.63E-01	7.79E-01	1.13E+00	1.44E+00	1.58E+00	1.58E+00
20-39	1475000	63	5.32E-01	4.93E-04	4.89E-02	4.89E-02	5.55E-02	1.15E-01	1.66E-01	3.05E-01	5.11E-01	1.22E+00	2.03E+00	2.67E+00	2.67E+00
40-69	2074000	96	5.39E-01	3.50E-04	3.90E-02	3.90E-02	9.22E-02	1.43E-01	2.21E-01	4.03E-01	6.54E-01	1.09E+00	1.33E+00	3.02E+00	3.02E+00
70 +	761000	32	7.81E-01	5.97E-04	7.64E-02	7.64E-02	2.02E-01	2.77E-01	3.70E-01	5.72E-01	1.24E+00	1.61E+00	1.99E+00	1.99E+00	1.99E+00
Season															
Fall	2664000	97	7.38E-01	4.94E-04	9.21E-02	9.21E-02	1.22E-01	1.43E-01	2.61E-01	4.51E-01	9.74E-01	1.73E+00	2.23E+00	3.02E+00	6.63E+00
Spring	315000	34	5.64E-01	7.82E-04	1.43E-01	1.43E-01	1.45E-01	1.98E-01	2.47E-01	4.45E-01	6.43E-01	1.01E+00	1.42E+00	2.41E+00	2.41E+00
Summer	1619000	52	5.09E-01	3.61E-04	4.16E-02	4.16E-02	5.49E-02	6.48E-02	2.26E-01	4.10E-01	6.35E-01	9.64E-01	1.67E+00	2.31E+00	2.31E+00
Winter	869000	62	6.29E-01	7.73E-04	3.90E-02	3.90E-02	4.34E-02	6.29E-02	1.72E-01	3.52E-01	7.96E-01	1.54E+00	2.23E+00	4.37E+00	4.37E+00
Urbanization															
Central City	1308000	43	5.07E-01	4.06E-04	3.90E-02	3.90E-02	6.29E-02	1.43E-01	2.13E-01	3.88E-01	5.88E-01	9.64E-01	1.41E+00	2.24E+00	2.24E+00
Nonmetropolitan	2100000	118	6.66E-01	5.79E-04	4.16E-02	4.16E-02	5.55E-02	9.07E-02	2.20E-01	3.70E-01	8.65E-01	1.39E+00	2.12E+00	4.37E+00	6.63E+00
Surburban	2059000	84	7.07E-01	4.47E-04	6.48E-02	6.48E-02	9.22E-02	1.26E-01	2.62E-01	4.25E-01	9.74E-01	1.67E+00	2.03E+00	2.67E+00	2.67E+00
Race															
Asian	74000	2	7.53E-01	2.27E-03	1.35E-01	1.35E-01	1.35E-01	1.35E-01	1.35E-01	7.53E-01	1.37E+00	1.37E+00	1.37E+00	1.37E+00	1.37E+00
Black	129000	8	1.23E+00	6.09E-03	9.29E-02	9.29E-02	9.29E-02	9.29E-02	2.21E-01	4.38E-01	4.91E-01	6.63E+00	6.63E+00	6.63E+00	6.63E+00
Other/NA	171000	6	1.13E-01	2.88E-04	4.16E-02	4.16E-02	4.16E-02	4.16E-02	5.55E-02	6.05E-02	9.07E-02	3.92E-01	3.92E-01	3.92E-01	3.92E-01
White	5093000	229	6.45E-01	2.71E-04	3.90E-02	4.89E-02	9.21E-02	1.43E-01	2.41E-01	4.25E-01	7.96E-01	1.50E+00	2.03E+00	2.67E+00	4.37E+00
Region															
Midwest	2792000	128	7.52E-01	4.07E-04	3.90E-02	4.34E-02	1.32E-01	1.93E-01	2.82E-01	5.09E-01	9.55E-01	1.73E+00	2.23E+00	3.02E+00	4.37E+00
Northeast	735000	29	3.96E-01	5.06E-04	4.16E-02	4.16E-02	5.55E-02	6.05E-02	9.22E-02	1.50E-01	6.35E-01	1.09E+00	1.37E+00	2.21E+00	2.21E+00
South	557000	30	5.39E-01	1.52E-03	4.89E-02	4.89E-02	5.49E-02	7.74E-02	2.20E-01	3.05E-01	4.38E-01	7.74E-01	1.22E+00	6.63E+00	6.63E+00
West	1383000	58	5.97E-01	4.58E-04	6.48E-02	6.48E-02	1.27E-01	1.43E-01	2.21E-01	4.10E-01	6.42E-01	1.44E+00	1.89E+00	2.31E+00	2.31E+00
Response to Questionnaire															
Do you garden?	5177000	233	6.23E-01	2.63E-04	3.90E-02	4.16E-02	9.07E-02	1.32E-01	2.32E-01	4.15E-01	7.50E-01	1.42E+00	1.99E+00	2.67E+00	4.37E+00
Do you farm?	1088000	51	6.06E-01	5.83E-04	9.21E-02	9.21E-02	9.22E-02	1.22E-01	1.94E-01	3.40E-01	9.40E-01	1.28E+00	1.73E+00	3.02E+00	3.02E+00

Table 2-246. Intake of Homegrown Other Vegetables (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	25221000	1437	1.38E+00	3.77E-04	0.00E+00	9.44E-03	1.07E-01	1.76E-01	3.62E-01	7.78E-01	1.65E+00	3.09E+00	4.52E+00	9.95E+00	1.84E+01
Age															
< 01	298000	16	4.38E+00	5.50E-03	1.11E-01	1.11E-01	6.53E-01	1.70E+00	2.21E+00	3.53E+00	6.40E+00	1.08E+01	1.08E+01	1.10E+01	1.10E+01
01-02	613000	38	3.80E+00	4.94E-03	1.92E-01	1.92E-01	2.73E-01	4.04E-01	1.04E+00	2.61E+00	4.55E+00	7.74E+00	1.12E+01	1.80E+01	1.80E+01
03-05	887000	59	2.15E+00	2.18E-03	0.00E+00	0.00E+00	2.28E-01	3.72E-01	7.20E-01	1.37E+00	3.16E+00	4.47E+00	5.96E+00	8.41E+00	1.40E+01
06-11	2149000	134	1.30E+00	1.09E-03	0.00E+00	0.00E+00	1.21E-01	1.93E-01	3.54E-01	8.00E-01	1.61E+00	3.04E+00	4.57E+00	9.95E+00	9.95E+00
12-19	2379000	141	9.80E-01	6.59E-04	0.00E+00	0.00E+00	5.76E-02	1.15E-01	3.17E-01	6.40E-01	1.33E+00	2.05E+00	3.17E+00	5.41E+00	5.41E+00
20-39	6020000	328	9.30E-01	4.43E-04	8.38E-03	3.19E-02	9.37E-02	1.48E-01	2.43E-01	5.60E-01	1.12E+00	2.19E+00	3.04E+00	5.10E+00	7.00E+00
40-69	9649000	547	1.40E+00	6.57E-04	1.97E-03	5.20E-03	1.11E-01	1.86E-01	3.95E-01	8.43E-01	1.58E+00	2.92E+00	4.65E+00	1.41E+01	1.84E+01
70 +	3226000	174	1.58E+00	1.04E-03	5.59E-03	1.85E-02	1.52E-01	2.38E-01	4.62E-01	9.48E-01	1.91E+00	3.46E+00	5.79E+00	9.96E+00	1.14E+01
Season															
Fall	6934000	253	1.19E+00	5.21E-04	3.19E-02	4.92E-02	1.48E-01	1.86E-01	3.28E-01	7.16E-01	1.44E+00	2.74E+00	4.00E+00	6.74E+00	9.96E+00
Spring	5407000	567	1.16E+00	6.33E-04	0.00E+00	3.66E-03	4.32E-02	1.04E-01	3.10E-01	7.10E-01	1.39E+00	2.67E+00	4.21E+00	7.35E+00	1.40E+01
Summer	8454000	283	1.79E+00	8.84E-04	0.00E+00	0.00E+00	1.18E-01	1.81E-01	3.85E-01	9.68E-01	1.97E+00	4.13E+00	6.14E+00	1.46E+01	1.84E+01
Winter	4426000	334	1.19E+00	6.33E-04	3.03E-03	4.79E-03	1.41E-01	2.31E-01	4.09E-01	7.33E-01	1.49E+00	2.41E+00	3.37E+00	7.00E+00	1.10E+01
Urbanization															
Central City	4148000	161	9.66E-01	5.49E-04	8.38E-03	3.50E-02	9.37E-02	1.63E-01	3.24E-01	6.07E-01	1.23E+00	1.97E+00	3.22E+00	7.00E+00	8.85E+00
Nonmetropolitan	10721000	710	1.78E+00	7.31E-04	0.00E+00	2.74E-02	1.60E-01	2.26E-01	4.68E-01	1.01E+00	2.01E+00	4.05E+00	5.74E+00	1.41E+01	1.84E+01
Suburban	10292000	564	1.14E+00	4.42E-04	0.00E+00	4.79E-03	8.98E-02	1.46E-01	3.06E-01	6.47E-01	1.44E+00	2.69E+00	3.77E+00	6.81E+00	1.14E+01
Race															
Asian	110000	6	2.79E-01	6.71E-04	4.34E-02	4.34E-02	4.34E-02	4.73E-02	1.68E-01	2.16E-01	2.98E-01	8.37E-01	8.37E-01	8.37E-01	8.37E-01
Black	1347000	84	1.30E+00	1.34E-03	2.87E-02	4.41E-02	1.74E-01	2.06E-01	3.50E-01	7.11E-01	1.49E+00	3.88E+00	5.47E+00	6.21E+00	7.72E+00
Native American	28000	1	1.76E-01	0.00E+00	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01	1.76E-01
Other/NA	309000	17	2.20E+00	3.18E-03	4.95E-03	4.95E-03	2.09E-01	2.15E-01	3.54E-01	2.12E+00	3.73E+00	3.99E+00	5.41E+00	5.41E+00	5.41E+00
White	23367000	1327	1.39E+00	3.96E-04	0.00E+00	1.29E-02	1.10E-01	1.79E-01	3.76E-01	7.93E-01	1.65E+00	3.04E+00	4.49E+00	9.96E+00	1.84E+01
Region															
Midwest	8296000	522	1.43E+00	7.34E-04	1.85E-02	3.19E-02	1.21E-01	1.90E-01	3.66E-01	7.29E-01	1.65E+00	3.05E+00	4.65E+00	1.12E+01	1.84E+01
Northeast	2914000	162	1.33E+00	1.23E-03	0.00E+00	1.97E-03	5.69E-02	1.07E-01	2.44E-01	5.97E-01	1.64E+00	3.07E+00	5.41E+00	1.20E+01	1.41E+01
South	9218000	518	1.53E+00	5.86E-04	0.00E+00	1.41E-02	1.68E-01	2.53E-01	4.87E-01	1.03E+00	1.76E+00	3.37E+00	4.70E+00	8.33E+00	1.80E+01
West	4733000	233	1.08E+00	6.91E-04	2.29E-03	1.11E-02	7.06E-02	1.22E-01	2.55E-01	5.73E-01	1.21E+00	2.41E+00	3.73E+00	8.02E+00	1.14E+01
Response to Questionnaire															
Do you garden?	22417000	1291	1.44E+00	3.98E-04	0.00E+00	1.11E-02	1.11E-01	1.80E-01	3.84E-01	8.18E-01	1.70E+00	3.22E+00	4.65E+00	9.95E+00	1.84E+01
Do you farm?	3965000	239	1.95E+00	1.27E-03	0.00E+00	1.41E-02	1.36E-01	2.34E-01	5.20E-01	1.21E+00	2.04E+00	5.32E+00	7.02E+00	1.46E+01	1.59E+01

Table 2-247. Intake of Homegrown Citrus Fruits (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2530000	125	4.76E+00	4.25E-03	7.82E-02	7.82E-02	1.57E-01	2.86E-01	7.56E-01	1.99E+00	5.10E+00	1.41E+01	1.97E+01	3.22E+01	4.79E+01
Age															
< 01	8000	1	7.52E+00	0.00E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00	7.52E+00
01-02	54000	4	1.14E+01	3.15E-02	1.00E+00	1.00E+00	1.00E+00	1.00E+00	3.40E+00	9.91E+00	2.00E+01	2.00E+01	2.00E+01	2.00E+01	2.00E+01
03-05	51000	3	1.87E+01	8.84E-02	1.83E+00	1.83E+00	1.83E+00	1.83E+00	1.83E+00	8.59E+00	4.79E+01	4.79E+01	4.79E+01	4.79E+01	4.79E+01
06-11	181000	9	7.88E+00	2.50E-02	4.45E-01	4.45E-01	4.45E-01	4.45E-01	7.56E-01	1.13E+00	1.56E+01	2.48E+01	3.22E+01	3.22E+01	3.22E+01
12-19	194000	14	3.12E+00	1.29E-02	1.16E-01	1.16E-01	1.16E-01	1.57E-01	2.88E-01	6.59E-01	1.56E+00	1.13E+01	1.91E+01	1.91E+01	1.91E+01
20-39	402000	18	2.50E+00	2.91E-03	1.84E-01	1.84E-01	3.05E-01	3.65E-01	1.14E+00	1.88E+00	3.42E+00	4.99E+00	4.99E+00	8.12E+00	8.12E+00
40-69	1183000	55	4.54E+00	5.50E-03	8.11E-02	8.11E-02	1.50E-01	2.47E-01	5.21E-01	1.74E+00	5.24E+00	1.52E+01	1.97E+01	2.38E+01	2.38E+01
70 +	457000	21	4.43E+00	5.14E-03	7.82E-02	7.82E-02	7.82E-02	4.94E-01	1.95E+00	3.53E+00	6.94E+00	8.97E+00	8.97E+00	1.57E+01	1.57E+01
Season															
Fall	280000	8	3.14E+00	5.81E-03	4.50E-01	4.50E-01	4.50E-01	4.50E-01	7.42E-01	1.22E+00	4.97E+00	8.97E+00	8.97E+00	8.97E+00	8.97E+00
Spring	437000	33	2.31E+00	3.26E-03	1.57E-01	1.57E-01	1.84E-01	2.35E-01	3.69E-01	1.36E+00	4.15E+00	5.10E+00	6.50E+00	7.52E+00	7.52E+00
Summer	334000	11	1.78E+00	4.82E-03	7.82E-02	7.82E-02	7.82E-02	8.11E-02	2.47E-01	7.56E-01	1.74E+00	3.05E+00	1.03E+01	1.03E+01	1.03E+01
Winter	1479000	73	6.47E+00	6.69E-03	1.16E-01	1.50E-01	3.33E-01	4.94E-01	1.64E+00	2.93E+00	8.59E+00	1.91E+01	2.38E+01	4.79E+01	4.79E+01
Urbanization															
Central City	1053000	43	3.57E+00	3.31E-03	1.50E-01	1.50E-01	3.33E-01	4.50E-01	1.13E+00	3.01E+00	4.97E+00	7.46E+00	8.97E+00	2.00E+01	2.00E+01
Surburban	1477000	82	5.61E+00	6.81E-03	7.82E-02	7.82E-02	1.14E-01	2.47E-01	5.17E-01	1.81E+00	8.12E+00	1.79E+01	2.38E+01	4.79E+01	4.79E+01
Race															
Black	200000	8	2.83E+00	1.28E-02	4.50E-01	4.50E-01	4.50E-01	4.50E-01	6.44E-01	8.40E-01	1.42E+00	1.08E+01	2.00E+01	2.00E+01	2.00E+01
White	2330000	117	4.93E+00	4.47E-03	7.82E-02	7.82E-02	1.50E-01	2.84E-01	7.82E-01	2.34E+00	5.34E+00	1.41E+01	1.97E+01	3.22E+01	4.79E+01
Region															
Midwest	64000	4	5.81E-01	4.61E-04	5.03E-01	5.03E-01	5.03E-01	5.03E-01	5.10E-01	5.19E-01	6.52E-01	7.82E-01	7.82E-01	7.82E-01	7.82E-01
South	1240000	55	5.18E+00	4.91E-03	1.16E-01	1.57E-01	3.76E-01	6.44E-01	1.60E+00	3.42E+00	6.50E+00	1.41E+01	1.97E+01	2.38E+01	2.38E+01
West	1226000	66	4.56E+00	7.18E-03	7.82E-02	7.82E-02	1.14E-01	2.35E-01	3.69E-01	1.42E+00	4.53E+00	1.24E+01	2.00E+01	4.79E+01	4.79E+01
Response to Questionnaire															
Do you garden?	2151000	102	4.55E+00	4.56E-03	7.82E-02	7.82E-02	1.50E-01	2.84E-01	7.56E-01	1.99E+00	4.99E+00	1.24E+01	1.79E+01	3.22E+01	4.79E+01
Do you farm?	130000	5	3.69E-01	6.11E-04	1.14E-01	1.14E-01	1.14E-01	1.14E-01	2.47E-01	2.84E-01	4.45E-01	7.56E-01	7.56E-01	7.56E-01	7.56E-01

Table 2-248. Intakes of Homegrown Other Fruit (g/kg-day)

Population Group	N wgtd	N unwgtd	Mean	SE	P0	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12615000	706	2.20E+00	1.39E-03	0.00E+00	5.41E-02	1.47E-01	2.55E-01	4.60E-01	9.06E-01	1.91E+00	4.59E+00	8.12E+00	1.84E+01	6.26E+01
Age															
< 01	177000	10	6.52E+00	1.25E-02	5.43E-01	5.43E-01	1.86E+00	2.26E+00	2.65E+00	4.94E+00	7.40E+00	1.54E+01	1.54E+01	1.54E+01	1.54E+01
01-02	306000	19	8.63E+00	2.96E-02	1.10E+00	1.10E+00	1.10E+00	1.33E+00	1.70E+00	3.62E+00	5.39E+00	1.15E+01	6.26E+01	6.26E+01	6.26E+01
03-05	499000	31	2.66E+00	5.99E-03	0.00E+00	0.00E+00	0.00E+00	3.80E-01	1.02E+00	1.87E+00	2.71E+00	5.54E+00	6.30E+00	3.32E+01	3.32E+01
06-11	915000	68	2.60E+00	3.77E-03	0.00E+00	0.00E+00	1.77E-01	3.86E-01	6.37E-01	1.14E+00	2.99E+00	7.13E+00	1.21E+01	1.62E+01	1.65E+01
12-19	1021000	54	1.62E+00	2.01E-03	8.40E-02	8.40E-02	1.20E-01	2.57E-01	3.86E-01	6.09E-01	2.36E+00	3.92E+00	6.81E+00	8.12E+00	8.12E+00
20-39	2761000	146	1.85E+00	2.70E-03	5.41E-02	7.94E-02	1.30E-01	1.80E-01	3.07E-01	6.20E-01	1.39E+00	3.70E+00	6.64E+00	3.70E+01	3.70E+01
40-69	4610000	259	2.09E+00	2.31E-03	2.57E-02	6.52E-02	1.47E-01	2.54E-01	4.44E-01	7.68E-01	1.77E+00	3.17E+00	9.77E+00	1.84E+01	5.33E+01
70 +	2326000	119	1.66E+00	1.32E-03	4.15E-02	4.41E-02	2.07E-01	3.56E-01	5.71E-01	1.07E+00	1.65E+00	4.06E+00	5.21E+00	1.17E+01	1.17E+01
Season															
Fall	2923000	102	1.39E+00	6.75E-04	2.59E-01	2.59E-01	3.04E-01	3.81E-01	5.67E-01	1.07E+00	1.88E+00	2.89E+00	4.06E+00	5.39E+00	5.54E+00
Spring	2526000	268	1.47E+00	1.56E-03	6.53E-02	8.66E-02	1.98E-01	2.54E-01	4.25E-01	8.33E-01	1.65E+00	2.89E+00	4.59E+00	8.26E+00	3.32E+01
Summer	4327000	144	3.77E+00	3.77E-03	0.00E+00	0.00E+00	9.18E-02	1.47E-01	4.04E-01	1.02E+00	3.17E+00	1.09E+01	1.54E+01	5.33E+01	6.26E+01
Winter	2839000	192	1.29E+00	8.91E-04	2.57E-02	4.15E-02	1.01E-01	2.25E-01	4.54E-01	8.33E-01	1.55E+00	2.70E+00	4.79E+00	8.06E+00	1.13E+01
Urbanization															
Central City	2681000	102	1.79E+00	1.77E-03	4.15E-02	4.41E-02	1.66E-01	2.91E-01	5.21E-01	8.87E-01	1.60E+00	2.61E+00	1.04E+01	1.54E+01	1.54E+01
Nonmetropolitan	4118000	278	2.43E+00	2.55E-03	2.57E-02	6.52E-02	1.20E-01	2.38E-01	4.50E-01	1.13E+00	2.43E+00	4.60E+00	8.12E+00	2.40E+01	5.33E+01
Surburban	5756000	324	2.25E+00	2.29E-03	3.43E-02	1.25E-01	1.99E-01	2.82E-01	4.46E-01	7.64E-01	1.81E+00	4.72E+00	7.61E+00	1.84E+01	6.26E+01
Race															
Black	250000	12	1.14E+00	1.41E-03	1.40E-01	1.40E-01	1.40E-01	2.91E-01	5.99E-01	1.17E+00	1.61E+00	2.29E+00	2.29E+00	2.29E+00	2.29E+00
Other/NA	49000	2	5.44E-01	1.43E-03	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	4.04E-01	1.26E+00	1.26E+00	1.26E+00	1.26E+00
White	12256000	690	2.24E+00	1.43E-03	2.57E-02	6.96E-02	1.50E-01	2.59E-01	4.66E-01	9.16E-01	1.94E+00	4.65E+00	8.26E+00	1.84E+01	6.26E+01
Region															
Midwest	4619000	298	3.07E+00	3.41E-03	2.57E-02	4.41E-02	1.25E-01	2.35E-01	4.54E-01	1.04E+00	2.35E+00	6.73E+00	1.42E+01	5.33E+01	6.26E+01
Northeast	1279000	72	9.32E-01	1.65E-03	7.98E-02	7.98E-02	8.55E-02	1.62E-01	3.11E-01	4.75E-01	8.12E-01	1.29E+00	2.16E+00	1.17E+01	1.17E+01
South	3004000	157	1.99E+00	1.87E-03	3.43E-02	7.94E-02	2.38E-01	2.99E-01	5.46E-01	1.10E+00	1.82E+00	4.06E+00	6.30E+00	1.62E+01	2.40E+01
West	3653000	177	1.76E+00	1.14E-03	7.14E-02	1.00E-01	2.16E-01	2.91E-01	5.44E-01	9.71E-01	2.04E+00	4.35E+00	5.75E+00	1.30E+01	1.30E+01
Response to Questionnaire															
Do you garden?	10926000	619	2.38E+00	1.59E-03	0.00E+00	4.41E-02	1.58E-01	2.57E-01	4.74E-01	9.94E-01	1.96E+00	4.94E+00	1.04E+01	1.84E+01	6.26E+01
Do you farm?	1917000	112	2.57E+00	2.03E-03	5.41E-02	6.96E-02	2.76E-01	3.61E-01	7.33E-01	1.55E+00	3.62E+00	5.80E+00	8.06E+00	1.62E+01	1.62E+01

Table 2-249. Mean Fraction of Food Intake That is Homeproduced

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	Total Fruits	Total Vegetables	Total Meats	Total Dairy	Total Fish
All Regions					
Total	0.041	0.070	0.024	0.012	0.095
Central City	0.027	0.027	0.003	0.000	0.053
Nonmetropolitan	0.052	0.144	0.064	0.043	0.219
Surburban	0.047	0.058	0.018	0.004	0.075
Asian	0.000	0.013	0.000	0.001	0.029
Black	0.007	0.027	0.001	0.000	0.063
Native American	0.000	0.001	0.003	0.000	0.095
Other/NA	0.001	0.034	0.003	0.000	0.060
White	0.049	0.081	0.031	0.014	0.110
Do you garden?	0.101	0.173			
Do you raise animals?			0.306	0.207	
Do you farm?	0.161	0.308	0.319	0.254	
Do you fish?					0.325
Midwest					
Total	0.059	0.112	0.046	0.024	0.133
Central City	0.018	0.043	0.005	0.000	0.028
Nonmetropolitan	0.088	0.206	0.132	0.074	0.382
Surburban	0.097	0.116	0.029	0.001	0.103
Northeast					
Total	0.005	0.038	0.009	0.010	0.008
Central City	0.000	0.006	0.000	0.000	0.000
Nonmetropolitan	0.004	0.076	0.025	0.062	0.035
Surburban	0.008	0.044	0.011	0.002	0.009
South					
Total	0.042	0.069	0.017	0.006	0.126
Central City	0.045	0.014	0.000	0.000	0.041
Nonmetropolitan	0.046	0.156	0.043	0.019	0.197
Surburban	0.038	0.035	0.009	0.000	0.150
West					
Total	0.062	0.057	0.023	0.007	0.108
Central City	0.053	0.046	0.007	0.000	0.186
Nonmetropolitan	0.038	0.045	0.026	0.003	0.072
Surburban	0.073	0.067	0.031	0.014	0.057

Table 2-249. Mean Fraction of Food Intake That is Homeproduced (continued)

	Exposed Vegetables	Protected Vegetables	Root Vegetables	Exposed Fruits	Protected Fruits	Dark Green Vegetables	Deep Yellow Vegetables	Other Vegetables	Citrus Fruits	Other Fruits
Total	0.095	0.069	0.043	0.050	0.037	0.044	0.065	0.069	0.038	0.042
Urbanization										
Central City	0.037	0.027	0.016	0.030	0.026	0.012	0.038	0.026	0.035	0.022
Nonmetropolitan	0.207	0.134	0.088	0.100	0.025	0.090	0.122	0.154	0.000	0.077
Surburban	0.079	0.054	0.035	0.043	0.050	0.054	0.058	0.053	0.056	0.042
Race										
Asian	0.018	0.001	0.008	0.000	0.000	0.063	0.020	0.002	0.000	0.000
Black	0.037	0.029	0.012	0.008	0.007	0.053	0.056	0.026	0.012	0.004
Native American	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Other/NA	0.058	0.004	0.028	0.002	0.000	0.004	0.017	0.040	0.000	0.001
White	0.109	0.081	0.050	0.059	0.045	0.043	0.071	0.082	0.045	0.051
Region										
Midwest	0.148	0.109	0.077	0.078	0.048	0.054	0.174	0.102	0.001	0.083
Northeast	0.062	0.016	0.018	0.010	0.002	0.039	0.019	0.034	0.000	0.008
South	0.091	0.077	0.042	0.040	0.044	0.049	0.022	0.077	0.060	0.031
West	0.079	0.060	0.029	0.075	0.054	0.034	0.063	0.055	0.103	0.046
Response to Questionnaire										
Do you garden?	0.233	0.178	0.106	0.116	0.094	0.120	0.140	0.180	0.087	0.107
Do you farm?	0.420	0.394	0.173	0.328	0.030	0.220	0.328	0.368	0.005	0.227

Table 2-249. Mean Fraction of Food Intake That is Homeproduced (continued)

	Apples	Peaches	Pears	Strawberries	Other Berries	Asparagus	Beets	Broccoli	Cabbage	Carrots	Corn	Cucumbers	Lettuce	Lima Beans
Total	0.030	0.147	0.067	0.111	0.217	0.063	0.203	0.015	0.038	0.043	0.078	0.148	0.010	0.121
Urbanization														
Central City	0.017	0.087	0.038	0.107	0.228	0.058	0.212	0.004	0.004	0.018	0.025	0.029	0.009	0.037
Nonmetropolitan	0.066	0.272	0.155	0.133	0.282	0.145	0.377	0.040	0.082	0.091	0.173	0.377	0.017	0.132
Surburban	0.024	0.121	0.068	0.101	0.175	0.040	0.127	0.016	0.045	0.039	0.047	0.088	0.009	0.165
Race														
Asian	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.082	0.000	0.019	0.002	0.000
Black	0.007	0.018	0.004	0.000	0.470	0.000	0.000	0.000	0.001	0.068	0.019	0.060	0.007	0.103
Native American	0.000	0.000	0.000	0.000	-	0.000	0.172	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other/NA	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.008	0.065	0.018	0.000	0.531	0.007	0.000
White	0.035	0.164	0.089	0.125	0.214	0.071	0.224	0.018	0.056	0.042	0.093	0.155	0.011	0.135
Region														
Midwest	0.052	0.164	0.112	0.209	0.231	0.194	0.432	0.025	0.053	0.101	0.124	0.193	0.020	0.149
Northeast	0.004	0.027	0.002	0.085	0.205	0.091	0.074	0.020	0.047	0.025	0.020	0.147	0.009	0.026
South	0.024	0.143	0.080	0.072	0.177	0.015	0.145	0.013	0.029	0.020	0.038	0.140	0.006	0.140
West	0.043	0.238	0.093	0.044	0.233	0.015	0.202	0.006	0.029	0.039	0.069	0.119	0.009	0.000
Response to Questionnaire														
Do you garden?	0.070	0.316	0.169	0.232	0.306	0.125	0.420	0.043	0.099	0.103	0.220	0.349	0.031	0.258
Do you farm?	0.292	0.461	0.606	0.057	0.548	0.432	0.316	0.159	0.219	0.185	0.524	0.524	0.063	0.103

	Okra	Onions	Peas	Peppers	Pumpkin	Snap Beans	Tomatoes	White Potatoes	Beef	Game	Pork	Poultry	Eggs
Total	0.270	0.056	0.069	0.107	0.155	0.155	0.184	0.038	0.038	0.276	0.013	0.011	0.014
Urbanization													
Central City	0.068	0.017	0.033	0.067	0.130	0.066	0.100	0.009	0.001	0.146	0.001	0.002	0.002
Nonmetropolitan	0.411	0.127	0.123	0.228	0.250	0.307	0.313	0.080	0.107	0.323	0.040	0.026	0.029
Surburban	0.299	0.050	0.064	0.086	0.127	0.118	0.156	0.029	0.026	0.316	0.006	0.011	0.014
Race													
Asian	1.000	0.000	0.042	0.042	0.000	0.007	0.046	0.000	0.000	0.000	0.000	0.000	0.000
Black	0.069	0.009	0.047	0.039	0.022	0.046	0.060	0.007	0.000	0.000	0.000	0.001	0.002
Native American	-	0.006	0.000	0.000	0.000	0.000	0.015	0.000	0.000	-	0.000	0.000	0.000
Other/NA	0.000	0.015	0.045	0.000	0.000	0.029	0.040	0.034	0.001	0.179	0.000	0.000	0.000
White	0.373	0.068	0.076	0.121	0.187	0.186	0.202	0.044	0.048	0.359	0.017	0.014	0.017
Region													
Midwest	0.224	0.098	0.058	0.188	0.357	0.243	0.291	0.065	0.076	0.513	0.021	0.021	0.019
Northeast	0.000	0.022	0.021	0.067	0.002	0.052	0.117	0.016	0.014	0.202	0.006	0.002	0.004
South	0.291	0.047	0.106	0.113	0.044	0.161	0.149	0.042	0.022	0.199	0.012	0.012	0.012
West	0.333	0.083	0.051	0.082	0.181	0.108	0.182	0.013	0.041	0.207	0.011	0.008	0.021
Response to Questionnaire													
Do you garden?	0.618	0.148	0.193	0.246	0.230	0.384	0.398	0.090					
Do you raise animals?									0.478		0.239	0.151	0.214
Do you hunt?										0.729			
Do you farm?	0.821	0.361	0.308	0.564	0.824	0.623	0.616	0.134	0.485		0.242	0.156	0.146

2.8. SOIL INGESTION AND PICA

2.8.1. Background

The ingestion of soil is a potential source of human toxics exposure. The potential for exposure to contaminants via this source is greater for children because they are likely to ingest more soil than adults as a result of behavioral patterns present during childhood. Inadvertent soil ingestion among children may occur through the mouthing of objects or hands. Mouthing behavior is considered to be a normal phase of childhood development. Adults may also ingest soil or dust particles that adhere to food, cigarettes, or their hands. Deliberate soil ingestion is defined as pica and is considered to be relatively uncommon. Because normal inadvertent soil ingestion is more prevalent and data for individuals with pica behavior are limited, this section focuses primarily on normal soil ingestion that occurs as a result of mouthing or unintentional hand-to-mouth activity.

Several studies have been conducted to estimate the amount of soil ingested by children. Most of the early studies attempted to estimate the amount of soil ingested by measuring the amount of dirt present on children's hands and making generalizations based on behavior. More recently, soil intake studies have been conducted using a methodology that measures trace elements in feces and soil which are believed to be poorly absorbed in the gut. These measurements are used to estimate the amount of soil ingested over a specified time period. The available studies on soil intake are summarized in the following sections. Studies on soil intake among children have been classified as either key studies or relevant studies based on their applicability to exposure assessment needs. Recommended intake rates are based on the results of key studies, but relevant studies are also presented to provide the reader with added perspective on the current state-of-knowledge pertaining to soil intake. Information on soil ingestion among adults are presented based on available data from a limited number of studies. Relevant information on the prevalence of pica and intake among individuals exhibiting pica behavior are also presented.

2.8.2. Key Studies on Soil Intake Among Children

Binder et al. - Estimating Soil Ingestion: Use of Tracer Elements in Estimating the Amount of Soil Ingested by Young Children - Binder et al. (1986) studied the ingestion of soil among children 1 to 3 years of age who wore diapers using a tracer technique modified from a method previously used to measure soil ingestion among grazing animals. The children were studied during the summer of 1984 as part of a larger study of residents living near a lead smelter in East Helena, Montana. Soiled diapers were collected over a 3-day period from 65 children (42 males and 23 females), and composited samples of soil were obtained from the children's yards. Both excreta and soil samples were analyzed for aluminum, silicon, and titanium. These elements were found in soil but were thought to be poorly absorbed in the gut and to have been present in the diet only in limited quantities. This made them useful tracers for estimating soil intake. Excreta measurements were obtained for 59 of the children. Soil ingestion by each child was estimated based on each of the three tracer elements using a standard assumed fecal dry weight of 15 g/day, and the following equation.

$$T_{i,e} = \frac{f_{i,e} \ x \ F_i}{S_{i,e}} \qquad \text{(Eqn. 2-19)}$$

where:

$T_{i,e}$ = estimated soil ingestion for child i based on element e (g/day);
$f_{i,e}$ = concentration of element e in fecal sample of child i (mg/g);
F_i = fecal dry weight (g/day); and
$S_{i,e}$ = concentration of element e in child i's yard soil (mg/g).

The analysis conducted by Binder et al. (1986) assumed that: (1) the tracer elements were neither lost nor introduced during sample processing; (2) the soil ingested by children originates primarily from their own yards; and (3) that absorption of the tracer elements by children occurred in only small amounts. The study did not distinguish between ingestion of soil and housedust nor did it account for the presence of the tracer elements in ingested foods or medicines.

The arithmetic mean quantity of soil ingested by the children in the Binder et al. (1986) study was estimated to be 181 mg/day (range 25 to 1,324) based on the aluminum tracer; 184 mg/day (range 31 to 799) based on the silicon tracer; and 1,834 mg/day (range 4 to 17,076) based on the titanium tracer (Table 2-250). The overall mean soil ingestion estimate based on the minimum of the three individual tracer estimates for each child was 108 mg/day (range 4 to 708). The 95th percentile values for aluminum, silicon, and titanium were 584 mg/day, 578 mg/day, and 9,590 mg/day, respectively. The 95th percentile value based on the minimum of the three individual tracer estimates for each child was 386 mg/day.

The authors were not able to explain the difference between the results for titanium and for the other two elements, but speculated that unrecognized sources of titanium in the diet or in the laboratory processing of stool samples may have accounted for the increased levels. The frequency distribution graph of soil ingestion estimates based on titanium shows that a group of 21 children had particularly high titanium values (i.e., >1,000 mg/day). The remainder of the children showed titanium ingestion estimates at lower levels, with a distribution more comparable to that of the other elements.

The advantages of this study are that a relatively large number of children were studied and tracer elements were used to estimate soil ingestion. However, the children studied may not be representative of the U.S. population and the study did not account for tracers ingested via foods or medicines. Also, the use of an assumed fecal weight instead of actual fecal weights may have biased the results of this study. Finally, because of the short-term nature of the survey, soil intake estimates may not be entirely representative of long-term behavior, especially at the upper-end of the distribution of intake.

Clausing et al. - A Method for Estimating Soil Ingestion by Children - Clausing et al. (1987) conducted a soil ingestion study with Dutch children using a tracer element methodology similar to that of Binder et al. (1986). Aluminum, titanium, and acid-insoluble residue (AIR) contents were determined for fecal samples from children, aged 2 to 4, attending a nursery school, and for samples of playground dirt at that school. Twenty-seven daily fecal samples were obtained over a 5-day period for the 18 children examined. Using the average soil concentrations present at the school, and assuming a standard fecal dry weight of 10 g/day, Clausing et al. (1987) estimated soil ingestion for each tracer. Clausing et al. (1987) also collected eight daily fecal samples from six hospitalized, bedridden children. These children served as a control group, representing children who had very limited access to soil.

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Table 2-250. Estimated Daily Soil Ingestion Based on Aluminum, Silicon, and Titanium Concentrations

Estimation Method	Mean (mg/day)	Median (mg/day)	Standard Deviation (mg/day)	Range (mg/day)	95th Percentile (mg/day)	Geometric Mean (mg/day)
Aluminum	181	121	203	25-1,324	584	128
Silicon	184	136	175	31-799	578	130
Titanium	1,834	618	3,091	4-17,076	9,590	401
Minimum	108	88	121	4-708	386	65

Source: Binder et al., 1986.

The average quantity of soil ingested by the school children in this study was as follows: 230 mg/day (range 23 to 979 mg/day) for aluminum; 129 mg/day (range 48 to 362 mg/day) for AIR; and 1,430 mg/day (range 64 to 11,620 mg/day) for titanium (Table 2-251). As in the Binder et al. (1986) study, a fraction of the children (6/19) showed titanium values well above 1,000 mg/day, with most of the remaining children showing substantially lower values. Based on the Limiting Tracer Method (LTM), mean soil intake was estimated to be 105 mg/day with a population standard deviation of 67 mg/day (range 23 to 362 mg/day). Use of the LTM assumed that "the maximum amount of soil ingested corresponded with the lowest estimate from the three tracers" (Clausing et al., 1987). Geometric mean soil intake was estimated to be 90 mg/day. This assumes that the maximum amount of soil ingested cannot be higher than the lowest estimate for the individual tracers.

Mean soil intake for the hospitalized children was estimated to be 56 mg/day based on aluminum (Table 2-252). For titanium, three of the children had estimates well in excess of 1,000 mg/day, with the remaining three children in the range of 28 to 58 mg/day. Using the LTM method, the mean soil ingestion rate was estimated to be 49 mg/day with a population standard deviation of 22 mg/day (range 26 to 84 mg/day). The geometric mean soil intake rate was 45 mg/day. The data on hospitalized children suggest a major nonsoil source of titanium for some children, and may suggest a background nonsoil source of aluminum. However, conditions specific to hospitalization (e.g., medications) was not considered. AIR measurements were not reported for the hospitalized children. Assuming that the tracer-based soil ingestion rates observed in hospitalized children actually represent background tracer intake from dietary and other nonsoil sources, mean soil ingestion by nursery school children was estimated to be 56 mg/day, based on the LTM (i.e., 105 mg/day for nursery school children minus 49 mg/day for hospitalized children) (Clausing et al. 1987).

The advantages of this study are that Clausing et al. (1987) evaluated soil ingestion among two populations of children that had differences in access to soil, and corrected soil intake rates based on background estimates derived from the hospitalized group. However, a smaller number of children were used in this study than in the Binder et al. (1986) study and

Table 2-251. Calculated Soil Ingestion by Nursery School Children

Child	Sample Number	Soil Ingestion as Calculated from Ti (mg/day)	Soil Ingestion as Calculated from Al (mg/day)	Soil Ingestion as Calculated from AIR (mg/day)	Limiting Tracer (mg/day)
1	L3	103	300	107	103
	L14	154	211	172	154
	L25	130	23	-	23
2	L5	131	-	71	71
	L13	184	103	82	82
	L27	142	81	84	81
3	L2	124	42	84	42
	L17	670	566	174	174
4	L4	246	62	145	62
	L11	2,990	65	139	65
5	L8	293	-	108	108
	L21	313	-	152	152
6	L12	1,110	693	362	362
	L16	176	-	145	145
7	L18	11,620	-	120	120
	L22	11,320	77	-	77
8	L1	3,060	82	96	82
9	L6	624	979	111	111
10	L7	600	200	124	124
11	L9	133	-	95	95
12	L10	354	195	106	106
13	L15	2,400	-	48	48
14	L19	124	71	93	71
15	L20	269	212	274	212
16	L23	1,130	51	84	51
17	L24	64	566	-	64
18	L26	184	56	-	56
Arithmetic Mean		1,431	232	129	105

Source: Adapted from Clausing et al. 1987.

Table 2-252. Calculated Soil Ingestion by Hospitalized, Bedridden Children

Child	Sample	Soil Ingestion as Calculated from Ti (mg/day)	Soil Ingestion as Calculated from Al (mg/day)	Limiting Tracer (mg/day)
1	G5	3,290	57	57
	G6	4,790	71	71
2	G1	28	26	26
3	G2	6,570	94	84
	G8	2,480	57	57
4	G3	28	77	28
5	G4	1,100	30	30
6	G7	58	38	38
Arithmetic Mean		2,293	56	49

Source: Adapted from Clausing et al. 1987.

these children may not be representative of the U.S. population. Tracer elements in foods or medicines were not evaluated. Also, intake rates derived from this study may not be representative of soil intake over the long-term because of the short-term nature of the study.

Van Wijnen et al. - Estimated Soil Ingestion by Children - In a study by Van Wijnen et al. (1990), soil ingestion among Dutch children ranging in age from 1 to 5 years was evaluated using a tracer element methodology similar to that used by Clausing et al. (1987). Van Wijnen et al. (1990) measured three tracers (i.e., titanium, aluminum, and AIR) in soil and feces and estimated soil ingestion based on the LTM. An average daily feces weight of 15 g dry weight was assumed. A total of 292 children attending daycare centers were sampled during the first of two sampling periods and 187 children were sampled in the second sampling period; 162 of these children were sampled during both periods (i.e., at the beginning and near the end of the summer of 1986). A total of 78 children were sampled at campgrounds, and 15 hospitalized children were sampled. The mean values for these groups were: 162 mg/day for children in daycare centers, 213 mg/day for campers and 93 mg/day for hospitalized children. Van Wijnen et al. (1990) also reported geometric mean LTM values because soil intake rates were found to be skewed and the log transformed data were approximately normally distributed. Geometric mean LTM values were estimated to be 111 mg/day for children in daycare centers, 174 mg/day for children vacationing at campgrounds (Table 2-253) and 74 mg/day for hospitalized children (70-120 mg/day based on the 95 percent confidence limits of the mean); a 5 mg/day represents the midpoint. AIR was the limiting tracer in about 80 percent of the samples. Among children attending daycare centers, soil intake was also found to be higher when the weather was good (i.e., <2 days/week precipitation) than when the weather was bad (i.e., >4 days/week precipitation (Table 2-254). Van Wijnen et al. (1990) suggest that the mean LTM value for hospitalized infants represents background intake of tracers and should be used to correct the soil intake rates based on LTM values for other sampling groups. Using mean values, corrected soil intake rates were 69 mg/day (162 mg/day minus 93 mg/day) for daycare children and 120 mg/day (213 mg/day minus 93 mg/day) for campers. Corrected geometric mean soil intake was estimated to range from 0 to 90 mg/day with a 90th percentile value of 190 mg/day for the various age categories within the daycare group and 30 to 200 mg/day with a 90th percentile value of 300 mg/day for the various age categories within the camping group.

Table 2-253. Geometric Mean (GM) and Standard Deviation (GSD) LTM Values for Children at Daycare Centers and Campgrounds

Age (yrs)	Sex	Daycare Centers			Campgrounds		
		n	GM LTM (mg/day)	GSD LTM (mg/day)	n	GM LTM (mg/day)	GSD LTM (mg/day)
<1	Girls	3	81	1.09	-	-	-
	Boys	1	75	-	-	-	-
1-<2	Girls	20	124	1.87	3	207	1.99
	Boys	17	114	1.47	5	312	2.58
2-<3	Girls	34	118	1.74	4	367	2.44
	Boys	17	96	1.53	8	232	2.15
3-4	Girls	26	111	1.57	6	164	1.27
	Boys	29	110	1.32	8	148	1.42
4-<5	Girls	1	180	-	19	164	1.48
	Boys	4	99	1.62	18	136	1.30
All girls		86	117	1.70	36	179	1.67
All boys		72	104	1.46	42	169	1.79
Total		162[a]	111	1.60	78[b]	174	1.73

[a] Age and/or sex not registered for eight children.
[b] Age not registered for seven children.

Source: Adapted from Van Wijnen et al., 1990.

Table 2-254. Estimated Geometric Mean LTM Values of Children Attending Day-Care Centers According to Age, Weather Category, and Sampling Period

Weather Category	Age (years)	First Sampling Period n	First Sampling Period Estimated Geometric Mean LTM Value (mg/day)	Second Sampling Period n	Second Sampling Period Estimated Geometric Mean LTM Value (mg/day)
Bad	<1	3	94	3	67
(>4 days/week precipitation)	1-<2	18	103	33	80
	2-<3	33	109	48	91
	4-<5	5	124	6	109
Reasonable	<1			1	61
(2-3 days/week precipitation)	1-<2			10	96
	2-<3			13	99
	3-<4			19	94
	4-<5			1	61
Good	<1	4	102		
(<2 days/week precipitation)	1-<2	42	229		
	2-<3	65	166		
	3-<4	67	138		
	4-<5	10	132		

Source: Van Wijnen et al., 1990.

The advantage of this study is that soil intake was estimated for three different populations of children; one expected to have high intake, one expected to have "typical" intake and one expected to have low or background-level intake. Van Wijnen et al. (1990) used the background tracer measurements to correct soil intake rates for the other two populations. Tracer concentrations in food and medicine were not evaluated. Also, the population of children studied was relatively large, but may not be representative of the U.S. population. This study was conducted over a relatively short time period. Thus, estimated intake rates may not reflect long-term patterns, especially at the high-end of the distribution. Another limitation of this study is that values were not reported element-by-element which would be the preferred way of reporting.

Davis et al. - Quantitative Estimates of Soil Ingestion in Normal Children Between the ages of 2 and 7 years: Population-Based Estimates Using Aluminum, Silicon, and Titanium as Soil Tracer Elements - Davis et al. (1990) also used a mass-balance/tracer technique to estimate soil ingestion among children. In this study, 104 children between the ages of 2 and 7 years were randomly selected from a three-city area in southeastern Washington State. The study was conducted over a seven day period, primarily during the summer. Daily soil ingestion was evaluated by collecting and analyzing soil and house dust samples, feces, urine, and duplicate food samples for aluminum, silicon, and titanium. In addition, information on dietary habits and demographics was collected in an attempt to identify behavioral and demographic characteristics that influence soil intake rates among children. The amount of soil ingested on a daily basis was estimated using the following equation:

$$S_{i,e} = \frac{(((DW_f + DW_p) \times E_f) + 2E_u) - (DW_{fd} \times E_{fd})}{E_{soil}} \qquad \text{(Eqn. 2-20)}$$

where:

$S_{i,e}$ = soil ingested for child i based on tracer e (g);

DW_f = feces dry weight (g);

DW_p = feces dry weight on toilet paper (g);

E_f = tracer amount in feces (μg/g);

E_u = tracer amount in urine (μg/g);

DW_{fd} = food dry weight (g);

E_{fd} = tracer amount in food (μg/g); and

E_{soil} = tracer concentration in soil (μg/g).

The soil intake rates were corrected by adding the amount of tracer in vitamins and medications to the amount of tracer in food, and adjusting the food quantities, feces dry weights, and tracer concentrations in urine to account for missing samples.

Soil ingestion rates were highly variable, especially those based on titanium. Mean daily soil ingestion estimates were 38.9 mg/day for aluminum, 82.4 mg/day for silicon and 245.5 mg/day for titanium (Table 2-255). Median values were 25 mg/day for aluminum, 50 mg/day for silicon, and 81 mg/day for titanium. Davis et al. (1990) also evaluated the extent to which differences in tracer concentrations in house dust and yard soil impacted estimated soil ingestion rates. The value used in the denominator of the mass balance equation was recalculated to represent a weighted average of the tracer concentration in yard soil and house dust based on the proportion of time the child spent indoors and outdoors. The adjusted mean soil/dust intake rates were 64.5 mg/day for aluminum, 160.0 mg/day for silicon, and 268.4 mg/day for titanium. Adjusted median soil/dust intake rates were: 51.8 mg/day for aluminum, 112.4 mg/day for silicon, and 116.6 mg/day for titanium. Davis et al. (1990) also observed that the following demographic characteristics were associated with high soil intake rates: male sex, non-white racial group, low income, operator/laborer as the principal occupation of the parent, and city of residence. However, none of these factors were predictive of soil intake rates when tested using multiple linear regression.

The advantages of the Davis et al. (1990) study are that soil intake rates were corrected based on the tracer content of foods and medicines and that a relatively large number of children were sampled. Also, demographic and behavioral information was collected for the survey group. However, although a relatively large sample population was surveyed, these children were all from a single area of the U.S. and may not be representative of the U.S. population as a whole. The study was conducted over a one-week period during the summer and may not be representative of long-term (i.e., annual) patterns of intake.

Table 2-255. Average Daily Soil Ingestion Values Based on Aluminum, Silicon, and Titanium as Tracer Elements[a]

Element	Mean (mg/d)	Median (mg/d)	Standard Error of the Mean (mg/d)	Range (mg/d)[b]
Aluminum	38.9	25.3	14.4	279.0 to 904.5
Silicon	82.4	59.4	12.2	-404.0 to 534.6
Titanium	245.5	81.3	119.7	-5,820.8 to 6,182.2
Minimum	38.9	25.3	12.2	-5,820.8
Maximum	245.5	81.3	119.7	6,182.2

[a] Excludes three children who did not provide any samples (N=101).
[b] Negative values occurred as a result of correction for nonsoil sources of the tracer elements.

Source: Adapted from Davis et al., 1990.

Calabrese et al. - How Much Soil do Young Children Ingest: An Epidemiologic Study - Calabrese et al. (1989) studied soil ingestion among children using the basic tracer design developed by Binder et al. (1986). However, in contrast to the Binder et al. (1987) study, eight tracer elements (i.e., aluminum, barium, manganese, silicon, titanium, vanadium, ytrium, and zirconium) were analyzed instead of only three (i.e., aluminum, silicon, and titanium). A total of 64 children between the ages of 1 and 4 years old were included in the study. These children were all selected from the greater Amherst, Massachusetts area and were predominantly from two-parent households where the parents were highly educated. The Calabrese et al. (1989) study was conducted over eight days during a two week period and included the use of a mass-balance methodology in which duplicate samples of food, medicines, vitamins, and others were collected and analyzed on a daily basis, in addition to soil and dust samples collected from the child's home and play area. Fecal and urine samples were also collected and analyzed for tracer elements. Toothpaste, low in tracer content, was provided to all participants.

In order to validate the mass-balance methodology used to estimate soil ingestion rates among children and to determine which tracer elements provided the most reliable data on soil ingestion, known amounts of soil (i.e., 300 mg over three days and 1,500 mg over three days) containing eight tracers were administered to six adult volunteers (i.e., three males and three females). Soil samples and feces samples from these adults and duplicate food samples were analyzed for tracer elements to calculate recovery rates of tracer elements in soil. Based on the adult validation study, Calabrese et al. (1989) confirmed that the tracer methodology could adequately detect tracer elements in feces at levels expected to correspond with soil intake rates in children. Calabrese et al. (1989) also found that aluminum, silicon, and ytrium were the most reliable of the eight tracer elements analyzed. The standard deviation of recovery of these three tracers was the lowest and the percentage of recovery was closest to 100 percent (Calabrese, et al., 1989). The recovery of these three tracers ranged from 120 to 153 percent when 300 mg of soil had been ingested over a three-day period and from 88 to 94 percent when 1,500 mg soil had been ingested over a three-day period (Table 2-256).

Using the three most reliable tracer elements, the mean soil intake rate for children, adjusted to account for the amount of tracer found in food and medicines, was estimated to be 153 mg/day based on aluminum, 154 mg/day based on silicon, and 85 mg/day based on ytrium

Table 2-256. Mean and Standard Deviation Percentage Recovery of Eight Tracer Elements

Tracer Element	300 mg Soil Ingested		1500 mg Soil Ingested	
	Mean	SD	Mean	SD
Al	152.8	107.5	93.5	15.5
Ba	2304.3	4533.0	149.8	69.5
Mn	1177.2	1341.0	248.3	183.6
Si	139.3	149.6	91.8	16.6
Ti	251.5	316.0	286.3	380.0
V	345.0	247.0	147.6	66.8
Y	120.5	42.4	87.5	12.6
Zr	80.6	43.7	54.6	33.4

Source: Adapted from Calabrese et al., 1989.

(Table 2-257). Median intake rates were somewhat lower (29 mg/day for aluminum, 40 mg/day for silicon, and 9 mg/day for ytrium). Upper-percentile (i.e., 95th) values were 223 mg/day for aluminum, 276 mg/day for silicon, and 106 mg/day for ytrium. Similar results were observed when soil and dust ingestion was combined (Table 2-257). Intake of soil and dust was estimated using a weighted average of tracer concentration in dust composite samples and in soil composite samples based on the time children spent at home and away from home, and indoors and outdoors. Calabrese et al. (1989) suggested that the use of titanium as a tracer in earlier studies that lacked food ingestion data may have significantly overestimated soil intake because of the high levels of titanium in food. Using the median values of aluminum and silicon, Calabrese et al. (1989) estimated the quantity of soil ingested daily to be 29 mg/day and 40 mg/day, respectively. It should be noted that soil ingestion for one child in the study ranged from approximately 10 to 14 grams/day during the second week of observation. Average soil ingestion for this child was 5 to 7 mg/day, based on the entire study period.

The advantages of this study are that intake rates were corrected for tracer concentrations in foods and medicines and that the methodology was validated using adults. Also, intake was observed over a longer time period in this study than in earlier studies and the number of tracers used was larger than for other studies. A relatively large population was studied, but they may not be entirely representative of the U.S. population because they were selected from a single location.

2.8.3. Other Relevant Studies on Soil Intake Among Children

Thompson and Burmaster - Parametric Distributions for Soil Ingestion by Children - Thompson and Burmaster (1991) developed parameterized distributions of soil ingestion rates for children based on a reanalysis of the data collected by Binder et al. (1986). In the original Binder et al. (1986) study, an assumed fecal weight of 15 g/day was used. Thompson and Burmaster reestimated the soil ingestion rates from the Binder et al. (1986) study using the actual stool weights of the study participants instead of the assumed stool weights. Because the actual stool weights averaged only 7.5 g/day, the soil ingestion estimates presented by Thompson and Burmaster (1991) are approximately one-half of those reported by Binder et al. (1986). Table 2-258 presents the distribution of estimated soil ingestion rates calculated by Thompson and Burmaster (1991) based on the three tracers elements (i.e., aluminum, silicon, and titanium),

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Table 2-257. Soil and Dust Ingestion Estimates for Children Aged 1-4 Years

Tracer Element	N	Intake (mg/day)[a]				
		Mean	Median	SD	95th Percentile	Maximum
Aluminum						
soil	64	153	29	852	223	6,837
dust	64	317	31	1,272	506	8,462
soil/dust combined	64	154	30	629	478	4,929
Silicon						
soil	64	154	40	693	276	5,549
dust	64	964	49	6,848	692	54,870
soil/dust combined	64	483	49	3,105	653	24,900
Ytrium						
soil	62	85	9	890	106	6,736
dust	64	62	15	687	169	5,096
soil/dust combined	62	65	11	717	159	5,269
Titanium						
soil	64	218	55	1,150	1,432	6,707
dust	64	163	28	659	1,266	3,354
soil/dust combined	64	170	30	691	1,059	3,597

[a] Corrected for Tracer Concentrations in Foods

Source: Adapted from Calabrese et al., 1989.

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Table 2-258. Estimated Soil Ingestion Rate Summary Statistics and Parameters for Distributions Using Binder et al. (1986) Data with Actual Fecal Weights

Trace Element Basis	Soil Intake (mg/day)			
	Al	Si	Ti	AVE[a]
Mean	97	85	1,004	91
Min	11	10	1	13
10th	21	19	3	22
20th	33	23	22	34
30th	39	36	47	43
40th	43	52	172	49
Med	45	60	293	59
60th	55	65	475	69
70th	73	79	724	92
80th	104	106	1,071	100
90th	197	166	2,105	143
Max	1,201	642	14,061	921
	Lognormal Distribution Parameters			
Median	45	60	--	59
Standard Deviation	169	95	--	126
Arithmetic Mean	97	85	--	91
	Underlying Normal Distribution Parameters			
Mean	4.06	4.07	--	4.13
Standard Deviation	0.88	0.85	--	0.80

[a]AVE = arithmetic average of soil ingestion based on aluminum and silicon.

Source: Thompson and Burmaster, 1991.

and on the arithmetic average of soil ingestion based on aluminum and silicon. The mean soil intake rates were 97 mg/day for aluminum, 85 mg/day for silicon, and 1,004 mg/day for titanium. The 90th percentile estimates were 197 mg/day for aluminum, 166 mg/day for silicon, and 2,105 mg/day for titanium. Based on the arithmetic average of aluminum and silicon for each child, mean soil intake was estimated to be 91 mg/day and 90th percentile intake was estimated to be 143 mg/day.

Thompson and Burmaster (1991) tested the hypothesis that soil ingestion rates based on the adjusted Binder et al. (1986) data for aluminum, silicon and the average of these two tracers were lognormally distributed. The distribution of soil intake based on titanium was not tested for lognormality because titanium may be present in food in high concentrations and the Binder et al. (1986) study did not correct for food sources of titanium (Thompson and Burmaster, 1991). Although visual inspection of the distributions for aluminum, silicon, and the average of these tracers all indicated that they may be lognormally distributed, statistical tests indicated that only silicon and the average of the silicon and aluminum tracers were lognormally distributed. Soil intake rates based on aluminum were not lognormally distributed. Table Soil-9 also presents the lognormal distribution parameters and underlying normal distribution parameters (i.e., the natural logarithms of the data) for aluminum, silicon, and the average of these two tracers. According to the authors, "the parameters estimated from the underlying normal distribution are much more reliable and robust" (Thompson and Burmaster, 1991).

The advantages of this study are that it provides percentile data and defines the shape of soil intake distributions. However, the number of data points used to fit the distribution was limited. In addition, the study did not generate "new" data. Instead, it provided a reanalysis of previously-reported data using actual fecal weights. No corrections were made for tracer intake from food or medicine and the results may not be representative of long-term intake rates because the data were derived from a short-term study.

Lepow et al. - Role of Airborne Lead in Increased Body Burden of Lead in Hartford Children - Lepow et al. (1974) estimated ingestion of airborne lead fallout among urban children by: (1) analyzing surface dirt and dust samples from locations where children played; (2) measuring hand dirt by applying preweighed adhesive labels to the hands and weighing the amount of dirt that was removed; and (3) observing "mouthing" behavior over 3 to 6 hours of normal play. Twenty-two children from an urban area of Connecticut were included in the study. Lepow et al. (1975) found that the mean weight of soil/dust on the hands was 11 mg. Assuming that a child would put fingers or other "dirty" objects into his mouth about 10 times a day ingesting 11 mg of dirt each time, Lepow et al. (1975) estimated that the daily soil ingestion rate would be about 100 mg/day. According to Lepow et al. (1975), the amount of hand dirt measured with this technique is probably an underestimate because dirt trapped in skin folds and creases was probably not removed by the adhesive label. Consequently, mean soil ingestion rates may be somewhat higher than the values estimated in this study.

Duggan and Williams - Lead in Dust in City Streets - Duggan and Williams (1977) assessed the risks associated with lead in street dust by analyzing street dust from areas in and around London for lead, and estimating the amount of hand dirt that a child might ingest. Duggan and Williams (1977) estimated the amount of dust that would be retained on the forefinger and thumb by removing a small amount of dust from a weighed amount, rubbing the forefinger and thumb together, and reweighing to determine the amount retained on the finger and thumb. The results of "a number of tests with several different people" indicated that the mean amount of dust retained on the finger and thumb was approximately 4 mg with a range of 2 to 7 mg (Duggan and Williams, 1977). Assuming that a child would suck his/her finger or thumb 10 times a day and that all of the dirt is removed each time and replaced with new dirt prior to subsequent mouthing behavior, Duggan and Williams (1977) estimated that 20 mg of dust would be ingested per day.

Day et al. - Lead in Urban Street Dust - Day et al. (1975) evaluated the contribution of incidental ingestion of lead-contaminated street dust and soil to children's total daily intake of lead by measuring the amount of lead in street dust and soil and estimating the amount of dirt ingested by children. The amount of soil that might be ingested was estimated by measuring the amount of dirt that was transferred to a "sticky sweet" during 30 minutes of play and assuming that a child might eat from 2 to 20 such sweets per day. Based on "a small number of direct measurements", Day et al. (1975) found that 5 to 50 mg of dirt from a child's hands may be transferred to a "sticky sweet" during 30 minutes of "normal playground activity. Assuming that all of the dirt is ingested with the 2 to 20 "sticky sweets." Day et al. (1975) estimated that intake of soil among children could range from 10 to 1000 mg/day.

Hawley et al. - Assessment of Health Risk from Exposure to Contaminated Soil - Using existing literature, Hawley (1985) developed scenarios for estimating exposure of young children, older children, and adults to contaminated soil. Annual soil ingestion rates were estimated based on assumed intake rates of soil and housedust for indoor and outdoor activities and assumptions about the duration and frequency of the activities. These soil ingestion rates were based on the assumption that the contaminated area is in a region having a winter season. Housedust was assumed to be comprised of 80 percent soil.

Outdoor exposure to contaminated soil among young children (i.e., 2.5 years old) was assumed to occur 5 days per week during only 6 months of the year (i.e., mid-April through mid-October). Children were assumed to ingest 250 mg soil/day while playing outdoors based on data presented in Lepow et al. (1974; 1975) and Roels et al. (1980). Indoor exposures among this population were based on the assumption that young children ingest 100 mg of housedust per day while spending all of their time indoors during the winter months, and 50 mg of housedust per day during the warmer months when only a portion of their time is spent indoors. Based on these assumptions, Hawley (1985) estimated that the annual average soil intake rate for young children is 150 mg/day (Table 2-259). Older children (i.e., 6 year olds) were assumed to ingest 50 mg of soil per day from an area equal to the area of the fingers on one hand while playing outdoors. This assumption was based on data from Lepow et al. (1975). Outdoor activities were assumed to occur each day over 5 months of the year (i.e., during May through October). These children were also assumed to ingest 3 mg/day of housedust from the indoor surfaces of the hands during indoor activities occurring over the entire year. Using these data, Hawley (1985) estimated the annual average soil intake rate for older children to be 23.4 mg/day (Table 2-259).

2.8.4. Soil Intake Among Adults

Information on soil ingestion among adults is very limited. Hawley (1985) estimated soil ingestion among adults based on assumptions regarding activity patterns and corresponding ingestion amounts. Hawley (1985) assumed that adults ingest outdoor soil at a rate of 480 mg/day while engaged in yardwork or other physical activity. These outdoor exposures were assumed to occur 2 days/week during 5 months of the year (i.e., May through October). The

Table 2-259. Estimates of Soil Ingestion for Children

Scenarios	Media	Exposure (mg/day)	Days/Year Activity	Fraction Soil Content	Annual Average Soil Intake (mg/day)
Young Child (2.5 Years Old)					
Outdoor Activities (Summer)	Soil	250	130	1	90
Indoor Activities (Summer)	Dust	50	182	0.8	20
Indoor Activities (Winter	Dust	100	182	0.8	40
TOTAL SOIL INTAKE					150
Older Child (6 Years Old)					
Outdoor Activities (Summer)	Soil	50	152	1	21
Indoor Activities (Year-Round)	Dust	3	365	0.8	2.4
TOTAL SOIL INTAKE					23.4

Source: Hawley, 1985.

ingestion estimate was based on the assumption that a 50 μm/thick layer of soil is ingested from the inside surfaces of the thumb and fingers of one hand. Ingestion of indoor housedust was assumed to occur from typical living space activities such as eating and smoking, and work in attics or other uncleaned areas of the house. Hawley (1985) assumed that adults ingest an average of 0.56 mg housedust/day during typical living space activities and 110 mg housedust/day while working in attics. Attic work was assumed to occur 12 days/year. Hawley (1985) also assumed that soil comprises 80 percent of household dust. Based on these assumptions about soil intake and the frequency of indoor and outdoor activities, Hawley (1985) estimated the annual average soil intake rate for adults to be 60.5 mg/day (Table 2-260).

The soil intake value estimated by Hawley (1985) is consistent with adult soil intake rates suggested by other researchers. Calabrese et al. (1987) suggested that soil intake among adults ranges from 1 to 100 mg/day. According to Calabrese et al. (1987), these values "are conjectural and based on fractional estimates" of earlier Center for Disease Control (CDC) estimates. In a recently completed evaluation of the scientific literature concerning soil ingestion rates for children and adults (Krablin, 1989), Arco Coal Company suggested that 10 mg/day may be an appropriate value for adult soil ingestion. This value is based on "extrapolation from urine arsenic epidemiological studies and information on mouthing behavior and time activity patterns" (Krablin, 1989).

Calabrese et al. - Preliminary Adult Soil Ingestion Estimates: Results of a Pilot Study- Calabrese et al. (1990) studied six adults to evaluate the extent to which they ingest soil. This adult study was originally part of the children soil ingestion study conducted by Calabrese and was used to validate part of the analytical methodology used in the children study. The participants were six healthy adults, three males and three females, 25-41 years old. Each volunteer ingested one empty gelatin capsule at breakfast and one at dinner Monday, Tuesday, and Wednesday during the first week of the study. During the second week, they ingested 50 mg of sterilized soil within a gelatin capsule at breakfast and at dinner (a total of 100 mg of sterilized soil per day) for 3 days. For the third week, the participants ingested 250 mg of sterilized soil in a gelatin capsule at breakfast and at dinner (a total of 500 mg of soil per day) during the three days. Duplicate meal samples (food and beverage) were collected from the six adults. The sample included all foods ingested from breakfast Monday, through the evening

Table 2-260. Estimates of Soil Ingestion for Adults

Scenarios	Media	Exposure (mg/day)	Days/Year Activity	Fraction Soil Content	Annual Average Soil Intake (mg/day)
Adult					
Work in attic (year-round)	Dust	110	12	0.8	3
Living Space (year-round)	Dust	0.56	365	0.8	0.5
Outdoor Work (summer)	Soil	480	43	1	57
TOTAL SOIL INTAKE					60.5

Source: Hawley, 1985.

meal Wednesday during each of the 3 weeks. In addition, all medications and vitamins ingested by the adults were collected. Total excretory output were collected from Monday noon through Friday midnight over 3 consecutive weeks. Table 2-261 provides the mean and median values of soil ingestion for each element by week. Data obtained from the first week, when empty gelatin capsules were ingested, may be used to derive an estimate of soil intake by adults. The mean intake rates for the eight tracers are: Al, 110 mg; Ba, -232 mg; Mn, 330 mg; Si, 30 mg; Ti, 71 mg; V, 1,288 mg; Y, 63 mg; and Zr, 134 mg.

The advantage of this study is that it provides quantitative estimates of soil ingestion by adults. The study also corrected for tracer concentrations in foods and medicines. However, a limitation of this study is that a limited number of subjects were studied. In addition, the subjects were only studied for one week before soil capsules were ingested.

2.8.5. Prevalence of Pica

The scientific literature define pica as "the repeated eating of nonnutritive substances" (Feldman, 1986). For the purposes of this handbook, pica is defined as an deliberately high soil ingestion rate. Numerous articles have been published that report on the incidence of pica among various populations. However, most of these papers describe pica for substances other than soil including sand, clay, paint, plaster, hair, string, cloth, glass, matches, paper, feces, and various other items. These papers indicate that the pica occurs in approximately half of all children between the ages of 1 and 3 years (Sayetta, 1986). The incidence of deliberate ingestion behavior in children has been shown to differ for different subpopulations. The incidence rate appears to be higher for black children than for white children. Approximately 30 percent of black children aged 1 to 6 years are reported to have deliberate ingestion behavior, compared with 10 to 18 percent of white children in the same age group (Danford, 1982). There does not appear to be any sex differences in the incidence rates for males or females (Kaplan and Sadock, 1985). Lourie et al. (1963) states that the incidence of pica is higher among children in lower socioeconomic groups (i.e., 50 to 60 percent) than in higher income families (i.e., about 30 percent). Deliberate soil ingestion behavior appears to be more common in rural areas (Vermeer and Frate, 1979). A higher rate of pica has also been reported for pregnant women and individuals with poor nutritional status (Danford, 1982). In general,

Table 2-261. Adult Daily Soil Ingestion Estimates by Week and Tracer Element After Subtracting Food and Capsule Ingestion, Based on Median Amherst Soil Concentrations: Means and Medians Over Subjects (mg)[a]

Week	Al	Ba	Mn	Si	Ti	V	Y	Zr
Means								
1	110	-2.32	330	30	71	1,288	63	134
2	98	12,265	1,306	14	25	43	21	58
3	28	201	790	-23	896	532	67	-74
Medians								
1	60	-71	388	31	102	1,192	44	124
2	85	597	1,368	15	112	150	35	65
3	66	386	831	-27	156	047	60	-144

[a] Data were converted to milligrams

Source: Calabrese et al., 1990

deliberate ingestion behavior is more frequent and more severe in mentally retarded children than in children in the general population (Behrman and Vaughan 1983, Danford 1982, Forfar and Arneil 1984, Illingworth 1983, Sayetta 1986).

It should be noted that the pica statistics cited above apply to the incidence of general pica and not soil pica. Information on the incidence of soil pica is limited, but it appears that soil pica is less common. A study by Vermeer and Frate (1979) showed that the incidence of geophagia (i.e., earth-eating) was about 16 percent among children from a rural black community in Mississippi. However, geophagia was described as a cultural practice among the community surveyed and may not be representative of the general population. Average daily consumption of soil was estimated to be 50 g/day. Bruhn and Pangborn (1971) reported the incidence of pica for "dirt" to be 19 percent in children, 14 percent in pregnant women, and 3 percent in nonpregnant women. However, "dirt" was not clearly defined. The Bruhn and Pangborn (1971) study was conducted among 91 non-black, low income families of migrant agricultural workers in California. Based on the data from the five key tracer studies (Binder et al., 1986; Clausing et al., 1987; Van Wijnen et al., 1990; Davis et al., 1990; and Calabrese et al., 1989) only one child out of the more than 600 children involved in all of these studies ingested an amount of soil significantly greater than the range for other children. Although these studies did not include all populations and were representative of short-term ingestions only, it can be assumed that the incidence rate of deliberate soil ingestion behavior in the general population is low.

2.8.6. Deliberate Soil Ingestion Among Children

Information on the amount of soil ingested by children with abnormal soil ingestion behavior is limited. However, some evidence suggests that a rate on the order of 5 to 10 g/day may not be unreasonable. Calabrese et al. (1991) estimated that upper range soil ingestion values may range from approximately 5-7 grams/day. This estimate was based on observations of one pica child among the 64 children who participated in the study. In the study, a 3.5-year old female exhibited extremely high soil ingestion behavior during one of the two weeks of observation. Intake ranged from 74 mg/day to 2.2 g/day during the first week of observation and 10.1 to 13.6 g/day during the second week of observation (Table 2-262). These results are

Table 2-262. Daily Soil Ingestion Estimation in a Soil-Pica Child by Tracer and by Week (mg/day)

Tracer	Week 1 Estimated Soil Ingestion	Week 2 Estimated Soil Ingestion
Al	74	13,600
Ba	458	12,088
Mn	2,221	12,341
Si	142	10,955
Ti	1,543	11,870
V	1,269	10,071
Y	147	13,325
Zr	86	2,695

Source: Calabrese et al., 1991

based on mass-balance analyses for seven (i.e., aluminum, barium, manganese, silicon, titanium, vanadium, and ytrium) of the eight tracer elements used. Intake rates based on zirconium was significantly lower but Calabrese et al. (1991) indicated that this may have "resulted from a limitation in the analytical protocol."

In conducting a risk assessment for TCDD, U.S. EPA (1984b) used 5 g/day to represent the soil intake rate for pica children. The Centers for Disease Control (CDC) also investigated the potential for exposure to TCDD through the soil ingestion route. CDC used a value of 10 g/day to represent the amount of soil that a child with deliberate soil ingestion behavior might ingest (Kimbrough et al., 1984). These values are consistent with those observed by Calabrese et al. (1991).

2.8.7. Recommendations

The key studies described in this section were used to recommend values for soil intake among children. The key and relevant studies used different survey designs and study populations. These studies are summarized in Table 2-263. For example, in some of the studies food and nonfood sources of trace elements were considered, while other did not. In other studies, soil ingestion estimates were adjusted to account for the contribution of house dust to this estimate. Despite these differences, the mean and upper-percentile estimates reported for these studies are relatively consistent.

It is important, however, to understand the various uncertainties associated with these values. First, individuals were not studied for sufficient periods of time to get a good estimate of the usual intake. Therefore, the values presented in this section may not necessarily be representative of long term exposures. Second, the experimental error in measuring soil ingestion values for individual children is another source of uncertainty. For example, incomplete sample collection of both input (i.e., food and nonfood sources) and output (i.e., urine and feces) is a limitation for some of the studies conducted. In addition, an individual's soil ingestion value may be artificially high or low depending on the extent to which a mismatch between input and output occurs due to individual variation in the gastrointestinal transit time. Third, the degree to which the tracer elements used in these studies are absorbed in the human body is uncertain. Accuracy of the soil ingestion estimates depends on how good this

Table 2-263. Soil Intake Studies

Study	Study Type	Number of Observations	Age	Population Studied	Comments
Binder et al., 1986	Tracer study using aluminum, silicon, and titanium	59 children	1-3 years	Children living near lead smelter in Montana	Did not account for tracer in food and medicine; used assumed fecal weight of 15 g/day; short-term study conducted over 3 days
Calabrese et al., 1989	Tracer - mass balance study using aluminum, barium, manganese, silicon, titanium, vanadium, ytrium, and zirconium	64 Children	1-4 years	Children from greater Amherst area of Massachusetts; highly-educated parents	Corrected for tracer in food and medicine; study conducted over two-week period; used adults to validate methods; one pica child in study group.
Calabrese et al., 1991	Tracer - mass balance	1 pica child	3.5 years	1 pica child from greater Amherst area of Massachusetts	Child was observed as part of the Calabrese et al., 1989 study.
Clausing et al., 1987	Tracer study using aluminum, acid insoluble residue, and titanium	18 nursery school children; 6 hospitalized children	2-4 years	Dutch children	Did not account for tracer in food and medicines; used tracer-based intake rates for hospitalized children as background values; short-term study conducted over 5 days

Table 2-263. Soil Intake Studies (continued)

Study	Study Type	Number of Observations	Age	Population Studied	Comments
Davis et al., 1990	Tracer - mass balance study using aluminum silicon and titanium	104 children	2-7 years	Children from 3-city area in Washington State	Corrected for tracer in food and medicine; short-term study conducted over seven-day period; collected information on demographic characteristics affecting soil intake.
Day et al., 1977	Measured dirt on sticky sweets and assumed number of sweets eaten per day	Not specified	Not specified	Not specified	Based on observations and crude measurements
Duggan and Williams, 1977	Measured soil on fingers and observed mouthing behavior	Not specified	Not specified	Areas around London	Based on observations and crude measurements.
Hawley et al., 1985	Assumed soil intake rates based on nature and duration of activities	Not specified	Young children, older children, adults	Not specified	No data on soil intake collected; estimates based on assumptions regarding data from previous studies.
Lepow et al., 1974	Measured soil on hands and observed mouthing behavior	22 children	2-6 years	Urban children from Connecticut	Based on observations over 3-6 hours of play and crude measurement techniques.

Table 2-263. Soil Intake Studies (continued)

Study	Study Type	Number of Observations	Age	Population Studied	Comments
Thompson and Burmaster, 1991	Re-evaluation of Binder et al., 1986 data	59 children	1-3 years	Children living near lead smelter in Montana	Re-calculated soil intake rates from Binder et al., 1986 data using actual fecal weights instead of assumed weights.
Van Wijnen et al., 1990	Tracer study using aluminum, acid insoluble residue, and titanium	292 daycare children; 78 campers; 15 hospitalized children	1-5 years	Dutch children	Did not account for tracer in food and medicines; used tracer-based intake for hospitalized children as background values; evaluated population (campers) with greater access to soil; evaluated differences in soil intake due to weather conditions.

assumption is. Fourth, there is uncertainty with regard to the homogeneity of soil samples and the accuracy of parent's knowledge about their child's playing areas. Fifth, all the soil ingestion studies presented in this section with the exception of Calabrese et al. (1989) were conducted during the summer when soil contact is more likely.

Although the recommendations presented below are derived from studies which were mostly conducted in the summer, exposure during the winter months when the ground is frozen or snow covered should not be considered as zero. Exposure during these months, although may be lower than the summer months, would not be zero since some portion of the house dust comes from outdoor soil.

Soil Ingestion Among Children - Estimates of the amount of soil ingested by children are summarized below.

Mean (mg/day)					Upper Percentile (mg/day)				References
Al	Si	AIR[a]	Ti	Y	Al	Si	Ti	Y	
181	184				584	578			Binder et al. 1986
230		129							Clausing et al. 1987
3[a]	82		245.5						David et al. 1990
64.5[b]	160[b]		268.4[b]						
153	154		218	85	223	276	1,432	106	Calabrese et al. 1989
154[b]	483[b]		170[b]	65[b]	478[b]	653[b]	1,059[b]	159[b]	
162-213[c]									Van Wijnen et al. 1990
Average	=	165 mg/day soil 191 mg/day soil and dust combined			545 mg/day soil 587 mg/day soil and dust combined				

[a] AIR = Acid Insoluble Residue
[b] Soil and dust combined
[c] Range reported

The mean values ranged from 39 mg/day to 245.5 mg/day with an average of 165 mg/day for soil ingestion and 191 mg/day for soil and dust ingestion. Results obtained using titanium as a tracer in the Binder and Clausing studies were not considered in the derivation of a

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recommendation because these studies did not take into consideration other sources of the element in the diet which for titanium seems to be significant. Therefore, these values may overestimate the soil intake. One can note that this group of mean values is consistent with the 200 mg/day value that EPA programs have used as a conservative mean estimate. Taking into consideration that the highest values were seen with titanium, which may exhibit greater variability than the other tracers, and the fact that the Calabrese study included a pica child, 100 mg/day appears to represent a central estimate of the mean for children under 6 years of age. However, since the children were studied for short periods of time and the prevalence of pica behavior is not known, excluding the pica child from the calculations may underestimate soil intake rates. It is plausible that many children may exhibit some pica behavior if studied for longer periods of time. Over the period of study, upper percentile values ranged from 106 mg/day to 1,432 mg/day with an average of 545 mg/day for soil ingestion and 587 mg/day for soil and dust ingestion. However, since the period of study was short, these values are not estimates of usual intake.

Data on soil ingestion rates for children who deliberately ingest soil are also limited. However, an ingestion rate of 10 - 14 g/day may not be an unreasonable assumption for use in acute exposure assessments, based on the available information. It should be noted, however, that this value is based on only one pica child observed in the Calabrese et al. (1989) study.

Soil Ingestion Among Adults - For adults, data on soil ingestion are limited. The available data are presented below:

Mean (mg/day)				Upper Percentile (mg/day)	References
Al	Si	Ti	Y		
110	30	71	63	—	Calabrese
0.5-57[a]	—	—	—	480	Hawley

[a] Range reported

The average soil intake rate ranged from 0.5 mg/day to 110 mg/day. This set of values is consistent with the 50 mg/day value often used by the program offices to represent a mean soil intake rate for adults. A value of 480 mg/day was estimated by Hawley for adults engaged in outdoor activities. However, this value should be used in conjunction with a short-term exposure frequency and duration since this value represents soil ingestion per event and not an annual average.

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APPENDIX 2A

Food Costs and Definitions Used in Analysis of 1987/88 USDA NFCS Data

APPENDIX 2D

National Marine Fisheries Service Recreational Fishing Data

Appendix 2-A. Foods Codes and Definitions Used in Analysis of the 1987/88 USDA NFCS Data

Food Product	Household Code/Definition	Individual Code
	MAJOR FOOD GROUPS	
Total Fruits	50- Fresh Fruits citrus other vitamin-C rich other fruits 512- Commercially Canned Fruits 522- Commercially Frozen Fruits 533- Canned Fruit Juice 534- Frozen Fruit Juice 535- Aseptically Packed Fruit Juice 536- Fresh Fruit Juice 542- Dried Fruits (includes baby foods)	6- Fruits citrus fruits and juices dried fruits other fruits fruits/juices & nectar fruit/juices baby food (includes baby foods)
Total Vegetables	48- Potatoes, Sweetpotatoes 49- Fresh Vegetables dark green deep yellow tomatoes light green other 511- Commercially Canned Vegetables 521- Commercially Frozen Vegetables 531- Canned Vegetable Juice 532- Frozen Vegetable Juice 537- Fresh Vegetable Juice 538- Aseptically Packed Vegetable Juice 541- Dried Vegetables (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures/dinners)	7- Vegetables (all forms) white potatoes & PR starchy dark green vegetables deep yellow vegetables tomatoes and tom. mixtures other vegetables veg. and mixtures/baby food veg. with meat mixtures (includes baby foods; mixtures, mostly vegetables)
Total Meats	44- Meat beef pork veal lamb mutton goat game lunch meat mixtures 451- Poultry (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	20- Meat, type not specified 21- Beef 22- Pork 23- Lamb, veal, game, carcass meat 24- Poultry 25- Organ meats, sausages, lunchmeats, meat spreads (excludes meat, poultry, and fish with non-meat items; frozen plate meals; soups and gravies with meat, poultry and fish base; and gelatin-based drinks; includes baby foods)
Total Dairy	40- Milk Equivalent fresh fluid milk processed milk cream and cream substitutes frozen desserts with milk cheese dairy-based dips (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners)	1- Milk and Milk Products milk and milk drinks cream and cream substitutes milk desserts, sauces, and gravies cheeses (includes regular fluid milk, human milk, imitation milk products, yogurt, milk-based meal replacements, and infant formulas)
Total Fish	452- Fish, Shellfish various species fresh, frozen, commercial, dried (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners)	26- Fish, Shellfish various species and forms (excludes meat, poultry, and fish with non-meat items; frozen plate meals; soups and gravies with meat, poultry and fish base; and gelatin-based drinks)

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DO NOT QUOTE OR
CITE

Food Product	Household Code/Definition	Individual Code
INDIVIDUAL FOODS		
White Potatoes	4811- White Potatoes, fresh 4821- White Potatoes, commercially canned 4831- White Potatoes, commercially frozen 4841- White Potatoes, dehydrated 4851- White Potatoes, chips, sticks, salad (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners)	71- White Potatoes and PR Starchy Veg. baked, boiled, chips, sticks, creamed, scalloped, au gratin, fried, mashed, stuffed, puffs, salad, recipes, soups, Puerto Rican starchy vegetables (does not include vegetables soups; vegetable mixtures; or vegetable with meat mixtures)
Peppers	4913- Green/Red Peppers, fresh 5111201 Sweet Green Peppers, commercially canned 5111202 Hot Chili Peppers, commercially canned 5211301 Sweet Green Peppers, commercially frozen 5211302 Green Chili Peppers, commercially frozen 5211303 Red Chili Peppers, commercially frozen 5413112 Sweet Green Peppers, dry 5413113 Red Chili Peppers, dry (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners)	7512100 Pepper, hot chili, raw 7512200 Pepper, raw 7512210 Pepper, sweet green, raw 7512220 Pepper, sweet red, raw 7522600 Pepper, green, cooked, NS as to fat added 7522601 Pepper, green, cooked, fat not added 7522602 Pepper, green, cooked, fat added 7522604 Pepper, red, cooked, NS as to fat added 7522605 Pepper, red, cooked, fat not added 7522606 Pepper, red, cooked, fat added 7522609 Pepper, hot, cooked, NS as to fat added 7522610 Pepper, hot, cooked, fat not added 7522611 Pepper, hot, cooked, fat added 7551101 Peppers, hot, sauce 7551102 Peppers, pickled (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Onions	4953- Onions, Garlic, fresh onions chives garlic leeks 5114908 Garlic Pulp, raw 5114915 Onions, commercially canned 5213722 Onions, commercially frozen 5213723 Onions with Sauce, commercially frozen 5413103 Chives, dried 5413105 Garlic Flakes, dried 5413110 Onion Flakes, dried (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners)	7510950 Chives, raw 7511150 Garlic, raw 7511250 Leek, raw 7511701 Onions, young green, raw 7511702 Onions, mature 7521550 Chives, dried 7521740 Garlic, cooked 7522100 Onions, mature cooked, NS as to fat added 7522101 Onions, mature cooked, fat not added 7522102 Onions, mature cooked, fat added 7522103 Onions, pearl cooked 7522104 Onions, young green cooked, NS as to fat 7522105 Onions, young green cooked, fat not added 7522106 Onions, young green cooked, fat added 7522110 Onion, dehydrated 7541501 Onions, creamed 7541502 Onion rings (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Corn	4956- Corn, fresh 5114601 Yellow Corn, commercially canned 5114602 White Corn, commercially canned 5114603 Yellow Creamed Corn, commercially canned 5114604 White Creamed Corn, commercially canned 5114605 Corn on Cob, commercially canned 5114607 Hominy, canned 5115306 Low Sodium Corn, commercially canned 5115307 Low Sodium Cr. Corn, commercially canned 5213501 Yellow Corn on Cob, commercially frozen 5213502 Yellow Corn off Cob, commercially frozen 5213503 Yell. Corn with Sauce, commercially frozen 5213504 Corn with other Veg., commercially frozen 5213505 White Corn on Cob, commercially frozen 5213506 White Corn off Cob, commercially frozen 5213507 Wh. Corn with Sauce, commercially frozen 5413104 Corn, dried 5413106 Hominy, dry 5413603 Corn, instant baby food (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby food)	7510960 Corn, raw 7521600 Corn, cooked, NS as to color/fat added 7521601 Corn, cooked, NS as to color/fat not added 7521602 Corn, cooked, NS as to color/fat added 7521605 Corn, cooked, NS as to color/cream style 7521607 Corn, cooked, dried 7521610 Corn, cooked, yellow/NS as to fat added 7521611 Corn, cooked, yellow/fat not added 7521612 Corn, cooked, yellow/fat added 7521615 Corn, yellow, cream style 7521616 Corn, cooked, yell. & wh./NS as to fat 7521617 Corn, cooked, yell. & wh./fat not added 7521618 Corn, cooked, yell. & wh./fat added 7521619 Corn, yellow, cream style, fat added 7521620 Corn, cooked, white/NS as to fat added 7521621 Corn, cooked, white/fat not added 7521622 Corn, cooked, white/fat added 7521625 Corn, white, cream style 7521630 Corn, yellow, canned, low sodium, NS fat 7521631 Corn, yell., canned, low sod., fat not add 7521632 Corn, yell., canned, low sod., fat added 7521749 Hominy, cooked 752175- Hominy, cooked 7541101 Corn scalloped or pudding 7541102 Corn fritter 7541103 Corn with cream sauce 7550101 Corn relish 76405- Corn, baby (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; includes baby food)

Appendix 2-A. Foods Codes and Definitions Used in Analysis of the 1987/88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Apples	5031- Apples, fresh 5122101 Applesauce with sugar, commercially canned 5122102 Applesauce without sugar, comm. canned 5122103 Apple Pie Filling, commercially canned 5122104 Apples, Applesauce, baby/jr., comm. canned 5122106 Apple Pie Filling, Low Cal., comm. canned 5223101 Apple Slices, commercially frozen 5332101 Apple Juice, canned 5332102 Apple Juice, baby, Comm. canned 5342201 Apple Juice, comm. frozen 5342202 Apple Juice, home frozen 5352101 Apple Juice, aseptically packed 5362101 Apple Juice, fresh 5423101 Apples, dried (includes baby food; except mixtures)	6210110 Apples, dried, uncooked 6210115 Apples, dried, uncooked, low sodium 6210120 Apples, dried, cooked, NS as to sweetener 6210122 Apples, dried, cooked, unsweetened 6210123 Apples, dried, cooked, with sugar 6310100 Apples, raw 6310111 Applesauce, NS as to sweetener 6310112 Applesauce, unsweetened 6310113 Applesauce with sugar 6310114 Applesauce with low calorie sweetener 6310121 Apples, cooked or canned with syrup 6310131 Apple, baked NS as to sweetener 6310132 Apple, baked, unsweetened 6310133 Apple, baked with sugar 6310141 Apple rings, fried 6310142 Apple, pickled 6310150 Apple, fried 6340101 Apple, salad 6340106 Apple, candied 6410101 Apple cider 6410401 Apple juice 6410405 Apple juice with vitamin C 6710200 Applesauce baby fd., NS as to str. or jr. 6710201 Applesauce baby food, strained 6710202 Applesauce baby food, junior 6720200 Apple juice, baby food (includes baby food; except mixtures)
Tomatoes	4931- Tomatoes, fresh 5113- Tomatoes, commercially canned 5115201 Tomatoes, low sodium, commercially canned 5115202 Tomato Sauce, low sodium, comm. canned 5115203 Tomato Paste, low sodium, comm. canned 5115204 Tomato Puree, low sodium, comm. canned 5311- Canned Tomato Juice and Tomato Mixtures 5321- Frozen Tomato Juice 5371- Fresh Tomato Juice 5381102 Tomato Juice, aseptically packed 5413115 Tomatoes, dry 5614- Tomato Soup 5624- Condensed Tomato Soup 5654- Dry Tomato Soup (does not include mixtures, and ready-to-eat dinners)	74- Tomatoes and Tomato Mixtures raw, cooked, juices, sauces, mixtures, soups, sandwiches
Snap Beans	4943- Snap or Wax Beans, fresh 5114401 Green or Snap Beans, commercially canned 5114402 Wax or Yellow Beans, commercially canned 5114403 Beans, baby/jr., commercially canned 5115302 Green Beans, low sodium, comm. canned 5115303 Yell. or Wax Beans, low sod., comm. canned 5213301 Snap or Green Beans, comm. frozen 5213302 Snap or Green w/sauce, comm. frozen 5213303 Snap or Green Beans w/other veg., comm. fr. 5213304 Sp. or Gr. Beans w/other veg./sc., comm. fr. 5213305 Wax or Yell. Beans, comm. frozen (does not include soups, mixtures, and ready-to-eat dinners; includes baby foods)	7510180 Beans, string, green, raw 7520498 Beans, string, cooked, NS color/fat added 7520499 Beans, string, cooked, NS color/no fat 7520500 Beans, string, cooked, NS color & fat 7520501 Beans, string, cooked, green/NS fat 7520502 Beans, string, cooked, green/no fat 7520503 Beans, string, cooked, green/fat 7520511 Beans, str., canned, low sod.,green/NS fat 7520512 Beans, str., canned, low sod.,green/no fat 7520513 Beans, str., canned, low sod.,green/fat 7520600 Beans, string, cooked, yellow/NS fat 7520601 Beans, string, cooked, yellow/no fat 7520602 Beans, string, cooked, yellow/fat 7540301 Beans, string, green, creamed 7540302 Beans, string, green, w/mushroom sauce 7540401 Beans, string, yellow, creamed 7550011 Beans, string, green, pickled 7640100 Beans, green, string, baby 7640101 Beans, green, string, baby, str. 7640102 Beans, green, string, baby, junior 7640103 Beans, green, string, baby, creamed (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; includes baby foods)

Appendix 2-A. Foods Codes and Definitions Used in Analysis of the 1987/88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Beef	441- Beef (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	21- Beef beef, nfs beef steak beef oxtails, neckbones, ribs roasts, stew meat, corned, brisket, sandwich steaks ground beef, patties, meatballs other beef items beef baby food (excludes meat, poultry, and fish with non-meat items; frozen plate meals; soups and gravies with meat, poultry and fish base; and gelatin-based drinks; includes baby food)
Pork	442- Pork (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	22- Pork pork, nfs; ground dehydrated chops steaks, cutlets ham roasts Canadian bacon bacon, salt pork other pork items pork baby food (excludes meat, poultry, and fish with non-meat items; frozen plate meals; soups and gravies with meat, poultry and fish base; and gelatin-based drinks; includes baby food)
Game	445- Variety Meat, Game (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	233- Game (excludes meat, poultry, and fish with non-meat items; frozen plate meals; soups and gravies with meat, poultry and fish base; and gelatin-based drinks)
Poultry	451- Poultry (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	24- Poultry chicken turkey duck other poultry poultry baby food (excludes meat, poultry, and fish with non-meat items; frozen plate meals; soups and gravies with meat, poultry and fish base; and gelatin-based drinks; includes baby food)
Eggs	46- Eggs (fresh equivalent) fresh processed eggs, substitutes (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	3- Eggs eggs egg mixtures egg substitutes eggs baby food froz. meals with egg as main ingred. (includes baby foods)
Broccoli	4912- Fresh Broccoli (and home canned/froz.) 5111203 Broccoli, comm. canned 52112- Comm. Frozen Broccoli (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	722- Broccoli (all forms) (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Carrots	4921- Fresh Carrots (and home canned/froz.) 51121- Comm. Canned Carrots 5115101 Carrots, Low Sodium, Comm. Canned 52121- Comm. Frozen Carrots 5312103 Comm. Canned Carrot Juice 5372102 Carrot Juice Fresh 5413502 Carrots, Dried Baby Food (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	7310- Carrots (all forms) 7311140 Carrots in Sauce 7311200 Carrot Chips 76201- Carrots, baby (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; includes baby foods except mixtures)

Food Product	Household Code/Definition	Individual Code
Pumpkin	4922- Fresh Pumpkin, Winter Squash (and home canned/froz.) 51122- Pumpkin/Squash, Baby or Junior, Comm. Canned 52122- Winter Squash, Comm. Frozen 5413504 Squash, Dried Baby Food (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	732- Pumpkin (all forms) 733- Winter squash (all forms) 76205- Squash, baby (does not include vegetable soups; vegetables mixtures; or vegetable with meat mixtures; includes baby foods)
Asparagus	4941- Fresh Asparagus (and home canned/froz.) 5114101 Comm. Canned Asparagus 5115301 Asparagus, Low Sodium, Comm. Canned 52131- Comm. Frozen Asparagus (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	7510080 Asparagus, raw 75202- Asparagus, cooked 7540101 Asparagus, creamed or with cheese (does not include vegetable soups; vegetables mixtures, or vegetable with meat mixtures)
Lima Beans	4942- Fresh Lima and Fava Beans (and home canned/froz.) 5114204 Comm. Canned Mature Lima Beans 5114301 Comm. Canned Green Lima Beans 5115304 Comm. Canned Low Sodium Lima Beans 52132- Comm. Frozen Lima Beans 54111- Dried Lima Beans 5411306 Dried Fava Beans (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures; does not include succotash)	7510200 Lima Beans, raw 752040- Lima Beans, cooked 752041- Lima Beans, canned 75402- Lima Beans with sauce (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; does not include succotash)
Cabbage	4944- Fresh Cabbage (and home canned/froz.) 4958601 Sauerkraut, home canned or pkgd 5114801 Sauerkraut, comm. canned 5114904 Comm. Canned Cabbage 5114905 Comm. Canned Cabbage (no sauce; incl. baby) 5115501 Sauerkraut, low sodium., comm. canned 5312102 Sauerkraut Juice, comm. canned (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	7510300 Cabbage, raw 7510400 Cabbage, Chinese, raw 7510500 Cabbage, red, raw 7514100 Cabbage salad or coleslaw 7514130 Cabbage, Chinese, salad 75210- Chinese Cabbage, cooked 75211- Green Cabbage, cooked 75212- Red Cabbage, cooked 752130- Savoy Cabbage, cooked 75230- Sauerkraut, cooked 7540701 Cabbage, creamed 755025- Cabbage, pickled or in relish (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Lettuce	4945- Fresh Lettuce, French Endive (and home canned/froz.) (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	75113- Lettuce, raw 75143- Lettuce salad with other veg. 7514410 Lettuce, wilted, with bacon dressing 7522005 Lettuce, cooked (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Okra	4946- Fresh Okra (and home canned/froz.) 5114914 Comm. Canned Okra 5213720 Comm. Frozen Okra 5213721 Comm. Frozen Okra with Oth. Veg. & Sauce (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	7522000 Okra, cooked, NS as to fat 7522001 Okra, cooked, fat not added 7522002 Okra, cooked, fat added 7522010 Lufta, cooked (Chinese Okra) 7541450 Okra, fried 7550700 Okra, pickled (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Peas	4947- Fresh Peas (and home canned/froz.) 51147- Comm Canned Peas (incl. baby) 5115310 Low Sodium Green or English Peas (canned) 5115314 Low Sod. Blackeye, Gr. or Imm. Peas (canned) 5114205 Blackeyed Peas, comm. canned 52134- Comm. Frozen Peas 5412- Dried Peas and Lentils (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	7512000 Peas, green, raw 7512775 Snowpeas, raw 75223- Peas, cowpeas, field or blackeye, cooked 75224- Peas, green, cooked 75225- Peas, pigeon, cooked 75231- Snowpeas, cooked 7541650 Pea salad 7541660 Pea salad with cheese 75417- Peas, with sauce or creamed 76409- Peas, baby 76411- Peas, creamed, baby (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; includes baby foods except mixtures)

Food Product	Household Code/Definition	Individual Code
Cucumbers	4952- Fresh Cucumbers (and home canned/froz.) (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	7511100 Cucumbers, raw 75142- Cucumber salads 752167- Cucumbers, cooked 7550301 Cucumber pickles, dill 7550302 Cucumber pickles, relish 7550303 Cucumber pickles, sour 7550304 Cucumber pickles, sweet 7550305 Cucumber pickles, fresh 7550307 Cucumber, Kim Chee 7550311 Cucumber pickles, dill, reduced salt 7550314 Cucumber pickles, sweet, reduced salt (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Beets	4954- Fresh Beets (and home canned/froz.) 51145- Comm. Canned Beets (incl. baby) 5115305 Low Sodium Beets (canned) 5213714 Comm. Frozen Beets 5312104 Beet Juice (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	7510250 Beets, raw 752080- Beets, cooked 752081- Beets, canned 7540501 Beets, harvard 7550021 Beets, pickled 76403- Beets, baby (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; includes baby foods except mixtures)
Strawberries	5022- Fresh Strawberries 5122801 Comm. Canned Strawberries with sugar 5122802 Comm. Canned Strawberries without sugar 5122803 Canned Strawberry Pie Filling 5222- Comm. Frozen Strawberries (does not include ready-to-eat dinners; includes baby foods except mixtures)	6322- Strawberries 6413250 Strawberry Juice (includes baby food; except mixtures)
Other Berries	5033- Fresh Berries Other than Strawberries 5122804 Comm. Canned Blackberries with sugar 5122805 Comm. Canned Blackberries without sugar 5122806 Comm. Canned Blueberries with sugar 5122807 Comm. Canned Blueberries without sugar 5122808 Canned Blueberry Pie Filling 5122809 Comm. Canned Gooseberries with sugar 5122810 Comm. Canned Gooseberries without sugar 5122811 Comm. Canned Raspberries with sugar 5122812 Comm. Canned Raspberries without sugar 5122813 Comm. Canned Cranberry Sauce 5122815 Comm. Canned Cranberry-Orange Relish 52233- Comm. Frozen Berries (not strawberries) 5332404 Blackberry Juice (home and comm. canned) 5423114 Dried Berries (not strawberries) (does not include ready-to-eat dinners; includes baby foods except mixtures)	6320- Other Berries 6321- Other Berries 6341101 Cranberry salad 6410460 Blackberry Juice 64105- Cranberry Juice (includes baby food; except mixtures)
Peaches	5036- Fresh Peaches 51224- Comm. Canned Peaches (incl. baby) 5223601 Comm. Frozen Peaches 5332405 Home Canned Peach Juice 5423105 Dried Peaches (baby) 5423106 Dried Peaches (does not include ready-to-eat dinners; includes baby foods except mixtures)	62116- Dried Peaches 63135- Peaches 6412203 Peach Juice 6420501 Peach Nectar 67108- Peaches,baby 6711450 Peaches, dry, baby (includes baby food; except mixtures)
Pears	5037- Fresh Pears 51225- Comm. Canned Pears (incl. baby) 5332403 Comm. Canned Pear Juice, baby 5362204 Fresh Pear Juice 5423107 Dried Pears (does not include ready-to-eat dinners; includes baby foods except mixtures)	62119- Dried Pears 63137- Pears 6341201 Pear salad 6421501 Pear Nectr 67109- Pears, baby 6711455 Pears, dry, baby (includes baby food; except mixtures)

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Food Product	Household Code/Definition	Individual Code
	EXPOSED/PROTECTED FRUITS/VEGETABLES, ROOT VEGETABLES	
Exposed Fruits	5022- Strawberries, fresh 5023101 Acerola, fresh 5023401 Currants, fresh 5031- Apples/Applesauce, fresh 5033- Berries other than Strawberries, fresh 5034- Cherries, fresh 5036- Peaches, fresh 5037- Pears, fresh 50381- Apricots, Nectarines, Loquats, fresh 5038305 Dates, fresh 50384- Grapes, fresh 50386- Plums, fresh 50387- Rhubarb, fresh 5038805 Persimmons, fresh 5038901 Sapote, fresh 51221- Apples/Applesauce, canned 51222- Apricots, canned 51223- Cherries, canned 51224- Peaches, canned 51225- Pears, canned 51228- Berries, canned 5122903 Grapes with sugar, canned 5122904 Grapes without sugar, canned 5122905 Plums with sugar, canned 5122906 Plums without sugar, canned 5122907 Plums, canned, baby 5122911 Prunes, canned, baby 5122912 Prunes, with sugar, canned 5122913 Prunes, without sugar, canned 5122914 Raisin Pie Filling 5222- Frozen Strawberries 52231- Apples Slices, frozen 52233- Berries, frozen 52234- Cherries, frozen 52236- Peaches, frozen 52239- Rhubarb, frozen 53321- Canned Apple Juice 53322- Canned Grape Juice 5332402 Canned Prune Juice 5332403 Canned Pear Juice 5332404 Canned Blackberry Juice 5332405 Canned Peach Juice 53421- Frozen Grape Juice 5342201 Frozen Apple Juice, comm. fr. 5342202 Frozen Apple Juice, home fr. 5352101 Apple Juice, asep. packed 5352201 Grape Juice, asep. packed 5362101 Apple Juice, fresh 5362202 Apricot Juice, fresh 5362203 Grape Juice, fresh 5362204 Pear Juice, fresh 5362205 Prune Juice, fresh 5421- Dried Prunes 5422- Raisins, Currants, dried 5423101 Dry Apples 5423102 Dry Apricots 5423103 Dates without pits 5423104 Dates with pits 5423105 Peaches, dry, baby 5423106 Peaches, dry 5423107 Pears, dry 5423114 Berries, dry 5423115 Cherries, dry (includes baby foods)	62101- Apple, dried 62104- Apricot, dried 62108- Currants, dried 62110- Date, dried 62116- Peaches, dried 62119- Pears, dried 62121- Plum, dried 62122- Prune, dried 62125- Raisins 63101- Apples/applesauce 63102- Wi-apple 63103- Apricots 63111- Cherries, maraschino 63112- Acerola 63113- Cherries, sour 63115- Cherries, sweet 63117- Currants, raw 63123- Grapes 6312601 Juneberry 63131- Nectarine 63135- Peach 63137- Pear 63139- Persimmons 63143- Plum 63146- Quince 63147- Rhubarb/Sapodillo 632- Berries 64101- Apple Cider 64104- Apple Juice 64105- Cranberry Juice 64116- Grape Juice 64122- Peach Juice 64132- Prune/Strawberry Juice 6420101 Apricot Nectar 64205- Peach Nectar 64215- Pear Nectar 67102- Applesauce, baby 67108- Peaches, baby 67109- Pears, baby 6711450 Peaches, baby, dry 6711455 Pears, baby, dry 67202- Apple Juice, baby 6720380 White Grape Juice, baby 67212- Pear Juice, baby (includes baby foods/juices except mixtures; excludes fruit mixtures)

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Food Product	Household Code/Definition	Individual Code
Protected Fruits	501- Citrus Fruits, fresh 5021- Cantaloupe, fresh 5023201 Mangoes, fresh 5023301 Guava, fresh 5023601 Kiwi, fresh 5023701 Papayas, fresh 5023801 Passion Fruit, fresh 5032- Bananas, Plantains, fresh 5035- Melons other than Cantaloupe, fresh 50382- Avocados, fresh 5038301 Figs, fresh 5038302 Figs, cooked 5038303 Figs, home canned 5038304 Figs, home frozen 50385- Pineapple, fresh 5038801 Pomegranates, fresh 5038902 Cherimoya, fresh 5038903 Jackfruit, fresh 5038904 Breadfruit, fresh 5038905 Tamarind, fresh 5038906 Carambola, fresh 5038907 Longan, fresh 5121- Citrus, canned 51226- Pineapple, canned 5122901 Figs with sugar, canned 5122902 Figs without sugar, canned 5122909 Bananas, canned, baby 5122910 Bananas and Pineapple, canned, baby 5122915 Litchis, canned 5122916 Mangos with sugar, canned 5122917 Mangos without sugar, canned 5122918 Mangos, canned, baby 5122920 Guava with sugar, canned 5122921 Guava without sugar, canned 5122923 Papaya with sugar, canned 5122924 Papaya without sugar, canned 52232- Bananas, frozen 52235- Melon, frozen 52237- Pineapple, frozen 5331- Canned Citrus Juices 53323- Canned Pineapple Juice 5332408 Canned Papaya Juice 5332410 Canned Mango Juice 5332501 Canned Papaya Concentrate 5341- Frozen Citrus Juice 5342203 Frozen Pineapple Juice 5351- Citrus and Citrus Blend Juices, asep. packed 5352302 Pineapple Juice, asep. packed 5361- Fresh Citrus and Citrus Blend Juices 5362206 Papaya Juice, fresh 5362207 Pineapple-Coconut Juice, fresh 5362208 Mango Juice, fresh 5362209 Pineapple Juice, fresh 5423108 Pineapple, dry 5423109 Papaya, dry 5423110 Bananas, dry 5423111 Mangos, dry 5423117 Litchis, dry 5423118 Tamarind, dry 5423119 Plantain, dry (includes baby foods)	61- Citrus Fr., Juices (incl. cit. juice mixtures) 62107- Bananas, dried 62113- Figs, dried 62114- Lychees/Papayas, dried 62120- Pineapple, dried 62126- Tamarind, dried 63105- Avocado, raw 63107- Bananas 63109- Cantaloupe, Carambola 63110- Cassaba Melon 63119- Figs 63121- Genip 63125- Guava/Jackfruit, raw 6312650 Kiwi 6312651 Lychee, raw 6312660 Lychee, cooked 63127- Honeydew 63129- Mango 63133- Papaya 63134- Passion Fruit 63141- Pineapple 63145- Pomegranate 63148- Sweetsop, Soursop, Tamarind 63149- Watermelon 64120- Papaya Juice 64121- Passion Fruit Juice 64124- Pineapple Juice 64133- Watermelon Juice 6420150 Banana Nectar 64202- Cantaloupe Nectar 64203- Guava Nectar 64204- Mango Nectar 64210- Papaya Nectar 64213- Passion Fruit Nectar 64221- Soursop Nectar 6710503 Bananas, baby 6711500 Bananas, baby, dry 6720500 Orange Juice, baby 6721300 Pineapple Juice, baby (includes baby foods/juices except mixtures; excludes fruit mixtures)

Food Product	Household Code/Definition	Individual Code
Exposed Veg.	491- Fresh Dark Green Vegetables 493- Fresh Tomatoes 4941- Fresh Asparagus 4943- Fresh Beans, Snap or Wax 4944- Fresh Cabbage 4945- Fresh Lettuce 4946- Fresh Okra 49481- Fresh Artichokes 49483- Fresh Brussel Sprouts 4951- Fresh Celery 4952- Fresh Cucumbers 4955- Fresh Cauliflower 4958103 Fresh Kohlrabi 4958111 Fresh Jerusalem Artichokes 4958112 Fresh Mushrooms 4958113 Mushrooms, home canned 4958114 Mushrooms, home frozen 4958118 Fresh Eggplant 4958119 Eggplant, cooked 4958120 Eggplant, home frozen 4958200 Fresh Summer Squash 4958201 Summer Squash, cooked 4958202 Summer Squash, home canned 4958203 Summer Squash, home frozen 4958402 Fresh Bean Sprouts 4958403 Fresh Alfalfa Sprouts 4958504 Bamboo Shoots 4958506 Seaweed 4958508 Tree Fern, fresh 4958601 Sauerkraut 5111- Dark Green Vegetables (all are exposed) 5113- Tomatoes 5114101 Asparagus, comm. canned 51144- Beans, green, snap, yellow, comm. canned 5114704 Snow Peas, comm. canned 5114801 Sauerkraut, comm. canned 5114901 Artichokes, comm. canned 5114902 Bamboo Shoots, comm. canned 5114903 Bean Sprouts, comm. canned 5114904 Cabbage, comm. canned 5114905 Cabbage, comm. canned, no sauce 5114906 Cauliflower, comm. canned, no sauce 5114907 Eggplant, comm. canned, no sauce 5114913 Mushrooms, comm. canned 5114914 Okra, comm. canned 5114918 Seaweeds, comm. canned 5114920 Summer Squash, comm. canned	721- Dark Green Leafy Veg. 722- Dark Green Nonleafy Veg. 74- Tomatoes and Tomato Mixtures 7510050 Alfalfa Sprouts 7510075 Artichoke, Jerusalem, raw 7510080 Asparagus, raw 75101- Beans, sprouts and green, raw 7510275 Brussel Sprouts, raw 7510280 Buckwheat Sprouts, raw 7510300 Cabbage, raw 7510400 Cabbage, Chinese, raw 7510500 Cabbage, Red, raw 7510700 Cauliflower, raw 7510900 Celery, raw 7510950 Chives, raw 7511100 Cucumber, raw 7511120 Eggplant, raw 7511200 Kohlrabi, raw 75113- Lettuce, raw 7511500 Mushrooms, raw 7511900 Parsley 7512100 Pepper, hot chili 75122- Peppers, raw 7512750 Seaweed, raw 7512775 Snowpeas, raw 75128- Summer Squash, raw 7513210 Celery Juice 7514100 Cabbage or cole slaw 7514130 Chinese Cabbage Salad 7514150 Celery with cheese 75142- Cucumber salads 75143- Lettuce salads 7514410 Lettuce, wilted with bacon dressing 7514600 Greek salad 7514700 Spinach salad 7520600 Algae, dried 75201- Artichoke, cooked 75202- Asparagus, cooked 75203- Bamboo shoots, cooked 752049- Beans, string, cooked 75205- Beans, green, cooked/canned 75206- Beans, yellow, cooked/canned 75207- Bean Sprouts, cooked 752085- Breadfruit 752090- Brussel Sprouts, cooked 75210- Cabbage, Chinese, cooked 75211- Cabbage, green, cooked

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Food Product	Household Code/Definition	Individual Code
Exposed Veg. (cont.)	5114923 Chinese or Celery Cabbage, comm. canned 51152- Tomatoes, canned, low sod. 5115301 Asparagus, canned, low sod. 5115302 Beans, Green, canned, low sod. 5115303 Beans, Yellow, canned, low sod. 5115309 Mushrooms, canned, low sod. 51154- Greens, canned, low sod. 5115501 Sauerkraut, low sodium 5211- Dark Gr. Veg., comm. frozen (all exp.) 52131- Asparagus, comm. froz. 52133- Beans, snap, green, yellow, comm. froz. 5213407 Peapods, comm froz. 5213408 Peapods, with sauce, comm froz. 5213409 Peapods, with other veg., comm froz. 5213701 Brussel Sprouts, comm. froz. 5213702 Brussel Sprouts, comm. froz. with cheese 5213703 Brussel Sprouts, comm. froz. with other veg. 5213705 Cauliflower, comm. froz. 5213706 Cauliflower, comm. froz. with sauce 5213707 Cauliflower, comm. froz. with other veg. 5213708 Caul., comm. froz. with other veg. & sauce 5213709 Summer Squash, comm. froz. 5213710 Summer Squash, comm. froz. with other veg. 5213716 Eggplant, comm. froz. 5213718 Mushrooms with sauce, comm. froz. 5213719 Mushrooms, comm. froz. 5213720 Okra, comm. froz. 5213721 Okra, comm. froz., with sauce 5311- Canned Tomato Juice and Tomato Mixtures 5312102 Canned Sauerkraut Juice 5321- Frozen Tomato Juice 5371- Fresh Tomato Juice 5381102 Aseptically Packed Tomato Juice 5413101 Dry Algae 5413102 Dry Celery 5413103 Dry Chives 5413109 Dry Mushrooms 5413111 Dry Parsley 5413112 Dry Green Peppers 5413113 Dry Red Peppers 5413114 Dry Seaweed 5413115 Dry Tomatoes (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	75212- Cabbage, red, cooked 752130- Cabbage, savoy, cooked 75214- Cauliflower 75215- Celery, Chives, Christophine (chayote) 752167- Cucumber, cooked 752170- Eggplant, cooked 752171- Fern shoots 752172- Fern shoots 752173- Flowers of sesbania, squash or lily 7521801 Kohlrabi, cooked 75219- Mushrooms, cooked 75220- Okra/lettuce, cooked 7522116 Palm Hearts, cooked 7522121 Parsley, cooked 75226- Peppers, pimento, cooked 75230- Sauerkraut, cooked/canned 75231- Snowpeas, cooked 75232- Seaweed 75233- Summer Squash 7540050 Artichokes, stuffed 7540101 Asparagus, creamed or with cheese 75403- Beans, green with sauce 75404- Beans, yellow with sauce 7540601 Brussel Sprouts, creamed 7540701 Cabbage, creamed 75409- Cauliflower, creamed 75410- Celery/Chiles, creamed 75412- Eggplant, fried, with sauce, etc. 75413- Kohlrabi, creamed 75414- Mushrooms, Okra, fried, stuffed, creamed 754180- Squash, baked, fried, creamed, etc. 7541822 Christophine, creamed 7550011 Beans, pickled 7550051 Celery, pickled 7550201 Cauliflower, pickled 755025- Cabbage, pickled 7550301 Cucumber pickles, dill 7550302 Cucumber pickles, relish 7550303 Cucumber pickles, sour 7550304 Cucumber pickles, sweet 7550305 Cucumber pickles, fresh 7550307 Cucumber, Kim Chee 7550308 Eggplant, pickled 7550311 Cucumber pickles, dill, reduced salt 7550314 Cucumber pickles, sweet, reduced salt 7550500 Mushrooms, pickled 7550700 Okra, pickled 75510- Olives 7551101 Peppers, hot 7551102 Peppers,pickled 7551301 Seaweed, pickled 7553500 Zucchini, pickled 76102- Dark Green Veg., baby 76401- Beans, baby (excl. most soups & mixtures)

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Appendix 2-A. Foods Codes and Definitions Used in Analysis of the 1987/88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Protected Veg.	4922- Fresh Pumpkin, Winter Squash 4942- Fresh Lima Beans 4947- Fresh Peas 49482- Fresh Soy Beans 4956- Fresh Corn 4958303 Succotash, home canned 4958304 Succotash, home frozen 4958401 Fresh Cactus (prickly pear) 4958503 Burdock 4958505 Bitter Melon 4958507 Horseradish Tree Pods 51122- Comm. Canned Pumpkin and Squash (baby) 51142- Beans, comm. canned 51143- Beans, lima and soy, comm. canned 51146- Corn, comm. canned 5114701 Peas, green, comm. canned 5114702 Peas, baby, comm. canned 5114703 Peas, blackeye, comm. canned 5114705 Pigeon Peas, comm. canned 5114919 Succotash, comm. canned 5115304 Lima Beans, canned, low sod. 5115306 Corn, canned, low sod. 5115307 Creamed Corn, canned, low sod. 511531- Peas and Beans, canned, low sod. 52122- Winter Squash, comm. froz. 52132- Lima Beans, comm. froz. 5213401 Peas, gr., comm. froz. 5213402 Peas, gr., with sauce, comm. froz. 5213403 Peas, gr., with other veg., comm. froz. 5213404 Peas, gr., with other veg., comm. froz. 5213405 Peas, blackeye, comm froz. 5213406 Peas, blackeye, with sauce, comm froz. 52135- Corn, comm. froz. 5213712 Artichoke Hearts, comm. froz. 5213713 Baked Beans, comm. froz. 5213717 Kidney Beans, comm. froz. 5213724 Succotash, comm. froz. 5411- Dried Beans 5412- Dried Peas and Lentils 5413104 Dry Corn 5413106 Dry Hominy 5413504 Dry Squash, baby 5413603 Dry Creamed Corn, baby (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	732- Pumpkin 733- Winter Squash 7510200 Lima Beans, raw 7510550 Cactus, raw 7510960 Corn, raw 7512000 Peas, raw 7520070 Aloe vera juice 752040- Lima Beans, cooked 752041- Lima Beans, canned 7520829 Bitter Melon 752083- Bitter Melon, cooked 7520950 Burdock 752131- Cactus 752160- Corn, cooked 752161- Corn, yellow, cooked 752162- Corn, white, cooked 752163- Corn, canned 7521749 Hominy 752175- Hominy 75223- Peas, cowpeas, field or blackeye, cooked 75224- Peas, green, cooked 75225- Peas, pigeon, cooked 75301- Succotash 75402- Lima Beans with sauce 75411- Corn, scalloped, fritter, with cream 7541650 Pea salad 7541660 Pea salad with cheese 75417- Peas, with sauce or creamed 7550101 Corn relish 76205- Squash, yellow, baby 76405- Corn, baby 76409- Peas, baby 76411- Peas, creamed, baby (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)

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Food Product	Household Code/Definition	Individual Code
Root Vegetables	48- Potatoes, Sweetpotatoes 4921- Fresh Carrots 4953- Fresh Onions, Garlic 4954- Fresh Beets 4957- Fresh Turnips 4958101 Fresh Celeriac 4958102 Fresh Horseradish 4958104 Fresh Radishes, no greens 4958105 Radishes, home canned 4958106 Radishes, home frozen 4958107 Fresh Radishes, with greens 4958108 Fresh Salsify 4958109 Fresh Rutabagas 4958110 Rutabagas, home frozen 4958115 Fresh Parsnips 4958116 Parsnips, home canned 4958117 Parsnips, home frozen 4958502 Fresh Lotus Root 4958509 Ginger Root 4958510 Jicama, including yambean 51121- Carrots, comm. canned 51145- Beets, comm. canned 5114908 Garlic Pulp, comm. canned 5114910 Horseradish, comm. prep. 5114915 Onions, comm. canned 5114916 Rutabagas, comm. canned 5114917 Salsify, comm. canned 5114921 Turnips, comm. canned 5114922 Water Chestnuts, comm. canned 51151- Carrots, canned, low sod. 5115305 Beets, canned, low sod. 5115502 Turnips, low sod. 52121- Carrots, comm. froz. 5213714 Beets, comm. froz. 5213722 Onions, comm. froz. 5213723 Onions, comm. froz., with sauce 5213725 Turnips, comm. froz. 5312103 Canned Carrot Juice 5312104 Canned Beet Juice 5372102 Fresh Carrot Juice 5413105 Dry Garlic 5413110 Dry Onion 5413502 Dry Carrots, baby 5413503 Dry Sweet Potatoes, baby (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures)	71- White Potatoes and Puerto Rican St. Veg. 7310- Carrots 7311140 Carrots in sauce 7311200 Carrot chips 734- Sweetpotatoes 7510250 Beets, raw 7511150 Garlic, raw 7511180 Jicama (yambean), raw 7511250 Leeks, raw 75117- Onions, raw 7512500 Radish, raw 7512700 Rutabaga, raw 7512900 Turnip, raw 752080- Beets, cooked 752081- Beets, canned 7521362 Cassava 7521740 Garlic, cooked 7521771 Horseradish 7521850 Lotus root 752210- Onions, cooked 7522110 Onions, dehydrated 752220- Parsnips, cooked 75227- Radishes, cooked 75228- Rutabaga, cooked 75229- Salsify, cooked 75234- Turnip, cooked 75235- Water Chestnut 7540501 Beets, harvard 75415- Onions, creamed, fried 7541601 Parsnips, creamed 7541810 Turnips, creamed 7550021 Beets, pickled 7550309 Horseradish 7551201 Radishes, pickled 7553403 Turnip, pickled 76201- Carrots, baby 76209- Sweetpotatoes, baby 76403- Beets, baby (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)

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Food Product	Household Code/Definition	Individual Code
	USDA SUBCATEGORIES	
Dark Green Vegetables	491- Fresh Dark Green Vegetables 5111- Comm. Canned Dark Green Veg. 51154- Low Sodium Dark Green Veg. 5211- Comm. Frozen Dark Green Veg. 5413111 Dry Parsley 5413112 Dry Green Peppers 5413113 Dry Red Peppers (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures/dinners; excludes vegetable juices and dried vegetables)	72- Dark Green Vegetables all forms leafy, nonleafy, dk. gr. veg. soups
Deep Yellow Vegetables	492- Fresh Deep Yellow Vegetables 5112- Comm. Canned Deep Yellow Veg. 51151- Low Sodium Carrots 5212- Comm. Frozen Deep Yellow Veg. 5312103 Carrot Juice 54135- Dry Carrots, Squash, Sw. Potatoes (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures/dinners; excludes vegetable juices and dried vegetables)	73- Deep Yellow Vegetables all forms carrots, pumpkin, squash, sweetpotatoes, dp. yell. veg. soups
Other Vegetables	494- Fresh Light Green Vegetables 495- Fresh Other Vegetables 5114- Comm. Canned Other Veg. 51153- Low Sodium Other Veg. 51155- Low Sodium Other Veg. 5213- Comm. Frozen Other Veg. 5312102 Sauerkraut Juice 5312104 Beet Juice 5411- Dreid Beans 5412- Dried Peas, Lentils 541310- Dried Other Veg. 5413114 Dry Seaweed 5413603 Dry Cr. Corn, baby (does not include soups, sauces, gravies, mixtures, and ready-to-eat dinners; includes baby foods except mixtures/dinners; excludes vegetable juices and dried vegetables)	75- Other Vegetables all forms
Citrus Fruits	501- Fresh Citrus Fruits 5121- Comm. Canned Citrus Fruits 5331- Canned Citrus and Citrus Blend Juice 5341- Frozen Citrus and Citrus Blend Juice 5351- Aseptically Packed Citrus and Citr. Blend Juice 5361- Fresh Citrus and Citrus Blend Juice (includes baby foods; excludes dried fruits)	61- Citrus Fruits and Juices 6720500 Orange Juice, baby food 6720600 Orange-Apricot Juice, baby food 6720700 Orange-Pineapple Juice, baby food 6721100 Orange-Apple-Banana Juice, baby food (excludes dried fruits)
Other Fruits	502- Fresh Other Vitamin C-Rich Fruits 503- Fresh Other Fruits 5122- Comm. Canned Fruits Other than Citrus 5222- Frozen Strawberries 5223- Frozen Other than Citr. or Vitamin C-Rich Fr. 5332- Canned Fruit Juice Other than Citrus 5342- Frozen Juices Other than Citrus 5352- Aseptically Packed Fruit Juice Other than Citr. 5362- Fresh Fruit Juice Other than Citrus 542- Dry Fruits (includes baby foods; excludes dried fruits)	62- Dried Fruits 63- Other Fruits 64- Fruit Juices and Nectars Excluding Citrus 671- Fruits, baby 67202- Apple Juice, baby 67203- Baby Juices 67204- Baby Juices 67212- Baby Juices 67213- Baby Juices 673- Baby Fruits 674- Baby Fruits

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APPENDIX 2B

Sample Calculation of Mean Daily Fat Intake Based on CDC (1994) Data

Sample Calculation of Mean Daily Fat Intake Based on CDC (1994) Data

$$0.34 \ x \ 2{,}095 \ kcal \ x \ X = 82 \ g\text{-}fat$$

$$\therefore X = 0.115 \ \frac{g\text{-}fat}{kcal}$$

X is the conversion factor from kcal/day to g-fat/day. An example of obtaining the grams of fat from the daily TFEI (1591 kcal/day) for children ages 3-5 and their percent TFEI from total dietary fat (33%) is as follows:

$$1{,}591 \ \frac{kcal}{day} \ x \ 0.33 \ x \ 0.12 \ \frac{g\text{-}fat}{kcal} = 63 \ \frac{g\text{-}fat}{day}$$

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Health and Nutrition Examination Surveys — Continued

ture (USDA) Survey Nutrient Data Base (SNDB); estimates were not computed for nursing infants and children or for recalls coded unreliable or incomplete.

Of the 20,277 persons selected for the survey, 17,487 (86%) were interviewed, and 15,630 (77%) underwent a standardized physical examination. Of those examined, 14,801 (95%) had a complete and reliable 24-hour dietary recall, resulting in an overall analytic response rate of 73%. Data were weighted to account for survey design and nonresponse.

A computer-based, automated dietary interview and coding system (5) was used to collect all 24-hour dietary recalls. Respondents reported their TFEI during the preceding 24 hours (midnight to midnight). Proxy respondents reported for infants and children aged 2 months–11 years and for respondents who were unable to self report (6).

During 1988–91, the overall mean daily TFEI for the population aged ≥2 months was 2095 kcal (range: 877–2533 kcal) (Table 1). For persons aged ≥2 years, 34% (82 g) of their TFEI was from total dietary fat; 12% (29 g) was from saturated fat (Table 1). Mean daily TFEI was higher for males than for females (Table 2, page 123). The overall mean percentages of TFEI derived from total dietary fat and from saturated fat did not differ by sex (Table 2, page 123).

Reported by: C Lenfant, MD, N Ernst, National Heart, Lung, and Blood Institute, National Institutes of Health. Div of Health Examination Statistics, National Center for Health Statistics, CDC.

(Continued on page 123)

TABLE 1. Mean daily total food-energy intake (TFEI)* and mean percentages of TFEI from total dietary fat[†] and from saturated fat, by age group — Third National Health and Nutrition Examination Survey, Phase 1, 1988–91

Age group (yrs)	Sample size	Daily TFEI No.	Daily TFEI (SE[§])	% TFEI from total dietary fat %	% TFEI from total dietary fat (SE)	% TFEI from saturated fat %	% TFEI from saturated fat (SE)
2–11 mos[¶]	871	877	(±10.9)	37.2	(±0.3)	15.8	(±0.1)
1– 2[¶]	1,231	1289	(±21.2)	33.7	(±0.4)	13.9	(±0.2)
3– 5	1,617	1591	(±20.5)	33.8	(±0.3)	12.0	(±0.1)
6–11	1,745	1897	(±25.0)	34.0	(±0.4)	12.6	(±0.3)
12–15	711	2218	(±40.8)	33.4	(±0.8)	12.2	(±0.2)
16–19	786	2533	(±80.2)	34.6	(±0.4)	12.4	(±0.2)
20–29	1,682	2484	(±44.4)	34.8	(±0.4)	12.8	(±0.2)
30–39	1,528	2372	(±43.4)	34.4	(±0.4)	11.9	(±0.2)
40–49	1,228	2140	(±44.5)	34.4	(±0.5)	11.8	(±0.2)
50–59	929	1987	(±30.7)	34.7	(±0.4)	11.8	(±0.2)
60–69	1,106	1822	(±35.0)	33.0	(±0.3)	11.2	(±0.3)
70–79	851	1624	(±26.3)	32.9	(±0.5)	11.2	(±0.3)
≥80	889	1484	(±27.4)	32.0	(±0.3)	11.0	(±0.2)
Total	14,801	2095	(±20.8)	33.8	(±0.2)	12.0	(±0.1)
≥2	*13,314*	*2123*	*(±20.4)*	*33.6*	*(±0.2)*	*11.9*	*(±0.1)*

*Defined as all nutrients (i.e., protein, fat, carbohydrate, and alcohol) derived from consumption of foods and beverages (excluding plain drinking water), measured in kilocalories (kcal).
[†]Defined as all fat (i.e., saturated and unsaturated) derived from consumption of foods and beverages, measured in grams.
[§]Standard error.
[¶]Excludes nursing infants and children.

Source: CDC, 1994.

Health and Nutrition Examination Surveys — Continued

Editorial Note: The findings from NHANES III in this report update national population estimates of daily dietary fat and TFEIs. Since NHANES II (1976–80), the mean percentages of TFEI derived from total dietary fat and from saturated fat have decreased (7), sustaining a trend observed since the mid-1960s (8). Mean serum cholesterol level for adults also decreased from NHANES II to NHANES III (9).

One national health objective for the year 2000 is to reduce dietary fat intake to an average of 30% or less and average saturated fat intake to less than 10% of calories among persons aged ≥2 years (baseline: 36% of calories from total fat and 13% from

TABLE 2. Mean daily total food-energy intake (TFEI)* and percentages of TFEI from total dietary fat[†] and from saturated fat, by age group and sex — Third National Health and Nutrition Examination Survey, Phase 1, 1988–91

Sex/Age group (yrs)	Sample size	Daily TFEI No.	Daily TFEI (SE[§])	% TFEI from total dietary fat %	% TFEI from total dietary fat (SE)	% TFEI from saturated fat %	% TFEI from saturated fat (SE)
Males							
2–11 mos[¶]	439	903	(± 13.3)	38.9	(±0.4)	16.8	(±0.2)
1– 2[¶]	601	1339	(± 20.3)	33.6	(±0.5)	13.8	(±0.2)
3– 5	744	1663	(± 26.5)	32.8	(±0.4)	12.6	(±0.2)
6–11	868	2036	(± 44.4)	33.9	(±0.3)	12.8	(±0.2)
12–15	338	2578	(± 76.4)	33.1	(±0.8)	12.4	(±0.3)
16–19	308	3097	(±114.4)	34.6	(±0.7)	12.8	(±0.2)
20–29	844	3026	(± 68.6)	34.9	(±0.5)	12.0	(±0.2)
30–39	736	2872	(± 88.4)	34.6	(±0.8)	11.9	(±0.3)
40–49	628	2646	(± 64.4)	33.9	(±0.5)	11.4	(±0.2)
50–59	473	2341	(± 61.5)	36.7	(±0.8)	11.8	(±0.2)
60–69	646	2110	(± 57.7)	33.3	(±0.6)	11.3	(±0.3)
70–79	444	1887	(± 39.7)	33.8	(±0.5)	11.0	(±0.2)
≥80	298	1778	(± 35.7)	33.3	(±0.6)	11.4	(±0.2)
Total	7322	2478	(± 30.3)	34.1	(±0.3)	12.1	(±0.1)
≥2	6594	*2618*	*(± 29.6)*	*34.1*	*(±0.3)*	*12.0*	*(±0.1)*
Females							
2–11 mos[¶]	432	850	(± 15.0)	37.6	(±0.5)	15.8	(±0.2)
1– 2[¶]	630	1238	(± 26.5)	34.0	(±0.5)	13.9	(±0.2)
3– 5	803	1518	(± 23.8)	33.1	(±0.4)	12.6	(±0.2)
6–11	877	1763	(± 20.4)	34.2	(±0.5)	12.7	(±0.2)
12–15	373	1838	(± 48.4)	33.7	(±0.7)	12.0	(±0.2)
16–19	397	1958	(± 70.3)	34.4	(±0.7)	12.3	(±0.4)
20–29	838	1957	(± 32.3)	34.0	(±0.4)	11.9	(±0.2)
30–39	791	1883	(± 37.0)	34.2	(±0.4)	11.9	(±0.2)
40–49	602	1764	(± 35.7)	34.9	(±0.7)	11.8	(±0.2)
50–59	458	1629	(± 37.2)	33.8	(±0.8)	11.4	(±0.2)
60–69	560	1578	(± 30.3)	32.8	(±0.6)	11.0	(±0.3)
70–79	407	1436	(± 28.5)	32.3	(±0.7)	10.8	(±0.4)
≥80	313	1329	(± 28.0)	31.3	(±0.4)	10.6	(±0.2)
Total	7479	1732	(± 14.5)	33.9	(±0.3)	11.9	(±0.1)
≥2	6720	*1761*	*(± 15.0)*	*33.8*	*(±0.3)*	*11.8*	*(±0.1)*

*Defined as all nutrients (i.e., protein, fat, carbohydrate, and alcohol) derived from consumption of foods and beverages (excluding plain drinking water), measured in kilocalories (kcal).
[†]Defined as all fat (i.e., saturated and unsaturated) derived from consumption of foods and beverages, measured in grams.
[§]Standard error.
[¶]Excludes nursing infants and children.

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APPENDIX 2C

Method of Calculation Used by Javitz, 1980

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APPENDIX 2C

METHOD OF CALCULATION USED BY JAVITZ, 1980: WEIGHTED MEANS AND PERCENTILES

The weighted mean of N respondents from the survey having weights W_1, W_2, ... W_n and monthly fish consumption C_1, C_2, ..., C_n is computed as follows:

$$\text{Mean consumption} = \sum_{i=1}^{N} W_i \ C_i \ / \sum_{i=1}^{N} W_i$$

The weight W_i is the number of fish consumers represented by the ith survey respondent. The sum of all the weights represents the average number of U.S. fish consumers during the survey year.

The 95th percentile of fish consumption was also computed on a weighted basis; no assumptions about the data distribution were made. Using the same parameters described above, the intake rates of individuals in a subset can be ordered so that $C_1 \leq C_2 \leq \ldots \leq C_n$. The 95th percentile of fish consumption for N respondents is defined as the consumption of the jth individual such that:

$$\sum_{i=1}^{j-1} W_i < (0.95) \sum_{i=1}^{N} W_i$$

The sum of the weights of the individuals in the subset with consumption less than the jth person is less than 95 percent of the total weight of the subset.

$$\sum_{i=1}^{j} W_i \geq (0.95) \sum_{i=1}^{N} W_i$$

APPENDIX 2D

National Marine Fisheries Service Recreational Fishing Data

APPENDIX 2D

NATIONAL MARINE FISHERIES SERVICE RECREATIONAL FISHING DATA

The National Marine Fisheries Service (NMFS) estimated recreational marine catch from intercept surveys of fishermen in the field and an independent telephone survey of households. In 1985, the marine recreational finfish catch in the United States, excluding fish caught in Alaska and Hawaii and Pacific Coast salmon, was an estimated 425 million fish weighing 717.3 million pounds (NMFS 1986a). The estimated number of marine recreational fishermen, which has been relatively stable over the last few years, is 17 million. The size of the population that consumes the national recreational marine catch has not been measured.

Recreational marine fish catch data from the Atlantic and Gulf Coasts for 1985 is presented by species and region in Table 2D-1 (NMFS 1986b). Catch quantities include catch brought ashore in whole form and available for identification during the interview; fish not available for identification and those released alive, discarded dead, filleted, or used for bait are excluded. Weights (including inedible portions) and lengths of the identified fish were measured. Of the approximately 114 million kilograms of fish caught on the Atlantic and Gulf Coasts, the smallest portion of the total catch was made in the North Atlantic. Over one half of the recreational marine catch occurred within 3 miles of the shore or in inland waterways. The data in Table 2D-2 demonstrate the effect of season and local climate on the size of recreational catch. Total catch weight for the Atlantic declines significantly from November throughout February, but the Gulf Coast catch rate remains fairly stable throughout the year. Estimated total numbers of sport fishermen by state and subregion are given in Table 2D-3. These totals may include fishermen who participate but take no fish home for consumption.

Similar data for the Pacific Coast are presented in Tables 2D-4 through 2D-6 (NMFS 1986c). Table 2D-4 shows that over 80 percent of the 12.7 million kg total Pacific Coast recreational catch (excluding Hawaii and Alaska) occurs along the California coast. As in he

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Atlantic, the majority of the recreational marine catch is taken within 3 miles of the shore or from inland waterways. Table 2D-5 shows seasonal fluctuations in the recreational catch; May through October are the peak recreational fishing months for the Pacific Coast. The estimated total number of participants is given according to regions in T-'.le 2D-6.

Table 2D-1. **Estimated Weight of Fish Caught (Catch Type A)[a] by Marine Recreational Fishermen by Species Group and Subregion**

	Species Group	North Atlantic (1,000 kg)	Mid Atlantic (1,000 kg)	South Atlantic (1,000 kg)	Gulf (1,000 kg)	All Regions (1,000 kg)
01.	Sharks	*[b]	2,165	1,521	1,618	5,305
02.	Sharks, Dogfish	–[c]	126	–	*	148
03.	Skates/Rays	–	–	–	–	110
04.	Eels	22	73	*	–	95
05.	Herrings	19	31	–	–	54
06.	Freshwater Catfishes	*	138	–	–	412
07.	Saltwater Catfishes	*	*	161	226	387
08.	Toadfishes	–	18	–	–	20
09.	Atlantic Cod	2,128	311	*	*	2,439
10.	Atlantic Tomcod	22	–	*	*	22
11.	Pollock	94	–	*	*	128
12.	Silver Hake	–	21	*	*	23
13.	Searobins	22	70	*	–	92
14.	Sculpins	–	–	*	*	–
15.	White Perch	–	82	14	*	104
16.	Striped Bass	169	149	–	–	332
17.	Black Sea Bass	9	1,084	1,125	843	3,061
18.	Groupers	*	*	947	2,881	3,827
19.	Sea Basses	–	–	29	17	47
20.	Bluefish	9,283	10,733	7,108	213	27,337
21.	Jack Crevalle	*	*	230	247	478
22.	Blue Runner	*	*	56	42	98
23.	Greater Amberjack	*	*	668	925	1,593
24.	Florida Pompano	*	–	81	–	93
25.	Jacks	*	–	67	257	325
26.	Dolphins	*	–	1,745	262	2,040
27.	Gray Snapper	*	*	347	369	716
28.	Red Snapper	*	*	803	1,865	2,667
29.	Lane Snapper	*	*	31	47	78
30.	Vermilion Snapper	*	*	138	54	192
31.	Yellowtail Snapper	*	*	36	197	232
32.	Snappers	*	*	74	68	142
33.	Pigfish	*	5	100	19	124
34.	White Grunt	*	*	43	605	648
35.	Grunts	*	–	95	149	245
36.	Scup	1,441	1,537	–	*	2,977
37.	Pinefish	*	–	86	46	132
38.	Sheepshead	*	*	413	1,088	1,501
39.	Red Porgy	*	*	107	126	233
40.	Porgies	*	–	89	66	156
41.	Spotted Seatrout	*	–	931	3,222	4,178
42.	Weakfish	–	1,969	157	*	2,218
43.	Sand Seatrout	*	*	*	1,392	1,392
44.	Silver Peach	*	*	19	20	39
45.	Spot	*	1,248	1,222	4	2,473
46.	Kingfishes	*	17	485	298	800
47.	Atlantic Croaker	*	527	441	821	1,788
48.	Black Drum	*	–	295	785	1,311
49.	Red Drum	*	*	610	2,217	2,828

Table 2D-1. Estimated Weight of Fish Caught (Catch Type A)[a] by Marine Recreational Fishermen by Species Group and Subregion (continued)

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Species Group		North Atlantic (1,000 kg)	Mid Atlantic (1,000 kg)	South Atlantic (1,000 kg)	Gulf (1,000 kg)	All Regions (1,000 kg)
50.	Drums	*	–	49	196	246
51.	Mullets	*	7	130	196	333
52.	Barracudas	*	*	230	240	470
53.	Tautog	355	1,758	–	*	2,116
54.	Cunner	11	–	*	*	15
55.	LittleTunny/ATLBonito	–	208	506	321	1,062
56.	Atlantic Mackerel	479	988	*	*	1,467
57.	King Mackerel	*	–	4,571	684	5,258
58.	Spanish Mackerel	*	*	425	528	953
59.	Tunas/Mackerels	–	2,328	5,401	115	8,985
60.	Summer Flounder	202	3,966	597	*	4,765
61.	Gulf Flounder	*	*	–	240	245
62.	Southern Flounder	*	–	210	734	948
63.	Winter Flounder	2,380	5,837	*	*	8,217
64.	Flounders	–	21	–	50	77
65.	Triggerfishes/Filefishes	*	–	165	203	379
66.	Puffers	–	30	36	–	70
67.	Other Fishes	108	282	1,180	1,130	2,701
	TOTALS	18,045	36,074	33,876	25,684	113,679

[a] Catch Type A is an estimate of part of the total catch based on fish brought ashore in whole form, available for interviewer identification and enumeration, from which samples of lengths and weights were obtained.

[b] As asterisk (*) denotes none reported.

[c] A dash denotes no information available.

Source: NMFS, 1986b

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Table 2D-2. Estimated Weight of Fish Caught (Catch Type A)[a] by Marine Recreational Fishermen by Wave and Subregion January 1985 - December 1985

Wave	Subregion	Weight
Jan/Feb	South Atlantic	2,345
	Gulf	4,355
	TOTAL	6,700
Mar/Apr	North Atlantic	1,348
	Mid Atlantic	8,063
	South Atlantic	9,884
	Gulf	2,315
	TOTAL	21,609
May/Jun	North Atlantic	3,818
	Mid Atlantic	9,339
	South Atlantic	6,325
	Gulf	5,096
	TOTAL	24,577
Jul/Aug	North Atlantic	4,928
	Mid Atlantic	6,221
	South Atlantic	4,002
	Gulf	5,403
	TOTAL	20,554
Sep/Oct	North Atlantic	7,516
	Mid Atlantic	10,259
	South Atlantic	8,731
	Gulf	4,720
	TOTAL	31,227
Nov/Dec	North Atlantic	436
	Mid Atlantic	2,193
	South Atlantic	2,588
	Gulf	3,795
	TOTAL	9,012
	GRAND TOTAL	113,679

[a] Catch Type A is an estimate of part of the total catch based on fish brought ashore in whole form, available for interviewer identification and enumeration, from which samples of lengths and weights were obtained.

Source: NMFS, 1986b

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Table 2D-3. Estimated Number of Participants in Marine Recreational Fishing by State and Subregion
January 1989 - December 1989

Subregion	State	Coastal Participants	Non-Coastal Participants	Out of State [1]	Total Participants [1]
North Atlantic	Connecticut	265	*	46	311
	Maine	99	31	76	206
	Massachusetts	428	59	147	634
	New Hampshire	73	13	86	172
	Rhode Island	93	*	105	198
	TOTALS	957	104		
Mid-tlantic	Delaware	126	*	144	270
	Maryland	417	24	261	701
	New Jersey	340	12	233	585
	New York	525	9	67	602
	Virginia	407	65	151	623
	TOTALS	1,815	110		
South Atlantic	Florida	952	8	748	1,708
	Georgia	46	16	16	78
	N. Carolina	254	269	458	980
	S. Carolina	72	47	150	269
	TOTALS	1,324	340		
Gulf of Mexico	Alabama	64	54	74	192
	Florida	923	*	1,321	2,244
	Louisiana	309	46	46	400
	Mississippi	61	21	56	138
	TOTALS	1,357	120		
	GRAND TOTALS	5,453	675		

NOTE: An asterik (*) denotes no participation from this area.
1. Not additive across states. One person can be counted as "OUT OF STATE" for more than one state.

Source: NMFS, 1986b. "Marine Recreational Fishery Statistics Survey, Atlantic and Gulf Coasts, 1987-1989," National Marine Fisheries Service

Table 2D-4. Estimated Weight of Fish Caught (Catch Type A)[a] by Marine Recreational Fishermen by Species Group and Subregion January 1985 to December 1985

	Species Group	Southern California (1,000 kg)	Northern California (1,000 kg)	Oregon (1,000 kg)	Washington (1,000 kg)	All Regions (1,000 kg)
01.	Spiny Dogfish	—[b]	—	*[c]	7	57
02.	Sharks, Other	253	—	*	*	401
03.	Sturgeons	*	—	—	—	—
04.	Pacific Herring	*	7	—	0[d]	7
05.	Northern Anchovy	—	—	—	*	—
06.	Surf Smelt	*	46	2	1	48
07.	Smelts, Other	*	*	—	—	—
08.	Pacific Cod	*	*	*	78	78
09.	Pacific Tomcod	*	—	—	—	—
10.	Walleye Pollock	*	*	*	158	158
11.	Pacific Hake	—	49	*	—	58
12.	Silversides	*	*	—	*	0
13.	Jacksmelt	40	7	*	*	47
14.	Striped Bass	—	58	—	*	62
15.	Kelp Bass	354	*	*	*	354
16.	Spotted Sand Bass	29	*	*	*	29
17.	Barred Sand Bass	431	*	*	*	431
18.	Sea Basses, Other[e]	—	—	—		—
19.	Yellowtail	179	*	*	—*	179
20.	White Croaker	78	142	*	*	—
21.	California Corbina	—	*	*	*	—
22.	Queenfish	14	*	*	*	14
23.	Croakers, Other	57	—	*	*	58
24.	Opaleye	21	*	*	*	21
25.	Halfmoon	10	*	*	*	10
26.	Shiner Perch	—	1	—	—	1
27.	Striped Seaperch	—	20	27	—	55
28.	Black Perch	12	—	*	*	15
29.	Walleye Surfperch	9	6	—	—	20
30.	Silver Surfperch	10	9	—	—	20
31.	White Seaperch	—	—	—	*	10
32.	Pile Perch	—	—	21	15	60
33.	Redtail Surfperch	*	29	34	53	116
34.	Barred Surfperch	75	24	*	*	99
35.	Surfperches, Other	15	7	—	—	22
36.	Pacific Barracuda	132	*	*	*	132
37.	California Sheephead	132	*	*	*	132
38.	Pacific Bonito	267	—	*	*	268
39.	Chub Mackerel	684	37	—	*	721
40.	Tunas	612	333	*	*	945
41.	Brown Rockfish	89	121	*	21	231
42.	Copper Rockfish	140	134	—	78	355
43.	Widow Rockfish	34	18	—	—	54
44.	Yellowtail Rockfish	151	238	45	—	441
45.	Chilipepper Rockfish	203	159	*	*	362
46.	Quillback Rockfish	—	—	—	61	78
47.	Black Rockfish	34	430	354	219	1,037
48.	Blue Rockfish	138	258	43	—	451
49.	Bocaccio	298	64	—	—	366
50.	Canary Rockfish	33	129	60	—	229
				*	*	235

(Continued on the following page)

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Table 2A-4. Estimated Weight of Fish Caught (Catch Type A)[a] by Marine Recreational Fishermen by Species Group and Subregion January 1985 to December 1985 (Continued)

	Species Group	Southern California (1,000 kg)	Northern California (1,000 kg)	Oregon (1,000 kg)	Washington (1,000 kg)	All Regions (1,000 kg)
51.	Greenspotted Rockfish	159	75	*	*	235
52.	Olive Rockfish	108	28	*	*	136
53.	Gopher Rockfish	104	30	*	*	134
54.	California Scorpionfish	63	*	*	*	63
55.	Rockfishes, Other	601	280	47	–	952
56.	Sablefish	–	–	*	–	34
57.	Kelp Greenling	–	28	18	–	64
58.	Lingcod	128	760	175	162	1,225
59.	Greenlings, Other	*	–	–	–	10
60.	Cabezon	29	39	–	–	106
61.	Sculpins, Other	–	–	–	–	6
62.	Sanddabs	11	39	–	16	65
63.	California Halibut	227	–	*	*	252
64.	Rock Sole	–	–	*	16	24
65.	Starry Flounder	–	–	–	–	–
66.	Flatfishes, Other	–	–	–	87	106
67.	Other Fish	184	107	179	–	479
	TOTALS	6,248	4,064	1,069	1,364	12,745

a Catch Type A is an estimate of part of the total catch based on fish brought ashore in whole form, available for interviewer identification and enumeration, from which samples of lengths and weights were obtained.

b A dash denotes no information available.

c An asterisk (*) denotes none reported.

d A zero (0) indicates less than one thousand.

e This species was not surveyed during this time period.

Source: NMFS, 1986c

Table 2D-5. Estimated Weight of Fish Caught (Catch Type A)[a] by Marine Recreational Fishermen by Wave and Subregion

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January 1985 to December 1985

Wave	Subregion	Weight
Jan/Feb	Southern California	827
	Northern California	365
	Oregon	27
	Washington	75
	TOTAL	1,294
Mar/Apr	Southern California	495
	Northern California	253
	Oregon	43
	Washington	144
	TOTAL	935
May/Jun	Southern California	1,201
	Northern California	489
	Oregon	366
	Washington	617
	TOTAL	2,673
Jul/Aug	Southern California	1,757
	Northern California	1,543
	Oregon	42
	Washington	425
	TOTAL	3,768
Sep/Oct	Southern California	921
	Northern California	1,006
	Oregon	505
	Washington	67
	TOTAL	2,499
Nov/Dec	Southern California	1,047
	Northern California	408
	Oregon	86
	Washington	35
	TOTAL	1,576
	GRAND TOTAL	12,745

[a] Catch Type A is an estimate of part of the total catch based on fish brought ashore in whole form, available for interviewer identification and enumeration, from which samples of lengths and weights were obtained.

Source: NMFS, 1986c.

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Table 2D-6. **Estimated Number of Participants in Marine Recreational Fishing by Subregion for the Pacific Coast January 1985 to December 1985**

Subregion	Coastal participants (thousands)	Non-coastal participants (thousands)	Out of State (a) (thousands)	Total participants in state (a) (thousands)
Southern California	994	50	344	1,389
Standard Error	1,427	44	193	1,441
Northern California	624	101	62	787
Standard Error	783	92	52	790
Oregon	188	22	35	245
Standard Error	234	18	35	237
Washington	252	34	46	333
Standard Error	352	32	43	356
GRAND TOTALS	2,058	208		
Standard Errors	1,682	108		

(a) = Not additive across states. One person can be counted as "out of state" for more than one state.

Source: NMFS, 1986c.

3. INHALATION ROUTE

Humans may be exposed to toxic chemicals by the inhalation route from various sources. Airborne chemicals may be inhaled in gaseous form as vapors, or as particulates. This chapter discusses factors associated with exposure via inhalation.

3.1. EXPOSURE EQUATION FOR INHALATION

The general equation for calculating average daily dose (ADD) for inhalation exposure is:

$$ADD = [[C \times IR \times ED] / [BW \times AT]] \qquad \text{(Eqn. 3-1)}$$

where:

ADD	=	average daily dose (mg/kg-day);
C	=	contaminant concentration in air ($\mu g/m^3$);
IR	=	inhalation rate (m^3/day);
ED	=	exposure duration (days);
BW	=	body weight (kg); and
AT	=	averaging time (days), for non-carcinogenic effects AT = ED, for carcinogenic effects AT = 70 years or 25,550 days.

The average daily dose is the dose rate averaged over a pathway-specific period of exposure expressed as a daily dose on a per-unit-body-weight basis. The ADD is used for exposure to chemicals with non-carcinogenic non-chronic effects. For compounds with carcinogenic or chronic effects, the lifetime average daily dose (LADD) is used. The LADD is the dose rate averaged over a lifetime. The contaminant concentration refers to the concentration of the contaminant in inhaled air. Exposure duration refers to the time an individual is exposed at a particular location. The inhalation rate (expressed as cubic meters per hour) varies according to the exertion level and other factors.

3.2. INHALATION RATE

3.2.1. Background

The health risk associated with human exposure to airborne toxics is a function of concentration of air pollutants, duration of exposure, and inhalation rate (m^3/hr). Because the estimation for exposure or inhaled dose for a given air pollutant is dependent on inhalation rates, several published studies that provide information on inhalation rates are presented in this section. An extensive review of literature indicates that inhalation rate commonly termed as ventilation rate (VR) or breathing rate is usually measured as minute volume, i.e. volume (liters) of air exhaled per minute(V_E). The volume of air exhaled (V_E) is the product of the number of respiratory cycles in a minute and the volume of air respired during each respiratory cycle (tidal volume, V_T). Oxygen consumption, hence breathing rates are affected by numerous individual characteristics which include: age, gender, weight, health status, and levels of various activity patterns (running, walking, jogging etc.) (Layton, 1993). Ventilation rates (VR) are either measured directly using a spirometer and a collection system or indirectly from heart rate (HR) measurements. HR measurements obtained from Heart watches are usually correlated with VR in simple and multiple regression analysis.

In the Ozone Criteria Document prepared by the U.S. EPA's Environmental Criteria and Assessment Office, the EPA identified the collapsed range of activities and its corresponding VR as follows: light exercise (V_E < 23 L/min or 1.4 m^3/hr); moderate/medium exercise (V_E= 24-43 L/min or 1.4-2.6m^3/hr); heavy exercise (V_E= 2.6-3.8 m^3/hr); and very heavy exercise (V_E> 64 L/min or 3.8 m^3/hr), (CARB, 1993). Also, in the Ambient Water Quality Criteria documents (U.S. EPA, 1980) an average daily inhalation rate for a reference man was reported to be 20 m^3/day. This value is widely used for exposure assessment studies.

The available studies on inhalation rates are summarized in the following sections. Inhalation rates are reported for outdoor workers/athletes, adults and children including infants performing various activities. The activity levels are categorized as resting, sedentary, light, moderate, and heavy. In most studies, the sample population kept diaries to record their physical activities, locations, and breathing rates. Ventilation rates were either measured, self-estimated or predicted from equations derived using VR-HR calibration relationships. These studies have been classified as key studies or other relevant studies based on the applicability of the data to exposure assessments. The recommended inhalation rate values are based on the results from key studies. Section 3.2.4 presents inhalation rate values recommended for use in exposure assessments for adults, children, and outdoor workers/athletes. For each study, inhalation rates that were reported as minute volume in liters per minute have been converted to m^3/hr.

3.2.2. Key Inhalation Rate Studies

Layton - Metabolically Consistent Breathing Rates for use in Dose Assessments - Layton (1993), presented a new method for estimating metabolically consistent inhalation rates for use in quantitative dose assessments of airborne radionuclides. Historically, the approach for estimating breathing rate of a specified time frame was to calculate a time-weighted-average of ventilation rates associated with physical activities of varying durations (Layton, 1993). However, in this study, breathing rates were calculated based on oxygen consumption associated with energy expenditures for short (hours) and long (weeks and months) periods of time. Layton (1993) used the following general equation in calculating energy-dependent inhalation rates:

$$V_E = E \times H \times VQ \qquad \text{(Eqn. 3-2)}$$

where:

V_E	=	ventilation rate (L/min or m^3/hr);
E	=	energy expenditure rate (KJ/min or MJ/hr);
H	=	volume of oxygen (at standard temperature and pressure, dry air) (STPD) consumed in the production of 1 KJ of energy expended (L/KJ or m^3/MJ); and
VQ	=	ventilatory equivalent (ratio of minute volume (L/min) to oxygen uptake (L/min)) unitless.

Three alternative approaches were used in estimating daily chronic (long term) inhalation rates for different age/gender cohorts of the U.S. population. In the first approach, inhalation rates were estimated by multiplying average daily food energy intakes for different age/gender cohorts, volume of oxygen (H), and ventilatory equivalent (VQ) as shown in the equation above. The average food energy intake data (Table 3-1) were obtained from the USDA 1977-78 Nationwide Food Consumption Survey (USDA-NFCS). In the USDA survey 14,035 households were randomly selected and food intake data were obtained from 30,770 individuals. The food energy intakes were adjusted upwards by a constant factor of 1.2 for all individuals 9 years and older (Layton, 1993). This factor compensated

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Table 3-1. **Comparisons of Estimated Basal Metabolic Rates (BMR) with Average Food-energy Intakes for Individuals Sampled in the 1977-78 NFCS (USDA 1984)**

Cohort/Age	Body Weight	BMR[a]		Energy Intake (EFD)		Ratio
(y)	kg	$MJ\ d^{-1}$ [b]	$kcal\ d^{-1}$ [c]	$MJ\ d^{-1}$	$kcal\ d^{-1}$	EFD/BMR
Children						
Under 1	7.6	1.74	416	3.32	793	1.90
1 to 2	13	3.08	734	5.07	1209	1.65
3 to 5	18	3.69	881	6.14	1466	1.66
6 to 8	26	4.41	1053	7.43	1774	1.68
Males						
9 to 11	36	5.42	1293	8.55	2040	1.58
12 to 14	50	6.45	1540	9.54	2276	1.48
15 to 18	66	7.64	1823	10.8	2568	1.41
19 to 22	74	7.56	1804	10.0	2395	1.33
23 to 34	79	7.87	1879	10.1	2418	1.29
35 to 50	82	7.59	1811	9.51	2270	1.25
51 to 64	80	7.49	1788	9.04	2158	1.21
65 to 74	76	6.18	1476	8.02	1913	1.30
75 +	71	5.94	1417	7.82	1866	1.32
Females						
9 to 11	36	4.91	1173	7.75	1849	1.58
12 to 14	49	5.64	1347	7.72	1842	1.37
15 to 18	56	6.03	1440	7.32	1748	1.21
19 to 22	59	5.69	1359	6.71	1601	1.18
23 to 34	62	5.88	1403	6.72	1603	1.14
35 to 50	66	5.78	1380	6.34	1514	1.10
51 to 64	67	5.82	1388	6.40	1528	1.10
65 to 74	66	5.26	1256	5.99	1430	1.14
75 +	62	5.11	1220	5.94	1417	1.16

[a] Calculated from the appropriate age and gender-based BMR equations given in Appendix Table 3A-1.
[b] $MJ\ d^{-1}$ - mega joules/day
[c] $kcal\ d^{-1}$ - kilo calories/day
Source: Layton, 1993.

for reported food bias in USDA-NFCS (Layton, 1993). The weighted average oxygen uptake of 0.05 L O_2/KJ used in this study was calculated from data reported in the 1977-78 USDA-NFCS and the second National Health and Nutrition Examination Survey (NHANES II). The ventilatory equivalent (VQ) of 27 used was calculated as the geometric mean of VQ data that were obtained from several studies (Layton, 1993).

Table 3-2 presents the daily inhalation rate for each age/gender cohorts. The highest daily inhalation rates (10 m^3/day) were reported for children between the ages of 6-8 years, for males between 15-18 years (17 m^3/day), and females between 9-11 years (13 m^3/day). Estimated average lifetime inhalation rates for males and females 14 m^3/day and 10 m^3/day, respectively (Table 3-2). Inhalation rates were also calculated for active and inactive periods for the various age/gender cohorts.

The inhalation rate for inactive periods was estimated by multiplying the basal metabolic rate (BMR) times the oxygen uptake times the ventilatory equivalent (H) (VQ). BMR was defined as "the minimum amount of energy required to support basic cellular respiration while at rest and not actively digesting food" (Layton, 1993). The inhalation rate for active periods was calculated by multiplying the inactive inhalation rate by the ratio of the rate of energy expenditure during active hours to the estimated BMR. This ratio is presented as F in Table 3-2 (Layton, 1993). These data for active and inactive inhalation rates are also presented in Table 3-2. For children, inactive and active inhalation rates ranged between 2-6 and 6-13 m^3/day, respectively. For adult males (19-64 years old), the average inactive and active inhalation rates were 10 and 19 m^3/day, respectively. Also, the average inactive and active inhalation rates for adult females (19-64 years old) were 8 and 12 m^3/day, respectively.

In the second approach, inhalation rates were calculated by multiplying the BMR of the population cohorts, A, which is the ratio of total daily energy expenditure to daily BMR, H, and VQ. The BMR data obtained from literature had been statistically analyzed and regression equations were developed to predict BMR from body weights of various age/gender cohorts (Layton, 1993). The statistical data used to develop the regression equations are presented in Appendix Table 3A-1. The data obtained from the second approach are presented in Table 3-3. Inhalation rates for children (6 months - 10 years)

Table 3-2. Daily Inhalation Rates Calculated from Food-Energy Intakes

Cohort/Age	L[d]	Daily[a] Inhalation Rate (m³/day)	Sleep (h)	MET[b] Value A[e]	MET[b] Value F	Inhalation Rates Inactive[c] (m³/day)	Inhalation Rates Active[c] (m³/day)
Children							
<1	1	4.5	11	1.9	2.7	2.35	6.35
1 - 2	2	6.8	11	1.6	2.2	4.16	9.15
3 - 5	3	8.3	10	1.7	2.2	4.98	10.96
6 - 8	3	10	10	1.7	2.2	5.95	13.09
Males							
9 - 11	3	14	9	1.9	2.5	7.32	18.3
12 - 14	3	15	9	1.8	2.2	8.71	19.16
15 - 18	4	17	8	1.7	2.1	10.31	21.65
19 - 22	4	16	8	1.6	1.9	10.21	19.4
23 - 34	11	16	8	1.5	1.8	10.62	19.12
35 - 50	16	15	8	1.5	1.8	10.25	18.45
51 - 64	14	15	8	1.4	1.7	10.11	17.19
65 - 74	10	13	8	1.6	1.8	8.34	15.01
75+	1	13	8	1.6	1.9	8.02	15.24
Lifetime[f] average		14					
Females							
9 - 11	3	13	9	1.9	2.5	6.63	16.58
12 - 14	3	12	9	1.6	2.0	7.61	15.20
15 - 18	4	12	8	1.5	1.7	8.14	13.84
19 - 22	4	11	8	1.4	1.6	7.68	12.29
23 - 34	11	11	8	1.4	1.6	7.94	12.7
35 - 50	16	10	8	1.3	1.5	7.80	11.7
51 - 64	14	10	8	1.3	1.5	7.86	11.8
65 - 74	10	9.7	8	1.4	1.5	7.10	10.65
75+	1	9.6	8	1.4	1.6	6.90	11.04
Lifetime average		10					

Table 3-2. (Continued)

[a] Daily inhalation rate was calculated by multiplying the EFD values (see Table 3-1) by H x VQ for subjects under 9 years of age and by 1.2 x H x VQ for subjects 9 years of age and older (See text for explanation).

[b] MET = Metabolic equivalent

[c] Inhalation rate for inactive periods was calculated as BMR x H x VQ and for active periods by multiplying inactive inhalation rate by F (Table 3-2); BMR values are from Table 3-1.

[d] L is the number of years for each cohort.

[e] For individuals 9 years of age and older, A was calculated by multiplying the ratio for EFD/BMR (Table 3-1) by the factor 1.2 (see text for explanation).

[f] Lifetime average was calculated by multiplying individual inhalation rate by corresponding L values summing the products across cohorts and dividing the result by 75, the total of the cohort age spans.

NOTE:	BMR	=	Basal metabolic rate (MJ/day) or (kg/hr)
	EFD	=	Food energy intake (MJ/day) or (KCal/sec)
	A	=	EFD/BMR (unitless)
	S	=	Number of hours spent sleeping each day (hrs)
	F	=	(24A - S)/(24 - S), ratio of the rate of energy expenditure during active hours to the estimated BMR (unitless)
	H	=	Oxygen uptake = 0.05 LO_2/KJ or M^3O_2/MJ, calculate as the weighted average oxygen uptake factor from the 1977-78 NFCS and the second National Health and Nutrition Examination Survey (NHANESII)
	VQ	=	Ventilation equivalent = 27 = geometric mean of VQs obtained from several studies (unitless)

Source: Adapted from Layton, 1993.

Table 3-3. Daily Inhalation Rates Obtained from the Ratios of Total Energy Expenditure to Basal Metabolic Rate (BMR)

Gender/Age (yrs)	Body Weight[a] (kg)	BMR[b] (MJ/day)	VQ	A[c]	H (m^3O_2/MJ)	Inhalation Rate, V_E (m^3/day)[d]
Male						
0.5 - <3	14	3.4	27	1.6	0.05	7.3
3 - <10	23	4.3	27	1.6	0.05	9.3
10 - <18	53	6.7	27	1.7	0.05	15
18 - <30	76	7.7	27	1.59	0.05	17
30 - <60	80	7.5	27	1.59	0.05	16
60+	75	6.1	27	1.59	0.05	13
Female						
0.5 - <3	11	2.6	27	1.6	0.05	5.6
3 - <10	23	4.0	27	1.6	0.05	8.6
10 - <18	50	5.7	27	1.5	0.05	12
18 - <30	62	5.9	27	1.38	0.05	11
30 - <60	68	5.8	27	1.38	0.05	11
60+	67	5.3	27	1.38	0.05	9.9

[a] Body weight was based on the average weights for age/gender cohorts in the U.S. population obtained from Najjar and Rowland (1987).

[b] The BMRs (basal metabolic rate) are calculated using the respective body weights and BMR equations (see Appendix Table 3A-1).

[c] The values of the BMR multiplier (EFD/BMR) for those 18 years and older were derived from the Basiotis et al. (1989) study: Male = 1.59, Female = 1.38. For males and females under 10 years old, the mean BMR multiplier used was 1.6. For males and females aged 10 to < 18 years, the mean values for A given in Table 3-2 for 12-14 years and 15-18 years, age brackets for males and females were used: male = 1.7 and female = 1.5.

[d] Inhalation rate = BMR x A x H x VQ; VQ = ventilation equivalent and H = oxygen uptake.

Source: Layton, 1993.

ranged from 7.3-9.3 m^3/day and ages 10-18 was 15 m^3/day, while adult females (18 years and older) ranged from 9.9-11 m^3/day and adult males (18 years and older) ranged from 13-17 m^3/day. These rates are similar to the daily inhalation rates obtained using the first approach. Also, the inactive inhalation rates obtained from the first approach are lower than the inhalation rates obtained using the second approach. This may be attributed to the BMR multiplier employed in the second approach equation to calculate inhalation rates.

In the third approach, inhalation rates were calculated by multiplying estimated energy expenditures associated with different levels of physical activity engaged in over the course of an average day by VQ and H for each age/gender cohort. The energy expenditure associated with each level of activity was estimated by multiplying BMRs of each activity level by the metabolic equivalent (MET) and by the time spent per day performing each activity for each age/gender population. The data used in this approach were obtained from a time-activity survey. The survey sampled 2126 individuals (1,120 women and 1,006 men) ages 20-74 that were selected randomly from California communities. Table 3-4 presents the inhalation rates (V_E) in m^3/day and m^3/hr obtained for adult males and females aged 20-74 years at five physical activity levels. The total daily inhalation rates ranged from 13-17 m^3/day for adult males and 11-15 m^3/day for adult females. The rates for adult females were higher when compared with the other two approaches. In all three approaches, the range of inhalation rates for adults were 9.6-17 m^3/day, 9.9-17 m^3/day, and 13-17 m^3/day, respectively. Inhalation rates were also calculated for short-term exposures for various age/gender cohorts and five energy-expenditure categories (rest, sedentary, light, moderate, and heavy). BMRs were multiplied by the product of MET, H, and VQ. The data obtained for short term exposures are presented in Table 3-5.

A limitation of the third approach employed is that the survey provided information on physical activities which were based on recall. Another limitation in utilizing dietary surveys to estimate inhalation rates is that the diet of the population surveyed is only reflected for a particular period of time (1977-78). An advantage of this study is that the survey sample size was large and represents the general U.S. population. Another advantage of this study is that inhalation rates for different age cohorts were also presented. Also, the methodology used in estimating inhalation rates characterized the dependent relationship

Table 3-4. Daily Inhalation Rates Based on Time-Activity Survey

Age (yrs) and Activity	MET	Males: Body Weight[a] (kg)	Males: BMR[b] (KJ/hr)	Males: Duration[c] (hr/day)	Males: E[d] (mJ/day)	Males: V_E[e] (m^3/day)	Males: V_E[f] (m^3/hr)	Females: Body Weight[a] (kg)	Females: BMR[b] (KJ/hr)	Females: Duration[c] (hr/day)	Females: E[d] (mJ/day)	Females: V_E[e] (m^3/day)	Females: V_E[f] (m^3/hr)
20-34													
Sleep	1	76	320	7.2	2.3	3.1	0.4	62	283	7.2	2.0	2.8	0.4
Light	1.5	76	320	14.5	7.0	9.4	0.7	62	283	14.5	6.2	8.3	0.6
Moderate	4	76	320	1.2	1.5	2.1	1.7	62	283	1.2	1.4	1.8	1.5
Hard	6	76	320	0.64	1.2	1.7	2.6	62	283	0.64	1.1	1.5	2.3
Very Hard	10	76	320	0.23	0.74	1.0	4.3	62	283	0.23	0.65	0.88	3.8
Totals				24	17	17				24	11	15	
35-49													
Sleep	1	81	314	7.1	2.2	3.0	0.4	67	242	7.1	1.7	2.3	0.3
Light	1.5	81	314	14.6	6.9	9.3	0.6	67	242	14.6	5.3	7.2	0.5
Moderate	4	81	314	1.4	1.8	2.4	1.7	67	242	1.4	1.4	1.8	1.3
Hard	6	81	314	0.59	1.1	1.5	2.5	67	242	0.59	0.9	1.2	2.0
Very Hard	10	81	314	0.29	0.91	1.2	4.2	67	242	0.29	0.70	0.95	3.2
Totals				24	13	17				24	9.9	13	
50-64													
Sleep	1	80	312	7.3	2.3	3.1	0.4	68	244	7.3	1.8	2.4	0.3
Light	1.5	80	312	14.9	7.0	9.4	0.6	68	244	14.9	5.4	7.4	0.5
Moderate	4	80	312	1.1	1.4	1.9	1.7	68	244	1.1	1.1	1.4	1.3
Hard	6	80	312	0.50	0.94	1.3	2.5	68	244	0.5	0.7	1.0	2.0
Very Hard	10	80	312	0.14	0.44	0.6	4.2	68	244	0.14	0.34	0.46	3.3
Totals				24	12	16				24	9.4	13	
65-74													
Sleep	1	75	256	7.3	1.9	2.5	0.3	67	221	7.3	1.6	2.2	0.3
Light	1.5	75	256	14.9	5.7	7.7	0.5	67	221	14.9	4.9	6.7	0.4
Moderate	4	75	256	1.1	1.1	1.5	1.4	67	221	1.1	1.0	1.3	1.2
Hard	6	75	256	0.5	0.8	1.0	2.1	67	221	0.5	0.7	0.9	1.8
Very Hard	10	75	256	0.14	0.36	0.48	3.5	67	221	0.14	0.31	0.42	3.0
Totals				24	9.8	13				24	8.5	11	

[a] Body weights were obtained from Najjar and Rowland (1987)
[b] The basal metabolic rates (BMRs) for the age/gender cohorts were calculated using the respective body weights and the BMR equations (Appendix Table 3A-1)
[c] Duration of activities were obtained from Sallis et al (1985)
[d] Energy expenditure rate (E) was calculated by multiplying BMR (KJ/hr) x (MJ/1000 KJ) x duration (hr/day) x MET
[e] V_E (inhalation rate) was calculated by multiplying E (MJ/day) by H(0.05 m^3O_2/MJ) by VQ (27)
[f] V_E (m^3/hr) was calculated by multiplying BMR (KJ/hr) x (MJ/1000 KJ) x MET x H (0.05 m^3O_2/MJ) x VQ (27)

Source: Layton, 1993.

Table 3-5. Inhalation Rates for Short-Term Exposures

Gender/Age (yrs)	Weight (kg[e])	BMR[a] (kJ/day)	Rest	Sedentary	Light	Moderate	Heavy
			MET (BMR Multiplier)				
			1	1.2	2[b]	4[c]	10[d]
			Inhalation Rate (m^3/hr)[f,g]				
Male							
0.5 - <3	14	3.40	0.19	0.23	0.38	0.78	1.92
3 - <10	23	4.30	0.24	0.29	0.49	0.96	2.40
10 - <18	53	6.70	0.38	0.45	0.78	1.50	3.78
18 - <30	76	7.70	0.43	0.52	0.84	1.74	4.32
30 - <60	80	7.50	0.42	0.50	0.84	1.68	4.20
60+	75	6.10	0.34	0.41	0.66	1.38	3.42
Female							
0.5 - <3	11	2.60	0.14	0.17	0.29	0.60	1.44
3 - <10	23	4.00	0.23	0.27	0.45	0.90	2.28
10 - <18	50	5.70	0.32	0.38	0.66	1.26	3.18
18 - <30	62	5.90	0.33	0.40	0.66	1.32	3.30
30 - <60	68	5.80	0.32	0.39	0.66	1.32	3.24
60+	67	5.30	0.30	0.36	0.59	1.20	3.00

[a] The BMRs for the age/gender cohorts were calculated using the respective body weights and the BMR equations (Appendix Table 3A-1).
[b] Range of 1.5 - 2.5.
[c] Range of 3 - 5.
[d] Range of >5 - 20.
[e] Body weights were based on average weights for age/gender cohorts of the U.S. population given in Najjar and Rowland (1987).
[f] The inhalation rate was calculated by multiplying BMR (KJ/day) x H (0.05 L/KJ) x MET x VQ (27) x (d/1,440 min)
[g] Original data were presented in L/min. Conversion to m^3/hr was obtained as follows:

$$\frac{60\ \text{min}}{\text{hr}} \times \frac{m^3}{1000}L \times \frac{L}{\text{min}}$$

Source: Layton, 1993.

between breathing and food ingestion. This approach increases the potential for more accurate results.

Linn et al. - Documentation of Activity Patterns in "High-Risk" Groups Exposed to Ozone in the Los Angeles Area - Linn et al. (1992) conducted a study that estimated the inhalation rates for "high-risk" subpopulation groups exposed to ozone (O_3) in their daily activities in the Los Angeles area. The population surveyed consisted of seven subject panels: **Panel 1:** 20 healthy outdoor workers (15 males, 5 females, ages 19-50); **Panel 2:** 17 healthy elementary school students (5 males, 12 females, ages 10-12); **Panel 3:** 19 healthy high school students (7 males, 12 females, ages 13-17); **Panel 4:** 49 asthmatic adults (clinically mild, moderate, and severe, 15 males, 34 females, ages 18-50); **Panel 5:** 24 asthmatic adults from 2 neighborhoods of contrasting O_3 air quality (10 males, 14 females, ages 19-46); **Panel 6:** 13 young asthmatics (7 males, 6 females, ages 11-16); **Panel 7:** construction workers (7 males, ages 26-34).

Initially, a calibration test was conducted and was followed by a training session. Finally, a field study was conducted which involved subjects' collecting their own heart rate (HR) and diary data. The calibration exercise protocols varied for each panel subject: **Panel 1** had laboratory treadmill exercise tests, indoor hall-way walking tests at different self-chosen speeds, and 2 outdoor tests each consisted of 1 hour cycles of rest, walking, and jogging; **Panel 2 and 3** performed outdoor exercises that consisted each of 20 minute rest, slow walking, jogging, and fast walking; **Panel 4 and 5** had treadmill and hallway tests; **Panel 6** had laboratory tests on bicycles and treadmills; **Panel 7** performed similar exercises as Panel 2 and 3, and also performed job-related tests including lifting and carrying a 9-kg pipe (Linn et al., 1992). During the calibration tests, ventilation rates (VR) and HR were measured simultaneously at each exercise level. A regression line was fed to the calibration data, HR and lognormal VR, and an equation was developed to predict VR from measured HR.

In the field study, each subject (except construction workers) recorded in diaries their daily activities, change in locations (indoors, outdoors, or in a vehicle), self-estimated their breathing rates during each activity/location, time spent at each activity/location. Healthy subjects recorded their HR once every 60 seconds and asthmatic subjects recorded their diary information once every hour with a Heart watch. Construction workers dictated their diary information to a technician accompanying them on the job. Subjective breathing rates were defined as slow (walking at their normal pace); medium (faster than normal walking); and fast (running or similarly strenuous exercise). Table 3-6 presents the protocols for self-monitoring of diary information for each subject panel.

Table 3-7 presents the mean VR, the 99th percentile VR, and the VR at each subjective activity level (slow, medium, fast). The mean and 99th percentile VRs were derived from the valid HR recordings excluding diary data. Each of the three activity levels were determined from diary data and HR recordings (Linn et al., 1992). The preliminary data for construction workers indicated that during a 10-hr work shift, their mean VR (1.5 m^3/hr) exceeded the VRs of other subject panels (Table 3-7). Linn et al. (1992) reported that the diary data showed that most individuals expect construction workers spent most of their time (in a typical day) indoors at slow activity level. During outdoor activities, VRs were lower for asthmatics than for healthy subjects. During slow activity level, asthmatic subjects had higher VRs than healthy subjects (Linn et al., 1992). Also Linn et al. (1992), reported that in every panel, the predicted VR correlated significantly with the subjective estimates of activity levels.

According to Linn et al. (1992), "Calibration results may overestimate the predictive power of HR during actual field monitoring, because the wider variety of exercise in everyday activities may result in wider variation of the VR-HR relationship." Another limitation of this study is the small sample size of each subpopulation surveyed, therefore, this may not be representative the U.S. population. Also, in the course of this study, information on activity patterns were obtained, but the information was not presented. This information could be useful for exposure assessments. An advantage of these data set is that activities were recorded in a diary and not generated based on recall. Another advantage is that inhalation rates were presented for various subpopulations (i.e., healthy outdoor workers, asthmatics, healthy adults, and healthy children).

Table 3-6. Protocols for Self-Monitoring of Activities Grouped by Subject Panels

Panel	Protocol
Panel 1 - Healthy Outdoor Workers - 15 female, 5 male, age 19-50	3 days in 1 typical summer week (includes most active workday and most active day off); HR recordings and activity diary during waking hours.
Panel 2 - Healthy Elementary School Students - 5 male, 12 female, age 10-12	Saturday, Sunday and Monday (school day) in early autumn; HR recordings and activity diary during waking hours and during sleep.
Panel 3 - Healthy High School Students - 7 male, 12 female, age 13-17	Same as panel 2, however, no HR recordings during sleep for most subjects.
Panel 4 - Adult Asthmatics, clinically mild, moderate, and severe - 15 male, 34 female, age 18-50	1 typical summer week, 1 typical winter week; hourly activity/health diary during waking hours; lung function tests 3 times daily; HR recordings during waking hours on at least 3 days (including most active work day and day off).
Panel 5 - Adult Asthmatics from 2 neighborhoods of contrasting O_3 air quality - 10 male, 14 female, age 19-46	Similar to panel 4, personal NO_2 and acid exposure monitoring included. (Panels 4 and 5 were studied in different years, and had 10 subjects in common).
Panel 6 - Young Asthmatics - 7 male, 6 female, age 11-16	Similar to Panel 4, summer monitoring for 2 successive weeks, including 2 controlled exposure studies with few or no observable respiratory effects.
Panel 7 - Construction Workers - 7 male, age 26-34	HR recordings and diary information during 1 typical summer work day.

Source: Linn et al., 1992

Table 3-7. Subject Panel Inhalation Rates (IR) by Mean IR, Upper Percentiles, and Self-Estimated Breathing Rates

Panel	Inhalation Rates (m^3/hr)				
	Mean	99th Percentile	Slow	Medium[c]	Fast[c]
<u>Healthy</u>					
1 - Adults	0.78	2.46	0.72	1.02	3.06
2 - Elementary School Students	0.90	1.98	0.84	0.96	1.14
3 - High School Students	0.84	2.22	0.78	1.14	1.62
7 - Construction Workers[a]	1.50	4.26	1.26	1.50	1.68
<u>Asthmatics</u>					
4 - Adults	1.02	1.92	1.02	1.68	2.46
5 - Adults[b]	1.20	2.40	1.20	2.04	4.02
6 - Elementary and High School Students	1.20	2.40	1.20	1.20	1.50

[a] Construction workers recorded only on 1 day, mostly during work, while others recorded on ≥ 1 work or school day and ≥ 1 day off.

[b] Excluding subjects also in Panel 4

[c] Some subjects did not report medium and/or fast activity. Group means were calculated from individual means (i.e., give equal weight to each individual who recorded any time at the indicated activity level).

Source: Linn et al., 1992.

Linn et al. - Activity patterns in Ozone Exposed Construction Workers - Linn et al. (1993) estimated the inhalation rates of 19 construction workers before and during a typical work shift. The workers were employed at a hospital construction site in suburban Los Angeles. The study was conducted between mid-July and early November, 1991. During this period, ozone (O_3) levels were typically high in Glendale, Los Angeles. Initially, each subject was calibrated with a 25-minutes exercise test that included slow walking, fast walking, jogging, lifting, and carrying. All calibration tests were conducted in the mornings. Ventilation rates (VR) and heart rates (HR) were measured simultaneously during the test. The data were analyzed using the least squares regression to derive an equation for predicting VR at a given HR. Following the calibration tests and before beginning work, each subject recorded their change in activity (i.e. sitting/standing, walking, lifting/carrying, and "working at trade" - defined as tasks specific to the individual's job classification). Location, and self-estimated breathing rates ("slow" similar to slow walking, "medium" similar to fast walking, and "fast" similar to running) were also recorded in the diary. During work, an investigator recorded the diary information dictated by the subjects. HR was recorded minute by minute for each subject before work and during the entire work shift. Thus, VR ranges for each breathing rate and activity category were estimated from the HR recordings by employing the relationship between VR and HR obtained from the calibration tests.

A total of 182 hours of HR recordings were obtained during the survey from the 19 volunteers; 144 hours reflected actual working time according to diary records. The lowest actual working hours recorded was 6.6 hours and the highest recorded was 11.6 hours for a complete work shift (Linn et al., 1993). Summary statistics for HR and predicted VR distributions for each individual, the complete group of all individuals, and job or site defined groups are presented in Table 3-8. The data reflects all recordings before and during work, and at break times. For all subjects the mean HR was 93 beats/minute and the mean inhalation rate (IR) was 1.68 m^3/hr as shown in Table 3-8. In Table 3-8 for most subjects, the 1st and 99th percentiles of HR were outside of the calibration range (calibration ranges are presented in Appendix Table 3A-2). Therefore, corresponding IR percentiles were extrapolated using the calibration data (Table 3-8).

Table 3-8. Distributions of Individual and Group Heartrate and Inhalation/Ventilation Rate for Outdoor Workers

		Heart Rate (HR) (beats/min)				Ventilation Rate (VR) (m^3/hr)			
Subject No.	Minutes Recorded	Mean ± SD	1%	50%	99%	Mean ± SD	1%	50%	99%
1761	583	88 ± 13	67	86	128	1.5 ± 0.72	0.54	1.26	4.2
1763	456	94 ± 13	73	93	129	1.32 ± 0.66	0.48	1.20	3.48
1764	635	69 ± 10	50	68	98	1.56 ± 0.72	1.02	1.32	4.02
1765	447	91 ± 23	44	91	156	1.80 ± 0.96	0.72	1.62	5.52
1766	776	83 ± 9	65	82	110	1.14 ± 0.48	0.30	1.08	2.58
1767	559	78 ± 21	41	79	142	1.08 ± 0.48	0.72	0.96	3.24
1768	756	74 ± 14	49	73	128	1.08 ± 0.48	0.30	1.08	2.88
1769	638	100 ± 21	68	96	163	2.58 ± 1.38	0.66	2.28	7.08
1770	645	88 ± 17	55	87	137	1.62 ± 0.66	0.96	1.44	4.26
1771	647	110 ± 17	66	113	138	1.62 ± 0.78	0.30	1.86	2.58
1772	617	109 ± 16	76	110	142	2.58 ± 0.96	1.08	2.52	5.04
1773	727	100 ± 17	73	99	141	1.44 ± 0.66	0.30	1.44	2.88
1774	125	95 ± 19	69	91	161	1.56 ± 0.54	1.08	1.38	3.96
1775	652	99 ± 16	64	100	132	1.74 ± 1.02	0.30	1.74	5.94
1776	654	96 ± 16	65	96	137	1.74 ± 0.66	0.48	1.68	3.6
1778	682	101 ± 16	71	100	145	2.16 ± 0.96	0.84	2.04	5.28
1779	146	111 ± 13	87	110	154	2.58 ± 0.66	1.50	2.52	4.98
1780	568	88 ± 10	65	89	111	1.62 ± 0.36	1.20	1.50	2.82
1781	659	85 ± 12	56	87	111	1.38 ± 0.42	0.36	1.44	2.22
Group and Subgroup Means[a]									
All Subjects		93 ± 15	63	92	135	1.68 ± 0.72	0.66	1.62	3.90
General Laborers (GCW)		86 ± 15	58	86	130	1.44 ± 0.66	0.48	1.32	3.66
Iron Workers (Irn)		96 ± 14	67	96	128	1.62 ± 0.66	0.60	1.56	3.24
Carpenters (Car)		95 ± 16	65	94	139	1.86 ± 0.78	0.78	1.74	4.14
Office Site (Ofc)		82 ± 15	56	82	127	1.38 ± 0.66	0.60	1.20	3.72
Hospital Site (Hosp)		98 ± 16	68	98	139	1.86 ± 0.78	0.72	1.80	3.96

[a] Each group or subgroup mean was calculated from individual means above, not from pooled data.

Source: Linn et al., 1993.

The data presented in Table 3-9 represents distribution patterns of IR for each subject, total subjects, and job or site defined subgroups by self-estimated breathing rates (slow, medium, fast) or by type of job activity. All data include working and non-working hours. The mean inhalation rates for most individuals showed statistically significant increases with higher self-estimated breathing rates or with increasingly strenuous job activity (Linn et al., 1993). Inhalation rates were higher in hospital site workers compared with office site workers (Table 3-9). However, hospital site workers reported a higher percentage of slow breathing time (31 percent) than the office site workers (20 percent), and a lower percentage of fast breathing time, 3 percent and 5 percent, respectively (Linn et al., 1993). Based on the subjects HR measurements and IR predictions, individuals whose work was objectively heavier than average tended to describe their work as lighter than average. Linn et al. (1993) attributed this observation to either a better physical conditioning in hardworking individuals and/or a "macho effect" (reluctance to admit the degree of exercise stress they felt).

A limitation associated with this study is the small sample size which may not be representative of construction worker subpopulation. Another limitation of this study is that calibration data were not obtained at extreme conditions (i.e., heat stress). Therefore, it was necessary to predict IR values outside the calibration range which may introduce an unknown uncertainty to the data set. Also, subjective self-estimated breathing rates may be another source of uncertainty in the inhalation rates estimated. An advantage of these data set is that activities were recorded in a diary and not generated based on recall. Another advantage is that this survey provides some values for a subpopulation of highly active individuals.

Spier et al. - Activity Patterns in Elementary and High School Students Exposed To Oxidant Pollution - Spier et al. (1992) investigated activity patterns of 17 elementary school students (10-12 years old) from the Seventh Day Adventist school and 19 high school students (13-17 years old) in suburban Los Angeles from late September to October (oxidant pollution season). Calibration tests were conducted in supervised outdoor exercise sessions. The exercise sessions consisted of 5 minutes for each: rest, slow walking, jogging, and fast walking. Heart rate (HR) and ventilation rate (VR) were measured during the last 2 minutes of each exercise. Individual VR and HR relationships were determined by fitting a

Table 3-9. Individual Mean Inhalation Rate (m³/hr) by Self-Estimated Breathing Rate or Job Activity Category for Outdoor Workers

			Self-Estimated Breathing Rate (m³/hr)			Job Activity Category (m³/hr)			
Subj. No.	Site[a]	Job[b]	Slow	Med	Fast	Sit/Std	Walk	Carry	Trade[c]
1761	Ofc	GCW	1.32	1.56	1.68[d]	1.32	1.62	2.46	1.50[d]
1763	Ofc	GCW	1.20	1.56	2.04[d]	1.20	1.44	1.68	1.74[d]
1764	Ofc	Car	1.44	1.62	1.68[d]	1.38	1.50	1.62	1.62[e]
1765	Ofc	GCW	1.32	1.86	1.68[d]	1.50	1.68	1.86	1.86
1766	Ofc	Car	0.96	1.20	1.68[d]	1.08	1.08	1.5	1.26[d]
1767	Ofc	Car	1.08	1.08	1.38	0.96	1.08	1.26	1.08
1768	Ofc	GCW	0.78	1.14	1.32[d]	0.96	1.14	1.26	1.20[f]
1769	Hosp	Car	2.10	3.06	3.30[d]	1.86	2.46	3.06	2.94[d]
1770	Hosp	Car	1.38	1.98	2.70[d]	1.26	1.74	1.92	1.92[d]
1771	Hosp	Car	1.02	1.92	1.74[d]	1.56	1.92	2.34	1.86[d]
1772	Hosp	Car	2.34	2.82	3.54[d]	2.46	2.76	3.48	3.06[d]
1773	Hosp	Irn	1.26	1.74	2.28[d]	1.56	1.56	2.04	1.92[d]
1774	Hosp	Car	1.32	1.68	—[d]	1.98	1.92	1.92	1.68[d]
1775	Hosp	Irn	1.32	2.10	2.22[d]	1.68	1.92	2.22	2.10[f]
1776	Hosp	Car	1.38	1.98	1.74[d]	1.44	1.68	1.92	1.98[d]
1778	Hosp	Car	1.86	2.52	2.52[d]	2.10	2.64	3.42	2.52[d]
1779	Hosp	Car	2.40	2.64	—	2.64	2.64	2.40	2.64
1780	Hosp	Irn	1.50	1.80	1.86[d]	1.62	1.74	1.74	1.74
1781	Hosp	Lab	1.38	1.56	1.74[d]	1.26	1.44	1.44	1.44[e]
Group and Subgroup Means									
All Subjects			1.44	1.86	2.04	1.56	1.80	2.10	1.92
GCW/Laborers			1.20	1.56	1.68	1.26	1.44	1.74	1.56
Iron Workers			1.38	1.86	2.10	1.62	1.74	1.98	1.92
Carpenters			1.62	2.04	2.28	1.62	1.92	2.28	2.04
Office Site			1.14	1.44	1.62	1.14	1.38	1.68	1.44
Hospital Site			1.62	2.16	2.40	1.80	2.04	2.34	2.16

[a] Ofc - Office; Hosp - hospital building
[b] GCW - general construction worker; Car - carpenter; Irn - ironworker; Lab - labororer
[c] Trade - "Working at Trade" (i.e., tasks specific to the individual's job classification)
[d] Rate or category differences are significant, $p<0.001$
[e] Rates or category differences are significant, $P < 0.05$
[f] Rate or category differences are significant, $P<0.01$

Source: Linn et al., 1993

regression line to HR values and lognormal VR values. Each subject recorded their daily activities change in location, and breathing rates in diaries for 3 consecutive days. Self-estimated breathing rates were recorded as slow (slow walking), medium (walking faster than normal), and fast (running). HR was recorded during the 3 days once per minute by wearing a Heart watch. VR values for each self-estimated breathing rate and activity type were estimated from the HR recordings by employing the VR and HR equation obtained from the calibration tests.

The data presented in Table 3-10 represents HR distribution patterns and corresponding predicted VR for each age group during hours spent awake. At the same self-reported activity levels for both age groups, inhalation rates were higher for outdoor activities than indoor activities. The total hours spent indoors by high school students (21.2 hours) were higher than for elementary school students (19.6 hours). The converse was true for outdoor activities; 2.7 hours for high school students, and 4.4 hours for elementary school students (Table 3-11). Based on the data presented in Tables 3-10 and 3-11, the average inhalation specific-activity rate for elementary (10-12 years) and high school (13-17 years) students were calculated. For elementary school students the average daily inhalation rates are 15.8 m^3/day for light activities, 4.62 m^3/day for moderate activities, and 0.98 m^3/day for heavy activities. Also, for high school students the daily inhalation rate during light, moderate, and heavy activities are estimated at 16.4 m^3/day, 3.1 m^3/day, and 0.54 m^3/day, respectively (Table 3-12).

A limitation of this study is the small sample size. It may not be representative of all children in these age groups. Another limitation is that associated with the accuracy of the self-estimated breathing rates reported by younger age groups. This may affect the validity of the data set generated. An advantage of this study is that data was generated from diary recordings and not based on recall. This approach appears to give more accurate estimates.

California Air Resources Board (CARB) - Measurement of Breathing Rate and Volume in Routinely Performed Daily Activities - The California Air Resources Board, CARB (1993), conducted research to accomplish two main objectives: (1) identification of mean and ranges of inhalation rates for various age/gender cohorts; and (2) derivation of simple linear and multiple regression equations used to predict inhalation rates through other measured

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Table 3-10. Distribution of HR and Predicted IR, by Location and Self-Estimated Breathing Rate for Elementary (EL) and High School (HS) Students

Location/ Breathing Rate	Students[a]	% of Recorded[b] Time	Arithmetic Mean ± SD	Percentile Rankings 1st	50th	99.9th
			Heart Rate, Beats/Min			
In/slow	EL	49.6	95 ± 16	61	95	166
	HS	70.7	86 ± 17	55	85	173
In/medium	EL	23.6	98 ± 17	63	98	160
	HS	10.9	96 ± 18	61	93	174
In/fast	EL	2.4	105 ± 32	63	100	188
	HS	1.4	109 ± 22	71	105	187
Out/slow	EL	8.9	104 ± 23	60	102	182
	HS	8.2	98 ± 18	61	96	193
Out/medium	EL	11.2	115 ± 21	67	113	185
	HS	7.4	106 ± 24	66	103	198
Out/fast	EL	4.3	119 ± 20	81	118	188
	HS	1.4	115 ± 31	69	109	200
			Inhalation Rates, m^3/hr			
In/slow	EL	49.6	0.84 ± 0.36	0.18	0.78	2.34
	HS	70.7	0.78 ± 0.36	0.30	0.72	3.24
In/medium	EL	23.6	0.96 ± 0.36	0.24	0.84	2.58
	HS	10.9	0.96 ± 0.42	0.42	0.84	4.02
In/fast	EL	2.4	1.02 ± 0.60	0.24	0.84	3.42
	HS	1.4	1.26 ± 0.66	0.54	1.08	6.84[c]
Out/slow	EL	8.9	0.96 ± 0.54	0.36	0.78	4.32
	HS	8.2	0.96 ± 0.48	0.42	0.90	5.28
Out/medium	EL	11.2	1.08 ± 0.48	0.24	0.96	3.36
	HS	7.4	1.26 ± 0.78	0.48	1.08	5.70
Out/fast	EL	4.3	1.14 ± 0.60	0.48	0.96	3.60
	HS	1.4	1.44 ± 1.08	0.48	1.02	5.94

a EL students were between 10-12 yrs old; HS students were between 13-17 yrs old.
b Recorded time averaged about 23/hr per elementary student and 33/hr per high school student, over 72-hr. periods.
c Highest single value.

Source: Spier et al, 1992.

Table 3-11. Average Hours Spent per Day in a Given Location and Activity Level by Elementary (EL) and High School (HS) Students

	Time (hrs/day)	
	Students	
	EL[a]	HS[b]
Indoor		
Slow	16.3	19.5
Medium	2.9	1.5
Fast	0.4	0.2
TOTAL	19.6	21.2
Outdoor		
Slow	2.2	1.2
Medium	1.7	1.3
Fast	0.5	0.2
TOTAL	4.4	2.7

[a] EL students were between 10-12 years old
[b] HS students were between 13-17 years old

Source: Spier et al., 1992.

Table 3-12. Distribution Patterns of Daily Inhalation Rates for Elementary (EL) and High School Students (HS) Grouped by Activity Level

Location	Activity Type[a]	Students[b]	Average, IR[c] (m^3/day)	Percentile Rankings		
				1st	50th	99th
Indoor	Light	EL	13.7	2.93	12.71	38.14
		HS	15.2	5.85	14.04	63.18
	Moderate	EL	2.8	0.70	2.44	7.48
		HS	1.4	0.63	1.26	6.03
	Heavy	EL	0.4	0.096	0.34	1.37
		HS	0.25	0.11	0.22	1.37
Outdoor	Light	EL	2.1	0.79	1.72	9.50
		HS	1.15	0.50	1.08	6.34
	Moderate	EL	1.84	0.41	1.63	5.71
		HS	1.64	0.62	1.40	7.41
	Heavy	EL	0.57	0.24	0.48	1.80
		HS	0.29	0.096	0.20	1.19

[a] In this report, activity type presented in Table 3-7 was redefined as light activity for slow, moderate activity for medium and heavy activity for fast.
[b] EL students were between 10-12 years old; HS students were between 13-17 years old.
[c] Daily inhalation rate was calculated by multiplying the hours spent at each activity level (Table 3-8) by the corresponding inhlation rate (Table 3-7).

Source: Generated using data from Tables 3-8 and 3-9.

variables: heart rate (HR), breathing frequency (f_B), and oxygen consumption (V_{O2}). The survey population consisted of 160 individuals (both genders) from California of various ages (6-77 years) and ethnicity (CARB, 1993). Further research was also conducted to validate empirically derived equations for children engaged in selected field and laboratory studies. The test subjects were 40 children from 6 to 12 years old. Twelve children (3-5 years) were subjects for pilot testing (CARB, 1993).

Resting protocols conducted in the laboratory consisted of phases (25 minutes each) of lying, sitting, and standing. They were categorized as resting and sedentary activities. Two active protocols including moderate (walking) and heavy (jogging/running) phases were performed on a treadmill over a progressive continuum of intensities made up of 6 minute intervals, at 3 speeds ranging from slow to moderately fast. All protocols involved measuring VR, HR, f_B, and V_{O2}. Measurements were taken in the last 5 minutes of each phase of the resting protocol (25 minutes), and the last 3 minutes of the 6 minutes intervals, at each speed designated in the active protocols.

In the field, all children completed spontaneous play protocols, while the older adolescent population (16-18 years) completed car driving and riding, car maintenance (males), and housework (females) protocols. All adults (19-60 years) and most or the senior (60-77 years) females completed housework, yardwork, and car driving and riding protocols. Adult and senior males only completed car driving and riding, yardwork, and mowing protocols. HR, VR, and f_B were measured during each protocol and most protocols were conducted for 30 mins. All the active field protocols were conducted twice.

During all activities in either the laboratory or field protocols, inhalation rate (IR) for the children's group revealed no significant gender differences and those for the adult groups demonstrated gender differences. Therefore, IR data presented in Appendix Tables 3A-3 and 3A-4 were categorized as young children, children, adult female, and adult male by activity levels (resting, sedentary, light, moderate, and heavy). These categorized data for the laboratory protocols are shown in Table 3-13. Table 3-14 presents the mean inhalation rates by group and activity levels (light, sedentary, and moderate) in field protocols. A comparison of the data shown in Tables 3-13 and 3-14 suggest that during light and sedentary activities in laboratory and field protocols similar inhalation rates were obtained for adult

Table 3-13. Summary of Average Inhalation Rates (m^3/hr) by Age Group and Activity Levels for Laboratory Protocols

Age	Resting[a]	Sedentary[b]	Light[c]	Moderate[d]	Heavy[e]
Young Children[f]	0.37	0.40	0.65	DNP[g]	DNP[g]
Children[h]	0.45	0.47	0.95	1.74	2.23
Adult Females[i]	0.43	0.48	1.33	2.76[g]	2.96[j]
Adult Males[d]	0.54	0.60	1.45	1.93	3.63

[a] Resting defined as lying (see Appendix Table 3A-3 for original data).
[b] Sedentary defined as sitting and standing (see Appendix Table 3A-3 for original data).
[c] Light defined as walking at speed level 1.5 - 3.0 mph (see Appendix Table 3A-3 for original data).
[d] Moderate defined as fast walking (3.3 - 4.0 mph) and slow running (3.5 - 4.0 mph) (see Appendix Table 3A-3 for original data).
[e] Heavy defined as fast running (4.5 - 6.0 mph) (see Appendix Table 3A-3 for original data).
[f] Young children (both genders) 3 - 5.9 yrs old.
[g] DNP. Group did not perform this protocol or N was too small for appropriate mean comparisons. All young children did not run.
[h] Children (both genders) 6 - 12.9 yrs old.
[i] Adult females defined as adolescent, young to middle aged, and older adult females.
[j] Older adults not included in mean value since they did not perform running protocols at particular speeds.
[k] Adult males defined as adolescent, young to middle aged, and older adult males.

Source: CARB, 1993.

Table 3-14. Summary of Average Inhalation Rates (m^3/hr) by Age Group and Activity Levels in Field Protocols

Activity Level	Young Children[a]	Children[b]	Adult Females[c]	Adult Males[d]
Light[f]	DNP[e]	DNP[e]	1.10[j]	1.40[i]
Sedentary[g]	DNP[e]	DNP[e]	0.51	0.62
Moderate[h]	0.68	1.07	DNP[e]	1.78[j]

[a] Young children (both genders) = 3 - 5.9 yrs old.
[b] Children (both genders) = 6 - 12.9 yrs old.
[c] Adult females defined as adolescent, young to middle aged, and older adult females.
[d] Adult males defined as adolescent, young to middle aged, and older adult males.
[e] DNP. Group did not perform this protocol or N was too small for appropriate mean comparisons.
[f] Light activity was defined as car maintenance (males), housework (females), and yard work (females) (see Appendix Table 3A-4 for original data).
[g] Sedentary activity was defined as car driving and riding (both genders) (see Appendix Table 3A-4 for original data).
[h] Moderate activity was defined as moving (males); wood working (males); yard work (males); and play (children). (see Appendix Table 3A-4 for original data).
[i] Older adults not included in mean value since they did not perform this activity.
[j] Adolescents not included in mean value since they did not perform this activity.

Source: CARB, 1993.

females and adult males. Accurate predictions of IR across all population ~~groups and activity~~ types were obtained by including body surface area (BSA), HR, and f_B in multiple regression analysis (CARB, 1993). CARB (1993) calculated BSA from measured height and weight using the equation: BSA = $height^{(0.725)} \times weight^{(0.425)} \times 71.84$.

A limitation associated with this study is that the population does not represent the general U.S. population. Also, the classification of activity types (i.e. laboratory and field protocols) into activity levels may bias the inhalation rates obtained for various age/gender cohorts. The estimated rates were based on short-term data and may not reflect long-term patterns. An advantage of this study is that it provides inhalation data for all age groups.

3.2.3. Other Relevant Inhalation Rate Studies

Shamoo et al. - Improved Quantitation of Air Pollution Dose Rates by Improved Estimation of Ventilation Rate- Shamoo et al. (1990) conducted this study to develop and validate new methods to accurately estimate ventilation rates for typical individuals during their normal activities. Two practical approaches were tested for estimating ventilation rates indirectly: (1) volunteers were trained to estimate their own ventilation rate (VR) at various controlled levels of exercise; and (2) individual VR and heart rate (HR) relationships were determined in another set of volunteers during supervised exercise sessions (Shamoo et al. 1990). In the first approach, the training session involved 9 volunteers (3 females and 6 males) from 21-37 years old. Initially the subjects were trained on a treadmill with regularly increasing speeds. VR measurements were recorded during the last minute of the 3-minute interval at each speed. VR was reported to the subjects as low (1.4 m^3/hr), medium (1.5-2.3 m^3/hr), heavy (2.4-3.8 m^3/hr), and very heavy (3.8 m^3/hr or higher) (Shamoo et al., 1990).

Following the initial test on a different day, treadmill training sessions were conducted where 7 different speeds were used, each for 3 minutes in arbitrary order. VR was measured and the subjects were provided feedback. A treadmill testing session was conducted in the same manner as the training session. Each subject then estimated their own ventilation level at each speed and the correct level was revealed to the volunteers. Subsequently, two 3-hour outdoor supervised exercise sessions were conducted in the summer on two consecutive days. Each hour consisted of 15 minutes each of rest, slow walking, jogging, and fast walking. The subjects' ventilation level and VR were recorded, however, no feedback was given to the subjects. Electrocardiograms were recorded via direct connection or telemetry and HR was measured concurrently with ventilation measurement for all treadmill sessions.

The second approach consisted of two protocol phases (indoor/outdoor exercise sessions and field testing). 20 outdoor adult workers between 19-50 years old were employed. Indoor and outdoor supervised exercises similar to the protocols in the first approach were conducted, however there were no feedbacks. Also, in this approach electrocardiograms were recorded and HR was measured concurrently with VR. During the field testing phase, subjects were trained to record their activities during three different 24-hour periods within one week. These periods included their most active working and non-working days. HR was measured quasi-continuously during the 24-hour periods activities were recorded. The subjects recorded in a diary all changes in physical activity, location, exercise levels during waking hours. Self-estimated activities in supervised exercises and field studies were categorized as slow (resting, slow walking or equivalent), medium (fast walking or equivalent), and fast (jogging or equivalent).

Inhalation rates were not reported in the data presented by Shamoo et al. (1990). Shamoo et al. (1990) reported that the first approach employed indicated that about 68% of the sample population estimated their VR correctly. They also observed that inaccurate self-estimates occurred in the younger male population who were highly physically fit and were competitive aerobic trainers. This subset of sample population tended to underestimate their own physical activity levels at higher VR ranges. Shamoo et al. (1990) attributed this to a "macho effect." In the second approach, a regression analysis was conducted that related the logarithm of VR to HR. The logarithm of VR correlated better with HR than VR itself (Shamoo et al., 1990). Also, the effect of heat stress was observed on the HR data obtained during the second hour of the exercise sessions.

A limitation associated with this study is that the population sampled does not give a representation of the general U.S. population. Also, ventilation rates were not presented. Training individuals to estimate their VR may contribute to uncertainty in the results because the estimates are subjective. Another limitation is that heat stress was not accounted for in the equation used to predict VR from HR measurements. This may somewhat affect the accuracy of the estimated VR. An advantage of this study is that data sets were generated from diary recordings of activities during the sampling period and were not based on recall. The former approach appears to give more accurate responses.

Shamoo et al. - Activity Patterns in a Panel of Outdoor Workers Exposed to Oxidant Pollution - Shamoo et al. (1991) investigated summer activity patterns in 20 adult volunteers (15 men and 5 women) outdoor workers in the Los Angeles area. They were exposed to oxidant pollution. The age of the subjects ranged from 19-50 years old. All volunteers worked outdoors at least 10 hours per week. The experimental approach involved two stages: (1) indirect objective estimation of ventilation rate (VR) from heart rate (HR) measurements; and (2) self estimation of inhalation/ventilation rates recorded by subjects in diaries during their normal activities (Shamoo et al., 1991). The approach consisted of calibrating the relationship between VR and HR for each test subject in controlled exercise; monitoring by subjects of their own normal activities with diaries and electronic HR recorders; and then relating VR with the activities described in the diaries (Shamoo et al., 1991).

Calibration tests were conducted for indoor and outdoor supervised exercises to determine individual relationships between VR and HR. Indoors, each subject was tested on a treadmill at rest and at increasing speeds. HR and VR were measured at the third minute at each 3-minute interval speed. In addition, subjects were tested while walking a 90-meter course in a corridor at 3 self-selected speeds (normal, slower than normal, and faster than normal) for 3 mins.

Two outdoor testing sessions (one hour each) were conducted for each subject, 7 days apart. Subjects exercised on a 260-m asphalt course. The session involved 15 minutes each of: rest, slow walking, jogging, and fast walking during the first hour. The sequence was also repeated during the second hour. HR and VR measurements were recorded starting at the 8th minute of each 15-minute segment. Following the calibration tests, a field study was conducted in which subject's self-monitored their activities (by filling out activity diary booklets), self-estimated their breathing rates, and HR. Breathing rates were defined as sleep, slow (slow or normal walking), medium (fast walking), and fast (running) (Shamoo et al., 1991). Changes in location, activity, or breathing rates during three 24-hr periods within a week were recorded. These periods included their most active working and non-working days. Each subject wore Heart watches which recorded their HR once per minute during the field study. Ventilation rates were estimated for the following categories: sleep, slow, medium, and fast.

A regression line was fed to the calibration data, HR and lognormal VR, in order to develop an equation to predict VR from measured HR. The average measured VR were 0.48, 0.9, 1.68, and 4.02 m^3/hr for rest, slow walking or normal walking, fast walking and jogging, respectively (Shamoo et al., 1991). Collectively, the diary recordings showed that sleep occupied about 33 percent of the subject's time, slow activity 59 percent, medium 7 percent, and fast 1 percent. The diary data covered an average of 69 hrs per subject (Shamoo et al., 1991). Table 3-15 presents the distribution pattern of predicted ventilation rates and equivalent ventilation rates (EVR) obtained at the four activity levels. EVR was defined as the VR per square meter of body surface area, and also as a percentage of the subjects average VR over the entire field monitoring period (Shamoo et al., 1991). The overall mean predicted VR were 0.42 m^3/hr for sleep; 0.71 m^3/hr for slow activity; 0.84 m^3/hr for medium activity; and 2.63 m^3/hr for fast activity. The mean predicted VR and standard deviation, and the percentage of time spent in each combination of VR, activity type (essential and non-essential), and location (indoor and outdoor) are presented in Table 3-16. Essential activities include income-related work, household chores, child care, study and other school activities, personal care and destination-oriented travel. Non-essential activities include sports and active leisure, passive leisure, some travel, and social or civic activities (Shamoo et al., 1991).

The author noted that the methodology employed in this study and the previous study by Shamoo et al. (1990) are similar. Consequently, the same advantages and disadvantages associated with the Shamoo et al. (1990) data set also apply to this data set. According to Shamoo et al. (1990), "These results confirm that subjective activity diary data can provide exposure modelers with useful rough estimates of VR for groups of generally healthy people. As a group, the subjects showed meaningful and highly statistically significant increases in measured HR and predicted VR across the range of diary-recorded activity levels (sleep-

Table 3-15. Distribution Pattern of Predicted VR and EVR (Equivalent Ventilation Rate) for Outdoor Workers

Perceived Breathing Rate	N[b]	VR (M^3/hr)[a] Arithmetic Mean ± S.D.	VR (M^3/hr)[a] Geometric Mean ± S.D.	EVR (m^3/hr/m^2 body surface) Arithmetic Mean ± S.D.	EVR (m^3/hr/m^2 body surface) Geometric Mean ± S.D.
Sleep	18,597	0.42 ± 0.16	0.39 ± 0.08	0.23 ± 0.08	0.22 ± 0.08
Slow	41,745	0.71 ± 0.4	0.65 ± 0.09	0.38 ± 0.20	0.35 ± 0.09
Medium	3,898	0.84 ± 0.47	0.76 ± 0.09	0.48 ± 0.24	0.44 ± 0.09
Fast	572	2.63 ± 2.16	1.87 ± 0.14	1.42 ± 1.20	1.00 ± 0.14

Percentile Rankings, VR

	1	5	10	50	90	95	99	99.9
Sleep	0.18	0.18	0.24	0.36	0.66	0.72	0.90	1.20
Slow	0.30	0.36	0.36	0.66	1.08	1.32	1.98	4.38
Medium	0.36	0.42	0.48	0.72	1.32	1.68	2.64	3.84
Fast	0.42	0.54	0.60	1.74	5.70	6.84	9.18	10.26

Percentile Rankings, EVR

	1	5	10	50	90	95	99	99.9
Sleep	0.12	0.12	0.12	0.24	0.36	0.36	0.48	0.60
Slow	0.18	0.18	0.24	0.36	0.54	0.66	1.08	2.40
Medium	0.18	0.24	0.30	0.42	0.72	0.90	1.38	2.28
Fast	0.24	0.30	0.36	0.90	3.24	3.72	4.86	5.52

[a] Data presented by Shamoo were presented in liters/minute were converted to m^3/hr.

[b] Number of minutes with valid appearing heart rate records and corresponding daily records of breathing rate.

[c] EVR = VR per square meter of body surface area.

Source: Shamoo et al., 1991

Table 3-16. Distribution Pattern of Inhalation Rate by Location and Activity Type for Outdoor Workers

Location	Activity Type[a]	Perceived Breathing Rates	% of Time	Inhalation rate (m^3/hr) ± S.D.	% of Avg.[b]
Indoor	Essential	Sleep	28.7	0.42 ± 0.12	69 ± 15
		Slow	29.5	0.72 ± 0.36	106 ± 43
		Medium	2.4	0.72 ± 0.30	129 ± 38
		Fast	0	0	0
Indoor	Non-essential	Slow	20.4	0.66 ± 0.36	98 ± 36
		Medium	0.9	0.78 ± 0.30	120 ± 50
		Fast	0.2	1.86 ± 0.96	278 ± 124
Outdoor	Essential	Slow	11.3	0.78 ± 0.36	117 ± 42
		Medium	1.8	0.84 ± 0.54	130 ± 56
		Fast	0	0	0
Outdoor	Non-essential	Slow	3.2	0.90 ± 0.66	136 ± 90
		Medium	0.8	1.26 ± 0.60	213 ± 91
		Fast	0.7	2.82 ± 2.28	362 ± 275

[a] Statistic was calculated by converting each VR for a given subject to a percentage of her/his overall average.
[b] Essential activities include income-related, work, household chores, child care, study and other school activities, personal care, and destination-oriented travel; Non-essential activities include sports and active leisure, passive leisure, some travel, and social or civic activities.

Source: Shamoo et al., (1991).

slow-medium-fast). At the same time, the results show high within-person and between-person variability in VR at each diary-recorded level, indicating that VR estimates from diary reports may be substantially misleading in individual cases."

Shamoo et al. - Effectiveness of Training Subjects to Estimate Their Level of Ventilation - Shamoo et al. (1992) conducted a study where nine non-sedentary subjects in good health were trained on a treadmill to estimate their own ventilation rates at four activity levels: low, medium, heavy, and very heavy. The purpose of the study was to train the subjects self-estimation of ventilation in the field and assess the effectiveness of the training (Shamoo et al., 1992). The subjects included 3 females and 6 males between 21 to 37 years of age. The tests were conducted in four stages. First, an initial treadmill pretest was conducted indoors at various speeds until the four ventilation levels were experienced by each subject, VR was measured and feedback was given to the subjects. Second, two treadmill training sessions which involved seven 3-min segments of varying speeds based on initial test were conducted, VR was measured and feedback was given to the subjects. Another similar session was conducted, however, the subjects estimated their own ventilation level during the last 20 seconds of each segment and VR was measured during the last minute of each segment. Immediate feedback was given to the subject's estimate; and the third and fourth stages involved 2 outdoor sessions of 3 hours each. Each hour comprised 15 minutes each of rest, slow walking, jogging, and fast walking. The subjects estimated their own ventilation level at the middle of each segment. The subject's estimate was verified by a respirometer which measured VR in the middle of each 15-minute activity. No feedback was given to the subject.

For purposes of this study, inhalation rates were analyzed from the raw data provided by Shamoo et al. (1992). These data are presented in Appendix Table 3A-5. Table 3-17 presents the actual inhalation rates obtained at four ventilation levels and two microenvironments (i.e., indoors and outdoors). The mean inhalation rates for all subjeccts were 0.93, 1.92, 3.01, 4.80 for low, medium, heavy, and very heavy activities.

The population sample size used in this study was small and may somewhat affect the distribution of the data set obtained. Another limitation is that the population selected does not represent the general U.S. population. The training approach employed may not be cost

Table 3-17. Actual Inhalation Rates (VE) Measured at Four Ventilation Levels

Subject	Location	Mean VE[a] (m³/hr) Low[b]	Medium[c]	Heavy[d]	Very Heavy[e]
0124	Indoor (Tm post)[f]	1.46	1.97	3.52	4.94
	Outdoor[g]	1.18	2.78	3.22	5.17
	Total[h]	1.22	2.55	3.42	5.14
0720	Indoor (Tm post)	1.48	1.94	3.47	-
	Outdoor	0.98	2.39	3.22	4.76
	Total	1.05	2.24	3.33	4.76
1000	Indoor (Tm post)	1.01	1.40	2.65	3.73
	Outdoor	0.53	1.71	2.92	4.38
	Total	0.60	1.64	2.78	4.22
1200	Indoor (Tm post)	1.01	1.49	2.59	3.64
	Outdoor	0.65	1.63	2.29	4.96
	Total	0.71	1.57	2.38	4.77
1239	Indoor (Tm post)	1.10	1.88	3.08	-
	Outdoor	0.75	1.44	3.37	4.25
	Total	0.83	1.57	3.24	4.25
1240	Indoor (Tm post)	0.92	1.48	2.92	-
	Outdoor	0.58	1.42	2.47	4.13
	Total	0.68	1.45	2.74	4.13
1241	Indoor (Tm post)	1.25	1.78	2.79	3.92
	Outdoor	0.91	2.05	3.03	4.21
	Total	0.93	1.89	2.95	4.16
1242	Indoor (Tm post)	1.28	2.23	3.37	4.37
	Outdoor	1.08	1.89	2.96	6.40
	Total	1.12	2.06	3.06	6.11

Table 3-17. Actual Ventilation Rates (VE) Measured at Four Ventilation Levels (continued)

Subject	Location	Mean VE[a] (m^3/hr)			
		Low[b]	Medium[c]	Heavy[d]	Very Heavy[e]
1243	Indoor (Tm post)	1.53	2.27	3.80	4.20
	Outdoor	1.01	2.32	2.92	5.87
	Total	1.09	2.29	3.17	5.63
All subjects	Indoor (Tm post)	1.23	1.83	3.13	4.13
	Outdoor	0.88	1.96	2.93	4.90
	Total	0.93	1.92	3.01	4.80

[a] Original data were presented in L/min. Conversion to m^3/hr was obtained as follows:

$$60\ \frac{\text{min}}{hr}\ x\ \frac{m^3}{1000L}\ x\ \frac{L}{\text{min}}$$

[b] Low = 1A, 1B (see Appendix Table 3A-5)
[c] Medium = 2A, 2B and 2C (see Appendix Table 3A-5)
[d] Heavy = 3A, 3B, 3CC and 3D (see Appendix Table 3A-5)
[e] Very heavy = 4A, 4B and 4C (see Appendix Table 3A-5)
[f] Indoor activities include Treadmill Post-test, TM post (see Appendix Table 3A-5)
[g] Outdoor activities includes all rest, low walk, high walk and jog (see Appendix Table 3A-5)
[h] Total includes all indoor and outdoor activities (see Appendix Table 3A-5)

Source: Shamoo et al., 1992

effective because it was labor intensive, therefore, this approach may not be viable in field studies especially for large sample sizes.

U.S. EPA - Development of Statistical Distributions or Ranges of Standard Factors Used in Exposure Assessments - Due to a paucity of information in literature regarding equations used to develop statistical distributions of minute ventilation/ventilation rate at all activity levels for male and female children and adults, the U.S. EPA (1985) compiled measured values of minute ventilation for various age/gender cohorts from early studies. In more recent investigations, minute ventilations have been measured more as background information than as research objective itself and the available studies have been for specific subpopulations such as obese, asthmatics or marathon runners. The data compiled by the U.S. EPA (1985) for each age/gender cohorts were obtained at various activity levels. These levels were categorized as light, moderate, or heavy according to the criteria developed by the Environmental Criteria and Assessment Office of EPA for the Ozone Criteria Document. These criteria were developed for a reference male adult with a body weight of 70 kg (U.S. EPA, 1985). The minute ventilation rates for adult males based on these activity level categories are detailed in Appendix Table 3A-5. Table 3-18 presents a summary of inhalation rates by age, gender, and activity level found in Appendix Table 3A-6 . A description of activities included in each activity level is also presented in Table 3-18. Based on data in Appendix Table 3A-7, at rest, the average adult inhalation rate is 0.5 m^3/hr. The mean inhalation rate for children at rest, ages 6 and 10, is 0.4 m^3/hr.

The total amount of time spent indoors, outdoors, and in transportation vehicle at three activity levels for both males and females of all age groups are presented in Table 3-19. The total average hours spent indoors was 20.4, outdoors was 1.77, and in transportation vehicle was 1.77. Based on the data presented in Tables 3-18 and 3-19, a daily inhalation rate was calculated for adults and children by using a time-activity-ventilation approach. The calculated average daily inhalation rates are 16 m^3/day for adults. The average daily inhalation rate for children (6 and 10 yrs) is 18.9 m^3/day ([16.74 + 21.02]/2). These data are presented in Table 3-20.

A limitation associated with this study is that many of the values used in the data compilation were from early studies. The accuracy and/or validity of the values used and

Table 3-18. Subject Estimation of Ventilation Range

	% Correct	% Incorrect	
		% Over	% Under
All Levels			
Total	67.8	25.3	74.7
Indoor (TM Post)[a]	82.5	36.4	63.6
Outdoor (2 Sessions)	62.4	23.7	76.3
Level 1 - Low			
Total	83.4	100.0	0.0
Indoor	70.6	100.0	0.0
Outdoor	75.0	100.0	0.0
Level 2 - Medium			
Total	84.3	50.0	50.0
Indoor	100.0	0.0	0.0
Outdoor	75.0	50.0	50.0
Level 3 - Heavy			
Total	59.2	4.4	95.6
Indoor	85.7	38.3	67.7
Outdoor	54.4	0.0	100.0
Level 4 - Very Heavy			
Total	26.9	0.0	100.0
Indoor	33.3	0.0	100.0
Outdoor	26.1	0.0	100.0
Over & Under Main Anchor[b]			
Total	88.3	13.3	86.7
Indoor	96.9	0.0	100.0
Outdoor	85.6	13.8	86.2

[a] TM Post = Treadmill Post-test
[b] Main anchor point-ventilation level at which breathing typically changes from primarily nasal to oro-nasal breathing.

Source: Shamoo et al., 1992

Table 3-19. Activity Pattern Data Aggregated for Three Microenvironments by Activity Level for all Age Groups

Microenvironment	Activity Level	Average Hours Per Day in Each Microenvironment at Each Activity Level
Indoors	Resting	9.82
	Light	9.82
	Moderate	0.71
	Heavy	0.098
	TOTAL	20.4
Outdoors	Resting	0.505
	Light	0.505
	Moderate	0.65
	Heavy	0.12
	TOTAL	1.77
In Transportation Vehicle	Resting	0.86
	Light	0.86
	Moderate	0.05
	Heavy	0.0012
	TOTAL	1.77

Source: Adapted from U.S. EPA, 1985.

Table 3-20. Summary of Daily Inhalation Rates Grouped by Age and Activity level in a Microenvironment

Subject	Daily Inhalation Rate (m^3/day)[a] Resting	Light	Moderate	Heavy	Total Daily IR[b] (m^3/day)
Adult Male	7.83	8.95	3.53	1.05	21.4
Adult Female	3.35	5.59	2.26	0.64	11.8
Average Adult	5.60	6.71	2.96	0.85	16
Child (age 6)	4.47	8.95	2.82	0.50	16.74
Child (age 10)	4.47	11.19	4.51	0.85	21.02

[a] In this report, inhalation rate was calculated by using the following equation:

$IR = IR_i t_i$
IR_i = inhalation rate at i^{th} activity (Table 3-15)
t_i = hours spent per day during i^{th} activity (Table 3-16)

[b] In this report, total daily inhalation rate was calculated by summing the specific activity daily inhalation rate.

Source: U.S. EPA, 1985.

data collection method were not presented in the U.S. EPA (1985) report. This may introduce some degree of uncertainty in the results obtained. An advantage of this study is that the data are actual measurement data for a large number of subjects and data are presented for both adults and children.

International Commission on Radiological Protection - Report of the Task Group on Reference Man - The International Commission of Radiological Protection (ICRP) estimated daily inhalation rates for reference adult males, adult females, children (10 years old), infant (1 year old), and newborn babies by using a time-activity-ventilation approach. This approach for estimating inhalation rate over a specified period of time was based on calculating a time weighted average of inhalation rates associated with physical activities of varying durations. ICRP (1981) selected reference values (Appendix Table 3A-8) of minute volume/inhalation rates from a compiled data of various literature sources. ICRP (1981) assumed the daily activities of a reference man, woman, and child consisted of 8 hours of rest and 16 hours of light activities divided evenly between occupational and nonoccupational activities, while an infant's and a newborn's daily activities consisted of 10 and 1 hour resting and 14 and 23 hours light activities, respectively. Table 3-21 presents the daily inhalation rates obtained for all ages/gender. The estimated inhalation rates were 23 m^3/day for adult males, 21 m^3/day for adult females, 15 m^3/day for children (age 10), 3.8 m^3/day for infants (age 1), and 0.8 m^3/day for newborns.

A limitation associated with this study is that the validity and accuracy of the inhalation rates data used in the compilation were not specified. This may introduce some degree of uncertainty in the results obtained. Also, the approach used involved assuming hours spent by various age/gender cohorts in specific activities. These assumptions may over/under-estimate the inhalation rates obtained.

3.2.4. Recommendations

The recommended inhalation rates for adults, children, and outdoor workers/athletes are based on the key studies described in the preceding sections. Different survey designs and populations were utilized by the studies described in this report. A summary of these designs, data generated, and their limitations/advantages are presented in Table 3-22.

Table 3-21. Daily Inhalation Rates Estimated From Daily Activities for a Reference Man

Subject	Inhalation Rate (IR) Resting (m^3/hr)	Light Activity (m^3/hr)	Daily Inhalation Rate (DIR)[a] (m^3/day)
Adult Man	0.45	1.2	22.8
Adult Woman	0.36	1.14	21.1
Child (10 yrs)	0.29	0.78	14.8
Infant (1 yr)	0.09	0.25	3.76
Newborn	0.03	0.09	0.78

Assumptions made were based on 8 hours resting and 16 hours light activity for adults and children (10 yrs); 14 hours resting and 10 hours light activity for infants (1 yr); 23 hours resting and 1 hour light activity for newborns.

a

$$DIR = \frac{1}{T}\sum_{i=1}^{K} IR_i t_i$$

IR_i = Corresponding inhalation rate at i^{th} activity

t_i = Hours spent during the i^{th} activity

k = Number of activity periods

T = Total time of the exposure period (i.e. a day)

Source: ICRP, 1981

Table 3-22. Summary of Inhalation Rate Studies

Study	Population Surveyed	Survey Time Period	Data Generated	Limitations/Advantages
Layton 1992	Based on data from dietary surveys and other sources including: the NFCS survey approximately 30,000 individuals of various age/gender cohorts; the NHANES survey approximately 20,000 individuals; and a time-activity survey conducted by Sallis et al. (1985); about 2,126 individuals (ages 20-74) selected from California communities.		Daily IR estimated from 3 methods for adult males, females, children (including infants) at various activity levels. Also estimated IR for short-term exposures by age/gender cohorts at various activity level.	The values were estimated from several data sources and not measured. IRs were estimated based on energy expenditure at various activity levels; reported food biases in the dietary surveys employed; time activity survey was based on recall.
Linn et al., 1992	Seven subject panels: Panel 1 - healthy outdoor workers, 15 male, 15 female, ages 19-50; Panel 2 - healthy elementary school students, 5 male, 12 female, ages 10-12; Panel 3 - healthy high school students, 7 male, 12 female, ages 13-17; Panel 4 - adult asthmatics, 15 male, 34 female, ages 18-20; Panel 5 - adult asthmatics not included in Panel 4, 10 male, 14 male, ages 19-46; Panel 6 - young asthmatics, 7 male, 6 female, ages 11-16; Panel 7 - construction workers, 7 male, ages 26-34.	Late spring and early autumn. Most subject panels were involved in 3 days of HR and diary recording. Construction workers were involved in 1 working day of HR and diary recording	Mean and upper estimates of IR for each subject panel. Also, IR at three self-estimated breathing rates (slow, medium, and fast)	Small sample size of subpopulation surveyed. Population may not represent U.S. population. Calibration data not obtained over full HR range (i.e., heat stress). Activities based on short-term diary data. Activity patterns data not presented.

(Continued)

Table 3-22. (continued)

Study	Population Surveyed	Survey Time Period	Data Generated	Limitations/Advantages
Linn et al.; 1993	Outdoor workers; 19 construction workers in suburban Los Angeles	(Mid-July-early November, 1991) Diary recordings before work, during work and break times	Distribution patterns of hourly IR by activity level.	Small sample population size. IR was predicted from HR calibration data. Estimated breathing rates were subjective in nature. Activities were based on short-term diary data. Population does not represent U.S. population.
Spier et al., 1992	26 students, ages 10-17, both genders.	(Late September - October) Involved 3 consecutive days of diary recording	Distribution patterns of hourly IR by activity levels and location	IR predicted from HR calibration data; short-term activity data based on diary recordings; accuracy of self-estimated breathing rate by younger population; population does not represent U.S. population small sample population size.
CARB 1993	160 volunteers ages 6-77, both genders	Three 25 min phases of resting protocol in the lab 6 mins of active protocols in the lab. 30 min phases of field protocols repeated once.	Mean values of IR for adult males and females and children by their activity levels.	Population does not represent general U.S. population; HR was poorly correlated with IR. However, from multiple regression analysis F_B and BSA correlated better with VR; small sample size.
Shamoo et al., 1990	9 volunteers of both genders, ages 21-37, 20 outdoor workers, 19-50 years old.	Involved 3-min indoor session/two 3-hr outdoor session at 4 activity levels	No IR data presented.	Graphs presented in original study were difficult to read; no useful data were presented for exposure assessments studies.

(Continued)

Table 3-22. (continued)

Study	Population Surveyed	Survey Time Period	Data Generated	Limitations/Advantages
Shamoo et al., 1991	20 outdoor workers of both gender, ages 19-50	Diary recordings of three 24-hr. periods within a week.	Distribution patterns of IR and EVR by activity levels and location.	Sample population does not represent the general U.S. population; small sample size; short-term diary data.
Shamoo et al., 1992	9 non-sedentary subjects, both genders, ages 21-37.	3-min. intervals of indoor exercises/two 3-hr outdoor exercise sessions at 4 activity levels.	Actual measured ventilation rates presented.	Small sample size; population does not represent general U.S. population; training approach may not be cost-effective; VR obtained for outdoor workers which are sensitive subpopulation.
U.S. EPA, 1985	Based on data from several literature sources	--	Estimated IR for adult males, adult females and children (ages 6 and 10) by various activity levels.	Validity and accuracy of data set employed not defined; IR was estimated not measured.
ICRP, 1974	Based on data from other references	--	Reference daily IR for adult females, adult males, children (10 yrs), and infant (1 yr)	Validity and accuracy of data set employed not defined; IR was estimated not measured.

Note: IR = inhalation rate; HR = heart rate; f_B = breathing frequency; BSA = body-surface area; EVR = equivalent ventilation rate.

Excluding the study by Layton (1993), the population surveyed in all of the key studies described in this report were limited to the Los Angeles area. This limited population does not represent the general U.S. population and may result in biases. However, based on other aspects of the study design, these studies were selected as the basis for recommended inhalation rates. The selection of inhalation rates to be used for exposure assessment studies depends on the age of the exposed population and the specific activity levels of this population during various exposure scenarios. The recommended values for adults, children (including infants), and outdoor worker/athlete for use in various exposure scenarios are discussed below.

Adults - For purposes of this recommendation, adults include adolescent (13-18 yrs), young to middle age adults (19-64 yrs), and older adults (65+ yrs). The daily inhalation rates reported for adults are summarized as follows:

Summary of Inhalation Rates for Long Term Exposure

Arithmetic Mean (m^3/day)		Upper percentile (m^3/day)	Reference
13	(1st approach)	-	Layton, 1993
13	(2nd approach)	-	Layton, 1993
14	(3rd approach)	-	Layton, 1993
20	(Calculated, See Table 3-11)	85.5	Spier et al., 1992

The daily inhalation rate (20 m^3/day) calculated from the data generated by Spier et al. (1992) is much higher when compared with the rates (13-14 m^3/day) obtained by Layton (1993). This discrepancy can be attributed to the fact that the population surveyed by Spier et al. (1992) only represented individuals between 13-17 years old (adolescents), and heart rate (HR) and diary information were collected during hours spent awake (i.e., sleep was excluded in the activity level). Also, this age group of individuals tend to be more active than older adults. In contrast, the Layton (1993) study represented a wider age/gender cohort (13 years and older) and sleep was included in the activity level. Therefore, 20 m^3/day (Spier et al., 1992) may represent the daily inhalation rate during active hours only. Based on this observations, the suggested daily inhalation rates for adults ranges from 13-14 m^3/day (Layton, 1993). Therefore, for continuous exposure assessments in which specific activity patterns are not known, 13.3 m^3/day is the recommended average daily inhalation rate for adults.

The upper percentile estimate (85.5 m^3/day) obtained from Spier et al. (1992) appears very high and can be attributed to the same phenomena explained above. Therefore, 85.5 m^3/day may not be an appropriate as an upper percentile estimate. For continuous exposure assessment studies, 20 m^3/day (EPA Ambient Water Quality Criteria Document) is the widely used average daily inhalation rate. This value is much higher than the (13.3 m^3/day) recommended rate in the Layton (1993) study, but it is similar to the active daily rate (20 m^3/day) obtained from the Spier et al. (1992) study. Therefore, 20 m^3/day is probably representive of an upper percentile estimate among adults.

For exposure scenarios in which the distribution of activity patterns is known, the following results, calculated from the studies referenced can be applied:

Summary of Inhalation Rates for Short-Term Exposure

Arithmetic Mean (m^3/hr)					Reference
		Activity level			
Rest	Sedentary	Light	Moderate	Heavy	
0.5	0.5	1.4	2.4	3.3	CARB, 1993 (Lab protocols)
-	0.6	1.2	1.8	-	CARB, 1993 (Field protocols)
0.4	0.4	0.7	1.4	3.6	Layton, 1993 (Short-term exposure)
0.4	-	0.6	1.5	3.0	Layton, 1993 (3rd approach)
-	-	1.7	2.2	2.7	Spier et al., 1992
-	-	0.8	1.1	1.6	Linn et al., 1992

Based on these key studies, the following recommendations are made: for short term exposures in which distribution of activity patterns are specified, the recommended average rates are 0.4m^3/hr during rest; 0.5 m^3/hr for sedentary activities; 1.1 m^3/hr for light activities; 1.7 m^3/hr for moderate activities; and 2.8 m^3/hr for heavy activities.

Children (including Infants) - For purposes of this recommendation, children are defined as males and females between the ages of 1-12 years old, while infants are individuals less than 1 year old. The inhalation rates for children are presented below according to different exposure scenarios. For continuous exposures the daily inhalation rates are summarized as follows:

Summary of Long Term Exposure Data

Arithmetic Mean (m^3/day)	Upper Percentiles (m^3/day)	Reference
4.5 (less than 1 yr) 1st approach		Layton, 1993
9.65 (1-11 yrs) 1st approach		Layton, 1993
7.7 (0.5-10 yrs) 2nd approach		Layton, 1993
21.4 (10-12 yrs) calculated (Table 3-11)	64.0 (99th)	Spier et al., 1992

Based on the key study results (i.e., Layton, 1993), the recommended daily inhalation rate for infants (children less than 1 yr), during continuous exposure assessments is 4.5 m^3/day. The mean daily inhalation rate obtained from the Spier et al. (1992) study is much higher than the values from the Layton (1993) study. This can be attributed to the survey methodologies used. In addition, dairy information and heart rate (HR) recordings were obtained when the children were awake (i.e., during active hours) in the Spier et al. (1992) study. In contrast, inhalation rates in the Layton (1993) study inhalation rates were calculated either based on basal metabolic rate (BMR) which includes resting or on food energy intake. Also both studies represent different age groups. Therefore, based on the Layton (1993) study, the recommended average daily inhalation rate for children between the ages of 1 and 12 years is 8.7 m^3/day. The same observations discussed above can be attributed to the upper percentile estimate (64 m^3/day) obtained from the Spier et al. (1992) study.

For exposure assessments in which activity patterns are known, the data summarized below can be used:

Summary of Short-Term Exposure Data

Arithmetic mean (m^3/hr)

		Activity level			
Rest	Sedentary	Light	Moderate	Heavy	Reference
0.4	0.4	0.8	-	-	CARB, 1993 (lab. protocols)
-	-	-	0.9	-	CARB, 1993 (field protocols)
0.2	0.3	0.5	1.0	2.5	Layton, 1993 (Short-term data)
	-	1.8	2.0	2.2	Spier et al., 1992 (10-12 yrs)
-	-	0.8	1.0	1.1	Linn et al., 1992 (10-12 yrs)

For short term exposures, the recommended average hourly inhalation rates are based on these key studies. They are as follows: 0.3 m^3/hr during rest; 0.4 m^3/hr for sedentary activities; 1.0 m^3/hr for light activities; 1.2 m^3/hr for moderate activities; and 1.9m^3/hr for heavy activities. The recommended short-term exposure data also includes infants (less than 1 yr).

Outdoor Worker/Athlete - Inhalation rate data for outdoor workers/athlete are limited. However, based on the key studies (Linn et al., 1992 and 1993), the recommended average hourly inhalation rate for outdoor workers is 1.3 m^3/hr and the upper-percentile rate is 3.5 m^3/hr (see Tables 3-7 and 3-8). The recommended average inhalation rates for outdoor workers based on their activity levels categorized as slow (light activities), medium (moderate activities), and fast (heavy activities) are 1.1 m^3/hr, 1.5 m^3/hr, and 2.3 m^3/hr, respectively. These values are based on the data from Linn et al. (1992 and 1993) (see Tables 3-7 and 3-9).

3.3. REFERENCES FOR CHAPTER 3

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APPENDIX 3-A

Ventilation Data

Table 3A-1. Statistics of the Age/Gender Cohorts Used to Develop Regression Equations for Predicting Basal Metabolic Rates (BMR) (from Schofield, 1985)

Gender/Age (y)	BMR MJ d^{-1}	±SD	CV[a]	Body Weight (kg)	N[b]	BMR Equation[c]	r[d]
Males							
Under 3	1.51	0.918	0.61	6.6	162	0.249 bw - 0.127	0.95
3 to < 10	4.14	0.498	0.12	21	338	0.095 bw + 2.110	0.83
10 to < 18	5.86	1.171	0.20	42	734	0.074 bw + 2.754	0.93
18 to < 30	6.87	0.843	0.12	63	2879	0.063 bw + 2.896	0.65
30 to < 60	6.75	0.872	0.13	64	646	0.048 bw + 3.653	0.6
60 +	5.59	0.928	0.17	62	50	0.049 bw + 2.459	0.71
Females							
Under 3	1.54	0.915	0.59	6.9	137	0.244 bw - 0.130	0.96
3 to < 10	3.85	0.493	0.13	21	413	0.085 bw + 2.033	0.81
10 to < 18	5.04	0.780	0.15	38	575	0.056 bw + 2.898	0.8
18 to < 30	5.33	0.721	0.14	53	829	0.062 bw + 2.036	0.73
30 to < 60	5.62	0.630	0.11	61	372	0.034 bw + 3.538	0.68
60 +	4.85	0.605	0.12	56	38	0.038 bw + 2.755	0.68

[a] Coefficient of variation (SD/mean)
[b] N = number of subjects
[c] Body weight (bw) is in kg
[d] coefficient of correlation

Source: Layton, 1993.

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Table 3A-2. Characteristics of Individual Subjects: Anthropometric Data, Job Categories, Calibration Results[a]

Subj. #	Age	Ht. (in.)	Wt. (lb.)	Ethnic Group[a]	Job[b]	Site[c]	Calibration HR Range[d]	Calibration r^2[e]
1761	26	71	180	Wht	GCW	Ofc	69-108	.91
1763	29	63	135	Asn	GCW	Ofc	80-112	.95
1764	32	71	165	Blk	Car	Ofc	56-87	.95
1765	30	73	145	Wht	GCW	Ofc	66-126	.97
1766	31	67	170	His	Car	Ofc	75-112	.89
1767	34	74	220	Wht	Car	Ofc	59-114	.98
1768	32	69	155	Blk	GCW	Ofc	62-152	.95
1769	32	77	230	Wht	Car	Hosp	69-132	.99
1770	26	70	180	Wht	Car	Hosp	63-106	.89
1771	39	66	150	Wht	Car	Hosp	88-118	.91
1772	32	71	260	Wht	Car	Hosp	83-130	.97
1773	39	69	170	Wht	Irn	Hosp	77-128	.95
1774	23	68	150	His	Car	Hosp	68-139	.98
1775	42	67	150	Wht	Irn	Hosp	76-118	.88
1776	29	70	180	His	Car	Hosp	68-152	.99
1778	35	76	220	Ind	Car	Hosp	70-129	.94
1779	40	70	175	Wht	Car	Hosp	72-140	.99
1780	37	75	242	His	Irn	Hosp	68-120	.98
1781	38	65	165	His	Lab	Hosp	66-121	.89
Mean	33	70	181				70-123	.94
S.D.	5	4	36				8-16	.04

[a] Abbreviations are interpreted as follows. Ethnic Group: Asn = Asian-Pacific, Blk = Black, His = Hispanic, Ind = American Indian, Wht = White
[b] Job: Car = carpenter, GCW = general construction worker, Irn = ironworker, Lab = laborer
[c] Site: Hosp = hospital buidling, Ofc = medical office complex. Calibration data
[d] Hr range = range of heart rates in calibration study
[e] r^2 = coefficient of determination (proportion of ventilation rate variability explainable by heart rate variability under calibration-study conditions, using quadratic prediction equation).

Source: Linn et al., 1993.

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Table 3A-3. Mean Minute Ventilation (V_E, L/min) by Group and Activity for Laboratory Protocols

Activity		Young Children[a]	Children	Adult Females	Adult Males
Lying		6.19	7.51	7.12	8.93
Sitting		6.48	7.28	7.72	9.30
Standing		6.76	8.49	8.36	10.65
Walking	1.5 mph	10.25	DNP	DNP	DNP
	1.875 mph	10.53	DNP	DNP	DNP
	2.0 mph	DNP	14.13	DNP	DNP
	2.25 mph	11.68	DNP	DNP	DNP
	2.5 mph	DNP	15.58	20.32	24.13
	3.0 mph	DNP	17.79	24.20	DNP
	3.3 mph	DNP	DNP	DNP	27.90
	4.0 mph	DNP	DNP	DNP	36.53
Running	3.5 mph	DNP	26.77	DNP	DNP
	4.0 mph	DNP	31.35	46.03[b]	DNP
	4.5 mph	DNP	37.22	47.86[b]	57.30
	5.0 mph	DNP	DNP	50.78[b]	58.45
	6.0 mph	DNP	DNP	DNP	65.66[b]

[a] Young Children, male and female 3-5.9 yr olds; Children, male and female 6-12.9 yr olds; Adult Females, adolescent, young to middle-aged, and older adult females; Adult Males, adolescent, young to middle-aged, and older adult males; DNP, group did not perform this protocol or N was too small for appropriate mean comparisons

[b] Older adults not included in the mean value since they did not perform running protocol at particular speeds.

Source: CARB, 1993.

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Table 3A-4. Mean Minute Ventilation (V_E, L/min) by Group and Activity for Field Protocols

Activity	Young Children[a]	Children	Adult Females	Adult Males
Play	11.31	17.89	DNP	DNP
Car Driving	DNP	DNP	8.95	10.79
Car Riding	DNP	DNP	8.19	9.83
Yardwork	DNP	DNP	19.23•	26.07[b]/31.89[c]
Housework	DNP	DNP	17.38	DNP
Car Maintenance	DNP	DNP	DNP	23.21[d]
Mowing	DNP	DNP	DNP	36.55[c]
Woodworking	DNP	DNP	DNP	24.42[c]

a Young Children, male and female 3-5.9 yr olds; Children, male and female 6-12.9 yr olds; Adult Females, adolescent, young to middle-aged, and older adult females; Adult Males, adolescent, young to middle-aged, and older adult males; DNP, group did not perform this protocol or N was too small for appropriate mean comparisons;

b Mean value for young to middle-aged adults only

c Mean value for older adults only

d Older adults not included in the mean value since they did not perform this activity; +, adolescents not included in mean value since they did not perform this activity

Source: CARB, 1993.

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Table 3A-5. Ventilation Data for Training Subjects (Raw Data)

SUBJ	TEST DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
0			0	0.00	0		0.00		0.00	0.00	0	0.00	0.00
124	07-SEP-88	TM PRE	1	1.70	0		24.60	1B	0.00	0.00	110	72.00	50.00
124	07-SEP-88	TM PRE	2	2.50	0		29.80	1B	0.00	0.00	115	72.00	50.00
124	07-SEP-88	TM PRE	3	3.40	0		38.30	2B	0.00	0.00	128	72.00	50.00
124	07-SEP-88	TM PRE	4	4.20	0		47.10	3A	0.00	0.00	145	72.00	50.00
124	07-SEP-88	TM PRE	5	5.00	0		74.20	4A	0.00	0.00	168	72.00	50.00
124	07-SEP-88	TM PRE	6	5.50	0		93.40	4B	0.00	0.00	183	72.00	50.00
124	09-SEP-88	TM TR	1	2.00	1		22.70	1B	0.00	0.00	114	72.00	50.00
124	09-SEP-88	TM POST	1	2.00	1	1B	18.10	1B	0.00	0.00	128	72.00	50.00
124	09-SEP-88	TM POST	2	3.40	2	2A	30.70	1B	1.00	0.00	133	72.00	50.00
124	09-SEP-88	TM TR	2	4.50	3		44.80	2C	0.00	18.00	142	72.00	50.00
124	09-SEP-88	TM POST	3	6.50	4	3C	82.30	4A	-18.00	0.00	195	72.00	50.00
124	09-SEP-88	TM TR	3	3.40	2		34.10	2A	0.00	0.00	135	72.00	50.00
124	09-SEP-88	TM POST	4	4.60	3	3A	61.80	3C	-10.00	0.00	0	72.00	50.00
124	09-SEP-88	TM TR	4	4.80	3		61.20	3C	0.00	24.00	165	72.00	50.00
124	09-SEP-88	TM POST	5	3.00	2	2C	32.90	2A	9.00	0.00	145	72.00	50.00
124	09-SEP-88	TM TR	5	5.60	4		68.90	3D	0.00	24.00	195	72.00	50.00
124	09-SEP-88	TM POST	6	3.60	3	2B	32.90	2A	4.00	0.00	151	72.00	50.00
124	09-SEP-88	TM TR	6	4.80	3		77.60	4A	0.00	24.00	185	72.00	50.00
124	09-SEP-88	TM TR	7	3.40	2		47.50	3A	0.00	0.00	155	72.00	50.00
124	09-SEP-88	TM POST	7	4.50	3	2C	55.60	3B	-10.00	0.00	166	72.00	50.00
124	14-SEP-88	JOG 1.1	0	0.00	0	2C	75.00	4A	-29.00	24.00	197	71.00	48.00
124	14-SEP-88	JOG1.2	0	0.00	0	3B	75.80	4A	-17.80	21.00	197	71.00	48.00
124	14-SEP-88	HIWLK 1.2	0	0.00	0	2C	44.80	2C	0.00	18.00	171	71.00	48.00
124	14-SEP-88	HIWLK 1.3	0	0.00	0	2C	46.30	2C	0.00	18.00	171	71.00	48.00
124	14-SEP-88	JOG1.3	0	0.00	0	3D	84.80	4A	-14.80	27.00	202	71.00	48.00
124	14-SEP-88	REST 1.2	0	0.00	0	2A	26.80	1B	11.00	0.00	155	71.00	48.00
124	14-SEP-88	REST 1.1	0	0.00	0	1A	9.20	1A	0.00	0.00	93	71.00	48.00
124	14-SEP-88	REST 1.3	0	0.00	0	2A	19.20	1B	12.80	0.00	126	71.00	48.00
124	14-SEP-88	LOWLK 1.1	0	0.00	0	1B	21.90	1B	0.00	0.00	121	71.00	48.00
124	14-SEP-88	HIWLK1.1	0	0.00	0	2B	53.80	2B	0.00	24.00	178	71.00	48.00
124	14-SEP-88	LOWLK 1.2	0	0.00	0	1A	22.20	1B	-7.20	0.00	0	71.00	48.00
124	14-SEP-88	LOWLK 1.3	0	0.00	0	1B	26.70	1B	0.00	0.00	0	71.00	48.00
124	21-SEP-88	REST 2.3	0	0.00	0	1A	8.80	1A	0.00	0.00	113	68.00	40.00
124	21-SEP-88	LOWLK2.2	0	0.00	0	1B	25.70	1B	0.00	0.00	124	68.00	40.00
124	21-SEP-88	HIWLK 2.2	0	0.00	0	2C	45.20	2C	0.00	14.00	159	68.00	40.00
124	21-SEP-88	JOG 2.3	0	0.00	0	4A	100.00	4C	-15.00	40.00	195	68.00	40.00
124	21-SEP-88	HIWLK 2.3	0	0.00	0	2B	41.30	2B	0.00	12.00	163	68.00	40.00
124	21-SEP-88	HIWLK 2.1	0	0.00	0	2C	53.60	3B	-7.60	15.00	173	68.00	40.00
124	21-SEP-88	LOWLK 2.1	0	0.00	0	2A	27.70	1B	4.30	0.00	111	68.00	40.00
124	21-SEP-88	REST 2.2	0	0.00	0	1B	11.70	1A	4.30	0.00	128	68.00	40.00
124	21-SEP-88	LOWLK2.3	0	0.00	0	1B	21.30	1B	0.00	0.00	125	68.00	40.00
124	21-SEP-88	JOG 2.1	0	0.00	0	3B	97.00	4B	-39.00	27.00	198	68.00	40.00
124	21-SEP-88	JOG 2.2	0	0.00	0	3D	84.80	4A	-14.80	27.00	193	68.00	40.00
124	21-SEP-88	REST2.1	0	0.00	0	1B	15.90	1B	0.00	0.00	93	68.00	40.00
720	31-AUG-88	TM PRE	1	1.70	0		21.70	1B	0.00	0.00	75	72.00	50.00
720	31-AUG-88	TM PRE	2	2.50	0		26.30	1B	0.00	0.00	90	72.00	50.00
720	31-AUG-88	TM PRE	3	3.40	0		31.10	2A	0.00	0.00	93	72.00	50.00
720	31-AUG-88	TM PRE	4	4.20	0		37.60	2B	0.00	0.00	105	72.00	50.00
720	31-AUG-88	TM PRE	5	5.00	0		60.50	3C	0.00	0.00	142	72.00	50.00
720	31-AUG-88	TM PRE	6	5.50	0		66.70	3D	0.00	0.00	156	72.00	50.00
720	31-AUG-88	TM PRE	7	6.00	0		75.60	4A	0.00	0.00	162	72.00	50.00
720	01-SEP-88	TM TR	1	1.70	1		20.10	1B	0.00	0.00	84	72.00	50.00

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Table 3A-5. Ventilation Data for Training Subjects (Raw Data) (continued)

SUBJ	TEST DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
720	01-SEP-88	TM POST	1	2.00	1	1B	22.40	1B	0.00	0.00	96	72.00	50.00
720	01-SEP-88	TM TR	2	5.00	3		46.10	3A	0.00	0.00	128	72.00	50.00
720	01-SEP-88	TM POST	2	4.20	2	2A	30.50	2A	0.00	0.00	128	72.00	50.00
720	01-SEP-88	TM TR	3	4.20	2		37.40	2B	0.00	0.00	103	72.00	50.00
720	01-SEP-88	TM POST	3	6.20	4	3C	60.30	3C	0.00	0.00	163	72.00	50.00
720	01-SEP-88	TM TR	4	5.00	3		50.70	3A	0.00	0.00	145	72.00	50.00
720	01-SEP-88	TM POST	4	5.00	3	3A	56.90	3C	-7.00	0.00	161	72.00	50.00
720	01-SEP-88	TM POST	5	3.80	2	2C	34.20	2A	6.00	0.00	128	72.00	50.00
720	01-SEP-88	TM TR	5	6.00	4		69.90	4B	0.00	0.00	162	72.00	50.00
720	01-SEP-88	TM TR	6	5.00	3		61.00	3C	0.00	0.00	153	72.00	50.00
~~720~~	~~01-SEP-88~~	~~TM POST~~	~~6~~	~~5.40~~	~~5~~	~~4A~~	~~56.50~~	~~5B~~	~~15.00~~	~~0.00~~	~~166~~	~~72.00~~	~~50.00~~
720	01-SEP-88	TM TR	7	4.20	2		40.00	2B	0.00	0.00	128	72.00	50.00
720	01-SEP-88	TM POST	7	2.50	1	1B	26.80	1B	0.00	0.00	122	72.00	50.00
720	15-SEP-88	HIWLK 1.3	0	0.00	0	2B	37.90	2B	0.00	26.00	139	75.00	44.00
720	15-SEP-88	REST 1.2	0	0.00	0	1A	8.30	1A	0.00	0.00	105	75.00	44.00
720	15-SEP-88	LOWLK 1.3	0	0.00	0	1B	23.20	1B	0.00	0.00	117	75.00	44.00
720	15-SEP-88	LOWLK 1.1	0	0.00	0	1B	19.10	1B	0.00	0.00	93	75.00	44.00
720	15-SEP-88	JOG 1.3	0	0.00	0	4B	74.20	4A	10.00	33.00	177	75.00	44.00
720	15-SEP-88	REST 1.3	0	0.00	0	1B	17.50	1B	0.00	0.00	109	75.00	44.00
720	15-SEP-88	HIWLK 1.2	0	0.00	0	2C	40.50	2C	0.00	23.00	153	75.00	44.00
720	15-SEP-88	JOG 1.2	0	0.00	0	4B	86.20	4B	0.00	38.00	185	75.00	44.00
720	15-SEP-88	LOWLK 1.2	0	0.00	0	1B	22.00	1B	0.00	0.00	109	75.00	44.00
720	15-SEP-88	JOG1.1	0	0.00	0	3D	81.10	4A	-13.00	38.00	179	75.00	44.00
720	15-SEP-88	REST 1.1	0	0.00	0	1B	6.10	1A	9.00	0.00	66	75.00	44.00
720	15-SEP-88	HIWLK1.1	0	0.00	0	3A	48.30	3A	0.00	30.00	149	75.00	44.00
720	29-SEP-88	HIWLK 2.1	0	0.00	0	3A	39.20	2B	3.80	24.00	131	85.00	27.00
720	29-SEP-88	REST 2.2	0	0.00	0	1A	9.20	1A	0.00	0.00	89	85.00	27.00
720	29-SEP-88	LOWLK 2.2	0	0.00	0	1B	24.30	1B	0.00	0.00	97	85.00	27.00
720	29-SEP-88	REST 2.3	0	0.00	0	1A	11.40	1A	0.00	0.00	95	85.00	27.00
720	29-SEP-88	LOWLK 2.3	0	0.00	0	1B	24.70	1B	0.00	0.00	109	85.00	27.00
720	29-SEP-88	HIWLK 2.2	0	0.00	0	2C	45.90	3A	-1.90	21.00	139	75.00	44.00
720	29-SEP-88	HIWLK 2.3	0	0.00	0	2C	41.50	2C	0.00	24.00	143	85.00	27.00
720	29-SEP-88	LOWLK 2.1	0	0.00	0	1B	21.30	1B	0.00	0.00	95	85.00	27.00
720	29-SEP-88	JOG 2.3	0	0.00	0	4A	76.00	4A	0.00	36.00	171	85.00	27.00
720	29-SEP-88	JOG 2.2	0	0.00	0	3D	61.60	3C	1.40	27.00	163	85.00	27.00
720	29-SEP-88	REST 2.1	0	0.00	0	1A	8.50	1A	0.00	0.00	75	85.00	27.00
720	29-SEP-88	JOG 2.1	0	0.00	0	3C	59.10	3C	0.00	30.00	150	85.00	27.00
1000	31-AUG-88	TM PRE	1	1.70	0		15.30	1B	0.00	0.00	108	72.00	50.00
1000	31-AUG-88	TM PRE	2	2.50	0		19.90	2A	0.00	0.00	105	72.00	50.00
1000	31-AUG-88	TM PRE	3	3.40	0		24.40	2A	0.00	0.00	122	72.00	50.00
1000	31-AUG-88	TM PRE	4	4.20	0		37.70	3A	0.00	0.00	151	72.00	50.00
1000	31-AUG-88	TM PRE	5	5.00	0		58.00	3D	0.00	0.00	180	72.00	50.00
1000	31-AUG-88	TM PRE	6	5.50	0		66.00	4A	0.00	0.00	178	72.00	50.00
1000	31-AUG-88	TM PRE	7	6.00	0		68.70	4A	0.00	0.00	182	72.00	50.00
1000	09-SEP-88	TMPOST	1	1.80	1	1B	15.40	1B	0.00	0.00	120	72.00	50.00
1000	09-SEP-88	TM TR	1	1.80	1		15.70	1B	0.00	0.00	110	72.00	50.00
1000	09-SEP-88	TM TR	2	4.40	3		41.40	3B	0.00	36.00	158	72.00	50.00
1000	09-SEP-88	TMPOST	2	4.60	3	3B	45.60	3B	0.00	0.00	162	72.00	50.00
1000	09-SEP-88	TMPOST	3	5.70	4	4A	62.10	4A	0.00	0.00	186	72.00	50.00
1000	09-SEP-88	TM TR	3	3.00	2		23.20	2A	0.00	0.00	122	72.00	50.00
1000	09-SEP-88	TM TR	4	4.40	3		41.70	3B	0.00	24.00	158	72.00	50.00
1000	09-SEP-88	TMPOST	4	3.00	2	2B	26.50	2B	0.00	0.00	138	72.00	50.00
1000	09-SEP-88	TM TR	5	5.50	4		62.40	4A	0.00	36.00	186	72.00	50.00

Table 3A-5. Ventilation Data for Training Subjects (Raw Data) (continued)

SUBJ	TEST DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
1000	09-SEP-88	TMPOST	5	4.60	3	3B	42.70	3B	0.00	0.00	170	72.00	50.00
1000	09-SEP-88	TM TR	6	4.40	3		47.30	3C	0.00	36.00	160	72.00	50.00
1000	09-SEP-88	TMPOST	6	3.00	2	2A	20.20	2A	0.00	0.00	134	72.00	50.00
1000	09-SEP-88	TM TR	7	3.40	2		27.70	2B	0.00	0.00	132	72.00	50.00
1000	09-SEP-88	TMPOST	7	1.80	1	1B	18.40	1B	0.00	0.00	120	72.00	50.00
1000	14-SEP-88	JOG 1.2	0	0.00	0	3C	68.70	4A	16.70	39.00	189	0.00	2.00
1000	14-SEP-88	JOG 1.3	0	0.00	0	4A	66.20	4A	0.00	42.00	185	71.00	48.00
1000	14-SEP-88	LOWLK 1.2	0	0.00	0	1B	12.80	1B	0.00	0.00	119	71.00	48.00
1000	14-SEP-88	REST 1.2	0	0.00	0	1A	6.20	1A	0.00	0.00	117	71.00	48.00
1000	14-SEP-88	LOWLK 1.1	0	0.00	0	1B	11.30	1B	0.00	0.00	0	71.00	48.00
1000	14-SEP-88	REST 1.3	0	0.00	0	1B	8.30	1A	1.70	0.00	107	71.00	48.00
1000	14-SEP-88	HIWLK 1.1	0	0.00	0	2C	30.20	2C	0.00	20.00	167	71.00	48.00
1000	14-SEP-88	JOG 1.1	0	0.00	0	3B	44.80	3B	0.00	27.00	171	71.00	48.00
1000	14-SEP-88	HIWLK 1.2	0	0.00	0	2C	27.80	2B	2.20	14.00	159	71.00	48.00
1000	14-SEP-88	REST 1.1	0	0.00	0	1A	4.30	1A	0.00	0.00	95	71.00	48.00
1000	14-SEP-88	LOWLK 1.3	0	0.00	0	2B	12.10	1B	12.90	0.00	119	71.00	48.00
1000	14-SEP-88	HIWLK 1.3	0	0.00	0	2C	25.80	2B	4.20	15.00	156	71.00	48.00
1000	21-SEP-88	JOG 2.1	0	0.00	0	3C	32.50	2C	14.50	27.00	137	68.00	40.00
1000	21-SEP-88	REST 2.2	0	0.00	0	1A	6.30	1A	0.00	0.00	85	68.00	40.00
1000	21-SEP-88	LOWLK 2.2	0	0.00	0	1B	11.40	1B	0.00	0.00	96	68.00	40.00
1000	21-SEP-88	JOG 2.3	0	0.00	0	3D	52.40	3C	0.60	21.00	179	68.00	40.00
1000	21-SEP-88	LOWLK 2.3	0	0.00	0	1B	11.80	1B	0.00	0.00	119	68.00	40.00
1000	21-SEP-88	HIWLK 2.3	0	0.00	0	2C	28.60	2B	1.40	14.00	148	68.00	40.00
1000	21-SEP-88	HIWLK 2.1	0	0.00	0	2B	27.30	2B	0.00	10.00	127	68.00	40.00
1000	21-SEP-88	JOG 2.2	0	0.00	0	4A	84.30	4B	11.30	42.00	186	68.00	40.00
1000	21-SEP-88	REST 2.1	0	0.00	0	1A	3.60	1A	0.00	0.00	82	68.00	40.00
1000	21-SEP-88	HIWLK 2.2	0	0.00	0	2C	27.70	2B	2.30	15.00	147	68.00	40.00
1000	21-SEP-88	LOWLK 2.1	0	0.00	0	1B	11.90	1B	0.00	0.00	93	68.00	40.00
1000	21-SEP-88	REST 2.3	0	0.00	0	1A	5.60	1A	0.00	0.00	115	68.00	40.00
1200	06-SEP-88	TMPRE	1	1.70	0		14.10	1B	0.00	0.00	71	72.00	50.00
1200	06-SEP-88	TMPRE	2	2.50	0		16.60	1B	0.00	0.00	75	72.00	50.00
1200	06-SEP-88	TMPRE	3	3.40	0		22.40	2A	0.00	0.00	102	72.00	50.00
1200	06-SEP-88	TMPRE	4	4.20	0		33.10	2C	0.00	0.00	128	72.00	50.00
1200	06-SEP-88	TMPRE	5	5.00	0		52.60	3D	0.00	0.00	162	72.00	50.00
1200	06-SEP-88	TMPRE	6	5.50	0		61.80	4A	0.00	0.00	178	72.00	50.00
1200	06-SEP-88	TMPRE	7	6.00	0		73.10	4A	0.00	0.00	198	72.00	50.00
1200	08-SEP-88	TM TR	1	2.00	1		16.70	1B	0.00	0.00	83	72.00	50.00
1200	08-SEP-88	TMPOST	1	2.00	1	1B	16.30	1B	0.00	0.00	107	72.00	50.00
1200	08-SEP-88	TM TR	2	5.00	3		54.80	3D	0.00	48.00	153	72.00	50.00
1200	08-SEP-88	TMPOST	2	3.40	2	2B	23.90	2A	-1.00	0.00	124	72.00	50.00
1200	08-SEP-88	TMPOST	3	5.80	4	3C	60.70	4A	-9.00	0.00	178	72.00	50.00
1200	08-SEP-88	TM TR	3	3.60	2		30.00	2C	0.00	0.00	118	72.00	50.00
1200	08-SEP-88	TMPOST	4	4.40	3	3B	43.40	3B	0.00	0.00	163	72.00	50.00
1200	08-SEP-88	TM TR	4	4.80	3		50.60	3C	0.00	0.00	155	72.00	50.00
1200	08-SEP-88	TM TR	5	5.80	4		63.30	4A	0.00	48.00	174	72.00	50.00
1200	08-SEP-88	TMPOST	5	3.40	2	2B	25.90	2B	0.00	0.00	134	72.00	50.00
1200	08-SEP-88	TM TR	6	4.80	3		58.70	3D	0.00	42.00	170	72.00	50.00
1200	08-SEP-88	TMPOST	6	4.60	3	3C	43.00	3B	-4.00	0.00	161	72.00	50.00
1200	08-SEP-88	TMPOST	7	2.00	1	2A	17.50	1B	2.00	0.00	125	72.00	50.00
1200	08-SEP-88	TM TR	7	3.40	2		29.00	2B	0.00	0.00	131	72.00	50.00
1200	15-SEP-88	HIWLK 1.3	0	0.00	0	2B	35.50	3A	-5.50	30.00	137	75.00	44.00
1200	15-SEP-88	LOWLK 1.3	0	0.00	0	1B	16.50	1B	0.00	0.00	109	75.00	44.00
1200	15-SEP-88	HIWLK 1.1	0	0.00	0	2B	30.10	2C	-1.00	30.00	127	75.00	44.00

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Table 3A-5. Ventilation Data for Training Subjects (Raw Data) (continued)

SUBJ	TEST DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
1200	15-SEP-88	LOWLK 1.2	0	0.00	0	2A	30.70	2C	-7.00	0.00	106	75.00	44.00
1200	15-SEP-88	JOG 1.3	0	0.00	0	4A	80.20	4B	-7.00	42.00	187	75.00	44.00
1200	15-SEP-88	HIWLK 1.2	0	0.00	0	2C	35.30	3A	-1.00	36.00	141	75.00	44.00
1200	15-SEP-88	LOWLK 1.1	0	0.00	0	2A	20.60	2A	0.00	0.00	67	75.00	44.00
1200	15-SEP-88	JOG 1.2	0	0.00	0	4A	89.10	4C	-30.00	45.00	187	75.00	44.00
1200	15-SEP-88	REST 1.1	0	0.00	0	1B	7.10	1A	3.00	0.00	73	75.00	44.00
1200	15-SEP-88	JOG 1.1	0	0.00	0	3D	75.50	4B	-18.00	42.00	171	75.00	44.00
1200	15-SEP-88	LOWLK 1.1	0	0.00	0	1B	9.40	1A	1.00	0.00	92	75.00	44.00
1200	15-SEP-88	REST 1.2	0	0.00	0	1B	7.90	1A	2.00	0.00	87	75.00	44.00
1200	22-SEP-88	HIWLK 2.1	0	0.00	0	2C	35.40	3A	-1.00	32.00	123	74.00	31.00
1200	22-SEP-88	REST 2.2	0	0.00	0	1A	7.00	1A	0.00	0.00	81	74.00	31.00
1200	22-SEP-88	JOG 2.3	0	0.00	0	4C	81.40	4B	8.00	44.00	181	74.00	31.00
1200	22-SEP-88	LOWLK 2.2	0	0.00	0	1B	16.80	1B	0.00	0.00	97	75.00	44.00
1200	22-SEP-88	HIWLK 2.3	0	0.00	0	3B	45.80	3B	0.00	40.00	145	74.00	31.00
1200	22-SEP-88	LOWLK 2.3	0	0.00	0	1B	12.00	1B	0.00	0.00	95	74.00	31.00
1200	22-SEP-88	HIWLK 2.2	0	0.00	0	3A	38.90	3A	0.00	36.00	133	74.00	31.00
1200	22-SEP-88	LOWLK 2.1	0	0.00	0	1B	12.60	1B	0.00	0.00	73	74.00	31.00
1200	22-SEP-88	JOG 2.2	0	0.00	0	4C	91.20	4C	0.00	32.00	179	74.00	31.00
1200	22-SEP-88	JOG 2.1	0	0.00	0	4A	78.80	4B	-6.00	42.00	174	74.00	31.00
1200	22-SEP-88	REST 2.1	0	0.00	0	1A	7.20	1A	0.00	0.00	56	74.00	31.00
1200	22-SEP-88	REST 2.3	0	0.00	0	1A	7.20	1A	0.00	0.00	83	74.00	31.00
1239	26-JUL-88	TM PRE PT	1	1.70	0		29.90	2B	0.00	0.00	146	72.00	50.00
1239	26-JUL-88	TM PRE PT	2	2.50	0		38.50	3A	0.00	0.00	152	72.00	50.00
1239	26-JUL-88	TM PRE PT	3	3.40	0		63.10	4A	0.00	0.00	178	72.00	50.00
1239	26-JUL-88	TM PRE PT	4	4.20	0		110.50	4C	0.00	0.00	193	72.00	50.00
1239	26-JUL-88	TM PRE PT	5	5.00	0		135.10	4C	0.00	0.00	198	72.00	50.00
1239	07-SEP-88	TM TR	1	2.00	1		18.60	1B	0.00	0.00	100	72.00	50.00
1239	07-SEP-88	TM POST	1	2.00	1	1B	17.60	1B	0.00	0.00	125	72.00	50.00
1239	07-SEP-88	TM TR	2	5.40	3		52.10	3C	0.00	0.00	168	72.00	50.00
1239	07-SEP-88	TM POST	2	4.00	2	2C	27.80	2B	3.00	0.00	149	72.00	50.00
1239	07-SEP-88	TM POST	3	6.50	4	3C	56.40	3D	-1.00	56.00	180	72.00	50.00
~~1239~~	~~07-SEP-88~~	~~TM TR~~	~~3~~	~~4.20~~	~~2~~		~~34.00~~	~~2B~~	~~0.00~~	~~0.00~~	~~142~~	~~72.00~~	~~50.00~~
1239	07-SEP-88	TM TR	4	5.20	3		49.10	3C	0.00	0.00	158	72.00	50.00
1239	07-SEP-88	TM POST	4	5.20	3	3B	48.80	3B	0.00	24.00	165	72.00	50.00
1239	07-SEP-88	TM POST	5	4.00	2	2C	32.90	2C	0.00	0.00	149	72.00	50.00
1239	07-SEP-88	TM TR	5	6.50	4		61.10	4A	0.00	0.00	175	72.00	50.00
1239	07-SEP-88	TM POST	6	5.40	3	3C	49.00	3B	-1.00	30.00	166	72.00	50.00
1239	07-SEP-88	TM TR	6	5.20	3		54.70	3C	0.00	0.00	165	72.00	50.00
1239	07-SEP-88	TM POST	7	2.00	1	2A	19.20	1B	4.00	0.00	139	72.00	50.00
1239	07-SEP-88	TM TR	7	4.00	2		30.40	2B	0.00	0.00	142	72.00	50.00
1239	12-SEP-88	REST 1.3	0	0.00	0	2A	10.00	1A	13.00	0.00	103	72.00	39.00
1239	12-SEP-88	JOG 1.3	0	0.00	0	3C	-999.00	-9	0.00	78.00	175	72.00	39.00
1239	12-SEP-88	HIWLK 1.2	0	0.00	0	2C	54.80	3C	-23.00	48.00	153	72.00	39.00
1239	12-SEP-88	LOWLK 1.2	0	0.00	0	1B	27.40	2A	-5.00	0.00	117	72.00	39.00
1239	12-SEP-88	REST1.1	0	0.00	0	1A	12.20	1B	-2.00	0.00	75	72.00	39.00
1239	12-SEP-88	HIWLK 1.3	0	0.00	0	3A	-9999.00	-9	0.00	36.00	149	72.00	39.00
1239	12-SEP-88	REST 1.2	0	0.00	0	1B	11.90	1B	0.00	0.00	99	72.00	39.00
1239	12-SEP-88	LOWLK 1.3	0	0.00	0	2A	23.70	2A	0.00	0.00	123	72.00	39.00
1239	12-SEP-88	JOG 1.2	0	0.00	0	3B	67.00	4A	-18.00	63.00	159	72.00	39.00
1239	12-SEP-88	JOG 1.1	0	0.00	0	3C	65.50	4A	-10.50	51.00	157	72.00	39.00
1239	12-SEP-88	LOWLK 1.1	0	0.00	0	1B	22.60	2A	-1.00	0.00	97	72.00	39.00
1239	12-SEP-88	HIWLK 1.1	0	0.00	0	2B	51.60	3C	-20.00	42.00	149	72.00	39.00
1239	19-SEP-88	JOG 2.1	0	0.00	0	3C	78.90	4B	-24.00	57.00	169	68.00	57.00

Table 3A-5. Ventilation Data for Training Subjects (Raw Data) (continued)

SUBJ.	TEST DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
1239	19-SEP-88	JOG 2.2	0	0.00	0	3B	74.30	4A	-25.00	72.00	169	68.00	57.00
1239	19-SEP-88	JOG 2.3	0	0.00	0	3C	73.20	4A	-18.00	81.00	171	68.00	57.00
1239	19-SEP-88	REST 2.2	0	0.00	0	1B	11.60	1B	0.00	0.00	87	68.00	57.00
1239	19-SEP-88	HIWLK 2.3	0	0.00	0	2C	66.30	4A	-29.00	54.00	137	68.00	57.00
1239	19-SEP-88	LOWLK 2.3	0	0.00	0	2B	23.10	2A	5.00	0.00	107	68.00	57.00
1239	19-SEP-88	REST 2.1	0	0.00	0	1A	11.00	1B	-1.00	0.00	71	68.00	57.00
1239	19-SEP-88	LOWLK 2.2	0	0.00	0	2A	23.50	2A	0.00	0.00	100	68.00	57.00
1239	19-SEP-88	HIWLK2.2	0	0.00	0	2C	60.00	3D	-23.00	60.00	131	68.00	57.00
1239	19-SEP-88	REST 2.3	0	0.00	0	2A	11.40	1B	12.00	0.00	87	68.00	57.00
1239	19-SEP-88	HIWLK 2.1	0	0.00	0	2C	58.00	3D	-21.00	54.00	135	68.00	57.00
1239	19-SEP-88	LOWLK 2.1	0	0.00	0	1B	18.90	1B	0.00	0.00	85	68.00	57.00
1240	01-AUG-88	TM PRE PT	1	1.70	0		14.00	1B	0.00	0.00	105	72.00	50.00
1240	01-AUG-88	TM PRE PT	2	2.50	0		25.10	2B	0.00	0.00	120	72.00	50.00
1240	01-AUG-88	TM PRE PT	3	3.40	0		45.20	3C	0.00	0.00	170	72.00	50.00
1240	01-AUG-88	TM PRE PT	4	4.20	0		52.10	3D	0.00	0.00	180	72.00	50.00
1240	09-SEP-88	TM POST	1	2.00	1	1B	14.90	1B	0.00	0.00	116	72.00	50.00
~~1240~~	~~09-SEP-88~~	~~TM TR~~	~~1~~	~~1.80~~	~~1~~		~~13.80~~	~~1B~~	~~0.00~~	~~0.00~~	~~81~~	~~72.00~~	~~50.00~~
1240	09-SEP-88	TM TR	2	4.40	3		39.40	3B	0.00	42.00	165	72.00	50.00
1240	09-SEP-88	TM POST	2	3.20	2	2B	15.70	1B	6.00	0.00	131	72.00	50.00
1240	09-SEP-88	TM TR	3	3.40	2		27.20	2C	0.00	0.00	118	72.00	50.00
1240	09-SEP-88	TM POST	3	6.00	4	3C	46.00	3C	0.00	0.00	194	72.00	50.00
1240	09-SEP-88	TM POST	4	4.40	3	2C	48.10	3C	17.00	0.00	185	72.00	50.00
1240	09-SEP-88	TM TR	4	4.80	3		43.50	3C	0.00	42.00	178	72.00	50.00
1240	09-SEP-88	TM POST	5	3.40	2	2B	28.90	2C	-3.00	0.00	146	72.00	50.00
1240	09-SEP-88	TM TR	5	6.00	4		56.40	4A	0.00	42.00	199	72.00	50.00
1240	09-SEP-88	TM TR	6	4.60	3		47.70	3C	0.00	42.00	190	72.00	50.00
1240	09-SEP-88	TM POST	6	4.60	3	3C	51.90	3D	-3.00	0.00	190	72.00	50.00
1240	09-SEP-88	TM TR	7	3.20	2		24.20	2B	0.00	0.00	139	72.00	50.00
1240	09-SEP-88	TM POST	7	2.00	1	2B	20.30	2A	2.00	0.00	142	72.00	50.00
1240	13-SEP-88	HIWLK 1.2	0	0.00	0	2B	40.80	3B	-14.80	27.00	193	71.00	46.00
1240	13-SEP-88	REST 1.2	0	0.00	0	2A	10.40	1B	6.60	0.00	113	71.00	46.00
1240	13-SEP-88	LOWLK 1.3	0	0.00	0	2A	20.70	2A	0.00	0.00	141	71.00	46.00
1240	13-SEP-88	REST 1.3	0	0.00	0	2A	7.50	1B	9.00	0.00	129	71.00	46.00
1240	13-SEP-88	LOWLK 1.2	0	0.00	0	1B	14.50	1B	0.00	0.00	131	71.00	46.00
1240	13-SEP-88	JOG 1.1	0	0.00	0	3A	41.60	3B	-4.60	28.00	184	71.00	46.00
1240	13-SEP-88	LOWLK 1.1	0	0.00	0	1B	10.60	1B	0.00	0.00	90	71.00	46.00
1240	13-SEP-88	JOG 1.2	0	0.00	0	2C	71.00	4B	-40.00	39.00	210	71.00	46.00
1240	13-SEP-88	HIWLK 1.3	0	0.00	0	2C	26.80	2C	0.00	24.00	171	71.00	46.00
1240	13-SEP-88	JOG 1.3	0	0.00	0	3D	67.70	4A	-13.00	39.00	203	71.00	46.00
1240	13-SEP-88	JOG 1.1	0	0.00	0	4A	67.80	4A	0.00	42.00	207	71.00	46.00
1240	13-SEP-88	REST 1.1	0	0.00	0	1A	5.70	1A	0.00	0.00	71	71.00	46.00
1241	07-SEP-88	TM PRE	1	1.70	0		17.70	1B	0.00	0.00	65	72.00	50.00
1241	07-SEP-88	TM PRE	2	2.50	0		22.70	2A	0.00	0.00	78	72.00	50.00
1241	07-SEP-88	TM PRE	3	3.40	0		27.30	2A	0.00	0.00	100	72.00	50.00
1241	07-SEP-88	TM PRE	4	4.20	0		35.80	2C	0.00	0.00	112	72.00	50.00
1241	07-SEP-88	TM PRE	5	5.00	0		43.40	3B	0.00	0.00	116	72.00	50.00
1241	07-SEP-88	TM PRE	6	5.50	0		42.40	3B	0.00	0.00	128	72.00	50.00
1241	07-SEP-88	TM PRE	7	6.00	0		49.10	3B	0.00	0.00	142	72.00	50.00
1241	07-SEP-88	TM PRE	8	7.20	0		60.60	3D	0.00	0.00	162	72.00	50.00
1241	13-SEP-88	REST 1.3	0	0.00	0	1B	10.70	1B	0.00	0.00	97	71.00	46.00
1241	13-SEP-88	LOWLK 1.1	0	0.00	0	1B	19.40	1B	0.00	0.00	81	71.00	46.00
1241	13-SEP-88	HIWLK 1.1	0	0.00	0	3B	59.20	3D	10.20	27.00	148	71.00	46.00
1241	13-SEP-88	LOWLK 1.2	0	0.00	0	1B	19.40	1B	0.00	0.00	109	71.00	46.00

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Table 3A-5. Ventilation Data for Training Subjects (Raw Data) (continued)

SUBJ	TEST-DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
1241	13-SEP-88	REST 1.1	0	0.00	0	1A	11.80	1B	1.80	0.00	67	71.00	46.00
1241	13-SEP-88	LOWLK 1.3	0	0.00	0	1B	21.20	1B	0.00	0.00	108	71.00	46.00
1241	13-SEP-88	JOG 2.2	0	0.00	0	3D	68.50	4A	-7.50	39.00	152	71.00	46.00
1241	13-SEP-88	HIWLK 2.2	0	0.00	0	3B	58.10	3D	-9.10	36.00	152	71.00	46.00
1241	13-SEP-88	JOG 1.3	0	0.00	0	3D	82.50	4B	-22.00	39.00	180	71.00	46.00
1241	13-SEP-88	REST 1.2	0	0.00	0	1B	20.10	1B	0.00	0.00	109	71.00	46.00
1241	13-SEP-88	JOG 1.1	0	0.00	0	3A	61.60	4A	-18.60	30.00	173	71.00	46.00
1241	13-SEP-88	HIWLK 1.3	0	0.00	0	3B	46.20	3B	0.00	30.00	159	71.00	46.00
1241	13-SEP-88	TMTR	1	2.00	1		20.20	1B	0.00	0.00	76	72.00	50.00
1241	13-SEP-88	TM POST	1	2.00	1	1B	20.90	1B	0.00	0.00	90	72.00	50.00
1241	13-SEP-88	TMTR	2	5.00	3		48.30	3B	0.00	24.00	130	72.00	50.00
1241	13-SEP-88	TM POST	2	3.60	2	2B	30.10	2B	0.00	0.00	100	72.00	50.00
1241	13-SEP-88	TM POST	3	7.00	4	3D	65.40	4A	-4.00	0.00	160	72.00	50.00
1241	13-SEP-88	TMTR	3	3.60	2		34.00	2C	0.00	0.00	106	72.00	50.00
1241	13-SEP-88	TMTR	4	5.50	3		47.80	3B	0.00	30.00	130	72.00	50.00
1241	13-SEP-88	TM POST	4	5.00	3	3B	45.10	3B	0.00	0.00	140	72.00	50.00
1241	13-SEP-88	TMTR	5	7.00	4		60.10	3D	0.00	36.00	160	72.00	50.00
1241	13-SEP-88	TM POST	5	3.40	2	2C	36.30	2C	0.00	0.00	102	72.00	50.00
1241	13-SEP-88	TMTR	6	5.00	3		51.60	3C	0.00	30.00	140	72.00	50.00
1241	13-SEP-88	TM POST	6	5.50	3	3C	47.80	3B	2.00	0.00	144	72.00	50.00
1241	13-SEP-88	TMTR	7	3.40	2		30.60	2B	0.00	0.00	112	72.00	50.00
1241	13-SEP-88	TM POST	7	2.20	1	2A	22.80	2A	0.00	0.00	102	72.00	50.00
1241	22-SEP-88	REST 2.1	0	0.00	0	1A	9.20	1A	0.00	0.00	58	74.00	31.00
1241	22-SEP-88	LOWLK 2.1	0	0.00	0	1B	14.50	1B	0.00	0.00	73	74.00	31.00
1241	22-SEP-88	HIWLK 2.1	0	0.00	0	3B	37.40	2C	7.00	27.00	137	74.00	31.00
1241	22-SEP-88	HIWLK 2.3	0	0.00	0	3A	38.80	3A	0.00	27.00	147	74.00	31.00
1241	22-SEP-88	HIWLK2.2	0	0.00	0	3B	30.90	2B	13.00	21.00	131	74.00	31.00
1241	22-SEP-88	JOG 2.2	0	0.00	0	3D	63.40	4A	-2.00	39.00	187	74.00	31.00
1241	22-SEP-88	LOWLK 2.3	0	0.00	0	1B	17.90	1B	0.00	0.00	97	74.00	31.00
1241	22-SEP-88	REST 2.3	0	0.00	0	1B	10.50	1A	0.50	0.00	97	74.00	31.00
1241	22-SEP-88	JOG 2.1	0	0.00	0	3D	72.60	4A	-12.00	33.00	184	74.00	31.00
1241	22-SEP-88	REST 2.2	0	0.00	0	1B	8.00	1A	3.00	0.00	85	74.00	31.00
1241	22-SEP-88	LOWLK 2.2	0	0.00	0	1B	18.80	1B	0.00	0.00	95	74.00	31.00
1241	22-SEP-88	JOG 2.3	0	0.00	0	3D	72.00	4A	-11.00	40.00	187	74.00	31.00
1242	20-JUL-88	TM PRE PT	0	0.00	0		13.70	1A	0.00	0.00	64	72.00	50.00
1242	20-JUL-88	TM PRE PT	1	1.70	0		30.50	2A	0.00	0.00	94	72.00	50.00
1242	20-JUL-88	TM PRE PT	2	2.50	0		47.20	3A	0.00	0.00	114	72.00	50.00
1242	20-JUL-88	TM PRE PT	3	3.40	0		75.40	4A	0.00	0.00	144	72.00	50.00
1242	20-JUL-88	TM PRE PT	4	4.20	0		139.50	4C	0.00	0.00	172	72.00	50.00
1242	20-JUL-88	TM PRE PT	5	5.00	0		143.20	4C	0.00	0.00	185	72.00	50.00
1242	09-SEP-88	TM POST	1	2.00	1	1B	19.60	1B	0.00	0.00	81	72.00	50.00
1242	09-SEP-88	TM TR	1	2.00	1		19.80	1B	0.00	0.00	63	72.00	50.00
1242	09-SEP-88	TM TR	2	5.00	3		55.10	3B	0.00	48.00	116	72.00	50.00
1242	09-SEP-88	TM POST	2	4.20	2	2C	34.40	2A	6.00	0.00	101	72.00	50.00
1242	09-SEP-88	TM TR	3	4.20	2		37.80	2B	0.00	0.00	96	72.00	50.00
1242	09-SEP-88	TM POST	3	6.90	4	4A	72.80	4A	0.00	0.00	145	72.00	50.00
1242	09-SEP-88	TM POST	4	5.00	3	3B	54.50	3B	0.00	0.00	122	72.00	50.00
1242	09-SEP-88	TM TR	4	5.00	3		55.00	3B	0.00	30.00	122	72.00	50.00
1242	09-SEP-88	TM POST	5	4.40	2	2B	39.80	2C	-1.00	0.00	103	72.00	50.00
1242	09-SEP-88	TM TR	5	6.90	4		82.80	4A	0.00	36.00	143	72.00	50.00
1242	09-SEP-88	TM POST	6	5.40	3	3B	57.80	3C	-2.00	0.00	123	72.00	50.00
1242	09-SEP-88	TM TR	6	5.00	3		54.70	3B	0.00	27.00	120	72.00	50.00
1242	09-SEP-88	TM TR	7	4.20	2		[illegible]	2B	0.00	0.00	100	72.00	50.00

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Table 3A-5. Ventilation Data for Training Subjects (Raw Data) (continued)

SUBJ	TEST DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
1242	09-SEP-88	TM POST	7	2.40	1	1B	23.20	1B	0.00	0.00	82	72.00	50.00
1242	16-SEP-88	HIWLK 1.1	0	0.00	0	2B	49.50	3A	-10.50	39.00	133	75.00	43.00
1242	16-SEP-88	REST1.1	0	0.00	0	1A	11.50	1A	0.00	0.00	54	75.00	43.00
1242	16-SEP-88	REST 1.2	0	0.00	0	1B	11.30	1A	3.70	0.00	83	75.00	43.00
1242	16-SEP-88	LOWLK 1.3	0	0.00	0	2A	25.60	1B	4.00	0.00	109	75.00	43.00
1242	16-SEP-88	LOWLK 1.2	0	0.00	0	1B	24.80	1B	0.00	0.00	98	75.00	43.00
1242	16-SEP-88	HIWLK 1.2	0	0.00	0	2B	52.10	3B	-13.10	36.00	142	75.00	43.00
1242	16-SEP-88	LOWLK 1.1	0	0.00	0	1B	19.30	1B	0.00	0.00	73	75.00	43.00
1242	16-SEP-88	JOG 1.1	0	0.00	0	2D	100.00	4C	-56.00	60.00	195	75.00	43.00
1242	16-SEP-88	HIWLK 1.3	0	0.00	0	2B	48.80	3A	-10.00	36.00	143	75.00	43.00
1242	16-SEP-88	REST 1.3	0	0.00	0	1B	10.40	1A	5.00	0.00	95	75.00	43.00
1242	16-SEP-88	JOG 1.2	0	0.00	0	3D	100.00	4C	-32.00	60.00	193	75.00	43.00
1242	16-SEP-88	JOG 1.3	0	0.00	0	3C	100.00	4C	38.00	60.00	199	75.00	43.00
1242	23-SEP-88	JOG 2.3	0	0.00	0	3D	120.00	4C	-52.00	48.00	178	75.00	45.00
1242	23-SEP-88	HIWLK 2.1	0	0.00	0	2B	53.00	3B	-14.00	36.00	119	75.00	45.00
1242	23-SEP-88	HIWLK 2.2	0	0.00	0	2B	46.50	3A	-7.50	36.00	123	75.00	45.00
1242	23-SEP-88	LOWLK 2.3	0	0.00	0	1B	28.00	1B	0.00	0.00	89	75.00	45.00
1242	23-SEP-88	LOWLK 2.1	0	0.00	0	1A	30.30	2A	-16.00	0.00	73	75.00	45.00
1242	23-SEP-88	REST 2.2	0	0.00	0	1B	18.60	1B	0.00	0.00	88	75.00	45.00
1242	23-SEP-88	REST2.3	0	0.00	0	1B	14.90	1B	0.00	0.00	74	75.00	45.00
1242	23-SEP-88	JOG 2.2	0	0.00	0	3D	100.00	4C	-32.00	48.00	175	75.00	43.00
1242	23-SEP-88	REST 2.1	0	0.00	0	1A	16.30	1B	-2.30	0.00	63	75.00	45.00
1242	23-SEP-88	HIWLK 2.3	0	0.00	0	2B	45.60	3A	-7.00	45.00	119	75.00	45.00
1242	23-SEP-88	LOWLK 2.2	0	0.00	0	1B	32.80	2A	-3.80	0.00	95	75.00	45.00
1242	23-SEP-88	JOG 2.1	0	0.00	0	3D	120.00	4C	-52.00	60.00	173	75.00	45.00
1243	14-JUL-88	TM PRE PT	1	1.70	0		26.30	1B	0.00	0.00	103	72.00	50.00
1243	14-JUL-88	TM PRE PT	2	2.50	0		39.80	2C	0.00	0.00	138	72.00	50.00
1243	14-JUL-88	TM PRE PT	3	3.40	0		63.50	3D	0.00	0.00	174	72.00	50.00
1243	14-JUL-88	TM PRE PT	4	4.20	0		113.40	4C	0.00	0.00	197	72.00	50.00
1243	14-JUL-88	TM PRE PT	5	5.00	0		182.30	4C	0.00	0.00	211	72.00	50.00
1243	08-AUG-88	TM TR	1	1.70	1		27.00	1B	0.00	0.00	92	72.00	50.00
1243	08-AUG-88	TM POST	1	2.00	1	2B	22.70	1B	11.00	0.00	130	72.00	50.00
1243	08-AUG-88	TM POST	2	4.20	2	2C	35.90	2B	3.00	0.00	155	72.00	50.00
1243	08-AUG-88	TM TR	2	5.00	3		50.90	3B	0.00	0.00	148	72.00	50.00
1243	08-AUG-88	TM POST	3	6.50	4	3C	70.00	4A	-9.00	0.00	192	72.00	50.00
1243	08-AUG-88	TM TR	3	4.20	2		37.20	2B	0.00	0.00	136	72.00	50.00
1243	08-AUG-88	TM TR	4	5.40	3		52.10	3B	0.00	18.00	182	72.00	50.00
1243	08-AUG-88	TM POST	4	5.00	3	3B	60.70	3C	6.00	0.00	189	72.00	50.00
1243	08-AUG-88	TM TR	5	6.00	4		64.90	3D	0.00	36.00	185	72.00	50.00
1243	08-AUG-88	TM POST	5	4.00	2	2C	39.70	2C	0.00	0.00	158	72.00	50.00
1243	08-AUG-88	TM TR	6	5.40	3		64.40	3D	0.00	36.00	185	72.00	50.00
1243	08-AUG-88	TM POST	6	5.40	3	3C	66.00	3D	-5.00	0.00	182	72.00	50.00
1243	08-AUG-88	TM POST	7	2.00	1	1B	28.40	1B	0.00	0.00	150	72.00	50.00
1243	08-AUG-88	TM TR	7	4.00	2		36.00	2B	0.00	0.00	163	72.00	50.00
1243	16-SEP-88	LOWLK 1.3	0	0.00	0	2A	28.50	1B	0.50	0.00	129	75.00	43.00
1243	16-SEP-88	JOG 1.1	0	0.00	0	2C	100.00	4C	-57.00	51.00	202	75.00	43.00
1243	16-SEP-88	JOG 1.2	0	0.00	0	3C	98.50	4C	-37.50	39.00	207	75.00	43.00
1243	16-SEP-88	JOG 1.3	0	0.00	0	2C	100.00	4C	57.00	39.00	201	75.00	43.00
1243	16-SEP-88	LOWLK 1.1	0	0.00	0	1A	17.40	1B	4.40	0.00	87	75.00	43.00
1243	16-SEP-88	JOG 1.2	0	0.00	0	2B	50.30	3B	-11.70	24.00	163	75.00	43.00
1243	16-SEP-88	REST 1.2	0	0.00	0	2A	9.80	1A	19.20	0.00	96	75.00	43.00
[illegible]	[illegible]	[illegible]	0	0.00	0	1B	27.90	1B	0.00	0.00	155	75.00	43.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12.90	1A	16.00	0.00	115	75.00	43.00

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Table 3A-5. Ventilation Data for Training Subjects (Raw Data) (continued)

SUBJ	TEST DATE	ACTIVITY	SPED	SPEED	CHOSEN VE	PERVCD VPN	ACTUAL VE	ACTUAL VPN	DIFFERENCE	RESP R	HR	TEMP	RH
1243	16-SEP-88	HIWLK 1.1	0	0.00	0	3A	51.10	3B	2.10	27.00	166	75.00	43.0
1243	16-SEP-88	REST 1.1	0	0.00	0	1A	7.20	1A	0.00	0.00	69	75.00	43.0
1243	16-SEP-88	HIWLK 1.3	0	0.00	0	2B	41.90	2C	-4.00	24.00	157	75.00	43.0
1243	23-SEP-88	LOWLK 2.2	0	0.00	0	2A	27.30	1B	1.70	0.00	141	75.00	43.0
1243	23-SEP-88	LOWLK 2.3	0	0.00	0	2B	33.40	2B	0.00	0.00	145	75.00	42.0
1243	23-SEP-88	JOG 2.3	0	0.00	0	3C	88.80	4B	-28.00	39.00	201	75.00	42.0
1243	23-SEP-88	HIWLK 2.2	0	0.00	0	2B	48.40	3A	10.00	24.00	175	75.00	42.0
1243	23-SEP-88	HIWLK 2.1	0	0.00	0	2B	43.70	3A	-5.70	15.00	171	75.00	42.0
1243	23-SEP-88	LOWLK 2.1	0	0.00	0	1A	21.00	1B	-8.00	0.00	105	75.00	42.0
1243	23-SEP-88	HIWLK 2.3	0	0.00	0	2C	49.80	3B	7.00	24.00	169	75.00	42.0
1243	23-SEP-88	JOG 2.2	0	0.00	0	3A	100.00	4C	-51.00	39.00	203	75.00	42.0
1243	23-SEP-88	REST 2.1	0	0.00	0	1A	8.50	1A	0.00	0.00	75	75.00	42.0
1243	23-SEP-88	JOG 2.1	0	0.00	0	2B	100.00	4C	62.00	30.00	197	75.00	42.0
1243	23-SEP-88	REST2.3	0	0.00	0	2B	10.00	1A	24.00	0.00	119	75.00	42.0
1243	23-SEP-88	REST 2.2	0	0.00	0	1B	13.80	1B	0.00	0.00	117	75.00	42.0

Source: Shamoo et al., 1992. Effectiveness of Training Subjects to Estimate Their Level of Ventilation.

Table 3A-6. Estimated Minute Ventilation Associated with Activity Level for Average Male Adult[a]

Level of work	L/min	Representative activities
Light	13	Level walking at 2 mph; washing clothes
Light	19	Level walking at 3 mph; bowling; scrubbing floors
Light	25	Dancing; pushing wheelbarrow with 15-kg load; simple construction; stacking firewood
Moderate	30	Easy cycling; pushing wheelbarrow with 75-kg load; using sledgehammer
Moderate	35	Climbing stairs; playing tennis; digging with spade
Moderate	40	Cycling at 13 mph; walking on snow; digging trenches
Heavy Heavy Very heavy	55 63 72	Cross-country skiing; rock climbing; stair climbing with load; playing squash or handball; chopping with axe
Very heavy	85	Level running at 10 mph; competitive cycling
Severe	100+	Competitive long distance running; cross-country skiing

[a] Average adult assumed to weigh 70 kg.

Source: Adapted from U.S. EPA, 1985

Table 3A-7. Minute Ventilation Ranges by Age, Sex, and Activity Level

Age (yr)	Sex	Ventilation ranges (liters/minute) Resting n	Resting Range	Resting Mean	Light n	Light Range	Light Mean	Moderate n	Moderate Range	Moderate Mean	Heavy n	Heavy Range	Heavy Mean
Infants	M/F	316	0.25 - 2.09	0.84					—			—	
2	F		—			—			—			—	
	M		—			—			—			—	
3	F		—			—			—			—	
	M		—			—			—			—	
4	F		—			—			—		2	32.0 - 32.5	32.3
	M		—			—			—		4	39.3 - 43.3	41.2
5	F		—			—			—		3	31.0 - 35.0	32.8
	M		—			—			—		3	30.9 - 42.6	37.5
6	F		—			—			—		2	35.9 - 38.9	37.4
	M	8	5.0 - 7.0	6.5	16	5.0 - 32.0	13.9	4	28.0 - 43.0	33.3	3	35.5 - 43.5	40.3
7	F		—			—			—		3	48.2 - 51.4	49.6
	M		—			—			—		2	44.1 - 55.8	50.0
8	F		—			—			—		4	51.2 - 67.6	57.6
	M		—			—			—		3	59.3 - 62.2	60.7
9	F		—			—			—		27	55.8 - 63.4	50.9
	M		—			—			—		7	59.5 - 75.2	65.7
10	F		—			—			—		21	46.2 - 71.1	60.4
	M	10	5.2 - 8.3	7.1	20	5.2 - 35.0	17.2	9	41.0 - 68.0	53.4	6	63.9 - 74.6	70.5
	F		—			—			—		7	49.7 - 80.9	63.5
	M		—		20	—	20.3	20	—	33.1	9	47.6 - 77.5	65.5
12	F	54	4.1 - 16.1	15.4		—		4	19.6 - 46.3	26.5	31	65.5 - 79.9	71.8
	M	56	7.2 - 16.3	15.4		—		6	18.5 - 46.3	34.1	9	58.1 - 84.7	67.7
13	F	5	7.2 - 15.4	9.9		—		5	18.5 - 46.3	30.3	7	67.6 - 102.6	87.7
	M	16	3.1 - 15.4	8.9	30	3.1 - 24.9	16.4	29	14.4 - 48.4	32.8	38	27.8 - 105.0	57.9
14	F	53	3.1 - 15.6	14.9		—		3	21.6 - 37.1	28.1	5	80.7 - 100.7	88.9
	M	77	3.1 - 27.8	14.2		—		24	24.7 - 55.0	39.7	16	42.2 - 121.0	86.9

(Continued)

Table 3A-7. (Continued)

Age (yr)	Sex	Ventilation ranges (liters/minute)											
		Resting			Light			Moderate			Heavy		
		n	Range	Mean	n	Range	Mean	n	Range	Mean	n	Range	Mean
15	F	1	—	6.2		—		1	—	26.8	6	68.4 - 97.1	87.1
	M	8	3.1 - 26.8	11.1		—		7	27.8 - 46.3	39.3	6	48.4 - 140.3	110.5
16	F	50	—	15.2		—	—		—		8	73.6 - 119.1	93.9
	M	50	—	15.6		—			—		3	79.6 - 132.2	102.5
17	F		—			—			—		2	91.9 - 95.3	93.6
	M	12	5.8 - 9.0	7.3		—		12	40.0 - 63.0	48.6	3	89.4 - 139.3	107.7
18	F		—			—			—			—	
	M		—			—			—		9	99.7 - 143.0	120.9
Adults	F	595	4.2 - 11.66	5.7	786	4.2 - 29.4	8.1	106	20.7 - 34.2	26.5	211	23.4 - 114.8	47.9
Adults	M	454	2.3 - 18.8	12.2	102	2.3 - 27.6	13.8	102	14.4 - 78.0	40.9	267	34.6 - 183.4	80.0

n = number of observations

Note: Values in liters/minute can be converted to units of m^3/hour by multiplying by the conversion factor, $\frac{60\ \text{minutes/hour}}{1000\ \text{liters/m}^3}$

Source: Adapted from U.S. EPA, 1985.

Table 3A-8. Reference Values Obtrained From Literature Sources

Col.	1	2	3			4			5			6		
Line	Subject	W (kg)	Resting			Light Activity			Heavy Work			Maximal Work During Exercise		
			f	VT	V*	f	VT	V*	f	VT	V*	f	VT	V*
	<u>Adult</u>													
1	Man	68.5	12	750	7.4	17	1670	29	21	2030	43			
2	1.7 m^2 SA		12	500	6									
3	30y; 170 cm L		15	500	7.5	16	1250	20						
4	20-33 y	70.4										40	3050	111
5	Woman	54	12	340	4.5	19	860	16	30	880	25			
6	30 y; 160 cm L		15	400	6	20	940	19						
7	20-25 y; 165.8 cm L	60.3										46	2100	90
8	Pregnant (8th mo)		16	650	10									
	<u>Adolescent</u>													
9	male, 14-16 y		16	330	5.2							53	2520	113
10	male, 14-15 y	59.4												
11	female, 14-16 y		15	300	4.5									
12	female, 14-15 y; 164.9 cm L	56										52	1870	88
	<u>Children</u>													
13	10 y; 140 cm L		16	300	4.8	24	600	14						
14	males, 10-11 y	36.5										58	1330	71
15	males, 10-11 y; 140.6 cm L	32.5										61	1050	61

(Continued)

Table 3A-8. (continued)

Col.	1	2	3			4			5			6		
Line	Subject	W (kg)	Resting			Light Activity			Heavy Work			Maximal Work During Exercise		
			f	VT	V*	f	VT	V*	f	VT	V*	f	VT	V*
16	females, 4-6 y	20.8										70	600	40
17	females, 4-6 y; 111.6 cm L	18.4										66	520	34
18	Infant, 1 y		30	48	1.4[a]									
19	Newborn	2.5	34	15	0.5									
20	10 h-13 wk	2.5-5.3										68[b]	51[a,b]	3.5[b]
21	9.6 h	3.6	25	21	0.5									
22	6.6 d	3.7	29	21	0.6									

Values in column 2 are body weights referable to the dimension quoted in column 1. f = frequency (breaths/min); VT = tidal volume (ml); V* = minute volume (l/min); SA = surface area.

[a] Calculated from V* = f x VT.
[b] Crying.

Source: ICRP, 1981.

4. DERMAL ROUTE

Dermal exposure to environmental contaminants can occur during a variety of activities and may be associated with a number of different environmental media (U.S. EPA, 1992). These media include:

- Water (e.g., bathing, washing, swimming);
- Soil (e.g., outdoor recreation, gardening, construction);
- Sediment (e.g., wading, fishing);
- Liquids (e.g., use of commercial products);
- Vapors (e.g., use of commercial products); and
- Indoor dust (e.g., children playing on carpeted floors).

The major factors that must be considered when estimating dermal exposure include the amount of or concentration of contaminant contacting the skin, the duration of exposure, the rate at which the material is absorbed, and the size of the exposed body surface area. This chapter focuses primarily on measurements of the body surface areas and various factors for estimating dermal exposure to contaminants in water and soil. U.S. EPA (1992), *Dermal Exposure Assessment: Principles and Applications*, provides detailed information concerning dermal exposure using a stepwise guide for the exposure assessment process.

4.1. EQUATION FOR DERMAL DOSE

The average daily dose (ADD) is the dose rate averaged over a pathway-specific period of exposure expressed as a daily dose on a per-unit-body-weight basis. The ADD is used for exposure to chemicals with non-carcinogenic non-chronic effects. For compounds with carcinogenic or chronic effects, the lifetime average daily dose (LADD) is used. The LADD is the dose rate averaged over a lifetime. For contact with contaminated water, dermally absorbed average daily dose can be estimated by (U.S. EPA 1992):

$$ADD = \frac{DA_{event} \ x \ EV \ x \ ED \ x \ EF \ x \ SA}{BW \ x \ AT} \qquad \text{(Eqn. 4-1)}$$

where:

ADD	=	average daily dose (mg/kg-day);
DA_{event}	=	absorbed dose per event (mg/cm^2-event);
EV	=	event frequency (events/yr);
ED	=	exposure duration (years);
EF	=	event frequency (days/year);
SA	=	skin surface area available for contact (cm^2);
BW	=	body weight (kg); and
AT	=	averaging time (days) for noncarcinogenic effects, AT = ED and for carcinogenic effects, AT = 70 years or 25,550 days.

For example, this method is used when calculating absorbed dose for a swimmer. The total body surface area (SA) is assumed to be exposed to contaminated water for a period of time (ED). The DA_{event} is estimated taking in consideration the permeability coefficient from water, the chemical concentration in water and event duration. The approach for estimating DA_{event} is different for inorganics and organics. The nonsteady-state approach for estimating the dermally absorbed dose from water is recommended as the preferred approach for application to organics which exhibit octanol-water partitioning (U.S. EPA, 1992). First, the method more accurately reflects normal human exposure conditions since the short contact times associated with bathing and swimming generally mean that steady state will not occur. Second, the method accounts for the dose that can occur after the actual exposure event due to absorption of contaminants stored in skin lipids. It is recommended that the traditional steady-state approach be applied to inorganics (U.S. EPA, 1992). Use of the nonsteady-state model for organics has implications for how to select K_p values for these chemicals (U.S. EPA, 1992). The reader is referred to U.S. EPA (1992) for detailed information for estimating the absorbed dose per event (DA_{event}).

For contact with contaminated soil, a variation of Equation 4-1 is used. Dermally absorbed dose is calculated using the equation below:

$$ADD = \frac{DA_{event} \ x \ EF \ x \ ED \ x \ SA}{BW \ x \ AT} \qquad \text{(Eqn. 4-2)}$$

where:

ADD	=	average daily dose (mg/kg-day);
DA_{event}	=	absorbed dose per event (mg/cm^2-event);
SA	=	skin surface area available for contact (cm^2);
EF	=	exposure frequency (events/year);
ED	=	exposure duration (years);
BW	=	body weight (kg); and
AT	=	averaging time (days), a non-carcinogenic effects, AT = ED, and for carcinogenic effects, AT = 70 years or 25,550 days.

Estimation of the DA_{event} for contaminated soil exposure is based on the concentration of the contaminant in the soil, the adherence factor of soil to skin, and the absorption fraction.

The apparent simplicity of the absorption fraction (% absorbed) makes this approach appealing, but it is not practical to apply it to water contact scenarios, such as swimming, because of the difficulty in estimating the total material contacted (U.S. EPA, 1992). There is essentially an infinite thickness of material available, and the contaminant will be continuously replaced, thereby increasing the amount of available material by some large, but unknown, amount. Therefore, the permeability coefficient-based approach is advocated over the absorption fraction approach for determining the dermally absorbed dose of compounds in an aqueous media (U.S. EPA, 1992). In contrast, not all of the soil contaminant in a thick layer of dirt applied to the skin can be considered to be bioavailable, nor can it be considered to constitute a dose. However, if the amount of contaminant in the adhered soil can be established, the absorption fraction approach may be practical. Because of the lack of K_p data for compounds bound to soil, and reduced uncertainty in defining an applied dose, the absorption fraction-based approach is suggested for determining the dermally absorbed dose of soil contaminants. The reader is referred to U.S. EPA (1992) for a more detailed explanation of the equations, assumptions, and approaches, that have been are presented in this section.

4.2. SURFACE AREA

4.2.1. Background

Dermal exposure to contaminants is an important pathway that warrants consideration in many exposure assessments. The size of the exposed surface area is a necessary component of any dermal exposure scenario. Upon determination that a contaminant can gain access to the body through topical (skin) exposure, the assessor may use estimations of total body surface area or, depending upon the exposure scenario, estimations of specific body part surface areas to calculate the contact rate for the contaminant. Information on soil adherence to human skin may also be needed, depending on the scenario. This section presents values for total body surface area and the surface area of component body parts that may be exposed to contaminated media, information on the application of surface area data, and dermal adherence data. The available studies are summarized in the following sections. Studies on surface area and adherence have been classified as either key studies or relevant studies based on their applicability to exposure assessment needs. Recommended values are based on the results of key studies, but relevant studies are also presented to provide the reader with added perspective on the current state-of-knowledge pertaining to dermal exposure factors.

4.2.2. Measurement Techniques

Direct measurement techniques that have been used to measure total body surface area include direct coating, triangulation, and surface integration (U.S. EPA, 1985). The coating methods consist of coating either the whole body or specific regions with a substance of known or measured area. Triangulation consists of marking the area of the body into geometric figures, then calculating the figure areas from their linear dimensions. Surface integration is performed by using a planimeter and adding the areas.

Using the triangulation measurement technique, surface area of the body can be estimated using geometric approximations by assuming that parts of the body resemble geometric solids (Boyd, 1935). More recently, Popendorf and Leffinwell (1976), and Haycock et al. (1978) have developed geometric methods for estimating body surface area

(U.S. EPA, 1985). Both methods assume that body parts correspond to geometric solids, such as the sphere and cylinder. A linear method was proposed by DuBois and DuBois (1916) (U.S. EPA, 1985). It was based on the principle that the surface areas of the parts of the body are proportional, rather than equal, to the surface area of the solids they resemble.

In addition to direct measurement techniques, several formulae, including that of Gehan and George (1970), have been proposed for estimating body surface area from measurements of other major body dimensions (i.e., height and weight) (U.S. EPA, 1985). Generally, the formulae are based on the principles that body density and shape are roughly the same and that the relationship of surface area to any dimension may be represented by the curve of central tendency of their plotted values or by the algebraic expression for the curve (U.S. EPA, 1985). A discussion and comparison of formulae to determine total body surface area are presented in Appendix 4A.

Determination of the surface areas of the component body parts has been performed by a number of authors as part of their determination of whole body surface areas. The surface areas of anatomical parts have been reported by gender, age, and ethnic group. Early studies have reported surface areas for such component parts as head, trunk, upper arms, forearms, hands, thighs, legs, and feet. Several investigators have estimated body surface area and reported their results in terms of surface areas of different parts of the body as well as total surface area (U.S. EPA, 1985). The literature contains surface area of body parts as both direct measurements and as estimates using the linear and geometric methods.

4.2.3. Key Surface Area Studies

U.S. EPA (1985) - Development of Statistical Distributions or Ranges of Standard Factor Used in Exposure Assessments - U.S. EPA (1985) analyzed the direct surface area measurement data of Gehan and George (1970) using the Statistical Processing System (SPS) software package of Buhyoff et al. (1982). The data of Gehan and George (401 observations) were selected from the data of Boyd (1935) where the data were complete for surface area, height, weight, and age. Although Boyd (1935) reported surface area estimates for 1,114 individuals, only 401 observations were used by Gehan and George (1970) in their analysis. These observations were those obtained by direct coating, triangulation or surface integration methods (Gehan and George, 1970). SPS was used to generate equations for calculating surface area as a function of height and weight. These equations were then used to calculate surface area distributions of the U.S. population using the height and weight data obtained from the National Health and Nutrition Examination Survey (NHANES) II and the computer program QNTLS of Rochon and Kalsbeek (1983) (U.S. EPA, 1985). A description of the computer program is provided in Appendix B of U.S. EPA (1985).

The equation proposed by Gehan and George (1970) was determined in U.S. EPA (1985) as the best choice for estimating total body surface area. However, the paper by Gehan and George gave insufficient information to estimate the standard error about the regression. Therefore, the 401 direct measurements of children and adults (i.e., Boyd, 1935) were reanalyzed in U.S. EPA (1985) using the formula of Dubois and Dubois (1916) and SPS to obtain the standard error.

Regression equations using the Dubois and Dubois (1916) formula were also developed for specific body parts by U.S. EPA (1985) using the surface area of various body parts provided by Boyd (1935) and Van Graan (1969), and SPS. Regression equations for adults were developed for the head, trunk (including the neck), upper extremities and lower extremities. Upper extremities comprise arms and hands; arms are further divided into upper arms and forearms. Lower extremities include legs and feet, with legs further divided into thighs and lower legs. Table 4-1 presents a summary of the equation parameters developed in U.S. EPA (1985) for calculating surface area of adult body parts. Equations to estimate the body part surface area of children were not developed because of insufficient data.

Percentile estimates of total surface area and surface area of body parts developed by U.S. EPA (1985) using the regression equations and NHANES II height and weight data are presented in Table 4-2 and 4-3 for adult males and adult females, respectively. The calculated mean surface areas of body parts for men and women are presented in Table 4-4. The standard deviation, the minimum value, and the maximum value for each body part are included. The median total body surface area for men and women and the corresponding standard errors about the regressions are also given. It has been assumed that errors associated with height and weight are negligible (U.S. EPA, 1985). The data in Table 4-5 present the percentage of total body surface by body part for men and women.

Table 4-1. Summary of Equation Parameters for Calculating Adult Body Surface Area

Body Part	Equation for surface area[a] (m^2) a_0	W^{a1}	H^{a2}	P	R^2	S.E.	N
Head							
Female	0.0256	0.124	0.189	0.01	0.302	0.00678	57
Male	0.0492	0.339	-0.0950	0.01	0.222	0.0202	32
Trunk							
Female	0.188	0.647	-0.304	0.001	0.877	0.00567	57
Male	0.0240	0.808	-0.0131	0.001	0.894	0.0118	32
Upper Extremities							
Female	0.0288	0.341	0.175	0.001	0.526	0.00833	57
Male	0.00329	0.466	0.524	0.001	0.821	0.0101	48
Arms							
Female	0.00223	0.201	0.748	0.01	0.731	0.00996	13
Male	0.00111	0.616	0.561	0.001	0.892	0.0177	32
Upper Arms							
Male	8.70	0.741	-1.40	0.25	0.576	0.0387	6
Forearms							
Male	0.326	0.858	-0.895	0.05	0.897	0.0207	6
Hands							
Female	0.0131	0.412	0.0274	0.1	0.447	0.0172	12[b]
Male	0.0257	0.573	-0.218	0.001	0.575	0.0187	32
Lower Extremities[c]	0.00286	0.458	0.696	0.001	0.802	0.00633	105
Legs	0.00240	0.542	0.626	0.001	0.780	0.0130	45
Thighs	0.00352	0.629	0.379	0.001	0.739	0.0149	45
Lower legs	0.000276	0.416	0.973	0.001	0.727	0.0149	45
Feet	0.000618	0.372	0.725	0.001	0.651	0.0147	45

[a] SA $= a_0 \; W^{a1} \; H^{a2}$
W = Weight in kilograms; H = Height in centimeters; P = Level of significance; R^2 = Coefficient of determination;
SA = Surface Area; S.E. = Standard error; N = Number of observations

[b] One observation for a female whose body weight exceeded the 95 percentile was not used.

[c] Although two separate regressions were marginally indicated by the F test, pooling was done for consistency with individual components of lower extremities.

Source: U.S. EPA, 1985.

Table 4-2. Surface Area of Adult Males in Square Meters

	Percentile									
Body part	5	10	15	25	50	75	85	90	95	S.E.[a]
Total	1.66	1.72	1.76	1.82	1.94	2.07	2.14	2.20	2.28	0.00374
Head	0.119	0.121	0.123	0.124	0.130	0.135	0.138	0.140	0.143	0.0202
Trunk[b]	0.591	0.622	0.643	0.674	0.739	0.807	0.851	0.883	0.935[c]	0.0118
Upper extremities	0.321	0.332	0.340	0.350	0.372	0.395	0.408	0.418	0.432[c]	0.00101
Arms	0.241	0.252	0.259	0.270	0.291	0.314[c]	0.328[c]	0.339[c]	0.354[c]	0.00387
Forearms	0.106	0.111	0.115	0.121	0.131	0.144[c]	0.151[c]	0.157[c]	0.166[c]	0.0207
Hands	0.085	0.088	0.090	0.093	0.099	0.105	0.109	0.112	0.117	0.0187
Lower extremities	0.653	0.676	0.692	0.715	0.761	0.810	0.838	0.858	0.888[c]	0.00633
Legs	0.539	0.561	0.576	0.597	0.640	0.686[c]	0.714[c]	0.734[c]	0.762[c]	0.0130
Thighs	0.318	0.331	0.341	0.354	0.382	0.411[c]	0.429[c]	0.443[c]	0.463[c]	0.0149
Lower legs	0.218	0.226	0.232	0.240	0.256	0.272	0.282	0.288	0.299	0.0149
Feet	0.114	0.118	0.120	0.124	0.131	0.138	0.142	0.145	0.149	0.0147

[a] Standard error for the 5-95 percentile of each body part.
[b] Trunk includes neck.
[c] Percentile estimates exceed the maximum measured values upon which the equations are based.

Source: U.S. EPA, 1985.

Table 4-3. Surface Area of Adult Females in Square Meters

Body part	Percentile									
	5	10	15	25	50	75	85	90	95	S.E.[a]
Total	1.45	1.49	1.53	1.58	1.69[c]	1.82	1.91	1.98	2.09	0.00374
Head	0.106	0.107	0.108	0.109	0.111	0.113	0.114	0.115	0.117	0.00678
Trunk[b]	0.490	0.507	0.518	0.538	0.579	0.636	0.677	0.704	0.752	0.00567
Upper extremities	0.260	0.265	0.269	0.274	0.287	0.301	0.311	0.318	0.329	0.00833
Arms	0.210	0.214	0.217	0.221	0.230	0.238[c]	0.243[c]	0.247[c]	0.253[c]	0.00996
Hands	0.0730	0.0746	0.0757	0.0777	0.0817	0.0868[c]	0.0903[c]	0.0927[c]	0.0966[c]	0.0172
Lower extremities	0.564	0.582	0.595	0.615	0.657	0.704	0.736	0.757	0.796	0.00633
Legs	0.460	0.477	0.488	0.507	0.546	0.592	0.623	0.645	0.683[c]	0.0130
Thighs	0.271	0.281	0.289	0.300	0.326	0.357	0.379	0.394	0.421[c]	0.0149
Lower legs	0.186	0.192	0.197	0.204	0.218	0.233	0.243	0.249	0.261	0.0149
Feet	0.100	0.103	0.105	0.108	0.114	0.121	0.126	0.129	0.134	0.0147

[a] Standard error for the 5-95 percentile of each body part.
[b] Trunk includes neck.
[c] Percentile estimates exceed the maximum measured values upon which the equations are based.

Source: U.S. EPA, 1985.

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Table 4-4. Surface Area by Body Part for Adults (m^2)

	Men						Women					
Body part	Mean	(s.d.)[a]	Min.	-	Max.	N[b]	Mean	(s.d.)	Min.	-	Max.	N
Head	0.118	(0.0160)	0.090	-	0.161	32	0.110	(0.00625)	0.0953	-	0.127	57
Trunk (incl. neck)	0.569	(0.104)	0.306	-	0.893	32	0.542	(0.0712)	0.437	-	0.867	57
Upper extremities	0.319	(0.0461)	0.169	-	0.429	48	0.276	(0.0241)	0.215	-	0.333	57
Arms	0.228	(0.0374)	0.109	-	0.292	32	0.210	(0.0129)	0.193	-	0.235	13
Upper arms	0.143	(0.0143)	0.122	-	0.156	6	-	-	-		-	-
Forearms	0.114	(0.0127)	0.0945	-	0.136	6	-	-	-		-	-
Hands	0.084	(0.0127)	0.0596	-	0.113	32	0.0746	(0.00510)	0.0639	-	0.0824	12
Lower extremities	0.636	(0.0994)	0.283	-	0.868	48	0.626	(0.0675)	0.492	-	0.809	57
Legs	0.505	(0.0885)	0.221	-	0.656	32	0.488	(0.0515)	0.423	-	0.585	13
Thighs	0.198	(0.1470)	0.128	-	0.403	32	0.258	(0.0333)	0.258	-	0.360	13
Lower legs	0.207	(0.0379)	0.093	-	0.296	32	0.194	(0.0240)	0.165	-	0.229	13
Feet	0.112	(0.0177)	0.0611	-	0.156	32	0.0975	(0.00903)	0.0834	-	0.115	13
TOTAL	1.94	(0.00374)[c]	1.66	-	2.28[d]		1.69	(0.00374)[c]	1.45	-	2.09[d]	

[a] standard deviation.
[b] number of observations.
[c] median (standard error).
[d] percentiles (5th - 95th).

Source: Adapted from U.S. EPA, 1985.

Table 4-5. Percentage of Total Body Surface Area by Part for Adults

	Men						Women					
Body part	Mean	(s.d.)[a]	Min.	-	Max.	N[b]	Mean	(s.d.)	Min.	-	Max.	N
Head	7.8	(1.0)	6.1	-	10.6	32	7.1	(0.6)	5.6	-	8.1	57
Trunk	35.9	(2.1)	30.5	-	41.4	32	34.8	(1.9)	32.8	-	41.7	57
Upper extremities	18.8	(1.1)	16.4	-	21.0	48	17.9	(0.9)	15.6	-	19.9	57
Arms	14.1	(0.9)	12.5	-	15.5	32	14.0	(0.6)	12.4	-	14.8	13
Upper arms	7.4	(0.5)	6.7	-	8.1	6	-	-	-		-	-
Forearms	5.9	(0.3)	5.4	-	6.3	6	-	-	-		-	-
Hands	5.2	(0.5)	4.6	-	7.0	32	5.1	(0.3)	4.4	-	5.4	12
Lower extremities	37.5	(1.9)	33.3	-	41.2	48	40.3	(1.6)	36.0	-	43.2	57
Legs	31.2	(1.6)	26.1	-	33.4	32	32.4	(1.6)	29.8	-	35.3	13
Thighs	18.4	(1.2)	15.2	-	20.2	32	19.5	(1.1)	18.0	-	21.7	13
Lower legs	12.8	(1.0)	11.0	-	15.8	32	12.8	(1.0)	11.4	-	14.9	13
Feet	7.0	(0.5)	6.0	-	7.9	32	6.5	(0.3)	6.0	-	7.0	13

[a] Standard deviation.
[b] Number of observations.

Source: Adapted from U.S. EPA, 1985.

Percentile estimates for total surface area of children for males and females are presented in Tables 4-6 and 4-7 were calculated using the total surface area regression equation, NHANES II height and weight data, and using QNTLS. Estimates are not included for children younger than 2 years old because NHANES height data are not available for this age group. For children, the error associated with height and weight cannot be assumed to be zero because of their relatively small sizes. Therefore, the standard errors of the percentile estimates cannot be estimated, since it cannot be assumed that the errors associated with the exogenous variables (height and weight) are independent of that associated with the model; there are insufficient data to determine the relationship between these errors.

Available measurements of the surface area of children's body parts are summarized as a percentage of total surface area in Table 4-8. Because of the small sample size, the data cannot be assumed to represent the average percentage of surface area by body part for all children. Note that the percent of total body surface area contributed by the head decreases from childhood to adult status, whereas that contributed by the leg increases.

An advantage of this study is that it provides statistical distributions based on a large number of observations for adults. It also provides data for total surface and body parts by gender for adults. In addition, data are also provided (with limitations described previously) for children. Any disadvantages of this study are those associated with the data sets used. A possible limitation is that more than half the 401 observations used in the analyses are for children. In addition, the data may not be representative of the general U.S. population. However, the results from the analyses by U.S. EPA (1985) have been generally accepted as the most recommended to use.

Phillips et al. - Distributions of Total Skin Surface Area to Body Weight Ratios - Phillips et al. (1993) observed a strong correlation (0.986) between surface area and body weight and studied the effect of using these factors as independent variables in the LADD equation. Phillips et al. (1993) concluded that, because of the correlation between these two variables, the use of surface area to body weight (SA/BW) ratios in human exposure assessments is more appropriate than treating these factors as independent variables. Direct measurement (coating, triangulation, and surface integration) data from the scientific

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Table 4-6. Total Body Surface Area of Male Children in Square Meters[a]

Age (yr)[b]	Percentile 5	10	15	25	50	75	85	90	95
2 < 3	0.527	0.544	0.552	0.569	0.603	0.629	0.643	0.661	0.682
3 < 4	0.585	0.606	0.620	0.636	0.664	0.700	0.719	0.729	0.764
4 < 5	0.633	0.658	0.673	0.689	0.731	0.771	0,796	0.809	0.845
5 < 6	0.692	0.721	0.732	0.746	0.793	0.840	0.864	0.895	0.918
6 < 7	0.757	0.788	0.809	0.821	0.866	0.915	0.957	1.01	1.06
7 < 8	0.794	0.832	0.848	0.877	0.936	0.993	1.01	1.06	1.11
8 < 9	0.836	0.897	0.914	0.932	1.00	1.06	1.12	1.17	1.24
9 < 10	0.932	0.966	0.988	1.00	1.07	1.13	1.16	1.25	1.29
10 < 11	1.01	1.04	1.06	1.10	1.18	1.28	1.35	1.40	1.48
11 < 12	1.00	1.06	1.12	1.16	1.23	1.40	1.47	1.53	1.60
12 < 13	1.11	1.13	1.20	1.25	1.34	1.47	1.52	1.62	1.76
13 < 14	1.20	1.24	1.27	1.30	1.47	1.62	1.67	1.75	1.81
14 < 15	1.33	1.39	1.45	1.51	1.61	1.73	1.78	1.84	1.91
15 < 16	1.45	1.49	1.52	1.60	1.70	1.79	1.84	1.90	2.02
16 < 17	1.55	1.59	1.61	1.66	1.76	1.87	1.98	2.03	2.16
17 < 18	1.54	1.56	1.62	1.69	1.80	1.91	1.96	2.03	2.09
3 < 6	0.616	0.636	0.649	0.673	0.728	0.785	0.817	0.842	0.876
6 < 9	0.787	0.814	0.834	0.866	0.931	1.01	1.05	1.09	1.14
9 < 12	0.972	1.00	1.02	1.07	1.16	1.28	1.36	1.42	1.52
12 < 15	1.19	1.24	1.27	1.32	1.49	1.64	1.73	1.77	1.85
15 < 18	1.50	1.55	1.59	1.65	1.75	1.86	1.94	2.01	2.11

a Lack of height measurements for children <2 years in NHANES II precluded calculation of surface areas for this age group.
b Estimated values calculated using NHANES II data.

Source: U.S. EPA, 1985.

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Table 4-7. Total Body Surface Area of Female Children in Square Meters[a]

Age (yr)[b]	Percentile 5	10	15	25	50	75	85	90	95
2 < 3	0.516	0.532	0.544	0.557	0.579	0.610	0.623	0.637	0.653
3 < 4	0.555	0.570	0.589	0.607	0.649	0.688	0.707	0.721	0.737
4 < 5	0.627	0.639	0.649	0.666	0.706	0.758	0.777	0.794	0.820
5 < 6	0.675	0.700	0.714	0.735	0.779	0.830	0.870	0.902	0.952
6 < 7	0.723	0.748	0.770	0.791	0.843	0.914	0.961	0.989	1.03
7 < 8	0.792	0.808	0.819	0.854	0.917	0.977	1.02	1.06	1.13
8 < 9	0.863	0.888	0.913	0.932	1.00	1.05	1.08	1.11	1.18
9 < 10	0.897	0.948	0.969	1.01	1.06	1.14	1.22	1.31	1.41
10 < 11	0.981	1.01	1.05	1.10	1.17	1.29	1.34	1.37	1.43
11 < 12	1.06	1.09	1.12	1.16	1.30	1.40	1.50	1.56	1.62
12 < 13	1.13	1.19	1.24	1.27	1.40	1.51	1.62	1.64	1.70
3 < 14	1.21	1.28	1.32	1.38	1.48	1.59	1.67	1.75	1.86
14 < 15	1.31	1.34	1.39	1.45	1.55	1.66	1.74	1.76	1.88
15 < 16	1.38	1.49	1.43	1.47	1.57	1.67	1.72	1.76	1.83
16 < 17	1.40	1.46	1.48	1.53	1.60	1.69	1.79	1.84	1.91
17 < 18	1.42	1.49	1.51	1.56	1.63	1.73	1.80	1.84	1.94
3 < 6	0.585	0.610	0.630	0.654	0.711	0.770	0.808	0.831	0.879
6 < 9	0.754	0.790	0.804	0.845	0.919	1.00	1.04	1.07	1.13
9 < 12	0.957	0.990	1.03	1.06	1.16	1.31	1.38	1.43	1.56
12 < 15	1.21	1.27	1.30	1.37	1.48	1.61	1.68	1.74	1.82
15 < 18	1.40	1.44	1.47	1.51	1.60	1.70	1.76	1.82	1.92

[a] Lack of height measurements for children <2 years in NHANES II precluded calculation of surface areas for this age group.
[b] Estimated values calculated using NHANES II data.

Source: U.S. EPA, 1985.

Table 4-8. Percentage of Total Body Surface Area by Part for Children

		Percent of Total											
		Head		Trunk		Arms		Hands		Legs		Feet	
Age (yr)	N M:F	Mean	Min-Max	Mean	Min-Max	Mean	Min-Max	Mean	Min-Max	Mean	Min-Max	Mean	Min-Max
< 1	2:0	18.2	18.2-18.3	35.7	34.8-36.6	13.7	12.4-15.1	5.3	5.21-5.39	20.6	18.2-22.9	6.54	6.49-6.59
1 < 2	1:1	16.5	16.5-16.5	35.5	34.5-36.6	13.0	12.8-13.1	5.68	5.57-5.78	23.1	22.1-24.0	6.27	5.84-6.70
2 < 3	1:0	14.2		38.5		11.8		5.30		23.2		7.07	
3 < 4	0:5	13.6	13.3-14.0	31.9	29.9-32.8	14.4	14.2-14.7	6.07	5.83-6.32	26.8	26.0-28.6	7.21	6.80-7.88
4 < 5	1:3	13.8	12.1-15.3	31.5	30.5-32.4	14.0	13.0-15.5	5.70	5.15-6.62	27.8	26.0-29.3	7.29	6.91-8.10
5 < 6													
6 < 7	1:0	13.1		35.1		13.1		4.71		27.1		6.90	
7 < 8													
8 < 9													
9 < 10	0:2	12.0	11.6-12.5	34.2	33.4-34.9	12.3	11.7-12.8	5.30	5.15-5.44	28.7	28.5-28.8	7.58	7.38-7.77
10 < 11													
11 < 12													
12 < 13	1:0	8.74		34.7		13.7		5.39		30.5		7.03	
13 < 14	1:0	9.97		32.7		12.1		5.11		32.0		8.02	
14 < 15													
15 < 16													
16 < 17	1:0	7.96		32.7		13.1		5.68		33.6		6.93	
17 < 18	1:0	7.58		31.7		17.5		5.13		30.8		7.28	

N: Number of subjects, male to female ratios.

Source: U.S. EPA 1985.

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literature were used to calculate surface area to body weight (SA/BW) ratios for three age groups (infants aged 0-2 years; children aged 2.1-17.9 years; and adults 18 years and older) of the population. These ratios were calculated by dividing surface areas by corresponding body weights for the 401 individuals provided in Gehan and George (1970), and ultimately summarized in U.S. EPA (1985). Distributions of SA/BW ratios were developed and summary statistics were calculated for the three age groups and the entire data set was then combined. Summary statistics for these populations are presented in Table 4-9. The shapes of these SA/BW distributions were determined using D'Agostino's test. The results indicate that the SA/BW data for infants are lognormally distributed and the SA/BW data for adults and all ages combined are normally distributed (Figure 4-1). SA/BW ratios for children were neither normally nor lognormally distributed. According to Phillips et al. (1993), SA/BW ratios should be used to calculate LADDs by replacing the surface area factor in the numerator of the LADD equation with the SA/BW ratio and eliminating the body weight factor in the denominator of the LADD equation.

The effect of sex and age on SA/BW distribution was also analyzed by classifying the 401 observations by sex and age. Statistical analyses indicated no significant differences between SA/BW ratios for males and females. SA/BW ratios were found to decrease with increasing age.

Advantages of this study is that it uses direct measurement data for the analyses and it provides distribution data for calculating LADD. Any limitations with this study are those associated with the data set that were used to generate this distribution. In addition, data are not provided for body parts in this study.

4.2.4. Other Relevant Surface Area Studies

Murray and Burmaster (1992) - Estimated Distributions for Total Body Surface Area of Men and Women in the United States - In this study distributions of total body surface area for men and women ages 18 to 74 years were estimated using Monte Carlo simulations based on height and weight distributions. Four different formulae for estimating surface area as a function of height and weight were employed.

Table 4-9. Descriptive Statistics for SA/BW Ratios (m^2/kg)

					Percentiles						
Age (yrs.)	Mean	S.D.	S.E.	Range	5	10	25	50	75	90	95
0-2	0.0641	0.0114	7.84e-4	0.0421-0.1142	0.0470	0.0507	0.0563	0.0617	0.0719	0.0784	0.0846
2.1 - 17.9	0.0423	0.0076	1.05e-3	0.0268-0.0670	0.0291	0.0328	0.0376	0.0422	0.0454	0.0501	0.0594
≥ 18	0.0284	0.0028	7.68e-6	0.0200-0.0351	0.0238	0.0244	0.0270	0.0286	0.0302	0.0316	0.0329
All ages	0.0489	0.0187	9.33e-4	0.0200-0.1142	0.0253	0.0272	0.0299	0.0495	0.0631	0.0740	0.0788

[a] Standard deviation.
[b] Standard error of the mean.

Source: Phillips et al., 1993.

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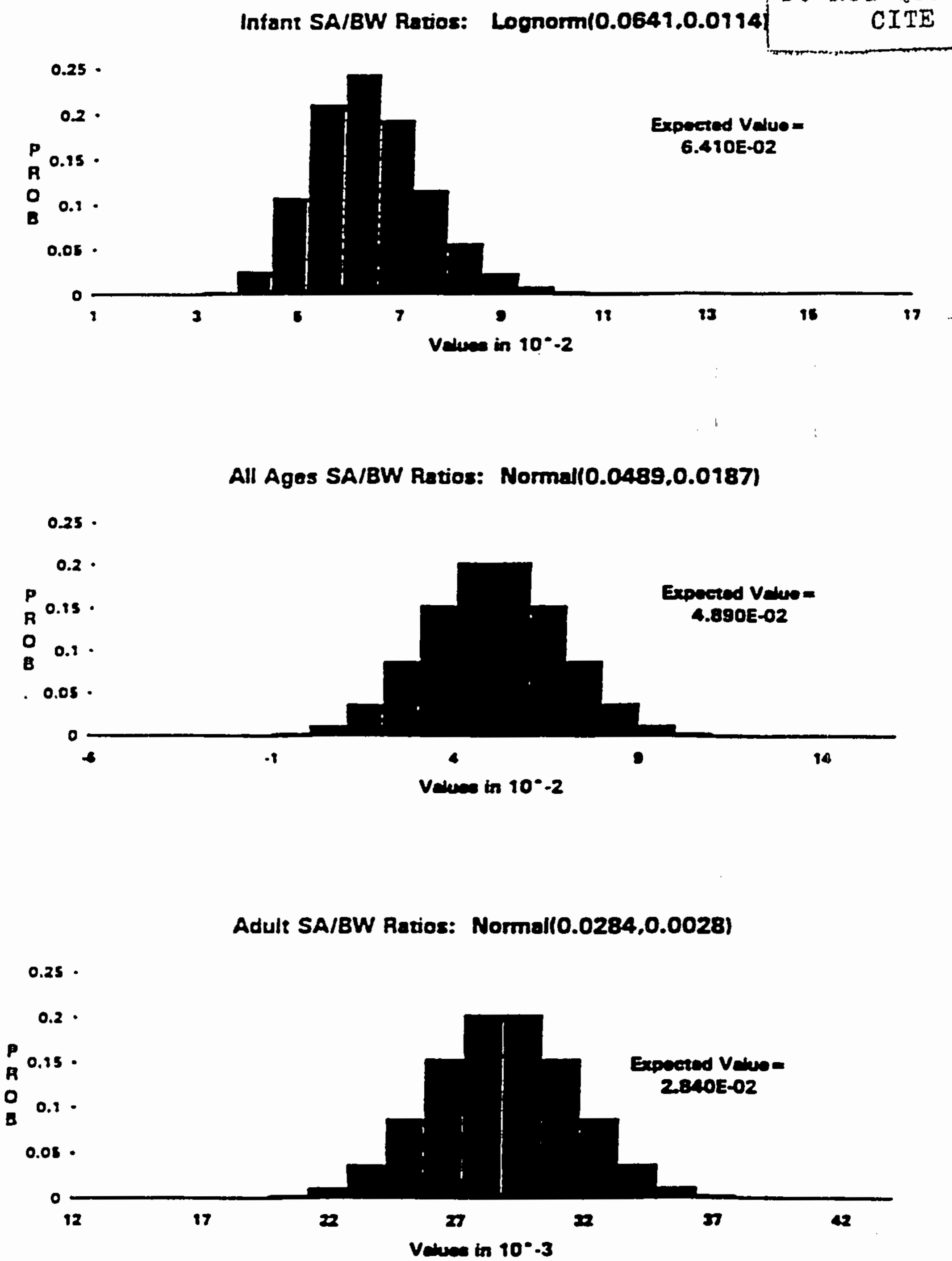


Figure 4-1. SA/BW Distributions for Infants, Adults, and All Ages Combined

Source: Phillips et al., 1993.

Dubois and Dubois (1916), Boyd (1935), and U.S. EPA (1989) used formula based on height and weight. These are presented in Appendix 4A. Costeff (1966) developed a formula based on 220 observations that estimate surface area based on weight only.

The formula for calculating total body surface area developed by Costeff (1966) is as follows:

$$SA = 4W + 7/W + 90 \qquad \text{(Eqn. 4-3)}$$

where:

SA = Surface Area (m^2); and
W = Weight (kg).

These formulae for estimating surface area (as a function of height and weight) were compared and the effect of the correlation between height and weight on the surface area distribution was analyzed.

Monte Carlo simulations were conducted to estimate surface area distributions. They were based on the bivariate distributions as estimated by Brainard and Burmaster (1992) for height and natural logarithm of weight and the formulae described above. A total of 5000 random samples each for men and women were selected from the two correlated bivariate distributions. Surface area calculations were made, for each sample and for each surface area formula, resulting in surface area distributions.

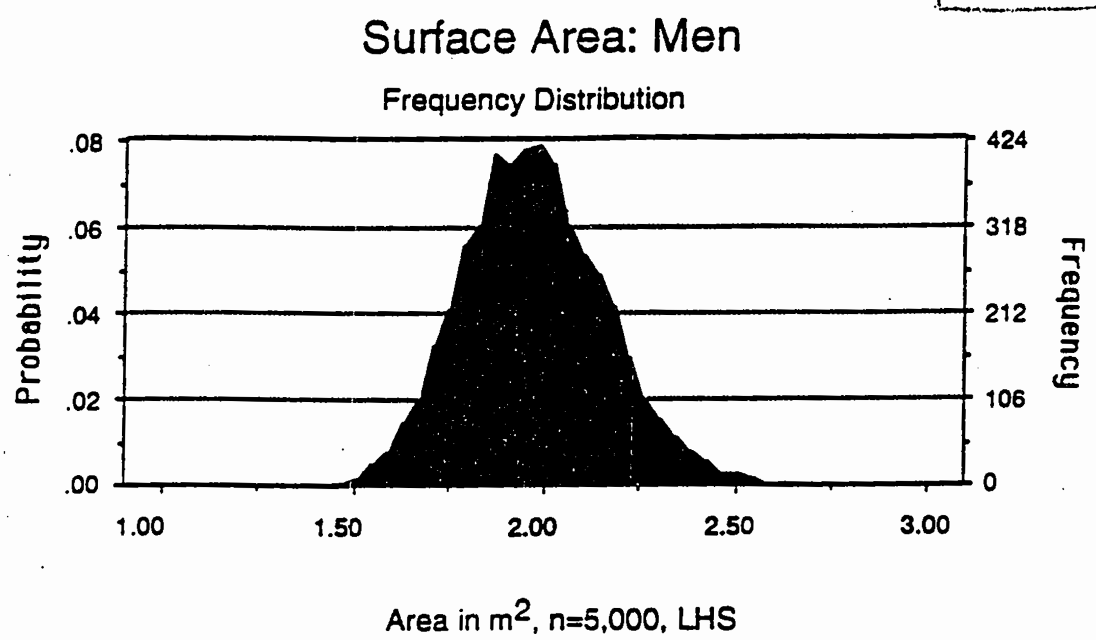
Murray and Burmaster (1992), found that the surface area frequency distributions were similar for the four models (Table 4-10). Using the U.S. EPA (1985) formula, the median surface area values were calculated by Murray and Burmaster (1992) to be 1.96 m^2 for men and 1.69 m^2 for women. The median value for women is identical to that generated by U.S. EPA (1985) but the median value for men differs from the U.S. EPA (1985) value by approximately 1 percent. Surface area was found to have lognormal distribution for both men and women (Figure 4-2). It was also found that assuming correlation between height and weight influences the final distribution by less than 1 percent.

Advantages of this study is that it provides frequency distributions for surface area of men and women based on a large data set. It also produced results similar to the results of

Table 4-10. Statistical Results for Total Body Surface Area Distributions

	Men			
	U.S. EPA	Boyd	DuBois and DuBois	Costeff
Mean	1.97	1.95	1.94	1.89
Median	1.96	1.94	1.94	1.89
Mode	1.96	1.91	1.90	1.90
Standard Deviation	0.19	0.18	0.17	0.16
Skewness	0.27	0.26	0.23	0.04
Kurtosis	3.08	3.06	3.02	2.92
	Women			
	U.S. EPA	Boyd	DuBois and DuBois	Costeff
Mean	1.73	1.71	1.69	1.71
Median	1.69	1.68	1.67	1.68
Mode	1.68	1.62	1.60	1.66
Standard Deviation	0.21	0.20	0.18	0.21
Skewness	0.92	0.88	0.77	0.69
Kurtosis	4.30	4.21	4.01	3.52

Source: Murray and Burmaster, 1992



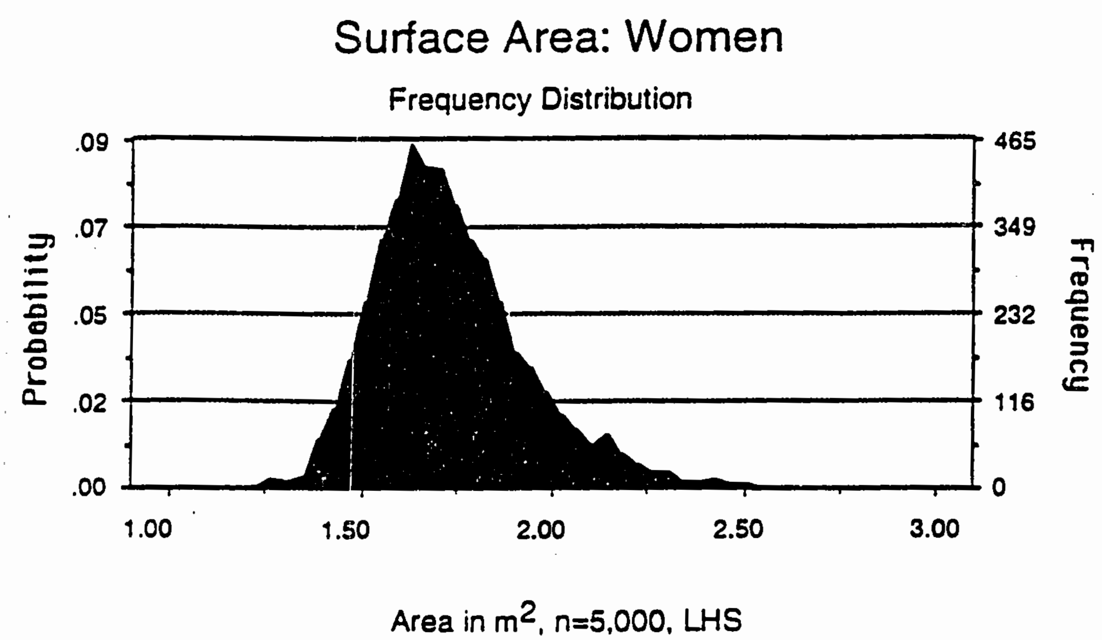


Figure 4-2

Source: Murray and Burmaster, 1992.

the U.S. EPA, 1985 analyses. Limitations associated with the study are that the results cannot be applied to children, and it does not provide data for body parts.

4.2.5. Application of Body Surface Area Data

For many exposure settings, it is likely that only certain areas of the body are at risk of exposure. To estimate the total surface area of the body dermally exposed to the contaminant, all body parts that come in contact with a contaminant must be determined. The data in Table 4-4 may be used to estimate the total surface area of the particular body part(s) exposed. For example, to assess exposure to contaminants in a cleaning product for which only the hands are exposed, surface area values for hands on Table 4-4 may be used. For cleaning products for which both the hands and arms are exposed, mean surface areas for these parts may be summed to estimate the total surface area exposed for that exposure scenario (Table 4-4). The mean surface area of these body parts for men and women is as follows:

	Surface Area (m^2)	
	Men	Women
Arms (includes upper forearms)	0.228	0.210
Hands	0.084	0.075
Total area	0.312	0.285

Therefore, the total body part surface area that may be in contact with the contaminant contained in the cleaning product is 0.312 m^2 for men and 0.285 m^2 for women.

According to U.S. EPA (1992), one inherent assumption of many exposure scenarios developed in the past is that clothing prevents dermal contact and subsequent absorption of contaminants. This assumption may in fact be faulty in cases where the contaminant is carried in a fine dust or liquid suspension, which may be able to penetrate clothing. Studies using personal patch monitors placed beneath clothing of pesticide workers show that a significant proportion of the dermal exposure may occur at anatomical sites covered by clothing (U.S. EPA, 1992). In addition, it has been demonstrated that a "pumping" effect can occur which causes material to move under clothing (U.S. EPA, 1992). Furthermore, studies have demonstrated that hands cannot be considered to be protected from exposure even if waterproof gloves are worn. This may be because of contamination on the interior surface of the gloves, removal of gloves during machine adjustments, and handling of the outside of the gloves while putting them on or taking them off (U.S. EPA, 1992). Depending on their specific tasks, pesticide workers have been shown to experience 12 percent to 43 percent of their total exposure through their hands, approximately 20 percent to 23 percent through their heads and necks, and 36 percent to 64 percent through their torsos and arms, despite the use of protective gloves and clothing (U.S. EPA, 1992). These studies were conducted with fine mists and vapors.

For swimming and bathing scenarios, past exposure assessments have assumed that 75 percent to 100 percent of the skin surface is exposed (U.S. EPA, 1992). As shown in Table 4-4, total adult body surface areas can vary from about 17,000 cm^2 to 23,000 cm^2. The mean is reported as about 20,000 cm^2. For default purposes, adult surface areas of 20,000 cm^2 (central estimate) to 23,000 cm^2 (upper percentile) are recommended in U.S. EPA (1992). Tables 4-2 and 4-3 can also be used when the default values are not preferred. U.S. EPA (1992) recommends that default values for children should be derived from Table 4-6 or 4-7 using the 50th and 95th percentile values for the ages of concern to represent central and upper-percentile values.

Clothing is expected to limit the extent of the exposed surface area in cases of soil contact. The 1989 Exposure Factors Handbook, U.S. EPA (1989) presented two adult clothing scenarios for outdoor activities:

Central tendency mid range:	Individual wears long sleeve shirt, pants, and shoes. The exposed skin surface is limited to the head and hands (2,000 cm^2);
Upper percentile:	Individual wears a short sleeve shirt, shorts, and shoes. The exposed skin surface is limited to the head, hands, forearms, and lower legs (5,300 cm^2).

The clothing scenarios presented above, suggest that roughly 10 percent to 25 percent of the skin area may be exposed to soil. Since some studies have suggested that exposure can occur under clothing, the upper end of this range was selected in EPA, 1992 for deriving defaults.

Thus, taking 25 percent to the total body surface area results in defaults for adults of 5,000 cm^2 to 5,800 cm^2. The range of defaults for children can be derived from multiplying the 50th and 95th percentiles by 0.25 for the ages of interest.

When addressing soil contact exposures, assessors may also want to refine estimates of surface area exposed on the basis of seasonal conditions. For example, in moderate climates, it may be reasonable to assume that 5 percent of the skin is exposed during the winter, 10 percent during the spring and fall, and 25 percent during the summer.

4.3. DERMAL ADHERENCE OF SOIL

4.3.1. Background

Dermal adherence of soil to the surface of the skin is a parameter needed for calculating dermal dose when the exposure scenario involves dermal contact with contaminated soil. A number of studies have attempted to determine the magnitude of dermal soil adherence. These studies are described in detail in U.S. EPA (1992).

4.3.2. Past Studies on Dermal Adherence of Soil

Lepow et al. (1975) - Investigations into Sources of Lead in the Environment of Urban Children - This study was conducted to identify the behavioral and environmental factors contributing to elevated lead levels in ten preschool children. The study was performed over a period of 6-25 months (Lepow et al., 1975). Samples of dirt from the hands of the study subjects were collected during the course of play around the areas that they lived. The study used preweighed self-adhesive labels to sample a standard area on the palm of the hands of 16 male and female children. The preweighed labels were pressed on a single area, and often pressed several times on the given area to obtain an adequate sample. In the laboratory, labels were equilibrated in a desiccant cabinet for 24 hours (comparable to the preweighed desiccation), then the total weight was again recorded. The mean weight of hand dirt for the 22 hand samples was 11 mg; on a 21.5 cm^2 preweighed label, this amounts to 0.51 mg/cm^2. Lepow et al. (1975) stated that this amount (11 mg) represented only a small fraction (percent not specified) of the total amount of surface dirt present on the hands, because much of the dirt may be trapped in skin folds and creases; moreover, there may have been patchy distribution of the dirt on the hands.

Roels et al. - Exposure to Lead by the Oral and the Pulmonary Routes of Children Living in the Vicinity of a Primary Lead Smelter - Roels et al. (1980) examined blood lead levels among children living in the vicinity of a large lead smelter in Brussels, Belgium during five different study periods. The overall age group ranged from 9-14 years. The total number of study subjects was 661 children. This study assessed lead levels removed from 661 children's hands by rinsing the hands in 500 mL dilute nitric acid. The amount of lead on the hands was divided by the concentration of lead in soil to estimate the amount of soil adhering to the hands. The mean soil amount adhering to the hands was 0.159 g.

Sedman - The Development of Applied Action Levels for Soil Contact: A Scenario for the Exposure of Humans to Soil in a Residential Setting - Sedman (1989) used the estimate from Roels et al. (1980) and the average surface area of the hand of an 11 year old (i.e., 307 cm^2) to estimate the amount of soil adhering per unit area of skin (0.9 mg/cm^2). The Sedman (1989) estimate assumed that approximately 60% (185 cm^2) of the lead on the hands was recovered by the method employed by Roels et al. (1980).

Sedman (1989) used the previously presented estimates from Lepow et al. (1975), Roels et al. (1980), and Que Hee et al. (1985) to develop a maximum soil load that could occur on the skin given the types of procedures employed in each study. A rounded arithmetic mean of 0.5 mg/cm^2 was calculated from the three studies. According to Sedman (1989), this was near the maximum load of soil that could occur on the skin depending on the type of method used to determine the measurement. Also, it is unlikely that most skin surfaces would be covered with this amount of soil (Sedman, 1989).

Gallacher et al. 1985 - To be added later

Que Hee et al. - Evolution of Efficient Methods to Sample Lead Sources, Such as House Dust and Hand Dust, in the Homes of Children - Que Hee et al. (1985) used household dust (collected with a vacuum cleaner) having particle sizes ranging from $\leq$ 44 to 833 μm diameters, fractionated into six size ranges, to estimate the amount of dust adhering to skin. For each range of particle size, the amount of dust that adhered to the palm of the hand of a small adult was determined by applying approximately 5 g of soil for each size fraction, removing excess dust by shaking the hands, and then measuring the difference in weight before and after dust application. On average, 31.2 mg of dust adhered to the small adult palm. The exposed surface area was approximately 20 cm^2. Based on these assumptions, 1.5 mg of dust adhered to 1 cm^2 of skin.

Driver et al. - Soil Adherence to Human Skin - This study conducted soil adherence experiments which involved the use of various soil types collected from sites in Virginia. A total of five soil types were collected: Hyde, Chapanoke, Panorama, Jackland, and Montalto. Both top soils and subsoils were collected for each soil type. The soils were also characterized by cation exchange capacity, organic content, clay mineralogy, and particle size distribution. The soils were dry sieved to obtain particle sizes of $\leq 250\ \mu m$ and $\leq 150\ \mu m$. For each soil type, the amount (mg) of soil adhering to adult male hands, using both sieved and unsieved soils, was determined gravimetrically (i.e., measuring the difference in soil sample weight before and after soil application to the hands). An attempt was made to measure only the minimal or "monolayer" of soil adhering to the hands. This was done by mixing a pre-weighed amount of soil over the entire surface area of the hands for a period of approximately 30 seconds, followed by removal of excess soil by gently rubbing the hands together after contact with the soil. Excess soil that was removed from the hands was collected and the weight compared with the original soil sample weights. Driver et al. (1989) measured average adherences of 1.40 mg/cm^2 for particle sizes less than 150 μm, 0.95 mg/cm^2 for particle sizes less than 250 μm and 0.58 mg/cm^2 for unsieved soils. The analysis of variance statistics showed that the most important factor affecting adherence variability was particle size, with a variance (F) ratio far in excess of the 0.999 significance value ($p < 0.001$). The next most important factor is soil type and subtype with an F ratio also in excess of 0.999 significance level ($p < 0.001$). The interaction of soil type and particle size was also significant, but at a lower 0.99 significance level ($p < 0.01$).

Driver et al. (1989) found statistically significant increases in adherence with decreasing particle size; whereas, Que Hee et al. (1985) found relatively small changes over particle size. Also, the amount of adherence found by Driver et al. (1989) was greater than that of Que Hee et al. (1985). Although it appears that soil particle size may affect adherence, exact quantitative relationships cannot be derived at this time because of insufficient data. It is suggested that this is an area for further study (Driver et al. 1989).

Yang et al. - In vitro and In vivo Percutaneous Absorption of Benzo[a]pyrene from Petroleum Crude - Fortified Soil in the Rat - Yang et al. (1989) evaluated the percutaneous absorption of benzo[a]pyrene (BAP) in petroleum crude oil sorbed on soil using a modified in vitro technique. This method was used in preliminary experiments to determine the minimum amount of soil adhering to the skin of rats (Yang et al., 1989). Based on these preliminary results from soil evaluation, percutaneous absorption experiments with the crude-sorbed soil were conducted with soil particles of <150 μm only (Yang et al. (1989). This particle size was intended to represent the composition of the soil adhering to the skin surface (Yang et al., 1989). Approximately 9 mg/cm^2 of soil was found to be the minimum amount required for a "monolayer" coverage of the skin surface in both in vitro and in vivo experiments. This value is larger than the <1 mg/cm^2 of soil (dust) reported for human skin in the studies of Lepow et al. 1975; Roels et al. 1980; and Que Hee et al., 1985 (Yang et al., 1989). Yang et al. 1985 suggested that the differences between the rat and human soil adhesion findings may be the result of differences in rat and human skin texture, the types of soils used, soil moisture content or possibly the methods of measuring soil adhesion.

4.3.3 New Soil Adherence Research

Kissel et al. - Dermal Soil Exposure: Investigation of Soil Contact and Skin Coverage - Kissel et al. (1995) conducted soil adherence experiments using five soil types: Canyon Park (sandy loam,"CP"), Day Creek (silt loam, "72"), Blewett Pass King Creek (loamy sand, "85"), Darrington (sand, "211"), and Nooksack Middle Fork (sandy loam, "228"). The soils were analyzed by hydrometer to determine composition, and to characterize them by organic content. The soils were dry sieved to obtain particle size ranges of <150, 150-250, and >250 μm. For each soil type, the amount (mg) of soil adhering to adult male hands, using both sieved and unsieved soils, was determined by measuring the difference in soil sample weight before and after hands were pressed in the soil. Loadings were estimated by dividing the recovered soil mass by total hand area, although loading occurred primarily on only one side of the hand. Adherence was found to be directly correlated with moisture content, inversely correlated with particle size and independent of clay content, and organic carbon content.

Kissel et al. (1995) used a fluorescent marking technique and video imaging to assess the percentage of skin coverage in several soil contact trials in a greenhouse setting, and an irrigation pipe laying trial (Table 4-11). The investigators concluded that adjusted loadings, averaged over fluorescing area only, may be two to three orders of magnitude larger than average loadings if average loadings are small.

Further experiments by Kissel et al. (1995) estimated soil adherence associated with various indoor and outdoor activities: greenhouse gardening, tae kwon do students, soccer, rugby, reed gathering, irrigation installation, truck farming, and playing in mud. Subjects' body surfaces (forearms, hands, lower legs in all cases, faces and/or feet pairs in some cases) were washed before and after target activities. Paired surfaces were pooled into single samples. Mass recovered was converted to loading using allometric models of surface area. These data are presented in Table 4-12.

4.3.4 Advantages and Limitations of the Soil Adherence Studies

The soil adherence value from the Yang et al. (1989) study which used rat skin was not included for consideration because of the uncertainties associated with using this value for human dermal exposure scenarios. Among the remaining studies, the Lepow (1975) and the Roels (1980) studies have the advantage that they were conducted under actual field conditions and the disadvantage that they involved collection methods with unknown efficiencies. The use of collection methods that were less than 100% efficient suggest that the estimates may be low. However, only hand samples were collected which suggests that the estimates may be high for other parts of the body that probably have less soil contact. Finally, only children were surveyed, and they may not be representative of adults. The Que Hee et al. (1989) and Driver et al. (1989) studies used the gravimetric methods which do not involve a collection method with unknown efficiency and should, therefore, provide accurate estimates of adherence potential. However, these studies were conducted under laboratory conditions and examined adherence to hands only after intimate contact with soil. Such contact may not be representative of normal behavior. Parts of the body that have less

Table 4-11. Skin Coverage with Soil by Body Part and Activity

Exposure Trial	Percent Skin Coverage by Body Part							
	Hands	N[a]	Lower legs	N[a]	Forearms	N[a]	Face	N[a]
Children playing in wet soil	80	24	20	18	10	18	0	13
Adults transplanting plants in wet soil	70	28	10	24	0	26	0	15
Pipe laying trials dry soil, 15-30 min. duration	36-52 (M)[b] 54-62 (W)[b]	3 3	6-12 (M) 15-33 (W)	3 3	-- --	-- --	0 0	-- --
Pipe laying trials wet soil, 15-30 min. duration	75-82 (M) 56-86 (W)	4 3	12-25 (M) 4-14 (W)	4 3	-- --	-- --	0 0	-- --

[a] N = number of subjects
[b] M = men; W = women

Source: Kissel et al. 1995.

Table 4-12. Mean Soil Adherence by Activity and Body Region

Activity	Body Part (mg/cm^2)					
	Hands	Arms	Legs	Face	Feet	N[a]
Tae Kwon Do	0.0062	0.0019	0.0020	--	0.0024	7
Greenhouse Workers	0.043	0.0064	0.0015	0.0051	--	2
Soccer Players	0.035 - 0.11	0.0011 - 0.0043	0.0081 - 0.031	0.012 - 0.016	--	23
Grounds keepers	0.030 - 0.15	0.0021 - 0.023	0.0008 - 0.0012	0.0021 - 0.01	0.0041-0.018	29
Irrigation Installers	0.19	0.18	0.0054	0.0063	--	6
Rugby Players	0.4	0.27	0.36	0.059	--	8
Farmers	0.41 - 0.47	0.059 - 0.13	0.0059 - 0.037	0.018 - 0.041	--	10
Reed Gatherers	0.66	0.036	0.16	--	0.63	4
Kids-in-mud	35 - 58	11	9.5 - 36	--	6.7-24	12

[a] N = number of subjects

Source: Kissel et al., 1995

intimate contact with the soil will likely have lower values. The new studies by Kissel have the advantages of measuring soil adherence on all exposed skin areas, for both children and adults and under actual field conditions.

4.4. RECOMMENDATIONS

This chapter has reviewed the available data on parameters needed to characterize dermal contact scenarios involving water and soil. Table 4-13 summarizes the surface area studies presented in this chapter. For most dermal exposure scenarios concerning adults, it is recommended that the body surface areas presented in Table 4-4 be used after determining which body parts will be exposed. Table 4-4 was selected because using these data will be a straightforward determination for most scenarios. However, for others, additional considerations may need to be addressed. For example, (1) the type of clothing worn could have a significant effect on the surface area exposed, and (2) climatic conditions will also affect the type of clothing worn and, thus, the skin surface area exposed. Frequency and event and exposure duration for water activities and soil contact are presented in the Activity Patterns section of Chapter 5 of this report. For each parameter, a range of default values were derived corresponding to average and upper percentile values. Each of these considerations are also discussed in more detail in U.S. EPA (1992). Data in Tables 4-2 and 4-3 can be used when distributions are preferred. A range of default values for surface area children may be taken from Tables 4-6 and 4-7 using the 50th and 95th percentile values for age(s) of concern. A range of recommended default values for adult skin surface area were provided in U.S. EPA (1992) and are as follows:

Water Contact

	Central	Upper
Bathing and Swimming	20,000 cm^2	23,000 cm^2

Soil Contact

	Central	Upper
Outdoor Activities	5,000 cm^2	5,800 cm^2

Table 4-13. Surface Area Studies

Study	Surface Area				
	No. of Individuals	Type of Surface Area Measurement	Recommended Formulae Used	Population Surveyed	Comments
U.S. EPA (1985)		Based on Gehan & George (1970)	$SA=0.0239*W^{0.517}*H^{0.417}$	Children Adults	Provides statistical distribution data for total SA and SA of body parts
Phillips et al. (1993)	Based on data from USEPA (1985): 401 individuals	NA	calculated surface area to body weight ratios	Children Adults	Developed distributions of SA/BW and calculated summary and statistics for 3 age groups and the combined data set
Murray & Burmaster (1992)	Based on data from USEPA: 401 DuBois & Dubois: 9 Boyd: 231 Costaff: 220	Calculated based on regression equation using the data of USEPA, 1985	Various	Children Adults	Analysis of and comparision of four models developed by Dubois & Dubois (1916), Boyd (1935), U.S. EPA (1985), and Costeff (1966). Presents frequency distribtions
Boyd (1935)	231	Direct measurements using data for coating, surface integration, and triangulation methods only	$SA=0.0178*W^{0.500}*H^{0.4838}$	Children Adults	Reviewed all methods and data used to measure or estimate SA
Gehan & George (1970)	401	Based on Boyd, 1935	$SA=0.0235*W^{0.51456}*H^{0.42246}$	Children Adults	Used 401 observations from Boyd's data where direct measurement for SA, height, and weight were compiled. Used least squares method to develop constants for equation. > 50 percent of data were for children < 5 years old.
Dubois & Dubois (1916)	9	Linear	$SA=0.0178*W^{0.425}*H^{0.725}$	Children Adults	Direct measurement

[a] Based on height weight data presented in report.

Table 4-14 summarizes the available soil adherence studies. The adherence value represents the amount of soil on the skin at the time of measurement. Assuming that the amount measured on the skin represents its accumulation between washings and that people wash at least once per day, then these adherence values could be interpreted as daily contact rates (U.S. EPA, 1992). However, since the residence time of soils on skin has not been studied and the adherence studies are independent of time, this is not recommended. Instead, it is recommended that these adherence values are interpreted on an event basis (U.S. EPA, 1992).

The data in Table 4-14 were reviewed for the purposes of recommending a default value. In summary, all of the early studies have the disadvantage that they measured adherence values to hands only. The new studies by Kissel measured adherence on all exposed body parts under actual field conditions. Therefore, these studies now offer the best data base for deriving estimates of soil adhernece. Based on Kissel et al. 1995, the following generalizations about soil adherence can be drawn:

- Soil properties can influence adherence. Adherence increases with moisture content, decreases with particle size, and is relatively unaffected by clay or organic carbon content.
- Adherence levels vary considerably across different parts of the body. Logically, the highest levels were found on common contact points such as hands, knees and elbows. Generally the least adherence was detected on the face.
- Adherence levels vary with activity. In general, the highest levels of soil adherence were seen for outdoor workers such as farmers and irrigation installers, followed by outdoor recreation, and then gardening activities. Very high adherence levels were seen for individuals contacting wet soils such as might occur during wading or other shore area recreational activities.

These generalizations suggest that changes are needed to the recommendations in U.S. EPA, 1992 regarding soil adherence. The earlier recommendations suggested applying an average of 0.2 to 1.0 mg/cm^2 to the entire exposed skin surface area without consideration of the type of activity. The new studies suggest a more site-specific approach is needed which

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Table 4-14. Soil Adherence Values

Reference	Size Fraction (μm)	Soil Adherence (mg/cm^2)	Subject Type (number tested)
Lepow et al., 1975	--	0.5	children
Roels et al., 1980	--	0.9 - 1.5	children
Que Hee et al., 1985[a]		1.5	adult
Driver et al., 1989[b]	< 150	1.40	adult
	< 250	0.95	adult
	unsieved	0.58	adult
Yang et al., 1989[c]	< 150	9	rats
Kissel et al., 1995[d]		See Table 4-12	adult children

[a] Assume exposed area = 20 cm^2.
[b] Five different soil types and 2-3 soil horizons (top soils and subsoils).
[c] Rat skin "monolayer" (i.e., minimal amount of soil covering the skin).
[d] Adherence values are presented by body part (see Table 4-12).

Source: U.S. EPA, 1992.

considers the type of activity and uses different estimates for different regions of the body. Further research is needed to reach final conclusions about how such recommendations should be made. Meanwhile, assessors can use the data presented in Table 4-12 to select adherence values for activities which best match those of the population being assessed.

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4.5. REFERENCES FOR CHAPTER 4

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APPENDIX 4A

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APPENDIX 4A

FORMULAE FOR TOTAL BODY SURFACE AREA

Most formulae for estimating surface area (SA), relate height to weight to surface area. The following formula was proposed by Gehan and George (1970):

$$SA = KW^{2/3} \qquad \text{(Eqn. 4A-1)}$$

where:

SA = surface area in square meters;
W = weight in kg; and
K = constant.

While the above equation has been criticized because human bodies have different specific gravities and because the surface area per unit volume differs for individuals with different body builds, it gives a reasonably good estimate of surface area.

A formula published in 1916 that still finds wide acceptance and use is that of DuBois and DuBois. Their model can be written:

$$SA = a_0 H^{a_1} W^{a_2} \qquad \text{(Eqn. 4A-2)}$$

where:

SA = surface area in square meters;
H = height in centimeters; and
W = weight in kg.

The values of a_0 (0.007182), a_1 (0.725), and a_2 (0.425) were estimated from a sample of only nine individuals for whom surface area was directly measured. Boyd (1935) stated that the Dubois formula was considered a reasonably adequate substitute for measuring surface area. Nomograms for determining surface area from height and mass presented in Volume I of the Geigy Scientific Tables (1981) are based on the DuBois and DuBois formula. In addition, a computerized literature search conducted for this report identified several articles written in the last 10 years in which the DuBois and DuBois formula was used to estimate body surface area.

Boyd (1935) developed new constants for the DuBois and DuBois model based on 231 direct measurements of body surface area found in the literature. These data were limited to measurements of surface area by coating methods (122 cases), surface integration (93 cases), and triangulation (16 cases). The subjects were Caucasians of normal body build for whom data on weight, height, and age (except for exact age of adults) were complete. Resulting values for the constants in the DuBois and DuBois model were $a_0 = 0.01787$, $a_1 = 0.500$, and $a_2 = 0.4838$. Boyd also developed a formula based exclusively on weight, which was inferior to the DuBois and DuBois formula based on height and weight.

Gehan and George (1970) proposed another set of constants for the DuBois and DuBois model. The constants were based on a total of 401 direct measurements of surface area, height, and weight of all postnatal subjects listed in Boyd (1935). The methods used to measure these subjects were coating (163 cases), surface integration (222 cases), and triangulation (16 cases).

Gehan and George (1970) used a least-squares method to identify the values of the constants. The values of the constants chosen are those that minimize the sum of the squared percentage errors of the predicted values of surface area. This approach was used because the importance of an error of 0.1 square meter depends on the surface area of the individual. Gehan and George (1970) used the 401 observations summarized in Boyd (1935) in the least-squares method. The following estimates of the constants were obtained: $a_0 = 0.02350$, $a_1 = 0.42246$, and $a_2 = 0.51456$. Hence, their equation for predicting surface area (SA) is:

$$SA = 0.02350\ H^{0.42246}\ W^{0.51456} \qquad \text{(Eqn. 4A-3)}$$

or in logarithmic form:

$$\ln SA = -3.75080 + 0.42246 \ln H + 0.51456 \ln W \qquad \text{(Eqn. 4A-4)}$$

where:

SA = surface area in square meters;
H = height in centimeters; and
W = weight in kg.

This prediction explains more than 99 percent of the variations in surface area among the 401 individuals measured (Gehan and George, 1970).

The equation proposed by Gehan and George (1970) was determined by the U.S. EPA (1985) as the best choice for estimating total body surface area. However, the paper by Gehan and George gave insufficient information to estimate the standard error about the regression. Therefore, the 401 direct measurements of children and adults (i.e., Boyd, 1935) were reanalyzed in U.S. EPA (1985) using the formula of Dubois and Dubois (1916) and the Statistical Processing System (SPS) software package to obtain the standard error.

The Dubois and Dubois (1916) formula uses weight and height as independent variables to predict total body surface area (SA), and can be written as:

$$SA_i = a_0\ H_i^{a1}\ W_i^{a2}\ e_i \qquad \text{(Eqn. 4A-5)}$$

or in logarithmic form:

$$\ln (SA)_i = \ln a_0 + a_1 \ln\ H_i + a_2 \ln W_i + \ln e_i \qquad \text{(Eqn. 4A-6)}$$

where:

SAi	=	surface area of the i-th individual (m^2);
Hi	=	height of the i-th individual (cm);
Wi	=	weight of the i-th individual (kg);
a_0, a_1, and a_2	=	parameters to be estimated; and
e_i	=	a random error term with mean zero and constant variance.

Using the least squares procedure for the 401 observations, the following parameter estimates and their standard errors were obtained:

$$a_0 = -3.73\ (0.18),\ \ a_1 = 0.417\ (0.054),\ \ a_2 = 0.517\ (0.022).$$

The model is then:

$$SA = 0.0239\ H^{0.417}\ W^{0.517} \qquad \text{(Eqn. 4A-7)}$$

or in logarithmic form:

$$\ln SA = -3.73 + 0.417 \ln H + 0.517 \ln W \qquad \text{(Eqn. 4A-8)}$$

with a standard error about the regression of 0.00374. This model explains more than 99 percent of the total variation in surface area among the observations, and is identical to two significant figures with the model developed by Gehan and George (1970).

When natural logarithms of the measured surface areas are plotted against natural logarithms of the surface predicted by the equation, the observed surface areas are symmetrically distributed around a line of perfect fit, with only a few large percentage deviations. Only five subjects differed from the measured value by 25 percent or more. Because each of the five subjects weighed less than 13 pounds, the amount of difference was small. Eighteen estimates differed from measurements by 15 to 24 percent. Of these, 12 weighed less than 15 pounds each, 1 was overweight (5 feet 7 inches, 172 pounds), 1 was very thin (4 feet 11 inches, 78 pounds), and 4 were of average build. Since the same observer measured surface area for these 4 subjects, the possibility of some bias in measured values cannot be discounted (Gehan and George 1970).

Gehan and George (1970) also considered separate constants for different age groups: less than 5 years old, 5 years old to less than 20 years old, and greater than 20 years old. The different values for the constants are presented below:

Table 4A-1. Estimated Parameter Values for Different Age Intervals

Age group	Number of persons	a_0	a_1	a_2
All ages	401	0.02350	0.42246	0.51456
<5 years old	229	0.02667	0.38217	0.53937
≥ 5 - <20 years old	42	0.03050	0.35129	0.54375
≥ 20 years old	130	0.01545	0.54468	0.46336

The surface areas estimated using the parameter values for all ages were compared to surface areas estimated by the values for each age group for subjects at the 3rd, 50th, and 97th percentiles of weight and height. Nearly all differences in surface area estimates were less than 0.01 square meter, and the largest difference was 0.03 m^2 for an 18-year-old at the 97th percentile. The authors concluded that there is no advantage in using separate values of a_0, a_1, and a_2 by age interval.

Haycock et al. (1978) without knowledge of the work by Gehan and George (1970), developed values for the parameters a_0, a_1, and a_2 for the DuBois and DuBois model. Their interest in making the DuBois and DuBois model more accurate resulted from their work in pediatrics and the fact that DuBois and DuBois (1916) included only one child in their study group, a severely undernourished girl who weighed only 13.8 pounds at age 21 months. Haycock et al. (1978) used their own geometric method for estimating surface area from 34 body measurements for 81 subjects. Their study included newborn infants (10 cases), infants (12 cases), children (40 cases), and adult members of the medical and secretarial staffs of 2 hospitals (19 cases). The subjects all had grossly normal body structure, but the sample included subjects of widely varying physique ranging from thin to obese. Black, Hispanic, and white children were included in their sample. The values of the model parameters were solved for the relationship between surface area and height and weight by multiple regression analysis. The least squares best fit for this equation yielded the following values for the three coefficients: $a_0 = 0.024265$, $a_1 = 0.3964$, and $a_2 = 0.5378$. The result was the following equation for estimating surface area:

$$SA = 0.024265\ H^{0.3964}\ W^{0.5378} \qquad \text{(Eqn. 4A-9)}$$

expressed logarithmically as:

$$\ln SA = \ln 0.024265 + 0.3964 \ln H + 0.5378 \ln W \qquad \text{(Eqn. 4A-10)}$$

The coefficients for this equation agree remarkably with those obtained by Gehan and George (1970) for 401 measurements.

George et al. (1979) agree that a model more complex than the model of DuBois and DuBois for estimating surface area is unnecessary. Based on samples of direct measurements by Boyd (1935) and Gehan and George (1970), and samples of geometric estimates by Haycock et al. (1978), these authors have obtained parameters for the DuBois and DuBois model that are different than those originally postulated in 1916. The DuBois and DuBois model can be written logarithmically as:

$$\ln SA = \ln a_0 + a_1 \ln H + a_2 \ln W \qquad \text{(Eqn. 4A-11)}$$

The values for a_0, a_1, and a_2 obtained by the various authors discussed in this section are presented to follow:

Table 4A-2. Summary of Surface Area Parameter Values for the DuBois and DuBois Model

Author (year)	Number of persons	a_0	a_1	a_2
DuBois and DuBois (1916)	9	0.007184	0.725	0.425
Boyd (1935)	231	0.01787	0.500	0.4838
Gehan and George (1970)	401	0.02350	0.42246	0.51456
Haycock et al. (1978)	81	0.024265	0.3964	0.5378

The agreement between the model parameters estimated by Gehan and George (1970) and Haycock et al. (1978) is remarkable in view of the fact that Haycock et al. were unaware of the previous work. Haycock et al. used an entirely different set of subjects, and used geometric estimates of surface area rather than direct measurements. It has been determined that the Gehan and George model is the formula of choice for estimating total surface area of the body since it is based on the largest number of direct measurements.

Nomograms

Sendroy and Cecchini (1954) proposed a graphical method whereby surface area could be read from a diagram relating height and weight to surface area. However, they do not give an explicit model for calculating surface area. The graph was developed empirically based on 252 cases, 127 of which were from the 401 direct measurements reported by Boyd

(1935). In the other 125 cases the surface area was estimated using the linear method of DuBois and DuBois (1916). Because the Sendroy and Cecchini method is graphical, it is inherently less precise and less accurate than the formulae of other authors discussed above.

5. OTHER FACTORS FOR EXPOSURE CALCULATIONS

In previous chapters, intake rate, inhalation rate, and information for dermal uptake (body surface area) have been addressed. Other factors are needed to perform the exposure calculation using equation for average daily potential dose are life expectancy, body weight and activity patterns data. These factors are addressed in this chapter.

5.1. LIFETIME

Statistical data on life expectancy are published annually by the U.S. Department of Commerce in the publication: "Statistical Abstract of the United States." The latest year for which statistics are available is 1992. Preliminary data for 1992 show that the life expectancy for an average person born in the United States in 1992 is 75.7 years (U.S. Bureau of the Census, 1994). The average life expectancy for males is 72.3 years, and 79 years for females. Life expectancies for various subpopulations born in the years 1970 to 1992 are presented in Table 5-1. Table 5-1 also indicates that life expectancy for white males (73.2 years) is longer than for Black males (65.5 years). Additionally, it indicates that life expectancy for White females (79.7 years) is longer than for Black females (75.6). Although current data suggest that 75 years would be an appropriate value to reflect the average life expectancy of new members of the population, 70 years has been widely accepted for conducting exposure assessments, and is the recommended value. However, it should be noted that if gender is a factor considered in the assessment, the average life expectancy value for females is higher than for males. Also, if race is a consideration in assessing exposure to male individuals, note that the life expectancy is about 8 years longer for Whites than for Blacks.

5.2. BODY WEIGHT STUDIES

The purpose of this section is to describe published studies on body weight for the U.S. population. The studies have been grouped as either key or relevant studies. The classifications of these studies have been based on their applicability of the data to exposure assessments.

Table 5-1. Expectation of Life at Birth, 1970 to 1992, and Projections, 1995 to 2010[a]

YEAR	TOTAL			WHITE			BLACK AND OTHER			BLACK		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1970	70.8	67.1	74.7	71.7	68.0	75.6	65.3	61.3	69.4	64.1	60.0	68.3
1975	72.6	68.8	76.6	73.4	69.5	77.3	68.0	63.7	72.4	66.8	62.4	71.3
1980	73.7	70.0	77.4	74.4	70.7	78.1	69.5	65.3	73.6	68.1	63.8	72.5
1981	74.1	70.4	77.8	74.8	71.1	78.4	70.3	66.2	74.4	68.9	64.5	73.2
1982	74.5	70.8	78.1	75.1	71.5	78.7	70.9	66.8	74.9	69.4	65.1	73.6
1983	74.6	71.0	78.1	75.2	71.6	78.7	70.9	67.0	74.7	69.4	65.2	73.5
1984	74.7	71.1	78.2	75.3	71.8	78.7	71.1	67.2	74.9	69.5	65.3	73.6
1985	74.7	71.1	78.2	75.3	71.8	78.7	71.0	67.0	74.8	69.3	65.0	73.4
1986	74.7	71.2	78.2	75.4	71.9	78.8	70.9	66.8	74.9	69.1	64.8	73.4
1987	74.9	71.4	78.3	75.6	72.1	78.9	71.0	66.9	75.0	69.1	64.7	73.4
1988	74.9	71.4	78.3	75.6	72.2	78.9	70.8	66.7	74.8	68.9	64.4	73.2
1989	75.1	71.7	78.5	75.9	72.5	79.2	70.9	66.7	74.9	68.8	64.3	73.3
1990	75.4	71.8	78.8	76.1	72.7	79.4	71.2	67.0	75.2	69.1	64.5	73.6
1991	75.5	71.0	78.9	76.3	72.9	79.6	71.5	67.3	75.5	69.3	64.6	73.8
1992 prel.	75.7	72.3	79.0	76.5	73.2	79.7	71.8	67.8	75.6	69.8	65.5	73.9
Projections[b] 1995	76.3	72.8	79.7	77.0	73.7	80.3	72.5	68.2	76.8	70.3	65.8	74.8
2000	76.7	73.2	80.2	77.6	74.3	80.9	72.9	68.3	77.5	70.2	65.3	75.1
2005	77.3	73.8	80.7	78.2	74.9	81.4	73.6	69.1	78.1	70.7	65.9	75.5
2010	77.9	74.5	81.3	78.8	75.6	81.0	74.3	69.9	78.7	71.3	66.5	76.0

a Excludes deaths of nonresidents of the United States

b Based on middle mortality assumptions; for details, see U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 1018.

Source: Bureau of the Census, 1994.

5.2.1. Key Body Weight Studies

NCHS - Anthropometric Reference Data and Prevalence of Overweight, United States, 1976-80 - Statistics on anthropometric measurements, including body weight, for the U.S. population were collected by the National Center for Health Statistics (NCHS) through the second National Health and Nutrition Examination Survey (NHANES II). NHANES II was conducted on a nationwide probability sample of approximately 28,000 persons, aged 6 months to 74 years, from the civilian, non-institutionalized population of the United States. Of the 28,000 persons, 20,322 were interviewed and examined, resulting in a response rate of 73.1 percent. The survey began in February 1976 and was completed in February 1980. The sample was selected so that certain subgroups thought to be at high risk of malnutrition (persons with low incomes, preschool children and the elderly) were oversampled. The estimates were weighted to reflect national population estimates. The weighting was accomplished by inflating examination results for each subject by the reciprocal of selection probabilities adjusted to account for those who were not examined and post stratifying by race, age, and sex (NCHS, 1987).

NHANES II collected anthropometric information on 20,322 individuals. Standard body measurements, including height and weight, were made at various times of the day and in different seasons of the year. This technique was used because one's weight may vary between winter and summer and may fluctuate with recency of food and water intake and other daily activities (NCHS, 1987). Mean body weights of adults, by age, and their standard deviations are presented in Table 5-2 for men, women, and both sexes combined. Mean body weights and standard deviations for children, ages 6 months to 19 years, are presented in Table 5-3 for boys, girls, and boys and girls combined. Percentile distributions of the body weights of adults by age and race for males are presented in Table 5-4, and for females in Table 5-5. Data for children by age are presented in Table 5-6 for males, and for females in Table 5-7.

Results shown in Tables 3 and 4 indicate that the mean weight for adult males is 78.1 kg and for adult females, 65.4 kg. It also shows that the mean weight for White males (78.5 kg) is greater than for Black males (77.9 kg). Additionally, mean weights are greater for Black females (71.2 kg) than for White females (64.8 kg). From Table 5-3, the mean body

Table 5-2. Body Weights of Adults[a] (kilograms)

	Men		Women		Men and women
Age	Mean	Std. Dev.	Mean	Std. Dev.	Mean
18 < 25	73.8	12.7	60.6	11.9	67.2
25 < 35	78.7	13.7	64.2	15.0	71.5
35 < 45	80.9	13.4	67.1	15.2	74.0
45 < 55	80.9	13.6	68.0	15.3	74.5
55 < 65	78.8	12.8	67.9	14.7	73.4
65 < 75	74.8	12.8	66.6	13.8	70.7
18 < 75	78.1	13.5	65.4	14.6	71.8

[a] Includes clothing weight, estimated as ranging from 0.09 to 0.28 kilogram.

Source: Adapted from National Center for Health Statistics (NCHS), 1987.

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Table 5-3. Body Weights of Children[a] (kilograms)

Age	Boys		Girls		Boys and girls
	Mean	Std. Dev.	Mean	Std. Dev.	Mean
6-11 months	9.4	1.3	8.8	1.2	9.1
1 year	11.8	1.9	10.8	1.4	11.3
2 years	13.6	1.7	13.0	1.5	13.3
3 years	15.7	2.0	14.9	2.1	15.3
4 years	17.8	2.5	17.0	2.4	17.4
5 years	19.8	3.0	19.6	3.3	19.7
6 years	23.0	4.0	22.1	4.0	22.6
7 years	25.1	3.9	24.7	5.0	24.9
8 years	28.2	6.2	27.9	5.7	28.1
9 years	31.1	6.3	31.9	8.4	31.5
10 years	36.4	7.7	36.1	8.0	36.3
11 years	40.3	10.1	41.8	10.9	41.1
12 years	44.2	10.1	46.4	10.1	45.3
13 years	49.9	12.3	50.9	11.8	50.4
14 years	57.1	11.0	54.8	11.1	56.0
15 years	61.0	11.0	55.1	9.8	58.1
16 years	67.1	12.4	58.1	10.1	62.6
17 years	66.7	11.5	59.6	11.4	63.2
18 years	71.1	12.7	59.0	11.1	65.1
19 years	71.7	11.6	60.2	11.0	66.0

[a] Includes clothing weight, estimated as ranging from 0.09 to 0.28 kilogram.

Source: Adapted from National Center for Health Statistics (NCHS), 1987.

Table 5-4. Weight in Kilograms for Males 18-74 Years of Age–Number Examined, Mean, Standard Deviation, and Selected Percentiles, by Race and Age: United States, 1976-1980[a]

Race and Age	Number of Examined Persons	Mean	Standard Deviation	Percentile 5th	10th	15th	25th	50th	75th	85th	90th	95th
All races[b]												
18-74 years	5,916	78.1	13.5	58.6	62.3	64.9	68.7	76.9	85.6	91.3	95.7	102.7
18-24 years	988	73.8	12.7	56.8	60.4	61.9	64.8	72.0	80.3	85.1	90.4	99.5
25-34 years	1,067	78.7	13.7	59.5	62.9	65.4	69.3	77.5	85.6	91.1	95.1	102.7
35-44 years	745	80.9	13.4	59.7	65.1	67.7	72.1	79.9	88.1	94.8	98.8	104.3
45-54 years	690	80.9	13.6	50.8	65.2	67.2	71.7	79.0	89.4	94.5	99.5	105.3
55-64 years	1,227	78.8	12.8	59.9	63.8	66.4	70.2	77.7	85.6	90.5	94.7	102.3
65-74 years	1,199	74.8	12.8	54.4	58.5	61.2	66.1	74.2	82.7	87.9	91.2	96.6
White												
18-74 years	5,148	78.5	13.1	59.3	62.8	65.5	69.4	77.3	85.6	91.4	95.5	102.3
18-24 years	846	74.2	12.8	56.8	60.5	62.0	65.0	72.4	80.6	85.5	91.0	100.0
25-34 years	901	79.0	13.1	59.9	63.7	65.9	69.8	78.0	85.6	91.3	95.3	102.7
35-44 years	653	81.4	12.8	62.3	66.6	68.8	72.9	80.1	88.2	94.6	98.7	104.1
45-54 years	617	81.0	13.4	62.0	66.1	67.3	71.9	79.0	89.4	94.2	99.0	104.5
55-64 years	1,086	78.9	12.4	60.5	64.5	66.6	70.6	78.2	85.6	90.4	94.5	101.7
65-74 years	1,045	75.4	12.4	55.5	59.5	62.5	67.0	74.7	83.0	87.9	91.2	96.0
Black												
18-74 years	649	77.9	15.2	58.0	61.1	63.6	67.2	75.3	85.4	92.9	98.3	105.4
18-24 years	121	72.2	12.0	58.3	60.9	62.3	64.9	70.8	77.1	81.8	83.7	93.6
25-34 years	139	78.2	16.3	58.7	63.4	64.9	68.4	75.3	84.4	90.6	92.2	106.3
35-44 years	70	82.5	15.4	*[c]	61.7	65.2	69.7	83.1	94.8	100.4	104.2	*
45-54 years	62	82.4	14.5	*	64.7	67.0	73.2	81.8	93.0	100.0	102.5	*
55-64 years	129	78.6	14.7	56.8	61.4	64.3	68.0	77.0	86.5	93.8	98.6	104.7
65.74 years	128	73.3	15.3	52.5	56.7	58.0	61.0	71.2	81.1	90.8	97.3	105.1

[a] Includes clothing weight, estimated as ranging from 0.09 to 0.28 kilogram.
[b] Includes all other races not shown as separate categories.
[c] Data not available.

Source: National Center for Health Statistics, 1987.

Table 5-5. Weight in Kilograms for Females 18-74 Years of Age--Number Examined, Mean, Standard Deviation, and Selected Percentiles, by Race and Age: United States, 1976-1980[a]

Race and Age	Number of Examined Persons	Mean	Standard Deviation	Percentile 5th	10th	15th	25th	50th	75th	85th	90th	95th
All races[b]												
18-74 years	6,588	65.4	14.6	47.7	50.3	52.2	55.4	62.4	72.1	79.2	84.4	93.1
18-24 years	1,066	60.6	11.9	46.6	49.1	50.6	53.2	58.0	65.0	70.4	75.3	82.9
25-34 years	1,170	64.2	15.0	47.4	49.6	51.4	54.3	60.9	69.6	78.4	84.1	93.5
35-44 years	844	67.1	15.2	49.2	52.0	53.3	56.9	63.4	73.9	81.7	87.5	98.9
45-54 years	763	68.0	15.3	48.5	51.3	53.3	57.3	65.5	75.7	82.1	87.6	96.0
55-64 years	1,329	67.9	14.7	48.6	51.3	54.1	57.3	65.2	75.3	82.3	87.5	95.1
65-74 years	1,416	66.6	13.8	47.1	50.8	53.2	57.4	64.8	73.8	79.8	84.4	91.3
White												
18-74 years	5,686	64.8	14.1	47.7	50.3	52.2	55.2	62.1	71.1	77.9	83.3	91.5
18-24 years	892	60.4	11.6	47.3	49.5	50.8	53.3	57.9	64.8	69.7	74.3	82.4
25-34 years	1,000	63.6	14.5	47.3	49.5	51.3	54.0	60.6	68.9	76.3	81.5	89.7
35-44 years	726	66.1	14.5	49.3	51.8	52.9	56.3	62.4	71.9	79.7	85.8	94.9
45-54 years	647	67.3	14.4	48.6	51.3	53.4	57.0	65.0	74.8	81.1	85.6	94.5
55-64 years	1,176	67.2	14.4	48.5	50.7	53.7	57.1	64.7	74.5	81.8	86.2	92.8
65-74 years	1,245	66.2	13.7	47.2	50.7	52.9	57.2	64.3	72.9	79.2	84.3	91.2
Black												
18-74 years	782	71.2	17.3	48.8	51.6	55.1	59.1	67.8	80.6	87.4	94.9	105.1
18-24 years	147	63.1	13.9	46.2	49.0	50.6	53.8	60.4	70.0	75.8	79.1	89.3
25-34 years	145	69.3	16.7	48.3	50.8	53.1	57.8	65.3	80.2	87.1	91.5	102.7
35-44 years	103	75.3	18.4	50.7	55.2	57.2	63.0	70.2	85.2	95.3	103.5	113.1
45-54 years	100	77.7	18.8	55.1	60.3	60.8	64.5	74.3	83.6	94.5	98.2	117.5
55-64 years	135	75.8	16.4	54.2	55.2	57.6	65.4	74.6	83.4	91.9	95.5	108.5
65.74 years	152	72.4	13.6	52.9	56.4	60.3	64.0	70.0	82.2	84.4	86.5	98.1

[a] Includes clothing weight, estimated as ranging from 0.09 to 0.28 kilogram.

[b] Includes all other races not shown as separate categories.

Source: National Center for Health Statistics, 1987.

Table 5-6. Weight in Kilograms for Males 6 Months-19 Years of Age–Number Examined, Mean, Standard Deviation, and Selected Percentiles, by Sex and Age: United States, 1976-1980[a]

Sex and Age	Number of Examined Persons	Mean	Standard Deviation	Percentile								
				5th	10th	15th	25th	50th	75th	85th	90th	95th
Male												
6-11 Months	179	9.4	1.3	7.5	7.6	8.2	8.6	9.4	10.1	10.7	10.9	11.4
1 years	370	11.8	1.9	9.6	10.0	10.3	10.8	11.7	12.6	13.1	13.6	14.4
2 years	375	13.6	1.7	11.1	11.6	11.8	12.6	13.5	14.5	15.2	15.8	16.5
3 years	418	15.7	2.0	12.9	13.5	13.9	14.4	15.4	16.8	17.4	17.9	19.1
4 years	404	17.8	2.5	14.1	15.0	15.3	16.0	17.6	19.0	19.9	20.9	22.2
5 years	397	19.8	3.0	16.0	16.8	17.1	17.7	19.4	21.3	22.9	23.7	25.4
6 years	133	23.0	4.0	18.6	19.2	19.8	20.3	22.0	24.1	26.4	28.3	30.1
7 years	148	25.1	3.9	19.7	20.8	21.2	22.2	24.8	26.9	28.2	29.6	33.9
8 years	147	28.2	6.2	20.4	22.7	23.6	24.6	27.5	29.9	33.0	35.5	39.1
9 years	145	31.1	6.3	24.0	25.6	26.0	27.1	30.2	33.0	35.4	38.6	43.1
10 years	157	36.4	7.7	27.2	28.2	29.6	31.4	34.8	39.2	43.5	46.3	53.4
11 years	155	40.3	10.1	26.8	28.8	31.8	33.5	37.3	46.4	52.0	57.0	61.0
12 years	145	44.2	10.1	30.7	32.5	35.4	37.8	42.5	48.8	52.6	58.9	67.5
13 years	173	49.9	12.3	35.4	37.0	38.3	40.1	48.4	56.3	59.8	64.2	69.9
14 years	186	57.1	11.0	41.0	44.5	46.4	49.8	56.4	63.3	66.1	68.9	77.0
15 years	184	61.0	11.0	46.2	49.1	50.6	54.2	50.1	64.9	68.7	72.8	81.3
16 years	178	67.1	12.4	51.4	54.3	56.1	58.7	64.4	73.6	78.1	82.2	91.2
17 years	173	66.7	11.5	50.7	53.4	54.8	578.7	65.8	72.0	76.8	82.3	88.9
18 years	164	71.1	12.7	54.1	56.6	60.3	61.9	70.4	76.6	80.0	83.5	95.3
19 years	148	71.7	11.6	55.9	57.9	60.5	63.8	69.5	77.9	84.3	86.8	92.1

[a] Includes clothing weight, estimated as ranging from 0.09 to 0.28 kilogram.

Source: National Center for Health Statistics, 1987.

Table 5-7. Weight in Kilograms for Females 6 Months-19 Years of Age--Number Examined, Mean, Standard Deviation, and Selected Percentiles, by Sex and Age: United States, 1976-1980[a]

Sex and Age	Number of Examined Persons	Mean	Standard Deviation	Percentile 5th	10th	15th	25th	50th	75th	85th	90th	95th
Female												
6-11 Months	177	8.8	1.2	6.6	7.3	7.5	7.9	8.9	9.4	10.1	10.4	10.9
1 years	336	10.8	1.4	8.8	9.1	9.4	9.9	10.7	11.7	12.4	12.7	13.4
2 years	336	13.0	1.5	10.8	11.2	11.6	12.0	12.7	13.8	14.5	14.9	15.9
3 years	366	14.9	2.1	11.7	12.3	12.9	13.4	14.7	16.1	17.0	17.4	18.4
4 years	396	17.0	2.4	13.7	14.3	14.5	15.2	16.7	18.4	19.3	20.2	21.1
5 years	364	19.6	3.3	15.3	16.1	16.7	17.2	19.0	21.2	22.8	24.7	26.6
6 years	135	22.1	4.0	17.0	17.8	18.6	19.3	21.3	23.8	26.6	28.9	29.6
7 years	157	24.7	5.0	19.2	19.5	19.8	21.4	23.8	27.1	28.7	30.3	34.0
8 years	123	27.9	5.7	21.4	22.3	23.3	24.4	27.5	30.2	31.3	33.2	36.5
9 years	149	31.9	8.4	22.9	25.0	25.8	27.0	29.7	33.6	39.3	43.3	48.4
10 years	136	36.1	8.0	25.7	27.5	29.0	31.0	34.5	39.5	44.2	45.8	49.6
11 years	140	41.8	10.9	29.8	30.3	31.3	33.9	40.3	45.8	51.0	56.6	60.0
12 years	147	46.4	10.1	32.3	35.0	36.7	39.1	45.4	52.6	58.0	60.5	64.3
13 years	162	50.9	11.8	35.4	39.0	40.3	44.1	49.0	55.2	60.9	66.4	76.3
14 years	178	54.8	11.1	40.3	42.8	43.7	47.4	53.1	60.3	65.7	67.6	75.2
15 years	145	55.1	9.8	44.0	45.1	46.5	48.2	53.3	59.6	62.2	65.5	76.6
16 years	170	58.1	10.1	44.1	47.3	48.9	51.3	55.6	62.5	68.9	73.3	76.8
17 years	134	59.6	11.4	44.5	48.9	50.5	52.2	58.4	63.4	68.4	71.6	81.8
18 years	170	59.0	11.1	45.3	49.5	50.8	52.8	56.4	63.0	66.0	70.1	78.0
19 years	158	60.2	11.0	48.5	49.7	51.7	53.9	57.1	64.4	70.7	74.8	78.1

[a] Includes clothing weight, estimated as ranging from 0.09 to 0.28 kilogram.

Source: National Center for Health Statistics, 1987.

weights for girls and boys are approximately the same from ages 6 months to 14 years. Starting at years 15-19, the difference in mean body weight ranges from 6-11 kg.

5.2.2. Other Relevant Body Weight Studies

Burmaster et al. (Submitted 2/19/94 to Risk Analysis for Publication) - Lognormal Distributions of Body Weight as a Function of Age for Female and Male Children in the United States - Burmaster et al. (1994), performed data analysis to fit normal and lognormal distributions to the body weights of female and male children at age 6 months to 20 years (Burmaster et al., 1994).

Data used in this analysis were from the second survey of the National Center for Health Statistics (NHANES II) of 4,079 females and 4,379 males 6 months to 20 years of age in the U.S. (Burmaster et al., 1994). The data of NCHS had been statistically adjusted for non-response and probability of selection and stratified by age, sex, and race to reflect the whole U.S. population prior to reporting (Burmaster et al., 1994). Burmaster et al. (1994) conducted exploratory and quantitative data analyses, and fit normal and lognormal distributions to percentiles of body weight for children. Cumulative distribution functions (CDFs) were plotted for female and male body weights on both linear and logarithmic scales.

Two models were used to assess the probability density functions (PDFs) of children's body weight. Linear and quadratic regression lines were fitted to the data. A number of goodness-of-fit measures between the two models were conducted. Burmaster et al. (1994) found that lognormal distributions give strong fits to the body weights of children, ages 6 months to 20 years. Statistics for the lognormal probability plots are presented in Tables 5-8 and 5-9. These data can be used for further analyses, i.e., Monte Carlo.

Brainard and Burmaster - Bivariate Distributions for Height and Weight of Men and Women in the United States - Brainard and Burmaster (1992) examined data on the height and weight of adults published by the U.S. Public Health Service and fit bivariate distributions to the tabulated values for men and women, separately.

Height and weight of 5,916 men and 6,588 women in the age range of 18-74 years were taken from the NHANES II Study and statistically adjusted to represent the U.S. population aged 18-74 years with regard to age structure, sex, and race. Estimation

Table 5-8. Statistics for Probability Plot Regression Analyses; Female's Body Weights 6 Months to 20 Years of Age

Lognormal Probability Plots		
	Linear Curve	
Age	μ_2[a]	σ_2[a]
6 months to 1	2.16	0.145
1 to 2	2.38	0.128
2 to 3	2.56	0.112
3 to 4	2.69	0.137
4 to 5	2.83	0.133
5 to 6	2.98	0.163
6 to 7	3.10	0.174
7 to 8	3.19	0.174
8 to 9	3.31	0.156
9 to 10	3.46	0.214
10 to 11	3.57	0.199
11 to 12	3.71	0.226
12 to 13	3.82	0.213
13 to 14	3.92	0.216
14 to 15	3.99	0.187
15 to 16	4.00	0.156
16 to 17	4.06	0.167
17 to 18	4.08	0.165
18 to 19	4.07	0.147
19 to 20	4.10	0.149

[a] μ_2, σ_2 - correspond to the mean and standard deviation, respectively, of the lognormal distribution.

Source: Burmaster et al., 1994.

Table 5-9. Statistics for Probability Plot Regression Analyses; Male's Body Weights 6 Months to 20 Years of Age

Lognormal Probability Plots		
	Linear Curve	
Age	μ_2 [a]	σ_2 [a]
6 months to 1	2.23	0.132
1 to 2	2.46	0.119
2 to 3	2.60	0.120
3 to 4	2.75	0.114
4 to 5	2.87	0.133
5 to 6	2.99	0.138
6 to 7	3.13	0.145
7 to 8	3.21	0.151
8 to 9	3.33	0.181
9 to 10	3.43	0.165
10 to 11	3.59	0.195
11 to 12	3.69	0.252
12 to 13	3.78	0.224
13 to 14	3.88	0.215
14 to 15	4.02	0.181
15 to 16	4.09	0.159
16 to 17	4.20	0.168
17 to 18	4.19	0.167
18 to 19	4.25	0.159
19 to 20	4.26	0.154

[a] μ_2, σ_2 - correspond to the mean and standard deviation, respectively, of the lognormal distribution.

Source: Burmaster et al., 1994.

techniques were used to fit normal distributions to the cumulative marginal data and goodness-of-fit tests were used to test the hypothesis that height and lognormal weight follow a normal distribution for each sex. It was found that the marginal distributions, of height and lognormal weight for both men and women, are Gaussian in form. This conclusion was reached by visual observation and the high R^2 values obtained using linear regression. The R^2 values for men's height and lognormal weight are reported to be 0.999. The R^2 values for women's height and lognormal weight are 0.999 and 0.985, respectively.

Brainard and Burmaster fit bivariate distributions to estimated numbers of men and women aged 18-74 years in cells representing 1 inch intervals in height and 10 pound intervals in weight. Adjusted height and lognormal weight data for men were fit to a single bivariate normal distribution with an estimated mean height of 69.2 inches and an estimated mean weight of 173.2 pounds. For women, height and lognormal weight data were fit to a pair of superimposed bivariate normal distributions (Brainard and Burmaster, 1992). The average height and weight for women were estimated from the combined bivariate analyses. Mean height for women was estimated to be 63.8 inches and mean weight was estimated to be 145.0 pounds. For women, a calculation using a single bivarite normal distribution gave poor results (Lloyd and Burmaster, 1994). According to Brainard and Burmaster, the distributions are suitable for use in Monte Carlo simulation.

5.2.3. Recommendations

The mean body weight for all adults (male and female, all age groups) combined is 71.8 kg as shown in Table 5-2. The mean values for each age group in Table 5-2 were derived by adding the body weights for men and women and dividing by 2. The 71.8 kg value can be rounded to 70 kg and is the recommended as the body weight to be used for adults if distribution data are not needed. If age and sex distribution of the exposed population is known, the mean body weight values in Table 5-2 can be used. If percentile data are needed or if race is a factor, Tables 5-4 and 5-5 can be used to select the appropriate data for percentiles or mean values. For children, appropriate mean values for weights may be selected from Table 5-3. If percentile values are needed, these data are presented in Table 5-6 for male children and in Table 6 for female children. Using the body weight data in Table 5-3, and the corresponding population percentages in Table 5-6, the average body weight for the entire population of individuals age 6 months to 19 years was calculated to be 36 kg. This value may be used as a default body weight value for the entire population of children under 19 years if specific age groups are not used.

5.3. ACTIVITY PATTERNS

In exposure assessments, a person's average daily dose can be determined from a combination of variables including the pollutant concentration, exposure duration, and frequency of exposure. These variables can be dependent on human activity patterns and time spent at each activity/location. A person's total exposure can be predicted using indirect approaches such as computerized models. This indirect approach of predicting exposure also requires activity patterns (time use) data.

The purpose of this section is to describe published time use studies that provide information on time-activity patterns of the national population and various sub-populations in the U.S. The studies involve survey designs where time diaries were used to collect information on the time spent at various activities and locations for children, adolescents, and adults, and for certain demographic and socioeconomic data. Available studies on time-activity data are summarized in the following sections, and they are grouped as key studies or other relevant studies. The classifications of these studies are based on the applicability of their data to exposure assessments. It should be noted that other site-limited studies, based on small sample sites, are available, but are not presented in this section. The studies presented in this section are ones believed to be the most appropriate for the purpose of the Handbook.

5.3.1. Key Activity Pattern Studies

Robinson - Changes in Americans' Use of Time: 1965-1975 - Robinson (1977) compared time use data obtained from two national surveys that were conducted in 1965-1966 and in 1975. Each survey used the time-diary method to collect data. The 1965-66 survey excluded the people in the following categories: (a) non-SMSA's (Census Bureau areas with no city more than 50,000 population); (b) households where no adult members were in the labor force for at least 10 hours per week; (c) age 65 and over; and (d) farm-related occupations (Robinson, 1977). The 1,244 respondents in the 1965-66 study included either employed men and women or housewives (Robinson, 1977). The survey was conducted between November-December 1965 and March-April 1966. Respondents recorded their daily activities in time diaries by using the "tomorrow" approach. In this approach, diaries were kept on the day following the interviewer's initial contact. The interviewer then made a second call to the respondent to determine if the information in diaries were correct and to obtain additional data. Only one person per household was interviewed. The survey was designed to obtain information on time spent with family members, time spent at various locations during activities, and time spent performing primary and secondary activities.

A similar study was conducted in 1975. Unlike the 1965-1966 survey, the 1975 survey included rural areas, farmers, the unemployed, students, and retirees. The 1975 survey was conducted October through December. Time diary data were collected using the "yesterday" approach. In this approach, interviewers made only one contact with respondents (greater than 1500) and the diaries were filled out based on a 24-hour recall (Robinson, 1977). Time diary data were also collected from the respondents spouses.

In both surveys, the various activities were coded into 96 categories, and then were combined into five major categories. Free-time activities were grouped into 5 sub-categories (Appendix Table 5A-1). In order to compare data obtained from both surveys, Robinson (1977) excluded the same population groups in the 1975 survey that were excluded in the 1965-66 survey (i.e., farmers, rural residents).

Results obtained from the surveys were presented by gender, age, marital and employment status, race, and education. Robinson (1977) reported the data collected in hours/weeks, however, the method for converting daily activities to hours/weeks were not presented. Table 5-10 shows the differences in time use by gender, employment, and marital status for five major activity categories and five subcategories for 1965 and 1975. Time spent on work related activities (i.e. work for pay and family care) was lower in 1975 than in 1965 for employed men and women. Table 5-10 also shows that there was an overall increase in free time activities for all the six groups. The difference in time use in 1965 and 1975 are presented by age, education, and race in Tables 5-11, 5-12, and 5-13, respectively.

Table 5-10. Differences in Time Use (hours/week)[a] Grouped by Sex, Employment Status, and Marital Status for the Surveys Conducted in 1965 and 1975

	Employed Men		Employed Women		Housewives		Total Sample
Urban Data	Married	Single	Married	Single	Married	Single	
<u>1965</u>	(N=448)	(N=73)	(N=190)	(N=152)	(N=341)	(N=14)	(N=1218)
Sleep	53.1	50.6	53.8	52.6	53.9	58.8	53.3
Work for Pay	51.3	51.4	38.4	39.8	0.5	1.6	33.0
Family Care	9.0	7.7	28.8	20.6	50.0	45.7	25.4
Personal Care	20.9	22.2	20.3	21.7	22.6	23.0	21.5
Free Time	33.7	36.1	26.7	33.3	41.0	38.9	34.8
Organizations	2.6	3.6	1.4	3.7	3.4	3.4	2.8
Media	17.1	13.9	10.7	11.1	15.3	19.1	14.7
Social Life	7.2	10.4	7.9	9.6	12.6	10.2	9.4
Recreation	1.4	1.3	0.6	0.5	0.6	1.1	0.9
Other Leisure	5.4	6.9	6.1	8.4	9.1	5.1	7.0
Total Time (Free)	168.0 (33.7)	168.0 (36.1)	168.0 (26.7)	168.0 (33.3)	168.0 (41.0)	168.0 (38.9)	168.0 (34.8)
<u>1975</u>	(N=245)	(N=87)	(N=117)	(N=108)	(N=141)	(N=28)	(N=726)
Sleep	53.4	54.1	55.1	54.3	56.8	58.6	54.7
Work for Pay	47.4	40.0	30.1	38.8	1.1	0.0	32.5
Family Care	9.7	9.0	24.9	16.6	44.3	42.8	20.5
Personal Care	21.4	20.0	26.2	21.9	21.4	19.2	21.8

Table 5-10. Differences in Time Use (hours/week)[a] Grouped by Sex, Employment Status, and Marital Status for the Surveys Conducted in 1965 and 1975 (continued)

	Employed Men		Employed Women		Housewives		Total Sample
Free Time	36.1	44.9	31.7	36.4	44.4	47.4	38.5
Organizations	3.7	4.8	1.1	4.4	4.8	3.0	3.8
Media	18.9	18.5	15.6	14.5	20.4	27.2	18.2
Social Life	6.4	8.9	6.6	8.9	10.1	9.1	7.8
Recreation	1.3	4.1	0.8	0.5	0.7	0.4	1.3
Other Leisure	5.8	8.6	6.5	8.1	8.4	7.7	7.4
Total Time (Free)	168.0 (36.1)	168.0 (44.9)	168.0 (31.7)	168.0 (36.4)	168.0 (44.4)	168.0 (47.4)	168.0 (38.5)

[a] Data weighted to ensure equal days of the week.

Source: Robinson, 1977.

Table 5-11. Time Use (hours/week)[a] Differences by Age for the Surveys Conducted in 1965 and 1975

	Mean Duration (hrs/wk)									
	Age Group									
	18-25		25-35		36-45		46-55		56-65	
	1965	1975	1965	1975	1965	1975	1965	1975	1965	1975
Activity	(N=200)	(N=149)	(N=321)	(N=234)	(N=306)	(N=150)	(N=252)	(N=141)	(N=156)	(N=111)
Sleep	54.2	55.4	52.5	53.9	53.1	54.7	53.9	55.4	53.6	56.0
Work for Pay	32.6	27.0	29.2	33.4	33.1	34.4	33.4	31.0	35.9	20.4
Family Care	21.2	15.3	30.4	21.6	25.4	20.4	24.9	23.2	20.4	23.2
Personal Care	20.9	20.3	20.3	20.8	22.5	21.1	22.4	23.1	20.9	26.6
Free Time	39.1	50.0	35.6	38.4	33.8	37.3	33.4	35.2	37.1	41.8
Organizations	4.8	8.4	3.0	4.2	3.0	3.3	2.0	3.1	2.9	3.2
Media	13.8	18.5	14.6	17.2	14.5	18.3	15.3	18.8	17.4	22.6
Social Life	11.3	10.7	10.3	8.7	8.4	7.8	8.6	5.4	8.1	6.2
Recreation	0.9	2.6	1.2	1.3	0.8	1.0	0.6	1.3	1.1	1.3
Other Leisure	8.3	9.8	6.5	7.0	7.1	6.9	6.9	6.6	7.6	8.5
Total (Free) Time	168.0 (39.1)	168.0 (50.0)	168.0 (35.6)	168.0 (38.4)	168.0 (33.8)	168.0 (37.3)	168.0 (33.4)	168.0 (35.2)	168.0 (37.1)	168.0 (41.8)

[a] Data weighted to ensure equal days of the week.

Source: Robinson, 1977.

Table 5-12. Time Use (hours/week)[a] Differences by Education for the Surveys Conducted in 1965 and 1975

Activity	Mean duration (hours/week)									
	Age Group									
	0-8		9-11		12		13-15		16+	
	1965 (N=171)	1975 (N=75)	1965 (N=220)	1975 (N=114)	1965 (N=452)	1975 (N=319)	1965 (N=195)	1975 (N=137)	1965 (N=191)	1975 (N=144)
Sleep	54.9	57.0	52.3	53.7	53.0	55.5	53.6	53.6	53.6	54.8
Work for Pay	31.6	30.0	33.1	32.0	30.9	26.9	34.4	27.5	34.5	38.0
Family Care	24.7	18.7	25.4	21.7	28.9	23.5	21.7	18.9	21.2	16.8
Personal Care	20.8	22.9	20.9	22.0	21.1	22.1	21.7	10.5	22.7	22.3
Free Time	35.9	39.4	36.1	38.6	34.1	40.0	36.5	47.5	35.9	36.1
Organizations	1.8	3.0	1.5	2.2	2.5	3.7	5.8	9.1	4.7	4.1
Media	19.3	18.0	16.5	20.7	14.2	19.0	13.3	19.7	12.5	16.2
Social Life	7.7	8.4	9.8	7.9	9.5	8.5	9.0	7.7	10.2	8.1
Recreation	0.9	1.3	1.4	0.7	0.7	1.3	1.1	2.0	0.9	1.3
Other Leisure	6.3	8.7	7.0	7.1	7.2	7.5	7.4	9.0	7.7	6.4
Total (Free) Time	168.0 (36.0)	168.0 (39.4)	168.0 (36.2)	168.0 (38.6)	168.0 (34.1)	168.0 (40.0)	168.0 (36.6)	168.0 (47.5)	168.0 (36.0)	168.0 (36.1)

[a] Data weighted to ensure equal days of the week.

Source: Robinson, 1977.

Table 5-13. Time Use (hours/week)[a] Differences by Race for the Surveys Conducted in 1965 and 1975

	Mean duration (hours/week)			
	White		Black	
Activity	1965 (N = 1030)	1975 (N = 680)	1965 (N = 103)	1975 (N = 77)
Sleep	53.4	54.5	50.9	54.8
Work for Pay	31.9	30.0	36.6	30.0
Family Care	26.0	21.1	23.6	17.6
Personal Care	21.8	22.1	20.0	21.0
Free Time	34.9	40.3	36.9	44.6
Organizations	2.8	4.4	3.0	4.9
Media	14.8	18.7	15.7	19.6
Social Life	9.3	8.2	9.1	9.8
Recreation	1.1	1.5	0.6	0.4
Other Leisure	6.9	7.5	8.4	9.9
Total (Free)	168.0 (34.9)	168.0 (40.3)	168.0 (36.8)	168.0 (44.6)

[a] Data weighted to ensure equal days of the week.

Source: Robinson, 1977.

These tables include data for students and certain employed respondents that were excluded in Table 5-10 (Robinson, 1977). In 1975, the eldest group (ages 56-65) showed a decline in paid work, and an increase in family care, personal care and sleep (Table 5-11). Education level comparisons across the ten-year interval indicated that the less educated had a decrease in paid work, an increase in sleep and personal care; the most educated had an increase in work time and a decrease in other leisure (Table 5-12). For racial comparisons, Blacks spent less time at paid work than Whites across the ten-year interval (Table 5-13). Table 5-13 also shows that Blacks spent more time than Whites for free time activities in 1975.

A limitation of this study is that statistical analysis of the data set were not provided. Additional limitations are that the time use data are old and the data may not reflect current changes in time use. The 1965 and 1975 data set excluded certain population groups and, therefore, may not be entirely representative of the U.S. population. An advantage of this study is that time use data were presented by age, gender, race, education level, and employment and marital status. Another advantage is that earlier investigations on the study method (24-hr recall) employed in the 1965 study revealed no systematic biases in reported activities (Robinson, 1977). Robinson (1977) also noted that the time-diary method provides a "zero-sum" measure (i.e., since there are only 24 daily hours or 168 weekly hours, if time on one activity increases then time on another activity must decrease). Another limitation that is these are short-term studies and may not necessarily represent long-term activity patterns.

Juster et al. - 1975-1981 Time Use Longitudinal Panel Study - The Time Allocation data series in the U.S. began with the first survey in 1965-66 as part of a multinational project. Time use was measured by a single 24-hour diary (Juster et al., 1983). A second national time use survey was conducted in 1975-1976 and another in 1981 (Juster et al. 1983). Juster et al. (1983) provided study descriptions of the second and third surveys. The surveys included a probability sample of adult population (18 years and older) and children between the ages of 3 and 17 in the United States. In both surveys, time use was measured from 24-hour recall diaries administered to respondents and their spouses. The 1975-1976 survey involved four waves of interview: wave 1, October-November 1975; wave 2, February 1976; wave 3, May-June 1976; wave 4, September 1976. The first wave was a personal interview and the other three waves were telephone interviews. The 1975-1976 survey sample consisted of 2,300 individuals, and of that sample, 1519 respondents. Four recall diaries (one from each wave of interviews) were obtained from 947 respondents with data on time use measures for two weekdays, one Saturday, and one Sunday. The survey was designed to gather information for: employment status; earnings and other income; "consumption benefits for activities of respondents and their spouses;" health, friendships and associations of the respondents; stock technology available to the household, house repair, and maintenance activities of the family; division of labor in household work and related attitudes; physical characteristics of the respondents housing structure, networth and housing values; job characteristics; characteristics of mass media usage on a typical day (Juster et al., 1983).

The 1981 survey was a follow-up of respondents and spouses who had completed at least three waves of interview in the 1975-1976 survey. For the 1981 survey, 920 individuals were eligible. The survey design was similar to the 1975-1976 survey, however in this survey, the adult population was 25 years and older and consisted of 620 respondents. Four waves of interviews were conducted between February - March 1981 (wave 1), May - June 1981 (wave 2), September 1981 (wave 3), and November - December (wave 4). The 1981 survey included the respondents' children between the ages of 3 and 17. The survey design for children provided information on time use measures from two time diary reports: one school day and one non-school day. In addition, information for academic achievement measures, school and family life measures, and ratings from the children's teachers were gathered during the survey.

Juster et al. (1983) did not report the time use data obtained for the 1975-1976 survey or the 1981 survey. These data are stored in four tape files and can be obtained from the Inter-university Consortium for Political and Social Research (ICPSR) in Michigan. The response rate for the first wave of interview (1975-76 survey) based on the original sample population was 66 percent, and the subsequent waves ranged from 42 percent (wave 4) to 50 percent (wave 2). In the 1981 survey, the response rate based on eligible respondents was 67 percent for the first interview, and ranged from 54 percent (wave 4) to 60 percent (wave 2) in the subsequent interviews (Juster et al., 1985). The 1975-1976 survey included 87 activities. In the 1981 survey, these 87 activities were broken down into smaller components, resulting in 223 activities (Juster et al., 1985). The activity codes and descriptors used for the adult time diaries in both surveys are presented in Appendix Table 5A-1.

A limitation of this study is that time use data which would be useful in exposure assessments were not presented. Another limitation is that time use data collected were based on a 24-hour diary recall. This may somewhat bias the data set obtained from this survey. An advantage associated with this survey is that it provides a data base of information on various human activities. This information can be used to assess various exposure pathways and scenarios associated with these activities. Also, some of the data from these surveys were used in the studies conducted by Timmer et al. (1985) and Hill (1985). In addition, the activity descriptor codes developed in these studies were used by Timmer et al (1985), Hill (1985), and Robinson and Thomas (1991). The studies are also presented in this section. Another advantage of this survey is that the data are based on a national survey and conducted over a one year period, resulting in a seasonally balanced survey and one representative of the U.S. population.

Timmer et al. - How Children Use Time - Timmer et al. (1985) conducted a study using the data obtained on children's time use from a 1981-1982 Panel follow-up of 1975-1976 households. Respondents (922) in this study were those that completed at least three out of four waves of interview in the 1975 - 1976 survey. The survey was conducted February through December 1981, and households were contacted four times during a 3 month interval of the survey period. The first contact was a personal interview, followed by subsequent telephone interviews for most of the respondents. However, families with children were contacted personally and questionnaires were administered to three children per household.

The children surveyed were between the ages of 3 through 17 years old and were interviewed twice. The questionnaires administered to children had two components: a time diary and a standardized interview. The time diary involved children reporting their activities beginning at 12.00 a.m. the previous night; the duration and location of each activity; the presence of another individual; and whether they were performing other activities at the same time. The standardized interview administered to the children was to gather information about their psychological, intellectual (using reading comprehension tests), and emotional well-being; their hopes and goals; their family environment; and their attitudes and beliefs.

For preschool children, parents provided information about their previous day activities. Children in first through third grades completed the time diary with their parents and, in addition, completed reading tests. Children in the fourth grade and above provided their own diary information and participated in the interview. Parents were asked to assess their children's socioemotional and intellectual development. A survey form was sent to a teacher of each school-age child to evaluate each child's socioemotional and intellectual development.

The mean time spent performing major activities on weekdays and weekends by age and sex, and type of day is presented in Table 5-14. On weekdays, children spend about 30 percent of their time sleeping, 20 percent in school, and 10 percent eating, washing, dressing, and performing other personal activities (Timmer et al., 1985). The data in Table 5-14 indicates that girls spend more time than boys performing household work and personal care activities, and less time playing sports. Also, children spend most of their free time watching television. Table 5-15 presents the mean time children spend during weekdays and weekends performing major activities by five different age groups. Also, the significant effects of each variable (i.e., age, sex) are shown in Table 5-15. Older children spend more time performing household and market work, studying and watching television, and less time eating, sleeping, and playing. Timmer et al. (1985) estimated that on the average, boys spend 19.4 hours a week watching television and girls spend 17.8 hours per week performing the same activity.

A limitation associated with this study is that the data reflect only the time of the year when children attend school; time use during school vacation was not accounted for. Therefore, the data does not provide an overall annual estimate of children's time use. Another limitation is that a distribution pattern of children's time use was not provided. In addition, the survey was conducted in 1981 and because activity patterns in children may have changed significantly from that period when compared with recent times. Therefore,

Table 5-14. Mean Time Spent (Minutes) Performing Major Activities Grouped by Age, Sex and Type of Day

Activity	Age (3-11) Duration of Time (mins/day) Weekdays Boys (n=118)	Age (3-11) Weekdays Girls (n=111)	Age (3-11) Weekends Boys (n=118)	Age (3-11) Weekends Girls (n=111)	Age (12-17) Duration of Time (mins/day) Weekdays Boys (n=77)	Age (12-17) Weekdays Girls (n=83)	Age (12-17) Weekends Boys (n=77)	Age (12-17) Weekends Girls (n=83)
Market Work	16	0	7	4	23	21	58	25
Household Work	17	21	32	43	16	40	46	89
Personal Care	43	44	42	50	48	11	35	76
Eating	81	78	78	84	73	65	58	75
Sleeping	584	590	625	619	504	478	550	612
School	252	259	--	--	314	342	--	--
Studying	14	19	4	9	29	37	25	25
Church	7	4	53	61	3	7	40	36
Visiting	16	9	23	37	17	25	46	53
Sports	25	12	33	23	52	37	65	26
Outdoors	10	7	30	23	10	10	36	19
Hobbies	3	1	3	4	7	4	4	7
Art Activities	4	4	4	4	12	6	11	9
Playing	137	115	177	166	37	13	35	24
TV	117	128	181	122	143	108	187	140
Reading	9	7	12	10	10	13	12	19
Household Conversations	10	11	14	9	21	30	24	30
Other Passive Leisure	9	14	16	17	21	14	43	33
NA[a]	22	25	20	29	14	17	10	4
Percent of Time Accounted for by Activities Above	94%	92%	93%	89%	93%	92%	88%	89%

[a] NA = Unknown

Source: Timmer et al., 1985.

Table 5-15. Mean Time Spent in Major Activities Grouped by Type of Day for Five Different Age Groups

	Time Duration (mins)										Sig Effects[a]
	Weekday					Weekend					
Age	3-5	6-8	9-11	12-14	15-17	3-5	6-8	9-11	12-14	15-17	
Activities											
Market Work	--	14	8	14	28	--	4	10	29	48	
Personal Care	41	49	40	56	60	47	45	44	60	51	A,S,AxS (F>M)
Household Work	14	15	18	27	34	17	27	51	72	60	A,S, AxS (F>M)
Eating	82	81	73	69	67	81	80	78	68	65	A
Sleeping	630	595	548	473	499	634	641	596	604	562	A
School	137	292	315	344	314	--	--	--	--	--	
Studying	2	8	29	33	33	1	2	12	15	30	A
Church	4	9	9	9	3	55	56	53	32	37	A
Visiting	14	15	10	21	20	10	8	13	22	56	A (Weekend only)
Sports	5	24	21	40	46	3	30	42	51	37	A,S (M>F)
Outdoor activities	4	9	8	7	11	8	23	39	25	26	
Hobbies	0	2	2	4	6	1	5	3	8	3	
Art Activities	5	4	3	3	12	4	4	4	7	10	
Other Passive Leisure	9	1	2	6	4	6	10	7	10	18	A
Playing	218	111	65	31	14	267	180	92	35	21	A,S (M>F)
TV	111	99	146	142	108	122	136	185	169	157	A,S, AxS (M>F)
Reading	5	5	9	10	12	4	9	10	10	18	A
Being read to	2	2	0	0	0	3	2	0	0	0	A
NA	30	14	23	25	7	52	7	14	4	9	A

[a] Effects are significant for weekdays and weekends, unless otherwise specified A = age effect, P<0.05, for both weekdays and weekend activities; S = sex effect P<0.05, F>M, M>F = females spend more time than males, or vice versa; and AxS = age by sex interaction, P<0.05.

Source: Timmer et al., 1985.

application of these data for current exposure situations may bias exposure assessments results. An advantage of this survey is that diary recordings of activity patterns were kept and the data obtained were not completely based on recall. Another advantage is that parents assisted younger children with keeping their diaries and during interviews; this helped to minimize any bias that may have been created by having younger children record their data.

Hill - Patterns of Time Use - Hill (1985) investigated the total amount of time American adults spend in one year performing various activities and the variation in time use across three different dimensions: demographic characteristics, geographical location, and seasonal characteristics. In this study, time estimates were based on data collected from time diaries in four waves (1 per season) of a survey conducted in the 1975-1976 Time Allocation Study. The survey was conducted from fall 1975 through fall 1976. The sampling periods included two weekdays, one saturday, and one sunday. The 1975-1976 Time Allocation Study provided information on the amount of time spent performing primary activities. The information gathered were responses to the survey question ("what were you doing?"). The survey also provided information on secondary activities (i.e., respondents performing more than one activity at the same time). Hill (1985) analyzed time estimates for 10 broad categories of activities based on data collected from 87 activities. These estimates included seasonal variation in time use patterns and comparisons of time use patterns for different days of the week. The 10 major categories and ranges of activity codes are listed in Appendix Table 5A-2. Hill (1985) collected data on time use for the major activity patterns in four different age groups (18-24, 25-44, 45-64, and 65 and older). However, the time use data were summarized in graphs rather than in tables.

Analysis of the 1975-76 survey data revealed very small regional differences in time use among the broad activity patterns (Hill, 1985). The weighted mean hours per week spent performing the 10 major activity categories presented by region are shown in Table 5-16. In all regions, adults spent more time on personal care (included night sleep). Adults in the North Central region of the country spent more time on market work activities than adults in other regions of the country. Adults in the South spent more time on leisure activities (passive and active combined) than adults elsewhere (Table 5-16). Table 5-17 presents the time spent per day, by the day of the week for the 10 major categories. Time spent on the

Table 5-16. Mean Time Spent (hours/week)[a] in 10 Major Activity Categories Grouped by Regions

Activity	West N=200	North Central N=304	Northeast N=185	South N=286	Total N[b]=975 Mean	S.D.[c]
Market Work	23.44	29.02	27.34	24.21	26.15	23.83
House/yard work	14.64	14.17	14.29	15.44	14.66	12.09
Child care	2.50	2.82	2.32	2.66	2.62	5.14
Services/shop	5.22	5.64	4.92	4.72	5.15	5.40
Personal care	79.23	76.62	78.11	79.38	78.24	12.70
Education	2.94	1.43	0.95	1.45	1.65	6.34
Organizations	3.42	2.97	2.45	2.68	2.88	5.40
Social entertainment	8.26	8.42	8.98	8.22	8.43	8.17
Active leisure	5.94	5.28	4.77	5.86	5.49	7.81
Passive leisure	22.47	21.71	23.94	23.47	22.80	13.35
Total Time	168.00	168.00	168.00	168.00	168.00	0.09

[a] Weighted for day of week, panel loss (not defined in report), and correspondence to Census. Data may not add to totals shown due to rounding.

[b] N = surveyed population

[c] S.D. = standard deviation

Source: Hill, 1985.

Table 5-17. Total Mean Time Spent (mins/day) in Ten Major Activity Categories Grouped by Type of Day

Activity Category	Time Duration (mins/day)		
	Weekday [N[a] = 831]	Saturday [N[a] = 831]	Sunday [N[a] = 831]
Market Work	288.0 (257.7)	97.9 (211.9)	58.0 (164.8)
House/Yardwork	126.3 (119.3)	160.5 (157.2)	124.5 (133.3)
Child Care	26.6 (50.9)	19.4 (51.5)	24.8 (61.9)
Services/Shopping	48.7 (58.7)	64.4 (92.5)	21.6 (49.9)
Personal Care	639.2 (114.8)	706.8 (169.8)	734.3 (156.5)
Education	16.4 (64.4)	5.4 (38.1)	7.3 (48.0)
Organizations	21.1 (49.7)	18.4 (75.2)	58.5 (104.5)
Social Entertainment	54.9 (69.2)	1,114.1 (156.0)	110.0 (151.2)
Active Leisure	37.9 (71.11)	61.4 (126.5)	64.5 (120.6)
Passive Leisure	181.1 (121.9)	191.8 (161.6)	236.5 (167.1)
Total Time	1,440	1,440	1,440

[a] N = Number of respondents
( ) = Numbers in parentheses are standard deviations

Source: Hill, 1985.

87 activities (components of the 10 major categories) are presented in Appendix Table 5A-3. Adult time use was dominated in descending order by personal care (including sleep), market work, passive leisure, and house work. Collectively, these activities represent about 80 percent of available time (Hill, 1985).

According to Hill (1985), sleep was the single most dominant activity averaging about 56.3 hours per week. Television watching (passive leisure) averaged about 21.8 hours per week, and housework activities averaged about 14.7 hours per week. Weekdays were predominantly market-work oriented. Weekends (Saturday and Sunday) were predominantly devoted to household tasks ("sleeping in," socializing, and active leisure) (Hill, 1985). Table 5-18 presents the mean time spent performing these 10 groups of activities during each wave of interview (fall, winter, spring, and summer). Adjustments were made to the data to assure equal distributions of weekdays, Saturdays, and Sundays (Hill, 1985). The data indicates that the time adults spent performing market work, child care, shopping, organizational activities, and active leisure were fairly constant throughout the year (Hill, 1985). The mean hours spent per week in performing the 10 major activity patterns are presented by gender in Table 5-19 (time use patterns for all 87 activities are presented in Appendix Table 5A-4) . The data in Table 5-19 indicates that time use patterns from the mid-1970's survey show gender differences. Men spent more time on activities related to labor market work and education, and women spent more time on household work activities.

A limitation associated with this study is that the time data were obtained from an old survey conducted in the mid-1970s. Because of dynamic changes in the present society, applying these data to current exposure assessments may result in some biases. Another limitation is that time use data were not presented for children. An advantage of this study is that time diaries were kept and data were not based on recall. The former approach may result in a more accurate data set. Another advantage of this study is that the survey is seasonally balanced since it was conducted throughout the year and the data are from a large survey sample.

Carey - Occupational Tenure in 1987: Many Workers Have Remained in Their Fields - Carey (1988) presented median occupational and employer tenure for different age groups (16-24, 25-34, 35-44, 45-54, 55-64, and 65 and older), gender, earnings, ethnicity, and

Table 5-18. Mean Time Spent (mins/day) in 10 Major Activity Categories During Four Waves of Interviews[a]

Activity Category	Fall Wave 1 (Nov. 1, 1975)[b] N=861	Winter Wave 2 (Feb. 28, 1976)[b]	Spring Wave 3 (June 1, 1976)[b] N=861	Summer Wave 4 (Sept. 21, 1976)[b] N=861	Range of Standard Deviations
Market work	222.94	226.53	210.44	230.92	272-287
House/yard work	133.16	135.58	143.10	119.95	129-156
Child care	25.50	22.44	25.51	21.07	49-58
Services/shop	48.98	44.09	44.61	47.75	76-79
Personal care	652.95	678.14	688.27	674.85	143-181
Education	22.79	12.57	2.87	10.76	32-93
Organizations	25.30	22.55	23.21	29.91	68-87
Social entertainment	63.87	67.11	83.90	72.24	102-127
Active leisure	42.71	47.46	46.19	42.30	96-105
Passive leisure	210.75	183.48	171.85	190.19	144-162
Total Time	1440.00	1440.00	1440.00	1440.00	–

[a] Weighted for day of week, panel loss (not defined in report), and correspondence to Census.
[b] Dates by which 50% of the interviews for each wave were taken.

Source: Hill, 1985.

Table 5-19. Mean Time Spent (hours/week) in 10 Major Activity Categories grouped by Gender[a]

Activity Category	Time duration (hours/week)					
	Men n = 410		Women n = 561		Men and Women n = 971	
Market work	35.8	(23.6)[b]	17.9	(20.7)	26.2	(23.8)
House/yard	8.5	(9.0)	20.0	(11.9)	14.7	(12.1)
Child care	1.2	(2.5)	3.9	(6.4)	2.6	(5.2)
Services/shop	3.9	(4.5)	6.3	(5.9)	5.2	(5.4)
Personal care	77.3	(13.0)	79.0	(12.4)	78.2	(12.7)
Education	2.3	(7.7)	1.1	(4.8)	1.7	(6.4)
Organizations	2.5	(5.5)	3.2	(5.3)	2.9	(5.4)
Social entertainment	7.9	(8.3)	8.9	(8.0)	8.4	(8.2)
Active leisure	5.9	(8.2)	5.2	(7.4)	5.5	(7.8)
Passive leisure	22.8	(14.1)	22.7	(12.7)	22.8	(13.3)
Total time	168.1		168.1		168.1	

[a] Detailed components of activities (87) are presented in Table 5A-4.

[b] ( ) = Numbers in parentheses are standard deviations.

Source: Hill, 1985.

educational attainment. Occupational tenure was defined as "the cumulative number of years a person worked in his or her current occupation, regardless of number of employers, interruptions in employment, or time spent in other occupations" (Carey, 1988). The information presented was obtained from supplemental data to the January 1987 Current Population Study, a U.S. Bureau of the Census publication. Carey (1988) did not present information on the survey design.

The median occupational tenure by age and gender, ethnicity, and employment status are presented in Tables 5-20, 5-21, and 5-22, respectively. The median occupational tenure of the working population (109.1 million people) 16 years of age and older in January of 1987, was 6.6 years (Table 5-20). Table 5-20 also shows that median occupational tenure increased from 1.9 years for workers ages 16-24 to 21.9 for workers 70 years and older. The median occupational tenure for men 16 years and older was higher (7.9 years) than for women of the same age group (5.4 years). Table 5-21 indicates that whites had more occupational tenure (6.7 years) than blacks (5.8 years), and Hispanics (4.5 years). Full-time workers had more occupational tenure than part-time workers 7.2 years and 3.1 years, respectively (Table 5-22).

Table 5-23 presents the median occupational tenure among major occupational groups. The median tenure ranged from 4.1 years for service workers to 10.4 years for people employed in farming, forestry, and fishing. In addition, median occupational tenure among detailed occupations ranged from 24.8 years for barbers to 1.5 years for food counter and fountain workers (Appendix Table 5A-5).

The strength of an individual's attachment to a specific occupation usually is dependent on the individual's investment in education (Carey, 1988). Carey (1988) reported the median occupational tenure for the surveyed working population by age and educational level. Workers with 5 or more college years had the highest median occupational tenure of 10.1 years. Workers that were 65 years and older with 5 or more college years had the highest occupational tenure level of 33.8 years. The median occupational tenure was 10.6 years for self-employed workers and 6.2 years for wage and salary workers (Carey, 1988).

A limitation associated with this study is that the survey design employed in the data collection was not presented. Therefore, the validity and accuracy of the data set cannot be

Table 5-20. Occupational Tenure of Employed Individuals by Age and Sex

	Median Tenure (years)		
Age Group	All Workers	Men	Women
16-24	1.9	2.0	1.9
25-29	4.4	4.6	4.1
30-34	6.9	7.6	6.0
35-39	9.0	10.4	7.0
40-44	10.7	13.8	8.0
45-49	13.3	17.5	10.0
50-54	15.2	20.0	10.8
55-59	17.7	21.9	12.4
60-64	19.4	23.9	14.5
65-69	20.1	26.9	15.6
70 and older	21.9	30.5	18.8
Total, 16 years and older	6.6	7.9	5.4

Source: Carey, 1988.

Table 5-21. Occupational Tenure for Employed Individuals Grouped by Sex and Race

Race	Median Tenure (Years)		
	All Individuals	Men	Women
White	6.7	8.3	5.4
Black	5.8	5.8	5.8
Hispanics	4.5	5.1	3.7

Source: Carey, 1988.

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Table 5-22. Occupational Tenure for Employed Individuals Grouped by Sex and Employment Status

	Median Tenure (Years)		
Employment Status	All Individuals	Men	Women
Full-Time	7.2	8.4	5.9
Part-Time	3.1	2.4	3.6

Source: Carey, 1988.

Table 5-23. Occupational Tenure of Employed Individuals Grouped by Major Occupational Groups and Age

		Median Tenure (years)					
		Age Group					
Occupational Group	Total[a]	16-24	25-34	35-44	45-54	55-64	65+
Executive, Administrative and Managerial	8.4	2.4	5.6	10.1	15.1	17.9	26.3
Professional Specialty	9.6	2.0	5.7	12.0	18.2	25.6	36.2
Technicians and Related Support	6.9	2.2	5.7	10.9	17.7	20.8	22.2
Sales Occupations	5.1	1.7	4.7	7.7	10.5	15.5	21.6
Administrative Support, including Clerical	5.4	2.1	5.0	7.6	10.9	14.6	15.4
Service Occupations	4.1	1.7	4.4	6.9	9.0	10.6	10.4
Precision Production, Craft and Repair	9.3	2.6	7.1	13.5	19.9	25.7	30.1
Operators, Fabricators and Laborers	5.5	1.7	4.6	9.1	13.7	18.1	14.7
Farming, Forestry and Fishing	10.4	2.9	7.9	13.5	20.7	30.5	39.8

[a] Includes all workers 16 years and older

Source: Carey, 1988.

determined. Another limitation is that only median values were reported in the study. An advantage of this study is that occupational tenure (years exposed to a specific occupation) was obtained for various age groups by gender, ethnicity, employment status, and educational level. Another advantage of this study is that the data were based on a survey population which appears to represent the general U.S. population.

Carey - Occupational Tenure, Employer Tenure, and Occupational Mobility - Carey (1990) conducted another study similar in scope to the study of Carey (1988). The January 1987 Current Population Study (CPS) was used. This study provided data on occupational mobility and employer tenure in addition to occupational tenure. Occupational tenure was referred in Carey (1988) as the "the cumulative number of years a person worked in his or her current occupation, regardless of number of employees, interruptions in employment, or time spent in other locations." Employer tenure was defined as "the length of time a worker has been with the same employer," while occupational mobility was defined as "more or less a mirror image of occupational tenure; it measures the number of workers who change from one occupation to another" (Carey, 1990). Occupational mobility was measured by asking individuals who were employed both in January 1986 and January 1987 if they were doing the same kind of work in each of these months (Carey, 1990). Carey (1990) further analyzed the occupational mobility data and obtained information on entry and exit rates for occupations. These rates were defined as "the percentage of persons employed in an occupation who had voluntarily entered it from another occupation; conversely, an exit rate is the percentage of persons employed in an occupation who had voluntarily left for a new occupation" (Carey, 1990).

Table 5-24 shows the voluntary occupational mobility rates in January 1987 for workers 16 years and older. For all workers, the overall voluntary occupational mobility rate was 5.3 percent. These data also show that younger workers left occupations at a higher rate than older workers. Carey (1990) reported that 10 million of the 100.1 million individuals employed in January 1986 and in January 1987 had changed occupations during that period, resulting in an overall mobility rate of 9.9 percent. Executive, administrative, and managerial occupations had the highest entry rate of 5.3 percent, followed by administrative support including clerical at 4.9 percent. Sales had the highest exit rate of 5.3

Table 5-24. Voluntary Occupational Mobility Rates for Workers Age 16 and Older

Age Group	Occupational Mobility Rate
16-24	12.7
25-34	6.6
35-44	4.0
45-54	1.9
55-64	1.0
64 and older	0.3
Total, age 16 and older	5.3

Source: Carey, 1990.

percent and service had the second highest exit rate of 4.8 percent (Carey, 1990). In January 1987, the median employer tenure for all workers was 4.2 years. The median employee tenure was 12.4 years for those workers that were 65 years of age and older (Carey, 1990).

Because the study was conducted by Carey (1990) was in a similar manner to that of the previous study (Carey, 1988), the same advantages and disadvantages associated with Carey (1988) also apply to this data set.

Robinson and Thomas - Time Spent in Activities, Locations, and Microenvironments: A California-National Comparison - Robinson and Thomas (1991) reviewed and compared data from the 1987-88 California Air Resources Board (CARB) time activity study and from a similar 1985 national study, American's Use of Time. Data from the national study were recorded similarly to the CARB code categories, in order to make data comparisons (Robinson and Thomas, 1991).

The CARB study involved residents who lived in the state of California. One adult 18 years or older was randomly sampled in each household and was asked to complete a diary with entries for the previous day's activities and the location of each activity. Time use patterns for other adults 12 years and older in the households contacted were also included in the diaries. Telephone interviews based on the random-digit-dialing procedure were conducted for approximately 1,762 respondents in the CARB survey. These interviews were distributed across all days of the week and across different months of the year (between October 1987-August 1988).

In the 1985 national study, single day diaries were collected from over 5,000 respondents across the United States, 12 years of age and older. The study was conducted January through December, 1985. Three modes of time diary collection were employed for this survey: mailback, telephone interview, and personal interview. Data obtained from the personal interviews were not used in this study (Robinson and Thomas, 1991). The sample population for the mail-back and telephone interview was selected based on a random-digit-dialing (RDD) method. The RDD was designed to represent all telephone households in the contiguous United States (Robinson and Thomas, 1991). In addition to estimates of time spent at various activities and locations, the survey design provided information on the employment status, age, education, race, and gender for each member of the respondents household. The mail-back procedure was based on a "tomorrow" approach and the telephone interview was based on recall.

Data comparisons by Robinson and Thomas (1991) were based on 10 major activity categories (100 sub-category codes) and 3 major locations (44 sub-location codes) employed in both the CARB and the 1985 national study. In order to make data comparisons, Robinson and Thomas (1991) excluded responses from individuals of ages 65 years and older and 18 years or less in both surveys. In addition, only mail-back responses were analyzed for the 1985 national study. The data were then weighted to project both the California and national population in terms of days of the week, region, numbers of respondents per household, and 3 monthly seasons of the year (Robinson and Thomas, 1991).

Table 5-25 shows the mean time spent in the 10 major activities by gender and for all respondents between the ages of 18-64 years (time use data for the individual activities are presented in Appendix Table 5A-6). In both studies respondents spent most of their time (642 mins/day) on personal needs and care (i.e., sleep). Californians spent more time on paid work, education and training, obtaining goods and services, and communication and less time on household work, child care, organizational activities, entertainment/social activities, and recreation than the national population. The male and female population followed almost the same trend as the general population. Table 5-26 shows the mean time spent at 3 major locations for the CARB and national study grouped by total sample and gender, ages 18-64 (time use data for the 44 detailed microenvironments are presented in Appendix Table 5A-7). Respondents spent most time at home, 892 mins/day for the CARB and 954 mins/day for the national study. Californians spent more of their time away from home and traveling compared to the national population.

In addition, Robinson and Thomas (1991) defined a set of 16 microenvironments based on the activity and location codes employed in both studies. The analysis included data for adolescents (12-17 years) and adults (65 years and older) in both the CARB study and the mail-back portion of the 1985 national study (Robinson and Thomas, 1991). The mean duration of time for total sample population, 12 years and older, across three types of locations are presented in Table 5-27 for both studies. Respondents spent most of their time indoors, 1255 and 1279 mins/day for the CARB and national study, respectively.

Table 5-25. Mean Time Spent in 10 Major Activity Cateogries Grouped by Total Sample and Gender for the CARB and National Studies (Age 18-64)

Activity Category[a]	Activity Codes[b]	Time Duration (mins/day) CARB (1987-88)	National (1985)	CARB (1987-88)		National (1985)	
		Total Sample		Men	Women	Men	Women
		n = 1,359	n = 1,980	n = 639	n = 720	n = 921	n = 1,059
Paid Work	00-09	273	252	346	200	323	190
Household Work	10-19	102	118	68	137	79	155
Child Care	20-29	23	25	12	36	11	43
Obtaining Goods and Services	30-39	61	55	48	73	44	62
Personal Needs and Care	40-49	642	642	630	655	636	645
Education and Training	50-59	22	19	25	20	21	16
Organizational Activities	60-69	12	17	11	13	12	20
Entertainment/Social Activities	70-79	60	62	57	55	64	62
Recreation	80-89	43	50	53	31	69	43
Communication	90-99	202	196	192	214	197	194

[a,b] = Time use for components of activity categories and codes are shown in Appendix Table 5A-6.

n = total diary days.

Source Adapted from U.S. EPA, 1991.

Table 5-26. Total Mean Time Spent at 3 Major Locations Grouped by Total Sample and Gender for the CARB and National Study (Ages 18-64)

Location[a]	Code[b]	CARB (1987-88)	National (1985)	CARB (1987-88)		National (1985)	
		Total Sample		Men	Women	Men	Women
		n* = 1359	n* = 1980	n* = 39	n* = 720	n* = 921	n* = 1059
At Home	WC01-13	892	954	822	963	886	1022
Away From Home	WC21-40	430	384	487	371	445	324
Travel	WC51-61	116	94	130	102	101	87
Not Ascertained	WC99	2	8	1	4	8	7
Total Time		1440	1440	1440	1440	1440	1440

*n Total Diary Days.

a,b = Time use data for the 44 components of location and location codes are presented in Appendix Table 5A-7.

Source: Robinson and Thomas, 1991.

Table 5-27. Mean Time Spent at Three Locations for both CARB and National Studies (Ages 12 and Older)

Location Category	Mean duration (mins/day)			
	CARB (n* = 1762)	S.E.[a]	National (n* = 2762)[b]	S.E.[a]
Indoor	1255[c]	28	1279[c]	21
Outdoor	86[d]	5	74[d]	4
In-Vehicle	98[d]	4	87[d]	2
Total Time Spent	1440		1440	

[a] S.E. = Standard Error of Mean
[b] Weighted Number - National sample population was weighted to obtain a ratio of 46.5 males and 53.5 females, in equal proportion for each day of the week, and for each quarter of the year.
[c] Difference between the mean values for the CARB and National studies is not statistically significant.
[d] Difference between the mean values for the CARB and National studies is statistically significant at the 0.05 level.

Source: Robinson and Thomas, 1991.

Table 5-28 presents the mean duration of time and standard mean error for the 16 microenvironments grouped by total sample population and gender, respectively. Also included is the mean time spent for respondents (Doers) who reported participating in each activity. Table 5-28 shows that in both studies men spend more time in autoplaces, garages, motor and other vehicles, physical outdoor activities, outdoor sites and work locations. In contrast, women spend more time cooking, engaging in other kitchen activities, performing other chores and shopping. The same trend holds on a per participant basis as well.

Table 5-29 shows the mean time spent in various microenvironments grouped by type of the day in both studies. Generally, respondents spent most of their time during the weekends in restaurants/ bars (CARB study), motor vehicles, outdoor activities, social-cultural settings, leisure/ communication activities, and sleeping. Microenvironmental differences by age are presented in Table 5-30. Respondents in the age group 18-24 and 25-44 spent most of their time in restaurants/bars and traveling. The oldest age group 65 years and older spent most of their time in the kitchen (cooking and other kitchen related activities) and communication activities.

Limitations associated with this study are that the CARB survey was based on recall and the survey was performed in California only. This may somewhat bias the CARB data set obtained. Another limitation is that the 1985 national study and the CARB studies were conducted independently. Therefore, survey designs (i.e., locational coding system) were different which may have resulted in varying estimates obtained from both studies, including the data that was recorded by Robinson and Thomas (1991). Other limitations are that time distribution patterns (statistical analysis) were not provided in both studies and the data are short term data. An advantage of this study is that the 1985 national study represent the general U.S. population. Also, it provides time estimates by activities, locations, microenvironments grouped by age, gender, and type of day. Another advantage is within the data comparisons, overall, both data sets showed similar patterns of activity (Robinson and Thomas, 1991).

California Air Resources Board (CARB) - Study of Children's Activity Patterns - The California children's activity pattern survey design provided time estimates of children (11 years old or less) in various activities and locations (microenvironments) on a typical day

Table 5-28. Mean Time Spent (mins/Day) in Various Microenvironments Grouped by Total Population and Gender (12 years and over) in the National CARB Data

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	National Data Mean Duration (standard error)[a]					
Microenvironment	N = 1284[b] Men	"Doer"[c] Men	N = 1478[b] Women	"Doer" Women	N = 2762[b] Total	"Doer" Total
Autoplaces	5 (1)	90	1 (0)	35	3 (0)	66
Restaurant/bar	22 (2)	73	20 (2)	79	21 (1)	77
In-vehicle	92 (3)	99	82 (3)	94	87 (2)	97
In-Vehicle/other	1 (1)	166	1 (0)	69	1 (0)	91
Physical/outdoors	24 (3)	139	11 (2)	101	17 (2)	135
Physical/indoors	11 (1)	84	6 (1)	57	8 (1)	74
Work/study-residence	17 (2)	153	15 (2)	150	16 (1)	142
Work/study-other	221 (10)	429	142 (7)	384	179 (6)	390
Cooking	14 (1)	35	52 (2)	67	34 (1)	57
Other activities/kitchen	54 (3)	69	90 (4)	102	73 (2)	88
Chores/child	88 (3)	89	153 (5)	154	123 93)	124
Shop/errand	23 (2)	56	38 (2)	74	31 (1)	67
Other/outdoors	70 (6)	131	43 (4)	97	56 (4)	120
Soc/cultural	71 (4)	118	75 (4)	110	73 (3)	118
Leisure-eat/indoors	235 (8)	241	215 (7)	224	224 (5)	232
Sleep/indoors	491 (14)	492	496 (11)	497	494 (9)	495

	CARB Data Mean Duration (standard error)[a]					
Microenvironment	N = 867[b] Men	"Doer"[c] Men	N = 895[b] Women	"Doer" Women	N = 1762[b] Total	"Doer" Total
Autoplaces	31 (8)	142	9 (2)	50	20 (4)	108
Restaurant/bar	45 (4)	106	28 (3)	86	36 (3)	102
In-vehicle	105 (7)	119	85 (4)	100	95 (4)	111
In-Vehicle/other	4 (1)	79	3 (2)	106	3 (1)	94
Physical/outdoors	25 (3)	131	8 (1)	86	17 (2)	107
Physical/indoors	8 (1)	63	5 (1)	70	7 (1)	68
Work/study-residence	14 (3)	126	11 (2)	120	13 (2)	131
Work/study-other	213 (14)	398	156 (11)	383	184 (9)	450
Cooking	12 (1)	43	42 (2)	65	27 (1)	55
Other activities/kitchen	38 (3)	65	60 (4)	82	49 (2)	74
Chores/child	66 (4)	75	134 (6)	140	100 (4)	109
Shop/errand	21 (3)	61	41 (3)	78	31 (2)	70
Other/outdoors	95 (9)	153	44 (4)	82	69 (5)	117
Soc/cultural	47 (4)	112	59 (5)	114	53 (3)	112
Leisure-eat/indoors	223 (10)	240	251 (10)	263	237 (7)	250
Sleep/indoors	492 (17)	499	504 (15)	506	498 (12)	501

[a] Standard error of the mean
[b] Weighted number
[c] *Doer = The mean time respondents who reported participating in each activity/location spent in microenvironments.*

Source: Robinson and Thomas, 1991.

Table 5-29. Mean Time Spent (mins/day) in Various Microenvironments by Type of Day (Sample Population Ages 12 and Older)

Weekday

Microenvironment	Mean Duration (standard error)[a] (mins/day)		Mean Duration for "Doer" (mins/day)	
	CARB (n=1259)*	NAT (n=1973)*	CARB	NAT
1 Autoplaces	21 (5)	3 (1)	108	73
2 Restaurant/Bar	29 (3)	20 (2)	83	73
3 In-Vehicle/Internal Combustion	90 (5)	85 (2)	104	95
4 In-Vehicle/Other	3 (1)	1 (0)	71	116
5 Physical/Outdoors	14 (2)	15 (2)	106	118
6 Physical/Indoors	7 (1)	8 (1)	64	68
7 Work/Study-Residence	14 (2)	16 (2)	116	147
8 Work/Study-Other	228 (11)	225 (8)	401	415
9 Cooking	27 (2)	35 (2)	58	57
10 Other Activities/Kitchen	51 (3)	73 (3)	76	87
11 Chores/Child	99 (5)	124 (4)	108	125
12 Shop/Errand	30 (2)	30 (2)	67	63
13 Other/Outdoors	67 (6)	51 (4)	117	107
14 Social/Cultural	42 (3)	62 (3)	99	101
15 Leisure-Eat/Indoors	230 (9)	211 (6)	244	218
16 Sleep/Indoors	490 (14)	481 (10)	495	483

Table 5-29. (Continued)

Weekend

Microenvironment	Mean Duration (standard error)[a] (mins/day)		Mean Duration for "Doer" (mins/day)	
	CARB (n=503)*	NAT (n=789)*	CARB	NAT
1 Autoplaces	19 (4)	3 (1)	82	62
2 Restaurant/Bar	55 (6)	23 (2)	127	84
3 In-Vehicle/Internal Combustion	108 (8)	91 (6)	125	100
4 In-Vehicle/Other	5 (3)	0 (0)	130	30
5 Physical/Outdoors	23 (3)	23 (4)	134	132
6 Physical/Indoors	7 (1)	9 (2)	72	80
7 Work/Study-Residence	10 (2)	15 (3)	155	165
8 Work/Study-Other	74 (11)	64 (6)	328	361
9 Cooking	27 (2)	34 (2)	60	55
10 Other Activities/Kitchen	44 (3)	73 (4)	71	90
11 Chores/Child	103 (7)	120 (5)	114	121
12 Shop/Errand	35 (4)	35 (3)	81	75
13 Other/Outdoors	74 (7)	67 (7)	126	132
14 Social/Cultural	79 (7)	99 (6)	140	141
15 Leisure-Eat/Indoors	256 (12)	257 (11)	273	268
16 Sleep/Indoors	520 (20)	525 (17)	521	525

[a] Standard Error of Mean
* Weighted Number

Source: Robinson and Thomas, 1991.

Table 5-30. Mean Time Spent (mins/day) in Various Microenvironments by Age Groups

Microenvironment	National Data Mean Duration (Standard Error)[b]									
	Age 12-17 N=340[a]	"Doer"[c]	Age 18-24 N=340[a]	"Doer"[c]	Age 24-44 N=340[a]	"Doer"[c]	Age 45-64 N=340[a]	"Doer"[c]	Age 65+ N=340[a]	"Doer"[c]
Autoplaces	2 (1)	73	7 (2)	137	2 (1)	43	4 (1)	73	4 (2)	57
Restaurant/bar	9 (2)	60	28 (3)	70	25 (3)	86	19 (2)	67	20 (5)	74
In-vehicle/internal combustion	79 (7)	88	103 (8)	109	94 (4)	101	82 (5)	91	62 (5)	80
In-vehicle/other	0 (0)	12	1 (1)	160	1 (0)	80	1 (1)	198	1 (1)	277
Physical/outdoors	32 (8)	130	17 (4)	110	19 (4)	164	7 (1)	79	15 (4)	81
Physical/indoors	15 (3)	87	8 (2)	76	7 (1)	71	7 (2)	77	7 (1)	51
Work/study-residence	22 (4)	82	19 (6)	185	16 (2)	181	9 (2)	169	5 (3)	297
Work/study-other	159 (14)	354	207 (20)	391	220 (11)	422	180 (13)	429	35 (6)	341
Cooking	11 (3)	40	18 (2)	39	38 (2)	57	43 (3)	64	50 (5)	65
Other activities/kitchen	53 (4)	64	42 (3)	55	70 (4)	86	90 (6)	101	108 (9)	119
Chores/child	91 (7)	92	124 (9)	125	133 (6)	134	121 (6)	122	119 (7)	121
Shop/errands	26 (4)	68	31 (4)	65	33 (2)	66	33 (3)	67	35 (5)	69
Other/outdoors	70 (13)	129	34 (4)	84	48 (6)	105	60 (7)	118	82 (13)	140
Social/cultural	87 (10)	120	100 (12)	141	56 (3)	94	73 (6)	116	85 (8)	122
Leisure-eat/indoors	237 (16)	242	181 (11)	189	200 (8)	208	238 (11)	244	303 (20)	312
Sleep/indoors	548 (31)	551	511 (26)	512	479 (14)	480	472 (15)	472	507 (26)	509

Table 5-30. Mean Time Spent (mins/day) in Various Microenvironments by Age Groups (continued)

Microenvironment	CARB Data Mean Duration (Standard Error)[b]									
	Age 12-17 N=183[a]	"Doer"[c]	Age 18-24 N=250[a]	"Doer"[c]	Age 24-44 N=749[a]	"Doer"[c]	Age 45-64 N=406[a]	"Doer"[c]	Age 65+ N=158[a]	"Doer"[c]
Autoplaces	16 (8)	124	16 (4)	71	25 (9)	114	20 (5)	94	9 (2)	53
Restaurant/bar	16 (4)	44	40 (8)	98	44 (5)	116	31 (4)	82	25 (7)	99
In-vehicle/internal combustion	78 (11)	89	111 (13)	122	98 (5)	111	100 (11)	117	63 (8)	89
In-vehicle/other	1 (0)	19	3 (1)	60	5 (2)	143	2 (1)	56	2 (1)	53
Physical/outdoors	32 (7)	110	13 (3)	88	17 (3)	128	14 (3)	123	15 (4)	104
Physical/indoors	20 (4)	65	5 (2)	77	6 (1)	61	5 (1)	77	3 (1)	48
Work/study-residence	25 (5)	76	30 (11)	161	7 (2)	137	10 (3)	139	5 (3)	195
Work/study-other	196 (30)	339	201 (24)	344	215 (14)	410	173 (20)	429	30 (11)	336
Cooking	3 (1)	19	14 (2)	40	32 (2)	59	31 (3)	68	41 (7)	69
Other activities/kitchen	31 (4)	51	31 (5)	55	43 (3)	65	62 (6)	91	97 (14)	119
Chores/child	72 (11)	77	79 (8)	85	110 (6)	119	99 (8)	109	123 (15)	141
Shop/errands	14 (3)	50	35 (7)	71	33 (4)	71	32 (3)	77	35 (5)	76
Other/outdoors	58 (8)	78	80 (15)	130	68 (8)	127	76 (12)	134	55 (7)	101
Social/cultural	63 (14)	109	65 (10)	110	50 (5)	122	50 (5)	107	49 (7)	114
Leisure-eat/indoors	260 (27)	270	211 (19)	234	202 (9)	215	248 (15)	261	386 (34)	394
Sleep/indoors	557 (44)	560	506 (30)	510	487 (17)	491	485 (23)	491	502 (31)	502

[a] Weighted number.
[b] Standard error.
[c] The mean time respondents who reported participating in each activity/location spent in microenvironments.

Source: Robinson and Thomas, 1991.

(CARB, 1991). The sample population consisted of 1,200 respondents (including children under 11 years of age and adult informants residing in the child's household) was selected using Waksberg random-digit-dialing methods. The population was also stratified to provide representative estimates for major regions of the state. The survey questionnaire included a time diary which provided information of the children's activity and location patterns based on a 24-hour recall period. In addition, the survey questionnaire included questions about potential exposure to sources of air pollution (i.e., presence of smokers) on the diary day and the socio-demographic characteristics (i.e., age, gender, marital status of adult) of children and adult respondents. One child was randomly selected from an English-speaking household. If the selected child was 8 years old or less, the adult in the same household who spent the most time with the child responded. However, if the selected child was between 9-11 years old, that child responded. The questionnaires and the time diaries were administered via a computer-assisted telephone interviewing (CATI) technology (CARB 1991). The telephone interviews were conducted April 1989 to February 1990 over four seasons: Spring (April-June, 1989), Summer (July-September, 1989), Fall (October-December, 1989), and Winter (January-February, 1990).

The data obtained from the survey interviews resulted in ten major activity categories, 113 detailed activity codes, 6 major categories of locations, and 63 detailed location codes. The average time respondents spent during the 10 activity categories for all children are presented in Table 5-31. Also included in this table are the detailed activity, including its code, with the highest mean duration of time; the percentage of respondents who reported participating in any activity (% doing); and the mean, median, and maximum time duration for "doers." The dominant activity category, personal care (night sleep being the highest contributor), had the highest time expenditure of 794 mins/day (13.2 hours/day). All respondents reported sleeping at night, resulting in a mean daily time per participant of 794 mins/day. Activity category (don't know) resulted in about 2 mins/day and only 4 percent of the respondents reported missing activity time.

Table 5-32 presents the mean time spent in the 10 activity categories by age and gender. Differences in activity patterns for boys and girls tended to be small. Table 5-33 presents the mean time spent in the 10 activity categories grouped by seasons and California

Table 5-31. Mean Time Children Spent in 10 Major Activity Categories for all Respondents

Activity Category	Mean Duration (Mins)	% Doing	Mean Duration for Doers[b] (mins)	Median Duration for Doers[b] (mins)	Maximum Duration for Doers[b] (mins)	Detailed Activity with Highest Avg. Minutes (code)
Work-related[a]	10	25	39	30	405	Eating at work/school/daycare (06)
Household	53	86	61	40	602	Travel to household (199)
Childcare	< 1	< 1	83	30	290	Other child care (27)
Goods/Services	21	26	81	60	450	Errands (38)
Personal Care	794	100	794	770	1440	Night sleep (45)
Education	110	35	316	335	790	School classes (50)
Organizational	4	4	111	105	435	Attend meetings (60)
Entertain/Social	15	17	87	60	490	Visiting with others (75)
Recreation	239	92	260	240	835	Games (87)
Communication/Passive Leisure	192	93	205	180	898	TV use (91)
Don't know/Not coded	2	4	41	15	600	--
All Activities[c]	1441					

[a] Includes eating at school or daycare, an activity not grouped under the "education activities" (codes 50-59, 549).
[b] "Doers" indicate the respondents who reported participating in each activity category.
[c] Column total may sum to 1440 due to rounding error

Source: CARB, 1991.

Table 5-32. Mean Time Children Spent in 10 Major Activity Categories Grouped by Age and Gender

Activity Category	Mean Duration (mins)									
	Boys					Girls				
	0-2 yrs	3-5 yrs	6-8 yrs	9-11 yrs	All Ages	0-2 yrs	3-5 yrs	6-8 yrs	9-11 yrs	All Ages
Work-related	4	9	14	12	10	5	12	11	10	10
Household	33	45	55	65	48	58	44	51	76	57
Childcare	0	0	0	1	<1	0	0	0	4	1
Goods/Services	20	22	19	14	19	22	25	23	22	23
Personal Care	914	799	736	690	792	906	816	766	701	797
Education	60	67	171	138	106	41	95	150	176	115
Organizational	1	3	7	6	4	6	1	4	6	4
Entertainment/Social	3	15	5	34	13	5	16	9	36	17
Recreation	217	311	236	229	250	223	255	238	194	228
Communication/Passive Leisure	187	166	195	250	197	171	173	189	213	186
Don't know/Not coded	1	4	1	1	2	3	1	<1	3	2
All Activities[a]	1440	1441	1439	1440	1442	1440	1438	1441	1441	1440
Sample Sizes Unweighted N's	172	151	145	156	624	141	151	124	160	576

[a] The column totals may differ from 1440 due to rounding error.

Source: CARB, 1991.

Table 5-33. Mean Time Children Spent in 10 Major Activity Categories Grouped by Seasons and Regions

Activity Category	Mean Duration (mins)								
	Season					Region			
	Winter (Jan-Mar)	Spring (Apr-June)	Summer (July-Sept)	Fall (Oct-Dec)	All Seasons	So. Coast	Bay Area	Rest of State	All Regions
Work-related	10	10	6	13	10	10	10	8	10
Household	47	58	53	52	53	45	62	55	53
Childcare	<1	1	<1	<1	<1	<1	<1	1	<1
Goods/Services	19	17	26	23	21	20	21	23	21
Personal Care	799	774	815	789	794	799	785	794	794
Education	124	137	49	131	110	109	115	109	110
Organizational	3	5	5	3	4	2	6	6	4
Entertainment/Social	14	12	12	22	15	17	10	16	15
Recreation	221	243	282	211	239	230	241	249	239
Communication/Passive Leisure	203	180	189	195	192	206	190	175	192
Don't know/Not coded	<1	2	3	<1	2	1	1	3	2
All Activities[a]	1442	1439	1441	1441	1441	1440	1442	1439	1441
Sample Sizes (Unweighted)	318	204	407	271	1200	224	263	713	1200

[a] The column totals may not be equal to 1440 due to rounding error.

Source: CARB, 1991.

regions. There were seasonal differences for 5 activity categories: personal care, educational activities, social/entertainment, recreation, and communication/passive leisure. Time expenditure differences in regions were minimal for childcare, work-related activities, shopping, personal care, education, social life, and recreation.

Table 5-34 presents the distribution of time across six location categories. The participation rates (%) of respondents, the mean, median, and maximum time for "doers." The detailed location with the highest average time expenditure are also shown. The largest amount of time spent was at home (1,078 min/day); 99 percent of respondents spent time at home (1086 mins/participant/day). Tables 5-35 and 5-36 show the average time spent in the six locations grouped by age and gender, and season and region, respectively. There are age differences in time expenditure in educational settings for boys and girls (Table 5-35). There are no differences in time expenditure at the six locations by regions, and time spent in school decreased in the summer months compared to other seasons (Table 5-36). Table 5-37 shows the average potential exposure time children (grouped by age and gender) spent in proximity to tobacco smoke, gasoline fumes, and gas oven fumes. The sampled children spent more time closer to tobacco smoke (77 mins/day) than gasoline fumes (2 mins/day) and gas oven fumes (11 mins/day).

A limitation of this study is that the sampling population was restricted to only English-speaking households; therefore, the data obtained does not represent a diverse population group present in California. Another limitation is that time use data obtained from this survey was based on 24-hr recall, which may somewhat create a bias on the dataset. Other limitations are: the survey was conducted in California and is not representative of the national population, and the significance of the observed differences in the data obtained (i.e., gender, age, seasons, and regions) were not tested statistically. An advantage of this study is that time expenditure in various activities and locations were presented for children grouped by age, gender, and seasons. Also, potential exposures of respondents to pollutants were explored in the survey. Another advantage is the CATI program employed in obtaining time diaries. This program allows automatic coding of activities and locations onto a computer tape, and allows activities forgotten by respondents to be inserted into its appropriate position during interviewing (CARB, 1991).

Table 5-34. Mean Time Children Spent in Six Major Location Categories for All Respondents

Location Category	Mean Duration (mins)	% Doing	Mean Duration (mins)	Median Duration (mins)	Maximum Duration (mins)	Detailed Location with Highest Avg. Time
Home	1,078	99	1,086	1,110	1,440	Home - bedroom
School/Childcare	109	33	330	325	1,260	School or daycare facility
Friend's/Other's House	80	32	251	144	1,440	Friend's/other's house - bedroom
Stores, Restaurants, Shopping Places	24	35	69	50	475	Shopping mall
In-transit	69	83	83	60	1,111	Traveling in car
Other Locations	79	57	139	105	1,440	Park, playground
Don't Know/Not Coded	<1	1	37	30	90	--
All Locations	1,440					

Source: CARB, 1991.

Table 5-35. Mean Time Children Spent in Six Location Categories Grouped by Age and Gender

	Mean Duration (mins.)									
	Boys					Girls				
Location Category	0-2 yrs	3-5 yrs	6-8 yrs	9-11 yrs	All Boys	0-2 yrs	3-5 yrs	6-8 yrs	9-11 yrs	All Ages
Home	1,157	1,134	1,044	1,020	1,094	1,151	1,099	1,021	968	1,061
School/Childcare	86	88	144	120	108	59	102	133	149	111
Friend's/Other's House	67	73	77	109	80	56	47	125	102	80
Stores, Restaurants, Shopping Places	21	25	22	15	21	23	35	27	26	28
In-transit	54	62	61	62	59	76	88	53	93	79
Other Locations	54	58	92	114	77	73	68	81	102	81
Don't Know/Not Coded	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
All Locations[a]	1,439	1,440	1,439	1,440	1,439	1,438	1,440	1,440	1,440	1,440
Sample Sizes (Unweighted)	172	151	145	156	624	141	151	124	160	576

[a] The column totals may not sum to 1,440 due to rounding error.

Source: CARB, 1991.

Table 5-36. Mean Time Children Spent in Six Location Categories Grouped by Season and Region

Location Category	Mean Duration (mins.)								
	Season					Region			
	Winter (Jan-Mar)	Spring (Apr-June)	Summer (July-Sept)	Fall (Oct-Dec)	All Seasons	So. Coast	Bay Area	Rest of State	All Regions
Home	1,091	1,042	1,097	1,081	1,078	1,078	1,078	1,078	1,078
School/Childcare	119	141	52	124	109	113	103	108	109
Friend's/Other's House	69	75	108	69	80	73	86	86	80
Stores, Restaurants, Shopping Places	22	21	30	24	24	26	23	23	24
In-transit	75	75	60	65	69	71	73	63	69
Other Locations	63	85	93	76	79	79	76	81	79
Don't Know/Not Coded	<1	<1	<1	<1	<1	<1	<1	<1	<1
All Locations[a]	1,439	1,439	1,440	1,439	1,439	1,439	1,440	1,440	1,439
Sample Sizes (Unweighted N's)	318	204	407	271	1,200	224	263	713	1,200

[a] The column totals may not sum to 1,440 due to rounding error.

Source: CARB, 1991.

Table 5-37. Mean Time Children Spent in Proximity to Three Potential Exposures Grouped by All Respondents, Age, and Gender

Potential Exposures	Mean Duration (mins.)										
		Boys					Girls				
	All Children	0-2 yrs	3-5 yrs	6-8 yrs	9-11 yrs	All Boys	0-2 yrs	3-5 yrs	6-8 yrs	9-11 yrs	All Girls
Tobacco Smoke	77	115	75	66	66	82	77	68	71	74	73
Gasoline Fumes	2	2	1	1	4	2	1	1	3	1	1
Gas Oven Fumes	11	10	15	12	11	12	12	10	10	7	10
Sample Sizes (Unweighted N's)	1,166[a]	168	148	144	150	610	140	147	122	147	556

[a] Respondents with missing data were excluded.

Source: CARB, 1991.

Tarshis - The Average American Book - Tarshis (1981) compiled a book addressing the habits, tastes, lifestyles and attitudes of the American people. In that book, Tarshis reported data for personal grooming. The data presented are gathered from small surveys, the Newspaper Advertising Bureau and magazines. Tarshis reported frequency and percentage data by gender and age for performing grooming activities such as showers and baths as the following:

- 90 percent take some sort of a bath in an average 24-hour period;
- 5 percent average more than 1 shower or bath a day;
- 75% of men shower, 25% take baths;
- 50% of women take showers, 50% take baths;
- 65% of teenage girls 16-19 shower daily;
- 55% of teenage girls take at least one bath a week;
- 50% of women use an additive in their bath every time they bath;
- Younger and richer people are more likely to shower than bath; and
- Showering is more popular than baths in large cities.

Limitations of this study is that the data are compiled from small surveys, newspapers, and magazines and the data are old. These data may not reflect the current trends of general population. An advantage is that is present frequency data that are useful in exposure assessment especially concerning volatilization of chemicals from water.

U.S. EPA - Dermal Exposure Assessment: Principles and Applications - U.S. EPA (1992a) addressed the variables exposure time, frequency, and duration that are needed to calculate dermal exposure as related to activity. The reader is referred to the document for a detailed discussion of these variables in relation to soil and water related activities. The suggested defaults values that can be used for dermal exposure are presented in Table 5-38. Limitations of this study is that the default values are based on small datasets and a limited

Table 5-38. Range of Recommended Defaults for Dermal Exposure Factors

	Water Contact				Soil Contact	
	Bathing		Swimming			
	Central	Upper	Central	Upper	Central	Upper
Event time and frequency[a]	10 min/event 1 event/day 350 days/yr	15 min/event 1 event/day 350 days/yr	0.5 hr/event 1 event/day 5 days/yr	1.0 hr/event 1 event/day 150 days/yr	40 events/yr	350events/yr
Exposure duration	9 years	30 years	9 years	30 years	9 years	30 years

[a] Bathing event time is presented to be representative of baths as well as showers.

Source: U.S. EPA 1992a.

number of studies. An advantage is that it presents default values for frequency and duration when this specific data are not available.

James and Knuiman - In 1987, James and Knuiman provided a distribution of the amount of time spent showering. This distribution was based on diary records of 2,500 households. Using these data, a cumulative frequency distribution was derived and is presented in Table 5-39. Based on these results, the mean shower length is approximately 8 minutes, the median shower length is approximately 7 minutes and the 90th percentile is approximately 12 minutes.

A limitation of the study is that the data are from households in Australia and may not be representative of U.S. households. An advantage is that it is present cumulative distribution data.

5.3.2. Other Relevant Activity Pattern Studies

Sexton and Ryan - Assessment of Human Exposure to Air Pollution: Methods, Measurements and Models - Sexton and Ryan (1987) addressed the state of the art air pollution exposure assessment and identified gaps for future research. Exposure assessments are dependent on pollutant concentration, exposure duration, and frequency of exposures (Sexton and Ryan, 1987). There are two basic approaches employed in assessing air pollution exposure: (1) air monitoring which involves direct (personal monitors) and indirect measurements; and (2) biological measurements in which biological markers are used to assess exposure (Sexton and Ryan, 1987). In the direct air monitoring approach, personal monitors are worn or carried during an individual's daily activities. Generally, participants maintain records of activities during the test periods. However, this approach is expensive and inconvenient depending on the size and weight of the monitor. In the indirect approach air pollution exposure is integrated by combining pollutant concentrations at fixed locations (i.e., outdoors, indoors) with time diaries, i.e. time spent in various specific micro-environments (Sexton and Ryan, 1987). Examples of biological measurements include immunoassay, bioassay specific for mutagenicity, and sister chromatid exchange rate.

Sexton and Ryan (1987) reported that there is a paucity of information on time budgets and activity patterns as they relate to exposure. They suggested the need for

Table 5-39. Cumulative Frequency Distribution of Average Shower Duration for 2,500 Households

Shower duration (minutes)	Cumulative frequency (percentage)
1	0.2
2	0.8
3	3.2
4	9.8
5	22.6
6	38.2
7	52.6
8	63.8
9	73.4
10	81.0
11	86.2
12	90.2
13	92.4
14	94.2
15	95.6
16	96.8
17	97.6
18	98.6
19	99.4
20	100.0

Source: James and Knuiman, 1987.

investigators to conduct more studies relating time-activity patterns to exposures and studies relating factors such as age, gender, socioeconomic status, and occupation to time-activity patterns. Sexton and Ryan summarized two earlier studies in which time-activity patterns were measured over a 24-hour period. These data are presented in Table 5-40. The respondents spent most of their time indoors, 21.95 hours (65 percent of total time) and 22.41 hours (70 percent of total time) for studies 1 and 2, respectively.

A limitation associated with this study is that the accuracy and the validity of the data presented were not discussed. In addition, the data presented are old, from studies in 1972 and 1974. There may have been significant changes in time expenditure in various microenvironments over two decades ago compared with recent times. Therefore, applying this data set to current exposures may bias the results obtained.

Sell - The Use of Children's Activity Patterns in the Development of a Strategy for Soil Sample in West Central Phoenix - In a report prepared for the Arizona Department of Environmental Quality, Sell (1989) investigated the activity patterns of preschool and school age children in Phoenix. The survey was conducted in two parts: (1) most of the school age children were interviewed personally from May through June, 1989 in three schools; and (2) survey questionnaires were mailed to parents of preschool children.

In the first survey, 15 percent of the total school population (2,008) was sampled with 111 children in grades K-6 participating (response rate of 37 percent). The surveyed population was 53.2 percent male and 46.8 percent female. Of this population, 41 percent were Hispanics, 49.5 percent Anglos, 7.2 percent Blacks, and 1.7 percent Asians. The children interviewed were between the ages of 5-13 years old. Within each school, the children in grades K-6 were stratified into two groups, primary (grades K-3) and intermediate (grades 4-6), and the children were selected randomly from each group. However, younger children in grades K-2 were either interviewed in school or at home in the presence of a parent or an adult care-provider. In the course of the interview, children were asked to identify locations of activity areas, social areas (i.e., places they went with friends), favorite areas, and locations of forts or clubhouses. Aerial photographs were used to mark these areas.

Table 5-40. Summary of Mean Time-Activity Patterns Over a 24-Hour Period

Location	Time Duration (Hours) Study 1[a]	Study 2[b]
Indoors		
Home	16.03	16.75
Work	4.61	4.03
Other	1.31	1.63
Subtotal	21.95	22.41
Outdoors		
Home	0.27	0.23
Work	--	--
Other	0.27	0.12
Subtotal	0.54	0.35
In Transit		
All Modes	1.16	1.25
Total	23.65[c]	24.01

[a] Study 1 - Chapin (1974)
[b] Study 2 - Szalai (1972)
[c] Shortfall from 24-hr. not explained by author

Source: Sexton and Ryan 1987

The second survey involved only preschool children. Parents completed questionnaires which provided information on the amount of time their children spent outdoors, outdoor play locations, favorite places, digging areas, use of park or playgrounds, and swimming or wading locations. This survey was conducted between June-July, 1989. One thousand (1,000) parents were sampled, but only 211 questionnaires were usable out of 886 questionnaires received. Therefore, the response rate for the preschool's survey was about 24 percent (based on the 886 valid sample units). The sample population consisted of children 1 month and up to preschool age. Of this population, 53 percent were Anglos, 18 percent Hispanics, 2 percent Blacks, and 3 percent Asians.

The survey design emphasized the kind of activities children engaged in, but not the amount of time children spent performing each activity. Therefore, Sell (1989) presented the data obtained from the survey in terms of percent of respondents who engaged in specific activities or locations. A summary of percent responses of the preschool and school-age children's activities at various locations in the Maryvale study areas are presented in Table 5-41. Also included in this table is a ranking of children's play locations based on other existing research works. Based on the survey data, Sell (1989) reported that the median time preschool children spent outdoors on weekdays was 1-2 hours, and on weekends the median time spent outdoors was 2-5 hours. Most of these children played outside in their own yards, and some played in other people's yards or parks and playgrounds (Sell, 1989).

A limitation associated with this study is that the survey design did not report the time spent in various activities or locations. Another limitation of this study is that the response rates obtained from the surveys were low and may result in biased data. In addition, the survey was conducted in Arizona, therefore, the surveyed population does not represent the children's population on a national basis. An advantage of this study is that various activities children engage in and locations of these activities were examined. It provides for time spent outdoors. This information is also useful in determining exposure pathways to toxic pollutants for children.

Table 5-41. Percent Responses of Children's "Play" (activities) Locations in Maryvale, Arizona[a]

Location	% Responses			Ranking of Children's "Play" Locations[c]
	Preschool n = 211	Primary Grades (K-3) n = 45	Intermediate Grades (4-6) n = 66	
Residential Yards	143[b]	124[b]	132[b]	Residential (Own and Others)
School Playgrounds	0	53	52	Parks and Recreation Areas
Parks and Recreation Areas	42	53	33	Street/Path/Alley
Commercial	2	24	27	Natural/Vacant Areas
Industrial	0	0	2	School
Institutional	1	2	0	Institutional
Streets	3	24	41	Commercial
Alleys	1	2	9	Parking Lots
Parking Lots	0	9	9	Child Built Places
Vacant Lots/Canals/Fields	1	7	8	Water
				Industrial

[a] Survey was conducted in Maryvale (West Central Phoenix), Arizona
[b] Percentages greater than 100, because many children played in more than one location
[c] Ranking of children's activity locations were obtained from other literature sources.

Source: Sell, 1989.

5.4. POPULATION MOBILITY

5.4.1. Background

An assessment of population mobility can assist in determining the length of time a household is exposed in a particular location. For example, the duration of exposure to site-specific contamination, such as a polluted stream from which a family fishes or contaminated soil on which children play or vegetables are grown, will be directly related to the period of time residents live near the contaminated site.

Information regarding population mobility is compiled and published by the U.S. Bureau of the Census (BOC). Banks, Insurance Companies, Credit Card Companies, Real estate and housing associations use residence history information. However, this information is mostly confidential. Information gathered by the BOC provides information about population mobility. However, it is difficult to determine the average residence time of a homeowner or apartment dweller from this information. Census data provide representations of a cross-section of the population at specific points in time, but the surveys are not designed to follow individual families through time. The most current Bureau of the Census information about annual geographical mobility and mobility by State is summarized in Appendix 5B. Figure 5-1 graphically displays the proportion of movers who made each type of move.

Available information was provided by the Oxford Development Corporation, The National Association of Realtors, and the Bureau of the Census. According to Oxford Development Corporation, a property management firm, the typical residence time for an apartment dweller for their corporation has been estimated to range from 18 to 30 months (S. Cameron Hendricks, Sales Department, Oxford Development Corporation, Gaithersburg, MD, personal communication with P. Wood (Versar) August 10, 1992).

5.4.2. Population Mobility Studies

The National Association of Realtors (NAR) (1993) The Home Buying and Selling Process - The survey was conducted by mailing a questionnaire to 15,000 home buyers throughout the U.S. who purchased homes during the second half of 1993. The survey was conducted in December 1993 and 1,763 usable responses were received, a response rate of

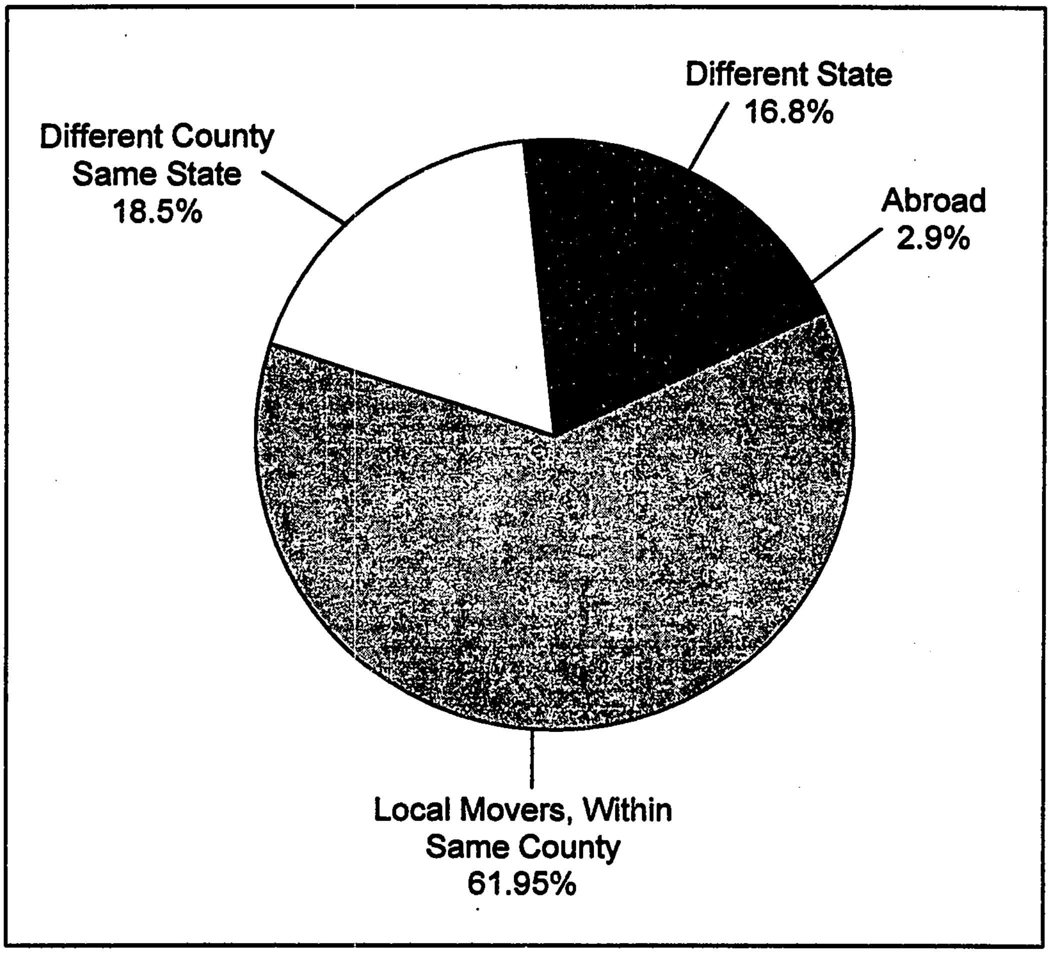

Figure 5-1. Distribution of individuals moving by type of move: 1991-92

Source: U.S. Bureau of the Census, 1993

12 percent. Of the respondents, forty-one percent were first time buyers. Home buyer names and addresses were obtained from Dataman Information Services. Dataman compiles information on residential real estate transactions from more than 600 counties throughout the United States using the Courthouse deed records. Most of the 250 Metropolitan Statistical Areas are also covered in Dataman's data compilation.

The survey results indicate that the average tenure of home buyers is 7.1 years based on an overall residence history of the respondents. These results are presented in Table 5-42. The home buyers were questioned on the length of time they owned their previous home. A typical repeat buyer was found to have lived in their previous home between four and seven years. The results of the survey are presented in Table 5-43. The median length of residence in respondents' previous homes was found to be 6 years.

The number of miles the respondents moved to their new homes were typically short distances. Seventeen (17) percent of the respondents purchased homes over 100 miles from their previous homes. However, 49 percent purchased homes less than 10 miles away. These data are presented in Table 5-44.

Israeli and Nelson (1992) - Distribution and Expected Time of Residence for U.S. Households - In risk assessments, the average current residence time (time since moving into current residence) has often been used as a substitute for the average total residence time (time between moving into and out of a residence) (Israeli and Nelson, 1992). Israeli and Nelson (1992) have estimated distribution and expected time of residence for U.S. households. Distributions and averages for both current and total residence times were calculated for several housing categories using the 1985 and 1987 Bureau of the Census housing survey data. The total residence time distribution was estimated from current residence time data by modeling the moving process (Israeli and Nelson, 1992). Israeli and Nelson estimated the average total residence time for a household to be approximately 4.6 years or 1/6 of the expected life span (see Table 5-45). The maximal total residence time that a given fraction of households will live in the same residence is presented in Table 5-46. For example, only 5 percent of the individuals in the "All Households" category will live in the same residence for 23 years and 95 percent will move in less than 23 years.

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Table 5-42. Summary of Residence Time of Recent Home Buyers

Number of years lived in previous house	Percent of Respondents
1 year or less	2
2-3	16
4-7	41
8-9	31
10 years or more	32

Source: NAR, 1993.

Table 5-43. Tenure in Previous Home (Percentage Distribution)

	Percent			
	1987	1989	1991	1993
One year or less	5	8	4	2
2-3 Years	25	15	21	16
4-7 Years	36	22	37	40
8-9 Years	10	11	9	10
10 or More Years	24	34	29	32
Total	100	100	100	100
Median	6	6	6	6

Source: NAR, 1993

Table 5-44. Number of Miles Moved (Percentage Distribution)

	All Buyers	First-Time Buyer	Repeat Buyer	New Home Buyer	Existing Home Buyer
Miles			Percent		
Less than 5 miles	29	33	27	23	31
5 to 9 miles	20	25	16	18	20
10 to 19 miles	18	20	17	20	17
20 to 34 miles	9	11	8	12	9
35 to 50 miles	2	2	2	2	3
51 to 100 miles	5	2	6	6	4
Over 100 miles	17	6	24	19	16
Total	100	100	100	100	100
Median	9	8	11	11	8
Mean	200	110	270	230	190

Source: NAR, 1993

Table 5-45. Values and Their Standard Errors for Average Total Residence Time, T, for Each Group in Survey[a]

Households	Average total residence time T (years)	S.D. S_T (years)	Average current residence time T_{CR} (years)	Households (percent) 1985	Households (percent) 1987
All households	4.55 ± 0.60	8.68	10.56 ± 0.10	100.0	100.0
Renters	2.35 ± 0.14	4.02	4.62 ± 0.08	36.5	36.0
Owners	11.36 ± 3.87	13.72	13.96 ± 0.12	63.5	64.0
Farms	17.31 ± 13.81	18.69	18.75 ± 0.38	2.1	1.9
Urban	4.19 ± 0.53	8.17	10.07 ± 0.10	74.9	74.5
Rural	7.80 ± 1.17	11.28	12.06 ± 0.23	25.1	25.5
Northeast region	7.37 ± 0.88	11.48	12.64 ± 0.12	21.2	20.9
Midwest region	5.11 ± 0.68	9.37	11.15 ± 0.10	25.0	24.5
South region	3.96 ± 0.47	8.03	10.12 ± 0.08	34.0	34.4
West region	3.49 ± 0.57	6.84	8.44 ± 0.11	19.8	20.2

[a] Values of the average current residence time, T_{CR}, are given for comparison.

Source: Israeli and Nelson, 1992.

Table 5-46. Total Residence Time, t (years), Corresponding to Selected Values of R(t)[a] by Housing Category

R(t) =	0.05	0.1	0.25	0.5	0.75
All households	23.1	12.9	3.7	1.4	0.5
Renters	8.0	5.2	2.6	1.2	0.5
Owners	41.4	32.0	17.1	5.2	1.4
Farms	58.4	48.3	26.7	10.0	2.4
Urban	21.7	10.9	3.4	1.4	0.5
Rural	32.3	21.7	9.1	3.3	1.2
Northeast region	34.4	22.3	7.5	2.8	1.0
Midwest region	25.7	15.0	4.3	1.6	0.6
South region	20.7	10.8	3.0	1.2	0.4
West region	17.1	8.9	2.9	1.2	0.4

[a] R(t) = fraction of households living in the same residence for t years or more.

Source: Israeli and Nelson, 1992.

The authors note that the data presented are for the expected time a household will stay in the same residence. The data do not predict the expected residence time for each member of the household, which is generally expected to be smaller (Israeli and Nelson, 1992). These values are more realistic estimates for the individual total residence time, than the average time a household has been living at its current residence. The expected total residence time for a household is consistently less than the average current residence time. This is caused by greater weighting of short residence time when calculating the average total residence time than when calculating the average current residence time (Israeli and Nelson, 1992). When averaging total residence over a time interval, frequent movers may appear several times, but when averaging current residence times, each household appears only once (Israeli and Nelson, 1992). According to Israeli and Nelson, the residence time distribution developed by the model is skewed and the median values are considerably less than the means (T), which are less than the average current residence times.

U.S. Bureau of the Census (1993) - American Housing Survey for the United States in 1991 - This survey is a national sample of 55,000 interviews in which collected data were presented by owners, renters, black householder, and hispanic householder. The data reflects the number of years a unit has been occupied and represent all occupied housing units that the residents rented or owned at the time of the survey.

The results of the survey pertaining to residence time of owner/renter occupied units in the U.S. is presented in Table 5-47. Using the data in Table 5-47, the percentages of householders living in houses for specified time ranges were determined and are presented in Table 5-48. Based on the Bureau of the Census data in Table 5-47, the 50th percentile and the 90th percentile values were calculated for the number of years lived in the householder's current house. These values were calculated by apportioning the total sample size (93,147 households) to the indicated percentile associated with the applicable range of years lived in current home. Assuming an even distribution within the appropriate range, the 50th and 90th percentile values for years living in current home were determined to be 9.1 and 32.7 years, respectively. These were then rounded to 9 and 33 years. Based on the above data, the

Table 5-47. Residence Time of Owner/Renter Occupied Units

Year householder moved into unit		Total occupied units (numbers in thousands)
1990-1994		24,534
1985-1989		27,054
1980-1984		10,613
1975-1979		9,369
1970-1974		6,233
1960-1969		7,933
1950-1959		4,754
1940-1949		1,772
1939 or earlier		885
	Total	93,147

Source: U.S. Bureau of the Census, 1993.

Table 5-48. Percent of Householders Living in Houses for Specified Ranges of Time

Years lived in current home	Percent of total households
0-4	26.34
5-9	29.04
10-14	11.39
15-19	10.06
20-24	6.69
25-34	8.52
35-44	5.1
45-54	1.9
> 55	0.95

Source: Adapted from U.S. Bureau of the Census, 1993.

range of 9 to 33 years is assumed to best represent a central tendency estimate of length of residence and upper percentile estimate of residence time, respectively.

A limitation associated with the above analysis is the assumption that there is an even distribution within the different ranges. As a result, the 50th and 90th percentile values may be biased.

Johnson and Capel (1992) - A Monte Carlo Approach to Simulating Residential Occupancy Periods and it's Application to the General U.S. Population - Johnson and Capel developed a methodology to estimate the distribution of the residential occupancy period (ROP) in the national population. ROP denotes the time (years) between a person moving into a residence and the time the person moves out or dies. The methodology uses a Monte Carlo approach to simulate a distribution of ROP for 500,000 persons using data on population, mobility, and mortality.

The methodology consists of six steps. The first step defines the population of interest and categorizes them by location, gender, age, sex and race. Next the demographics groups are selected and the fraction of the specified population that falls into each group is developed using Bureau of the Census (BOC) data. A mobility table is developed based on BOC data. This table provides the probability that a person with specified demographics did not move during the previous year. The fifth step uses data on vital statistics published by the National Center for Health Statistics and develops a mortality table which provides the probability that individuals with specific demographic characteristics would die during the upcoming year. As a final step, a computer based algorithm is used to apply a Monte Carlo approach to a series of persons selected at random from the population being analyzed.

Table 5-49 presents the results for residential occupancy periods for the total population and by gender. The estimated mean ROP for the total population is 11.7 years. The distribution is skewed (Johnson and Capel, 1992): the 25th, 50th, and 75th percentiles are 4, 9, and 16 years, respectively. The 90th, 95th, and 99th percentiles are 26, 33, and 47 years, respectively. The mean ROP for males is 11.1 years and 12.3 years for females, and the median value is 8 years for males and 9 years for females.

Descriptive statistics for subgroups defined by current ages were also calculated. These data, presented by gender, are shown in Table 5-50. The mean ROP increases from

Table 5-49. Descriptive Statistics for Residential Occupancy Period

Statistic	Value of statistic		
	Both genders	Males only	Females only
Number of simulated persons	500,000	244,274	255,726
Residential occupancy period, years			
Mean	11.7	11.1	12.3
5th percentile	2	2	2
10th percentile	2	2	2
25th percentile	3	4	5
50th percentile	9	8	9
75th percentile	16	15	17
90th percentile	26	24	28
95th percentile	33	31	35
98th percentile	41	39	43
99th percentile	47	44	49
99.5th percentile	51	48	53
99.8th percentile	55	53	58
99.9th percentile	59	56	61
Second largest value	75	73	75
Largest value	87	73	87

Source: Johnson and Capel, 1992.

Table 5-50. Descriptive Statistics for Both Genders by Current Age

Current age, years	Residential occupancy period, years						
	Mean	Percentile					
		25	50	75	90	95	99
3	6.5	3	5	8	13	17	22
6	8.0	4	7	10	15	18	22
9	8.9	5	8	12	16	18	22
12	9.3	5	9	13	16	18	23
15	9.1	5	8	12	16	18	23
18	8.2	4	7	11	16	19	23
21	6.0	2	4	8	13	17	23
24	5.2	2	4	6	11	15	25
27	6.0	3	5	8	12	16	27
30	7.3	3	6	9	14	19	32
33	8.7	4	7	11	17	23	39
36	10.4	5	8	13	21	28	47
39	12.0	5	9	15	24	31	48
42	13.5	6	11	18	27	35	49
45	15.3	7	13	20	31	38	52
48	16.6	8	14	22	32	39	52
51	17.4	9	15	24	33	39	50
54	18.3	9	16	25	34	40	50
57	19.1	10	17	26	35	41	51
60	19.7	11	18	27	35	40	51
63	20.2	11	19	27	36	41	51
66	20.7	12	20	28	36	41	50
69	21.2	12	20	29	37	42	50
72	21.6	13	20	29	37	43	53
75	21.5	13	20	29	38	43	53
78	21.4	12	19	29	38	44	53
81	21.2	11	20	29	39	45	55
84	20.3	11	19	28	37	44	56
87	20.6	10	18	29	39	46	57
90	18.9	8	15	27	40	47	56
All ages	11.7	4	9	16	26	33	47

Source: Johnson and Capel, 1992.

age 3 to age 12 and there is a noticeable decrease at age 24. However, there is a steady increase from age 24 through age 81.

There are a few biases within this methodology which have been noted by authors. The probability of not moving is estimated as a function only of gender and age. The Monte Carlo process assumes that this probability is independent of (1) the calendar year to which it is applied, and (2) to the past history of the person being simulated. These assumptions, according to Johnson and Capel are not entirely correct. They believe that extreme values are a function of sample size and will, for the most part, increase as the number of simulated persons increases.

Lehman - Homeowners Relocating at Faster Pace - Lehman (1994) presents data gathered by the Chicago Title and Trust Family Insurers. The data indicates that in 1993, the average U.S. homeowners moved every 12 years. In 1992, homeowners moved every 13.4 years and in 1991, every 14.3 years. Data from the U.S. Bureau of the Census indicate that 7 percent of the owner population moved in 1991. Based on this information, Lehman has concluded that it would take 12 years for 100 percent of owners to move. According to Lehman, Bill Harriett of the U.S. Bureau of the Census has been quoted to state that 14 years is a closer estimate for 100 percent of home owners to move. Other data presented in the article state that homeowners in Virginia moved ever 11.1 years and in Maryland every 11.7 years. An advantage of this study is that it provides percentile data for the residential occupancy period.

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APPENDIX 5-A

Activity Patterns Codes and Occupational Tenure Data

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries

WORK AND OTHER INCOME-PRODUCING ACTIVITIES

Paid Work

01 - Normal work: activities at the main job including work brought home, travel that is part of the job, and overtime; "working," "at work"
- Work at home; work activities for pay done in the home when home is the main workplace (include travel as above)

02 - Job search; looking for work, including visits to employment agencies, phone calls to prospective employers, answering want ads
- Unemployment benefits; applying for or collecting unemployment compensation
- Welfare, food stamps; applying for or collecting welfare, food stamps

05 - Second job; paid work activities that are not part of the main job (use this code only when R* clearly indicates a second job or "other" job); paid work for those not having main job; garage sales, rental property

06 - Lunch at the workplace; lunch eaten at work, cafeteria, lunchroom when "where" = work (lunch at a restaurant, code 44; lunch at home, code 43)
- Eating, smoking, drinking coffee as a secondary activity while working (at workplace)

07 - Before and/or after work at the workplace; activities at the workplace before starting or after stopping work; include "conversations," other work. Do not code secondary activities with this primary activity
- Other work-related

08 - Coffee breaks and other breaks at the workplace; unscheduled breaks and other nonwork during work hours at the workplace; "took a break"; "had coffee" (as a primary activity). Do not code secondary activities with this primary activity

09 - Travel; to and from the workplace when R's travel to and from work were both interrupted by stops; waiting for related travel
- Travel to and from the workplace, including time spent awaiting transportation

HOUSEHOLD ACTIVITIES

Indoor

10 - Meal preparation: cooking, fixing lunches
- Serving food, setting table, putting groceries away. unloading car after grocery shopping

11 - Doing dishes, rinsing dishes, loading dishwasher
- Meal cleanup, clearing table, unloading dishwasher

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

HOUSEHOLD ACTIVITIES (continued)

Indoor (continued)

12 - Miscellaneous, "worked around house." NA if indoor or outdoor - Routine indoor cleaning and chores, picking up, dusting, making beds, washing windows, vacuuming, "cleaning," "fall/spring cleaning," "housework"

14 - Laundry and clothes care - wash
- Laundry and clothes care - iron, fold, mending, putting away clothes ("Sewing" code 84)

16 - Repairs indoors; fixing, repairing appliances
- Repairs indoors; fixing, repairing furniture
- Repairs indoors; fixing, repairing furnace, plumbing, painting a room

17 - Care of houseplants

19 - Other indoor, NA whether cleaning or repair; "did things in house"

Outdoor

13 - Routine outdoor cleaning and chores; yard work, raking leaves, mowing grass, garbage removal, snow shoveling, putting on storm windows, cleaning garage, cutting wood

16 - Repair, maintenance, exterior; fixing repairs outdoors, painting the house, fixing the roof, repairing the driveway (patching)
- Home improvements: additions to and remodeling done to the house, garage; new roof
- Improvement to grounds around house; repaved driveway

17 - Gardening; flower or vegetable gardening; spading, weeding, composting, picking, worked in garden"

19 - Other outdoor; "worked outside," "puttering in garage

MISCELLANEOUS HOUSEHOLD CHORES

16 - Car care; necessary repairs and routine care to cars; tune up
- Car maintenance; changed oil, changed tires, washed cars; "worked on car" except when clearly as a hobby - (code 83)

17 - Pet care; care of household pets including activities with pets; playing with the dog; walking the dog; (caring for pets of relatives, friends, code 42)

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

MISCELLANEOUS HOUSEHOLD CHORES (continued)

19 - Household paperwork; paying bills, balancing the checkbook, making lists, getting the mail, working on the budget
- Other household chores; (no travel), picking up things at home, e.g., "picked up deposit slips" (relate travel to purpose)

CHILD CARE

Child Care for Children of Household

20 - Baby care; care to children aged 4 and under

21 - Child care; care to children aged 5*-17
- Child care; mixed ages or NA ages of children

22 - Helping/teaching children learn, fix, make things; helping son bake cookies; helping daughter fix bike
- Help with homework or supervising homework

23 - Giving children orders or instructions; asking them to help; telling the*i*n to behave

- Disciplining child; yelling at kids, spanking children; correcting children's behavior
- Reading to child
- Conversations with household children only; listening to children

24 - Indoor playing; other indoor activities with children (including games ("playing") unless obviously outdoor games)

25 - Outdoor playing; outdoor activities with children including sports, walks, biking with, other outdoor games
- Coaching/leading outdoor, nonorganizational activities

26 - Medical care at home or outside home; activities associated with children's health; "took son to doctor," "gave daughter medicine"

Other Child Care

27 - Babysitting (unpaid) or child care outside R's home or for children not residing in HH
- Coordinating or facilitating child's social or instructional nonschool activities; (travel related, code 29)
- Other child care, including phone conversations relating to child care other than medical

29 - Travel related to child's social and instructional nonschool activities
- Other travel related to child care activities; waiting for related travel

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

OBTAINING GOODS AND SERVICES

Goods (include phone calls to obtain goods)

30 - Groceries; supermarket, shopping for food
- All other shopping for goods; including for clothing, small appliances; at drugstores, hardware stores, department stores, "downtown" or "uptown," "shopping," "shopping center," buying gas, "window shopping"

31 - Durable household goods; shopping for large appliances, cars, furniture
- House, apartment: activities connected to buying, selling, renting, looking for house, apartment, including phone calls; showing house, including traveling around looking at real estate property (for own use)

Services (include phone conversations to obtain services)

32 - Personal care; beauty, barber shop; hairdressers

33 - Medical care for self; visits to doctor, dentist, optometrist, including making appointments

34 - Financial services; activities related to taking care of financial business; going to the bank, paying utility bills (not by mail), going to accountant, tax office, loan agency, insurance office
- Other government services: post office, driver's license, sporting licenses, marriage licenses, police station

35 - Auto services; repair and other auto services including waiting for such services
- Clothes repair and cleaning; cleaners, laundromat, tailor
- Appliance repair: including furnace, water heater, electric or battery operated appliances; including watching repair person
- Household repair services: including furniture; other repair services NA type; including watching repair person

37 - Other professional services; lawyer, counseling (therapy)
- Picking up food at a takeout place - no travel
- Other services, "going to the dump"

38 - Errands; "running errands," NA whether for goods or services; borrowing goods

39 - Related travel; travel related to obtaining goods and services and/or household activities except 31; waiting for related travel

PERSONAL NEEDS AND CARE

Care to Self

40 - Washing, showering, bathing
- Dressing; getting ready, packing and unpacking clothes, personal hygiene, going to the bathroom

(continued on the following page)

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Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries ~~(continued)~~

PERSONAL NEEDS AND CARE (continued)

Care to Self (continued)

41 - Medical care at home to self

43 - Meals at home; including coffee, drinking, smoking, food from a restaurant eaten at home, "breakfast," "lunch"

44 - Meals away from home; eaten at a friend's home (including coffee, drinking, smoking)
- Meals away from home, except at workplace (06) or at friend's home (44); eating at restaurants, out for coffee

45 - Night sleep; longest sleep for day; (may occur during day for night shift workers) including "in bed," but not asleep

46 - Naps and resting; rest periods, "dozing," "laying down" (relaxing code 98)

48 - Sex, making out
- Personal, private; "none of your business"
- Affection between household members; giving and getting hugs, kisses, sitting on laps

Help and Care to Others

41 - Medical care to adults in household (HH)

42 - Nonmedical care to adults in HH; routine nonmedical care to adults in household; "got my wife up," "ran a bath for my husband"
- Help and care to relatives not living in HH; helping care for, providing for needs of relatives; (except travel) helping move, bringing food, assisting in emergencies, doing housework for relatives; visiting when sick
- Help and care to neighbors, friends
- Help and care to others, NA relationship to respondent

Other Personal and Helping

48 - Other personal; watching personal care activities

49 - Travel (helping); travel related to code 42, including travel that is the helping activity; waiting for related travel
- Other personal travel; travel related to other personal care activities; waiting for related travel; travel, NA purpose of trip - e.g., "went to Memphis" (no further explanation given)

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

EDUCATION AND PROFESSIONAL TRAINING

50 - Student (full-time); attending classes, school if full-time student; includes daycare, nursery school for children not in school

51 - Other classes, courses, lectures, academic or professional; R not a full-time student or NA whether a student; being tutored

54 - Homework, studying, research, reading, related to classes or profession, except for current job (code 07); "went to the library"

56 - Other education

59 - Other school-related travel; travel related to education coded above; waiting for related travel; travel to school not originating from home

ORGANIZATIONAL ACTIVITIES

Volunteer, Helping Organizations: hospital volunteer group, United Fund, Red Cross, Big Brother/Sister

63 - Attending meetings of volunteer, helping organizations
- Officer work; work as an officer of volunteer, helping organizations; R must indicate he/she is an officer to be coded here
- Fund raising activities as a member of volunteer helping organization, collecting money, planning a collection drive
- Direct help to individuals or groups as a member of volunteer helping organizations; visiting, bringing food, driving
- Other activities as a member of volunteer helping organizations, including social events and meals

Religious Practice

65 - Attending services of a church or synagogue, including participating in the service; ushering, singing in choir, leading youth group, going to church, funerals
- Individual practice; religious practice carried out as an individual or in a small group; praying, meditating, Bible study group (not a church), visiting graves

Religious Groups

64 - Meetings: religious helping groups; attending meetings of helping - oriented church groups -ladies aid circle, missionary society, Knights of Columbus
- Other activities; religious helping groups; other activities as a member of groups listed above, including social activities and meals
- Meetings: other church groups; attending meetings of church group, not primarily helping-oriented, or NA if helping-oriented

(continued on the following page)

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Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

ORGANIZATIONAL ACTIVITIES (continued)

Religious Groups (continued)

- Other activities, other church groups; other activities as a member of church groups that are not helping-oriented or NA if helping, including social activities and meals; choir practice; Bible class

Professional/Union Organizations: State Education Association; AFL-CIO; Teamsters

60 - Meetings; professional/union; attending meetings of professional or union groups
- Other activities, professional/union; other activities as a member of professional or union group including social activities and meals

Child/Youth/Family Organizations: PTA, PTO; Boy/Girl Scouts; Little Leagues; YMCA/YWCA; school volunteer

67 - Meetings, family organizations; attending meetings of child/youth/family*-oriented organizations
- Other activities, family organizations; other activities as a member of child/youth/family-oriented organizations including social activities and meals

Fraternal Organizations: Moose, VFW, Kiwanis, Lions, Civitan, Chamber of Commerce, Shriners, American Legion

66 - Meetings, fraternal organizations; attending meetings of fraternal organizations
- Other activities, fraternal organizations; other activities as a member of fraternal organizations including social activities and helping activities and meals

Political Party and Civic Participation: Citizens' groups, Young Democrats, Young Republicans, radical political groups, civic duties

62 - Meetings, political/citizen organizations; attending meetings of a political party or citizen group, including city council
- Other activities, political/citizen organizations; other participation in political party and citizens' groups, including social activities, voting, jury duty, helping with elections, and meals

Special Interest/Identity Organizations (including groups based on sex, race, national origin); NOW; NAACP; Polish-American Society; neighborhood, block organizations; CR groups; senior citizens; Weight Watchers

61 - Meetings: identify organizations; attending meetings of special interest, identity organizations
- Other activities, identity organizations; other activities as a member of a special interest, identity organization, including social activities and meals

Other Miscellaneous Organizations, do not fit above

68 - Other organizations; any activities as a member of an organization not fitting into above categories; (meetings and other activities included here)

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

ORGANIZATIONAL ACTIVITIES (continued)

Travel Related to Organizational Activities

69 - Travel related to organizational activities as a member of a volunteer (helping) organization (code 63); including travel that is the helping activity, waiting for related travel
- Travel (other organization-related); travel related to all other organization activities; waiting for related travel

ENTERTAINMENT/SOCIAL ACTIVITIES

Attending Spectacles, Events

70 - Sports; attending sports events - football, basketball, hockey, etc.

71 - Miscellaneous spectacles, events: circus, fairs, rock concerts, accidents

72 - Movies; "went to the show"

73 - Theater, opera, concert, ballet

74 - Museums, art galleries, exhibitions, zoos

Socializing

75 - Visiting with others; socializing with people other than R's own HH members either at R's home or another home (visiting on the phone, code 96); talking/chatting in the context of receiving a visit or paying a visit

76 - Party; reception, weddings

77 - At bar; cocktail lounge, nightclub; socializing or hoping to socialize at bar, lounge
- Dancing

78 - Other events; other events or socializing, do not fit above

79 - Related travel; waiting for related travel

SPORTS AND ACTIVE LEISURE

Active Sports

80 - Football, basketball, baseball, volleyball, hockey. soccer, field hockey
- Tennis, squash, racquetball, paddleball
- Golf, miniature golf

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

SPORTS AND ACTIVE LEISURE (continued)

Active Sports (continued)

80 - Swimming, waterskiing
- Skiing, ice skating, sledding, roller skating
- Bowling; pool, ping-pong, pinball
- Frisbee, catch
- Exercises, yoga (gymnastics - code 86)
- Judo, boxing, wrestling

Out of Doors

81 - Hunting
- Fishing
- Boating, sailing, canoeing
- Camping, at the beach
- Snowmobiling, dune-buggies
- Gliding, ballooning, flying
- Excursions, pleasure drives (no destination), rides with the family
- Picnicking

Walking, Biking

82 - Walking for pleasure
- Hiking
- Jogging, running
- Bicycling
- Motorcycling
- Horseback riding

Hobbies

83 - Photography
- Working on cars - not necessarily related to their running; customizing, painting
- Working on or repairing leisure time equipment (repairing the boat, "sorting out fishing tackle")
- Collections, scrapbooks
- Carpentry and woodworking (as a hobby)

Domestic Crafts

84 - Preserving foodstuffs (canning, pickling)
- Knitting, needlework, weaving, crocheting (including classes), crewel, embroidery, quilting, quilling, macrame
- Sewing
- Care of animals/livestock when R is not a farmer (pets, code 17; "farmer", code 01, work)

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

SPORTS AND ACTIVE LEISURE (continued)

Art and Literature

85 - Sculpture, painting, potting, drawing
- Literature, poetry, writing (not letters), writing a diary

Music/Theater/Dance

86 - Playing a musical instrument (include practicing), whistling
- Singing
- Acting (rehearsal for play)
- Nonsocial dancing (ballet, modern dance, body movement)
- Gymnastics (lessons - code 88)

Games

87 - Playing card games (bridge, poker)
- Playing board games (Monopoly, Yahtzee, etc.), bingo, dominoes
- Playing social games (scavenger hunts), "played games" - NA kind
- Puzzles

Classes/Lessons for Active Leisure Activity

88 - Lessons in sports activities: swimming, golf, tennis. skating, roller skating
- Lessons in gymnastics, dance, judo, body movement
- Lessons in music, singing, instruments
- Other lessons, not listed above

Travel

89 - Related travel; travel related to sports and active leisure; waiting for related travel: vacation travel

PASSIVE LEISURE

90 - Radio

91 - TV

92 - Records, tapes, "listening to music," listening to others playing a musical instrument

93 - Reading books (current job related, code 07; professionally or class related, code 54)

94 - Reading magazines, reviews, pamphlets
- Reading NA what; or other

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

PASSIVE LEISURE (continued)

95 - Reading newspapers

96 - Phone conversations - not coded elsewhere, including all visiting by phone
- Other talking/conversations; face-to-face conversations, not coded elsewhere (if children in HH only, code 23); visiting other than 75
- Conversations with HH members only - adults only or children and adults
- Arguing or fighting with people other than HH members only, household and nonhousehold members, or NA
- Arguing or fighting with HH members only

97 - Letters (reading or writing); reading mail

98 - Relaxing
- Thinking, planning; reflecting
- "doing nothing," "sat"; just sat;
- Other passive leisure, smoking dope, pestering, teasing, joking around, messing around; laughing

99 - Related travel: waiting for related travel

MISSING DATA CODES

- Activities of others reported - R's activity not specified
- NA activities; a time gap of greater than 10 minutes.

EXAMPLES OF ACTIVITIES IN "OTHER" CATEGORIES

Other Work Related

07 - Foster parent activities

Other Household

19 - Typing
- Wrapping presents
- Checked refrigerator for shopping list
- Unpacked gifts from shower
- Packing/unpacking car
- "Settled in" after trip
- Hooked up boat to car
- Showed wife car (R was fixing)
- Packing to move
- Moved boxes
- Looking/searching for things at home (inside or out)

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

EXAMPLES OF ACTIVITIES IN "OTHER" CATEGORIES (continued)

Other Child Care

27 - Waited for son to get hair cut
- Picked up nephew at sister's house
- "Played with kids" (R's children from previous marriage not living with R)
- Called babysitter

Other Services

37 - Left clothing at Goodwill
- Unloaded furniture (just purchased)
- Returned books (at library)
- Brought clothes in from car (after laundromat)
- Delivered some stuff to a friend
- Waited for father to pick up meat
- Waited for stores to open
- Put away things from swap meet
- Sat in car waiting for rain to stop before shopping
- Waiting for others while they are shopping
- Showing mom what I bought

Other Personal

48 - Waiting to hear from daughter
- Stopped at home, NA what for
- Getting hysterical
- Breaking up a fight (not child care related)
- Waited for wife to get up
- Waiting for dinner at brother's house
- Waiting for plane (meeting someone at airport)
- Laughing
- Crying
- Moaning - head hurt
- Watching personal care activities ("watched dad shave")

Other Education

56 - Watched a film
- In discussion group

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

EXAMPLES OF ACTIVITIES IN "OTHER" CATEGORIES (continued)

Other Organization

68 - Attending "Club House coffee klatch"
- Waited for church activities to begin
- "Meeting" NA kind
- Cleanup after banquet
- Checked into swap meet - selling and looking

Other Social, Entertainment

78 - Waiting for movies, other events
- Opening presents (at a party)
- Looking at gifts
- Decorating for party
- Tour of a home (friends or otherwise)
- Waiting for date
- Preparing for a shower (baby shower)
- Unloaded uniforms (for parade)

Other Active Leisure

88 - Fed birds, bird watching
- Astrology
- Swinging
- At park
- Showing slides
- Showing sketches

Other Active Leisure (continued)

- Recording music
- Hung around airport (NA reason)
- Picked up fishing gear
- Inspecting motorcycle
- Arranging flowers
- Work on model airplane
- Picked asparagus
- Picked up softball equipment
- Registered to play golf
- Toured a village or lodge (coded 81)

(continued on the following page)

Table 5A-1. Activity Codes and Descriptors Used For Adult Time Diaries (continued)

EXAMPLES OF ACTIVITIES IN "OTHER" CATEGORIES (continued)

Other Passive Leisure

98 - Lying in sun
- Listening to birds
- Looking at slides
- Stopped at excavating place
- Looking at pictures
- Walked around outside
- Waiting for a call
- Watched plane leave
- Girl watching/boy watching
- Watching boats
- Wasted time
- In and out of house
- Home movies

* R = Respondent
HH = Household.

Source: Juster et al., 1983.

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Table 5A-2. Major Time Use Activity Categories[a]

Activity code	Activity
01-09	Market work
10-19	House/yard work
20-29	Child care
30-39	Services/shopping
40-49	Personal care
50-59	Education
60-69	Organizations
70-79	Social entertainment
80-89	Active leisure
90-99	Passive leisure

[a] Appendix Table 5A-1 presents a detailed explanation of the coding and activities.

Source: Hill, 1985.

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Table 5A-3. Mean Time Spent (mins/day) for 87 Activities Grouped by Day of the Week

Activity	Weekday N=831 Mean	Weekday Std. Dev.	Saturday N=831 Mean	Saturday Std. Dev.	Sunday N=831 Mean	Sunday Std. Dev.
01-Normal Work	240.54	219.10	82.43	184.41	46.74	139.71
02-Unemployment Acts	0.98	9.43	0.00	0.00	0.00	0.00
05-Second Job	3.76	25.04	2.84	32.64	2.65	27.30
06-Lunch At Work	10.00	15.81	1.82	7.88	1.43	8.29
07-Before/After Work	3.51	10.05	1.45	9.79	1.66	13.76
08-Coffee Breaks	5.05	11.53	1.59	7.32	0.93	8.52
09-Travel: To/From Work	24.03	30.37	7.74	22.00	4.60	17.55
10-Meal Preparation	42.18	46.59	40.37	59.82	42.38	57.42
11-Meal Cleanup	12.48	19.25	12.07	22.96	13.97	25.85
12-Indoor Cleaning	26.37	43.84	38.88	80.39	21.73	48.70
13-Outdoor Cleaning	7.48	25.45	15.71	58.00	9.01	39.39
14-Laundry	13.35	30.39	11.48	31.04	7.79	25.43
16-Repairs/Maintenance	9.61	35.43	17.36	72.50	13.56	62.12
17-Garden/Pet Care	8.52	25.15	14.75	49.17	8.47	37.54
19-Other Household	6.26	20.62	9.82	37.58	7.60	32.17
20-Baby Care	6.29	22.91	5.89	30.72	6.26	33.78
21-Child Care	6.26	16.34	5.38	21.58	7.09	23.15
22-Helping/Teaching	1.36	8.28	0.23	3.64	0.76	6.52
23-Reading/Talking	2.47	8.65	1.71	10.84	1.53	9.97
24-Indoor Playing	1.75	8.72	0.90	7.82	2.45	15.11
25-Outdoor Playing	0.73	6.33	1.23	13.03	0.91	10.30
26-Medical Care-Child	0.64	7.42	0.16	2.79	0.44	7.20
27-Babysitting/Other	2.93	14.56	2.16	19.11	3.28	24.89
29-Travel: Child Care	4.18	10.97	1.71	8.72	2.08	10.56
30-Everyday Shopping	19.73	30.28	33.52	61.38	10.13	30.18
31-Durable/House Shop	0.58	4.83	1.46	14.04	1.65	17.92
32-Personal Care Services	1.93	10.04	3.42	18.94	0.02	0.69
33-Medical Appointments	3.43	14.49	0.60	6.63	0.00	0.00
34-Gov't/Financial Services	1.90	6.07	0.66	4.34	0.03	0.43
35-Repair Services	1.33	7.14	1.25	10.24	0.52	5.61
37-Other Services	1.13	7.17	1.55	9.57	0.72	4.34
38-Errands	0.74	8.03	0.35	5.27	0.04	1.04
39-Travel: Goods/Services	17.93	23.58	21.61	36.35	8.45	21.64
40-Washing/Dressing	44.03	29.82	44.25	41.20	47.54	40.15
41-Medical Care R/HH Adults	0.77	6.19	1.29	15.90	1.45	29.18
42-Help & Care	8.43	28.17	12.19	52.58	14.32	55.13
43-Meals At Home	53.45	35.57	57.86	49.25	61.84	49.27
44-Meals Out	19.55	31.20	31.13	56.03	25.95	47.60
45-Night Sleep	468.49	79.42	498.40	115.55	528.86	115.84
46-Naps/Resting	22.07	43.92	30.67	74.98	27.56	66.01
48-N.A. Activities	7.52	22.32	11.72	41.61	8.18	35.79

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Table 5A-3. Mean Time Spent (mins/day) for 87 Activities Grouped by Day of the Week (continued)

Activity	Weekday N=831 Mean	Weekday Std. Dev.	Saturday N=831 Mean	Saturday Std. Dev.	Sunday N=831 Mean	Sunday Std. Dev.
49-Travel: Personal	14.87	27.76	19.33	50.42	18.58	46.36
50-Students' Classes	6.33	33.79	0.96	18.17	0.96	20.07
51-Other Classes	2.65	17.92	0.40	11.52	0.27	5.63
54-Homework	4.56	24.35	3.48	27.98	5.40	38.68
56-Other Education	0.53	5.91	0.15	2.75	0.45	9.85
59-Travel: Education	2.29	10.36	0.35	4.26	0.21	3.14
60-Professional/Union Orgs.	0.51	7.27	0.13	3.64	0.44	8.34
61-Identity Organizations	1.53	11.19	1.24	35.63	0.48	7.58
62-Political/Citizen Orgs	0.14	1.25	0.07	1.91	0.19	5.55
63-Volunteer/Helping Orgs	1.08	10.08	0.02	0.45	0.41	7.09
64-Religious Groups	2.96	17.33	3.05	27.73	8.59	33.31
65-Religious Practice	4.98	19.92	7.13	30.12	34.05	62.06
66-Fraternal Organizations	0.85	9.28	1.73	27.71	0.31	6.67
67-Child/Family Organizations	1.70	11.69	1.04	17.83	0.26	7.63
68-Other Organizations	3.91	22.85	1.31	20.28	1.71	17.52
69-Traves: Organizations	3.41	9.83	2.66	12.22	12.07	37.64
70-Sport Events	2.22	13.45	6.29	42.05	3.44	27.78
71-Miscellaneous Events	0.32	4.89	1.94	19.90	1.96	19.75
72-Movies	1.65	11.03	4.74	27.04	3.35	22.65
73-Theater	0.69	7.13	2.66	27.79	0.77	10.37
74-Museums	0.19	3.32	0.90	13.62	0.72	11.17
75-Visiting w/Others	33.14	51.69	56.78	95.61	69.65	114.58
76-Parties	2.81	16.49	12.63	56.11	7.16	39.02
77-Bars/Lounges	3.62	18.07	7.23	35.09	3.91	26.95
78-Other Events	1.39	11.55	1.33	15.52	1.00	10.80
79-Travel: Events/Social	8.90	16.19	19.55	43.38	18.02	34.45
80-Active Sports	5.30	19.60	9.23	43.69	11.39	48.66
81-Outdoors	5.11	33.00	11.58	55.07	15.52	62.68
82-Walking/Biking	2.08	9.70	5.87	36.38	5.92	32.28
83-Hobbies	1.78	11.73	3.20	32.43	4.10	31.55
84-Domestic Crafts	11.18	37.03	8.67	40.49	6.41	34.82
85-Art/Literature	0.99	10.84	0.86	13.59	1.13	15.07
86-Music/Drama/Dance	0.45	4.91	0.83	8.83	0.63	8.32
87-Games	5.06	22.91	10.14	45.11	7.89	40.45
88-Classes/Other	2.65	15.83	2.56	29.92	3.37	23.60
89-Travel: Active Leisure	3.31	14.77	8.50	48.72	8.19	38.11
90-Radio	2.89	12.19	3.53	23.42	2.88	18.50
91-TV	113.01	103.89	118.99	131.24	149.67	141.43
92-Records/Tapes	2.58	20.26	2.40	16.09	2.03	16.08
93-Reading Books	4.41	18.09	2.76	17.85	5.23	30.13
94-Reading Magazines/N.A.	13.72	31.73	16.33	46.24	17.18	51.01

Table 5A-3. Mean Time Spent (mins/day) for 87 Activities Grouped by Day of the Week (continued)

Activity	Weekday N=831		Saturday N=831		Sunday N=831	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
95-Reading Newspapers	12.03	22.65	12.19	34.96	26.01	44.47
96-Conversations	18.68	28.59	15.45	35.27	14.57	34.60
97-Letters	2.83	12.23	1.61	10.80	1.96	12.59
98-Other Passive Leisure	9.72	25.02	17.24	57.21	15.28	47.86
99-Travel: Passive Leisure	1.26	5.44	1.32	6.80	1.72	9.87

Source: Hill, 1985.

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Table 5A-4. Weighted Mean Hours Per Week by Gender: 87 Activities and 10 Subtotals

	Men N=410		Women N=561		Men and women N=971	
Activity	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
01 - Normal work	29.78	20.41	14.99	17.62	21.82	20.33
02 - Unemployment acts	0.14	1.06	0.08	0.75	0.11	0.90
05 - Second job	0.73	3.20	0.17	1.62	0.43	2.49
06 - Lunch at work	1.08	1.43	0.65	1.21	0.85	1.33
07 - Before/after work	0.51	1.27	0.23	0.69	0.36	1.01
08 - Coffee breaks	0.57	1.05	0.36	1.03	0.46	1.04
09 - Travel: to/from work	2.98	2.87	1.45	2.17	2.16	2.63
10 - Meal preparation	1.57	2.61	7.25	5.04	4.63	4.98
11 - Meal cleanup	0.33	0.83	2.30	2.19	1.39	1.97
12 - Indoor cleaning	0.85	2.01	5.03	5.05	3.10	4.46
13 - Outdoor cleaning	1.59	3.59	0.56	1.59	1.03	2.75
14 - Laundry	0.13	0.72	2.44	3.34	1.38	2.75
16 - Repairs/maintenance	2.14	4.29	0.68	3.43	1.35	3.92
17 - Gardening/pet care	0.94	2.78	1.00	2.19	0.97	2.48
19 - Other household	0.92	2.42	0.72	1.84	0.81	2.13
20 - Baby care	0.24	1.20	0.90	3.04	0.60	2.40
21 - Child care	0.24	0.78	0.99	2.11	0.64	1.68
22 - Helping/teaching	0.07	0.61	0.15	0.76	0.11	0.70
23 - Reading/talking	0.07	0.35	0.30	0.86	0.19	0.68
24 - Indoor playing	0.13	0.69	0.18	0.82	0.16	0.76
25 - Outdoor playing	0.06	0.37	0.12	0.72	0.09	0.58
26 - Medical care - child	0.01	0.09	0.09	0.67	0.05	0.50
27 - Babysitting/other	0.14	0.78	0.64	2.58	0.41	1.98
29 - Travel: child care	0.23	0.67	0.50	1.21	0.38	1.00
30 - Everyday shopping	1.45	2.18	2.78	3.25	2.17	2.89
31 - Durables/house shopping	0.19	1.39	0.08	0.51	0.13	1.01
32 - Personal care services	0.06	0.42	0.35	1.14	0.22	0.90
33 - Medical appointments	0.15	0.75	0.37	1.63	0.27	1.31
34 - Govt/financial services	0.15	0.44	0.19	0.61	0.17	0.54
35 - Repair services	0.11	0.45	0.17	0.78	0.14	0.65
37 - Other services	0.11	0.61	0.13	0.61	0.12	0.61
38 - Errands	0.04	0.41	0.06	0.68	0.05	0.57
39 - Travel: goods/services	1.60	2.02	2.14	2.17	1.89	2.12

(Continued on the following page)

Table 5A-4. (continued)

	Men N=410		Women N=561		Men and women N=971	
Activity	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
40 - Washing/dressing	4.33	2.39	5.43	3.24	4.92	2.93
41 - Medical care - adults	0.09	0.67	0.18	1.00	0.14	0.86
42 - Help and care	1.02	2.84	1.30	3.04	1.17	2.95
43 - Meals at home	6.59	3.87	6.32	3.53	6.44	3.69
44 - Meals out	2.72	3.48	2.24	2.73	2.46	3.10
45 - Night sleep	55.76	8.43	56.74	8.49	56.29	8.47
46 - Naps/resting	2.94	5.18	3.19	4.70	3.08	4.93
48 - N.A. activities	1.77	6.12	1.99	5.70	1.89	5.89
49 - Travel: personal	2.06	2.59	1.61	2.51	1.82	2.56
50 - Students' classes	0.92	4.00	0.38	2.51	0.63	3.29
51 - Other classes	0.23	1.68	0.15	1.05	0.18	1.38
54 - Homework	0.76	3.48	0.38	1.87	0.56	2.74
56 - Other education	0.11	0.86	0.02	0.22	0.06	0.61
59 - Travel: education	0.29	1.07	0.16	1.06	0.22	1.07
60 - Professional/union organizations	0.04	0.46	0.04	0.62	0.04	0.55
61 - Identity organizations	0.14	0.97	0.18	1.55	0.16	1.31
62 - Political/citizen organizations	0.01	0.08	0.02	0.15	0.01	0.12
63 - Volunteer/helping organizations	0.02	0.32	0.14	1.05	0.09	0.80
64 - Religious groups	0.38	1.82	0.41	1.61	0.40	1.71
65 - Religious practice	0.89	2.05	1.31	2.97	1.12	1.60
66 - Fraternal organizations	0.16	1.17	0.05	0.66	0.10	0.93
67 - Child/family organizations	0.10	0.88	0.21	1.33	0.16	1.15
68 - Other organizations	0.34	2.40	0.32	1.53	0.32	1.98
69 - Travel: organizations	0.43	1.04	0.52	1.02	0.48	1.03
70 - Sports events	0.30	1.31	0.26	1.28	0.28	1.29
71 - Miscellaneous events	0.07	0.52	0.08	0.59	0.07	0.56
72 - Movies	0.31	1.25	0.26	1.13	0.28	1.19
73 - Theatre	0.13	0.93	0.06	0.48	0.09	0.72
74 - Museums	0.04	0.37	0.03	0.35	0.03	0.36
75 - Visiting with others	4.24	5.72	5.84	6.42	5.10	6.16
76 - Parties	0.64	2.05	0.44	1.65	0.53	1.84
77 - Bars/lounges	0.71	2.21	0.46	2.09	0.57	2.15
78 - Other events	0.12	0.72	0.18	1.18	0.15	0.99
79 - Travel: events/social	1.40	1.82	1.26	1.67	1.32	1.74

(Continued on the following page)

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Table 5A-4. (continued)

Activity	Men N=410 Mean	Men N=410 Std. dev.	Women N=561 Mean	Women N=561 Std. dev.	Men and women N=971 Mean	Men and women N=971 Std. dev.
80 - Active sports	1.05	2.62	0.50	1.68	0.76	2.18
81 - Outdoors	1.49	4.59	0.48	1.67	0.94	3.39
82 - Walking/biking	0.52	1.31	0.23	0.98	0.36	1.16
83 - Hobbies	0.69	3.88	0.06	0.43	0.35	2.67
84 - Domestic crafts	0.30	1.59	2.00	4.72	1.21	3.93
85 - Art/literature	0.05	0.45	0.13	1.03	0.09	0.81
86 - Music/drama/dance	0.06	0.49	0.07	0.47	0.07	0.48
87 - Games	0.60	2.00	0.99	3.16	0.81	2.69
88 - Classes/other	0.41	1.75	0.28	1.50	0.34	1.62
89 - Travel: active leisure	0.76	1.91	0.43	1.43	0.58	1.68
90 - Radio	0.39	1.40	0.39	1.55	0.39	1.49
91 - TV	14.75	12.14	13.95	10.67	14.32	11.38
92 - Records/tapes	0.46	2.35	0.33	2.13	0.39	2.23
93 - Reading books	0.37	1.52	0.56	1.83	0.47	1.70
94 - Reading magazines/N.A.	1.32	2.81	1.97	3.67	1.67	3.32
95 - Reading newspapers	1.86	2.72	1.47	2.27	1.65	2.49
96 - Conversations	1.61	2.19	2.18	2.74	1.91	2.52
97 - Letters	0.20	1.06	0.31	1.12	0.26	1.10
98 - Other passive leisure	1.68	3.53	1.41	3.32	1.53	3.42
99 - Travel: passive leisure	0.18	0.49	0.13	0.49	0.15	0.49

Source: Hill, 1985.

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Table 5A-5. Ranking of Occupations by Median Years of Occupational Tenure

Occupation	Median years of occupational tenure
Barbers	24.8
Farmers, except horticultural	21.1
Railroad conductors and yardmasters	18.4
Clergy	15.8
Dentists	15.7
Telephone line installers and repairers	15.0
Millwrights	14.8
Locomotive operating occupations	14.8
Managers; farmers, except horticultural	14.4
Telephone installers and repairers	14.3
Airplane pilots and navigators	14.0
Supervisors: police and detectives	13.8
Grader, dozer, and scraper operators	13.3
Tailors	13.3
Civil engineers	13.0
Crane and tower operators	12.9
Supervisors, n.e.c.	12.9
Teachers, secondary school	12.5
Teachers, elementary school	12.4
Dental laboratory and medical applicance technicians	12.3
Separating, filtering, and clarifying machine oeprators	12.1
Tool and die makers	12.0
Lathe and turning machine operators	11.9
Machinists	11.9
Pharmacists	11.8
Stationary engineers	11.7
Mechanical engineers	11.4
Chemists, except biochemists	11.1
Inspectors, testers, and graders	11.0
Electricians	11.0
Operating engineers	11.0
Radiologic technicians	10.9
Electrical power installers and repairers	10.8
Supervisors; mechanics and repairers	10.7
Heavy equipment mechanics	10.7
Bus, truck, and stationary engine mechanics	10.7
Physicians	10.7
Construction inspectors	10.7
Cabinet makers and bench carpenters	10.6
Industrial machinery repairers	10.6
Automobile body and related repairers	10.4

(Continued on the following page)

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Table 5A-5. Ranking of Occupations by Median Years of Occupational Tenure (continued)

Occupation	Median years of occupational tenure
Electrical and electronic engineers	10.4
Plumbers, pipefitters, and steamfitters	10.4
Licensed practical nurses	10.3
Brickmasons and stonemasons	10.2
Truck drivers, heavy	10.1
Tile setters, hard and soft	10.1
Lawyers	10.1
Supervisors: production occupations	10.1
Administrators, education and related fields	10.1
Engineers, n.e.c.	10.0
Excavating and loading machine operators	10.0
Firefighting occupations	10.0
Aircraft engine mechanics	10.0
Police and detectives, public service	9.7
Counselors, educational and vocational	9.7
Architects	9.6
Stuctural metal workers	9.6
Aerospace engineers	9.6
Miscellaneous aterial moving equipment operators	9.4
Dental hygienists	9.4
Automobile mechanics	9.3
Registered nurses	9.3
Speech therapists	9.3
Binding and twisting machine operators	9.3
Managers and administrators, n.e.c.	9.1
Personnel and labor relations managers	9.0
Office machine repairer	9.0
Electronic repairers, commercial and industrial equipment	9.0
Welders and cutters	9.0
Punching and stamping press machine operators	9.0
Sheet metal workers	8.9
Administrators and officials, public administraion	8.9
Hairdressers and cosmetologists	8.9
Industrial engineers	8.9
Librarians	8.8
Inspectors and compliance officers, except construction	8.8
Upholsterers	8.6
Payroll and timekeeping clerks	8.6
Furnace, kiln, and oven operators, except food	8.6
Surveying and mapping technicians	8.6
Chemical engineers	8.6

(continued on the following page)

Table 5A-5. Ranking of Occupations by Median Years of Occupational Tenure (continued)

Occupation	Median years of occupational tenure
Sheriffs, bailiffs, and other law enforcement officers	8.6
Concrete and terrazzo finishers	8.6
Sales representatives, mining, manufacturing, and wholesale	8.6
Supervisors: general office	8.6
Specified mechanics and repairers, n.e.c.	8.5
Stenographers	8.5
Typesetters and compositors	8.5
Financial managers	8.4
Psychologists	8.4
Teachers: special education	8.4
Statistical clerks	8.3
Designers	8.3
Water and Sewage Treatment plant operators	8.3
Printing machine operators	8.2
Heating, air conditioning, and refrigeration mechanics	8.1
Supervisors; distribution, scheduling, and adjusting clerks	8.1
Insurance sales occupations	8.1
Carpenters	8.0
Public transportation attendants	8.0
Drafting occupations	8.0
Butchers and meatcutters	8.0
Miscellaneous electrical and electronic equipment repairers	7.9
Dressmakers	7.9
Musicians and composers	7.9
Supervisors and proprietors; sales occupations	7.9
Painters, Sculptors, craft-artists, and artist printmakers	7.9
Mechanics and repairers, not specified	7.7
Engineering technicians, n.e.c.	7.7
Clinical laboratory technologists and technicians	7.7
Purchasing managers	7.7
Purchasing agents and buyers, n.e.c.	7.7
Photographers	7.6
Chemical technicians	7.6
Managers; properties and real estate	7.6
Accountants and auditors	7.6
Religious workers, n.e.c.	7.6
Secretaries	7.5
Social workers	7.5
Operations and systems researchers and analysts	7.4
Postal clerks, except mail carriers	7.4
Managers; marketing, advertising, and public relations	7.3

(continued on the following page)

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Table 5A-5. Ranking of Occupations by Median Years of Occupational Tenure (continued)

Occupation	Median years of occupational tenure
Farm workers	7.3
Managers; medicine and health	7.2
Data processing equipment repairers	7.2
Bookkeepers, accounting and auditing clerks	7.1
Grinding, abrading, buffing, and polishing machine operators	7.0
Management related occupations, n.e.c.	7.0
Supervisiors; cleaning and building service workers	7.0
Management analysts	7.0
Science technicians, n.e.c.	7.0
Mail carriers, postal service	7.0
Knitting, looping, taping, and weaving machine operators	6.9
Electrical and electronic technicians	6.9
Painting and paint spraying machine operators	6.9
Postsecondary teachers, subject not specified	6.8
Crossing guards	6.8
Inhalation therapists	6.7
Carpet installers	6.7
Computer systems analysts and scientists	6.6
Other financial officers	6.6
Industrial truck and tractor equipment operators	6.6
Textile sewing machine operators	6.6
Correctional institution officers	6.5
Teachers, prekindergarten and kindergarten	6.4
Supervisors; financial records processing	6.4
Miscellaneous Textile machine operators	6.4
Production inspectors, checkers, and examiners	6.3
Actors and directors	6.3
Health technologists and technicians, n.e.c.	6.3
Miscellaneous machine operators, n.e.c.	6.2
Private household cleaners, and servants	6.2
Buyers, wholesale and retail trade, excluding farm products	6.0
Real estate sales occupations	6.0
Electrical and electronic equipment assemblers	6.0
Bus drivers	6.0
Editors and reporters	6.0
Laundering and dry cleaning machine operators	6.0
Meter readers	5.9
Painters, construction and maintenance	5.9
Driver-sales workers	5.9
Teachers, n.e.c.	5.9
Order clerks	5.8
Physicians' assistants	5.8

(continued on the following page)

Table 5A-5. Ranking of Occupations by Median Years of Occupational Tenure (continued)

Occupation	Median years of occupational tenure
Billing clerks	5.8
Drywall installers	5.7
Construction trades, n.e.c.	5.7
Telephone operators	5.7
Authors	5.6
Nursing aides, orderlies, and attendants	5.6
Dental assistants	5.6
Timber cutting and logging occupations	5.5
Molding and casting machine operators	5.5
Miscellaneous hand-working occupations	5.5
Production coordinators	5.5
Public relations specialists	5.5
Personnel clerks, except payroll and bookkeeping	5.4
Assemblers	5.4
Securities and financial services sales occupations	5.4
Salesworkers, furniture and home furnishings	5.4
Insurance adjusters, examiners, and investigators	5.3
Pressing machine operators	5.3
Roofers	5.3
Graders and sorters, except agricultural	5.3
Supervisors; related agricultural occupations	5.2
Typists	5.2
Supervisors; motor vehicle operators	5.2
Personnel, training, and labor relations specialists	5.2
Legal assistants	5.2
Physical therapists	5.2
Advertising and related sales occupations	5.1
Records clerks	5.1
Economists	5.1
Technicians, n.e.c.	5.0
Expediters	5.0
Sales occupations, other business services	4.9
Computer operators	4.8
Computer programmers	4.8
Investigators and adjusters, except insurance	4.8
Underwriters	4.8
Salesworkers, parts	4.8
Artists, performers, and related workers, n.e.c.	4.8
Teachers' aides	4.6
Maids and housemen	4.6
Sawing machine operators	4.6
Machine operators, not specified	4.5
Weighers, measurers, and checkers	4.5

(continued on the following page)

Table 5A-5. Ranking of Occupations by Median Years of Occupational Tenure (continued)

Occupation	Median years of occupational tenure
Traffic, shipping, and receiving clerks	4.5
Salesworkers, hardware and building supplies	4.5
Biological technicians	4.4
Athletes	4.4
Bill and account collectors	4.4
Taxicab drivers and chauffeurs	4.4
Slicing and cutting machine operators	4.3
Administrative support occupations, n.e.c.	4.3
Mixing and blending machine operators	4.3
Waiters and waitresses	4.2
Janitors and cleaners	4.2
Production helpers	4.1
General office clerks	4.0
Machine feeders and offbearers	3.9
Interviewers	3.9
Bartenders	3.9
Eligibility clerks, social welfare	3.9
Bank tellers	3.8
Cooks, except short-order	3.8
Health aides, except nursing	3.7
Laborers, except construction	3.7
Welfare service aides	3.7
Salesworkers, motor vehicles and boats	3.7
Cost and rate clerks	3.6
Construction laborers	3.6
Hand packers and packagers	3.5
Transportation ticket and reservation agents	3.5
Animal caretakers, except farm	3.5
Photographic process machine operators	3.5
Freight, stock, and material movers, hand, n.e.c.	3.4
Data-entry keyers	3.4
Bakers	3.4
Dispatchers	3.3
Guards and police, except public service	3.3
Packaging and filling machine operators	3.3
Receptionists	3.3
Library clerks	3.3
Truckdrivers, light	3.2
Salesworkers, radio, television, hi-fi, and appliances	3.2
Salesworkers, apparel	3.1
Sales counter clerks	3.1
Salesworkers, other commodities	3.1

(continued on the following page)

Table 5A-5. Ranking of Occupations by Median Years of Occupational Tenure (continued)

Occupation	Median years of occupational tenure
Small engine repairers	3.1
Supervisors, food preparation and service occupations	3.0
Health record technologists and technicians	2.9
Helpers, construction trades	2.9
Attendants, amusement and recreation facilities	2.8
Street and door-to-door salesworkers	2.7
Child-care workers, private household	2.7
Child-care workers, except private household	2.7
Information clerks, n.e.c.	2.7
Hotel clerks	2.7
Personal service occupations, n.e.c.	2.7
Salesworkers, shoes	2.6
Garage and service station related occupations	2.6
Short-order cooks	2.5
File clerks	2.5
Cashiers	2.4
Mail clerks, except postal service	2.3
Miscellaneous food preparation occupations	2.3
News vendors	2.3
Vehicle washers and equipment cleaners	2.3
Messengers	2.3
Kitchen workers, food preparation	2.1
Stock handlers and baggers	1.9
Waiters and waitresses assistants	1.7
Food counter, fountain, and related occupations	1.5

[a] n.e.c. - not elsewhere classified

Source: Carey, 1988.

Table 5A-6. Differences in Average Time Spent in Different Activities Between California and National Studies (Minutes Per Day for Age 18-64)

00-49	NON-FREE TIME	California 1987-88 (1359)	National 1985 (1980)	50-59	Free Time	California 1987-88 (1359)	National 1985 (1980)
00-09	PAID WORK			50-99	EDUCATION AND TRAINING		
00	(not used)			50	Students' Classes	9	5
01	Main Job	224	211	51	Other Classes	1	3
02	Unemployment	1	1	52	(not used)	-	-
03	Travel during work	8	NR	53	(not used)	-	-
04	(not used)	-	-	54	Homework	8	7
05	Second job	3	3	55	Library	*	1
06	Eating	6	8	56	Other Education	1	1
07	Before/after work	1	2	57	(not used)	-	-
08	Breaks	2	2	58	(not used)	-	-
09	Travel to/from work	28	25	59	Travel, Education	3	2
10-19	HOUSEHOLD WORK			60-69	ORGANIZATIONAL ACTIVITIES		
10	Food Preparation	29	36	60	Professional/Union	0	1
11	Meal Cleanup	10	11	61	Special Interest	*	1
12	Cleaning House	21	24	62	Political/Civic	0	*
13	Outdoor Cleaning	9	7	63	Volunteer/Helping	1	1
14	Clothes Care	7	11	64	Religious Groups	1	2
15	Car Repair/Maintenance (by R)	5	5	65	Religious Practice	5	7
16	Other Repairs (by R)	8	6	66	Fraternal	0	*
17	Plant Care	3	5	67	Child/Youth/Family	1	*
18	Animal Care	3	5	68	Other Organizations	2	1
19	Other Household	7	8	69	Travel Organizations	2	4
20-29	CHILD CARE			70-79	ENTERTAINMENT/ SOCIAL ACTIVITIES		
20	Baby Care	3	8	70	Sports Events	2	2
21	Child Care	7	5	71	Entertainment Events	5	1
22	Helping/Teaching	2	1	72	Movies	2	3
23	Talking/Reading	1	1	73	Theatre	1	1
24	Indoor Playing	2	3	74	Museums	1	*
25	Outdoor Playing	2	1	75	Visiting	26	25
26	Medical care - Care	*	1	76	Parties	6	7
27	Other Child Care	2	1	77	Bars/Lounges	4	6
28	(At Dry Cleaners)	*	NR	78	Other Social	*	1
29	Travel, Child care	4	4	79	Travel, Events/Social	13	16
30-39	OBTAINING GOODS AND SERVICES			80-89	RECREATION		
30	Everyday Shopping	8	5	80	Active Sports	15	13

Table 5A-6. Differences in Average Time Spent in Different Activities Between California and National Studies (Minutes Per Day for Age 18-64) (continued)

00-49	NON-FREE TIME	California 1987-88 (1359)	National 1985 (1980)	50-59	Free Time	California 1987-88 (1359)	National 1985 (1980)
31	Durable/House Shop	19	20	81	Outdoor	3	7
32	Personal Services	1	1	82	Walking/Hiking	5	4
33	Medical Appointments	2	2	83	Hobbies	1	1
34	Gov't/Financial Service	3	2	84	Domestic Crafts	3	6
35	Car Repair services	2	1	85	Art	*	1
36	Other Repair services	*	1	86	Music/Drama/Dance	3	2
37	Other Services	2	2	87	Games	5	7
38	Errands	*	1	88	Computer Use/Other	3	3
39	Travel, Goods and Services	24	20	89	Travel, Recreation	5	6
40-49	PERSONAL NEEDS AND CARE			90-99	COMMUNICATION		
40	Washing, Etc.	21	25	90	Radio	1	3
41	Medical Care	3	1	91	TV	130	126
42	Help and Care	3	4	92	Records/Tapes	3	1
43	Meals At Home	44	50	93	Read Books	4	7
44	Meals Out	27	20	94	Reading Magazines/Other	16	10
45	Night Sleep	480	469	95	Reading Newspaper	11	9
46	Naps/Day Sleep	16	16	96	Conversations	15	25
47	Dressing, Etc.	24	32	97	Writing	8	9
48	NA Activity	2	12	98	Think, Relax	9	6
49	Travel, Personal Care/NA	22	13	99	Travel, Communication	5	*
NR =	Not Recorded in National Survey				Total Travel	108	90
* =	Less than 0.5 Min. per day				(Codes 09, 29, 39, 49, 59, 69, 79, 89, 99)		

Source: Robinson and Thomas, 1991.

Table 5A-7. Time Spent in Various Micro-environments

	Mean duration					
	Men		Women		Total[a]	
Code Description	N = 639 California	N = 914 National	N = 720 California	N = 1059 National	N = 1980 California	N = 1359 National
AT HOME						
Kitchen	46	56	98	135	72	104
Living Room	181	136	98	180	189	158
Dining Room	18	10	22	18	19	15
Bathroom	27	27	38	43	33	38
Bedroom	481	478	534	531	508	521
Study	8	10	6	7	7	8
Garage	14	5	6	1	19	2
Basement	<0.5	4	<0.5	6	<0.5	5
Utility Room	1	0	3	5	2	4
Pool, Spa	1	NR	1	NR[b]	1	NR[b]
Yard	33		21		27	37
Room to Room	9	160[c]	34	116	21	40
Other NR Room	3		4		3	22
Total at home	822	888	963	1022	892	954
AWAY FROM HOME						
Office	78	261	94	155	86	193
Plant	73	–	12	–	42	–
Grocery Store	12	18	14	33	13	30
Shopping Mall	30	–	40	–	35	–
School	25	13	29	11	27	15
Other Public Places	18	–	10	–	14	12
Hospital	9	NR	24	NR	17	3
Restaurant	35	22	25	18	30	23
Bar-Night Club	15	–	5	–	10	–
Church	7	8	5	11	6	10
Indoor Gym	4	NR	4	NR	4	NR
Other's Home	60	42	61	45	61	43
Auto Repair	18	NR	4	NR	11	NR
Playground	16	27	8	16	12	NR
Hotel-Motel	7	NR	8	NR	8	NR
Dry Cleaners	<0.5	NR	1	NR	1	NR
Beauty Parlor	<0.5	NR	4	NR	2	NR
Other Locations	3	NR	1	NR	2	NR
Other Indoor	17	41	7	24	12	24
Other Outdoor	60	NR	13	NR	37	6
Total away from home	487	445	371	324	430	383

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Table 5A-7. Time Spent in Various Micro-environments

	Mean duration					
	Men		Women		Total[a]	
Code Description	N = 639 California	N = 914 National	N = 720 California	N = 1059 National	N = 1980 California	N = 1359 National
TRAVEL						
Car	76	–	77	–	76	–
Van/Truck	30	86	11	77	20	88
Walking	10	–	8	–	9	2
Bus Stop	<0.5	–	1	–	1	–
Bus	6	–	2	–	4	3
Rapid Train	1	–	–	–	1	1
Other Travel	2	–	1	–	1	<0.5
Airplane	1	15	<0.5	10	1	1
Bicycle	1	–	<0.5	–	1	NR
Motorcycle	2	–	<0.5	–	1	NR
Other or Missing	1	–	<0.5	–	1	NR
Total travel	130	101	102	87	116	94
Not ascertained	1	8	4	7	2	9
Total Time Outdoors	–	–	–	–	88	70

[a] Totals do not necessarily reflect exact averages presented for each gender. Totals were revised, but revisions for each gender were not provided.
[b] NR = Not Reported
[c] Is total mean duration for those categories; breakdowns per category were not reported.

Source: Robinson and Thomas, 1991.

		National		California	
Note:	Percent at home	men	= 62	men	= 57
		women	= 71	women	= 67
		total	= 67	total	= 62
	Percent away from home	men	= 31	men	= 34
		women	= 23	women	= 26
		total	= 27	total	= 30
	Percent in travel	men	= 7	men	= 9
		women	= 6	women	= 7
		total	= 7	total	= 8

APPENDIX 5-B

Population Mobility Data

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Table 5B-1. Annual Geographical Mobility Rates, by Type of Movement for Selected 1-Year Periods: 1960-1992 (Numbers in Thousands)

Mobility period	Total movers	Residing in the United States at beginning of period						Residing outside the United States at the beginning of period
		Total	Different house, same county	Different County				
				Total	Same State	Different State	Different Region	
NUMBER								
1991-92	42,800	41,545	26,587	14,957	7,853	7,105	3,285	1,255
1990-91	41,539	40,154	25,151	15,003	7,881	7,122	3,384	1,385
1989-90	43,381	41,821	25,726	16,094	8,061	8,033	3,761	1,560
1988-89	42,620	41,153	26,123	15,030	7,949	7,081	3,258	1,467
1987-88	42,174	40,974	26,201	14,772	7,727	7,046	3,098	1,200
1986-87	43,693	42,551	27,196	15,355	8,762	6,593	3,546	1,142
1985-86	43,237	42,037	26,401	15,636	8,665	6,791	3,778	1,200
1984-85	46,470	45,043	30,126	14,917	7,995	6,921	3,647	1,427
1983-84	39,379	38,300	23,659	14,641	8,198	6,444	3,540	1,079
1982-83	37,408	36,430	22,858	13,572	7,403	6,169	3,192	978
1981-82	38,127	37,039	23,081	13,959	7,330	6,628	3,679	1,088
1980-81	38,200	36,887	23,097	13,789	7,614	6,175	3,363	1,313
1970-71	37,705	36,161	23,018	13,143	6,197	6,946	3,936	1,544
1960-61	36,533	35,535	24,289	11,246	5,493	5,753	3,097	988
PERCENT								
1991-92	17.3	16.8	10.7	6.0	3.2	2.9	1.3	0.5
1990-91	17.0	16.4	10.3	6.1	3.2	2.9	1.4	0.6
1989-90	17.9	17.3	10.6	6.6	3.3	3.3	1.6	0.6
1988-89	17.8	17.2	10.9	6.3	3.3	3.0	1.4	0.6
1987-88	17.8	17.3	11.0	6.2	3.3	3.0	1.3	0.5
1986-87	18.6	18.1	11.6	6.5	3.7	2.8	1.5	0.5
1985-86	18.6	18.0	11.3	6.7	3.7	3.0	1.6	0.5
1984-85	20.2	19.6	13.1	6.5	3.5	3.0	1.6	0.6
1983-84	17.3	16.8	10.4	6.4	3.6	2.8	1.6	0.5
1982-83	16.6	16.1	10.1	6.0	3.3	2.7	1.4	0.4
1981-82	17.0	16.6	10.3	6.2	3.3	3.0	1.6	0.5
1980-81	17.2	16.6	10.4	6.2	3.4	2.8	1.5	0.6
1970-71	18.7	17.9	11.4	6.5	3.1	3.4	2.0	0.8
1960-61	20.6	20.0	13.7	6.3	3.1	3.2	1.7	0.6

Source: U.S. Bureau of Census, 1993.

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Table 5B-2. Mobility of the Resident Population by State: 1980

Region, division, and state	Persons 5 years old, and over[b] 1980 (1,000)	Percent distribution - residence in 1975[a]			
		Same house in 1980 as 1975	Different house, same county	Different county, same state	Different county, different state
United States	210,323	53.6	25.1	9.8	9.7
Northeast	46,052	61.7	22.3	8.0	6.1
New England	11,594	59.1	23.4	6.7	9.2
Maine	1,047	56.9	24.0	7.5	10.8
New Hampshire	857	51.6	22.8	6.2	18.5
Vermont	476	54.4	23.9	6.5	14.3
Massachusetts	5,398	61.0	22.7	7.6	7.0
Rhode Island	891	60.5	23.9	5.0	8.7
Connecticut	2,925	59.0	24.4	5.5	9.3
Middle Atlantic	34,458	62.6	21.9	8.4	5.0
New York	16,432	61.5	22.6	9.3	3.8
New Jersey	6,904	61.5	20.0	8.6	7.8
Pennsylvania	11,122	65.0	22.0	7.1	5.2
Midwest	54,513	55.4	26.4	10.2	7.0
East North Central	38,623	56.0	27.4	9.6	6.0
Ohio	10,015	56.7	27.9	9.0	5.7
Indiana	5,074	54.8	27.5	9.6	7.6
Illinois	10,593	55.5	28.5	8.1	6.1
Michigan	8,582	56.4	26.2	11.3	5.1
Wisconsin	4,360	56.2	25.5	11.0	6.7
West North Central	15,890	53.9	24.0	11.8	9.4
Minnesota	3,770	55.6	22.8	13.3	7.3
Iowa	2,693	55.6	25.0	10.9	7.9
Missouri	4,564	54.0	24.1	11.8	9.4
North Dakota	598	51.7	23.1	11.4	12.7
South Dakota	633	52.9	23.2	12.1	11.1
Nebraska	1,448	53.1	24.4	11.0	10.5
Kansas	2,184	50.2	25.1	10.7	12.6

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Table 5B-2. (continued)

Region, division, and state	Persons 5 years old, and over[b] 1980 (1,000)	Percent distribution - residence in 1975[a]: Same house in 1980 as 1975	Different house, same county	Different county, same state	Different county, different state
South	69,880	52.4	24.1	10.0	12.0
South Atlantic	34,498	52.7	22.4	9.7	13.6
Delaware	555	57.0	26.3	2.0	13.3
Maryland	3,947	55.5	21.9	10.3	10.4
District of Columbia	603	58.2	22.7	NA	16.3
Virginia	4,99i	51.0	17.9	15.0	13.9
West Virginia	1,806	60.9	23.4	6.6	8.6
North Carolina	5,476	56.9	23.5	8.9	9.8
South Carolina	2,884	57.5	22.3	7.7	11.5
Georgia	5,052	52.5	22.8	12.2	11.5
Florida	9,183	46.2	23.7	7.8	19.6
East South Central	13,556	56.0	25.9	7.9	9.5
Kentucky	3,379	54.4	27.2	8.6	9.0
Tennessee	4,269	54.2	27.2	7.4	10.6
Alabama	3,601	57.6	25.3	7.4	8.9
Mississippi	2,307	59.0	22.5	8.6	9.2
West South Central	21,826	49.6	25.6	11.8	11.0
Arkansas	2,113	53.1	24.8	9.1	12.4
Louisiana	3,847	57.0	24.3	9.2	8.4
Oklahoma	2,793	47.6	24.9	12.3	13.7
Texas	13,074	47.3	26.2	12.9	11.0
West	39,879	43.8	28.3	11.0	13.4
Mountain	10,386	42.7	25.1	9.1	21.1
Montana	722	47.3	24.5	12.3	15.0
Idaho	852	44.4	24.7	9.5	20.0
Wyoming	425	38.4	23.6	8.6	28.3
Colorado	2,676	39.8	22.7	14.8	20.6
New Mexico	1,188	50.3	23.2	7.2	17.4
Arizona	2,506	41.9	27.1	5.0	23.9
Utah	1,272	45.8	27.8	8.4	16.0
Nevada	745	34.8	27.4	3.6	31.5

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Table 5B-2. (continued)

Region, division, and state	Persons 5 years old, and over[b] 1980 (1,000)	Percent distribution - residence in 1975[a]			
		Same house in 1980 as 1975	Different house, same county	Different county, same state	Different county, different state
Pacific	29,493	44.2	29.4	11.6	10.7
Washington	3,825	43.7	27.7	10.1	16.2
Oregon	2,437	41.4	26.6	13.4	16.9
California	21,980	44.6	30.2	12.1	8.5
Alaska	363	32.2	27.6	8.7	29.1
Hawaii	888	49.3	25.2	2.8	16.9

[a] Survey assessed changes in residence between 1975 and 1980.
[b] Includes persons residing abroad in 1975.
NA = not applicable.

Source: U.S. Bureau of the Census, Statistical Abstract, 1984.

6. CONSUMER PRODUCTS

6.1. BACKGROUND

Consumer products may contain toxic or potentially toxic chemical constituents to which humans may be exposed as a result of their use. Exposure to chemical constituents released from consumer products can occur via ingestion, inhalation, and through dermal contact. This chapter focuses on consumer products commonly used in homes: cleaning products, painting products, and household products that contain solvents.

Three national surveys have been conducted by Westat (1987a, b, and c) that provide usage data for household solvent products, household cleaning products, paint, and paint-related products. The primary purpose of these surveys was to gather usage data needed to assess exposure to consumers from chemicals in common household products. The data that can be obtained from these studies are: frequency of use, duration of use, and amount used. For each survey, participants were selected based on a random digit dialing (RDD) procedure. Using this procedure, sample blocks of numbers that included residential telephone number (published, and nonpublished) were made available within a certain exchange, and random telephone numbers were dialed within those blocks of numbers. If a person in that particular household agreed to participate, a questionnaire was mailed to the participant. To complete the questionnaires, respondents were required to recall product usage behavior over the previous 12 months. A follow-up telephone call was made to those respondents who did not respond to the questionnaires within a 4-week period. If these respondents agreed to participate, the questionnaire was administered to them over the telephone.

The Waksberg Method of RDD was used for all surveys. This method provides an unbiased sample of households with telephones, with most of the households having the same probability of selection (Westat, 1987a, b, c). The method was also designed to reduce the number of nonproductive calls considering that a high proportion of nonworking and commercial numbers occur in consecutive sequences (Westat, 1987a, b, c). Data obtained from these surveys are summarized in the following sections. The reader is referred to Westat (1987a, b, c) for brand names, more explanation of the statistical procedures, and data for protective measures taken during use of these products.

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6.2. CONSUMER PRODUCTS STUDIES

Westat - Household Solvent Products: A National Usage Survey - Westat (1987a) surveyed 4,920 individuals (18 years of age or older) nationwide to determine consumer exposure to common household products believed to contain methylene chloride or its substitutes (trichloroethane, trichloroethylene, carbon tetrachloride, perchloroethylene, and 1,1,2-trichlorotrifluoroethane). Survey questions included how often the products were used; when they were last used; what was the amount of time spent using a product (per occasion or year) and the time the respondent remained in the room after use; how much of a product was used per occasion or year; and what protective measures were used (Westat, 1987a). Thirty-two categories of common household products were included in the survey and are presented in Table 6-1. Tables 6-1, 6-2, 6-3, and 6-4 provide means, medians, and percentile rankings for the following variables: frequency of use, exposure time, amount of use, and time exposed after use.

An advantage of this study is that the random digit dialing procedure (Waksberg Method) used in identifying participants for this survey enabled a diverse selection of a representative, unbiased, sample of the U.S. population (Westat 1987a). Also, empricial data generated from this study will provide more accurate calculations of human exposure to consumer household products than estimates previously used. However, a limitation associated with this study is that the data generated were based on recall behavior. Participants were asked to recall product usage data from the previous 12 months. This may degrade the response accuracy of the participants. Another limitation is that extrapolation of these data to long-term use patterns may be difficult.

Westat - National Usage Survey of Household Cleaning Products - Westat (1987b) collected use data from a nationwide survey to assess the magnitude of exposure of consumers to various household cleaning products. One hundred ninety-three (193) households participated in the survey. A telephone interview was conducted to obtain data from the person who did the majority of the cleaning in each household. Of those respondents, 83 percent were female, 16 percent were male, and the sex of the remaining 1 percent was not ascertained (Westat, 1987b). A random digit dialing procedure, previously mentioned, was used to generate telephone numbers. The survey was designed to generate data on the frequency of performing 14 different

Table 6-1. Frequency of Use For Household Solvent Products

				Percentile Rankings for Frequency of Use/Year									
Products	Mean	Std. dev.	Min.	1%	5%	10%	25%	50%	75%	90%	95%	99%	Max.
Spray Shoe Polish	10.28	20.10	1.00	1.00	1.00	1.00	2.00	4.00	8.00	24.30	52.00	111.26	156.00
Water Repellents/Protectors	3.50	11.70	1.00	1.00	1.00	1.00	1.00	2.00	3.00	6.00	10.00	35.70	300.00
Spot Removers	15.59	43.34	1.00	1.00	1.00	1.00	2.00	3.00	10.00	40.00	52.00	300.00	365.00
Solvent-Type Cleaning Fluids or Degreasers	16.46	44.12	1.00	1.00	1.00	1.00	2.00	4.00	12.00	46.00	52.00	300.00	365.00
Wood Floor and Paneling Cleaners	8.48	20.89	1.00	1.00	1.00	1.00	NA	2.00	6.00	24.00	50.00	56.00	350.00
TypeWriter Correction Fluid	40.00	74.78	1.00	1.00	1.00	2.00	4.00	12.00	40.00	100.00	200.00	365.00	520.00
Adhesives	8.89	26.20	1.00	1.00	1.00	1.00	2.00	3.00	6.00	15.00	28.00	100.00	500.00
Adhesive Removers	4.22	12.30	1.00	1.00	1.00	1.00	1.00	1.00	3.00	6.00	16.80	100.00	100.00
Silicone Lubricants	10.32	25.44	1.00	1.00	1.00	1.00	2.00	3.00	10.00	20.00	46.35	150.00	300.00
Other Lubricants (excluding Automotive)	10.66	25.46	1.00	1.00	1.00	1.00	2.00	4.00	10.00	20.00	50.00	100.00	420.00
Specialized Electronic Cleaners (for TVs, Etc.)	13.41	38.16	1.00	1.00	1.00	1.00	2.00	3.00	10.00	24.00	52.00	224.50	400.00
Latex Paint	3.93	20.81	1.00	1.00	1.00	1.00	1.00	2.00	4.00	6.00	10.00	30.00	800.00
Oil Paint	5.66	23.10	1.00	1.00	1.00	1.00	1.00	1.00	3.00	6.00	12.00	139.20	300.00
Wood Stains, Varnishes, and Finishes	4.21	12.19	1.00	1.00	1.00	1.00	1.00	2.00	4.00	7.00	12.00	50.80	250.00
Paint Removers/Strippers	3.68	9.10	1.00	1.00	1.00	1.00	4.00	2.00	3.00	6.00	11.80	44.56	100.00
Paint Thinners	6.78	22.10	0.03	0.03	0.10	0.23	1.00	2.00	4.00	12.00	23.00	100.00	352.00
Aerosol Spray Paint	4.22	15.59	1.00	1.00	1.00	1.00	1.00	2.00	4.00	6.10	12.00	31.05	365.00
Primers and Special Primers	3.43	8.76	1.00	1.00	1.00	1.00	1.00	1.00	3.00	6.00	10.00	50.06	104.00
Aerosol Rust Removers	6.17	9.82	1.00	1.00	1.00	1.00	1.00	2.00	6.00	15.00	24.45	50.90	80.00
Outdoor Water Repellents (for Wood or Cement)	2.07	3.71	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.90	12.00	52.00
Glass Frostings, Window Tints, and Artificial Snow	2.78	21.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	27.20	365.00

Table 6-1. Frequency of Use For Household Solvent Products (Continued)

Products	Mean	Std. dev.	Min.	Percentile Rankings for Frequency of Use/Year									Max.
				1%	5%	10%	25%	50%	75%	90%	95%	99%	
Engine Degreasers	4.18	13.72	1.00	1.00	1.00	1.00	1.00	2.00	3.25	6.70	12.00	41.70	300.00
Carburetor Cleaners	3.77	7.10	1.00	1.00	1.00	1.00	1.00	2.00	3.00	6.00	12.00	47.28	100.00
Aerosol Spray Paints for Cars	4.50	9.71	1.00	1.00	1.00	1.00	1.00	2.00	4.00	10.00	15.00	60.00	100.00
Auto Spray Primers	6.42	33.89	1.00	1.00	1.00	1.00	1.00	2.00	3.75	10.00	15.00	139.00	500.00
Spray Lubricant for Cars	10.31	30.71	1.00	1.00	1.00	1.00	2.00	3.00	6.00	20.00	40.00	105.60	365.00
Transmission Cleaners	2.28	3.55	1.00	NA	1.00	1.00	1.00	1.00	2.00	3.00	9.00	NA	26.00
Battery Terminal Protectors	3.95	24.33	1.00	1.00	1.00	1.00	1.00	2.00	2.00	4.00	6.55	41.30	365.00
Brake Quieters Cleaners	3.00	6.06	1.00	NA	1.00	1.00	1.00	2.00	2.00	6.00	10.40	NA	52.00
Gasket Remover	2.50	4.39	1.00	NA	1.00	1.00	1.00	1.00	2.00	5.00	6.50	NA	30.00
Tire/Hubcap Cleaners	11.18	18.67	1.00	1.00	1.00	1.00	2.00	4.00	12.00	30.00	50.00	77.00	200.00
Ignition and Wire Dryers	3.01	5.71	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	9.70	44.52	60.00

NA = Not Available

Source: Westat, 1987a

Table 6-2. Exposure Time of Use For Household Solvent Products

Products	Mean (mins)	Std. dev.	Min.	Percentile Rankings for Duration of Use (mins) 1%	5%	10%	25%	50%	75%	90%	95%	99%	Max.
Spray Shoe Polish	7.49	9.60	0.02	0.03	0.25	0.50	2.00	5.00	10.00	18.00	30.00	60.00	60.00
Water Repellents/Protectors	14.46	24.10	0.02	0.08	0.50	1.40	3.00	10.00	15.00	30.00	60.00	120.00	480.00
Spot Removers	10.68	22.36	0.02	0.03	0.08	0.25	2.00	5.00	10.00	30.00	30.00	120.00	360.00
Solvent-Type Cleaning Fluids or Degreasers	29.48	97.49	0.02	0.03	1.00	2.00	5.00	15.00	30.00	60.00	120.00	300.00	1800.00
Wood Floor and Paneling Cleaners	74.04	128.43	0.02	1.00	5.00	10.00	20.00	30.00	90.00	147.00	240.00	480.00	2700.00
TypeWriter Correction Fluid	7.62	29.66	0.02	0.02	0.03	0.03	0.17	1.00	2.00	10.00	32.00	120.00	480.00
Adhesives	15.58	81.80	0.02	0.03	0.08	0.33	1.00	4.25	10.00	30.00	60.00	180.00	2880.00
Adhesive Removers	121.20	171.63	0.03	0.03	1.45	3.00	15.00	60.00	120.00	246.00	480.00	960.00	960.00
Silicone Lubricants	10.42	29.47	0.02	0.03	0.08	0.17	0.50	2.00	10.00	20.00	45.00	180.00	360.00
Other Lubricants (excluding Automotive)	8.12	32.20	0.02	0.03	0.05	0.08	0.50	2.00	5.00	15.00	30.00	90.00	900.00
Specialized Electronic Cleaners (for TVs, Etc.)	9.47	45.35	0.02	0.03	0.08	0.17	0.50	2.00	5.00	20.00	30.00	93.60	900.00
Latex Paint	295.08	476.11	0.02	1.00	22.50	30.00	90.00	180.00	360.00	480.00	810.00	2880.00	5760.00
Oil Paint	194.12	345.68	0.02	0.51	15.00	30.00	60.00	120.00	240.00	480.00	579.00	1702.80	5760.00
Wood Stains, Varnishes, and Finishes	117.17	193.05	0.02	0.74	5.00	10.00	30.00	60.00	120.00	140.00	360.00	720.00	280.00
Paint Removers/Strippers	125.27	286.59	0.02	0.38	5.00	5.00	20.00	60.00	120.00	240.00	420.00	1200.00	4320.00
Paint Thinners	39.43	114.85	0.02	0.08	1.00	2.00	5.00	10.00	30.00	60.00	180.00	480.00	2400.00
Aerosol Spray Paint	39.54	87.79	0.02	0.17	2.00	5.00	10.00	20.00	45.00	60.00	120.00	300.00	1800.00
Primers and Special Primers	91.29	175.05	0.05	0.24	3.00	5.00	15.00	30.00	120.00	240.00	360.00	981.60	1920.00
Aerosol Rust Removers	18.57	48.54	0.02	0.05	0.17	0.25	2.00	5.00	20.00	60.00	60.00	130.20	720.00

Table 6-2. Exposure Time of Use For Household Solvent Products (Continued)

Products	Mean (mins)	Std. dev.	Min.	Percentile Rankings for Duration of Use (mins) 1%	5%	10%	25%	50%	75%	90%	95%	99%	Max.
Outdoor Water Repellents (for Wood or Cement)	104.94	115.36	0.02	0.05	5.00	15.00	30.00	60.00	120.00	240.00	300.00	480.00	960.00
Glass Frostings, Window Tints, and Artificial Snow	29.45	48.16	0.03	0.14	2.00	3.00	5.00	15.00	30.00	60.00	96.00	268.80	360.00
Engine Degreasers	29.29	48.14	0.02	0.95	2.00	5.00	10.00	15.00	30.00	60.00	120.00	180.00	900.00
Carburetor Cleaners	13.57	23.00	0.02	0.08	0.33	1.00	3.00	7.00	15.00	30.00	45.00	120.00	300.00
Aerosol Spray Paints for Cars	42.77	71.39	0.03	0.19	1.00	3.00	10.00	20.00	60.00	120.00	145.00	360.00	900.00
Auto Spray Primers	51.45	86.11	0.05	0.22	2.00	5.00	10.00	27.50	60.00	120.00	180.00	529.20	600.00
Spray Lubricant for Cars	9.90	35.62	0.02	0.03	0.08	0.17	1.00	5.00	10.00	15.00	30.00	120.00	720.00
Transmission Cleaners	27.90	61.44	0.17	NA	0.35	1.80	5.00	15.00	30.00	60.00	60.00	NA	450.00
Battery Terminal Protectors	9.61	18.15	0.03	0.04	0.08	0.23	1.00	5.00	10.00	20.00	30.00	120.00	180.00
Brake Quieters/Cleaners	23.38	36.32	0.07	NA	0.50	1.00	5.00	15.00	30.00	49.50	120.00	NA	240.00
Gasket Remover	23.57	27.18	0.33	NA	0.50	2.00	6.25	15.00	30.00	60.00	60.00	NA	180.00
Tire/Hubcap Cleaners	22.66	23.94	0.08	0.71	3.00	5.00	10.00	15.00	30.00	60.00	60.00	120.00	240.00
Ignition and Wire Dryers	7.24	8.48	0.02	0.02	0.08	0.47	1.50	5.00	10.00	15.00	25.50	48.60	60.00

NA = Not Available

Source: Westat, 1987a

Table 6-3. Amount of Products Used For Household Solvent Products

Products	Mean (ounces/yr)	Std. dev	Percentile Rankings for Amount of Products Used (ounces)										
			Min.	1%	5%	10%	25%	50%	75%	90%	95%	99%	Max.
Spray Shoe Polish	9.90	17.90	0.04	0.20	0.63	1.00	2.00	4.50	10.00	24.00	36.00	99.36	180.00
Water Repellents/Protectors	11.38	22.00	0.04	0.47	0.98	1.43	2.75	6.00	12.00	24.00	33.00	121.84	450.00
Spot Removers	26.32	90.10	0.01	0.24	0.60	1.00	2.00	5.50	16.00	48.00	119.20	384.00	1600.00
Solvent-Type Cleaning Fluids or Degreasers	58.30	226.97	0.04	0.50	2.00	3.00	6.50	16.00	32.00	96.00	192.00	845.00	5120.00
Wood Floor and Paneling Cleaners	28.41	57.23	0.03	0.80	2.45	3.50	7.00	14.00	30.00	64.00	96.00	204.40	1144.00
TypeWriter Correction Fluid	4.14	13.72	0.01	0.02	0.06	0.12	0.30	0.94	2.40	8.00	18.00	67.44	181.80
Adhesives	7.49	55.90	0.01	0.02	0.05	0.12	0.35	1.00	3.00	8.00	20.00	128.00	1280.00
Adhesive Removers	34.46	96.60	0.25	0.29	1.22	2.80	6.00	10.88	32.00	64.00	138.70	665.60	1024.00
Silicone Lubricants	12.50	27.85	0.02	0.20	0.69	1.00	2.25	4.50	12.00	24.00	41.20	192.00	312.00
Other Lubricants (excluding Automotive)	9.93	44.18	0.01	0.18	0.30	0.52	1.00	2.25	8.00	18.00	32.00	128.00	1280.00
Specialized Electronic Cleaners (for TVs, Etc.)	9.48	55.26	0.01	0.05	0.13	0.25	0.52	2.00	6.00	12.65	24.00	109.84	1024.00
Latex Paint	371.27	543.86	0.03	4.00	12.92	32.00	64.00	256.00	384.00	857.60	1280.00	2560.00	6400.00
Oil Paint	168.92	367.82	0.02	0.33	4.00	8.00	25.20	64.00	148.48	384.00	640.00	1532.16	5120.00
Wood Stains, Varnishes, and Finishes	65.06	174.01	0.12	1.09	4.00	4.00	8.00	16.00	64.00	128.00	256.00	768.00	3840.00
Paint Removers/Strippers	63.73	144.33	0.64	1.50	4.00	8.00	16.00	32.00	64.00	128.00	256.00	512.00	2560.00
Paint Thinners	69.45	190.55	0.03	0.45	3.10	4.00	8.00	20.48	64.00	128.00	256.00	640.00	3200.00
Aerosol Spray Paint	30.75	52.84	0.02	0.75	2.01	3.25	7.00	13.00	32.00	65.00	104.00	240.00	1053.00
Primers and Special Primers	68.39	171.21	0.01	0.09	1.30	3.23	8.00	16.00	60.00	128.00	256.00	867.75	1920.00
Aerosol Rust Removers	18.21	81.37	0.09	0.25	1.00	1.43	2.75	8.00	13.00	32.00	42.60	199.80	1280.00

Table 6-3. Amount of Products Used For Household Solvent Products (Continued)

Products	Mean (ounces/yr)	Std. dev	Percentile Rankings for Amount of Products Used (ounces)										
			Min.	1%	5%	10%	25%	50%	75%	90%	95%	99%	Max.
Outdoor Water Repellents (for Wood or Cement)	148.71	280.65	0.01	0.37	3.63	8.00	16.00	64.00	128.00	448.00	640.00	979.20	3200.00
Glass Frostings, Window Tints, and Artificial Snow	13.82	14.91	1.00	1.40	2.38	3.25	6.00	12.00	14.00	28.00	33.00	98.40	120.00
Engine Degreasers	46.95	135.17	0.04	1.56	4.00	6.00	12.00	16.00	36.00	80.00	160.00	480.00	2560.00
Carburetor Cleaners	22.00	50.60	0.10	0.50	1.50	3.00	5.22	12.00	16.00	39.00	75.00	212.00	672.00
Aerosol Spray Paints for Cars	44.95	89.78	0.04	0.14	1.50	3.00	6.12	16.00	48.00	100.80	156.00	557.76	900.00
Auto Spray Primers	70.37	274.56	0.12	0.77	3.00	4.00	9.00	16.00	48.00	128.00	222.00	1167.36	3840.00
Spray Lubricant for Cars	18.63	54.74	0.08	0.40	0.96	1.00	2.75	6.00	15.50	36.00	64.00	240.00	864.00
Transmission Cleaners	35.71	62.93	2.00	NA	3.75	4.00	8.00	15.00	32.00	77.00	140.00	NA	360.00
Battery Terminal Protectors	16.49	87.84	0.12	0.13	0.58	1.00	2.00	4.00	8.00	15.00	24.60	627.00	1050.00
Brake Quieters/Cleaners	11.72	13.25	0.50	NA	1.00	2.00	3.02	8.00	14.25	32.00	38.60	NA	78.00
Gasket Remover	13.25	22.35	0.50	NA	1.00	1.00	3.75	7.75	16.00	24.00	58.40	NA	160.00
Tire/Hubcap Cleaners	31.58	80.39	0.12	0.50	1.82	3.00	6.00	12.00	28.00	64.00	96.00	443.52	960.00
Ignition and Wire Dryers	9.02	14.59	0.13	0.32	1.09	1.50	3.00	6.00	10.75	16.00	20.55	113.04	120.00

NA = Not Available

Source: Westat, 1987a

Table 6-4. Time Exposed After Duration of Use For Household Solvent Products

Products	Mean (mins)	Std. dev.	Percentile Rankings for Time Exposed After Duration of Use (mins)										
			Min.	1%	5%	10%	25%	50%	75%	90%	95%	99%	Max.
Spray Shoe Polish	31.40	80.50	0.00	0.00	0.00	0.00	0.00	5.00	20.00	120.00	120.00	480.00	720.00
Water Repellents/Protectors	37.95	111.40	0.00	0.00	0.00	0.00	0.00	3.00	20.00	120.00	240.00	480.00	1800.00
Spot Removers	43.65	106.97	0.00	0.00	0.00	0.00	1.00	5.00	30.00	120.00	240.00	480.00	1440.00
Solvent-Type Cleaning Fluids or Degreasers	33.29	90.39	0.00	0.00	0.00	0.00	0.00	3.00	28.75	60.00	180.00	480.00	1440.00
Wood Floor and Paneling Cleaners	96.75	192.88	0.00	0.00	0.00	0.00	5.00	30.00	120.00	240.00	480.00	1062.00	1440.00
TypeWriter Correction Fluid	124.70	153.46	0.00	0.00	1.00	5.00	30.00	60.00	180.00	360.00	480.00	600.00	1800.00
Adhesives	68.88	163.72	0.00	0.00	0.00	0.00	1.00	10.00	60.00	180.00	360.00	720.00	2100.00
Adhesive Removers	94.12	157.69	0.00	0.00	0.00	0.00	1.75	20.00	120.00	360.00	480.00	720.00	720.00
Silicone Lubricants	30.77	107.39	0.00	0.00	0.00	0.00	0.00	0.00	10.00	60.00	180.00	480.00	1440.00
Other Lubricants (excluding Automotive)	47.45	127.11	0.00	0.00	0.00	0.00	0.00	2.00	30.00	120.00	240.00	485.40	1440.00
Specialized Electronic Cleaners (for TVs, Etc.)	117.24	154.38	0.00	0.00	0.00	1.00	10.00	60.00	180.00	300.00	480.00	720.00	1440.00
Latex Paint	91.38	254.61	0.00	0.00	0.00	0.00	0.00	5.00	60.00	240.00	480.00	1440.00	2880.00
Oil Paint	44.56	155.19	0.00	0.00	0.00	0.00	0.00	0.00	30.00	120.00	240.00	480.00	2880.00
Wood Stains, Varnishes, and Finishes	48.33	156.44	0.00	0.00	0.00	0.00	0.00	1.00	30.00	120.00	240.00	694.00	2880.00
Paint Removers/Strippers	31.38	103.07	0.00	0.00	0.00	0.00	0.00	0.00	20.00	60.00	180.00	541.20	1440.00
Paint Thinners	32.86	105.62	0.00	0.00	0.00	0.00	0.00	0.00	15.00	60.00	180.00	480.00	1440.00
Aerosol Spray Paint	12.70	62.80	0.00	0.00	0.00	0.00	0.00	0.00	1.00	30.00	60.00	260.50	1440.00
Primers and Special Primers	22.28	65.57	0.00	0.00	0.00	0.00	0.00	0.00	10.00	60.00	120.00	319.20	720.00
Aerosol Rust Removers	15.06	47.58	0.00	0.00	0.00	0.00	0.00	0.00	5.00	60.00	60.00	190.20	600.00

Table 6-4. Time Exposed After Duration of Use For Household Solvent Products (Continued)

Products	Mean (mins)	Std. dev.	Percentile Rankings for Time Exposed After Duration of Use (mins)										
			Min.	1%	5%	10%	25%	50%	75%	90%	95%	99%	Max.
Outdoor Water Repellents (for Wood or Cement)	8.33	43.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	58.50	309.60	420.00
Glass Frostings, Window Tints, and Artificial Snow	137.87	243.21	0.00	0.00	0.00	0.00	3.00	60.00	180.00	360.00	480.00	1440.00	1800.00
Engine Degreasers	4.52	24.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.50	120.00	360.00
Carburetor Cleaners	7.51	68.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	30.00	120.60	1800.00
Aerosol Spray Paints for Cars	10.71	45.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.50	60.00	282.00	480.00
Auto Spray Primers	11.37	45.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	77.25	360.00	360.00
Spray Lubricant for Cars	4.54	30.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	15.00	70.20	420.00
Transmission Cleaners	5.29	29.50	0.00	NA	0.00	0.00	0.00	0.00	0.00	5.00	22.50	NA	240.00
Battery Terminal Protectors	3.25	17.27	0.00	NA	0.00	0.00	0.00	0.00	0.00	2.90	15.00	120.00	180.00
Brake Quieters/Cleaners	10.27	30.02	0.00	NA	0.00	0.00	0.00	0.00	0.00	30.00	120.00	NA	120.00
Gasket Remover	27.56	58.54	0.00	NA	0.00	0.00	0.00	0.00	12.50	120.00	180.00	NA	240.00
Tire/Hubcap Cleaners	1.51	20.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	480.00
Ignition and Wire Dryers	6.39	31.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	30.00	216.60	240.00

NA = Not Available

Source: Westat, 1987a

cleaning tasks; the amount of time (duration) spent at each task; the cleaning product most frequently used; and the type of product (liquid, powder, aerosol or spray pump) used (Westat, 1987b). In addition, some demographic, product brand, and protective measure data were requested.

The data are presented in Tables 6-5, 6-6, 6-7, 6-8, and 6-9. Table 6-5 presents the mean and median total exposure time of use for each cleaning task and the product type preferred for each task. The percentile rankings for the total time exposed to the products used for 14 cleaning tasks are presented in Table 6-6. The mean and percentile rankings of the frequency in performing each task are presented in Table 6-7. Table 6-8 shows the mean and percentile rankings for exposure time per event of performing household tasks. The mean and percentile rankings for total number of hours spent per year using the top 10 product groups are presented in Table 6-9.

The methodology used to generate data in this survey and the survey reported by Westat (1987a) is similar. Therefore, the same advantages and disadvantages associated with the Westat (1987a) data also apply to this study.

Westat - National Household Survey of Interior Painters - Westat, (1987c) conducted a study to obtain usage information for household painting. Painting and painting related products generally contain chemicals that may be toxic. Therefore, consumer exposure to these chemicals may be harmful. The survey involved 208 participants (households), and the person in each household who did most of the interior painting during the last 12 months was interviewed over the telephone. The random digit dialing procedure previously described was used to generate sample blocks of telephone numbers. Questions were asked on frequency and time spent for interior painting activities; the amount of paint used; and protective measures used. Fifty-three percent of the primary painters in the households interviewed were male, 46 percent were female, and the sex of the remaining 1 percent was not ascertained. Three types of painting products were used in this study; latex paint, oil-based paint, and wood stains and varnishes. Of the respondents, 94.7 percent used latex paint, 16.8 percent used oil-based paint, and 20.2 percent used wood stains and varnishes.

Data generated from this survey are summarized in Tables 6-10, 6-11, and 6-12. Table 6-10 presents the mean, standard duration, and percentile rankings for the total exposure time

Table 6-5. Total Exposure Time of Performing Task and Product Type Used by Task For Household Cleaning Products

Tasks	Mean (hrs/year)	Median (hrs/year)	Product Type Used	
Clean Bathroom Sinks and Tubs	44	26	Liquid	29%
			Powder	44%
			Aerosol	16%
			Spray pump	10%
			Other	1%
Clean Kitchen Sinks	41	18	Liquid	31%
			Powder	61%
			Aerosol	2%
			Spray pump	4%
			Other	2%
Clean Inside of Cabinets (such as kitchen)	12	5	Liquid	68%
			Powder	12%
			Aerosol	2%
			Spray pump	16%
			Other	2%
Clean Outside of Cabinets	21	6	Liquid	61%
			Powder	8%
			Aerosol	16%
			Spray pump	13%
			Other	2%
Wipe Off Kitchen Counters	92	55	Liquid	67%
			Powder	13%
			Aerosol	2%
			Spray pump	15%
			Other	3%
Thoroughly Clean Counters	24	13	Liquid	56%
			Powder	21%
			Aerosol	5%
			Spray pump	17%
			Other	1%
Clean Bathroom Floors	20	9	Liquid	70%
			Powder	21%
			Aerosol	2%
			Spray pump	4%
			Other	3%
Clean Kitchen Floors	31	14	Liquid	70%
			Powder	27%
			Aerosol	2%
			Spray pump	1%
			Other	--
Clean Bathroom or Other Tilted or Ceramic Walls	16	9	Liquid	37%
			Powder	18%
			Aerosol	17%
			Spray pump	25%
			Other	3%

Table 6-5. Total Exposure Time of Performing Task and Product Type Used by Task For Household Cleaning Products (continued)

Tasks	Mean (hrs/year)	Median (hrs/year)	Product Type Used	
Clean Outside of Windows	13	6	Liquid	27%
			Powder	2%
			Aerosol	6%
			Spray pump	65%
			Other	--
Clean Inside of Windows	18	6	Liquid	24%
			Powder	1%
			Aerosol	8%
			Spray pump	66%
			Other	2%
Clean Glass Surfaces Such as Mirrors & Tables	34	13	Liquid	13%
			Powder	1%
			Aerosol	8%
			Spray pump	76%
			Other	2%
Clean Outside of Refrigerator and Other Appliances	27	13	Liquid	48%
			Powder	3%
			Aerosol	7%
			Spray pump	38%
			Other	4%
Clean Spots or Dirt on Walls or Doors Finishes	19	8	Liquid	46%
			Powder	15%
			Aerosol	4%
			Spray pump	30%
			Other	4%

Source: Westat, 1987b.

Table 6-6. Percentile Rankings for Total Exposure Time in Performing Task

Tasks	Percentile Rankings for Total Exposure Exposure Time Performing Task (hrs/yr)							
	100th	95th	90th	75th	50th	25th	10th	0th
Clean Bathroom Sinks and Tubs	365	121.67	91.25	52	26	13	5.2	0.4
Clean Kitchen Sinks	547.5	121.67	97.6	60.83	18.25	8.67	3.47	0.33
Clean Inside of Kitchen Cabinets	208	48	32.48	12	4.75	2	1	0.17
Clean Outside of Cabinets	780	78.66	36	17.33	6	2	0.967	0.07
Wipe Off Kitchen Counters	912.5	456.25	231.16	91.25	54.75	24.33	12.17	1.2
Thoroughly Clean Counters	547.5	94.43	52	26	13	6	1.75	0.17
Clean Bathroom Floors	365	71.49	36.83	26	8.67	4.33	2	0.1
Clean Kitchen Floors	730	96.98	52	26	14	8.67	4.33	0.5
Clean Bathroom or Other Tilted or Ceramic Walls	208	52	36	26	8.67	3	1	0.17
Clean Outside of Windows	468	32.6	24	11.5	6	2	1.5	0.07
Clean Inside of Windows	273	72	36	19.5	6	3	1.15	0.07
Clean Glass Surfaces Such as Mirrors & Tables	1460	104	60.83	26	13	6	1.73	0.17
Clean Outside Refrigerator and Other Appliances	365	95.29	91.25	30.42	13	4.33	1.81	0.1
Clean Spots or Dirt on Walls or Doors	312	78	52	24	8	2	0.568	0.07

Source: Westat, 1987b.

Table 6-7. Mean Percentile Rankings for Frequency of Use in Performing Household Tasks

Tasks	Mean	Percentile Rankings							
		0th	10th	25th	50th	75th	90th	95th	100th
Clean bathroom sinks and tubs	3 x per week	0.2 x per week	1 x per week	1 x per week	2 x per week	3.5 x per week	7 x per week	7 x per week	42 x per week
Clean kitchen sinks	7 x per week	0 x per week	1 x per week	2 x per week	7 x per week	7 x per week	15 x per week	21 x per week	28 x per week
Clean inside of cabinets such as those in the kitchen	9 x per year	1 x per year	1 x per year	1 x per year	2 x per year	12 x per year	12 x per year	52 x per year	156 x per year
Clean outside of cabinets	3 x per month	0.1 x per month	0.1 x per month	0.3 x per month	1 x per month	4 x per month	4 x per month	22 x per month	30 x per month
Wipe off counters such as those in the kitchen	2 x per day	0 x per day	0.4 x per day	1 x per day	1 x per day	3 x per day	4 x per day	6 x per day	16 x per day
Thoroughly clean counters	8 x per month	0.1 x per month	0.8 x per month	1 x per month	4 x per month	4 x per month	30 x per month	30 x per month	183 x per month
Clean bathroom floors	6 x per month	0.2 x per month	1 x per month	2 x per month	4 x per month	4 x per month	13 x per month	30 x per month	30 x per month
Clean kitchen floors	6 x per month	0.1 x per month	1 x per month	2 x per month	4 x per month	4 x per month	13 x per month	30 x per month	30 x per month
Clean bathroom or other tiled or ceramic walls	4 x per month	0.1 x per month	0.2 x per month	1 x per month	2 x per month	4 x per month	9 x per month	13 x per month	30 x per month
Clean outside of windows	5 x per year	1 x per year	1 x per year	1 x per year	2 x per year	4 x per year	12 x per year	12 x per year	156 x per year
Clean inside of windows	10 x per year	1 x per year	1 x per year	2 x per year	4 x per year	12 x per year	24 x per year	52 x per year	156 x per year
Clean other glass surfaces such as mirrors and tables	7 x per month	0.1 x per month	1 x per month	2 x per month	4 x per month	4 x per month	17 x per month	30 x per month	61 x per month
Clean outside of refrigerator and other appliances	10 x per month	0.2 x per month	1 x per month	2 x per month	4 x per month	13 x per month	30 x per month	30 x per month	61 x per month
Clean spots or dirt on walls or doors	6 x per month	0.1 x per month	0.2 x per month	0.3 x per month	1 x per month	4 x per month	13 x per month	30 x per month	152 x per month

Source: Westat, 1987b.

Table 6-8. Mean and Percentile Rankings for Exposure Time Per Event of Performing Household Tasks

Tasks	Mean (minutes/event)	Percentile Rankings (minutes/event)							
		0th	10th	25th	50th	75th	90th	95th	100th
Clean bathroom sinks and tubs	20	1	5	10	15	30	45	60	90
Clean kitchen sinks	10	1	2	3	5	10	15	20	480
Clean inside of cabinets such as those in the kitchen	137	5	24	44	120	180	240	360	2,880
Clean outside of cabinets	52	1	5	15	30	60	120	180	330
Wipe off counters such as those in the kitchen	9	1	2	3	5	10	15	30	120
Thoroughly clean counters	25	1	5	10	15	30	60	90	180
Clean bathroom floors	16	1	5	10	15	20	30	38	60
Clean kitchen floors	30	2	10	15	20	30	60	60	180
Clean bathroom or other tiled or ceramic walls	34	1	5	15	30	45	60	120	240
Clean outside of windows	180	4	30	60	120	240	420	480	1,200
Clean inside of windows	127	4	20	45	90	158	300	381	1,200
Clean other glass surfaces such as mirrors and tables	24	1	5	10	15	30	60	60	180
Clean outside of refrigerator and other appliances	19	1	4	5	10	20	30	45	240
Clean spots or dirt on walls or doors	50	1	5	10	20	60	120	216	960

Source: Westat, 1987b.

Table 6-9. Total Exposure Time for Ten Product Groups Most Frequently Used For Household Cleaning[a]

Products	Mean (hrs/yr)	Percentile Rankings of Total Exposure Time (hrs/yr)							
		0th	10th	25th	50th	75th	90th	95th	100th
Dish Detergents	107	0.2	6	24	56	134	274	486	941
Glass Cleaners	67	0.4	3	12	29	62	139	260	1,508
Floor Cleaners	52	0.7	4	7	22	52	102	414	449
Furniture Polish	32	0.1	0.3	1	12	36	101	215	243
Bathroom Tile Cleaners	47	0.5	2	8	17	48	115	287	369
Liquid Cleansers	68	0.2	2	9	22	52	122	215	2,381
Scouring Powders	78	0.3	9	17	35	92	165	281	747
Laundry Detergents	66	0.6	8	14	48	103	174	202	202
Rug Cleaners/Shampoos	12	0.3	0.3	0.3	9	26	26	26	26
All Purpose Cleaners	64	0.3	4	9	26	77	174	262	677

[a] The data in Table 8 above reflect for only the 14 tasks included in the survey. Therefore, many of the durations reported in the table underestimate the hours of the use of the product group. For example, use of dish detergents to wash dishes is not included.

Source: Westat, 1987b.

Table 6-10. Total Exposure Time of Painting Activity of Interior Painters (hrs)

Types of Paint	Mean (hrs)	Std. dev.	Percentile Rankings for Duration of Painting Activity (hrs)							
			Min.	10%	25%	50%	75%	90%	95%	Max.
Latex	12.2	11.28	1	3	4	9	15	24	40	248
Oil-based	10.68	15.56	1	1.6	3	6	10	21.6	65.6	72
Wood Stains and Varnishes	8.57	10.85	1	1	2	4	9.3	24	40	42

Source: Westat, 1987c.

Table 6-11. Exposure Time of Interior Painting Activity/Occasion (hrs) and Frequency of Occasions Spent Painting Per Year

Types of Paint	Duration of Painting/Occasion (hrs)		Frequency of Occasions Spent Painting/Year		Percentile Rankings for Frequency of Occasions Spent Painting							
	Mean	Median	Mean	Std. dev.	Min	10%	25%	50%	75%	90%	95%	Max.
Latex	2.97	3	4.16	5.54	1	1	2	3	4	9	10	62
Oil-based	2.14	3	5.06	11.98	1	1	1	2	4	8	26	72
Wood Stains and Varnishes	2.15	2	4.02	4.89	1	1	1	2	4	9	20	20

Source: Westat, 1987c.

Table 6-12. Amount of Paint Used by Interior Painters

Types of Paint	Median (gallons)	Mean (gallons)	Std. dev.	Percentile Rankings for Amount of Paint Used (gallons)							
				Min	10%	25%	50%	75%	90%	95%	Max.
Latex	3.0	3.89	4.56	0.13	1	2	3	5	8	10	50
Oil-based	2.0	2.55	3.03	0.13	0.25	0.5	2	3	7	12	12
Wood Stains and Varnishes	0.75	0.88	0.81	0.13	0.14	0.25	0.75	1	2	2	4.25

Source: Westat, 1987c.

for painting activity by paint type. Table 6-11 presents the mean and standard exposure time for the painting activity per occasion for each paint type. A "painting occasion" is defined as a time period from start to cleanup (Westat 1987c). Table 6-11 also presents the frequency and percentile rankings of painting occasions per year. Table 6-12 presents the total amount of paint used by interior painters.

The methodology used to generate data in this survey is similar to the methodology used in the survey reported by Westat (1987a). Therefore, the same advantages and disadvantages associated with the Westat (1987a) data also apply to this study.

6.3. RECOMMENDATIONS

In order to estimate consumer exposure to household products, several types of information are needed for the exposure equation. The information needed include frequency and duration of use, amount of product used, percent weight of the chemical found in the product, and for dermal exposure, the amount of the solution on the skin after exposure. The studies of Westat (1987a, b, and c) provide information on amount, duration, and frequency of use of household consumer products. The frequency and duration of use and amount of product used for some household products can be obtained from Tables 6-1 through 6-10. Exposure to chemicals present in common household products can be estimated by utilizing these data presented in these tables and the appropriate exposure equation. It should be noted that if these data are used to model indoor air concentrations, the values for time of use, time exposed after use, and frequency in the indoor air, should be the same values used in the dose equation for frequency and contact time for a given individual.

6.4. REFERENCES FOR CHAPTER 6

Westat (1987a) Household solvent products - a national usage survey. Under Subcontract to Battelle Columbus Div., Washington DC. Prepared for U.S. Environmental Protection Agency, Washington, DC. Available from NTIS, Springfield, VA. PB88-132881.

Westat (1987b) National usage survey of household cleaning products. Prepared for U.S. Environmental Protection Agency, Office of Toxic Substances and Office of Pesticides and Toxic Substances, Washington, DC.

Westat (1987c) National household survey of interior painters. Prepared for U.S. Environmental Protection Agency, Office of Toxic Substances and Office of Pesticides and Toxic Substances, Washington DC.

7. REFERENCE RESIDENCE

7.1 INTRODUCTION

Within a residence, exposures occur not only by the inhalation route, but also by the ingestion and dermal routes. The factors needed to assess many aspects of these last two routes (e.g., food consumption, product use information, etc.) are contained in other chapters. The role of human activity patterns is discussed in Chapter 5, and factors related to product use are summarized in Chapter 6. The purpose of this chapter is to provide information on various residential factors that are needed to assess inhalation exposures--whether those exposures occur alone or in conjunction with dermal and/or ingestion exposures.

Exposure assessments in residential settings require information to define: (1) the availability of the chemical(s) of concern at a given place within the building, (2) the nature and degree of human presence at that location and time, and (3) certain characteristics of the residence. Very often, indoor exposure assessments must be undertaken with little or no direct knowledge of the environmental abundance of the chemical(s) of concern and only sketchy information to define the human presence. As a consequence, such exposure assessments must be assembled from a mix of observational, physical and chemical measurement data coupled to theoretical and empirical assumptions to fill information gaps. In residential exposure scenarios, definition of source-receptor relationships can take on special complexities because: (1) chemical concentrations can vary over time due to building-specific as well as chemical- and source-specific factors, (2) the human who incurs the exposure very often exerts some influence over these factors (particularly for the source), (3) for some types of indoor sources, room-to-room differences in concentration are likely to prevail, and (4) people tend to move from room to room and to come and go from the exposure scene.

The chemical mass balance of the house provides a deterministic framework for considering the interactions among sources and fates for each chemical of concern (Figure 7-1). The fate, in particular, tells the exposure analyst whether concerns may arise from the perspectives of inhalation, dermal, or ingestion exposure, or some combination thereof. For

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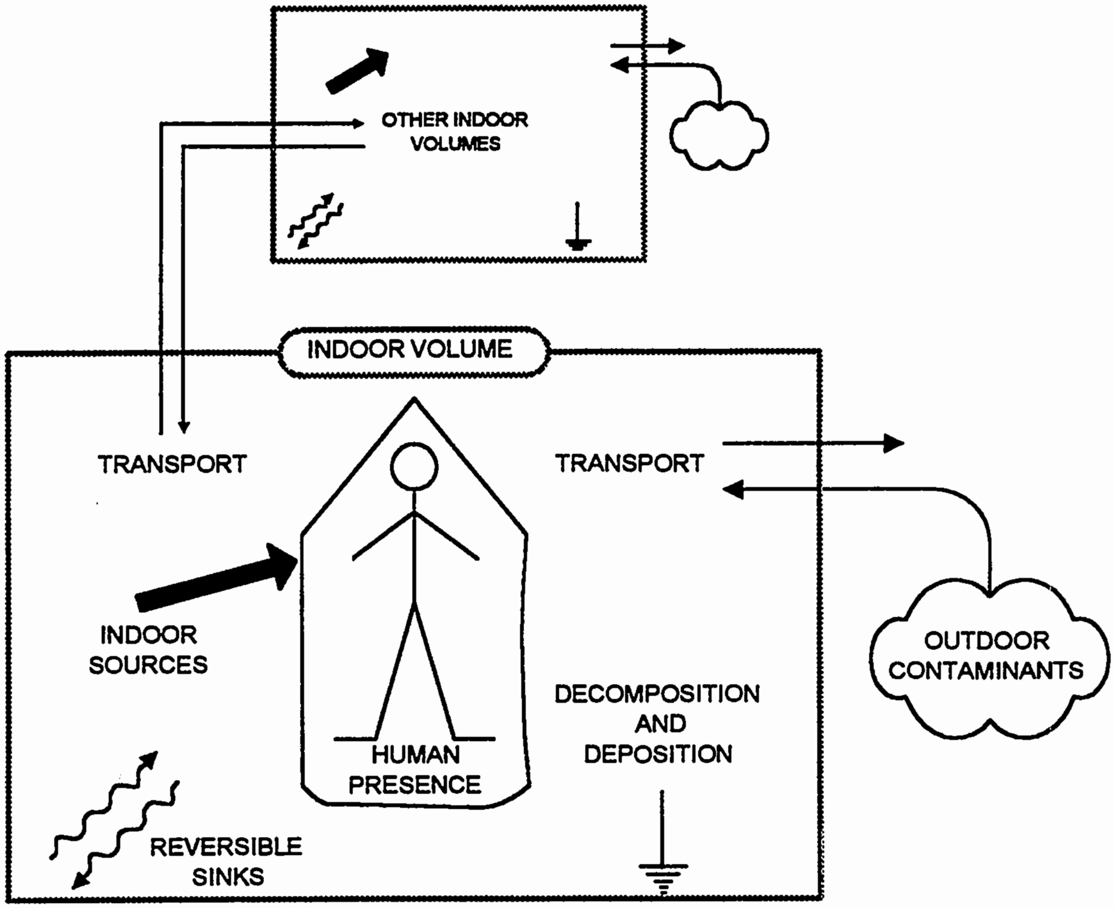
Figure 7-1. Elements of Residential Exposure



example, use of a hard surface cleaner with volatile constituents can result in inhalation of chemicals that volatilize during/after application as well as dermal contact in the course of applying the cleaner. For a chemical conveyed by the residential water supply, both inhalation and dermal exposure can occur while showering, in addition to direct ingestion when drinking the water.

The extent of human exposure by these various routes depends on a number of factors. Some residential exposure factors are related to features of the building itself, such as total and room-specific volumes, surface areas, and airflow rates. Other factors are related to human presence, such as location/activity patterns and use of various consumer products that can release chemicals of concern. The focus of this chapter is on the characteristics of the residence. Residential construction and finishing materials and interior furnishings also are of interest because they can emit or absorb some chemicals of concern, but these factors generally are beyond the current scope of this document.

The remainder of this chapter provides information on various residential factors that can affect human exposure while indoors. Section 7.2 summarizes existing data on whole-house and room-specific volumes. Section 7.3 lists indoor-outdoor air exchange rates and provides a basis for defining airflows within a residence that affect chemical transport. Section 7.4 provides information on one type of indoor source--the water supply--whose configuration is defined by the residence rather than the occupant. For completeness, factors related to occupant uses of the water are also presented.

7.2 INDOOR VOLUMES

7.2.1 Volumes of Residences

Residential Energy Consumption Survey (RECS) - No measurement surveys have been conducted to directly evaluate the range and distribution of residential volumes. Related data, however, are regularly collected through the U.S. Department of Energy's Residential Energy Consumption Survey (USDOE 1992). In addition to collecting information on energy use, this triennial survey collects data on housing characteristics, including direct measurements of total and heated floorspace for buildings visited by survey specialists. For a recent survey (1990), a statistical sample of over 5000 residences was surveyed, representing 94 million households nationwide. Table 7-1 summarizes indoor volumes estimated from this survey for leading categories of housing; these volumes were derived from the floorspace data contained in the USDOE report using an assumed ceiling height of 8 ft (2.44 m).

The data in Table 7-1 also indicate a relationship between residential volume and both housing type and ownership. The predominant housing type--single-family detached home--also has the largest volume. Multifamily units and mobile homes have volumes averaging about half that of single-family detached homes, with single-family attached homes about halfway between these extremes. Within each category of housing type, owner-occupied residences average about 50 percent greater volume than rental units. The owner-occupied residences collectively account for two-thirds of the U.S. housing stock.

The relationship of other factors--household size and structure age--to residential volumes is shown in Table 7-2. The relationship with household size is of particular interest for purposes of exposure assessment; for example, one-person households would not include children. The data indicate that multi-person households occupy residences with volumes averaging about 50 percent greater than residences occupied by single-person households. Data on year of construction indicate a slight decrease in residential volumes between 1950 and 1980, followed by an increasing trend over the next decade.

7.2.2 Room Volumes and Surface Areas

Volumes and Areas of Research Houses - Room volumes and surface areas have not been well characterized for the U.S. housing stock. However, there is information on several well-characterized houses that have been used for energy conservation and indoor air quality research. Four examples are given in Table 7-3; all houses were built in the late 1970s or early 1980s. Two of the houses--a two-story style and a ranch style--have been used by the National Institute of Standards and Technology (NIST, formerly National Bureau of Standards) for energy conservation and air quality research. The buildings were specified by NIST as "being typical of modern residential construction in 1977" (Emmerich and Persily 1994). A ranch style house used by EPA for indoor air quality research (Tichenor et al. 1990), like that specified by NIST, consists of a single story, and the two houses have

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Table 7-1. Average Estimated Volumes of U.S. Residences

	Ownership					
	Owner-Occupied		Rental		All Units	
Housing Type	Volume[1] (m^3)	Percent of Total	Volume (m^3)	Percent of Total	Volume (m^3)	Percent of Total
Single-Family Detached	534	53.2	349	8.9	508	62.1
Single-Family Attached	436	3.9	284	2.4	378	6.4
Multifamily (2-4 units)	394	2.7	224	8.0	267	10.6
Multifamily (5+ Units)	274	1.9	170	13.4	183	15.3
Mobile Home	221	4.5	177	1.1	213	5.5
All Types	494	66.2	239	33.8	408	100.0

[1] Volumes calculated from floor areas assuming a ceiling height of 8 feet.

Source: U.S. DOE 1992.

Table 7-2. Residential Volumes in Relation to Household Size and Year of Construction

	Volume[1] (m^3)	Percent of Total
Household Size		
1 Person	301	24.9
2 Persons	422	32.6
3 Persons	420	16.8
4 Persons	504	14.8
5 Persons	464	7.1
6 or More Persons	450	3.8
All Sizes	408	100.0
Year of Construction		
1939 or before	430	22.9
1940 to 1949	373	7.4
1950 to 1959	418	14.3
1960 to 1969	400	15.7
1970 to 1979	383	22.8
1980 to 1984	384	8.5
1985 to 1987	411	5.4
1988 to 1990	562	3.0
All Years	408	100.0

[1] Volumes calculated from floor areas assuming a ceiling height of 8 feet.

Source: U.S. DOE 1992.

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Table 7-3. Room Volumes and Surface Areas From Energy Conservation and Indoor Air Quality Research Houses

Room or Zone	Volume (m^3)	Surface Area Floor (m^2)	Surface Area Walls (m^2)
NIST Two-Story Style[1] (Total Habitable Volume = 420 m^3)			
Living Room	61	25	49
Dining Room	42	17	40
Kitchen/Family Area	75	31	55
Half-Bath	8	3	18
Large Closet	12	5	22
Utility Closet	5	2	14
Attached Garage	131	54	73
Master Bedroom	69	28	52
Master Closet	22	9	30
Master Bath	11	4	20
Hall	11	4	28
Bedroom 2	35	15	45
Bedroom 3	29	12	34
Bedroom 4	29	12	34
Bath	11	4	20
NIST Ranch Style[1] (Total Habitable Volume = 250 m^3)			
LR/DR	75	31	60
Kitchen	28	12	34
Hall	13	5	35
Master Bedroom	44	18	42
Master Bath	11	5	24
Bedroom 2	33	14	36
Bedroom 3	31	13	36
Hall Bath	15	6	24
Attached Garage	89	37	62
EPA Ranch Style[2] (Total Habitable Volume = 293 m^3)			
Den/Kit./LR	150	63	81
Hall	12	5	24
Middle Bedroom	34	14	27
Corner Bedroom	33	14	27
Master Bedroom	42	18	36
Master Bath	10	4	8
Hall Bath	12	5	7
GEOMET Split Foyer Style[3] (Total Habitable Volume = 311 m^3)			
LR/Kit./DR	100	41	36
Hall	11	5	24
Front Bedroom	23	8	28
Corner Bedroom	21	9	34
Master Bedroom	35	14	36
Master Bath	8	3	18
Hall Bath	9	4	20
Downstairs	104	43	59
Integral Garage	108	44	65

[1] Emmerich and Persily, 1994.
[2] Sparks, 1988.
[3] GEOMET, 1982.

similar volumes, in the range of 250 to 300 m^3. A two-story split-foyer house used by GEOMET (Koontz and Nagda 1989) for air quality and energy research has a habitable volume of 311 m^3. The house also includes an integral garage in the lower level; if the option for habitable space had been chosen instead of the garage, then the habitable volume would have been virtually identical to that of the two-story NIST residence (420 m^3). Thus, both the two-story residences have volumes very close to the national average (408 m^3) previously shown in Table 7-1.

Volumes of specific rooms are a function of both total house volume and interior design/layout. Across the four structures, the bedroom volumes varies by a factor of three, from 21 m^3 to 69 m^3, averaging 35 m^3. Bathroom volumes vary by a factor of two, from 8 m^3 to 15 m^3, averaging 11 m^3. The range of hallway volumes across these houses is quite narrow, from 11 m^3 to 13 m^3. Kitchen and living room volumes were not reported separately for two of the four houses because they are part of a series of interconnected rooms, but the cases where they were reported separately indicate a kitchen volume on the order of 30 m^3 and living room volume near 60 m^3. The surface-to-volume ratio for the floor (and, by analogy, the ceiling) is consistently 0.41 for these residences because a ceiling height of 8 feet (2.44 meters) was assumed in computing the volumes. The surface-to-volume ratio for walls varies from about 0.5 for open and interconnected areas (e.g., kitchen/dining room/living room) to about 2.0 for smaller enclosed areas such as closets, bathrooms, and hallways.

Surface Materials - Table 7-4 shows examples of assumed amounts (Tucker 1991) of selected products or materials used in constructing or finishing residential surfaces. Products used for floor surfaces include adhesive, varnish and wood stain, and materials used for walls include paneling, gypsum board, and wallpaper. Particleboard and chipboard most likely would be used for interior furnishings such as cabinets or shelves, but also could be used for decking or underlayment.

Table 7-4. Examples of Products and Materials Associated with Floor and Wall Surfaces in Residences[1]

Material Sources	Assumed Amount of Surface Covered
Silicone caulk	0.2 m^2
Floor adhesive	10.0 m^2
Floor wax	50.0 m^2
Wood stain	10.0 m^2
Polyurethane wood finish	10.0 m^2
Floor varnish or lacquer	50.0 m^2
Plywood paneling	100.0 m^2
Chipboard	100.0 m^2
Gypsum board	100.0 m^2
Wallpaper	100.0 m^2

[1] After Tucker, 1991.

7.3 AIRFLOWS

7.3.1 Background

Major air transport pathways for airborne substances in residences include the following:

- Air exchange—Air leakage through windows, doorways, intakes and exhausts, and "adventitious openings" (i.e., cracks and seams) that combine to form the leakage configuration of the building envelope plus natural and mechanical ventilation;
- Interzonal airflows—Transport through doorways, ductwork, and service chaseways that interconnect rooms or zones within a building; and
- Local circulation—Convective and adjective air circulation and mixing within a room or within a zone.

The distribution of airflows across the building envelope that contribute to air exchange and the interzonal airflows along interior flowpaths is determined by the interior pressure distribution. The forces causing the airflows are temperature differences, the actions of wind, and mechanical ventilation systems. Basic concepts have been reviewed by ASHRAE (1993). Indoor-outdoor and room-to-room temperature differences create density differences that help determine basic patterns of air motion. During the heating season, warmer indoor air tends to rise to exit the building at upper levels by stack action. Exiting air is replaced at lower levels by an influx of colder outdoor air. During the cooling season, this pattern is reversed: stack forces during the cooling season are generally not as strong as in the heating season because the indoor-outdoor temperature differences are not pronounced.

The position of the neutral pressure level (i.e., the point where indoor-outdoor pressures are equal) depends on the leakage configuration of the building envelope. The stack effect arising from indoor-outdoor temperature differences is also influenced by the partitioning of the building interior. When there is free communication between floors or stories, the building behaves as a single volume affected by a generally rising current during the heating season and a generally falling current during the cooling season. When vertical communication is restricted, each level essentially becomes an independent zone. As the wind flows past a building, regions of positive and negative pressure are created; positive pressures induce an influx of air, whereas negative pressures induce an outflow. Wind effects and stack effects combine to determine a net inflow or outflow.

The final element of indoor transport involves the actions of mechanical ventilation systems that circulate indoor air through the use of fans. Mechanical ventilation systems may be connected to heating/cooling systems that, depending on the type of building, recirculate thermally treated indoor air or a mixture of fresh air and recirculated air. Mechanical systems also may be solely dedicated to exhausting air from a designated area, as with some kitchen range hoods and bath exhausts, or to recirculating air in designated areas as with a room fan. Local air circulation also is influenced by the movement of people and the operation of local heat sources.

7.3.2 Air Exchange

Air exchange is the balanced flow into and out of the building, and is composed of three processes: (1) infiltration -- air leakage through random cracks, interstices and other unintentional openings in the building envelope; (2) natural ventilation -- airflows through open windows, doors, and other designed openings in the building envelope; and (3) forced or mechanical ventilation -- controlled air movement driven by fans. For nearly all indoor exposure scenarios, air exchange is treated as the principal means of diluting indoor concentrations because outdoor levels are generally assumed to be zero. The air exchange rate is generally expressed in terms of air changes per hour (ACH, with units of h^{-1}), the ratio of the airflow ($m^3\ h^{-1}$) to the volume (m^3).

Measurements with Perfluorocarbon Tracers - No measurement surveys have been conducted to directly evaluate the range and distribution of residential air exchange rates. Although a significant number of air exchange measurements have been carried out over the years, the diversity of protocols and study objectives make the formation of a representative database problematic. Since the early 1980s, however, an inexpensive perfluorocarbon tracer (PFT) technique (Dietz et al. 1986) has been used to measure time-averaged air exchange and interzonal airflows in more than 4,000 occupied residences using essentially similar protocols. These measurement results have been compiled to allow various researchers to access the data (Versar 1990).

While the residences represented in the PFT database do not constitute a random sample of those across the United States, they nonetheless represent a compilation of homes visited in the course of about 100 separate field-research projects by various organizations, some of which involved random sampling and some of which involved judgmental or fortuitous sampling. Further analysis on the assembled data (Koontz and Rector 1995) indicate that the 10th percentile value of 0.18 ACH would be appropriate as a conservative estimator for air exchange in residential settings, and that a value of 0.45 ACH would be appropriate when a typical air exchange rate is desired. Statistical summaries of the data are presented in
Table 7-5.

In applying conservative or typical values of air exchange rates it is important to realize the limitations of the underlying data base. Although the estimates are based on thousands of measurements, the residences represented in the database are not a random sample of the United States housing stock. The sample population is not balanced in terms of geography or time of year. Statistical techniques were applied to compensate for some of these imbalances. Despite such limitations, the estimates in Table 7-5 are believed to represent the best available information on the distribution of air exchange rates across United States residences throughout the year.

Earlier Studies - Prior to the Koontz and Rector (1993) study, Nazaroff et al. (1987) aggregated the data from two earlier tracer-gas decay studies that, at the time they were conducted, were the largest U.S. studies to include air exchange measurements. The first (Grot and Clark 1981) was conducted in 255 dwellings occupied by low-income families in 14 different cities. The geometric mean ± standard deviation for the air exchange measurements in these homes, with a median house age of 45 years, was 0.90 ± 2.13 ACH. The second study (Grimsrud et al. 1983) involved 312 newer residences, with a median age of less than 10 years. Based on measurements taken during the heating season, the geometric mean ± standard deviation for these homes was 0.53 ± 1.71 ACH. Based on an aggregation of the two distributions with proportional weighting by the respective number of

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Table 7-5. Summary Statistics for Air Exchange Rates (Air Changes Per Hour-ACH), by Region

	West Region	North Central Region	Northeast Region	South Region	All Regions
Arithmetic Mean	0.66	0.57	0.71	0.61	0.63
Arithmetic Standard Deviation	0.87	0.63	0.60	0.51	0.65
Geometric Mean	0.47	0.39	0.54	0.46	0.46
Geometric Standard Deviation	2.11	2.36	2.14	2.28	2.25
10th Percentile	0.20	0.16	0.23	0.16	0.18
50th Percentile	0.43	0.35	0.49	0.49	0.45
90th Percentile	1.25	1.49	1.33	1.21	1.26
Maximum	23.32	4.52	5.49	3.44	23.32

Source: Koontz and Rector, 1993.

houses studied, Nazaroff et al. (1987) developed an overall distribution with a geometric mean of 0.68 ACH and a geometric standard deviation of 2.01.

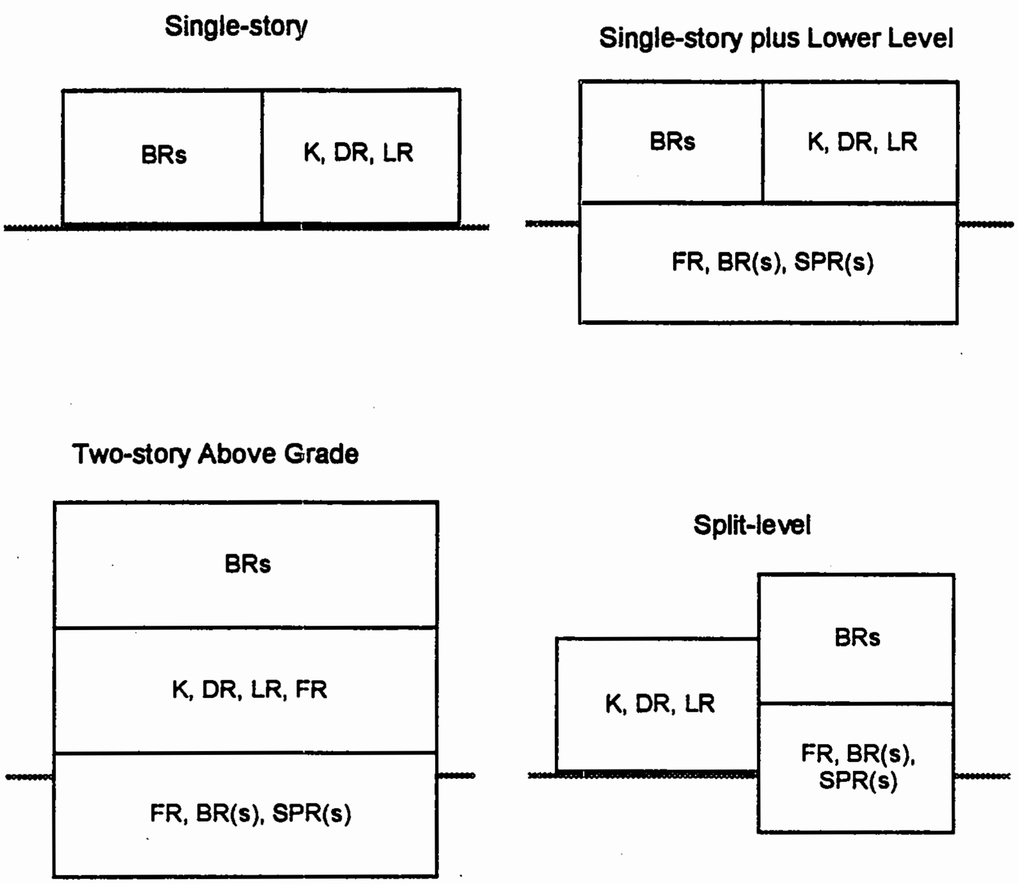
7.3.3 Interzonal Airflows

Background - Residential structures consist of a number of rooms that may be connected horizontally, vertically, or both horizontally and vertically. With some exceptions, the major variations in general residential layouts arise from the location of bedrooms relative to the area containing the kitchen, living room, and dining room (Rector and Koontz 1987). As illustrated in Figure 7-2, bedrooms usually are located either on the same floor as the kitchen or on a floor that is partly or completely above the kitchen. In some residences there is a basement below the kitchen floor, usually containing a recreation or family room, other special purpose rooms, and sometimes additional bedrooms. Before considering residential structures as a detailed network of rooms, it is convenient to divide them into one or more zones. At a minimum, each floor is defined as a separate zone. For indoor air exposure assessments, further divisions are sometimes made within a floor, depending on (1) locations of specific contaminant sources and (2) the presumed degree of air communication among areas with and without sources.

Defining the airflow balance for a multiple-zone exposure scenario rapidly increases the information requirements as rooms or zones are added. As depicted in Figure 7-3, a single zone system (considering the entire building as a single well-mixed volume) requires only two flows to define air exchange. Further, because air exchange is balanced flow (air does not "pile up" in the building, nor is a vacuum formed), only one number -- the air exchange rate -- is needed. With two zones, six airflows are needed to accommodate interzonal airflows plus air exchange; with three zones, twelve airflows are required. In some cases, the complexity can be reduced using judicious (if not convenient) assumptions. Interzonal airflows connecting nonadjacent rooms can be set to zero, for example, if flow pathways do not exist. Symmetry also can be applied to the system by assuming that each flow pair is balanced.

Relationship to House Volume and Air Exchange - A heuristic relationship between interzonal airflows and house volume and air exchange was developed by Koontz and Rector

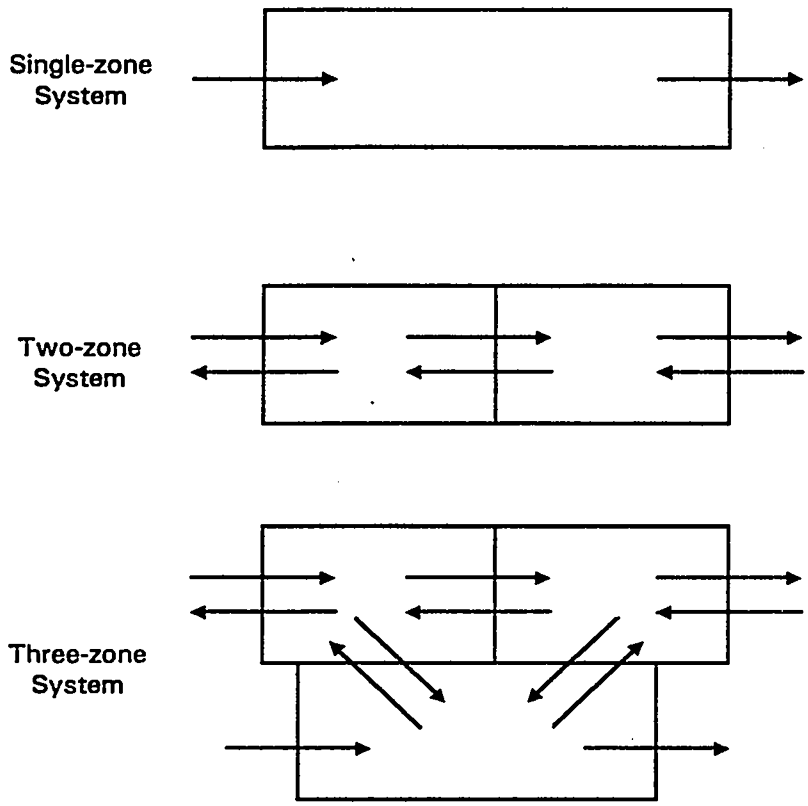
Figure 7-2. Residential Configurations (after Rector and Koontz 1993)



KEY:

K	=	Kitchen	FR	=	Family Room or Recreation Room
DR	=	Dining Room			
LR	=	Living Room	SPR	=	Special-Purpose Room
BR	=	Bedroom			

Figure 7-3. Airflows for multiple-zone systems



N-Zone System Defined by N·(N+1) Airflows

(1995) using selected cases from the PFT database. Two situations were investigated: (1) bedrooms, for which communication with the remainder of the house may be restricted by the presence of doorways; and (2) the kitchen, which generally has a more open communication path with adjacent areas. The PFT database contained approximately 1000 cases where researchers labeled a bedroom or the kitchen as separate zones. These cases were analyzed by normalizing the average interzonal airflows (Q_z, m^3 h^{-1}) into and out of the zone by the volume (V, m^3) of the house (i.e., dividing the airflows by the house (volume) and regressing the normalized airflows against the whole-house air exchange rate. This averaging also served to symmetrically balance each set of inflow-outflow pairs. For the bedroom cases, the relationship between the normalized interzonal airflow (Q_n, m^3 h^{-1} m^{-3}) and air exchange rate (N, h^{-1}) was:

$$Q_n = \frac{Q_z}{V} = 0.078 + 0.31N \tag{1}$$

where:

N	=	Whole-house air exchange rate
V_Z	=	Volume of house

For the kitchen cases, relationship between the normalized internal airflow and the air exchange rate was:

$$Q_n = \frac{Q_z}{V} = 0.046 + 0.39N \tag{2}$$

Example Calculations - Based on typical values and relationships given above, characteristic airflows can be postulated for two-zone situations conceptualized as "bedroom versus remainder of the house" and "living room versus remainder of the house." For example, using Equation (1) and assuming a whole-house volume of 408 m^3 (Table 7-1), an average bedroom volume of 35 m^3 (Table 7-3), and an air exchange rate of 0.45 h^{-1} (Table 7-5), the estimated interzonal airflow (Q_z) for the bedroom would be (0.078 + 0.31 x 0.45 h^{-1}) x 408 m^3, or 88.7 m^3 h^{-1}. The living room, like the kitchen, is assumed to have freer air communication with the rest of the house. Using Equation (2) above, the estimated interzonal airflow for the living room would be (0.046 + 0.39 x 0.45 h^{-1}) x 408 m^3, or 90.4 m^3 h^{-1}. Multiplying the zone-specific volumes by the air exchange rate gives their respective indoor-outdoor airflow rates. For example, the living room volume of 60 m^3, multiplied by 0.45 h^{-1}, gives an indoor-outdoor airflow rate of 27.0 m^3 for the living room. The volumes and estimated airflows for these situations are summarized in Figure 7-4.

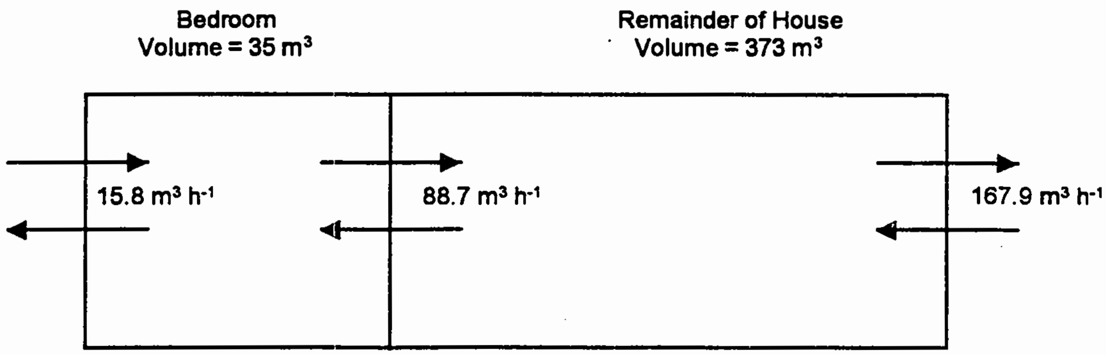
One cautionary note is in order when using the heuristic relationships described above. Some or many of the researchers contributing measurements to the PFT database used for the analysis may have defined a zone as a group of adjacent bedrooms, rather than an individual bedroom. If so, then the interzonal airflow rate for an individual bedroom is likely to be lower than indicated by the above relationship. Similarly, the living room, which generally has open communication with the rest of the house like the kitchen but also has a larger volume than the kitchen, might be expected to have a higher interzonal airflow rate than indicated by the above relationship.

7.3.4 Variability Within Zones

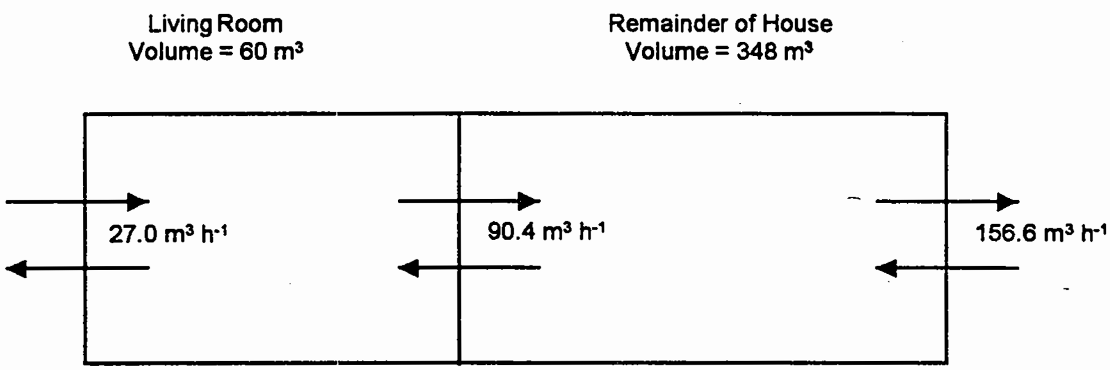
Many exposure measurements are predicated on the assumption of uniform mixing within a room or zone of a house. Recent experimental work by Baughman et al. (1994) indicates that, for an instantaneous release from a point source in a room, fairly complete mixing is achieved within 10 minutes when convective flow is induced by solar radiation but up to 100 minutes is required under quiescent (nearly isothermal) conditions. Similar findings might be expected for a continuously emitting area source such as carpeting or a freshly painted wall.

Experiments in a Research House - The situation changes, however, if a human invokes a point source for a more prolonged period and remains in the immediate vicinity of that source. A series of experiments conducted by GEOMET (1989) for the USEPA involved controlled point-source releases of carbon monoxide (CO), each for a duration of 30 minutes, on several occasions in both the master bedroom and the kitchen. A "breathing-zone" monitoring array was constructed using eight miniaturized continuous CO monitors arranged at the corners of a cube centered on the release point, with each detector located

Figure 7-4. Characteristic Volumes and Airflow Rates for Two-zone Situations



Bedroom versus Remainder of House



Living Room versus Remainder of House

approximately 0.4 m from the release point. Monitoring was also conducted elsewhere in the release rooms and in the remainder of the house. Although a fairly uniform mixing was achieved soon after the release was completed, during the release the breathing-zone concentrations were as much as 2 to 3 times higher for the bedroom case (with the central air conditioner off) and as much as 10 times higher for the kitchen case (again with the air conditioner off). Because the kitchen has freer communication with the remainder of the house, a more distinct concentration gradient between the breathing zone and remainder of the kitchen zone was apparent.

Experiments in an Environmental Chamber - A more recent USEPA-sponsored investigation by Furtaw et al. (1994) involved a series of experiments in a controlled-environment room-sized chamber to study spatial concentration gradients around a continuous point source. Sulfur hexafluoride (SF_6) tracer gas was used to simulate the point source. SF_6 was sampled at the wearer's breathing zone, using a sampling tube connected to a harness, and at numerous points throughout the chamber. In close proximity (about 0.4 m) to the source, the average monitored concentration was found to exceed concentrations several meters away by a factor that varies inversely with the ventilation intensity in the room. At typical room ventilation rates, the ratio of source-proximate to slightly-removed concentration was on the order of 2:1. Of the cases studied by GEOMET, this chamber study would most closely resemble the bedroom case (i.e., limited communication with other rooms), for which a similar ratio was obtained.

7.4 WATER SUPPLY AND USE

7.4.1 Background

As noted in the introduction to this chapter, the residential water supply may convey certain chemicals to which occupants can be exposed through ingestion, dermal contact, or inhalation. Among indoor water uses, showering, bathing and handwashing of dishes or clothes provide the primary opportunities for dermal exposure. Virtually all indoor water uses will result in some volatilization of chemicals, leading to inhalation exposure.

The exposure potential for a given situation will depend on the source of water, the types and extents of water uses, and the extent of volatilization of specific chemicals.

According to the results of the 1987 Annual Housing Survey (U.S. Bureau of the Census, 1992), 84.7% of U.S. housing units receive water from a public system or private company (as opposed to a well). Across the four major regions defined by the U.S. Census Bureau (Northeast, South, Midwest, and West), the percentage varies from 82.5 in the Midwest region to 93.2 in the West region (the Northeast and South regions both are very close to the national percentage). Water use is discussed separately below.

7.4.2 Water Use

The primary types of water use indoors can be classified as showering/bathing, toilet use, clothes washing, dishwashing, and faucet use (e.g., for drinking, cooking, general cleaning, or washing hands). Substantial information on water use has been collected in California households by the Metropolitan Water District of Southern California (MWD 1991) and by the East Bay Municipal Utility District (EBMUD 1992). An earlier study by the U.S. Department of Housing and Urban Development (USDHUD 1984) monitored water use in 200 households over a 20-month period. The household selection process for this study was not random; it involved volunteers from water companies and engineering organizations, most of which were located in large metropolitan areas. Nazaroff and Nero (1988) also assembled the results of several smaller surveys, typically involving between 5 and 50 households each.

A common feature of the various studies cited above is that the results were all reported in gallons per capita per day (gcd), or in units that could be easily converted to gcd. Most studies also provided estimates by type of use--shower/bath, toilet, laundry, dishwashing, and other (e.g., faucets). A summary of the various study results is provided in Table 7-6. There is generally about a threefold variation across studies for total in-house water use as well as each type of use. Central values for total use, obtained by taking the mean and median across the studies for each type of water use and then summing these means/medians across uses, are listed at the bottom of the table. The means and medians were summed across types of uses to obtain the mean for all uses combined because only a subset of the studies reported values for other uses.

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Table 7-6. In-house Water Use Rates (gcd), by Study and Type of Use

Study	Total, all Uses	Shower or Bath	Toilet	Laundry	Dishwashing	Other
MWD[1]	93	26	30	20	5	12
EBMUD[2]	67	20	28	9	4	6
USDHUD[3]	40	15	10	13	2	–
Cohen[4]	52	6	17	11	18	–
Ligman[4]						
Rural	46	11	18	14	3	–
Urban	43	10	18	11	4	–
Laak[4]	42	9	20	7	4	2
Bennett[4]	45	9	15	11	4	6
Milne[4]	70	21	32	7	7	3
Reid[4]	59	20	24	8	4	3
USEPA[4]	40	10	9	11	5	5
Partridge[4]	52-86	20-40	4-6	20-30	8-10	–
Mean Across Studies[5]	59	17	18	13	6	5
Median Across Studies[5]	53	15	18	11	4	5

1 Metropolitan Water District of Southern California, 1991.
2 East Bay Municipal Utility District, 1992.
3 U.S. Department of Housing and Urban Development, 1984.
4 Cited in Nazaroff and Nero, 1988.
5 The average value from each range reported in Partridge, as cited in Nazaroff and Nero (1988), was used to calculate the median across studies. The mean and median for the "Total, all Uses" column were obtained by summing across the means and medians for individual types of water use.

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8. ANALYSIS OF UNCERTAINTIES

Previous chapters have discussed exposure factors and algorithms for estimating exposure. Exposure factor values can be used to obtain a range of exposure estimates such as average exposure estimates, high-end estimates, and bounding estimates. This section discusses methods that can be used to evaluate and present the uncertainty associated with exposure estimates.

According to U.S. EPA (1992), uncertainty characterization and uncertainty assessment are two ways of describing uncertainty that may have different degrees of sophistication. Uncertainty characterization usually involves a qualitative discussion of the thought processes used to select or reject specific data, estimates, scenarios, etc. Uncertainty assessment is a more quantitative process that may range from simpler measures (i.e., ranges) and simpler analytical techniques (i.e., sensitivity analysis) to more complex measures and techniques. Its goal is to provide decision makers with information concerning the quality of an assessment, including the potential variability in the estimated exposures, major data gaps, and the effect these data gaps have on the exposure estimates developed. Uncertainty analysis allows the user or decision maker to better evaluate the assessment in the context of available data and assumptions. Thus, the decision making process can account for data integrity and completeness. The following subsections briefly describe procedures for analyzing and presenting the uncertainties in exposure assessments.

8.1. TYPES OF UNCERTAINTY

Uncertainty in exposure assessment can be classified into three broad categories (U.S. EPA, 1992):

1. Uncertainty regarding missing or incomplete information needed to fully define exposure and dose (Scenario Uncertainty).
2. Uncertainty regarding some parameter (Parameter Uncertainty).
3. Uncertainty regarding gaps in scientific theory required to make predictions on the basis of casual inferences (Model Uncertainty).

Exposure assessments often are developed in a phased approach. The initial phase usually screens the scenarios that are not expected to pose much risk to eliminate them from more detailed, resource-intensive review. These often represent exposures that would fall on or beyond the high-end of the expected exposure distribution. Because screening-level analyses are usually included in the final exposure assessment, the final document may contain scenarios that differ quite markedly in sophistication, data quality, and amenability to quantitative expressions of uncertainty.

Identification of the sources of uncertainty in an exposure assessment is the first step in determining how to reduce that uncertainty. The types of uncertainty mentioned above can be further defined by examining their principal causes. The following sections discuss sources, characterization, and analytical methods.

8.1.1. Scenario Uncertainty

The sources of scenario uncertainty include descriptive errors, aggregation errors, errors in professional judgment, and incomplete analysis.

Descriptive errors include information errors such as the current producers of the chemical and its industrial, commercial, and consumer uses. Information of this type is the foundation for fate-and-transport analysis and the eventual development of exposure pathways, scenarios, exposed populations, and exposure estimates.

Aggregation errors arise as a result of lumping approximations. Included among these are assumptions of homogeneous populations, and spatial and temporal approximations such as assuming steady-state conditions or using a 2-dimensional mathematical model to represent a 3-dimensional aquifer.

Professional judgment comes into play in virtually every aspect of the exposure assessment process, including defining appropriate exposure scenarios, selecting environmental fate models, determining representative environmental conditions, etc. Judgment errors can be the result of limited experience, or can arise when the assessor has difficulty separating opinion from fact. Errors in professional judgment are also a source of uncertainty.

A potentially serious source of uncertainty in exposure assessments arises from incomplete analysis. For example, the exposure assessor may overlook an important exposure pathway due to lack of information regarding the use of a chemical in a consumer product. Although this source of uncertainty is essentially unquantifiable, it should not be ignored. At a minimum, the assessor should describe the rationale for excluding particular exposure scenarios; characterize the uncertainty in these decisions as high, medium, or low; and state whether they were based on data, analogy, or professional judgment. Where uncertainty is high, a sensitivity analysis can be used to establish credible upper limits on exposure by way of a series of "What if . . . ?" questions.

The uncertainty associated with non-numerical assumptions (such as the assessment's direction and scope) is generally characterized in a qualitative discussion of the rationale for selecting specific scenarios.

8.1.2. Parameter Uncertainty

Sources of parameter uncertainty include measurement error, sampling error, variability, and use of generic or surrogate data. Measurement error may be random or systematic. Random error results from imprecise measurements. Systematic error is a bias or tendency to measure something other than what was intended.

Sampling error tends to reduce sample representativeness. The purpose of sampling is to measure some subset of a population to make an inference about the entire group. If the exposure assessment uses data that were generated for another purpose, such consumer product preference surveys or compliance monitoring surveys, uncertainty will arise if the data do not represent the exposure scenario being analyzed.

The inherent variability in environmental and exposure-related parameters is a major source of uncertainty. For example, meteorological and hydrological conditions change seasonally at a given location, soil characteristics exhibit large spatial variability, and human activity patterns depend on the age, sex, and geographic location of the population.

Generic or surrogate data are commonly used when site-specific data are not available. Examples include standard emission factors for industrial processes, generalized descriptions of environmental settings, and data pertaining to structurally-related chemicals as surrogates for the chemical of interest. Since surrogate data introduce additional uncertainty, they should be avoided if actual data can be obtained.

Several approaches can be used to characterize uncertainty in parameter values. When uncertainty is high, the assessor may use bounding estimates of parameter ranges. Another method describes the range for each parameter including the lower- and upper-bound and "best estimate" values determined by available data or professional judgement. Sometimes the parameter range can be described with a probabilistic distribution. The appropriate characterization depends on several factors, including whether sensitivity analysis indicates that the results are significantly affected by variations within the range.

When a single parameter profoundly influences exposure estimates, the assessor should develop a probabilistic description of its range. If there are enough data to support their use, standard statistical methods are preferred. If the data are inadequate, expert judgment can be used to generate a subjective probabilistic representation. Expert judgments should be developed in a consistent, well-documented manner. Morgan et al. (1979 and 1984) and Rish (1988) describe techniques to solicit expert judgment.

Most approaches for analyzing uncertainty examine how uncertainty in parameter values translates into overall uncertainty in the assessment. Details may be found in reviews such as Cox and Baybutt (1981), Whitmore (1985), Inman and Helton (1988), Seller (1987), and Rish and Marnicio (1988). These approaches can generally be described (in order of increasing complexity and data needs) as: (1) sensitivity analysis, (2) analytical uncertainty propagation, (3) probabilistic uncertainty analysis, or (4) classical statistical methods.

Sensitivity analysis is the process of changing one variable while leaving the others constant to determine its effect on the output. This procedure fixes each uncertain quantity at its credible lower and upper bounds (holding all others at their medians) and computes the results of each combination of values. The results identify the variables that have the greatest effect on exposure and help focus further information-gathering efforts. However, they do not indicate the probability of a variable being at any point within its range; therefore, this approach is most useful at the screening level to determine the need and direction of further analyses.

Analytical uncertainty propagation examines how uncertainty in individual parameters affects the overall uncertainty of the exposure assessment. The uncertainties associated with various parameters may propagate through a model very differently, even if they have approximately the same uncertainty. Some parameters are more important than others, and the model should be designed to account for their relative sensitivity. Since uncertainty propagation is a function of both the data and the model structure, this procedure evaluates both input variances and model sensitivity. Application of this approach to exposure assessment requires explicit mathematical expressions of exposure, estimates of variance for each variable of interest, and the ability to obtain a mathematical (analytical or numerical) derivative of the exposure equation.

Although uncertainty propagation is a powerful tool, it should be applied with caution: It is difficult to generate and solve the equations for the sensitivity coefficients. The technique is most accurate for linear equations, so any departure from linearity must be carefully evaluated. In addition, assumptions such as variable independence and error normality must be verified. Finally, the information to support required parameter variance estimates may not be readily available.

The most common example of probabilistic uncertainty analysis is the Monte Carlo method. This technique assigns a probability density function to each parameter, then randomly selects values from these distributions and inserts them into the exposure equation. Repeated calculations produce a distribution of predicted values that reflects the overall uncertainty in the inputs to the calculation.

The principal advantage of the Monte Carlo method is its very general applicability. There is no restriction on the form of the input distributions or the relationship between input and output, and computations are straightforward. However, Monte Carlo analysis does have its disadvantages: The exposure assessor should only consider using it when there are credible distribution data (or ranges) for most key variables. Even if these distributions are known, it may not be necessary to apply this technique. For example, if only average exposure values are needed, they can be computed as accurately by using average values for each input parameter. In addition, it is not necessary to use this technique if a bounding exposure estimates indicates that the particular pathway or chemical being assessed does not present a significant risk. Also, it is somewhat cumbersome to assess the sensitivity of the results to input distributions: Changing the distribution of only one parameter requires rerunning the entire calculation several hundreds or thousands of times. Monte Carlo analysis does not tell the assessor which variables contribute the most to overall uncertainty, so it does not identify effective ways to reduce uncertainty. Finally, Monte Carlo analysis assumes that the distributions of each variable are independent. Any dependencies among variables need to be considered in the analysis.

Classical statistical methods can be used to analyze uncertainty in measured exposures. Given a data set of measured exposure values for a series of individuals, the population distribution may be estimated directly, provided that the sample design captures a representative sample. Measured exposure values can also be used to directly compute confidence intervals for percentiles of the exposure distribution (ACS, 1989). When the exposure distribution is estimated from measured exposures for a probability sample of population members, confidence interval estimates for percentiles of the exposure distribution are the primary uncertainty characterization. Data collection, survey design, and the accuracy and precision of measurement techniques should also be discussed.

Often the observed exposure distribution is skewed because many points within the sample distribution fall at or below the detection limit, or because few points fall at the upper end of the distribution. Fitting the data to a distribution type can be problematic in these situations because (1) there is no way to determine the distribution of values below the detection limit and (2) data are usually scant in low-probability areas (such as upper-end tails) where numerical values may vary widely. Thus, for many data sets, means and standard deviations may be good approximations, but the tails of the distribution will be much less well-characterized. For data sets where sampling is still practical, the statistical population may be stratified in order to oversample the tail and increase the precision and confidence in that portion of the distribution.

8.1.3. Model Uncertainty

At a minimum, the exposure assessor should qualitatively describe the rationale for selection of conceptual and mathematical models. This discussion should address their verification and validation status, how well they represent the situation being assessed (e.g., average or high-end estimates), and any plausible alternatives in terms of their acceptance by the scientific community.

Relationship and modeling errors are the primary sources of model uncertainty. Relationship errors include flaws in environmental fate models and poor correlations between chemical properties or between structure and reactivity. Even though performance statistics for test chemicals may be available and can guide the selection process, the exposure assessor must select the methodology most appropriate to the goals of the assessment.

Modeling errors arise because models are simplified representations of reality. Even after the exposure assessor has selected the most appropriate model, he or she still faces the question of how well the model represents actual conditions. This question is compounded by the overlap between modeling uncertainties and other uncertainties (e.g., natural variability in environmental inputs, model representativeness, aggregation errors). The dilemma facing exposure assessors is that many existing models (particularly the very complex ones) and the hypotheses contained within them cannot be fully tested (Beck, 1987), although certain components of the model may be testable. Even if a model has been validated under a particular set of conditions, its application in cases beyond the test system will introduce uncertainty.

A variety of approaches can be used to quantitatively characterize the uncertainty associated with model constructs. One approach uses different modeling formulations (including the preferred and plausible alternatives) and assumes that the range of outputs represents the range of uncertainty. This strategy is most useful when available data do not support any "best" approach, or when a model must be used to extrapolate beyond the conditions for which it was designed.

Where the data base is sufficient, the exposure assessor should characterize the uncertainty in the selected model by describing the validation and verification efforts. The validation process compares the performance of the model to actual observations under situations representative of those being assessed. Burns (1985) discusses approaches for model validation. The verification process confirms that the model computer code produces the correct numerical output. In most situations, only partial validation is possible due to data deficiencies or model complexity.

8.2. PRESENTATION OF UNCERTAINTY ANALYSIS RESULTS

Comprehensive qualitative analysis and rigorous quantitative analysis are of little value for use in the decision-making process, if their results are not clearly presented. To clarify, it should be emphasized that variability (the receipt of different levels of exposure by different individuals) is being distinguished from uncertainty (the lack of knowledge about the correct value for a specific exposure measure or estimate). Most of the data that have been presented in this document deal with variability directly. The uncertainty of the exposure factor data present is discussed qualitatively by describing the limitations and assumptions of each study or data set. Associated with each exposure estimate, will be assumptions about the setting, chemical, population characteristics, and how contact with the chemical occurs through the various exposure routes and pathways. The exposure assessor will have to examine many sources of information that bear either directly or indirectly on these categories. In addition, the assessor will be required to make many decisions regarding the use of existing information in constructing scenarios and setting up the exposure equations. It is not sufficient to merely present the results of these many decisions using different exposure descriptors. A discussion must be included describing key assumptions and parameters which have the greatest impact on the exposure estimate. The exposure assessor should strive to address questions such as:

- What is the basis or rationale for selecting these assumptions/parameters such as data, modeling, scientific judgment, Agency policy, "what if" considerations, etc.?

- What is the range or variability of the key parameters? How were the parameter values selected for use in the assessment? Were average, mean, or upper-percentile values chosen? If other choices had been made, how would the results have differed?

- What is the assessor's confidence (including qualitative confidence aspects) in the key parameters and the overall assessment? What are the quality and the extent of the data base supporting the selection of the chosen values?

In presenting the scenario results, the assessor should strive for a balanced and impartial treatment of the evidence bearing on the conclusions with the key assumptions highlighted. For these key assumptions, one should cite data sources and explain any adjustments of the data.

Although assessors have always used descriptors to communicate the kind of scenario being addressed, the 1992 Exposure Guidelines establish clear quantitative definitions for these risk descriptors. These definitions were established to ensure that consistent terminology is used throughout the Agency. The risk descriptors defined in the Guidelines include descriptors of individual risk and population risk. Individual risk descriptors are intended to address questions dealing with risks borne by individuals within a population, including not only measures of central tendency (e.g., average or median), but also those risks at the high end of the distribution. Population risk descriptors refer to an assessment of the extent of harm to the population being addressed. It can be either an estimate of the number of cases of a particular effect that might occur in a population (or population segment), or a description of what fraction of the population receives exposures, doses, or risks greater than a specified value. The data presented in the Exposure Factors Handbook is one of the tools available to exposure assessors to construct the various risk descriptors.

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