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VOLUME II - FOOD INGESTION FACTORS

EXPOSURE FACTORS HANDBOOK

Update to Exposure Factors Handbook
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PREFACE

The National Center for Environmental Assessment (NCEA) of EPA's Office of Research and Development (ORD) 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 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., measures of central tendency such as average or mean, or high end), and characterization of individual risk, population risk, important subpopulations. A new document was issued titled "Guidance for Risk Characterization," dated February 1995. This document is an update of the guidance issued with the 1992 policy. Third, EPA published the revised Guidelines for Exposure Assessment in 1992.

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 firms, private industry, the States, and other Federal agencies. The purpose of the workshop was to identify new data sources, to discuss adequacy of the data and the feasibility of developing statistical distributions and to establish priorities.

As a result of the peer involvement workshop, three new chapters were added to the handbook. These chapters are: Consumer Product Use, Residential Building Characteristics, and Intake of Grains. This document also provides a summary of the available data on consumption of drinking water; consumption of fruits, vegetables, beef, dairy products, grain products, and fish; breast milk intake; soil ingestion; inhalation rates; skin surface area; soil adherence; lifetime; activity patterns; and body weight.

A new draft handbook that incorporated comments from the 1993 workshop was published for peer review in June 1995. A peer review workshop was held in July 1995 to discuss comments on the draft handbook. A new draft of the handbook that addressed comments from the 1995 peer review workshop was submitted to the Science Advisory Board (SAB) for review in August 1996. An SAB workshop meeting was held December 19-20, 1996, to discuss the comments of the SAB reviewers. Comments from the SAB review have been incorporated into the current handbook.

FOREWORD

The National Center for Environmental Assessment (NCEA) of EPA's Office of Research and Development (ORD) has five main functions: (1) providing risk assessment research, methods, and guidelines; (2) performing health and ecological assessments; (3) developing, maintaining, and transferring risk assessment information and training; (4) helping ORD set research priorities; and (5) developing and maintaining resource support systems for NCEA. The activities under each of these functions are supported by and respond to the needs of the various program offices. In relation to the first function, NCEA sponsors projects aimed at developing or refining techniques used in exposure assessments.

This handbook was first published in 1989 to provide statistical data on the various factors used in assessing exposure. This revised version of the handbook provides the up-to-date data on these exposure factors. The recommended values are based solely on our interpretations of the available data. In many situations different values may be appropriate to use in consideration of policy, precedent or other factors.

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The EPA Office of Water made an important contribution by conducting an analysis of the USDA Continuing Survey of Food Intakes by Individual (CSFII) data. They provided fish intake rates for the general population. The analysis was conducted under the direction of Helen Jacobs from the Office of Water.

9. INTAKE OF FRUITS AND VEGETABLES

9.1. BACKGROUND

Ingestion of contaminated fruits and vegetables is a potential pathway of human exposure to toxic chemicals. Fruits and vegetables may become contaminated with toxic chemicals by several different pathways. Ambient pollutants from the air may be deposited on or absorbed by the plants, or dissolved in rainfall or irrigation waters that contact the plants. Pollutants may also be absorbed through plant roots from contaminated soil and ground water. The addition of pesticides, soil additives, and fertilizers may also result in food contamination.

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) and the USDA Continuing Survey of Food Intakes by Individuals (CSFII). 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. CSFII data from the 1989-1991 survey have been analyzed by EPA to generate per capita intake rates for various food items and food groups.

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. Intake data from the individual component of the NFCS and CSFII are based on "as eaten" (i.e., cooked or prepared) forms of the food items/groups. Thus, corrections to account for changes in portion sizes from cooking losses are not required.

Estimating source-specific exposures to toxic chemicals in fruits and vegetables may also require information on the amount of fruits and vegetables that are exposed to or protected from contamination as a result of cultivation practices or the physical nature of the food product itself (i.e., those having protective coverings that are removed before eating would be considered protected), or the amount grown beneath the soil (i.e., most root crops such as potatoes). 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) guidance for converting between as consumed and dry weight intake rates; and (3) intake data for exposed and protected fruits and vegetables and those grown below ground. 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 considerations discussed in Volume I, Section 1.3.1 of the Introduction. Recommendations are based on data from the CSFII 1989-1991 survey, which was considered the only key intake study for fruits and vegetables. Other relevant studies are also presented to provide the reader with added perspective on this topic. It should be noted that many of the relevant studies are based on data from USDA's NFCS and CSFII. The USDA NFCS and CSFII are described below.

9.2. INTAKE STUDIES

9.2.1. U.S. Department of Agriculture Nationwide Food Consumption Survey and Continuing Survey of Food Intake by Individuals

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, 1992a). 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 on the socioeconomic and demographic characteristics of households, and the types, value, and sources of foods consumed over a 7-day period. The individual component collects information on food intakes of individuals within each household over a 3-day period (USDA, 1992b).

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, 1992a). 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 1-day data from the 1987-88 NFCS data are also presented.

USDA also conducts the Continuing Survey of Food Intake by Individuals. The purpose of the survey is to "assess food consumption behavior and nutritional content of diets for policy implications relating to food production and marketing, food safety, food assistance, and nutrition education" (USDA, 1995). An EPA analysis of the 1989-91 CSFII data set is presented in this handbook. During 1989 through 1991, over 15,000 individuals participated in the CSFII (USDA, 1995). Using a stratified sampling technique, individuals of all ages living in selected households in the 48 conterminous states and Washington, D.C. were surveyed. Individuals provided 3 consecutive days of data, including a personal interview on the first day followed by 2-day dietary records. The 3-day response rate for the 1989-91 CSFII was approximately 45 percent. Published 1-day data from the 1994 and 1995 CSFII are also presented. The 1994 and 1995 CSFII included data for 2 non-consecutive survey days (although 2 days of data have been collected, only data for the first survey day have been analyzed and published by USDA). Over 5,500 individuals participated in these surveys (USDA, 1996a; 1996b).

Individual average daily intake rates calculated from NFCS and CSFII data are based on averages of reported individual intakes over one day or three consecutive days. Such short term data are suitable for estimating mean average daily intake rates representative of both short-term and long-term consumption. However, the *distribution* of average daily intake rates generated using short term data (e.g., 3 day) do not necessarily reflect the long-term *distribution* of average daily intake rates. The distributions generated from short term and long term data will differ to the extent that each individual's intake varies from day to day; the distributions will be similar to the extent that individuals' intakes are constant from day to day.

Day to day variation in intake among individuals will be great for food item/groups that are highly seasonal and for items/groups that are eaten year around but that are not typically eaten every day. For these foods, the intake distribution generated from short term data will not be a good reflection of the long term distribution. On the other hand, for broad categories of foods (e.g., vegetables) which are eaten on a daily basis throughout the year with minimal seasonality, the short term distribution may be a reasonable approximation of the true long term distribution, although it will show somewhat more variability. In this and the following section, distributions are shown only for the following broad categories of foods: fruits, vegetables, meats and dairy. Because of the increased variability of the short-term distribution, the short-term upper percentiles shown here will overestimate somewhat the corresponding percentiles of the long-term distribution.

9.2.2. Key Fruits and Vegetables Intake Study Based on the USDA CSFII

U.S. EPA Analysis of USDA 1989-91 CSFII Data - EPA analyzed three years of data from USDA's CSFII to generate distributions of intake rates for various fruit and vegetable items/groups. Data from the 1989, 1990, and 1991 CFSII were combined into a single data set to increase the number of observations available for analysis. Approximately 15,000 individuals provided intake data over the three survey years. The fruit and vegetable items/groups selected for this analysis included total fruits and total vegetables; individual fruits such as: apples, peaches, pears, strawberries, and other berries; individual vegetables such as: asparagus, beets, broccoli, cabbage, carrots, corn, cucumbers, lettuce, lima beans, okra, onions, peas, peppers, pumpkin, snap beans, tomatoes, and white potatoes; fruits and vegetables categorized as exposed, protected and roots; and various USDA categories (i.e., citrus and other fruits, and dark green, deep yellow, and other vegetables). These fruit and vegetable categories were selected to be consistent with those evaluated in the homegrown food analysis presented in Chapter 13. Intake rates of total vegetables, tomatoes, and white potatoes were adjusted to account for the amount of these food items eaten as meat and grain mixtures as described in Appendix 9A. Food items/groups were identified in the CSFII data base according to USDA-defined food codes. Appendix 9B 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., home produced and commercially produced).

Individual identifiers in the database were used throughout the analysis to categorize populations according to demographics. These identifiers included identification number, region, urbanization, age, sex, race, body weight, weighting factor, season, and number of days that data were reported. Distributions of intake were determined for individuals who provided data for all three days of the survey. Individuals who did not provide information on body weight, or for which identifying information was unavailable, were excluded from the analysis. Three-day average intake rates were calculated for all individuals in the database for each of the food items/groups. These average daily intake rates were divided by each individual's reported body weight to generate intake rates in units of g/kg-day. The data were also weighted according to the three-day weights provided in the 1991 CSFII. USDA sample weights are calculated to account for inherent biases in the sample selection process, and to adjust the sample population to reflect the national population. Summary statistics for individual intake rates were generated on a per capita basis. That is, both users and non-users of the food item were included in the analysis. Mean consumer only intake rates may be calculated by dividing the mean per capita intake rate by the percent of the population consuming the food item of interest. Summary statistics included are: number of weighted and unweighted observations, percentage of the population using the food item/group being analyzed, mean intake rate, standard error, and percentiles of the intake rate distribution (i.e., 0, 1, 5, 10, 25, 50, 75, 90, 95, 99, and 100th percentile). Data were provided for the total population using the food item being evaluated and for several demographic groups including: various age groups (i.e., <1, 1-2, 3-5, 6-11, 12-19, 20-39, 40-69, and 70+ years); regions (i.e., Midwest, Northeast, South, and West); urbanizations (i.e., Central City, Nonmetropolitan, and Suburban; seasons (i.e., winter, spring, summer, and fall); and races (i.e., White, Black, Asian, Native American, and other). Table 9-1 provides the codes, definitions, and a description of the data in these categories. The total numbers of individuals in the data set, by demographic group are presented in Table 9-2. The food analysis was accomplished using the SAS statistical programming system (SAS, 1990).

The results of this analysis are presented in Tables 9-3 and 9-4 for total fruits and total vegetables, Table 9-5 for individual fruits and vegetables, and Table 9-6 for the various USDA categories. The data for exposed/protected and root food items are presented in Tables 9-7 through 9-11. These tables are presented at the end of this Chapter. The results are presented in units of g/kg-day. Thus, use of these data in calculating potential dose does not require the body weight factor to be included in the denominator of the average daily dose (ADD) equation. It should be noted that converting these intake rates into units of g/day by multiplying by a single average body weight is inappropriate, because individual intake rates were indexed to the reported body weights of the survey respondents. However, if there is a need to compare the intake data presented here to intake data in units of g/day, a body weight less than 70 kg (i.e., approximately 60 kg; calculated based on the number of respondents in each age category and the average body weights for these age groups, as presented in Chapter 7 of Volume I) should be used because the total survey population included children as well as adults.

The advantages of using the 1989-91 CSFII data set are that the data are expected to be generally representative of the U.S. population and that it includes data on a wide variety of food types. However, it should be noted that the survey covers only the 48 coterminous U.S. States; Hawaii, Alaska, and U.S. Territories are not included. The data set was the most recent of a series of publicly available USDA data sets (i.e., NFCS 1977-78; NFCS 1987-88; CSFII 1989-91) at the time that EPA conducted the analysis for this handbook, and should reflect recent eating patterns in the United States. The data set includes three years of intake data combined. However, the 1989-91 CSFII data are based on a three day survey period. Short-term dietary data may not accurately reflect long-term eating patterns. This is particularly true for the tails (extremes) of the distribution of food intake. In addition, the adjustment for including mixtures adds uncertainty to the intake rate distributions. The calculation for including mixtures assumes that intake of any mixture includes all of the foods identified in Appendix Table 9A-1 in the proportions specified in that table. This may under- or over-estimate intake of certain foods among some individuals.

The data presented in this handbook for the USDA 1989-91 CSFII is not the most up-to-date information on food intake. USDA has recently made available the data from its 1994 and 1995 CSFII. Over 5,500 people nationwide participated in both of these surveys, providing recalled food intake information for 2 separate days. Although the 2-day data analysis has not been conducted, USDA published the results for the respondents' intakes on the first day surveyed (USDA, 1996a; 1996b). USDA 1996 survey data will be made available later in 1997. As soon as 1996 data are available, EPA will take steps to get the 3-year data (1994, 1995, and 1996) analyzed and the food ingestion factors updated. Meanwhile, Table 9-12 presents a comparison of the mean daily intakes per individual in a day for fruits and vegetables from the USDA survey data from years 1977-78, 19887-88, 1989-91, 1994, and 1995. This table shows that food consumption patterns have changed for fruits when comparing 1977 and 1995 data. Consumption of fruits increased by 72 percent, but vegetable intake remained relatively constant, when comparing data from 1977 and 1995. However, only an 11 percent increase was observed when comparing fruit intake values from 1989-91 with the most recent data from 1994 and 1995. This indicates that the 1989-91 CSFII data are probably adequate for assessing ingestion exposure for current populations.

9.2.3. Relevant Fruits and Vegetables Intake Studies

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 1977-78 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 9-13. 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 9-13 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 reported 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 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. In addition, consumption patterns may have changed since the data were collected in 1977-78. OPP is in the process of translating consumption information from the USDA CSFII 1989-91 survey to be used in DRES.

Food and Nutrient Intakes of Individuals in One Day in the U.S., USDA (1980, 1992b, 1996a, 1996b) - USDA calculated mean intake rates for total fruits and total vegetables using NFCS data from 1977-78 and 1987-88 (USDA, 1980; USDA, 1992b) and CSFII data from 1994 and 1995 (USDA, 1996a; 1996b). The mean per capita total intake rates are presented in Tables 9-14 and 9-15 for fruits and Tables 9-16 and 9-17 for vegetables. These values are based on intake data for one day from the 1977-78 and 1987-88 USDA NFCSs, 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 9-18 and 9-19 present similar data from the 1994 and 1995 CSFII. The age groups used in this data set are the same as those used in the 1987-88 NFCS. Tables 9-14 through 9-19 include both per capita intake rates and intake rates for consumers-only for various ages of individuals. 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), 182 g/day based on the 1987-88 data (USDA, 1992b), 186 g/day based on the 1994 data, and 188 g/day based on the 1995 data. For fruits the average per capita intake rate is 142 g/day based on the two most recent USDA NFCSs (USDA, 1980; USDA, 1992b), and 171 g/day and 173 g/day based on the 1994 and 1995 CSFII, respectively (USDA, 1996a, 1996b). One-day per capita intake data for fats or oils from the 1994 and 1995 CSFII surveys are presented in Table 9-20. This total fats and oils food category includes table and cooking fats, vegetable oils, salad dressings, nondairy cream substitutes, and sauces such as tartar sauce that are mainly fat or oil (USDA, 1996a). It does not include oils or fats that were ingredients in food mixtures.

The advantages of using these data are that they provide intake estimates for all fruits, all vegetables, or all fats combined. Again, these estimates are based on one-day dietary data which may not reflect usual consumption patterns.

U.S. EPA - Office of Radiation Programs - The U.S. EPA Office of Radiation Programs (ORP) has also used the USDA 1977-78 NFCS to estimate daily food intake (U.S. EPA, 1984a; 1984b). ORP uses food consumption data to assess human intake of radionuclides in foods. The 1977-78 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 9-21 and Table 9-22. These data represent per capita, as consumed intake rates for total, leafy, exposed, and protected produce. Exposed produce refers to products (e.g., apples, pears, berries, etc.) that can intercept atmospherically deposited materials. The term protected refers to products (e.g., citrus fruit, carrots, corn, etc.) that are protected from deposition from the atmosphere. 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. Also, consumption patterns may have changed since the data were collected in 1977-78.

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 (U.S. EPA, 1989). 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 1977-78, NFCS and the second National Health and Nutrition Examination Survey (NHANES II), 1976-80 (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 9-23 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 U.S. EPA (1984a, 1984b) 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 to be estimated on a dry weight basis. These data, however, may not reflect current consumption patterns because they are based on data from 1977-78.

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 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 rates were reported for various age/sex groups of the population and for pregnant women (Table 9-24). 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, 1992b). It should be noted that these data are also based on short-term dietary recall and are based on the Canadian population.

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 on an annual basis (USDA, 1993). Supply and utilization balance sheets are generated, based on the flow of food items from production to end uses for the years 1970 to 1992. Total available supply is estimated as the sum of production and imports (USDA, 1993). The availability of food for human use commonly termed as "food disappearance" is determined by subtracting exported foods from the total available supply (USDA, 1993). USDA (1993) calculates 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 various fruit and vegetable products from 1970-1992 (1992 data are published). In this section, the 1991 values, which are the most recent published final data, are presented. Retail weight per capita data are presented in Table 9-25. These data have been derived from the annual per capita values in units of pounds per year, presented by USDA (1993), by converting to units of g/day.

One of the limitations of this study is that disappearance data do not account for losses from the food supply from waste or spoilage. As a result, intake rates based on these data may overestimate daily consumption because they are based on the total quantity of marketable commodity utilized. Thus, these data represent bounding estimates of intake rates only. It should also be noted that per capita estimates based on food disappearance are 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 fruits and vegetables that are representative of long-term intake because disappearance data are generated annually.

AIHC, 1994 - Exposure Factors Sourcebook - The AIHC Sourcebook (AIHC, 1994) uses the data presented in the 1989 version of the Exposure Factors Handbook which reported data from the USDA 1977-78 NFCS. Distributions are provided in the @Risk format and the @Risk formula is also provided. In this handbook, new analyses of more recent data from the USDA 1989-91 CSFII are presented. Numbers, however, cannot be directly compared with previous values since the results from the new analysis are presented on a body weight basis.

The Sourcebook was classified as a relevant study because it was not the primary source for the data to make recommendations in this document. However, it can be used as an alternative source of information.

The advantage of using the CSFII and USDA NFCS data sets are that they are 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.

9.2.4. Relevant Fruits and Vegetables Serving Size Study 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 distributions for the quantities of individual fruit and vegetables consumed per eating occasion by members of the U.S. population (i.e., serving sizes), 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.

Serving size data are presented on an as consumed (g/day) basis. The data presented in Table 9-26 are for all ages of the population, combined. If age-specific intake data are needed, refer to Pao et al. (1982). Although serving size data only are presented in this handbook, percentiles for the average quantities of individual fruits and vegetables consumed by members of the U.S. population who had consumed these fruits and vegetables over a 3-day period can be found in Pao et al. (1982).

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 serving size 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 represent the quantity of fruits and vegetables consumed per eating occasion. Although these estimates are based on USDA NFCS 1977-78 data, serving size data have been collected but not published for the more recent USDA surveys. These estimates may be useful for assessing acute exposures to contaminants in specific foods, or other assessments where the amount consumed per eating occasion is necessary. However, it should be noted that serving sizes may have changed since the data were collected in 1977-78.

9.2.5. 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 9-27 and the following equation:

$$IR_{dw} = IR_{ac} * [(100-W)/100] \qquad \text{(Eqn. 9-1)}$$

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

$$IR_{ac} = IR_{dw}/[(100-W)/100] \qquad \text{(Eqn. 9-2)}$$

where:

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

9.3. RECOMMENDATIONS

The 1989-91 CSFII data 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. The general design of both key and relevant studies are summarized in Table 9-28. Table 9-29 presents a summary of the recommended values for fruit and vegetable intake and Table 9-30 presents the confidence ratings for the fruit and vegetable intake recommendations. Based on the CSFII 1989-91, the recommended per capita fruit intake rate for the general population is 3.4 g/kg-day and the recommended per capita vegetable intake rate for the general population is 4.3 g/kg-day. Per capita intake rates for specific food items, on a g/kg-day basis, may be obtained from Table 9-5. Percentiles of the per capita intake rate distribution in the general population for total fruits and total vegetables are presented in Tables 9-3 and 9-4. From these tables, the 95th percentile intake rates for fruits and vegetables are 12 g/kg-day and 10 g/kg-day, respectively. It is important to note that the distributions presented in Tables 9-3 through 9-4 are based on data collected over a 3-day period and may not necessarily reflect the long-term distribution of average daily intake rates. However, for these broad categories of food (i.e., total fruits and total vegetables), because they are eaten on a daily basis throughout the year with minimal seasonality, the short term distribution may be a reasonable approximation of the long-term distribution, although it will display somewhat increased variability. This implies that the upper percentiles shown here will tend to overestimate the corresponding percentiles of the true long-term distribution. Intake rates for the home-produced form of these fruit and vegetable products are presented in Volume II, Chapter 13. It should be noted that because these recommendations are based on 1989-91 CSFII data, they may not reflect the most recent changes that may have occurred in consumption patterns. However, as indicated in Table 9-12, intake has remained fairly constant between 1989-91 and 1995. Thus, the 1989-91 CSFII data are believed to be appropriate for assessing ingestion exposure for current populations.

9.4. REFERENCES FOR CHAPTER 9

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Table 9-1. Sub-category Codes and Definitions Used in the CSFII 1989-91 Analysis

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.
		Season
Spring	-	April, May, June
Summer	-	July, August, September
Fall	-	October, November, December
Winter	-	January, February, March
		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

[a] Alaska and Hawaii were not included.
Source: CSFII 1989-91.

Table 9-2. Weighted and Unweighted Number of Observations for 1989-91 CSFII Data Used in Analysis of Food Intake

Demographic Factor	Weighted	Unweighted
Total	242,707,000	11,912
Age		
<01	7,394,000	424
01-02	7,827,000	450
03-05	11,795,000	603
06-11	21,830,000	1,147
12-19	26,046,000	1,250
20-39	78,680,000	3,555
40-69	71,899,000	3,380
70+	17,236,000	1,103
Season		
Fall	60,633,000	3,117
Spring	60,689,000	3,077
Summer	60,683,000	2,856
Winter	60,702,000	2,862
Urbanization		
Central City	73,410,000	3,607
Nonmetropolitan	53,993,000	3,119
Suburban	115,304,000	5,186
Race		
Asian	2,871,000	149
Black	29,721,000	1,632
Native American	2,102,000	171
Other/NA	7,556,000	350
White	200,457,000	9,610
Region		
Northeast	59,285,000	3,007
Midwest	50,099,000	2,180
South	83,741,000	4,203
West	49,582,000	2,522

Table 9-3. Per Capita Intake of Total Fruits (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	69.0%	3.381	0.068	0	0	0	0	1.68	4.16	7.98	12.44	26.54	210.72
Age (years)													
< 01	67.9%	14.898	1.285	0	0	0	0	8.80	21.90	35.98	42.77	88.42	210.72
01-02	76.7%	11.836	0.582	0	0	0	2.80	9.76	17.99	25.70	30.69	52.27	80.19
03-05	80.8%	8.422	0.364	0	0	0	2.22	6.37	12.53	19.29	22.78	32.83	52.87
06-11	79.2%	5.047	0.160	0	0	0	1.30	3.86	7.17	11.79	14.49	21.53	30.37
12-19	62.6%	2.183	0.095	0	0	0	0	1.36	3.38	5.66	7.24	11.80	16.86
20-39	58.8%	1.875	0.056	0	0	0	0	1.06	2.82	5.08	6.43	10.26	41.58
40-69	71.0%	2.119	0.051	0	0	0	0	1.36	3.24	5.20	6.73	10.52	23.07
70 +	83.3%	2.982	0.087	0	0	0	0.89	2.42	4.28	6.77	8.31	11.89	15.00
Season													
Fall	68.9%	3.579	0.169	0	0	0	0	1.66	3.94	8.20	13.41	32.62	204.28
Spring	68.3%	3.249	0.116	0	0	0	0	1.73	4.14	7.43	12.22	23.71	88.42
Summer	70.4%	3.381	0.131	0	0	0	0	1.80	4.29	7.87	12.26	23.11	210.72
Winter	68.4%	3.314	0.119	0	0	0	0	1.52	4.27	8.33	12.17	26.54	75.52
Urbanization													
Central City	68.8%	3.288	0.114	0	0	0	0	1.66	4.00	7.82	11.94	23.73	210.72
Nonmetropolitan	67.4%	3.107	0.113	0	0	0	0	1.51	3.94	7.52	12.25	26.04	84.34
Suburban	70.1%	3.567	0.113	0	0	0	0	1.80	4.40	8.43	13.19	28.13	204.28
Race													
Asian	77.2%	5.839	0.632	0	0	0	1.24	4.20	6.76	17.30	20.65	29.61	38.95
Black	63.7%	3.279	0.188	0	0	0	0	1.51	4.25	7.70	12.34	26.54	210.72
Native American	61.4%	3.319	0.490	0	0	0	0	1.58	4.31	7.57	16.02	22.66	29.24
Other/NA	64.9%	4.027	0.465	0	0	0	0	1.77	5.10	10.92	14.96	47.78	53.89
White	70.1%	3.337	0.075	0	0	0	0	1.66	4.06	7.87	12.21	26.48	204.28
Region													
Midwest	69.9%	3.236	0.120	0	0	0	0	1.58	4.07	7.87	11.30	28.64	84.34
Northeast	73.9%	3.665	0.143	0	0	0	0.07	1.84	4.70	8.37	12.75	31.67	88.42
South	62.0%	3.017	0.105	0	0	0	0	1.42	3.80	7.39	11.67	24.67	210.72
West	75.4%	3.880	0.187	0	0	0	0.17	2.08	4.45	9.18	14.61	25.49	204.28

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-4. Per Capita Intake of Total Vegetables (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	97.2%	4.259	0.029	0	0.75	1.29	2.26	3.60	5.37	7.93	10.00	15.65	44.99
Age (years)													
< 01	74.8%	6.802	0.375	0	0	0	0	5.52	10.41	15.27	19.29	29.61	44.99
01-02	95.6%	7.952	0.228	0	1.33	2.32	4.65	7.28	10.26	14.77	16.32	21.24	32.10
03-05	97.2%	7.125	0.200	0	1.11	2.15	3.79	5.83	9.64	13.87	15.43	25.09	35.56
06-11	97.6%	5.549	0.109	0	1.03	1.72	3.09	4.82	7.31	10.06	11.74	18.39	31.30
12-19	98.1%	3.807	0.070	0	0.85	1.30	2.16	3.49	4.71	6.80	8.52	12.26	27.84
20-39	98.2%	3.529	0.037	0	0.75	1.22	2.06	3.16	4.54	6.36	7.63	10.69	17.07
40-69	98.3%	3.741	0.039	0	0.85	1.34	2.19	3.43	4.94	6.56	7.78	10.91	24.51
70 +	98.3%	4.068	0.071	0	0.96	1.47	2.47	3.67	5.35	6.89	8.17	11.96	18.92
Season													
Fall	97.8%	4.366	0.063	0	0.86	1.31	2.28	3.56	5.28	8.33	10.52	17.95	35.56
Spring	96.9%	4.095	0.055	0	0.72	1.20	2.19	3.45	5.19	7.67	9.85	15.33	44.99
Summer	97.0%	4.181	0.059	0	0.58	1.16	2.21	3.54	5.34	7.73	9.54	15.14	41.68
Winter	97.0%	4.394	0.056	0	0.86	1.40	2.36	3.78	5.67	8.03	9.69	15.23	29.69
Urbanization													
Central City	97.4%	4.059	0.053	0	0.67	1.22	2.08	3.34	5.17	7.74	9.51	16.04	44.99
Nonmetropolitan	96.3%	4.450	0.060	0	0.86	1.41	2.44	3.72	5.66	8.28	10.08	16.27	35.56
Suburban	97.6%	4.296	0.044	0	0.82	1.31	2.30	3.64	5.38	7.86	10.17	15.39	41.68
Race													
Asian	93.3%	4.913	0.330	0	0	1.53	2.06	3.66	7.52	10.32	14.84	15.43	16.76
Black	96.1%	4.228	0.093	0	0.36	0.85	1.99	3.19	5.46	8.80	11.35	18.39	32.10
Native American	87.1%	4.880	0.277	0	0	0.58	2.40	4.22	6.85	8.87	11.37	13.89	21.77
Other/NA	96.6%	4.762	0.183	0	0	1.11	2.46	4.24	6.20	9.33	11.93	15.02	22.14
White	97.6%	4.229	0.031	0	0.86	1.37	2.30	3.60	5.32	7.74	9.75	15.31	44.99
Region													
Midwest	97.0%	4.123	0.061	0	0.75	1.20	2.09	3.35	5.16	8.03	9.87	16.90	35.56
Northeast	97.2%	4.494	0.073	0	0.69	1.29	2.37	3.77	5.70	8.42	11.00	15.86	41.68
South	97.4%	4.268	0.047	0	0.86	1.39	2.31	3.66	5.32	7.76	9.80	15.31	44.99
West	96.9%	4.168	0.060	0	0.60	1.22	2.25	3.57	5.38	7.78	9.53	15.28	35.56

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-5. Per Capita Intake of Individual Fruits and Vegetables (g/kg-day as consumed)												
	Apples			Asparagus			Bananas			Beets		
Population Group	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE
Total	28.4%	0.854	0.052	1.5%	0.012	0.008	20.9%	0.27	0.02	1.8%	0.009	0.010
Age (years)												
< 01	41.7%	5.042	0.823	0.0%	0	0	24.3%	1.33	0.27	1.2%	0.045	0.296
01-02	42.9%	4.085	0.508	0.2%	0.003	0.041	23.3%	0.86	0.17	0.7%	0.006	0.055
03-05	44.1%	3.004	0.312	0.2%	0.001	0.038	20.1%	0.46	0.09	0.5%	0.006	0.056
06-11	41.6%	1.501	0.123	0.3%	0.001	0.019	16.2%	0.29	0.05	0.9%	0.008	0.040
12-19	23.0%	0.394	0.062	0.3%	0.003	0.033	13.3%	0.16	0.03	0.6%	0.001	0.010
20-39	21.3%	0.337	0.033	1.1%	0.008	0.012	14.4%	0.13	0.02	1.3%	0.004	0.007
40-69	26.0%	0.356	0.027	2.5%	0.025	0.016	26.0%	0.22	0.02	2.4%	0.009	0.009
70 +	30.8%	0.435	0.052	3.5%	0.026	0.028	37.4%	0.36	0.03	5.2%	0.029	0.022
Season												
Fall	33.7%	1.094	0.116	0.8%	0.005	0.013	19.3%	0.25	0.03	1.2%	0.009	0.040
Spring	25.9%	0.667	0.078	2.7%	0.023	0.017	21.3%	0.27	0.03	2.0%	0.009	0.012
Summer	23.2%	0.751	0.122	1.1%	0.006	0.014	20.5%	0.23	0.03	1.7%	0.005	0.008
Winter	30.4%	0.905	0.095	1.3%	0.015	0.018	22.6%	0.31	0.03	2.3%	0.011	0.013
Urbanization												
Central City	27.4%	0.749	0.081	1.1%	0.013	0.018	19.6%	0.25	0.03	1.3%	0.008	0.031
Nonmetropolitan	26.8%	0.759	0.104	1.3%	0.011	0.015	20.5%	0.24	0.03	1.8%	0.010	0.013
Suburban	29.9%	0.965	0.083	1.8%	0.013	0.012	21.9%	0.29	0.03	2.0%	0.008	0.009
Race												
Asian	38.3%	0.871	0.327	2.7%	0.067	0.123	33.6%	0.54	0.20	0.7%	0.040	0.320
Black	22.7%	0.688	0.159	0.3%	0.003	0.019	14.4%	0.19	0.04	1.1%	0.007	0.024
Native American	20.5%	0.407	0.273	0.0%	0	0	17.5%	0.36	0.16	1.2%	0.003	0.028
Other/NA	24.9%	0.964	0.256	0.6%	0.001	0.009	20.6%	0.33	0.15	0.9%	0.015	0.101
White	29.4%	0.879	0.057	1.7%	0.013	0.009	21.8%	0.27	0.02	1.9%	0.008	0.010
Region												
Midwest	29.1%	0.782	0.082	1.8%	0.015	0.016	18.8%	0.25	0.03	0.8%	0.010	0.049
Northeast	31.5%	0.953	0.116	1.6%	0.015	0.022	23.0%	0.26	0.04	2.3%	0.008	0.012
South	23.6%	0.828	0.099	1.0%	0.010	0.014	19.3%	0.28	0.03	1.8%	0.009	0.011
West	32.7%	0.885	0.121	1.8%	0.012	0.015	24.0%	0.27	0.03	2.4%	0.008	0.009

Table 9-5. Per Capita Intake of Individual Fruits and Vegetables (g/kg-day as consumed) (continued)												
	Broccoli			Cabbage			Carrots			Corn		
Population Group	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE
Total	10.9%	0.107	0.012	12.2%	0.088	0.009	16.9%	0.115	0.010	24.1%	0.206	0.010
Age (years)												
< 01	4.2%	0.142	0.224	2.4%	0.023	0.078	13.4%	0.379	0.165	17.5%	0.356	0.128
01-02	7.6%	0.234	0.134	5.1%	0.086	0.089	13.3%	0.214	0.085	32.9%	0.587	0.091
03-05	10.1%	0.307	0.118	7.5%	0.107	0.081	15.1%	0.148	0.052	31.5%	0.490	0.070
06-11	6.8%	0.098	0.052	7.5%	0.049	0.027	17.1%	0.154	0.037	35.8%	0.367	0.032
12-19	8.2%	0.065	0.028	8.5%	0.065	0.028	11.8%	0.056	0.018	24.0%	0.173	0.024
20-39	11.4%	0.081	0.015	10.6%	0.070	0.015	15.2%	0.076	0.013	23.8%	0.154	0.013
40-69	13.8%	0.102	0.016	17.1%	0.115	0.015	20.1%	0.120	0.016	20.4%	0.138	0.013
70 +	11.8%	0.115	0.028	21.1%	0.151	0.025	21.3%	0.132	0.022	19.0%	0.140	0.027
Season												
Fall	10.8%	0.089	0.024	12.3%	0.092	0.019	17.7%	0.100	0.017	23.6%	0.171	0.018
Spring	11.7%	0.122	0.022	12.4%	0.086	0.018	16.5%	0.117	0.022	24.7%	0.204	0.019
Summer	8.8%	0.120	0.032	12.3%	0.097	0.018	13.9%	0.083	0.017	24.8%	0.244	0.022
Winter	12.3%	0.098	0.020	11.9%	0.076	0.014	19.2%	0.160	0.022	23.2%	0.205	0.020
Urbanization												
Central City	10.6%	0.119	0.024	10.8%	0.073	0.015	15.5%	0.111	0.019	22.4%	0.182	0.017
Nonmetropolitan	9.0%	0.067	0.017	13.7%	0.102	0.016	14.4%	0.095	0.017	27.6%	0.255	0.020
Suburban	12.2%	0.119	0.019	12.4%	0.091	0.014	19.2%	0.127	0.015	23.1%	0.198	0.015
Race												
Asian	15.4%	0.209	0.166	27.5%	0.400	0.100	28.2%	0.177	0.101	14.1%	0.134	0.080
Black	8.3%	0.154	0.047	13.9%	0.129	0.029	7.0%	0.066	0.036	24.6%	0.226	0.028
Native American	5.3%	0.021	0.045	4.7%	0.037	0.068	11.1%	0.097	0.075	30.4%	0.373	0.099
Other/NA	10.3%	0.180	0.100	6.0%	0.041	0.044	12.9%	0.104	0.063	16.9%	0.160	0.065
White	11.4%	0.097	0.012	12.1%	0.080	0.009	18.6%	0.122	0.011	24.3%	0.204	0.011
Region												
Midwest	8.4%	0.077	0.025	10.1%	0.065	0.016	16.2%	0.100	0.018	26.8%	0.242	0.020
Northeast	13.5%	0.113	0.026	11.6%	0.083	0.022	19.0%	0.151	0.027	23.3%	0.208	0.026
South	9.8%	0.109	0.022	14.4%	0.106	0.015	12.4%	0.074	0.015	24.9%	0.219	0.016
West	13.4%	0.135	0.025	11.8%	0.088	0.016	23.3%	0.166	0.021	20.1%	0.138	0.018

Table 9-5. Per Capita Intake of Individual Fruits and Vegetables (g/kg-day as consumed) (continued)

Population Group	Cucumbers Percent Consuming	Cucumbers Mean	Cucumbers SE	Lettuce Percent Consuming	Lettuce Mean	Lettuce SE	Lima Beans Percent Consuming	Lima Beans Mean	Lima Beans SE	Okra Percent Consuming	Okra Mean	Okra SE
Total	15.8%	0.063	0.006	41.3%	0.224	0.006	0.9%	0.006	0.007	1.3%	0.009	0.007
Age (years)												
< 01	2.4%	0.021	0.107	6.8%	0.025	0.026	0.5%	0.005	0.055	0.5%	0.003	0.040
01-02	7.3%	0.062	0.069	18.2%	0.116	0.039	0.4%	0.006	0.069	0.2%	0.004	0.068
03-05	12.1%	0.083	0.046	29.4%	0.191	0.031	0.0%	0	0	0.7%	0.013	0.046
06-11	14.9%	0.086	0.032	36.3%	0.247	0.027	0.3%	0.002	0.017	0.3%	0.005	0.028
12-19	12.6%	0.050	0.017	40.4%	0.187	0.014	0.5%	0.003	0.019	1.4%	0.011	0.027
20-39	17.0%	0.057	0.009	44.4%	0.231	0.010	0.7%	0.005	0.012	1.0%	0.008	0.016
40-69	19.8%	0.070	0.008	51.0%	0.264	0.010	1.5%	0.010	0.013	1.8%	0.008	0.010
70 +	14.8%	0.055	0.016	37.4%	0.203	0.017	1.9%	0.008	0.019	2.7%	0.015	0.021
Season												
Fall	14.3%	0.056	0.014	38.1%	0.175	0.010	0.8%	0.004	0.010	0.9%	0.004	0.009
Spring	15.8%	0.060	0.009	43.5%	0.259	0.011	1.0%	0.008	0.015	0.8%	0.009	0.020
Summer	19.0%	0.092	0.014	42.3%	0.218	0.012	0.9%	0.006	0.014	2.2%	0.016	0.015
Winter	14.3%	0.044	0.010	41.5%	0.243	0.013	1.0%	0.007	0.013	1.3%	0.006	0.012
Urbanization												
Central City	15.1%	0.061	0.011	37.9%	0.196	0.009	0.5%	0.004	0.011	1.0%	0.004	0.008
Nonmetropolitan	15.1%	0.071	0.013	39.9%	0.221	0.012	1.5%	0.015	0.018	1.8%	0.013	0.015
Suburban	16.7%	0.060	0.008	44.6%	0.242	0.009	0.9%	0.004	0.007	1.2%	0.010	0.012
Race												
Asian	16.1%	0.065	0.036	40.3%	0.231	0.050	0.0%	0	0	4.7%	0.084	0.074
Black	7.8%	0.040	0.021	27.1%	0.134	0.014	0.9%	0.006	0.021	2.1%	0.024	0.029
Native American	6.4%	0.037	0.042	42.7%	0.146	0.034	0.0%	0	0	0.0%	0	0
Other/NA	10.9%	0.038	0.029	41.1%	0.186	0.027	0.0%	0	0	1.7%	0.004	0.023
White	17.5%	0.067	0.007	43.7%	0.239	0.007	1.0%	0.006	0.007	1.1%	0.006	0.007
Region												
Midwest	15.1%	0.074	0.014	36.1%	0.191	0.012	0.4%	0.005	0.019	0.2%	0	0.004
Northeast	18.9%	0.097	0.018	43.9%	0.246	0.014	0.5%	0.003	0.013	0.6%	0.009	0.031
South	13.8%	0.042	0.007	39.3%	0.210	0.009	1.8%	0.011	0.011	3.2%	0.016	0.010
West	17.2%	0.050	0.011	48.7%	0.263	0.013	0.5%	0.002	0.009	0.2%	0.005	0.022

Table 9-5. Per Capita Intake of Fruits and Vegetables (g/kg-day as consumed) (continued)

Population Group	Onions Percent Consuming	Onions Mean	Onions SE	Other Berries Percent Consuming	Other Berries Mean	Other Berries SE	Peaches Percent Consuming	Peaches Mean	Peaches SE	Pears Percent Consuming	Pears Mean	Pears SE
Total	17.4%	0.040	0.003	2.5%	0.029	0.017	8.6%	0.131	0.019	4.8%	0.098	0.036
Age (years)												
< 01	1.9%	0.004	0.022	0.9%	0.092	0.369	14.2%	0.855	0.268	12.3%	1.286	0.598
01-02	6.4%	0.012	0.017	1.3%	0.053	0.248	8.9%	0.286	0.158	2.7%	0.105	0.243
03-05	8.0%	0.023	0.016	2.2%	0.039	0.073	10.0%	0.283	0.121	4.5%	0.144	0.141
06-11	9.7%	0.033	0.015	1.4%	0.014	0.056	13.8%	0.250	0.063	7.8%	0.147	0.057
12-19	12.2%	0.030	0.010	0.8%	0.011	0.029	6.9%	0.084	0.037	3.4%	0.025	0.027
20-39	20.5%	0.040	0.005	2.3%	0.024	0.030	4.2%	0.037	0.019	2.4%	0.026	0.019
40-69	24.0%	0.054	0.005	3.2%	0.031	0.023	8.7%	0.090	0.021	5.2%	0.062	0.022
70 +	16.5%	0.043	0.012	5.1%	0.049	0.040	16.1%	0.161	0.033	7.8%	0.087	0.037
Season												
Fall	16.3%	0.045	0.007	2.6%	0.024	0.023	6.4%	0.113	0.043	5.5%	0.159	0.107
Spring	19.7%	0.040	0.005	1.9%	0.019	0.024	8.4%	0.107	0.037	4.3%	0.071	0.041
Summer	18.7%	0.040	0.005	3.4%	0.032	0.027	12.5%	0.166	0.033	4.2%	0.076	0.066
Winter	14.8%	0.033	0.006	2.0%	0.042	0.058	7.4%	0.136	0.041	5.1%	0.088	0.039
Urbanization												
Central City	16.4%	0.043	0.006	2.9%	0.033	0.030	7.3%	0.121	0.035	4.5%	0.120	0.091
Nonmetropolitan	15.7%	0.033	0.005	1.6%	0.016	0.019	9.8%	0.156	0.034	5.4%	0.083	0.033
Suburban	19.1%	0.041	0.004	2.7%	0.033	0.028	8.8%	0.125	0.029	4.6%	0.092	0.050
Race												
Asian	20.8%	0.090	0.042	2.7%	0.014	0.057	6.7%	0.202	0.235	2.7%	0.053	0.151
Black	9.6%	0.034	0.014	0.9%	0.008	0.034	5.6%	0.111	0.053	2.9%	0.066	0.056
Native American	5.3%	0.018	0.022	2.3%	0.072	0.165	9.9%	0.192	0.158	1.2%	0.003	0.053
Other/NA	15.1%	0.057	0.022	0.9%	0.015	0.069	4.3%	0.118	0.145	5.1%	0.063	0.089
White	19.0%	0.039	0.003	2.8%	0.033	0.019	9.3%	0.132	0.021	5.2%	0.106	0.042
Region												
Midwest	13.8%	0.033	0.006	2.3%	0.022	0.020	9.6%	0.155	0.040	6.0%	0.121	0.054
Northeast	20.6%	0.057	0.009	3.2%	0.023	0.024	9.0%	0.132	0.048	5.7%	0.108	0.064
South	17.2%	0.034	0.004	1.7%	0.030	0.037	7.9%	0.113	0.027	3.6%	0.051	0.023
West	19.2%	0.039	0.006	3.3%	0.043	0.045	8.3%	0.131	0.042	4.5%	0.142	0.142

Table 9-5. Per Capita Intake of Individual Fruits and Vegetables (g/kg-day as consumed) (continued)

Population Group	Peas			Peppers			Pumpkins			Snap Beans		
	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE
Total	12.8%	0.095	0.009	6.5%	0.022	0.005	1.0%	0.026	0.032	21.5%	0.146	0.008
Age (years)												
< 01	13.7%	0.294	0.142	0.7%	0.003	0.025	5.2%	0.497	0.363	16.7%	0.439	0.154
01-02	13.6%	0.174	0.083	2.4%	0.011	0.031	0.4%	0.030	0.253	24.9%	0.383	0.070
03-05	12.9%	0.199	0.077	3.0%	0.014	0.032	0.7%	0.018	0.148	25.0%	0.274	0.048
06-11	13.2%	0.120	0.029	4.7%	0.019	0.016	0.4%	0.012	0.118	25.6%	0.183	0.024
12-19	8.4%	0.053	0.021	5.3%	0.017	0.014	0.2%	0	0.007	18.3%	0.112	0.018
20-39	10.9%	0.067	0.013	7.9%	0.026	0.009	0.6%	0.007	0.026	19.0%	0.096	0.010
40-69	14.8%	0.084	0.011	8.6%	0.027	0.008	1.2%	0.011	0.018	22.3%	0.124	0.011
70 +	16.4%	0.117	0.024	4.7%	0.010	0.008	1.7%	0.034	0.053	25.5%	0.149	0.019
Season												
Fall	13.2%	0.120	0.023	6.0%	0.023	0.009	1.9%	0.043	0.056	21.5%	0.164	0.018
Spring	12.6%	0.077	0.015	7.3%	0.021	0.009	0.6%	0.034	0.105	18.9%	0.109	0.013
Summer	11.2%	0.074	0.019	7.9%	0.023	0.009	0.4%	0.012	0.064	22.3%	0.147	0.016
Winter	14.1%	0.111	0.017	4.7%	0.019	0.010	1.0%	0.015	0.037	23.7%	0.163	0.017
Urbanization												
Central City	11.7%	0.085	0.018	6.5%	0.023	0.009	1.1%	0.035	0.068	20.2%	0.133	0.015
Nonmetropolitan	14.5%	0.113	0.020	6.0%	0.017	0.006	0.5%	0.015	0.068	22.3%	0.141	0.013
Suburban	12.5%	0.094	0.014	6.8%	0.023	0.007	1.3%	0.025	0.041	22.0%	0.156	0.013
Race												
Asian	8.1%	0.047	0.071	8.1%	0.102	0.112	0.7%	0.005	0.057	13.4%	0.059	0.050
Black	17.0%	0.143	0.032	3.6%	0.005	0.007	0.3%	0.037	0.238	24.1%	0.188	0.022
Native American	2.9%	0.007	0.035	5.3%	0.015	0.031	0.0%	0	0	21.1%	0.119	0.048
Other/NA	6.9%	0.037	0.058	11.1%	0.037	0.024	0.9%	0.024	0.208	15.1%	0.168	0.073
White	12.5%	0.092	0.010	6.8%	0.022	0.005	1.2%	0.025	0.030	21.5%	0.140	0.009
Region												
Midwest	10.9%	0.071	0.014	4.7%	0.016	0.011	1.2%	0.027	0.050	22.4%	0.146	0.014
Northeast	12.5%	0.101	0.026	9.0%	0.036	0.012	1.4%	0.061	0.106	19.7%	0.131	0.020
South	16.2%	0.126	0.017	5.8%	0.015	0.006	0.5%	0.002	0.026	24.3%	0.177	0.014
West	9.5%	0.067	0.018	7.6%	0.025	0.010	1.3%	0.030	0.060	17.5%	0.107	0.019

Table 9-5. Per Capita Intake of Individual Fruits and Vegetables (g/kg-day as consumed) (continued)

	Strawberries			Tomatoes			White Potatoes		
Population Group	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE
Total	3.4%	0.039	0.019	91.8%	0.876	0.010	87.6%	1.093	0.013
Age (years)									
< 01	0.7%	0.018	0.154	64.2%	1.116	0.094	59.9%	1.102	0.128
01-02	1.6%	0.155	0.598	93.8%	1.838	0.103	84.2%	2.228	0.113
03-05	3.2%	0.045	0.080	94.9%	1.700	0.072	88.1%	1.817	0.086
06-11	3.3%	0.052	0.058	95.2%	1.160	0.032	90.5%	1.702	0.058
12-19	2.3%	0.016	0.028	95.5%	0.852	0.022	90.1%	1.238	0.042
20-39	2.7%	0.028	0.020	94.7%	0.791	0.013	88.6%	0.897	0.018
40-69	4.5%	0.042	0.020	90.6%	0.673	0.013	88.1%	0.882	0.018
70 +	5.8%	0.050	0.040	87.2%	0.689	0.027	88.9%	0.865	0.031
Season									
Fall	1.3%	0.008	0.017	92.5%	0.907	0.021	88.9%	1.169	0.027
Spring	7.7%	0.105	0.045	90.6%	0.808	0.018	86.3%	1.036	0.024
Summer	2.2%	0.030	0.032	92.4%	0.946	0.019	86.5%	1.001	0.029
Winter	2.5%	0.013	0.015	91.9%	0.844	0.018	88.7%	1.167	0.024
Urbanization									
Central City	2.8%	0.028	0.020	91.5%	0.827	0.017	84.7%	1.017	0.025
Nonmetropolitan	3.8%	0.052	0.029	90.7%	0.827	0.018	89.4%	1.211	0.027
Suburban	3.6%	0.040	0.035	92.8%	0.931	0.015	88.5%	1.087	0.019
Race									
Asian	3.4%	0.395	1.152	90.6%	1.147	0.110	77.2%	0.446	0.062
Black	1.5%	0.031	0.056	87.4%	0.713	0.027	83.3%	1.202	0.047
Native American	1.8%	0.023	0.120	84.2%	0.890	0.073	85.4%	1.735	0.134
Other/NA	1.4%	0.007	0.042	91.4%	1.004	0.049	77.1%	1.036	0.080
White	3.9%	0.037	0.013	92.8%	0.892	0.011	88.9%	1.082	0.014
Region									
Midwest	4.8%	0.051	0.025	92.2%	0.814	0.019	89.2%	1.246	0.029
Northeast	3.3%	0.059	0.079	93.0%	0.988	0.024	86.6%	1.090	0.030
South	2.6%	0.025	0.019	90.7%	0.831	0.016	88.5%	1.074	0.021
West	3.3%	0.028	0.025	92.3%	0.914	0.021	85.1%	0.946	0.026

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-6. Per Capita Intake of USDA Categories of Fruits and Vegetables (g/kg-day as consumed)

	Dark Green Vegetables			Deep Yellow Vegetables			Citrus Fruits			Other Fruits			Other Vegetables		
Population Group	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE	Percent Consuming	Mean	SE
Total	19.1%	0.180	0.012	20.0%	0.147	0.010	38.0%	1.236	0.039	57.7%	2.141	0.063	83.1%	1.316	0.016
Age (years)															
< 01	7.5%	0.180	0.177	10.1%	0.178	0.157	24.8%	1.929	0.586	61.6%	12.855	1.284	41.7%	1.346	0.200
01-02	12.4%	0.364	0.137	14.4%	0.281	0.109	43.6%	4.237	0.459	66.4%	7.599	0.498	73.6%	2.077	0.136
03-05	14.8%	0.390	0.119	16.3%	0.177	0.063	41.0%	2.596	0.267	70.0%	5.826	0.348	78.9%	1.979	0.102
06-11	13.3%	0.150	0.044	19.1%	0.185	0.043	40.5%	1.805	0.138	70.1%	3.242	0.126	83.2%	1.534	0.062
12-19	14.3%	0.112	0.030	14.0%	0.080	0.020	37.0%	1.130	0.085	47.3%	1.053	0.070	81.0%	0.950	0.035
20-39	18.8%	0.137	0.016	17.5%	0.100	0.015	33.4%	0.903	0.049	44.9%	0.972	0.042	84.1%	1.081	0.022
40-69	24.4%	0.187	0.016	24.8%	0.164	0.017	39.9%	0.864	0.045	60.9%	1.255	0.038	88.3%	1.374	0.026
70 +	24.6%	0.255	0.034	29.4%	0.245	0.028	46.8%	1.155	0.069	76.1%	1.827	0.067	87.7%	1.615	0.046
Season															
Fall	19.6%	0.169	0.023	22.7%	0.156	0.020	38.3%	1.211	0.074	57.6%	2.354	0.171	82.5%	1.276	0.032
Spring	21.0%	0.187	0.020	19.7%	0.144	0.023	38.4%	1.225	0.072	56.4%	2.024	0.102	83.3%	1.297	0.030
Summer	15.4%	0.182	0.029	15.6%	0.094	0.017	33.8%	1.136	0.093	60.8%	2.245	0.112	83.1%	1.332	0.032
Winter	20.0%	0.180	0.024	21.9%	0.192	0.023	41.3%	1.371	0.073	56.0%	1.943	0.106	83.4%	1.361	0.031
Urbanization															
Central City	20.5%	0.197	0.021	18.6%	0.133	0.019	39.8%	1.187	0.072	55.3%	2.090	0.100	81.4%	1.245	0.027
Nonmetropolitan	16.0%	0.133	0.020	18.4%	0.138	0.021	34.2%	1.153	0.074	57.8%	1.954	0.100	83.2%	1.407	0.033
Suburban	19.9%	0.190	0.019	22.0%	0.160	0.016	39.1%	1.306	0.058	59.2%	2.262	0.110	84.1%	1.319	0.023
Race															
Asian	30.9%	0.327	0.127	29.5%	0.221	0.118	51.0%	2.479	0.453	69.8%	3.360	0.547	85.2%	2.228	0.205
Black	25.9%	0.318	0.039	12.5%	0.104	0.029	40.1%	1.474	0.135	46.2%	1.806	0.156	78.1%	1.232	0.044
Native American	9.4%	0.126	0.092	10.5%	0.081	0.060	33.3%	0.945	0.219	50.9%	2.375	0.431	75.4%	1.077	0.107
Other/NA	15.1%	0.224	0.087	13.4%	0.106	0.071	40.3%	1.439	0.229	52.0%	2.589	0.452	76.3%	1.116	0.104
White	18.1%	0.156	0.012	21.6%	0.154	0.011	37.4%	1.178	0.041	59.8%	2.154	0.071	84.2%	1.326	0.017
Region															
Midwest	12.6%	0.125	0.026	18.7%	0.128	0.020	35.5%	1.099	0.077	59.8%	2.137	0.108	81.2%	1.186	0.029
Northeast	21.1%	0.185	0.026	22.1%	0.175	0.026	45.6%	1.430	0.079	60.5%	2.235	0.132	84.5%	1.445	0.040
South	20.5%	0.206	0.021	16.8%	0.119	0.018	33.5%	1.090	0.067	50.3%	1.927	0.095	83.2%	1.346	0.026
West	22.6%	0.195	0.022	25.2%	0.187	0.021	41.8%	1.449	0.092	65.0%	2.414	0.182	83.8%	1.293	0.033

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-7. Per Capita Intake of Exposed Fruits (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	44.1%	1.435	0.062	0	0	0	0	0	1.402	3.496	6.075	17.823	204.28
Age (years)													
< 01	54.7%	9.224	1.247	0	0	0	0	2.897	12.336	26.98	33.216	75.353	204.28
01-02	55.3%	5.682	0.486	0	0	0	0	2.897	8.598	15.187	19.107	33.353	80.189
03-05	56.9%	4.324	0.344	0	0	0	0	2.305	5.766	11.65	19.049	24.123	48.728
06-11	58.8%	2.316	0.12	0	0	0	0	1.379	3.32	5.879	8.585	15.318	25.367
12-19	36.4%	0.682	0.065	0	0	0	0	0	0.871	2.158	3.214	6.703	10.766
20-39	32.7%	0.596	0.038	0	0	0	0	0	0.754	1.984	2.858	5.911	28.486
40-69	44.3%	0.716	0.031	0	0	0	0	0	1.102	2.139	3.048	5.127	13.206
70 +	57.7%	1.032	0.058	0	0	0	0	0.534	1.452	2.894	4.042	6.983	10.631
Season													
Fall	45.5%	1.753	0.179	0	0	0	0	0	1.521	3.64	7.537	25.206	204.28
Spring	42.6%	1.184	0.078	0	0	0	0	0	1.283	3.208	5.505	14.872	84.336
Summer	45.3%	1.44	0.113	0	0	0	0	0	1.389	3.451	6.313	17.427	98.133
Winter	43.0%	1.362	0.097	0	0	0	0	0	1.441	3.54	5.703	18.752	59.848
Urbanization													
Central City	42.4%	1.322	0.088	0	0	0	0	0	1.328	3.481	6.075	15.927	80.189
Nonmetropolitan	44.0%	1.335	0.097	0	0	0	0	0	1.445	3.32	5.505	16.057	84.336
Suburban	45.3%	1.553	0.112	0	0	0	0	0	1.442	3.686	6.614	20.444	204.28
Race													
Asian	52.3%	2.118	0.541	0	0	0	0	0.654	1.674	4.299	8.678	25.206	27.337
Black	34.6%	1.132	0.149	0	0	0	0	0	1.045	2.888	4.618	17.351	80.189
Native American	35.7%	0.939	0.316	0	0	0	0	0	0.922	2.271	4.157	15.635	17.684
Other/NA	34.0%	1.614	0.408	0	0	0	0	0	1.659	4.084	8.529	35.073	36.71
White	46.1%	1.468	0.07	0	0	0	0	0	1.441	3.593	6.104	17.427	204.28
Region													
Midwest	47.3%	1.422	0.091	0	0	0	0	0	1.645	3.501	6.114	16.438	84.336
Northeast	47.3%	1.518	0.118	0	0	0	0	0	1.49	3.898	6.834	19.393	75.353
South	36.9%	1.271	0.092	0	0	0	0	0	1.177	3.104	5.695	19.91	80.189
West	49.4%	1.643	0.198	0	0	0	0	0	1.443	3.774	7.009	15.947	204.28

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-8. Per Capita Intake of Protected Fruits (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	52.9%	1.692	0.037	0	0	0	0	0.598	2.316	4.687	6.717	13.019	136.69
Age (years)													
< 01	38.9%	3.097	0.528	0	0	0	0	0	4.353	9.963	15.242	23.624	136.69
01-02	56.7%	5.518	0.455	0	0	0	0	2.618	9.049	15.677	20.912	27.432	49.904
03-05	57.0%	3.443	0.235	0	0	0	0	1.948	5.606	9.826	13.018	17.729	35.141
06-11	56.2%	2.339	0.125	0	0	0	0	1.079	3.727	6.92	8.688	12.807	27.945
12-19	47.7%	1.401	0.081	0	0	0	0	0.598	2.234	4.341	5.761	7.894	15.503
20-39	45.4%	1.188	0.047	0	0	0	0	0.108	1.694	3.645	4.844	8.205	29.275
40-69	57.3%	1.284	0.043	0	0	0	0	0.583	2.009	3.541	4.596	7.719	21.372
70 +	67.5%	1.78	0.072	0	0	0	0	1.236	2.706	4.363	5.779	8.611	15.003
Season													
Fall	50.2%	1.539	0.071	0	0	0	0	0.269	2.04	4.323	6.509	13.595	26.751
Spring	53.9%	1.75	0.072	0	0	0	0	0.688	2.407	4.681	6.787	13.032	44.68
Summer	54.1%	1.754	0.082	0	0	0	0	0.672	2.471	4.732	6.571	15.503	136.69
Winter	53.7%	1.727	0.071	0	0	0	0	0.621	2.423	4.941	6.905	12.166	30.692
Urbanization													
Central City	53.3%	1.632	0.069	0	0	0	0	0.625	2.276	4.497	6.099	11.535	136.69
Nonmetropolitan	49.4%	1.55	0.069	0	0	0	0	0.334	2.115	4.368	6.961	12.076	29.275
Suburban	54.7%	1.797	0.056	0	0	0	0	0.667	2.472	4.897	6.826	14.399	44.68
Race													
Asian	69.8%	3.279	0.429	0	0	0	0	2.052	4.382	6.981	17.729	17.729	18.792
Black	49.6%	1.861	0.126	0	0	0	0	0.621	2.695	5.64	7.241	13.572	136.69
Native American	46.8%	2.019	0.33	0	0	0	0	0.851	2.701	5.995	10.354	11.554	15.244
Other/NA	51.7%	2.014	0.263	0	0	0	0	0.845	2.472	5.759	8.88	14.279	44.68
White	53.4%	1.629	0.039	0	0	0	0	0.574	2.238	4.527	6.425	12.53	49.904
Region													
Midwest	49.5%	1.501	0.072	0	0	0	0	0.265	2.07	4.353	6.099	12.53	49.904
Northeast	59.4%	1.887	0.08	0	0	0	0	0.838	2.675	5.371	7.268	13.018	42.347
South	47.6%	1.56	0.064	0	0	0	0	0.465	2.147	4.443	6.39	12.076	136.69
West	60.1%	1.947	0.084	0	0	0	0	0.854	2.613	4.88	7.836	16.064	44.68

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-9. Per Capita Intake of Exposed Vegetables (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	84.9%	1.49	0.016	0	0	0	0.367	1.043	2.067	3.403	4.515	7.727	20.492
Age (years)													
< 01	42.7%	1.208	0.17	0	0	0	0	0	1.55	3.834	6.451	11.524	18.592
01-02	78.0%	2.268	0.145	0	0	0	0.299	1.132	3.616	5.855	7.404	12.808	20.492
03-05	83.6%	2.245	0.119	0	0	0	0.329	1.411	3.061	5.433	7.664	12.493	17.872
06-11	84.7%	1.606	0.059	0	0	0	0.293	1.062	2.222	3.769	5.118	9.161	15.741
12-19	83.6%	1.181	0.04	0	0	0	0.253	0.804	1.696	2.756	3.84	5.699	12.139
20-39	86.3%	1.3	0.025	0	0	0	0.331	0.923	1.87	2.968	3.692	6.327	14.837
40-69	89.9%	1.568	0.026	0	0	0.07	0.557	1.22	2.177	3.42	4.443	6.274	13.624
70 +	86.4%	1.603	0.044	0	0	0	0.672	1.326	2.214	3.344	4.206	5.928	12.814
Season													
Fall	82.8%	1.383	0.033	0	0	0	0.29	0.951	1.824	3.151	4.283	8.783	18.592
Spring	85.0%	1.475	0.031	0	0	0	0.383	1.028	2.075	3.406	4.562	7.403	20.492
Summer	87.1%	1.634	0.033	0	0	0	0.432	1.272	2.289	3.68	4.765	7.399	18.283
Winter	84.9%	1.468	0.033	0	0	0	0.367	0.999	2.09	3.109	4.464	7.664	16.152
Urbanization													
Central City	83.6%	1.413	0.029	0	0	0	0.302	0.957	1.952	3.278	4.331	8.17	20.492
Nonmetropolitan	85.8%	1.55	0.031	0	0	0	0.471	1.185	2.146	3.499	4.59	7.283	17.872
Suburban	85.2%	1.511	0.025	0	0	0	0.356	1.055	2.098	3.464	4.683	7.664	16.152
Race													
Asian	83.2%	2.133	0.195	0	0	0	0.606	1.537	3.135	4.746	6.883	10.325	11.841
Black	81.8%	1.472	0.051	0	0	0	0.308	0.908	1.88	3.217	4.989	9.219	16.141
Native American	75.4%	1.501	0.141	0	0	0	0.168	1.018	2.423	3.445	4.155	6.424	8.189
Other/NA	85.4%	1.682	0.092	0	0	0	0.338	1.287	2.748	3.644	4.697	6.933	8.368
White	85.6%	1.476	0.017	0	0	0	0.371	1.045	2.067	3.376	4.464	7.359	20.492
Region													
Midwest	80.9%	1.215	0.029	0	0	0	0.239	0.824	1.683	2.843	3.834	6.35	20.492
Northeast	84.7%	1.561	0.041	0	0	0	0.378	1.051	2.126	3.564	4.994	8.243	18.283
South	86.7%	1.609	0.027	0	0	0	0.434	1.208	2.254	3.575	4.562	7.404	14.568
West	86.6%	1.546	0.035	0	0	0	0.424	1.127	2.158	3.524	4.7	7.664	16.152

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-10. Per Capita Intake of Protected Vegetables (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	34.0%	0.332	0.012	0	0	0	0	0	0.414	1.038	1.637	3.394	14.4
Age (years)													
< 01	30.9%	1.144	0.192	0	0	0	0	0	1.435	4.584	6.25	8.752	14.4
01-02	41.6%	0.794	0.104	0	0	0	0	0	1.201	2.232	3.766	6.488	9.74
03-05	39.8%	0.703	0.081	0	0	0	0	0	1.205	2.443	3.053	4.811	11.3
06-11	44.3%	0.5	0.035	0	0	0	0	0	0.848	1.439	2.058	3.32	8.6
12-19	30.1%	0.229	0.025	0	0	0	0	0	0.332	0.824	1.339	2.138	4.94
20-39	31.6%	0.233	0.015	0	0	0	0	0	0.323	0.78	1.161	2.427	5.6
40-69	32.4%	0.239	0.014	0	0	0	0	0	0.362	0.772	1.164	2.033	6.25
70 +	34.6%	0.303	0.028	0	0	0	0	0	0.427	1.015	1.491	2.291	5.34
Season													
Fall	34.1%	0.336	0.025	0	0	0	0	0	0.394	1.064	1.725	3.674	11.3
Spring	34.8%	0.32	0.024	0	0	0	0	0	0.421	0.96	1.435	3.493	14.4
Summer	32.5%	0.334	0.024	0	0	0	0	0	0.411	1.116	1.7	3.492	10.4
Winter	34.4%	0.337	0.022	0	0	0	0	0	0.42	1.109	1.724	2.945	8.68
Urbanization													
Central City	31.7%	0.303	0.022	0	0	0	0	0	0.354	0.971	1.619	3.098	14.4
Nonmetropolitan	37.9%	0.396	0.024	0	0	0	0	0	0.514	1.22	1.725	3.826	11.3
Suburban	33.1%	0.32	0.018	0	0	0	0	0	0.39	1.029	1.591	3.32	14.1
Race													
Asian	16.1%	0.166	0.081	0	0	0	0	0	0	0.636	1.201	1.506	3.17
Black	37.3%	0.411	0.038	0	0	0	0	0	0.502	1.29	2.014	4.579	9.07
Native American	32.7%	0.38	0.095	0	0	0	0	0	0.446	1.062	1.826	2.85	4.64
Other/NA	22.9%	0.221	0.074	0	0	0	0	0	0	0.644	1.369	2.767	5.6
White	34.1%	0.326	0.013	0	0	0	0	0	0.413	1.014	1.587	3.317	14.4
Region													
Midwest	35.8%	0.344	0.022	0	0	0	0	0	0.46	1.127	1.674	3.013	11.3
Northeast	32.4%	0.369	0.036	0	0	0	0	0	0.376	1.102	1.835	5.022	14.1
South	36.8%	0.358	0.019	0	0	0	0	0	0.48	1.093	1.726	3.484	14.4
West	28.4%	0.236	0.022	0	0	0	0	0	0.178	0.791	1.257	2.688	6.25

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-11. Per Capita Intake of Root Vegetables (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	80.7%	1.245	0.015	0	0	0	0.226	0.832	1.675	2.974	4.029	7.074	30.609
Age (years)													
< 01	52.4%	1.857	0.204	0	0	0	0	0.184	2.66	5.337	8.233	12.5	30.609
01-02	76.2%	2.398	0.129	0	0	0	0.52	1.879	3.542	5.695	7.084	10.449	16.27
03-05	77.9%	1.914	0.096	0	0	0	0.203	1.344	2.998	4.596	6.14	7.505	17.416
06-11	84.4%	1.85	0.065	0	0	0	0.381	1.23	2.638	4.449	6.018	8.165	17.107
12-19	81.4%	1.29	0.045	0	0	0	0.279	0.909	1.739	3.051	4.177	5.74	24.949
20-39	81.6%	0.988	0.02	0	0	0	0.182	0.717	1.37	2.385	3.096	5.025	8.002
40-69	82.8%	1.059	0.021	0	0	0	0.244	0.807	1.488	2.454	3.087	4.983	9.043
70 +	80.6%	1.109	0.04	0	0	0	0.312	0.821	1.549	2.535	3.203	5.636	10.723
Season													
Fall	80.6%	1.324	0.032	0	0	0	0.213	0.893	1.756	3.238	4.402	7.484	15.625
Spring	80.5%	1.204	0.029	0	0	0	0.228	0.858	1.557	2.752	3.889	6.644	30.609
Summer	80.3%	1.102	0.031	0	0	0	0.152	0.655	1.452	2.669	3.858	7.751	24.949
Winter	81.5%	1.348	0.029	0	0	0	0.339	0.97	1.953	3.1	4.137	5.989	17.416
Urbanization													
Central City	77.6%	1.167	0.029	0	0	0	0.176	0.755	1.545	2.826	3.903	7.505	30.609
Nonmetropolitan	82.3%	1.33	0.03	0	0	0	0.311	0.893	1.795	3.256	4.422	6.946	19.449
Suburban	81.9%	1.254	0.023	0	0	0	0.21	0.861	1.708	2.972	4.017	7.079	17.416
Race													
Asian	55.0%	0.743	0.146	0	0	0	0	0.274	0.814	1.764	3.546	7.269	10.702
Black	73.8%	1.309	0.052	0	0	0	0.134	0.761	1.627	3.337	5.358	7.968	17.534
Native American	78.9%	1.791	0.137	0	0	0	0.655	1.47	2.762	3.858	4.705	7.067	13.578
Other/NA	65.4%	1.239	0.11	0	0	0	0	0.635	1.75	3.38	4.861	8.253	10.415
White	82.9%	1.237	0.016	0	0	0	0.25	0.858	1.673	2.887	3.942	6.651	30.609
Region													
Midwest	82.2%	1.361	0.033	0	0	0	0.29	0.889	1.844	3.238	4.386	7.968	19.449
Northeast	80.2%	1.304	0.037	0	0	0	0.21	0.912	1.781	3.212	4.246	7.022	24.949
South	81.2%	1.183	0.024	0	0	0	0.25	0.796	1.591	2.82	3.906	6.926	30.609
West	78.5%	1.15	0.032	0	0	0	0.146	0.786	1.56	2.673	3.683	7.269	13.578

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analyses of the 1989-91 CSFII

Table 9-12. Mean Daily Intake of Fruits and Vegetables Per Individual in a Day for USDA 1977-78, 87-88, 89-91, 94, and 95 Surveys

Food Product	77-78 Data (g/day)	87-88 Data (g/day)	89-91 Data (g/day)	94 Data (g/day)	95 Data (g/day)
Fruits	142	142	156	171	173
Vegetables	201	182	179	186	188

Source: USDA, 1980; 1992; 1996a; 1996b.

Table 9-13. Mean Per Capita Intake Rates (as consumed) 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
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

Table 9-13. Mean Per Capita Intake Rates (as consumed) for Fruits and Vegetables Based on All Sex/Age/Demographic Subgroups (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight-Day)	Standard Error
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	*
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

Table 9-13. Mean Per Capita Intake Rates (as consumed) for Fruits and Vegetables Based on All Sex/Age/Demographic Subgroups (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight-Day)	Standard Error
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	*
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
Honeydew Melons	0.0183628	0.0042879

Table 9-13. Mean Per Capita Intake Rates (as consumed) for Fruits and Vegetables Based on All Sex/Age/Demographic Subgroups (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight-Day)	Standard Error
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	*
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

Table 9-13. Mean Per Capita Intake Rates (as consumed) for Fruits and Vegetables Based on All Sex/Age/Demographic Subgroups (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight-Day)	Standard Error
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
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	*

Table 9-13. Mean Per Capita Intake Rates (as consumed) for Fruits and Vegetables Based on All Sex/Age/Demographic Subgroups (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight-Day)	Standard Error
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
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
Tangerine-Juice	0.0000839	0.0000567

Table 9-13. Mean Per Capita Intake Rates (as consumed) for Fruits and Vegetables Based on All Sex/Age/Demographic Subgroups (continued)

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight-Day)	Standard Error
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 (based on 1977-78 NFCS data).

Table 9-14. Mean Total Fruit Intake (as consumed) 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			
I 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 9-15. Mean Total Fruit Intake (as consumed) 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, 1992b.

Table 9-16. Mean Total Vegetable Intake (as consumed) 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 9-17. Mean Total Vegetable Intake (as consumed) in a Day by Sex and Age (1987-1988)[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			
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, 1992b.

Table 9-18. Mean Total Fruit Intake (as consumed) in a Day by Sex and Age (1994 and 1995)[a]

Age (yr)	Per Capita Intake (g/day)		Percent of Population Using Fruit in 1 Day		Intake (g/day) for Users Only[b]	
	1994	1995	1994	1995	1994	1995
Males and Females						
5 and under	230	221	70.6	72.6	326	304
Males						
6-11	176	219	59.8	62.2	294	352
12-19	169	210	44.0	47.1	384	446
20 and over	175	170	50.2	49.6	349	342
Females						
6-11	174	172	59.3	63.6	293	270
12-19	148	167	47.1	44.4	314	376
20 and over	157	155	55.1	54.4	285	285
Males and Females						
All Ages	171	173	54.1	54.2	316	319

[a] Based on USDA CSFII (1994 and 1995) 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, 1996a; 1996b.

Table 9-19. Mean Total Vegetable Intake (as consumed) in a Day by Sex and Age (1994 and 1995)[a]

Age (yr)	Per Capita Intake (g/day)		Percent of Population Using Vegetables in 1 Day		Intake (g/day) for Users Only[b]	
	1994	1995	1994	1995	1994	1995
Males and Females						
5 and under	80	83	75.2	75.0	106	111
Males						
6-11	118	111	82.4	80.6	143	138
12-19	154	202	74.9	79.0	206	256
20 and over	242	241	85.9	86.4	282	278
Females						
6-11	115	108	82.9	79.1	139	137
12-19	132	144	78.5	76.0	168	189
20 and over	190	189	84.7	83.2	224	227
Males and Females						
All Ages	186	188	83.2	82.6	223	228

[a] Based on USDA CSFII (1994 and 1995) 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, 1996a; 1996b.

Table 9-20. Mean Per Capita Intake of Fats and Oils (g/day as consumed) in a Day by Sex and Age (1994 and 1995)[a]

	Total Fats and Oils[b]		Table Fats[c]		Salad Dressings[d]	
	1994	1995	1994	1995	1994	1995
Males and Females						
5 and under	4	3	2	2	2	1
Males						
6-11	8	7	3	3	5	4
12-19	11	14	2	5	8	10
20 and over	19	18	5	5	11	10
Females						
6-11	7	8	3	3	4	4
12-19	9	9	2	3	6	6
20 and over	16	14	4	5	10	7
Males and Females						
All Ages	14	14	4	4	9	8

[a] Based on USDA CSFII 1994 and 1995 data for one day.
[b] Table fats, cooking fats, vegetable oils, salad dressings, nondairy cream substitutes, sauces that are mainly fat and oil.
[c] Butter, margarines, blends of butter with margarines or vegetable oils, and butter replacements.
[d] Regular and reduced- and low-calorie dressings and mayonnaise.
Source: USDA. 1996a; 1996b.

Table 9-21. Mean and Standard Error for the Per Capita Daily Intake of Food Class and Subclass by Region (g/day 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

[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.

NOTE: Northeast = Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

North Central = Ohio, Illinois, Indiana, Wisconsin, Michigan, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

South = Maryland, Delaware, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma.

West = Montana, Idaho, Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada, Washington, Oregon, and California.

Source: U.S. EPA, 1984b (based on 1977-78 NFCS data).

Table 9-22.Mean and Standard Error for the Daily Intake of Food Subclasses Per Capita by Age (g/day as consumed)

Age (years)	Leafy produce[a]	Exposed produce[b]	Protected produce[c]	Other produce
All Ages	39.2 ± 0.8	86.0 ± 1.5	150.4 ± 2.3	7.0 ± 0.3
<1	3.2 ± 4.9	75.5 ± 9.8	50.8 ± 14.7	25.5 ± 1.8
1-4	9.1 ± 2.4	55.6 ± 4.8	94.5 ± 7.2	5.1 ± 0.9
5-9	20.1 ± 2.0	69.2 ± 4.8	128.9 ± 6.1	4.3 ± 0.8
10-14	26.1 ± 1.9	76.8 ± 3.8	151.7 ± 5.7	8.1 ± 0.7
15-19	31.4 ± 2.0	71.9 ± 4.0	156.6 ± 6.0	6.2 ± 0.7
20-24	35.3 ± 2.6	65.6 ± 5.2	144.5 ± 7.8	5.0 ± 1.0
25-29	41.4 ± 2.7	73.4 ± 5.3	149.8 ± 8.0	7.0 ± 1.0
30-39	44.4 ± 2.1	77.1 ± 4.2	150.5 ± 6.3	6.1 ± 0.8
40-59	51.3 ± 1.6	94.7 ± 3.3	162.9 ± 4.9	6.9 ± 0.6
≥ 60	45.4 ± 1.8	114.2 ± 3.6	163.9 ± 5.5	7.6 ± 0.7

[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, 1984a (based on 1977-78 NFCS data).

Table 9-23. Consumption of Foods (g dry weight/day) for Different Age Groups and Estimated Lifetime Average Daily Food Intakes for a US Citizen (averaged across sex) Calculated from the FDA Diet Data

	Age (in years)						Estimated Lifetime Intake[a]
	(0-1)	(1-5)	(6-13)	(14-19)	(20-44)	(45-70)	
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:

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

where IR = the intake rate for a specific age group.
Source: U.S. EPA, 1989 (based on 1977-78 NFCS and NHANES II data).

Table 9-24. 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.

Table 9-25. Per Capita Consumption of Fresh Fruits and Vegetables in 1991[a]			
Fresh Fruits		Fresh Vegetables	
Food Item	Per Capita Consumption (g/day)[b]	Food Item	Per Capita Consumption (g/day)[b]
Citrus		Artichokes	0.62
Oranges (includes Temple oranges)	10.2	Asparagus	0.75
Tangerines and Tangelos	1.6	Snap Beans	1.4
Lemons	3.1	Broccoli	3.5
Limes	0.9	Brussel Sprouts	0.4
Grapefruit	7.1	Cabbage	9.5
Total Fresh Citrus	22.9	Carrots	9.0
		Cauliflower	2.2
Noncitrus		Celery	7.8
Apples	21.8	Sweet Corn	6.6
Apricots	0.1	Cucumber	5.2
Avocados	1.7	Eggplant	0.5
Bananas	31.2	Escarole/Endive	0.3
Cherries	0.5	Garlic	1.6
Cranberries	0.4	Head Lettuce	30.2
Grapes	8.2	Onions	18.4
Kiwi Fruit	0.5	Bell Peppers	5.8
Mangoes	1.0	Radishes	0.6
Peaches & Nectarines	7.6	Spinach	0.9
Pears	3.7	Tomatoes	16.3
Pineapple	2.2	Total Fresh Vegetables	126.1
Papayas	0.3		
Plums and Prunes	1.7		
Strawberries	4.1		
Total Fresh Noncitrus	85.0		
Total Fresh Fruits	107.7		

[a] Based on retail-weight equivalent. Includes imports; excludes exports and foods grown in home gardens. Data for 1991 used.
[b] Original data were presented in lbs/yr; data were converted to g/day by multiplying by a factor of 454 g/lb and dividing by 365 days/yr.
Source: USDA, 1993.

Table 9-26. Quantity (as consumed) of Fruits and Vegetables Consumed Per Eating Occasion and the Percentage of Individuals Using These Foods in Three Days

Food category	% Indiv. using food in 3 days	Quantity consumed per eating occasion (g)		Consumers-only Quantity consumed per eating occasion at specified percentiles (g)[a]						
		Average	Standard Deviation	5	25	50	75	90	95	99
Raw vegetables										
White potatoes	74.4	125	90	29	63	105	170	235	280	426
Cabbage and coleslaw	9.7	68	45	15	40	60	90	120	120	240
Carrots	5	43	40	4	13	31	55	100	122	183
Cucumbers	5.6	80	76	8	24	70	110	158	220	316
Lettuce and tossed salad	50.7	65	59	10	20	55	93	140	186	270
Mature onions	8.5	31	33	3	17	18	36	57	72	180
Tomatoes	27.8	81	55	30	45	62	113	123	182	246
Cooked vegetables										
Broccoli	6.2	112	68	30	78	90	155	185	190	350
Cabbage	4.7	128	83	28	75	145	150	225	300	450
Carrots	9.8	70	59	19	46	75	92	150	155	276
Corn, whole kernel	23.9	95	56	21	65	83	123	170	170	330
Lima beans	2.8	110	75	21	67	88	170	175	219	350
Mixed vegetables	3.4	117	69	28	91	94	182	187	187	374
Cowpeas, field peas, black-eyed peas	2.9	131	88	22	88	88	175	196	350	350
Green peas	18.3	90	57	20	43	85	85	170	170	330
Spinach	4.5	121	70	24	78	103	185	205	205	380
String beans	27.3	86	54	18	67	70	135	140	140	280
Summer squash	2.8	145	98	27	105	108	215	215	352	430
Sweet potatoes	4.1	136	87	38	86	114	185	225	238	450
Tomato juice	3.9	91	122	91	122	182	243	243	363	486
Cucumber pickles	9.2	45	45	7	16	30	65	90	130	222
Fruits										
Grapefruit	4.7	159	58	106	134	134	165	268	268	330
Grapefruit juice	3.6	202	99	95	125	186	247	250	375	500
Oranges	9	146	57	73	145	145	145	180	228	360
Orange juice	35.5	190	84	95	125	187	249	249	311	498
Apples	18.2	141	49	69	138	138	138	212	212	276
Applesauce, cooked apples	9.8	134	86	28	64	128	130	255	155	488
Apple juice	3.8	191	101	63	124	186	248	248	372	496
Cantaloupe	3.3	171	91	61	136	136	272	272	272	529
Raw peaches	4.5	160	75	76	152	152	152	304	304	456
Raw pears	3.1	163	69	82	164	164	164	164	328	328
Raw strawberries	2.1	100	58	37	75	75	149	149	180	298

[a] Percentiles are cumulative; for example, 50 percent of people eat 105 g white potatoes per day or less.
Source: Pao et al., 1982 (based on 1977-78 NFCS data).

Table 9-27. Mean Moisture Content of Selected Fruits and Vegetables Expressed as Percentages of Edible Portions			
Food	Moisture Content (Percent)		Comments
	Raw	Cooked	
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 and 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	
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		

Table 9-27. Mean Moisture Content of Selected Fruits and Vegetables Expressed as Percentages of Edible Portions (continued)

Food	Moisture Content (Percent) Raw	Moisture Content (Percent) Cooked	Comments
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		
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

Table 9-27. Mean Moisture Content of Selected Fruits and Vegetables Expressed as Percentages of Edible Portions (continued)

Food	Moisture Content (Percent)		Comments
	Raw	Cooked	
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

Source: USDA, 1979-1986.

Table 9-28. Summary of Fruit and Vegetable Intake Studies

Study	Survey Population Used in Calculating Intake	Types of Data Used	Units	Food Items
KEY STUDIES				
EPA Analysis of 1989-91 USDA CSFII data	Per capita data; consumer only data can be calculated	1989-91 CSFII data; Based on 3-day average individual intake rate	g/kg-day; as consumed	Major food groups; individual food items; exposed and protected fruits and vegetables; USDA food categories
RELEVANT STUDIES				
AIHC, 1994	Per Capita	Based on the 1977-78 USDA NFCS data provided in the 1989 version of the Exposure Factors Handbook.	g/day	Distributions for vegetables using @Risk software.
Canadian Department of National Health and Welfare, n.d.	Not known if per capita or consumers only	1970-72 survey based on 24-hour dietary recall	g/day; not known if as consumed	Fruit and fruit products, vegetables not including potatoes and nuts and legumes
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
Pao et al., 1982	Consumers only serving size data provided	1977-78 NFCS 3-day individual intake data	g; as consumed	Serving sizes for only a limited number of products
USDA, 1980; 1992b; 1996a; 1996b	Per capita and consumer only	1977-78 and 1987-88 NFCS, and 1994 and 1995 CSFII 1-day individual intake data	g/day; as consumed	Total fruits and total vegetables
USDA, 1993	Per capita consumption based on "food disappearance"	Based on food supply and utilization data provided by the National Agricultural Statistics Service (NASS), Customs Service Reports, and trade associations	g/day; as consumed	Various food groups
U.S. EPA/ORP, 1984a; 1984b	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

Table 9-29. Summary of Recommended Values for Per Capita Intake of Fruits and Vegetables

Mean	95th Percentile	Multiple Percentiles	Study
Total Fruit Intake			
3.4 g/kg-day	12 g/kg-day	see Table 9-3	EPA Analysis of CSFII 1989-91 Data
Total Vegetable Intake			
4.3 g/kg-day	10 g/kg-day	see Table 9-4	EPA Analysis of CSFII 1989-91 Data
Individual Fruit and Vegetables Intake			
see Table 9-5	---	---	EPA Analysis of CSFII 1989-91 Data

Table 9-30. Confidence in Fruit and Vegetable Intake Recommendations

Considerations	Rationale	Rating
Study Elements		
• Level of peer review	USDA CSFII survey receives high level of peer review. EPA analysis of these data has been peer reviewed outside the Agency.	High
• Accessibility	CSFII data are publicly available.	High
• Reproducibility	Enough information is included to reproduce results.	High
• Focus on factor of interest	Analysis is specifically designed to address food intake.	High
• Data pertinent to U.S.	Data focuses on the U.S. population.	High
• Primary data	This is new analysis of primary data.	High
• Currency	Were the most current data publicly available at the time the analysis was conducted for the Handbook.	High
• Adequacy of data collection period	Survey is designed to collect short-term data.	Medium confidence for average values; Low confidence for long term percentile distribution
• Validity of approach	Survey methodology was adequate.	High
• Study size	Study size was very large and therefore adequate.	High
• Representativeness of the population	The population studied was the U.S. population.	High
• Characterization of variability	Survey was not designed to capture long term day-to-day variability. Short term distributions are provided.	Medium
• Lack of bias in study design (high rating is desirable)	Response rate was adequate.	Medium
• Measurement error	No measurements were taken. The study relied on survey data.	N/A
Other Elements		
• Number of studies	1; CSFII 1989-91 was the most recent data set publicly available at the time the analysis was conducted for the Handbook. Therefore, it was the only study classified as key study.	Low
• Agreement between researchers	Although the CSFII was the only study classified as key study, the results are in good agreement with earlier data.	High
Overall Rating	The survey is representative of U.S. population. Although there was only one study considered key, these data are the most recent and are in agreement with earlier data. The approach used to analyzed the data was adequate. However, due to the limitations of the survey design estimation of long-term percentile values (especially the upper percentiles) is uncertain.	High confidence in the average; Low confidence in the long-term upper percentiles

APPENDIX 9A

CALCULATIONS USED IN THE 1989-91 CSFII ANALYSIS TO CORRECT FOR MIXTURES

APPENDIX 9A
Calculations Used in the 1989-91 CSFII Analysis to Correct for Mixtures

Distributions of intake for various food groups were generated for the food/items groups using the USDA 1989-91 CSFII data set as described in Sections 9.2.2. and 11.1.2. However, several of the food categories used did not include meats, dairy products, and vegetables that were eaten as mixtures with other foods. Thus, adjusted intake rates were calculated for food items that were identified by USDA (1995) as comprising a significant portion of grain and meat mixtures. To account for the amount of these foods consumed as mixtures, the mean fractions of total meat or grain mixtures represented by these food items were calculated (Table 9A-1) using Appendix C of USDA (1995). Mean values for all individuals were used to calculate these fractions. These fractions were multiplied by each individual's intake rate for total meat mixtures or grain mixtures to calculate the amount of the individual's food mixture intake that can be categorized into one of the selected food groups. These amounts were then added to the total intakes rates for meats, grains, total vegetables, tomatoes, and white potatoes to calculate an individual's total intake of these food groups, as shown in the example for meats below.

$$IR_{meat-adjusted} = (IR_{gr\ mixtures} * Fr_{meat/gr}) + (IR_{mt\ mixtures} * Fr_{meat/mt}) + (IR_{meat})$$

where:

$IR_{meat\text{-}adjusted}$	=	adjusted individual intake rate for total meat;
$IR_{gr\ mixtures}$	=	individual intake rate for grain mixtures;
$IR_{mt\ mixtures}$	=	individual intake rate for meat mixtures;
IR_{meat}	=	individual intake rate for meats;
$Fr_{meat/gr}$	=	fraction of grain mixture that is meat; and
$Fr_{meat/mt}$	=	fraction of meat mixture that is meat.

Population distributions for mixture-adjusted intakes were based on adjusted intake rates for the population of interest.

Table 9A-1. Fraction of Grain and Meat Mixture Intake Represented by Various Food Items/Groups

Grain Mixtures	
total vegetables	0.2360
tomatoes	0.1685
white potatoes	0.0000
total meats	0.0787
beef	0.0449
pork	0.0112
poultry	0.0112
dairy	0.1348
total grains	0.3146
Meat Mixtures	
total vegetables	0.2778
tomatoes	0.1111
white potatoes	0.0333
total meats	0.3556
beef	0.2000
pork	0.0222
poultry	0.0778
dairy	0.0556
total grains	0.1333

APPENDIX 9B

FOOD CODES AND DEFINITIONS USED IN ANALYSIS OF THE 1989-91 USDA CSFII DATA

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data

Food Product	Food Codes	
	MAJOR FOOD GROUPS	
Total Fruits	6- Fruits citrus fruits and juices dried fruits other fruits fruits/juices & nectar fruit/juices baby food	(includes baby foods)
Total Vegetables	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	411- Beans/legumes 412- Beans/legumes 413- Beans/legumes (includes baby foods; mixtures, mostly vegetables; does not include nuts and seeds)
Total Meats	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	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)
	INDIVIDUAL FOODS	
White Potatoes	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	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 7551105 Peppers, hot pickled (does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Onions	7510950 Chives, raw 7511150 Garlic, raw 7511250 Leek, raw 7511701 Onions, young green, raw 7511702 Onions, mature 7521550 Chives, dried 7521740 Garlic, cooked 7521840 Leek, 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)

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data (continued)

Food Product	Food Codes			
Corn	7510960	Corn, raw	7521621	Corn, cooked, white/fat not added
	7521600	Corn, cooked, NS as to color/fat added	7521622	Corn, cooked, white/fat added
	7521601	Corn, cooked, NS as to color/fat not added	7521625	Corn, white, cream style
	7521602	Corn, cooked, NS as to color/fat added	7521630	Corn, yellow, canned, low sodium, NS fat
	7521605	Corn, cooked, NS as to color/cream style	7521631	Corn, yell., canned, low sod., fat not add
	7521607	Corn, cooked, dried	7521632	Corn, yell., canned, low sod., fat added
	7521610	Corn, cooked, yellow/NS as to fat added	7521749	Hominy, cooked
	7521611	Corn, cooked, yellow/fat not added	752175-	Hominy, cooked
	7521612	Corn, cooked, yellow/fat added	7541101	Corn scalloped or pudding
	7521615	Corn, yellow, cream style	7541102	Corn fritter
	7521616	Corn, cooked, yell. & wh./NS as to fat	7541103	Corn with cream sauce
	7521617	Corn, cooked, yell. & wh./fat not added	7550101	Corn relish
	7521618	Corn, cooked, yell. & wh./fat added	76405-	Corn, baby
	7521619	Corn, yellow, cream style, fat added	(does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; includes baby food)	
	7521620	Corn, cooked, white/NS as to fat added		
Apples	6210110	Apples, dried, uncooked	6310141	Apple rings, fried
	6210115	Apples, dried, uncooked, low sodium	6310142	Apple, pickled
	6210120	Apples, dried, cooked, NS as to sweetener	6310150	Apple, fried
	6210122	Apples, dried, cooked, unsweetened	6340101	Apple, salad
	6210123	Apples, dried, cooked, with sugar	6340106	Apple, candied
	6210130	Apple chips	6410101	Apple cider
	6310100	Apples, raw	6410401	Apple juice
	6310111	Applesauce, NS as to sweetener	6410405	Apple juice with vitamin C
	6310112	Applesauce, unsweetened	6410409	Apple juice with calcium
	6310113	Applesauce with sugar	6710200	Applesauce baby fd., NS as to str. or jr.
	6310114	Applesauce with low calorie sweetener	6710201	Applesauce baby food, strained
	6310121	Apples, cooked or canned with syrup	6710202	Applesauce baby food, junior
	6310131	Apple, baked NS as to sweetener	6720200	Apple juice, baby food
	6310132	Apple, baked, unsweetened	(includes baby food; except mixtures)	
	6310133	Apple, baked with sugar		
Tomatoes	74-	Tomatoes and Tomato Mixtures raw, cooked, juices, sauces, mixtures, soups, sandwiches		
Snap Beans	7510180	Beans, string, green, raw	7520602	Beans, string, cooked, yellow/fat
	7520498	Beans, string, cooked, NS color/fat added	7540301	Beans, string, green, creamed
	7520499	Beans, string, cooked, NS color/no fat	7540302	Beans, string, green, w/mushroom sauce
	7520500	Beans, string, cooked, NS color & fat	7540401	Beans, string, yellow, creamed
	7520501	Beans, string, cooked, green/NS fat	7550011	Beans, string, green, pickled
	7520502	Beans, string, cooked, green/no fat	7640100	Beans, green, string, baby
	7520503	Beans, string, cooked, green/fat	7640101	Beans, green, string, baby, str.
	7520511	Beans, str., canned, low sod.,green/NS fat	7640102	Beans, green, string, baby, junior
	7520512	Beans, str., canned, low sod.,green/no fat	7640103	Beans, green, string, baby, creamed
	7520513	Beans, str., canned, low sod.,green/fat	(does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures; includes baby foods)	
	7520600	Beans, string, cooked, yellow/NS fat		
	7520601	Beans, string, cooked, yellow/no fat		
Beef	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)	

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data (continued)

Food Product	Food Codes	
Pork	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	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	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	3- Eggs eggs egg mixtures egg substitutes eggs baby food froz. meals with egg as main ingred.	(includes baby foods)
Broccoli	722- Broccoli (all forms)	(does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
Carrots	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)
Pumpkin	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	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	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	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)

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data (continued)		
Food Product	Food Codes	
Lettuce	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	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	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)
Cucumbers	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	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	6322- Strawberries 6413250 Strawberry Juice	(includes baby food; except mixtures)
Other Berries	6320- Other Berries 6321- Other Berries 6341101 Cranberry salad	6410460 Blackberry Juice 64105- Cranberry Juice (includes baby food; except mixtures)
Peaches	62116- Dried Peaches 63135- Peaches 6412203 Peach Juice 6420501 Peach Nectar	67108- Peaches ,baby 6711450 Peaches, dry, baby (includes baby food; except mixtures)
Pears	62119- Dried Pears 63137- Pears 6341201 Pear salad 6421501 Pear Nectar	67109- Pears, baby 6711455 Pears, dry, baby 6721200 Pear juice, baby (includes baby food; except mixtures)

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data (continued)

Food Product	Food Codes			
EXPOSED/PROTECTED FRUITS/VEGETABLES, ROOT VEGETABLES				
Exposed Fruits	621011-	Apple, dried	63143-	Plum
	621012-	Apple, dried	63146-	Quince
	6210130	Apple chips	63147-	Rhubarb/Sapodillo
	62104-	Apricot, dried	632-	Berries
	62108-	Currants, dried	64101-	Apple Cider
	62110-	Date, dried	64104-	Apple Juice
	62116-	Peaches, dried	6410409	Apple juice with calcium
	62119-	Pears, dried	64105-	Cranberry Juice
	62121-	Plum, dried	64116-	Grape Juice
	62122-	Prune, dried	64122-	Peach Juice
	62125-	Raisins	64132-	Prune/Strawberry Juice
	63101-	Apples/applesauce	6420101	Apricot Nectar
	63102-	Wi-apple	64205-	Peach Nectar
	63103-	Apricots	64215-	Pear Nectar
	63111-	Cherries, maraschino	67102-	Applesauce, baby
	63112-	Acerola	67108-	Peaches, baby
	63113-	Cherries, sour	67109-	Pears, baby
	63115-	Cherries, sweet	6711450	Peaches, baby, dry
	63117-	Currants, raw	6711455	Pears, baby, dry
	63123-	Grapes	67202-	Apple Juice, baby
	6312601	Juneberry	6720380	White Grape Juice, baby
	63131-	Nectarine	67212-	Pear Juice, baby
	63135-	Peach	(includes baby foods/juices except mixtures; excludes fruit mixtures)	
	63137-	Pear		
	63139-	Persimmons		
Protected Fruits	61-	Citrus Fr., Juices (incl. cit. juice mixtures)	63145-	Pomegranate
	62107-	Bananas, dried	63148-	Sweetsop, Soursop, Tamarind
	62113-	Figs, dried	63149-	Watermelon
	62114-	Lychees/Papayas, dried	64120-	Papaya Juice
	62120-	Pineapple, dried	64121-	Passion Fruit Juice
	62126-	Tamarind, dried	64124-	Pineapple Juice
	63105-	Avocado, raw	64125-	Pineapple juice
	63107-	Bananas	64133-	Watermelon Juice
	63109-	Cantaloupe, Carambola	6420150	Banana Nectar
	63110-	Cassaba Melon	64202-	Cantaloupe Nectar
	63119-	Figs	64203-	Guava Nectar
	63121-	Genip	64204-	Mango Nectar
	63125-	Guava/Jackfruit, raw	64210-	Papaya Nectar
	6312650	Kiwi	64213-	Passion Fruit Nectar
	6312651	Lychee, raw	64221-	Soursop Nectar
	6312660	Lychee, cooked	6710503	Bananas, baby
	63127-	Honeydew	6711500	Bananas, baby, dry
	63129-	Mango	6720500	Orange Juice, baby
	63133-	Papaya	6721300	Pineapple Juice, baby
	63134-	Passion Fruit	(includes baby foods/juices except mixtures; excludes fruit mixtures)	
	63141-	Pineapple		

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data (continued)

Food Product	Food Codes			
Exposed Veg.	721-	Dark Green Leafy Veg.	752167-	Cucumber, cooked
	722-	Dark Green Nonleafy Veg.	752170-	Eggplant, cooked
	74-	Tomatoes and Tomato Mixtures	752171-	Fern shoots
	7510050	Alfalfa Sprouts	752172-	Fern shoots
	7510075	Artichoke, Jerusalem, raw	752173-	Flowers of sesbania, squash or lily
	7510080	Asparagus, raw	7521801	Kohlrabi, cooked
	75101-	Beans, sprouts and green, raw	75219-	Mushrooms, cooked
	7510260	Broccoflower, raw	75220-	Okra/lettuce, cooked
	7510275	Brussel Sprouts, raw	7522116	Palm Hearts, cooked
	7510280	Buckwheat Sprouts, raw	7522121	Parsley, cooked
	7510300	Cabbage, raw	75226-	Peppers, pimento, cooked
	7510400	Cabbage, Chinese, raw	75230-	Sauerkraut, cooked/canned
	7510500	Cabbage, Red, raw	75231-	Snowpeas, cooked
	7510700	Cauliflower, raw	75232-	Seaweed
	7510900	Celery, raw	75233-	Summer Squash
	7510950	Chives, raw	7540050	Artichokes, stuffed
	7511100	Cucumber, raw	7540101	Asparagus, creamed or with cheese
	7511120	Eggplant, raw	75403-	Beans, green with sauce
	7511200	Kohlrabi, raw	75404-	Beans, yellow with sauce
	75113-	Lettuce, raw	7540601	Brussel Sprouts, creamed
	7511500	Mushrooms, raw	7540701	Cabbage, creamed
	7511900	Parsley	75409-	Cauliflower, creamed
	7512100	Pepper, hot chili	75410-	Celery/Chiles, creamed
	75122-	Peppers, raw	75412-	Eggplant, fried, with sauce, etc.
	7512750	Seaweed, raw	75413-	Kohlrabi, creamed
	7512775	Snowpeas, raw	75414-	Mushrooms, Okra, fried, stuffed, creamed
	75128-	Summer Squash, raw	754180-	Squash, baked, fried, creamed, etc.
	7513210	Celery Juice	7541822	Christophine, creamed
	7514100	Cabbage or cole slaw	7550011	Beans, pickled
	7514130	Chinese Cabbage Salad	7550051	Celery, pickled
	7514150	Celery with cheese	7550201	Cauliflower, pickled
	75142-	Cucumber salads	755025-	Cabbage, pickled
	75143-	Lettuce salads	7550301	Cucumber pickles, dill
	7514410	Lettuce, wilted with bacon dressing	7550302	Cucumber pickles, relish
	7514600	Greek salad	7550303	Cucumber pickles, sour
	7514700	Spinach salad	7550304	Cucumber pickles, sweet
	7520060	Algae, dried	7550305	Cucumber pickles, fresh
	75201-	Artichoke, cooked	7550307	Cucumber, Kim Chee
	75202-	Asparagus, cooked	7550308	Eggplant, pickled
	75203-	Bamboo shoots, cooked	7550311	Cucumber pickles, dill, reduced salt
	752049-	Beans, string, cooked	7550314	Cucumber pickles, sweet, reduced salt
	75205-	Beans, green, cooked/canned	7550500	Mushrooms, pickled
	75206-	Beans, yellow, cooked/canned	7550700	Okra, pickled
	75207-	Bean Sprouts, cooked	75510-	Olives
	752085-	Breadfruit	7551101	Peppers, hot
	752087-	Broccoflower, cooked	7551102	Peppers,pickled
	752090-	Brussel Sprouts, cooked	7551104	Peppers, hot pickled
	75210-	Cabbage, Chinese, cooked	7551301	Seaweed, pickled
	75211-	Cabbage, green, cooked	7553500	Zucchini, pickled
	75212-	Cabbage, red, cooked	76102-	Dark Green Veg., baby
	752130-	Cabbage, savoy, cooked	76401-	Beans, baby (excl. most soups & mixtures)
	75214-	Cauliflower	411-	Beans/legumes
	75215-	Celery, Chives, Christophine (chayote)	412-	Beans/legumes
			413-	Beans/legumes

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data (continued)

Food Product	Food Codes			
Protected Veg.	732-	Pumpkin	752175-	Hominy
	733-	Winter Squash	75223-	Peas, cowpeas, field or blackeye, cooked
	7510200	Lima Beans, raw	75224-	Peas, green, cooked
	7510550	Cactus, raw	75225-	Peas, pigeon, cooked
	7510960	Corn, raw	75301-	Succotash
	7512000	Peas, raw	75402-	Lima Beans with sauce
	7520070	Aloe vera juice	75411-	Corn, scalloped, fritter, with cream
	752040-	Lima Beans, cooked	7541650	Pea salad
	752041-	Lima Beans, canned	7541660	Pea salad with cheese
	7520829	Bitter Melon	75417-	Peas, with sauce or creamed
	752083-	Bitter Melon, cooked	7550101	Corn relish
	7520950	Burdock	76205-	Squash, yellow, baby
	752131-	Cactus	76405-	Corn, baby
	752160-	Corn, cooked	76409-	Peas, baby
	752161-	Corn, yellow, cooked	76411-	Peas, creamed, baby
	752162-	Corn, white, cooked		(does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
	752163-	Corn, canned		
	7521749	Hominy		
Root Vegetables	71-	White Potatoes and Puerto Rican St. Veg.	7522110	Onions, dehydrated
	7310-	Carrots	752220-	Parsnips, cooked
	7311140	Carrots in sauce	75227-	Radishes, cooked
	7311200	Carrot chips	75228-	Rutabaga, cooked
	734-	Sweetpotatoes	75229-	Salsify, cooked
	7510250	Beets, raw	75234-	Turnip, cooked
	7511150	Garlic, raw	75235-	Water Chestnut
	7511180	Jicama (yambean), raw	7540501	Beets, harvard
	7511250	Leeks, raw	75415-	Onions, creamed, fried
	75117-	Onions, raw	7541601	Parsnips, creamed
	7512500	Radish, raw	7541810	Turnips, creamed
	7512700	Rutabaga, raw	7550021	Beets, pickled
	7512900	Turnip, raw	7550309	Horseradish
	752080-	Beets, cooked	7551201	Radishes, pickled
	752081-	Beets, canned	7553403	Turnip, pickled
	7521362	Cassava	76201-	Carrots, baby
	7521740	Garlic, cooked	76209-	Sweetpotatoes, baby
	7521771	Horseradish	76403-	Beets, baby
	7521840	Leek, cooked		(does not include vegetable soups; vegetable mixtures; or vegetable with meat mixtures)
	7521850	Lotus root		
	752210-	Onions, cooked		
USDA SUBCATEGORIES				
Dark Green Vegetables	72-	Dark Green Vegetables all forms leafy, nonleafy, dk. gr. veg. soups		
Deep Yellow Vegetables	73-	Deep Yellow Vegetables all forms carrots, pumpkin, squash, sweetpotatoes, dp. yell. veg. soups		
Other Vegetables	75-	Other Vegetables all forms		
Citrus Fruits	61-	Citrus Fruits and Juices	6720700	Orange-Pineapple Juice, baby food
	6720500	Orange Juice, baby food	6721100	Orange-Apple-Banana Juice, baby food
	6720600	Orange-Apricot Juice, baby food		(excludes dried fruits)

Appendix 9B. Food Codes and Definitions Used in Analysis of the 1989-91 USDA CSFII Data (continued)				
Food Product	**Food Codes**			
Other Fruits	62-	Dried Fruits	67204-	Baby Juices
	63-	Other Fruits	67212-	Baby Juices
	64-	Fruit Juices and Nectars Excluding Citrus	67213-	Baby Juices
	671-	Fruits, baby	6725-	Baby Juice
	67202-	Apple Juice, baby	673-	Baby Fruits
	67203-	Baby Juices	674-	Baby Fruits
MIXTURES				
Meat Mixtures	27- 28-	Meat Mixtures		(includes frozen plate meals and soups)
Grain Mixtures	58-	Grain Mixtures		(includes frozen plate meals and soups)

10. INTAKE OF FISH AND SHELLFISH
10.1. BACKGROUND

Contaminated finfish and shellfish are potential sources of human exposure to toxic chemicals. Pollutants are carried in the surface waters, but also may be stored and accumulated in the sediments as a result of complex physical and chemical processes. Consequently, finfish 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 intake rates of fish. Note that in this section the term fish refers to both finfish and shellfish. The following subsections address intake rates for the general population, and 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 based on the guidelines given in Volume I, Section 1.3. 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 have 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. In fact, results from creel studies have often been misinterpreted, due to inadequate knowledge of survey principles. Below, some basic facts about survey design are presented, followed by an analysis of the differences between creel and population based studies.

The typical survey seeks to draw inferences about a larger population from a smaller sample of that population. This larger population, from which the survey sample is to be taken and to which the results of the survey are to be generalized, is denoted the target population of the survey. In order to generalize from the sample to the target population, the probability of being sampled must be known for each member of the target population. This probability is reflected in weights assigned to each survey respondent, with weights being inversely proportional to sampling probability. When all members of the target population have the same probability of being sampled, all weights can be set to one and essentially ignored.

In a mail or phone study of licensed anglers, the target population is generally all licensed anglers in a particular area, and in the studies presented, the sampling probability is essentially equal for all target population members. In a creel study, the target population is anyone who fishes at the locations being studied; generally, in a creel study, the probability of being sampled is not the same for all members of the target population. For instance, if the survey is conducted for one day at a site, then it will include all persons who fish there daily but only about 1/7 of the people who fish there weekly, 1/30th of the people who fish there monthly, etc. In this example, the probability of being sampled (or inverse weight) is seen to be proportional to the frequency of fishing. However, if the survey involves interviewers revisiting the same site on multiple days, and persons are only interviewed once for the survey, then the probability of being in the survey is not proportional to frequency; in fact, it increases less than proportionally with frequency. At the extreme of surveying the same site every day over the survey period with no re-interviewing, all members of the target population would have the same probability of being sampled regardless of fishing frequency, implying that the survey weights should all equal one.

On the other hand, if the survey protocol calls for individuals to be interviewed each time an interviewer encounters them (i.e., without regard to whether they were previously interviewed), then the inverse weights will again be proportional to fishing frequency, no matter how many times interviewers revisit the same site. Note that when individuals can be interviewed multiple times, the results of each interview are included as separate records in the data base and the survey weights should be inversely proportional to the expected number of times that an individual's interviews are included in the data base.

In the published analyses of most creel studies, there is no mention of sampling weights; by default all weights are set to 1, implying equal probability of sampling. However, since the sampling probabilities in a creel study, even with repeated interviewing at a site, are highly dependent on fishing frequency, the fish intake distributions reported for these surveys are not reflective of the corresponding target populations. Instead, those individuals with high fishing frequencies are given too big a weight and the distribution is skewed to the right, i.e., it overestimates the target population distribution.

Price et al. (1994) explained this problem and set out to rectify it by adding weights to creel survey data; he used data from two creel studies (Puffer et al., 1981 and Pierce et al., 1981) as examples. Price et al. (1994) used inverse fishing frequency as survey weights and produced revised estimates of median and 95th percentile intake for the above two studies. These revised estimates were dramatically lower than the original estimates. The approach of Price et al. (1994) is discussed in more detail in Section 10.5 where the Puffer et al. (1981) and Pierce et al. (1981) studies are summarized.

When the correct weights are applied to survey data, the resulting percentiles reflect, on average, the distribution in the target population; thus, for example, an estimated 90 percent of the target population will have intake levels below the 90th percentile of the survey fish intake distribution. There is another way, however, of characterizing distributions in addition to the standard percentile approach; this approach is reflected in statements of the form "50 percent of the income is received by, for example, the top 10 percent of the population, which consists of individuals making more than $100,000", for example. Note that the 50th percentile (median) of the income distribution is well below $100,000. Here the $100,000 level can be thought of as, not the 50th percentile of the population income distribution, but as the 50th percentile of the "resource utilization distribution" (see Appendix 10A for technical discussion of this distribution). Other percentiles of the resource utilization distribution have similar interpretations; e.g., the 90th percentile of the resource utilization distribution (for income) would be that level of income such that 90 percent of total income is received by individuals with incomes below this level and 10 percent by individuals with income above this level. This alternative approach to characterizing distributions is of particular interest when a relatively small fraction of individuals consumes a relatively large fraction of a resource, which is the case with regards to recreational fish consumption. In the studies of recreational anglers, this alternative approach, based on resource utilization, will be presented, where possible, in addition to the primary approach of presenting the standard percentiles of the fish intake distribution.

It has been determined that the resource utilization approach to characterizing distributions has relevance to the interpretation of creel survey data. As mentioned above, most published analyses of creel surveys do not employ weights reflective of sampling probability, but instead give each respondent equal weight. For mathematical reasons that are explained in Appendix 10A, when creel analyses are performed in this (equal weighting) manner, the calculated percentiles of the fish intake distribution do not reflect the percentiles of the target population fish intake distribution but instead reflect (approximately) the percentiles of the "resource utilization distribution". Thus, one would not expect 50 percent of the target population to be consuming above the median intake level as reported from such a creel survey, but instead would expect that 50 percent of the total recreational fish consumption would be individuals consuming above this level. As with the example above, and in accordance with the statement above that creel surveys analyzed in this manner overestimate intake distributions, the actual median level of intake in the target population will be less (probably considerably so) than this level and, accordingly, (considerably) less than 50 percent of the target population will be consuming at or above this level. These considerations are discussed when the results of individual creel surveys are presented in later sections and should be kept in mind whenever estimates based on creel survey data are utilized.

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.

10.2. KEY GENERAL POPULATION STUDIES

Tuna Research Institute Survey - The Tuna Research Institute (TRI) funded a study of fish consumption which was performed by the National Purchase Diary (NPD) during the period of September, 1973 to August, 1974. The data tapes from this survey were obtained by the National Marine Fisheries Service (NMFS), which later, along with the FDA, USDA and TRI, conducted an intensive effort to identify and correct errors in the data base. Javitz (1980) summarized the TRI survey methodology and used the corrected tape to generate fish intake distributions for various sub-populations.

The TRI survey 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 was weighted to represent the U.S. population based on a number of census-defined controls (i.e., census region, household size, income, presence of children, race and age). The calculations of means, percentiles, etc. were performed on a weighted basis with each person contributing in proportion to his/her assigned survey weight.

The survey population was divided into 12 different sample segments and, for each of the 12 survey months, data were collected from a different segment. Each survey household was given a diary in which they recorded, over a one month period, the date of any fish meals consumed and the following accompanying information: the species of fish consumed, whether the fish was commercially or recreationally caught, the way the fish was packaged (canned, frozen fresh, dried, smoked), the amount of fish prepared and consumed, and the number of servings consumed by household members and guests. Both meals eaten at home and away from home were recorded. The amount of fish prepared was determined as follows (Javitz, 1980): "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) reported that the corrected survey tapes contained data on 24,652 individuals who consumed fish in the survey month and that tabulations performed by NPD indicated that these fish consumers represented 94 percent of the U.S. population. For this population of "fish consumers", Javitz (1980) calculated means and percentiles of fish consumption by demographic variables (age, sex, race, census region and community type) and overall (Tables 10-1 through 10-4). The overall mean fish intake rate among fish consumers was calculated at 14.3 g/day and the 95th percentile at 41.7 g/day.

As seen in Table 10-1, the mean and 95th percentile of fish consumption were higher for Asian-Americans as compared to the other racial groups. Other differences in intake rates are those between gender and age groups. While males (15.6 g/d) eat slightly more fish than females (13.2 g/d), and adults eat more fish than children, the corresponding differences in body weight 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.

The mean and 95th percentile intake rates by age-gender groups are presented in Table 10-2. Tables 10-3 and 10-4 present the distribution of fish consumption for females and males, respectively, by age; these tables give the percentages of females/males in a given age bracket with intake rates within various ranges. Table 10-5 presents mean total fish consumption by fish species.

The TRI survey data were also utilized by Rupp et al. (1980) to generate fish intake distributions for three age groups (<11, 12-18, and 19+ years) within each of the 9 census regions and for the entire United States. Separate distributions were derived for freshwater finfish, saltwater finfish and shellfish; thus, a total of 90 (3*3*10) different distributions were derived, each corresponding to intake of a specific category of fish for a given age group within a given region. The analysis of Rupp et al. (1980) included only those respondents with known age. This amounted to 23,213 respondents.

Ruffle et al. (1994) used the percentiles data of Rupp et al. (1980) to estimate the best fitting lognormal parameters for each distribution. Three methods (non-linear optimization, first probability plot and second probability plot) were used to estimate optimal parameters. Ruffle et al. (1994) determined that, of the three methods, the non-linear optimization method (NLO) generally gave the best results. For some of the distributions fitted by the NLO method, however, it was determined that the lognormal model did not adequately fit the empirical fish intake distribution. Ruffle et al.

(1994) used a criterion of minimum sum of squares (min SS) less than 30 to identify which distributions provided adequate fits. Of the 90 distributions studied, 77 were seen to have min SS < 30; for these, Ruffle et al. (1994) concluded that the NLO modeled lognormal distributions are "well suited for risk assessment". Of the remaining 13 distributions, 12 had min SS > 30; for these Ruffle et al. (1994) concluded that modeled lognormal distributions "may also be appropriate for use when exercised with due care and with sensitivity analyses". One distribution, that of freshwater finfish intake for children < 11 years of age in New England, could not be modeled due to the absence of any reported consumption.

Table 10-6 presents the optimal lognormal parameters, the mean (μ), standard deviation (s), and min SS, for all 89 modeled distributions. These parameters can be used to determine percentiles of the corresponding distribution of average daily fish consumption rates through the relation DFC(p)=exp[μ+ z(p)s] where DFC(p) is the pth percentile of the distribution of average daily fish consumption rates and z(p) is the z-score associated with the pth percentile (e.g., z(50)=0). The mean average daily fish consumption rate is given by exp[$\mu + 0.5s^2$].

The analyses of Javitz (1980) and Ruffle et al. (1994) were based on consumers only, who are estimated to represent 94.0 percent of the U.S. population. U.S. EPA estimated the mean intake in the general population by multiplying the fraction consuming, 0.94, by the mean among consumers reported by Javitz (1980) of 14.3 g/day; the resulting estimate is 13.4 g/day. The 95th percentile estimate of Javitz (1980) of 41.7 g/day among consumers would be essentially unchanged when applied to the general population; 41.7 g/day would represent the 95.3 percentile (i.e., 100*[0.95*0.94+0.06]) among the general population.

Advantages of the TRI data survey are that it was a large, nationally representative survey with a high response rate (80 percent) and was conducted over an entire year. In addition, consumption was recorded in a daily diary over a one month period; this format should be more reliable than one based on one-month recall. The upper percentiles presented are derived from one month of data, and are likely to overestimate the corresponding upper percentiles of the long-term (i.e., one year or more) average daily fish intake distribution. Similarly, the standard deviation of the fitted lognormal distribution probably overestimates the standard deviation of the long-term distribution. However, the period of this survey (one month) is considerably longer than those of many other consumption studies, including the USDA National Food Consumption Surveys, which report consumption over a 3 day to one week period.

Another obvious limitation of this data base is that it is now over twenty years out of date. Ruffle et al. (1994) considered this shortcoming and suggested that one may wish to shift the distribution upward to account for the recent increase in fish consumption. Adding ln(1+x/100) to the log mean μ will shift the distribution upward by x percent (e.g., adding 0.22 = ln(1.25) increases the distribution by 25 percent). Although the TRI survey distinguished between recreationally and commercially caught fish, Javitz (1980), Rupp et al. (1980), and Ruffle et al. (1994) (which was based on Rupp et al., 1980) did not present analyses by this variable.

U.S. EPA (1996a) - Daily Average Per Capita Fish Consumption Estimates Based on the Combined USDA 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals (CSFII) — The USDA conducts the CSFII on an ongoing basis. U.S. EPA used the 1989, 1990, and 1991 CSFII data to generate fish intake estimates. Participants in the CSFII provided 3 consecutive days of dietary data. For the first day's data, participants supplied dietary recall information to an in-home interviewer. Second and third day dietary intakes were recorded by participants. Data collection for the CSFII started in April of the given year and was completed in March of the following year.

The CSFII contains 469 fish-related food codes; survey respondents reported consumption across 284 of these codes. Respondents estimated the weight of each food that they consumed. The fish component (by weight) of these foods was calculated using data from the recipe file for release 7 of the USDA's Nutrient Data Base for Individual Food Intake Surveys. The amount of fish consumed by each individual was then calculated by summing, over all fish containing foods, the product of the weight of food consumed and the fish component (i.e., the percentage fish by weight) of the food.

The recipe file also contains cooking loss factors associated with each food. These were utilized to convert, for each fish containing food, the as-eaten fish weight consumed into an uncooked equivalent weight of fish. Analyses of fish intake were performed on both an as-eaten and uncooked basis.

Each (fish-related) food code was assigned by EPA a habitat type of either freshwater/estuarine or marine. Food codes were also designated as finfish or shellfish. Average daily individual consumption (g/day) for a given fish type-by-habitat category (e.g., marine finfish) was calculated by summing the amount of fish consumed by the individual across the three reporting days for all fish-related food codes in the given fish-by-habitat category and then dividing by 3. Individual consumption per day consuming fish (g/day) was calculated similarly except that total fish consumption was divided by the specific number of survey days the individual reported consuming fish; this was calculated for fish consumers only (i.e., those consuming fish on at least one of the three survey days). The reported body-weight of the individual was used to convert consumption in g/day to consumption in g/kg-day.

There were a total of 11,912 respondents in the combined data set who had three-day dietary intake data. Survey weights were assigned to this data set to make it representative of the U.S. population with respect to various demographic characteristics related to food intake.

U.S. EPA (1996a) reported means, medians, upper percentiles, and 90-percent interval estimates for the 90th, 95th, and 99th percentiles. The 90-percent interval estimates are nonparametric estimates from bootstrap techniques. The bootstrap estimates result from the percentile method which estimates the lower and upper bounds for the interval estimate by the 100α percentile and 100 (1-α) percentile estimates from the non-parametric distribution of the given point estimate (U.S. EPA, 1996a).

Analyses of fish intake were performed on an as-eaten as well as on an uncooked equivalent basis and on a g/day and g/kg-day basis. Table 10-7 gives the mean and various percentiles of the distribution of per-capita fish intake rates (g/day) based on uncooked equivalent weight by habitat and fish type, for the general population. The mean per capita intake rate of finfish and shellfish from all habitats was 20.1 g/day. Per-capita consumption estimates by species are shown in Appendix 10C. Table 10-8 displays the mean and various percentiles of the distribution of total fish intake per day consuming fish, by habitat for consumers only. Also displayed is the percentage of the population consuming fish of the specified habitat during the three day survey period. Tables 10-9 and 10-10 present similar results as above but on a mg/kg-day basis; Tables 10-11 and 10-12 present results in the same format for fish intake (g/day) on an as-eaten (cooked) basis.

Tables 10-13 through 10-44 present data for daily average per capita fish consumption by age and gender. These data are presented by selected age grouping (4 and under, 15-44, 45 and older, all ages) and gender. Tables 10-13 through 10-20 present fish intake data (g/day and mg/kg-day) on an as consumed basis for the general population and Tables 10-21 through 10-28 for consumers only. Tables 10-29 through 10-44 provide intake data (g/day and mg/kg-day) on an uncooked equivalent basis for the same population groups described above.

The advantages of this study are its large size, its relative currency and its representativeness. In addition, through use of the USDA recipe files, the analysis identified all fish-related food codes and estimated the percent fish content of each of these codes. By contrast, some analyses of the USDA National Food Consumption Surveys (NFCSs) which reported per capita fish intake rates (e.g., Pao et al., 1982; USDA, 1992a), excluded certain fish containing foods (e.g., fish mixtures, frozen plate meals) in their calculations.

Results from the 1977-1978 NFCS survey (Pao et al., 1982) showed that only a small percentage of consumers ate fish on more than one occasion per day. This implies that the distribution presented for fish intake per day consuming fish can be used as a surrogate for the distribution of fish intake per (fish) eating occasion (Table 10-8).

Also, it should be noted that the 1989-91 CSFII data are not the most recent intake survey data. USDA has recently made available data from its 1994 and 1995 CSFII. Over 5,500 people nationwide participated in both of these surveys, providing recalled food intake information for two separate days. Although the 2-day data analysis has not been conducted, USDA published results for the respondents' intakes on the first day surveyed (USDA, 1996a; USDA, 1996b). USDA 1996 survey data will be made available later in 1997. As soon as 1996 data are available, EPA will take steps to get the 3-year data (1994, 1995, 1996) analyzed and the food ingestion factors updated. Meanwhile, comparisons between the mean daily fish intake per individual in a day from the USDA survey data from years 1977-78, 1987-88, 1989-91, 1994, and 1995 indicate that fish intake has been relatively constant over time. The 1-day fish intake rates were 11 g/day, 11 g/day, 13 g/day, 9 g/day, and 11 g/day for survey years 1977-78, 1987-88, 1989-91, 1994, and 1995, respectively. This indicates that the 1989-91 CSFII data presented in this handbook are probably adequate for assessing fish ingestion exposure for current populations.

10.3. RELEVANT GENERAL POPULATION STUDIES

Pao et al. (1982) - Foods Commonly Eaten by Individuals: Amount Per Day and Per Eating Occasion - The USDA 1977-78 Nationwide Food Consumption Survey (NFCS) was described in Chapter 9. The survey consisted of a household and individual component. For the individual component, all members of surveyed households were asked to provide 3 consecutive days of dietary data. For the first day's data, participants supplied dietary recall information to an in-home interviewer. Second and third day dietary intakes were recorded by participants. A total of 15,000 households were included in the 1977-78 NFCS and about 38,000 individuals completed the 3-day diet records. Fish intake was estimated based on consumption of fish products identified in the NFCS data base according to NFCS-defined food codes. These products included fresh, breaded, floured, canned, raw and dried fish, but not fish mixtures or frozen plate meals.

Pao et al. (1982) used the 1977-78 NFCS to examine the quantity of fish consumed per eating occasion. For each individual consuming fish in the 3 day survey period, the quantity of fish consumed per eating occasion was derived by dividing the total reported fish intake over the 3 day period by the number of occasions the individual reported eating fish. The distributions, by age and sex, for the quantity of fish consumed per eating occasion are displayed in Table 10-13 (Pao et al., 1982). For the general population, the average quantity of fish consumed per fish meal was 117 g, with a 95th percentile of 284 g. Males in the age groups 19-34, 35-64 and 65-74 years had the highest average and 95th percentile quantities among the age-sex groups presented.

Pao et al. (1982) also used the data from this survey set to calculate per capita fish intake rates. However, because these data are now almost 20 years out of date, this analysis is not considered key with respect to assessing per capita intake (the average quantity of fish consumed per fish meal should be less subject to change over time than is per capita intake). In addition, fish mixtures and frozen plate meals were not included in the calculation of fish intake. The per capita fish intake rate reported by Pao et al. (1982) was 11.8 g/day. The 1977-1978 NFCS was a large and well designed survey and the data are representative of the U.S. population.

USDA Nationwide Food Consumption Survey 1987-88 - The USDA 1987-88 Nationwide Food Consumption Survey (NFCS) was described in Chapter 9. Briefly, the survey consisted of a household and individual component. The household component asked about household food consumption over the past one week period. For the individual component, each member of a surveyed household was interviewed (in person) and asked to recall all foods eaten the previous day; the information from this interview made up the "one day data" for the survey. In addition, members were instructed to fill out a detailed dietary record for the day of the interview and the following day. The data for this entire 3-day period made up the "3-day diet records". A statistical sampling design was used to ensure that all seasons, geographic regions of the U.S., demographic, and socioeconomic groups were represented. Sampling weights were used to match the population distribution of 13 demographic characteristics related to food intake (USDA, 1992a).

Total fish intake was estimated based on consumption of fish products identified in the NFCS data base according to NFCS-defined food codes. These products included fresh, breaded, floured, canned, raw and dried fish, but not fish mixtures or frozen plate meals.

A total of 4,500 households participated in the 1987-88 survey; the household response rate was 38 percent. One day data were obtained for 10,172 (81 percent) of the 12,522 individuals in participating households; 8,468 (68 percent) individuals completed 3-day diet records.

USDA (1992b) used the one day data to derive per capita fish intake rate and intake rates for consumers of total fish. These rates, calculated by sex and age group, are shown in Table 10-14. Intake rates for consumers-only were calculated by dividing the per capita intake rates by the fractions of the population consuming fish in one day.

The 1987-1988 NFCS was also utilized to estimate consumption of home produced fish (as well as home produced fruits, vegetables, meats and dairy products) in the general U.S. population. The methodology for estimating home-produced intake rates was rather complex and involved combining the household and individual components of the NFCS; the methodology, as well as the estimated intake rates, are described in detail in Chapter 12. However, since much of the rest of this chapter is concerned with estimating consumption of recreationally caught, i.e., home produced fish, the methods and results of Chapter 12, as they pertain to fish consumption, are summarized briefly here.

A total of 2.1 percent of the survey population reported home produced fish consumption during the survey week. Among consumers, the mean intake rate was 2.07 g/kg-day and the 95th percentile was 7.83 g/kg-day; the per-capita intake rate was 0.04 g/kg-day. Note that intake rates for home-produced foods were indexed to the weight of the survey respondent and reported in g/kg-day.

It is possible to compare the estimates of home-produced fish consumption derived in this analyses with estimates derived from studies of recreational anglers (described in Sections 10.4-10.8); however, the intake rates must be put into a similar context. The home-produced intake rates described refer to average daily intake rates among individuals consuming home-produced fish in a week; results from recreational angler studies, however, usually report average daily rates for those eating home-produced fish (or for those who recreationally fish) at least some time during the year. Since many of these latter individuals eat home-produced fish at a frequency of less than once per week, the average daily intake in this group would be expected to be less than that reported.

The NFCS household component contains the question "Does anyone in your household fish?". For the population answering yes to this question (21 percent of households), the NFCS data show that 9 percent consumed home-produced fish in the week of the survey; the mean intake rate for these consumers from fishing households was 2.2 g/kg-day. (Note that 91 percent of individuals reporting home grown fish consumption for the week of the survey indicated that a household member fishes; the overall mean intake rate among home-produced fish consumers, regardless of fishing status, was the above reported 2.07 g/kg-day). The per capita intake rate among those living in a fishing household is then calculated as 0.2 g/kg-day (2.2 * 0.09). Using the estimated average weight of survey participants of 59 kg, this translates into 11.8 g/day. Among members of fishing households, home-produced fish consumption accounted for 32.5 percent of total fish consumption.

As discussed in Chapter 12 of this volume, intake rates for home-produced foods, including fish, are based on the results of the household survey, and as such, reflect the weight of fish taken into the household. In most of the recreational fish surveys discussed later in this section, the weight of the fish catch (which generally corresponds to the weight taken into the household) is multiplied by an edible fraction to convert to an uncooked equivalent of the amount consumed. This fraction may be species specific, but some studies used an average value; these average values ranged from 0.3 to 0.5. Using a factor of 0.5 would convert the above 11.8 g/day rate to 5.9 g/day. This estimate, 5.9 g/day, of the per-capita fish intake rate among members of fishing households is within the range of the per-capita intake rates among recreational anglers addressed in sections to follow.

An advantage of analyses based on the 1987-1988 USDA NFCS is that the data set is a large, geographically and seasonally balanced survey of a representative sample of the U.S. population. The survey response rate, however, was low and an expert panel concluded that it was not possible to establish the presence or absence of non-response bias (USDA, 1992b). Limitations of the home-produced analysis are given in Chapter 12 of this volume.

Tsang and Klepeis (1996) - National Human Activity Pattern Survey (NHAPS) - The U.S. EPA collected information for the general population on the duration and frequency of time spent in selected activities and time spent in selected microenvironments via 24-hour diaries. Over 9,000 individuals from 48 contiguous states participated in NHAPS. Approximately 4,700 participants also provided information on seafood consumption. The survey was conducted between October 1992 and September 1994. Data were collected on the (1) number of people that ate seafood in the last month, (2) the number of servings of seafood consumed, and (3) whether the seafood consumed was caught or purchased (Tsang and Klepeis, 1996). The participant responses were weighted according to selected demographics such as age, gender, and race to ensure that results were representative of the U.S. population. Of those 4,700 respondents, 2,980 (59.6 percent) ate seafood (including shellfish, eels, or squid) in the last month (Table 10-15). The number of servings per month were categorized in ranges of 1-2, 3-5, 6-10, 11-19, and 20+ servings per month (Table 10-16). The highest percentage (35 percent) of respondent population had an intake of 3-5 servings per month. Most (92 percent) of the respondents purchased the seafood they ate (Table 10-17).

Intake data were not provided in the survey. However, intake of fish can be estimated using the information on the number of servings of fish eaten from this study and serving size data from other studies. The recommended mean value in this handbook for fish serving size is 129 g/serving (Table 10-8). Using this mean value for serving size and assuming that the average individual eats 3-5 servings per month, the amount of seafood eaten per month would range from 387 to 645 grams/month or 12.9 to 21.5 g/day for the highest percentage of the population. These values are within the range of mean intake values for total fish (20.1 g/day) calculated in the U.S. EPA analysis of the USDA CSFII data. It should be noted that an all inclusive description for seafood was not presented in Tsang and Klepeis (1996). It is not known if processed or canned seafood and seafood mixtures are included in the seafood category.

The advantages of NHAPS is that the data were collected for a large number of individuals and are representative of the U.S. general population. However, evaluation of seafood intake was not the primary purpose of the study and the data do not reflect the actual amount of seafood that was eaten. However, using the assumption described above, the estimated seafood intake from this study are comparable to those observed in the EPA CSFII analysis.

10.4. KEY RECREATIONAL (MARINE FISH STUDIES)

National Marine Fisheries Service (1986a, b, c; 1993) - The National Marine Fisheries Service (NMFS) conducts systematic surveys, on a continuing basis, of marine recreational fishing. These surveys are designed to estimate the size of the recreational marine finfish catch by location, species and fishing mode. In addition, the surveys provide estimates for the total number of participants in marine recreational finfishing and the total number of fishing trips. The surveys are not designed to estimate individual consumption of fish from marine recreational sources, primarily because they do not attempt to estimate the number of individuals consuming the recreational catch. Intake rates for marine recreational anglers can be estimated, however, by employing assumptions derived from other data sources about the number of consumers.

The NMFS surveys involve two components, telephone surveys and direct interviewing of fishermen in the field. The telephone survey randomly samples residents of coastal regions, defined generally as counties within 25 miles of the nearest seacoast, and inquires about participation in marine recreational fishing in the resident's home state in the past year, and more specifically, in the past two months. This component of the survey is used to estimate, for each coastal state, the total number of coastal region residents who participate in marine recreational fishing (for finfish) within the state, as well as the total number of (within state) fishing trips these residents take. To estimate the total number of participants and fishing trips in the state, by coastal residents and others, a ratio approach, based on the field interview data, was used. Thus, if the field survey data found that there was a 4:1 ratio of fishing trips taken by coastal residents as compared to trips taken by non-coastal and out of state residents, then an additional 25 percent would be added to the number of trips taken by coastal residents to generate an estimate of the total number of within state trips.

The field intercept survey is essentially a creel type survey. The survey utilizes a national site register which details marine fishing locations in each state. Sites for field interviews are chosen in proportion to fishing frequency at the site. Anglers fishing on shore, private boat, and charter/party boat modes who had completed their fishing were interviewed. The field survey included questions about frequency of fishing, area of fishing, age, and place of residence. The fish catch was classified by the interviewer as either type A, type B1 or type B2 catch. The type A catch denoted fish that were taken whole from the fishing site and were available for inspection. The type B1 and B2 catch were not available for inspection; the former consisted of fish used as bait, filleted, or discarded dead while the latter was fish released alive. The type A catch was identified by species and weighed, with the weight reflecting total fish weight, including inedible parts. The type B1 catch was not weighed, but weights were estimated using the average weight derived from the type A catch for the given species, state, fishing mode and season of the year. For both the A and B1 catch, the intended disposition of the catch (e.g., plan to eat, plan to throw away, etc.) was ascertained.

EPA obtained the raw data tapes from NMFS in order to generate intake distributions and other specialized analyses. Fish intake distributions were generated using the field survey tapes. Weights proportional to the inverse of the angler's reported fishing frequency were employed to correct for the unequal probabilities of sampling; this was the same approach used by NMFS in deriving their estimates. Note that in the field survey, anglers were interviewed regardless of past interviewing experience; thus, the use of inverse fishing frequency as weights was justified (see Section 10.1).

For each angler interviewed in the field survey, the yearly amount of fish caught that was intended to be eaten by the angler and his/her family or friends was estimated by EPA as follows:

$$Y = [(\text{wt of A catch}) * I_A + (\text{wt of B1 catch}) * I_B] * [\text{Fishing frequency}] \qquad (\text{Eqn. 10-1})$$

where I_A (I_B) are indicator variables equal to 1 if the type A (B1) catch was intended to be eaten and equal to 0 otherwise. To convert Y to a daily fish intake rate by the angler, it was necessary to convert amount of fish caught to edible amount of fish, divide by the number of intended consumers, and convert from yearly to daily rate. Although theoretically possible, EPA chose not to use species specific edible fractions to convert overall weight to edible fish weight since edible fraction estimates were not readily available for many marine species. Instead, an average value of 0.5 was employed. For the number of intended consumers, EPA used an average value of 2.5 which was an average derived from the results of several studies of recreational fish consumption (Chemrisk, 1991; Puffer et al., 1981; West et al., 1989). Thus, the average daily intake rate (ADI) for each angler was calculated as

$$ADI = Y * (0.5)/[2.5 * 365] \qquad (\text{Eqn. 10-2})$$

Note that ADI will be 0 for those anglers who either did not intend to eat their catch or who did not catch any fish. The distribution of ADI among anglers was calculated by region and coastal status (i.e., coastal versus non-coastal counties). A mean ADI for the overall population of a given area was calculated as follows: first the estimated number of anglers in the area was multiplied by the average number of intended fish consumers (2.5) to get a total number of recreational marine finfish consumers. This number was then multiplied by the mean ADI among anglers to get the total recreational marine finfish consumption in the area. Finally, the mean ADI in the population was calculated by dividing total fish consumption by the total population in the area.

The results presented below are based on the results of the 1993 survey. Samples sizes were 200,000 for the telephone survey and 120,000 for the field surveys. All coastal states in the continental U.S. were included in the survey except Texas and Washington.

Table 10-18 presents the estimated number of coastal, non-coastal, and out-of-state fishing participants by state and region of fishing. Florida had the greatest number of both Atlantic and Gulf participants. The total number of coastal residents who participated in marine finfishing in their home state was 8 million; an additional 750,000 non-coastal residents participated in marine finfishing in their home state.

Table 10-19 presents the estimated total weight of the A and B1 catch by region and time of year. For each region, the greatest catches were during the six-month period from May through October. This period accounted for about 90 percent of the North and Mid-Atlantic catch, about 80 percent of the Northern California and Oregon catch, about 70 percent of the Southern Atlantic and Southern California catch and 62 percent of the Gulf catch. Note that in the North and Mid-Atlantic regions, field surveys were not done in January and February due to very low fishing activity. For all regions, over half the catch occurred within 3 miles of the shore or in inland waterways.

Table 10-20 presents the mean and 95th percentile of average daily intake of recreationally caught marine finfish among anglers by region. The mean ADI among all anglers was 5.6, 7.2, and 2.0 g/day for the Atlantic, Gulf, and Pacific regions, respectively. Also given is the per-capita ADI in the overall population (anglers and non-anglers) of the region and in the overall coastal population of the region. Table 10-21 gives the distribution of the catch by species for the Atlantic and Gulf regions and Table 10-22 for Pacific regions.

The NMFS surveys provide a large, up-to-date, and geographically representative sample of marine angler activity in the U.S. The major limitation of this data base in terms of estimating fish intake is the lack of information regarding the intended number of consumers of each angler's catch. In this analysis, it was assumed that every angler's catch was consumed by the same number (2.5) of people; this number was derived from averaging the results of other studies. This assumption introduces a relatively low level of uncertainty in the estimated mean intake rates among anglers, but a somewhat higher level of uncertainty in the estimated intake distributions. It should be noted that under the above assumption, the distributions shown here pertain not only to the population of anglers, but also to the entire population of recreational fish consumers, which is 2.5 times the number of anglers. If the number of consumers was changed, to, for instance, 2.0, then the distribution would be increased by a factor of 1.25 (2.5/2.0), but the estimated population of recreational fish consumers to which the distribution would apply would decrease by a factor of 0.8 (2.0/2.5). Note that the mean intake rate of marine finfish in the overall population is independent of the assumption of number of intended fish consumers.

Another uncertainty involves the use of 0.5 as an (average) edible fraction. This figure is somewhat conservative (i.e., the true average edible fraction is probably lower); thus, the intake rates calculated here may be biased upward somewhat.

It should be noted again that the recreational fish intake distributions given refer only to marine finfish. In addition, the intake rates calculated are based only on the catch of anglers in their home state. Marine fishing performed out-of-state would not be included in these distributions. Therefore, these distributions give an estimate of consumption of locally caught fish.

10.5. RELEVANT RECREATIONAL MARINE STUDIES

Puffer et al. (1981) - 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. It 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 of fish caught, and fish consumption patterns. Scales were used to obtain fish weights. Interviews were conducted only with anglers who had caught fish, and the anglers were interviewed only once during the entire survey period.

Puffer et al. (1981) estimated daily consumption rates (grams/day) for each angler using the following equation:

$$(K \times N \times W \times F)/[E \times 365] \qquad \text{(Eqn. 10-3)}$$

where:
- K = edible fraction of fish (0.25 to 0.5 depending on species);
- N = number of fish in catch;
- W = average weight of (grams) fish in catch;
- F = frequency of fishing/year; and
- E = number of fish eaters in family/living group.

No explicit survey weights were used in analyzing this survey; thus, each respondent's data was given equal weight.

A total of 1,059 anglers were interviewed for the survey. The ethnic and age distribution of respondents is shown in Table 10-23; 88 percent of respondents were male. The median intake rate was higher for Oriental/Samoan anglers (median 70.6 g/day) than for other ethnic groups and higher for those ages over 65 years (median 113.0 g/day) than for other age groups. Puffer et al. (1981) found similar median intake rates for seasons; 36.3 g/day for November through March and 37.7 g/day for April through October. Puffer et al. (1981) also evaluated fish preparation methods; these data are presented in Appendix 10B. The cumulative distribution of recreational fish (finfish and shellfish) consumption by survey respondents is presented in Table 10-24; this distribution was calculated only for those fishermen who indicated they eat the fish they catch. The median fish consumption rate was 37 g/day and the 90th percentile rate was 225 g/day (Puffer et al., 1981). A description of catch patterns for primary fish species kept is presented in Table 10-25.

As mentioned in the Background to this Chapter, intake distributions derived from analyses of creel surveys which did not employ weights reflective of sampling probabilities will overestimate the target population intake distribution and will, in fact, be more reflective of the "resource utilization distribution". Therefore, the reported median level of 37.3 g/day does not reflect the fact that 50 percent of the target population has intake above this level; instead 50 percent of recreational fish consumption is by individuals consuming at or above 37.3 g/day. In order to generate an intake distribution reflective of that in the target population, weights inversely proportional to sampling probability need to be employed. Price et al. (1994) made this attempt with the Puffer et al. (1981) survey data, using inverse fishing frequencies as the sampling weights. Price et al. (1994) was unable to get the raw data for this survey, but using frequency tables and the average level of fish consumption per fishing trip provided in Puffer et al. (1981), generated an approximate revised intake distribution. This distribution was dramatically lower than that obtained by Puffer et al. (1981); the median was estimated at 2.9 g/day (compared with 37.3 from Puffer et al., 1981) and the 90th percentile at 35 g/day (compared to 225 g/day from Puffer et al., 1981).

There are several limitations to the interpretation of the percentiles presented by both Puffer et al. (1981) and Price et al. (1994). As described in Appendix 10A, the interpretation of percentiles reported from creel surveys in terms of percentiles of the "resource utilization distribution" is approximate and depends on several assumptions. One of these assumptions is that sampling probability is proportional to inverse fishing frequency. In this survey, where interviewers revisited sites numerous times and anglers were not interviewed more than once, this assumption is not valid, though it is likely that the sampling probability is still highly dependant on fishing frequency so that the assumption does hold in an approximate sense. The validity of this assumption also impacts the interpretation of percentiles reported by Price et al. (1994) since inverse frequency was used as sampling weights. It is likely that the value (2.9 g/day) of Price et al. (1994) underestimates somewhat the median intake in the target population, but is much closer to the actual value than the Puffer et al. (1981) estimate of 37.3 g/day. Similar statements would apply about the 90th percentile. Similarly, the 37.3 g/day median value, if interpreted as the 50th percentile of the "resource utilization distribution", is also somewhat of an underestimate.

It should be noted again that the fish intake distribution generated by Puffer et al. (1981) (and by Price et al., 1994) was based only on fishermen who caught fish and ate the fish they caught. If all anglers were included, intake estimates would be somewhat lower. In contrast, 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. An additional factor potentially affecting intake rates is that fishing quarantines were imposed in early spring due to heavy sewage overflow (Puffer et al., 1981).

Pierce et al. (1981) - Commencement Bay Seafood Consumption Study - Pierce et al. (1981) performed a local creel survey to examine seafood consumption patterns and demographics of sport fishermen in Commencement Bay, Washington. The objectives of this survey included determining (1) seafood consumption habits and demographics of non-commercial anglers catching seafood; (2) the extent to which resident fish were used as food; and (3) the method of preparation of the fish to be consumed. Salmon were excluded from the survey since it was believed that they had little potential for contamination. The first half of this survey was conducted from early July to mid-September, 1980 and the second half from mid-September through most of November. During the summer months, interviewers visited each of 4 sub-areas of Commencement Bay on five mornings and five evenings; in the fall the areas were sampled 4 complete survey days. Interviews were conducted only with persons who had caught fish. 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). The analysis of Pierce et al. (1981) did not employ explicit sampling weights (i.e., all weights were set to 1).

There were 304 interviews in the summer and 204 in the fall. About 60 percent of anglers were white, 20 percent black, 19 percent Oriental and the rest Hispanic or Native American. Table 10-26 gives the distribution of fishing frequency calculated by Pierce et al. (1981); for both the summer and fall, more than half of the fishermen caught and consumed fish weekly. The dominant (by weight) species caught were Pacific Hake and Walleye Pollock. Pierce et al. (1981) did not present a distribution of fish intake or a mean fish intake rate.

The U.S. EPA (1989a) used the Pierce et al. (1981) fishing frequency distribution and an estimate of the average amount of fish consumed per angling trip to create an approximate intake distribution for the Pierce et al. (1981) survey. The estimate of the amount of fish consumed per angling trip (380 g/person-trip) was based on data on mean fish catch weight and mean number of consumers reported in Pierce et. al. (1981) and on an edible fraction of 0.5. U.S. EPA (1989a) reported a median intake rate of 23 g/day.

Price et al. (1994) obtained the raw data from this survey and performed a re-analysis using sampling weights proportional to inverse fishing frequency. The rationale for these weights is explained in Section 10.1 and in the discussion above of the Puffer et al. (1981) study. In the re-analysis, Price et al. (1994) found a median intake rate of 1.0 g/day and a 90th percentile rate of 13 g/day. The distribution of fishing frequency generated by Price et al. (1994) is shown in Table 10-27. Note that when equal weights were used, Price et al. (1994) found a median rate of 19 g/day, which was close to the approximate U.S. EPA (1989a) value reported above of 23 g/day.

The same limitations apply to interpreting the results presented here to those presented above in the discussion of Puffer et al. (1981). The median intake rate found by Price et al. (1994) (using inverse frequency weights) is more reflective of median intake in the target population than is the value of 19 g/day (or 23 g/day); the latter value reflects more the 50th percentile of the resource utilization distribution, (i.e., that anglers with intakes above 19 g/day consume 50 percent of the recreational fish catch). Similarly, the fishing frequency distribution generated by Price et al. (1994) is more reflective of the fishing frequency distribution in the target population than is the distribution presented in Pierce et al. (1981). Note the target population is those anglers who fished at Commencement Bay during the time period of the survey.

As with the Puffer et al. (1981) data, these values (1.0 g/day and 19 g/day) are both probably underestimates since the sampling probabilities are less than proportional to fishing frequency; thus, the true target population median is probably somewhat above 1.0 g/day and the true 50th percentile of the resource utilization distribution is probably somewhat higher than 19 g/day. The data from this survey provide an indication of consumption patterns for the time period around 1980 in the Commencement Bay area. However, the data may not reflect current consumption patterns because fishing advisories were instituted due to local contamination.

U.S. DHHS (1995) - Health Study to Assess the Human Health Effects of Mercury Exposure to Fish Consumed from the Everglades - A health study was conducted in two phases in the Everglades, Florida for the U.S. Department of Health and Human Services (U.S. DHHS, 1995). The objectives of the first phase were to: (a) describe the human populations at risk for mercury exposure through their consumption of fish and other contaminated animals from the Everglades and (b) evaluate the extent of mercury exposure in those persons consuming contaminated food and their compliance with the voluntary health advisory. The second phase of the study involved neurologic testing of all study participants who had total mercury levels in hair greater than 7.5 μg/g. Study participants were identified by using special targeted screenings, mailings to residents, postings and multi-media advertisements of the study throughout the Everglades region, and direct discussions with people fishing along the canals and waterways in the contaminated areas. The contaminated areas were identified by the interviewers and long-term Everglade residents. Of a total of 1,794 individuals sampled, 405 individuals were eligible to participate in the study because they had consumed fish or wildlife from the Everglades at least once per month in the last 3 months of the study period. The majority of the eligible participants (> 93 percent) were either subsistence fishermen, Everglade residents, or both. Of the total eligible participants, 55 individuals refused to participate in the survey. Useable data were obtained from 330 respondents ranging in age from 10-81 years of age (mean age 39 years ± 18.8) (U.S. DHHS, 1995). Respondents were administered a three page questionnaire from which demographic information, fishing and eating habits, and other variables were obtained (U.S. DHHS, 1995).

Table 10-28 shows the ranges, means, and standard deviations of selected characteristics by subgroups of the survey population. Sixty-two percent of the respondents were male with a slight preponderance of black individuals (43 percent white, 46 percent black non-Hispanic, and 11 percent Hispanic) (Table 10-28). Most of the respondents reported earning an annual income of $15,000 or less per family before taxes (U.S. DHHS, 1995). The mean number of years fished along the canals by the respondents was 15.8 years with a standard deviation of 15.8. The mean number of times per week fish consumers reported eating fish over the last 6 months and last month of the survey period was 1.8 and 1.5 per week with a standard deviation of 2.5 and 1.4, respectively (Table 10-28). Table 10-28 also indicates that 71 percent of the respondents reported knowing about the mercury health advisories. Of those who were aware, 26 percent reported that they had lowered their consumption of fish caught in the Everglades while the rest (74 percent) reported no change in consumption patterns (U.S. DHHS, 1995).

A limitation of this study is that fish intake rates (g/day) were not reported. Another limitation is that the survey was site limited, and, therefore, not representative of the U.S. population. An advantage of this study is that it is one of the few studies targeting subsistence fishermen.

10.6. KEY FRESHWATER RECREATIONAL STUDIES

West et al. (1989) - Michigan Sport Anglers Fish Consumption Survey, 1989 - surveyed a stratified random sample of Michigan residents with fishing licences. The sample was divided into 18 cohorts, with one cohort receiving a mail questionnaire each week between January and May 1989. The survey included both a short term recall component recording respondents' fish intake over a seven day period and a usual frequency component. For the short-term component, respondents were asked to identify all household members and list all fish meals consumed by each household member during the past seven days. The source of the fish for each meal was requested (self-caught, gift, market, or restaurant). Respondents were asked to categorize serving size by comparison with pictures of 8 oz. fish portions; serving sizes could be designated as either "about the same size", "less", or "more" than the 8 oz. picture. Data on fish species, locations of self-caught fish and methods of preparation and cooking were also obtained.

The usual frequency component of the survey asked about the frequency of fish meals during each of the four seasons and requested respondents to give the overall percentage of household fish meals that come from recreational sources. A sample of 2,600 individuals were selected from state records to receive survey questionnaires. A total of 2,334 survey questionnaires were deliverable and 1,104 were completed and returned, giving a response rate of 47.3 percent among individuals receiving questionnaires.

In the analysis of the survey data by West et. al. (1989), the authors did not attempt to generate the distribution of recreationally caught fish intake in the survey population. EPA obtained the raw data of this survey for the purpose of generating fish intake distributions and other specialized analyses.

As described elsewhere in this handbook, percentiles of the distribution of average daily intake reflective of long-term consumption patterns can not in general be estimated using short-term (e.g., one week) data. Such data can be used to estimate mean average daily intake rates (reflective of short or long term consumption); in addition, short term data can serve to validate estimates of usual intake based on longer recall.

EPA first analyzed the short term data with the intent of estimating mean fish intake rates. In order to compare these results with those based on usual intake, only respondents with information on both short term and usual intake were included in this analysis. For the analysis of the short term data, EPA modified the serving size weights used by West et al. (1989), which were 5, 8 and 10 oz., respectively, for portions that were less, about the same, and more than the 8 oz. picture. EPA examined the percentiles of the distribution of fish meal sizes reported in Pao et al. (1982) derived from the 1977-1978 USDA National Food Consumption Survey and observed that a lognormal distribution provided a good visual fit to the percentile data. Using this lognormal distribution, the mean values for serving sizes greater than 8 oz. and for serving sizes at least 10 percent greater than 8 oz. were determined. In both cases a serving size of 12 oz. was consistent with the Pao et al. (1982) distribution. The weights used in the EPA analysis then were 5, 8, and 12 oz. for fish meals described as less, about the same, and more than the 8 oz. picture, respectively. It should be noted that the mean serving size from Pao et al. (1982) was about 5 oz., well below the value of 8 oz. most commonly reported by respondents in the West et al. (1989) survey.

Table 10-29 displays the mean number of total and recreational fish meals for each household member based on the seven day recall data. Also shown are mean fish intake rates derived by applying the weights described above to each fish meal. Intake was calculated on both a grams/day and grams/kg body weight/day basis. This analysis was restricted to individuals who eat fish and who reside in households reporting some recreational fish consumption during the previous year. About 75 percent of survey respondents (i.e., licensed anglers) and about 84 percent of respondents who fished in the prior year reported some household recreational fish consumption.

The EPA analysis next attempted to use the short term data to validate the usual intake data. West et al. (1989) asked the main respondent in each household to provide estimates of their usual frequency of fishing and eating fish, by season, during the previous year. The survey provides a series of frequency categories for each season and the respondent was asked to check the appropriate range. The ranges used for all questions were: almost daily, 2-4 times a week, once a week, 2-3 times a month, once a month, less often, none, and don't know. For quantitative analysis of the data it is necessary to convert this categorical information into numerical frequency values. As some of the ranges are relatively broad, the choice of conversion values can have some effect on intake estimates. In order to obtain optimal values, the usual fish eating frequency reported by respondents for the season during which the questionnaire was completed was compared to the number of fish meals reportedly consumed by respondents over the seven day short-term recall period. The results of these comparisons are displayed in Table 10-30; it shows that, on average, there is general agreement between estimates made using one year recall and estimates based on seven day recall.

The average number of meals (1.96/week) was at the bottom of the range for the most frequent consumption group with data (2-4 meals/week). In contrast, for the lower usual frequency categories, the average number of meals was at the top, or exceeded the top of category range. This suggests some tendency for relatively infrequent fish eaters to underestimate their usual frequency of fish consumption. The last column of the table shows the estimated fish eating frequency per week that was selected for use in making quantitative estimates of usual fish intake. These values were guided by the values in the second column, except that frequency values that were inconsistent with the ranges provided to respondents in the survey were avoided.

Using the four seasonal fish eating frequencies provided by respondents and the above conversions for reported intake frequency, EPA estimated the average number of fish meals per week for each respondent. This estimate, as well as the analysis above, pertain to the total number of fish meals eaten (in Michigan) regardless of the source of the fish. Respondents were not asked to provide a seasonal breakdown for eating frequency of recreationally caught fish; rather, they provided an overall estimate for the past year of the percent of fish they ate that was obtained from different sources. EPA estimated the annual frequency of recreationally caught fish meals by multiplying the estimated total number of fish meals by the reported percent of fish meals obtained from recreational sources; recreational sources were defined as either self caught or a gift from family or friends.

The usual intake component of the survey did not include questions about the usual portion size for fish meals. In order to estimate usual fish intake, a portion size of 8 oz. was applied (the majority of respondents reported this meal size in the 7 day recall data). Individual body weight data were used to estimate intake on a g/kg-day basis. The fish intake distribution estimated by EPA is displayed in Table 10-31.

The distribution shown in Table 10-31 is based on respondents who consumed recreational caught fish. As mentioned above, these represent 75 percent of all respondents and 84 percent of respondents who reported having fished in the prior year. Among this latter population, the mean recreational fish intake rate is 14.4*0.84=12.1 g/day; the value of 38.7 g/day (95th percentile among consumers) corresponds to the 95.8th percentile of the fish intake distribution in this (fishing) population.

The advantages of this data set and analysis are that the survey was relatively large and contained both short-term and usual intake data. The presence of short term data allowed validation of the usual intake data which was based on long term recall; thus, some of the problems associated with surveys relying on long term recall are mitigated here.

The response rate of this survey, 47 percent, was relatively low. In addition, the usual fish intake distribution generated here employed a constant fish meal size, 8 oz.. Although use of this value as an average meal size was validated by the short-term recall results, the use of a constant meal size, even if correct on average, may seriously reduce the variation in the estimated fish intake distribution.

This study was conducted in the winter and spring months of 1988. This period does not include the summer months when peak fishing activity can be anticipated, leading to the possibility that intake results based on the 7 day recall data may understate individuals' usual (annual average) fish consumption. A second survey by West et al. (1993) gathered diary data on fish intake for respondents spaced over a full year. However, this later survey did not include questions about usual fish intake and has not been reanalyzed here. The mean recreational fish intake rates derived from the short term and usual components were quite similar, however, 14.0 versus 14.4 g/day.

Chemrisk (1991) - Consumption of Freshwater Fish by Maine Anglers - Chemrisk conducted a study to characterize the rates of freshwater fish consumption among Maine residents (Chemrisk, 1991; Ebert et al., 1993). Since the only dietary source of local freshwater fish is recreational fish, the anglers in Maine were chosen as the survey population. 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 consumed that had been gifts from other members of their households or other household. The weight of fish consumed by anglers was calculated by first multiplying the estimated weight of the fish by the edible fraction, and then dividing this product by the number of intended consumers. Species specific regression equations were utilized to estimate weight from the reported fish length.

The edible fractions used were 0.4 for salmon, 0.78 for Atlantic smelt, and 0.3 for all other species (Ebert et al., 1993).

A total of 2,500 prospective survey participants were randomly selected from a list of anglers licensed in Maine. The surveys were mailed in during October, 1990. Since this was before the end of the open fishing season, respondents were also asked to predict how many more open water fishing trips they would undertake in 1990.

Chemrisk (1991) and Ebert et al. (1993) calculated distributions of freshwater fish intake for two populations, "all anglers" and "consuming anglers". All anglers were defined as licensed anglers who fished during either the 1989-1990 ice-fishing season or the 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. "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. In addition, the distribution of fish intake from rivers and streams was also calculated for two populations, those fishing on rivers and streams ("river anglers") and those consuming fish from rivers and streams ("consuming river anglers").

A total of 1,612 surveys were returned, giving a response rate of 64 percent; 1,369 (85 percent) of the 1,612 respondents were included in the "all angler" population and 1,053 (65 percent) were included in the "consuming angler" population. Freshwater fish intake distributions for these populations are presented in Table 10-32. The mean and 95th percentile was 5.0 g/day and 21.0 g/day, respectively, for " all anglers," and 6.4 g/day and 26.0 g/day, respectively, for "consuming anglers." Table 10-32 also presents intake distributions for fish caught from rivers and streams. Among "river anglers" the mean and 95th percentiles were 1.9 g/day and 6.2 g/day, respectively, while among "consuming river anglers" the mean was 3.7 g/day and the 95th percentile was 12.0 g/day. Table 10-33 presents fish intake distributions by ethnic group for consuming anglers. The highest mean intake rates reported are for Native Americans (10 g/day) and French Canadians (7.4 g/day). Because there was a low number of respondents for Hispanics, Asian/Pacific Islanders, and African Americans, intake rates within these subgroups were not calculated (Chemrisk, 1991).

The consumption, by species, of freshwater fish caught is presented in Table 10-34. The largest specie consumption was salmon from 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).

EPA obtained the raw data tapes from the marine anglers survey and performed some specialized analyses. One analysis involved examining the percentiles of the "resource utilization distribution" (this distribution was defined in Section 10.1). The 50th, or more generally the pth percentile of the resource utilization distribution, is defined as the consumption level such that p percent of the resource is consumed by individuals with consumptions below this level and 100-p percent by individuals with consumptions above this level. EPA found that 90 percent of recreational fish consumption was by individuals with intake rates above 3.1 g/day and 50 percent was by individuals with intakes above 20 g/day. Those above 3.1 g/day make up about 30 percent of the "all angler" population and those above 20 g/day make up about 5 percent of this population; thus, the top 5 percent of the angler population consumed 50 percent of the recreational fish catch.

EPA also performed an analysis of fish consumption among anglers and their families. This analysis was possible because the survey included questions on the number, sex, and age of each individual in the household and whether the individual consumed recreationally caught fish. The total population of licensed anglers in this survey and their household members was 4,872; the average household size for the 1,612 anglers in the survey was thus 3.0 persons. Fifty-six percent of the population was male and 30 percent was 18 or under.

A total of 55 percent of this population was reported to consume freshwater recreationally caught fish in the year of the survey. The sex and ethnic distribution of the consumers was similar to that of the overall population. The distribution of fish intake among the overall household population, or among consumers in the household, can be calculated under the assumption that recreationally caught fish was shared equally among all members of the household reporting consumption of such fish (note this assumption was used above to calculate intake rates for anglers). With this assumption, the mean intake rate among consumers was 5.9 g/day with a median of 1.8 g/day and a 95th percentile of 23.1 g/day; for the overall population the mean was 3.2 g/day and the 95th percentile was 14.1 g/day.

The results of this survey can be put into the context of the overall Maine population. The 1,612 anglers surveyed represent about 0.7 percent of the estimated 225,000 licensed anglers in Maine. It is reasonable to assume that licensed anglers and their families will have the highest exposure to recreationally caught freshwater fish. Thus, to estimate the number of persons in Maine with recreationally caught freshwater fish intake above, for instance, 6.5 g/day (the 80th percentile among household consumers in this survey), one can assume that virtually all persons came from the population of licensed anglers and their families. The number of persons above 6.5 g/day in the household survey population is calculated by taking 20 percent (i.e., 100 percent - 80 percent) of the consuming population in the survey; this number then is 0.2*(0.55*4872)=536. Dividing this number by the sampling fraction of 0.007 (0.7 percent) gives about 77,000 persons above 6.5 g/day of recreational freshwater fish consumption statewide. The 1990 census showed the population of Maine to be 1.2 million people; thus the 77,000 persons above 6.5 g/day represent about 6 percent of the state's population.

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 landlocked and Atlantic salmon; inclusion of the intended number of future fishing trips and an assumption that the average success and consumption rates for the individual angler during the trips already taken would continue through future trips. The data collected for this study were 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). Over reporting 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. The survey results showed that in 1990, 23 percent of all anglers consumed no freshwater fish, and 55 percent of the river anglers ate no freshwater fish. An advantage of this study is that it presents area-specific consumption patterns and the sample size is rather large.

West et al. (1993) - Michigan Sport Anglers Fish Consumption Study, 1991-1992 - This survey, financed by the Michigan Great Lakes Protection Fund, was a follow-up to the earlier 1989 Michigan survey described previously. The major purpose of 1991-1992 survey was to provide short-term recall data of recreational fish consumption over a full year period; the 1989 survey, in contrast, was conducted over only a half year period (West et al., 1993).

This survey was similar in design to the 1989 Michigan survey. A sample of 7,000 persons with Michigan fishing licenses was drawn and surveys were mailed in 2-week cohorts over the period January, 1991 to January, 1992. Respondents were asked to report detailed fish consumption patterns during the preceding seven days, as well as demographic information; they were also asked if they currently eat fish. Enclosed with the survey were pictures of about a half pound of fish. Respondents were asked to indicate whether reported consumption at each meal was more, less or about the same as the picture. Based on responses to this question, respondents were assumed to have consumed 10, 5 or 8 ounces of fish, respectively.

A total of 2,681 surveys were returned. West et al. (1993) calculated a response rate for the survey of 46.8 percent; this was derived by removing from the sample those respondents who could not be located or who did not reside in Michigan for at least six months.

Of these 2,681 respondents, 2,475 (93 percent) reported that they currently eat fish; all subsequent analyses were restricted to the current fish eaters. The mean fish consumption rates were found to be 16.7 g/day for sport fish and 26.5 g/day for total fish (West et al., 1993). Table 10-35 shows mean sport-fish consumption rates by demographic categories. Rates were higher among minorities, people with low income, and people residing in smaller communities. Consumption rates in g/day were also higher in males than in females; however, this difference would likely disappear if rates were computed on a g/kg-day basis.

West et al. (1993) estimated the 80th percentile of the survey fish consumption distribution. More extensive percentile calculations were performed by U.S. EPA (1995) using the raw data from the West et al. (1993) survey and calculated 50th, 90th, and 95th percentiles. However, since this survey only measured fish consumption over a short (one week) interval, the resulting distribution will not be indicative of the long-term fish consumption distribution and the upper percentiles reported from the EPA analysis will likely considerably overestimate the corresponding long term percentiles. The overall 95th percentile calculated by

U.S. EPA (1995) was 77.9; this is about double the 95th percentile estimated using year long consumption data from the 1989 Michigan survey.

The limitations of this survey are the relatively low response rate and the fact that only three categories were used to assign fish portion size. The main study strengths were its relatively large size and its reliance on short-term recall.

Connelly et al. (1996) - Sportfish Consumption Patterns of Lake Ontario Anglers and the Relationship to Health Advisories, 1992 - The objectives of this study were to provide accurate estimates of fish consumption (overall and sport caught) among Lake Ontario anglers and to evaluate the effect of Lake Ontario health advisory recommendations (Connelly et al., 1996). To target Lake Ontario anglers, a sample of 2,500 names was randomly drawn from 1990-1991 New York fishing license records for licenses purchased in six counties bordering Lake Ontario. Participation in the study was solicited by mail with potential participants encouraged to enroll in the study even if they fished infrequently or consumed little or no sport caught fish. The survey design involved three survey techniques including a mail questionnaire asking for 12 month recall of 1991 fishing trips and fish consumption, self-recording information in a diary for 1992 fishing trips and fish consumption, periodic telephone interviews to gather information recorded in the diary and a final telephone interview to determine awareness of health advisories (Connelly et al., 1996).

Participants were instructed to record in the diary the species of fish eaten, meal size, method by which fish was acquired (sport-caught or other), fish preparation and cooking techniques used and the number of household members eating the meal. Fish meals were defined as finfish only. Meal size was estimated by participants by comparing their meal size to pictures of 8 oz. fish steaks and fillets on dinner plates. An 8 oz. size was assumed unless participants noted their meal size was smaller than 8 oz., in which case a 4 oz. size was assumed, or they noted it was larger than 8 oz., in which case a 12 oz. size was assumed. Participants were also asked to record information on fishing trips to Lake Ontario and species and length of any fish caught.

From the initial sample of 2,500 license buyers, 1,993 (80 percent) were reachable by phone or mail and 1,410 of these were eligible for the study, in that they intended to fish Lake Ontario in 1992. A total of 1,202 of these 1,410, or 85 percent, agreed to participate in the study. Of the 1,202 participants, 853 either returned the diary or provided diary information by telephone. Due to changes in health advisories for Lake Ontario which resulted in less Lake Ontario fishing in 1992, only 43 percent, or 366 of these 853 persons indicated that they fished Lake Ontario during 1992. The study analyses summarized below concerning fish consumption and Lake Ontario fishing participation are based on these 366 persons.

Anglers who fished Lake Ontario reported an average of 30.3 (S.E. = 2.3) fish meals per person from all sources in 1992; of these meals 28 percent were sport caught (Connelly et al., 1996). Less than 1 percent ate no fish for the year and 16 percent ate no sport caught fish. The mean fish intake rate from all sources was 17.9 g/day and from sport caught sources was 4.9 g/day. Table 10-36 gives the distribution of fish intake rates from all sources and from sport caught fish. The median rates were 14.1 g/day for all sources and 2.2 g/day for sport caught; the 95th percentiles were 42.3 g/day and 17.9 g/day for all sources and sport caught, respectively. As seen in Table 10-37, statistically significant differences in intake rates were seen across age and residence groups, with residents of large cities and younger people having lower intake rates on average.

The main advantage of this study is the diary format. This format provides more accurate information on fishing participation and fish consumption, than studies based on 1 year recall (Ebert et al., 1993). However, a considerable portion of diary respondents participated in the study for only a portion of the year and some errors may have been generated in extrapolating these respondents' results to the entire year (Connelly et al., 1996). In addition, the response rate for this study was relatively low, 853 of 1,410 eligible respondents, or 60 percent, which may have engendered some non-response bias.

The presence of health advisories should be taken into account when evaluating the intake rates observed in this study. Nearly all respondents (>95 percent) were aware of the Lake Ontario health advisory. This advisory counseled to eat none of 9 fish species from Lake Ontario and to eat no more than one meal per month of another 4 species. In addition, New York State issues a general advisory to eat no more than 52 sport caught fish meals per year. Among participants who fished Lake Ontario in 1992, 32 percent said they would eat more fish if health advisories did not exist. A significant fraction of respondents did not totally adhere to the fish advisory; however, 36 percent of respondents, and 72 percent of respondents reporting Lake Ontario fish consumption, ate at least one species of fish over the advisory limit. Interestingly, 90 percent of those violating the advisory reported that they believed they were eating within advisory limits.

10.7. RELEVANT FRESHWATER RECREATIONAL STUDIES

Fiore et al. (1989) - Sport Fish Consumption and Body Burden Levels of Chlorinated Hydrocarbons: A Study of Wisconsin Anglers. This survey, reported by Fiore et al. (1989), was conducted to assess sociodemographic factors and sport fishing habits of anglers, to evaluate anglers' comprehension of and compliance with the Wisconsin Fish Consumption Advisory, to measure body burden levels of PCBs and DDE through analysis of blood serum samples and to examine the relationship between body burden levels and consumption of sport-caught fish. The survey targeted all Wisconsin residents who had purchased fishing or sporting licenses in 1984 in any of 10 pre-selected study counties. These counties were chosen in part based on their proximity to water bodies identified in Wisconsin fish advisories. A total of 1,600 anglers were sent survey questionnaires during the summer of 1985.

The survey questionnaire included questions about fishing history, locations fished, species targeted, kilograms caught for consumption, overall fish consumption (including commercially caught) and knowledge of fish advisories. The recall period was one year.

A total of 801 surveys were returned (50 percent response rate). Of these, 601 (75 percent) were from males and 200 from females; the mean age was 37 years. Fiore et al. (1989) reported that the mean number of fish meals for 1984 for all respondents was 18 for sport-caught meals and 24 for non-sport caught meals. Fiore et al. (1989) assumed that each fish meal consisted of 8 ounces (227 grams) of fish to generate means and percentiles of fish intake. The reported per-capita intake rate of sport-caught fish was 11.2 g/day; among consumers, who comprised 91 percent of all respondents, the mean sport-caught fish intake rate was 12.3 g/day and the 95th percentile was 37.3 g/day. The mean daily fish intake from all sources (both sport caught and commercial) was 26.1 g/day with a 95th percentile of 63.4 g/day. The 95th percentile of 37.3 g/day of sport caught fish represents 60 fish meals per year; 63.4 g/day (the 95th percentile of total fish intake) represents 102 fish meals per year.

Fiore et al. (1989) assumed a (constant) meal size of 8 ounces (227 grams) of fish which may over-estimate average meal size. Pao et al. (1982), using data from the 1977-78 USDA NFCS, reported an average fish meal size of slightly less than 150 grams for adult males. EPA obtained the raw data from this study and calculated the distribution of the number of sport-caught fish meals and the distribution of fish intake rates (using 150 grams/meal); these distributions are presented in Table 10-38. With this average meal size, the per-capita estimate is 7.4 g/day.

This study is limited in its ability to accurately estimate intake rates because of the absence of data on weight of fish consumed. Another limitation of this study is that the results are based on one year recall, which may tend to over-estimate the number of fishing trips (Ebert et al.,1993). In addition, the response rate was rather low (50 percent).

Connelly et al. (1992) - Effects of Health Advisory and Advisory Changes on Fishing Habits and Fish Consumption in New York Sport Fisheries - Connelly et al. (1992) conducted a study to assess the awareness and knowledge of New York anglers about fishing advisories and contaminants found in fish and their fishing and fish consuming behaviors. The survey sample consisted of 2,000 anglers with New York State fishing licenses for the year beginning October 1, 1990 through September 30, 1991. A questionnaire was mailed to the survey sample in January, 1992. The questionnaire was designed to measure catch and consumption of fish, as well as methods of fish preparation and knowledge of and attitudes towards health advisories (Connelly et al., 1992). The survey adjusted response rate was 52.8 percent (1,030 questionnaires were completed and 51 were not deliverable).

The average and median number of fishing days per year were 27 and 15 days respectively (Connelly et al. 1992). The mean number of sport-caught fish meals was 11. About 25 percent of anglers reported that they did not consume sport-caught fish.

Connelly et al. (1992) found that 80 percent of anglers statewide did not eat listed species or ate them within advisory limits and followed the 1 sport-caught fish meal per week recommended maximum. The other 20 percent of anglers exceeded the advisory recommendations in some way; 15 percent ate listed species above the limit and 5 percent ate more than one sport caught meal per week.

Connelly et al. (1992) found that respondents eating more than one sport-caught meal per week were just as likely as those eating less than one meal per week to know the recommended level of sport-caught fish consumption, although less than 1/3 in each group knew the level. An estimated 85 percent of anglers were aware of the health advisory. Over 50 percent of respondents said that they made changes in their fishing or fish consumption behaviors in response to health advisories.

The advisory included a section on methods that can be used to reduce contaminant exposure. Respondents were asked what methods they used for fish cleaning and cooking. Summary results on preparation and cooking methods are presented in Section 10.9 and in Appendix 10B.

A limitation of this study with respect to estimating fish intake rates is that only the number of sport-caught meals was ascertained, not the weight of fish consumed. The fish meal data can be converted to an intake rate (g/day) by assuming a value for a fish meal such as that from Pao et al. (1982) (about 150 grams as the average amount of fish consumed per eating occasion for adult males - males comprised 88 percent of respondents in the current study). Using 150 grams/meal the mean intake rate among the angler population would be 4.5 g/day; note that about 25 percent of this population reported no sport-caught fish consumption.

The major focus of this study was not on consumption, per se, but on the knowledge of and impact of fish health advisories; Connelly et al. (1992) provides important information on these issues.

Hudson River Sloop Clearwater, Inc. (1993) - Hudson River Angler Survey - Hudson River Sloop Clearwater, Inc. (1993) conducted a survey of adherence to fish consumption health advisories among Hudson River anglers. All fishing has been banned on the upper Hudson River where high levels of PCB contamination are well documented; while voluntary recreational fish consumption advisories have been issued for areas south of the Troy Dam (Hudson River Sloop Clearwater, Inc., 1993).

The survey consisted of direct interviews with 336 shore-based anglers between the months of June and November 1991, and April and July 1992. Socio-demographic characteristics of the respondents are presented in Table 10-39. The survey sites were selected based on observations of use by anglers, and legal accessibility. The selected sites included upper, mid-, and lower Hudson River sites located in both rural and urban settings. The interviews were conducted on weekends and weekdays during morning, midday, and evening periods. The anglers were asked specific questions concerning: fishing and fish consumption habits; perceptions of presence of contaminants in fish; perceptions of risks associated with consumption of recreationally caught fish; and awareness of, attitude toward, and response to fish consumption advisories or fishing bans.

Approximately 92 percent of the survey respondents were male. The following statistics were provided by Hudson River Sloop Clearwater, Inc. (1993). The most common reason given for fishing was for recreation or enjoyment. Over 58 percent of those surveyed indicated that they eat their catch. Of those anglers who eat their catch, 48 percent reported being aware of advisories. Approximately 24 percent of those who said they currently do not eat their catch, have done so in the past. Anglers were more likely to eat their catch from the lower Hudson areas where health advisories, rather than fishing bans, have been issued. Approximately 94 percent of Hispanic Americans were likely to eat their catch, while 77 percent of African Americans and 47 percent of Caucasian Americans intended to eat their catch. Of those who eat their catch, 87 percent were likely to share their meal with others (including women of childbearing age, and children under the age of fifteen).

For subsistence anglers, more low-income than upper income anglers cat their catch (Hudson River Sloop Clearwater, Inc., 1993). Approximately 10 percent of the respondents stated that food was their primary reason for fishing; this group is more likely to be in the lowest per capita income group (Hudson River Sloop Clearwater, Inc., 1993).

The average frequency of fish consumption reported was just under one (0.9) meal over the previous week, and three meals over the previous month. Approximately 35 percent of all anglers who eat their catch exceeded the amounts recommended by the New York State health advisories. Less than half (48 percent) of all the anglers interviewed were aware of the State health advisories or fishing bans. Only 42 percent of those anglers aware of the advisories have changed their fishing habits as a result.

The advantages of this study include: in-person interviews with 95 percent of all anglers approached; field-tested questions designed to minimize interviewer bias; and candid responses concerning consumption of fish from contaminated waters. The limitations of this study are that specific intake amounts are not indicated, and that only shore-based anglers were interviewed.

10.8. NATIVE AMERICAN FRESHWATER STUDIES

Wolfe and Walker (1987) - 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.

Of the 98 communities studied, four were large urban population centers and 94 were small communities. The harvests for these latter 94 communities 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) converted harvests to a common unit for comparison, pounds dressed weight per capita per year, by multiplying the harvests of households within each community by standard factors converting total pounds to dressed weight, summing across households, and then dividing by the total number of household members in the household sample. Dressed weight varied by species and community but in general was 70 to 75 percent of total fish weight; dressed weight for fish represents that portion brought into the kitchen for use (Wolfe and Walker, 1987).

Harvests for the four urban populations were developed from a statewide data set 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). Sport 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.

For the overall analysis, each of the 98 communities was 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 given equal weight, regardless of population size. Annual per capita harvests were calculated for each community. For the four urban centers, fish harvests ranged from 5 to 21 pounds per capita per year (6.2 g/day to 26.2 g/day).

The range for the 94 small communities was 25 to 1,239 pounds per capita per year (31 g/day to 1,541 g/day). For these 94 communities, the median per capita fish harvest was 130 pounds per year (162 g/day). In most (68 percent) of the 98 communities analyzed, resource harvests for fish were greater than the harvests of the other wildlife categories (land mammal, marine mammal, and other) combined.

The communities in this study were not made up entirely of Alaska Natives. For roughly half the communities, Alaska Natives comprised 80 percent or more of the population, but for about 40 percent of the communities they comprised less than 50 percent of the population. Wolfe and Walker (1987) performed a regression analysis which showed that the per capita harvest of a community tended to increase as a function of the percentage of Alaska Natives in the community. Although this analysis was done for total harvest (i.e., fish, land mammal, marine mammal and others) the same result should hold for fish harvest since fish harvest is highly correlated with total harvest.

A limitation of this report is that it presents (per-capita) harvest rates as opposed to individual intake rates. Wolfe and Walker (1987) compared the per capita harvest rates reported to the results for the household component of the 1977-1978 USDA National Food Consumption Survey (NFCS). The NFCS showed that about 222 pounds of meat, fish, and poultry were purchased and brought into the household kitchen for each person each year in the western region of the United States. This contrasts with a median total resource harvest of 260 lbs/yr in the 94 communities studied. This comparison, and the fact that Wolfe and Walker (1987) state that "harvests represent that portion brought into the kitchen for use," suggest that the same factors used to convert household consumption rates in the NFCS to individual intake rates can be used to convert per capita harvest rates to individual intake rates. In Section 10.3, a factor of 0.5 was used to convert fish consumption from household to individual intake rates. Applying this factor, the median per capita individual fish intake in the 94 communities would be 81 g/day and the range 15.5 to 770 g/day.

A limitation of this study is that the data were based on 1-year recall from a mailed survey. An advantage of the study is that it is one of the few studies that present fish harvest patterns for subsistence populations.

AIHC (1994) - Exposure Factors Sourcebook - The Exposure Factors Sourcebook (AIHC, 1994) provides data for non-marine fish intake consistent with this document. However, the total fish intake rate recommended in AIHC (1994) is approximately 40 percent lower than that in this document. The fish intake rates presented in this handbook are based on more recent data from USDA CSFII (1989-1991). AIHC (1994) presents probability distributions in grams fish per kilogram of body weight for fish consumption based on data from U.S. EPA Guidance Manual, Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish (U.S. EPA, 1989b). The @Risk formula is provided for direct use in the @Risk simulation software. The @Risk formula was provided for the distributions that were provided for the ingestion of freshwater finfish, saltwater finfish, and fish (unspecified) in the U.S. general population, children ages 1 to 6 years, and males ages 13 years and above. Distributions were also provided for saltwater finfish ingestion in the general population and for females and for males 13 years of age and older. Distributions for shellfish ingestion were provided for the general population, children ages 1 to 6 years, and for males and females 13 years of age and above. Additionally, distributions for "unspecified" fish ingestion were presented for the above mentioned populations.

The Sourcebook has been classified as a relevant rather than key study because it was not the primary source for the data used to make recommendations in this document. The Sourcebook is very similar to this document in the sense that it summarizes exposure factor data and recommends values. Therefore, it can be used as an alternative information source on fish intake.

Columbia River Inter-Tribal Fish Commission (CRITFC) (1994) - A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs Tribes of the Columbia River Basin - CRITFC (1994) conducted a fish consumption survey among four Columbia River Basin Indian tribes during the fall and winter of 1991-1992. The target population included all adult tribal members who lived on or near the Yakama, Warm Springs, Umatilla or Nez Perce reservations. The survey was based on a stratified random sampling design where respondents were selected from patient registration files at the Indian Health Service. Interviews were performed in person at a central location on the member's reservation.

Information requested included annual and seasonal numbers of fish meals, average serving size per fish meal, species and part(s) of fish consumed, preparation methods, changes in patterns of consumption over the last 20 years and during ceremonies and festivals, breast feeding practices and 24 hour dietary recall (CRITFC, 1994). Foam sponge food models approximating four, eight, and twelve ounce fish fillets were provided to help respondents estimate average fish meal size. Fish intake rates were calculated by multiplying the annual frequency of fish meals by the average serving size per fish meal.

The study was designed to give essentially equal sample sizes for each tribe. However, since the population sizes of the tribes were highly unequal, it was necessary to weight the data (in proportion to tribal population size) in order that the survey results represent the overall population of the four tribes. Such weights were applied to the analysis of adults; however, because the sample size for children was considered small, only an unweighted analysis was performed for this population (CRITFC, 1994).

The survey respondents consisted of 513 tribal members, 18 years old and above. Of these, 58 percent were female and 59 percent were under 40 years old. In addition, information for 204 children 5 years old and less was provided by the participating adult respondent. The overall response rate was 69 percent.

The results of the survey showed that adults consumed an average of 1.71 fish meals/week and had an average intake of 58.7 grams/day (CRITFC, 1994). Table 10-40 shows the adult fish intake distribution; the median was between 29 and 32 g/day and the 95th percentile about 170 g/day. A small percentage (7 percent) of respondents indicated that they were not fish consumers. Table 10-41 shows that mean intake was slightly higher in males than females (63 g/d versus 56 g/d) and was higher in the over 60 years age group (74.4 g/d) than in the 18-39 years (57.6 g/d) or 40-59 years (55.8 g/d) age groups. Intake also tended to be higher among those living on the reservation. The mean intake for nursing mothers, 59.1 g/d, was similar to the overall mean intake.

A total of 49 percent of respondents reported that they caught fish from the Columbia River basin and its tributaries for personal use or for tribal ceremonies and distributions to other tribe members and 88 percent reported that they obtained fish from either self-harvesting, family or friends, at tribal ceremonies or from tribal distributions. Of all fish consumed, 41 percent came from self or family harvesting, 11 percent from the harvest of friends, 35 percent from tribal ceremonies or distribution, 9 percent from stores and 4 percent from other sources (CRITFC, 1994).

The analysis of seasonal intake showed that May and June tended to be high consumption months and December and January low consumption months. The mean adult intake rate for May and June was 108 g/d while the mean intake rate for December and January was 30.7 g/d. Salmon was the species eaten by the highest number of respondents (92 percent) followed by trout (70 percent), lamprey (54 percent), and smelt (52 percent). Table 10-42 gives the fish intake distribution for children under 5 years of age. The mean intake rate was 19.6 g/d and the 95th percentile was approximately 70 g/d.

The authors noted that some non-response bias may have occurred in the survey since respondents were more likely to live near the reservation and were more likely to be female than non-respondents. In addition, they hypothesized that non fish consumers may have been more likely to be non-respondents than fish consumers since non consumers may have thought their contribution to the survey would be meaningless; if such were the case, this study would overestimate the mean intake rate. It was also noted that the timing of the survey, which was conducted during low fish consumption months, may have led to underestimation of actual fish consumption; the authors conjectured that an individual may report higher annual consumption if interviewed during a relatively high consumption month and lower annual consumption if interviewed during a relatively low consumption month. Finally, with respect to children's intake, it was observed that some of the respondents provided the same information for their children as for themselves, thereby the reliability of some of these data is questioned.

Although the authors have noted these limitations, this study does present information on fish consumption patterns and habits for a Native American subpopulation. It should be noted that the number of surveys that address subsistence subpopulations is very limited.

Peterson et al. (1994) - Fish Consumption Patterns and Blood Mercury Levels in Wisconsin Chippewa Indians - Peterson et al. (1994) investigated the extent of exposure of methylmercury to Chippewa Indians living on a Northern Wisconsin reservation who consume fish caught in northern Wisconsin lakes. The lakes in northern Wisconsin are known to be contaminated with mercury and the Chippewa have a reputation for high fish consumption (Peterson et al., 1994). The Chippewa Indians fish by the traditional method of spearfishing. Spearfishing (for walleye) occurs for about two weeks each spring after the ice breaks, and although only a small number of tribal members participate in it, the spearfishing harvest is distributed widely within the tribe by an informal distribution network of family and friends and through traditional tribal feasts (Peterson et al., 1994).

Potential survey participants, 465 adults, 18 years of age and older, were randomly selected from the tribal registries (Peterson et al., 1994). Participants were asked to complete a questionnaire describing their routine fish consumption and, more extensively, their fish consumption during the two previous months. They were also asked to give a blood sample that would be tested for mercury content. The survey was carried out in May 1990. A follow-up survey was conducted for a random sample of 75 non-respondents (80 percent were reachable), and their demographic and fish consumption patterns were obtained. Peterson et al. (1994) reported that the non-respondents' socioeconomic and fish consumption were similar to the respondents.

A total of 175 of the original random sample (38 percent) participated in the study. In addition, 152 nonrandomly selected participants were surveyed and included in the data analysis; these participants were reported by Peterson et al. (1994) to have fish consumption rates similar to those of the randomly selected participants. Results from the survey showed that fish consumption varied seasonally, with 50 percent of the respondents reporting April and May (spearfishing season) as the highest fish consumption months (Peterson et al., 1994). Table 10-43 shows the number of fish meals consumed per week during the last 2 months (recent consumption) before the survey was conducted and during the respondents' peak consumption months grouped by gender, age, education, and employment level. During peak consumption months, males consumed more fish (1.9 meals per week) than females (1.5 meals per week), respondents under 35 years of age consumed more fish (1.8 meals per week) than respondents 35 years of age and over (1.6 meals per week), and the unemployed consumed more fish (1.9 meals per week) than the employed (1.6 meals per week). During the highest fish consumption season (April and May), 50 percent of respondents reported eating one or less fish meals per week and only 2 percent reported daily fish consumption (Figures 10-1 and 10-2). A total of 72 percent of respondents reported Walleye consumption in the previous two months. Peterson et al. (1994) also reported that the mean number of fish meals usually consumed per week by the respondents was 1.2.

The mean fish consumption rate reported (1.2 fish meals per week, or 62.4 meals per year) in this survey was compared with the rate reported in a previous survey of Wisconsin anglers (Fiore et al., 1989) of 42 fish meals per year. These results indicate that the Chippewa Indians do not consume much more fish than the general Wisconsin angler population (Peterson et al., 1994). The differences in the two values may be attributed to differences in study methodology (Peterson et al., 1994). Note that this number (1.2 fish meals per week) includes fish from all sources. Peterson et al. (1994) noted that subsistence fishing, defined as fishing as a major food source, appears rare among the Chippewa. Using the recommended rate in this handbook of 129 g/meal as the average weight of fish consumed per fish meal in the general population, the rate reported here of 1.2 fish meals per week translates into a mean fish intake rate of 22 g/day in this population.

Fitzgerald et al. (1995) - Fish PCB Concentrations and Consumption Patterns Among Mohawk Women at Akwesasne - Akwesasne is a native American community of ten thousand plus persons located along the St. Lawrence River (Fitzgerald et al., 1995). The local food chain has been contaminated with PCBs and some species have levels that exceed the U.S. FDA tolerance limits for human consumption (Fitzgerald et al., 1995). Fitzgerald et al. (1995) conducted a recall study from 1986 to 1992 to determine the fish consumption patterns among nursing Mohawk women residing near three industrial sites. The study sample consisted of 97 Mohawk women and 154 nursing Caucasian controls. The Mohawk mothers were significantly younger (mean age 24.9) than the controls (mean age 26.4) and had significantly more years of education (mean 13.1 for Mohawks versus 12.4 for controls). A total of 97 out of 119 Mohawk nursing women responded, a response rate of 78 percent; 154 out of 287 control nursing Caucasian women responded, a response rate of 54 percent.

Potential participants were identified prior to, or shortly after, delivery. The interviews were conducted at home within one month postpartum and were structured to collect information for sociodemographics, vital statistics, use of medications, occupational and residential histories, behavioral patterns (cigarette smoking and alcohol consumption), drinking water source, diet, and fish preparation methods (Fitzgerald et al., 1995). The dietary data collected were based on recall for food intake during the index pregnancy, the year before the pregnancy, and more than one year before the pregnancy.

The dietary assessment involved the report by each participant on the consumption of various foods with emphasis on local species of fish and game (Fitzgerald et al., 1995). This method combined food frequency and dietary histories to estimate usual intake. Food frequency was evaluated with a checklist of foods for indicating the amount of consumption of a participant per week, month or year. Information gathered for the dietary history included duration of consumption, changes in the diet, and food preparation method.

Table 10-44 presents the number of local fish meals per year for both the Mohawk and control participants. The highest percentage of participants reported consuming between 1 and 9 local fish meals per year. Table 10-44 indicates that Mohawk respondents consumed statistically significantly more local fish than did control respondents during the two time periods prior to pregnancy; for the time period during pregnancy there was no significant difference in fish consumption between the two groups. Table 10-45 presents the mean number of local fish meals consumed per year by time period for all respondents and for those ever consuming (consumers only). A total of 82 (85 percent) Mohawk mothers and 72 (47 percent) control mothers reported ever consuming local fish. The mean number of local fish meals consumed per year by Mohawk respondents declined over time, from 23.4 (over one year before pregnancy) to 9.2 (less than one year before pregnancy) to 3.9 (during pregnancy); a similar decline was seen among consuming Mohawks only. There was also a decreasing trend over time in consumption among controls, though it was much less pronounced.

Table 10-46 presents the mean number of fish meals consumed per year for all participants by time period and selected characteristics (age, education, cigarette smoking, and alcohol consumption). Pairwise contrasts indicated that control participants over 34 years of age had the highest fish consumption of local fish meals (22.1) (Table 10-46). However, neither the overall nor pairwise differences by age among the Mohawk women over 34 years old were statistically significant, and may be due to the small sample size (N=6) (Fitzgerald et al., 1995). The most common fish consumed by Mohawk mothers was yellow perch; for controls the most common fish consumed was trout.

An advantage of this study is that it presents data for fish consumption patterns for Native Americans as compared to a demographically similar group of Caucasians. Although the data are based on nursing mothers as participants, the study also captures consumption patterns prior to pregnancy (up to 1 year before and more than 1 year before). Fitzgerald et al. (1995) noted that dietary recall for a period more than one year before pregnancy may be inaccurate, but these data were the best available measure of the more distant past. They also noted that the observed decrease in fish consumption among Mohawks from the period one year before pregnancy to the period of pregnancy is due to a secular trend of declining fish consumption over time in Mohawks. This decrease, which was more pronounced than that seen in controls, may be due to health advisories promulgated by tribal, as well as state, officials. The authors note that this decreasing secular trend in Mohawks is consistent with a survey from 1979-1980 that found an overall mean of 40 fish meals per year among male and female Mohawk adults.

The data are presented as number of fish meals per year; the authors did not assign an average weight to fish meals. If assessors wanted to estimate the weight of fish consumed, some average value of weight per fish meal would have to be assumed. Pao et al. (1982) reported 104 grams as the average weight of fish consumed per eating occasion for females 19-34 years old.

10.9. OTHER FACTORS

Other factors to consider when using the available survey data include location, climate, season, and ethnicity of the angler or consumer population, as well as the parts of fish consumed and the methods of preparation. Some contaminants (for example, some dioxin compounds) have the affinity to accumulate more in certain tissues, such as the fatty tissue, as well as in certain internal organs. The effects of cooking methods for various food products on the levels of dioxin-like compounds have been addressed by evaluating a number of studies in U.S. EPA (1996b). These studies showed various results for contamination losses based on the methodology of the study and the method of food preparation. The reader is referred to U.S. EPA (1996b) for a detailed review of these studies. In addition, some studies suggest that there is a significant decrease of contaminants in cooked fish when compared with raw fish (San Diego County, 1990). Several studies cited in this section have addressed fish preparation methods and parts of fish consumed. Table 10-47 provides summary results from these studies on fish preparation methods; further details on preparation methods, as well as results from some studies on parts of fish consumed, are presented in Appendix 10B.

The moisture content (percent) and total fat content (percent) measured and/or calculated in various fish forms (i.e., raw, cooked, smoked, etc.) for selected fish species are presented in Table 10-48, 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.

In some cases, the residue levels of contaminants in fish are reported as the concentration of contaminant per gram of fat. These contaminants are lipophilic compounds. When using 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 (Table 10-48) per product as follows:

$$\text{residue level/g product} = \left(\frac{\text{residue level}}{\text{g-fat}}\right) \times \left(\frac{\text{g-fat}}{\text{g-product}}\right) \qquad \text{(Eqn. 10-4)}$$

The resulting residue levels may then be used in conjunction with "as consumed" consumption rates.

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 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 10-48 and the following equation:

$$IR_{dw} = IR_{ac} * [(100-W)/100] \qquad \text{(Eqn. 10-5)}$$

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

$$IR_{ac} = IR_{dw}/[(100-W)/100] \qquad \text{(Eqn. 10-6)}$$

where:

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

10.10. RECOMMENDATIONS

Fish consumption rates are recommended based on the survey results presented in the key studies described in the preceding sections. Considerable variation exists in the mean and upper percentile fish consumption rates obtained from these studies. This can be attributed largely to the characteristics of the survey population (i.e., general population, recreational anglers) and the type of water body (i.e., marine, estuarine, freshwater), but other factors such as study design, method of data collection and geographic location also play a role. Based on these study variations, recommendations for consumption rates were classified into the following categories:

- General Population;
- Recreational Marine Anglers;
- Recreational Freshwater Anglers; and
- Native American Subsistence Fishing Populations

The recommendations for each of these categories were rated according to the level of confidence the Agency has in the recommended values. These ratings were derived according to the principles outlined in Volume I, Section 1.3; the ratings and a summary of the rationale behind them are presented in tables which follow the discussion of each category.

For exposure assessment purposes, the selection of the appropriate category (or categories) from above will depend on the exposure scenario being evaluated. Assessors should use the recommended values (or range of values) unless specific studies are felt to be particularly relevant to their needs, in which case results from a specific study or studies may be used. This is particularly true for the last two categories where no nationwide key studies exist. Even where national data exist, it may be advantageous to use regional estimates if the assessment targets a particular region. In addition, seasonal, age, and gender variations should be considered when appropriate.

It should be noted that the recommended rates are based on mean (or median) values which represent a typical intake or central tendency for the population studied, and on upper estimates (i.e., 90th-99th percentiles) which represent the high-end fish consumption of the population studied. For the recreational angler populations, the recommended means and percentiles are based on all persons engaged in recreational fishing, not just those consuming recreationally caught fish.

10.10.1. Recommendations - General Population

The key study for estimating mean fish intake (reflective of both short-term and long-term consumption) is U.S. EPA (1996a) analysis of USDA CSFII 1989-1991. The recommended values for mean intake by habitat and fish type are shown in Table 10-49.

For all fish (finfish and shellfish), the recommended values are 6.6 g/day for freshwater/ estuarine fish, 13.5 g/day for marine fish, and 20.1 g/day for all fish. Note that these values are reported as uncooked fish weight. This is important because the concentration of the contaminants in fish are generally measured in the uncooked samples. Assuming that cooking results in some reductions in weight (e.g., loss of moisture), and the mass of the contaminant in the fish tissue remains constant, then the contaminant concentration in the cooked fish tissue will increase. Although actual consumption may be overestimated when intake is expressed in an uncooked basis, the net effect on the dose may be canceled out since the actual concentration may be underestimated when it is based on the uncooked sample. On the other hand, if the "as consumed" intake rate and the uncooked concentration are used in the dose equation, dose may be underestimated since the concentration in the cooked fish is likely to be higher, if the mass of the contaminant remains constant after cooking. Therefore, it is more conservative and appropriate to use uncooked fish intake rates. If concentration data can be adjusted to account for changes after cooking, then the "as consumed" intake rates are appropriate. For example, concentration may be expressed on a dry weight basis and, if data are available, loss of contaminant mass after cooking may be accounted for in the concentration. However, data on the effects of cooking in contaminant concentrations are limited and assessors generally make the conservative assumption that cooking has no effect on the contaminant mass. Both "as consumed" and uncooked fish intake values have been presented in this handbook so that the assessor can choose the intake data that best matches the concentration data that is being used.

CSFII data were based on a short-term survey and could not be used to estimate the distribution over the long term of the average daily fish intake. The long-term average daily fish intake distribution can be estimated using the TRI study which provided dietary data for a one month period. However, because the data from the TRI study are now over 20 years old, the value presented in Table 10-49 (56 g/day) has been adjusted by upward 25 percent based on Ruffle et al. (1994) to reflect the increase in fish consumption since the TRI survey was conducted. In addition to the arguments provided by Ruffle et al. (1994) for adjusting the data upward, recent data from CSFII 1989-91 indicate an increase of fish intake of 33 percent when compared to USDA NFCS data from 1977-78. Therefore, the adjustment recommended by Ruffle et al. (1994) of 25 percent seems appropriate. Then, as suggested by Ruffle et al. (1994) the distributions generated from TRI should be shifted upward by 25 percent to estimate the current fish intake distribution. Thus, the recommended percentiles of long-term average daily fish intake are those of Javitz (1980) adjusted 25 percent upward (see Tables 10-3, 10-4). Alternatively, the log-normal distribution of Ruffle et al. (1994) (Table 10-6) may be used to approximate the long term fish intake distribution; adjusting the log mean μ by adding log(1.5)= 0.4, will shift the distribution upward by 25 percent.

It is important to note that a limitation with these data is that the total amount of fish reported by respondents included fish from all sources (e.g., fresh, frozen, canned, domestic, international origin). Neither the TRI nor the CSFII surveys identified the source of the fish consumed. This type of information may be relevant for some assessments. It should be noted that because these recommendations are based on 1989-91 CSFII data, they may not reflect the most recent changes that may have occurred in consumption patterns. However, as indicated in Section 10.2, the 1989-91 CSFII data are believed to be appropriate for assessing ingestion exposure for current populations because the rate of fish ingestion did not change dramatically between 1977-78 and 1995.

The distribution of serving sizes may be useful for acute exposure assessments. The recommended values are 129 grams for mean serving size and 326 grams for the 95th percentile serving size based on the CSFII analyses (Table 10-50).

10.10.2. Recommendations - Recreational Marine Anglers

The recommended values presented in Table 10-51 are based on the surveys of the National Marine Fisheries Service (NMFS, 1993). The intake values are based on finfish consumption only.

10.10.3. Recommendations - Recreational Freshwater Anglers

The data presented in Table 10-52 are based on mailed questionnaire surveys (Ebert et al., 1993 and West et al., 1989; 1993) and a diary study (Connelly et al., 1992; 1996). The mean intakes ranged from 5-17 g/day. The recommended mean and 95th percentile values for recreational freshwater anglers are 8 g/day and 25 g/day, respectively; these were derived by averaging the values from the three populations surveyed in the key studies. Since the two West et al. surveys studied the same population, the average of the means from the two studies was used to represent the mean for this population. The estimate from the West et al. (1989) survey was used to represent the 95th percentile for this population since the long term consumption percentiles could not be estimated from the West et al. (1993) study.

10.10.4. Recommendations - Native American Subsistence Populations

Fish consumption data for Native American subsistence populations are very limited. The CRITFC (1994) study gives a per-capita fish intake rate of 59 g/day and a 95th percentile of 170 g/day. The report by Wolfe and Walker (1987) presents harvest rates for 94 small communities engaged in subsistence harvests of natural resources. A factor of 0.5 was employed to convert the per-capita harvest rates presented in Wolfe and Walker (1987) to per capita individual consumption rates; this is the same factor used to convert from per capita household consumption rates to per capita individual consumption rates in the analysis of homegrown fish consumption from the 1987-1988 NFCS. Based on this factor, the median per-capita harvest in the 94 communities of 162 g/day (and the range of 31-1,540 g/day) is converted to the median per capita intake rate of 81 g/day (range 16-770 g/day) shown in Table 10-53. The recommended value for mean intake is 70 g/day and the recommended 95th percentile is 170 g/day.

It should be emphasized that the above recommendations refer only to Native American subsistence fishing populations, not the Native American general population. Several studies show that intake rates of recreationally caught fish among Native Americans with state fishing licenses (West et al., 1989; Ebert et al., 1993) are somewhat higher (50-100 percent) than intake rates among other anglers, but far lower than the rates shown above for Native American subsistence populations.

In addition, the studies of Peterson et al. (1994) and Fiore et al. (1989) show that total fish intake among a Native American population on a reservation (Chippewa in Wisconsin) is roughly comparable (50 percent higher) to total fish intake among licensed anglers in the same state. Also, the study of Fitzgerald et al. (1995) showed that pregnant women on a reservation (Mohawk in New York) have sport-caught fish intake rates comparable to those of a local white control population.

The survey designs, data generated, and limitations/advantages of the studies described in this report are summarized and presented in Table 10-54. The confidence in recommendations is presented in Table 10-55. The confidence rating for recreational marine anglers is presented in Table 10-56. Confidence in fish intake recommendations for recreational freshwater fish consumption is presented in Table 10-57. The confidence in intake recommendations for Native American subsistence populations is presented in Table 10-58.

10.11. REFERENCES FOR CHAPTER 10

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Table 10-1. 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
Community Type		
Rural, non-SMSA	13.0	38.3
Central city, 2M or more	19.0	55.6
Outside central city, 2M or more	15.9	47.3
Central city, 1M - 2M	15.4	41.7
Outside central city, 1M - 2M	14.5	41.5
Central city, 500K - 1M	14.2	41.0
Outside central city, 500K - 1M	14.0	39.7
Outside central city, 250K - 500K	12.2	32.1
Central city, 250K - 500K	14.1	40.5
Central city, 50K - 250K	13.8	43.4
Outside central city, 50K - 250K	11.3	31.7
Other urban	13.5	39.2

[a] The calculations in this table are based on respondents who consumed fish during the survey month. These respondents are estimated to represent 94 percent of the U.S. population.

Source: Javitz, 1980.

Table 10-2. Mean and 95th Percentile of Fish Consumption (g/day) by Sex and Age[a]

	Age (years)	Total Fish 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 respondents who consumed fish in the month of the survey. These respondents are estimated to represent 94.0% of the U.S. population.

Source: Javitz, 1980.

Table 10-3. 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 whose average daily fish consumption is within the specified range.
The calculations in this table are based upon the respondents who consumed fish during the month of the survey. These respondents are estimated to represent 94% of the U.S. population.
Source: Javitz, 1980.

Table 10-4. 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 whose average daily fish consumption is within the specified range.
The calculations in this table are based upon respondents who consumed fish during the month of the survey. These respondents are estimated to represent 94% of the U.S. population.
Source: Javitz, 1980.

Table 10-5. 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 respondents who consumed fish during the month of the survey. These respondents are estimated to represent 94% percent of the U.S. population.
[b] Designated as freshwater or estuarine species by Stephan (1980).
Source: Javitz, 1980.

Table 10-6. Best Fits of Lognormal Distributions Using the NonLinear Optimization (NLO) Method

	Adults	Teenagers	Children
Shellfish			
μ	1.370	-0.183	0.854
σ	0.858	1.092	0.730
(min SS)	27.57	1.19	16.06
Finfish (freshwater)			
μ	0.334	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	0.970
(min SS)	30.13	0.33	4.31

The following equations may be used with the appropriate μ and σ values to obtain an average Daily Consumption Rate (DCR), in grams, and percentiles of the DCR distribution.

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

Source: Ruffle et al., 1994.

Table 10-7. Per Capita Distribution of Fish Intake (g/day) by Habitat and Fish Type for the U.S. Population (Uncooked Fish Weight)

		Estimate (90% Interval)		
Habitat	Statistic	Finfish	Shellfish	Total
Fresh/Estuarine	Mean	3.6 (3.0 - 4.1)	2.4 (2.0 - 2.8)	6.0 (5.3 - 6.7)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	0.4 (0.00 - 0.7)	0.0 (0.0 - 0.3)	15.9 (14.4 - 17.8)
	95th%	21.7 (14.8 - 25.8)	13.3 (11.7 - 17.8)	40.0 (37.9 - 44.8)
	99th%	87.3 (80.1 - 98.0)	63.6 (60.4 - 68.5)	107.6 (98.3 - 109.1)
Marine	Mean	12.5 (11.5 - 13.5)	1.6 (1.3 - 1.9)	14.1 (13.1 - 15.1)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	47.5 (43.6 - 49.8)	0.0 (0.0 - 0.0)	52.1 (47.8 - 55.9)
	95th%	74.6 (70.3 - 76.3)	0.0 (0.0 - 6.8)	76.5 (74.6 - 80.9)
	99th%	133.0 (127.8 - 143.2)	50.3 (44.5 - 59.0)	138.2 (133.0 - 155.1)
All Fish	Mean	16.1 (15.0 - 17.2)	4.0 (3.4 - 4.6)	20.1 (18.8 - 21.4)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	59.1 (54.6 - 62.3)	0.0 (0.0 - 3.5)	70.1 (65.4 - 74.2)
	95th%	84.4 (81.3 - 89.6)	22.7 (21.8 - 26.6)	102.0 (99.3 - 106.7)
	99th%	156.7 (148.7 - 168.1)	99.0 (87.8 - 109.6)	173.2 (162.8 - 176.5)

Note: Percentile confidence intervals estimated using the bootstrap method with 1,000 replications; percent consuming gives the percentage of individuals consuming the specified category of fish during the 3-day survey period. Estimates are projected from a sample of 11,912 individuals to the U.S. population.

Source: U.S. EPA, 1996a.

Table 10-8. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) by Habitat for Consumers Only (Uncooked Fish Weight)

Habitat	Statistic	Estimate	90% Interval
Fresh/Estuarine[a]	Mean	86.2	78.4 - 94.0
	50th%	48.8	45.6 - 54.9
	90th%	217.9	205.3 - 237.3
	95th%	290.0	267.1 - 325.6
	99th%	489.3	424.9 - 534.2
	Percent Consuming	18.5	
Marine[b]	Mean	113.1	107.8 - 118.4
	50th%	93.3	92.0 - 94.9
	90th%	222.7	216.5 - 225.6
	95th%	271.7	260.6 - 279.9
	99th%	415.9	367.3 - 440.5
	Percent Consuming	30.1	
All Fish[c]	Mean	129.0	123.7 - 134.3
	50th%	101.9	98.9 - 103.9
	90th%	249.1	241.0 - 264.1
	95th%	326.0	306.1 - 335.6
	99th%	497.5	469.2 - 519.7
	Percent Consuming	36.9	

Note: Percentile confidence intervals estimated using the bootstrap method with 1,000 replications; percent consuming gives the percentage of individuals consuming the specified category of fish during the 3-day survey period.

a Sample size = 1,892; population size = 44,946,000
b Sample size = 3,184; population size = 73,100,000
c Sample size = 3,927; population size = 89,800,000

Source: U.S. EPA, 1996a.

Table 10-9. Per Capita Distribution of Fish Intake (mg/kg-day) by Habitat and Fish Type for U.S. Population (Uncooked Fish Weight)

Habitat	Statistic	Estimate (90% Interval)		
		Finfish	Shellfish	Total
Fresh/Estuarine	Mean	58.1 (48.4 - 67.7)	35.9 (30.2 - 41.6)	94.0 (83.4 - 104.6)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	5.9 (0.0 - 12.3)	0.0 (0.0 - 3.8)	251.8 (222.5 - 282.6)
	95th%	340.5 (252.9 - 410.1)	190.0 (155.7 - 268.3)	677.7 (631.9 - 729.1)
	99th%	1,401.9 (1,283.9 - 1,511.8)	953.5 (871.3 - 1,007.4)	1,593.3 (1,511.8 - 1,659.2)
Marine	Mean	215.8 (195.9 - 235.6)	24.3 (20.6 - 28.0)	240.1 (220.1 - 260.0)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	783.4 (752.5 - 842.2)	0.0 (0.0 - 0.0)	855.6 (809.7 - 909.8)
	95th%	1,208.1 (1,149.5 - 1,264.9)	0.0 (0.0 - 88.8	1,271.5 (1,227.2 - 1,371.2)
	99th%	2,400.0 (2,284.2 - 2,660.1)	701.3 (636.2 - 944.7)	2,575.3 (2,393.2 - 2,708.6)
All Fish	Mean	273.9 (252.0 - 295.7)	60.2 (52.3 - 68.2)	334.1 (311.3 - 356.9)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	966.1 (893.3 - 1,039.5)	0.0 (0.0 - 47.4)	1,123.1 (1,090.8 - 1,179.0)
	95th%	1,434.3 (1,371.2 - 1,526.8)	372.5 (324.1 - 460.5)	1,684.2 (1,620.5 - 1,718.5)
	99th%	2,857.5 (2,649.6 - 3,003.6)	1,412.4 (1,296.0 - 1,552.1)	3,092.8 (2,973.7 - 3,250.2)

Note: Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications. Estimates are projected from a sample of 11,912 individuals to the U.S. population.

Source: U.S. EPA, 1996a.

Table 10-10. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) by Habitat for Consumers Only (Uncooked Fish Weight)

Habitat	Statistic	Estimate	90% Interval
Fresh/Estuarine[a]	Mean	1,363.4	1,242.2 - 1,484.7
	50th%	819.7	736.9 - 895.7
	90th%	3,325.1	3,232.6 - 3,677.0
	95th%	4,408.2	4,085.6 - 4,781.3
	99th%	7,957.5	6,979.2 - 8,921.0
	Percent Consuming	18.5	
Marine[b]	Mean	1,927.0	1,829.5 - 2,024.4
	50th%	1,507.7	1,470.7 - 1,538.8
	90th%	3,752.9	3,632.0 - 4,001.2
	95th%	5,018.7	4,852.1 - 5,267.3
	99th%	8,448.3	7,215.7 - 9,136.9
	Percent Consuming	30.1	
All Fish[c]	Mean	2,145.3	2,055.9 - 2,234.6
	50th%	1,662.8	1,610.7 - 1,720.1
	90th%	4,223.9	4,085.8 - 4,454.2
	95th%	5,477.9	5,163.3 - 5,686.0
	99th%	9,171.5	8,605.4 - 9,796.6
	Percent Consuming	36.9	

Note: Percentile confidence intervals estimated using the bootstrap method with 1,000 replications; percent consuming gives the percentage of individuals consuming the specified category of fish during the 3-day survey period.

a Sample size = 1,892; population size = 44,946,000
b Sample size = 3,184; population size = 73,100,000
c Sample size = 3,927; population size = 89,800,000

Source: U.S. EPA, 1996a.

Table 10-11. Per Capita Distribution of Fish Intake (g/day) by Habitat and Fish Type for the U.S. Population (Cooked Fish Weight - As Consumed)

		Estimate (90% Interval)		
Habitat	Statistic	Finfish	Shellfish	Total
Fresh/Estuarine	Mean	2.8 (2.4 - 3.3)	1.9 (1.6 - 2.2)	4.7 (4.2 - 5.3)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	0.3 (0.0 - 0.7)	0.0 (0.0 - 0.2)	12.6 (10.9 - 14.0)
	95th%	17.2 (12.9 - 20.8)	10.1 (7.9 - 13.8)	32.2 (29.8 - 35.2)
	99th%	70.9 (60.3 - 75.7)	49.9 (45.6 - 56.4)	82.5 (77.2 - 86.4)
Marine	Mean	9.7 (9.0 - 10.5)	1.2 (1.0 - 1.4)	10.9 (10.1 - 11.7)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)
	90th%	37.3 (33.7 - 37.4)	0.0 (0.0 - 0.0)	39.5 (37.3 - 42.9)
	95th%	56.2 (55.6 - 58.2)	0.0 (0.0 - 5.3)	59.6 (57.0 - 61.8)
	99th%	103.1 (98.5 - 112.0)	37.0 (35.4 - 44.5)	106.8 (104.6 - 114.6)
All Fish	Mean	12.6 (11.7 - 13.4)	3.1 (2.7 - 3.5)	15.7 (14.7 - 16.6)
	50th%	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.0)	0.0 (0.0 - 0.-0)
	90th%	46.0 (43.6 - 49.0)	0.0 (0.0 - 2.6)	55.0 (51.4 - 56.0)
	95th%	67.0 (63.0 - 70.7)	18.9 (16.7 - 22.1)	78.3 (75.2 - 80.6)
	99th%	119.1 (113.9 - 125.9)	74.3 (68.7 - 82.0)	133.5 (125.3 - 140.2)

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications. Estimates are projected from a sample of 11,912 individuals to the U.S. population.

Source: U.S. EPA, 1996a.

Table 10-12. Per Capita Distribution of Fish Intake (g/day) by Habitat for Consumers Only
(Cooked Fish Weight - As Consumed)

Habitat	Statistic	Estimate	90% Interval
Fresh/Estuarine[a]	Mean	68.0	61.9 - 74.1
	50th%	39.5	36.2 - 44.7
	90th%	170.8	158.7 - 181.8
	95th%	224.8	212.9 - 246.0
	99th%	374.7	336.5 - 341.3
	Percent Consuming	18.5	
Marine[b]	Mean	87.8	83.7 - 91.8
	50th%	71.8	69.7 - 74.2
	90th%	169.4	167.0 - 173.7
	95th%	208.5	198.1 - 221.7
	99th%	320.4	292.8 - 341.9
	Percent Consuming	30.1	
All Fish[c]	Mean	100.6	96.7 - 104.6
	50th%	80.8	79.3 - 83.9
	90th%	197.4	188.7 - 205.1
	95th%	253.4	231.5 - 264.5
	99th%	371.6	359.3 - 401.6
	Percent Consuming	36.9	

Note: Percentile confidence intervals estimated using the bootstrap method with 1,000 replications; percent consuming gives the percentage of individuals consuming the specified category of fish during the 3-day survey period.

a Sample size = 1,892; population size = 44,946,000
b Sample size = 3,184; population size = 73,100,000
c Sample size = 3,927; population size = 89,800,000

Source: U.S. EPA, 1996a.

Table 10-13. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population by Age and Gender - As Consumed (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	1.58 (1.06-2.10)	1.44 (0.00-4.07)	12.51 (6.00-14.20)	36.09 (28.53-43.20)
15 - 44	2891	4.28 (3.55-5.02)	10.90 (8.79-13.84)	28.80 (26.26-33.53)	70.87 (64.74-90.56)
45 or older	2340	5.27 (4.21-6.32)	18.72 (15.19-22.12)	34.67 (29.17-39.38)	85.35 (71.71-100.50)
All ages	6662	4.02 (3.43-4.61)	10.66 (8.11-13.19)	28.11 (23.14-31.27)	71.98 (60.38-86.40)
Males					
14 or under	1546	2.17 (1.32-3.02)	0.99 (0.21-6.67)	14.94 (11.88-22.33)	48.72 (37.48-52.29)
15 - 44	2151	6.14 (5.08-7.19)	18.19 (10.21-24.20)	48.61 (35.42-54.65)	96.32 (85.60-115.75)
45 or older	1553	7.12 (5.87-8.38)	22.67 (19.28-27.83)	46.62 (41.27-58.01)	103.07 (86.41-125.11)
All ages	5250	5.46 (4.81-6.11)	16.05 (12.41-19.30)	40.29 (35.92-43.73)	86.40 (78.37-103.07)
Both Sexes					
14 or under	2977	1.88 (1.36-2.40)	1.31 (0.00-4.33)	13.90 (9.32-15.05)	40.77 (35.15-44.82)
15 - 44	5042	5.17 (4.46-5.87)	13.88 (12.05-17.21)	36.21 (28.64-47.31)	86.14 (74.67-96.67)
45 or older	3893	6.11 (5.20-7.02)	21.48 (16.69-23.33)	40.55 (35.80-47.31)	88.18 (85.33-103.07)
All ages	11912	4.71 (4.17-5.25)	12.62 (10.91-13.98)	32.16 (29.81-35.15)	82.45 (77.17-86.40)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-14. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population by Age and Gender - As Consumed (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	6.60 (5.16-8.05)	24.84 (18.67-31.20)	37.32 (32.27-42.05)	87.05 (63.26-112.06)
15 - 44	2891	9.97 (8.94-11.01)	36.83 (31.42-41.99)	55.53 (47.67-59.59)	105.32 (96.98-112.00)
45 or older	2340	12.59 (11.36-13.82)	42.92 (38.92-47.66)	63.85 (57.27-72.36)	103.08 (91.61-121.52)
All ages	6662	10.10 (9.27-10.93)	36.97 (34.86-37.33)	55.54 (51.67-56.98)	102.01 (97.67-110.69)
Males					
14 or under	1546	7.25 (5.72-8.79)	24.85 (19.92-33.85)	49.89 (42.09-56.45)	92.64 (65.87-132.39)
15 - 44	2151	13.33 (11.89-14.77)	52.73 (48.34-55.80)	71.49 (63.99-80.00)	116.51 (106.06-143.31)
45 or older	1553	13.32 (11.73-14.92)	50.39 (47.13-53.33)	64.51 (61.64-74.58)	116.86 (106.93-144.94)
All ages	5250	11.85 (10.75-12.95)	47.13 (44.52-49.80)	64.50 (62.46-67.53)	113.94 (103.47-130.00)
Both Sexes					
14 or under	2977	6.93 (5.63-8.23)	24.88 (22.64-28.08)	42.07 (38.15-48.96)	91.64 (68.59-112.06)
15 - 44	5042	11.58 (10.55-12.60)	44.24 (39.84-46.70)	62.18 (57.88-69.72)	110.07 (103.50-120.49)
45 or older	3893	12.92 (11.86-13.98)	46.51 (38.98-50.97)	64.19 (60.67-72.00)	113.33 (104.59-119.53)
All ages	11912	10.94 (10.14-11.73)	39.51 (37.29-42.91)	59.62 (57.03-61.84)	106.84 (104.59-114.55)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-15. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population by Age and Gender - As Consumed (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	8.19 (6.53-9.84)	32.28 (26.78-37.33)	43.09 (37.99-51.55)	95.19 (63.26-113.96)
15 - 44	2891	14.25 (12.96-15.55)	47.13 (41.95-55.83)	71.58 (64.74-82.11)	120.84 (110.69-132.79)
45 or older	2340	17.86 (16.19-19.52)	56.70 (54.13-62.99)	81.94 (74.63-88.23)	130.51 (122.02-140.21)
All ages	6662	14.13 (13.07-15.18)	46.44 (43.63-49.67)	70.23 (67.27-73.91)	120.22 (112.06-126.07)
Males					
14 or under	1546	9.42 (7.60-11.25)	34.85 (27.77-42.09)	52.85 (49.93-62.50)	98.36 (71.74-132.39)
15 - 44	2151	19.46 (17.75-21.18)	68.60 (65.74-74.70)	93.65 (85.60-96.96)	149.07 (142.73-154.41)
45 or older	1553	20.45 (18.41-22.49)	64.44 (61.33-69.27)	87.21 (85.33-100.19)	168.49 (143.78-174.55)
All ages	5250	17.31 (16.04-18.59)	60.23 (56.91-62.99)	85.69 (80.61-93.32)	143.91 (135.35-154.15)
Both Sexes					
14 or under	2977	8.82 (7.39-10.24)	32.88 (27.97-37.11)	50.95 (44.64-53.86)	98.33 (86.40-113.96)
15 - 44	5042	16.74 (15.54-17.94)	57.88 (56.00-60.85)	84.59 (79.91-90.83)	138.21 (122.84-149.15)
45 or older	3893	19.03 (17.54-20.52)	61.32 (56.00-65.74)	86.21 (77.42-94.70)	143.91 (131.12-171.37)
All ages	11912	15.65 (14.67-16.63)	55.02 (51.38-56.00)	78.34 (75.21-80.56)	133.46 (125.27-140.21)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-16. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population Aged 18 Years and Older by Habitat - As Consumed

		Grams/day		
			90% Interval	
Habitat	Statistic	Estimate	Lower Bound	Upper Bound
Fresh/Estuarine	Mean	5.59	4.91	6.28
	50th %	0.00	0.00	0.00
	90th %	17.80	14.89	20.63
	95th %	39.04	36.13	42.16
	99th %	86.30	81.99	96.67
Marine	Mean	12.42	11.55	13.29
	50th %	0.00	0.00	0.00
	90th %	45.98	44.48	48.34
	95th %	64.08	61.61	68.05
	99th %	111.38	101.94	120.49
All Fish	Mean	18.01	16.85	19.17
	50th %	0.00	0.00	0.00
	90th %	60.64	57.06	64.63
	95th %	86.25	80.29	91.00
	99th %	142.96	134.23	154.15

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Note: Estimates are projected from a sample of 8,478 individuals of age 18 and older to the U.S. population of 177,807,000 individuals of age 18 and older using 3-year combined survey weights.
Source: U.S. EPA, 1996a.

Table 10-17. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population by Age and Gender - As Consumed (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	67.12 (46.16-88.09)	57.30 (0.00-128.52)	460.16 (218.56-559.86)	1356.54 (1295.24-2118.93)
15 - 44	2891	66.22 (55.35-77.08)	174.96 (115.11-205.05)	451.04 (421.65-505.49)	1188.16 (977.85-1278.63)
45 or older	2340	78.29 (63.27-93.30)	273.63 (209.63-300.11)	548.66 (466.18-633.87)	1251.00 (1038.97-1324.90)
All ages	6662	70.32 (60.09-80.55)	177.91 (132.69-212.30)	497.30 (442.20-558.85)	1269.76 (1093.19-1328.24)
Males					
14 or under	1546	73.93 (44.89-102.96)	28.10 (8.86-231.33)	723.93 (423.52-785.58)	1290.10 (1279.82-1355.11)
15 - 44	2151	75.35 (62.00-88.70)	230.13 (132.30-309.85)	577.84 (410.09-706.31)	1132.23 (1028.61-1416.47)
45 or older	1553	86.75 (70.91-102.58)	291.50 (230.15-364.24)	584.96 (512.66-630.77)	1231.60 (1115.58-1566.68)
All ages	5250	78.36 (69.10-87.61)	231.57 (186.27-276.04)	589.22 (549.64-630.09)	1265.10 (1133.18-1355.11)
Both Sexes					
14 or under	2977	70.59 (53.29-87.89)	53.24 (0.00-118.48)	556.34 (417.11-683.80)	1347.67 (1279.82-1390.82)
15 - 44	5042	70.58 (61.27-79.89)	197.11 (154.78-229.29)	502.26 (410.09-604.29)	1167.57 (1021.96-1279.82)
45 or older	3893	82.12 (70.19-94.05)	286.93 (228.49-332.88)	566.30 (505.10-625.21)	1251.55 (1115.58-1324.90)
All ages	11912	74.16 (65.74-82.57)	204.00 (177.97-225.16)	547.64 (505.10-565.37)	1274.55 (1197.29-1324.90)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-18. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population by Age and Gender - As Consumed (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	256.90 (207.04-306.76)	936.94 (723.73-1055.43)	1545.15 (1260.24-1760.26)	3060.22 (2403.50-4354.46)
15 - 44	2891	159.79 (142.76-176.82)	573.49 (493.39-663.16)	873.73 (780.56-929.55)	1700.21 (1578.65-1815.48)
45 or older	2340	191.08 (171.33-210.83)	644.33 (608.39-725.83)	978.84 (881.06-1103.01)	1694.58 (1488.32-1791.84)
All ages	6662	190.61 (172.89-208.33)	658.64 (627.61-700.33)	1024.76 (958.94-1096.14)	1979.45 (1793.40-2137.78)
Males					
14 or under	1546	230.25 (188.33-272.17)	846.57 (734.83-987.18)	1504.37 (1320.60-1749.26)	2885.08 (2631.87-3430.60)
15 - 44	2151	165.92 (147.73-184.12)	626.85 (593.90-680.90)	933.05 (833.43-982.30)	1472.98 (1411.97-1525.47)
45 or older	1553	164.37 (144.87-183.87)	621.00 (562.90-691.03)	839.06 (800.23-946.97)	1422.94 (1293.89-1791.31)
All ages	5250	181.08 (163.00-199.15)	670.19 (622.62-714.53)	981.87 (934.45-1071.54)	1923.63 (1802.17-1972.86)
Both Sexes					
14 or under	2977	243.31 (202.43-284.18)	873.87 (741.53-1093.69)	1522.52 (1371.10-1587.20)	3059.93 (2732.63-3430.60)
15 - 44	5042	162.72 (148.13-177.31)	602.58 (564.88-648.54)	893.82 (856.58-940.85)	1576.09 (1503.11-1697.71)
45 or older	3893	178.99 (164.13-193.84)	628.06 (555.84-700.65)	914.67 (825.21-1040.75)	1568.85 (1483.71-1760.74)
All ages	11912	186.06 (170.81-201.31)	663.00 (627.39-717.18)	991.96 (960.40-1044.69)	1942.17 (1815.48-2042.99)

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-19. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population by Age and Gender - As Consumed (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	324.02 (264.25-383.80)	1091.52 (929.29-1407.54)	1690.99 (1513.97-2072.35)	3982.60 (3219.32-4568.45)
15 - 44	2891	226.01 (205.01-247.01)	755.51 (641.02-879.29)	1126.02 (975.49-1269.56)	2195.86 (1762.90-2310.54)
45 or older	2340	269.37 (243.36-295.38)	862.18 (796.63-955.82)	1296.64 (1186.00-1344.85)	2147.32 (1791.84-2354.25)
All ages	6662	260.93 (239.15-282.72)	873.61 (796.63-911.89)	1323.29 (1269.56-1418.85)	2361.12 (2272.41-2598.14)
Males					
14 or under	1546	304.17 (251.91-356.43)	1172.17 (1085.62-1320.60)	1575.43 (1496.19-1943.82)	3393.84 (2731.95-3733.22)
15 - 44	2151	241.27 (219.25-263.29)	867.70 (814.06-919.25)	1208.43 (1101.68-1266.32)	1760.48 (1611.45-1851.26)
45 or older	1553	251.12 (225.48-276.76)	797.83 (762.30-858.52)	1122.80 (1041.28-1266.18)	1922.33 (1786.53-2275.93)
All ages	5250	259.43 (239.81-279.06)	894.96 (842.29-938.16)	1298.95 (1224.82-1366.86)	2346.64 (1972.86-2631.87)
Both Sexes					
14 or under	2977	313.90 (268.42-359.38)	1128.26 (1005.58-1320.60)	1679.91 (1546.20-1848.43)	3419.49 (3184.04-3733.22)
15 - 44	5042	233.30 (216.16-250.44)	828.12 (771.73-868.89)	1155.30 (1102.57-1212.19)	2003.46 (1787.65-2182.19)
45 or older	3893	261.10 (240.34-281.87)	818.10 (771.23-882.53)	1249.97 (1101.32-1323.53)	1967.01 (1796.52-2257.50)
All ages	11912	260.22 (242.60-277.83)	880.47 (844.35-918.79)	1308.54 (1267.15-1346.71)	2356.54 (2224.54-2556.68)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-20. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population Aged 18 Years and Older by Habitat - As Consumed

			90% Interval	
Habitat	Statistic	Estimate	Lower Bound	Upper Bound
Fresh/Estuarine	Mean	75.56	66.37	84.75
	50th %	0.00	0.00	0.00
	90th %	242.49	205.05	277.26
	95th %	547.61	493.47	587.37
	99th %	1,171.84	1,123.52	1,252.78
Marine	Mean	172.86	160.73	184.99
	50th %	0.00	0.00	0.00
	90th %	624.83	598.84	670.34
	95th %	911.05	877.29	952.66
	99th %	1,573.20	1,468.43	1,713.17
All Fish	Mean	248.42	232.19	264.64
	50th %	0.00	0.00	0.00
	90th %	829.02	791.06	872.61
	95th %	1,197.36	1,133.18	1,264.74
	99th %	2,014.67	1,839.55	2,180.87

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Note: Estimates are projected from a sample of 8,478 individuals of age 18 and older to the population of 177,807,000 individuals of age 18 and older using 3-year combined survey weights.
Source: U.S. EPA, 1996a.

Table 10-21. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only by Age and Gender - As Consumed (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	138	38.44	91.30	128.97	182.66
15 - 44	445	61.40	148.83	185.44	363.56
45 or older	453	62.49	150.67	214.91	296.69
All ages	1036	58.82 (51.57-66.06)	145.65 (130.73-152.24)	190.28 (173.88-219.03)	330.41 (259.20-526.69)
Males					
14 or under	157	52.44	112.05	154.44	230.74
15 - 44	356	81.56	224.01	275.02	371.53
45 or older	343	82.23	192.31	255.68	449.09
All ages	856	77.50 (70.21-84.80)	197.93 (169.51-224.85)	253.48 (216.54-290.00)	404.65 (371.63-421.60)
Both Sexes					
14 or under	295	45.73	108.36	136.24	214.62
15 - 44	801	71.44	180.67	230.95	371.52
45 or older	796	71.81	174.54	231.38	427.73
All ages	1892	68.00 (61.92-74.07)	170.84 (158.74-181.79)	224.78 (212.91-245.98)	374.74 (336.50-431.34)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Acute Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-22. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only by Age and Gender - As Consumed (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	315	69.04	114.23	162.37	336.59
15 - 44	774	76.53	149.78	178.74	271.06
45 or older	715	85.24	167.11	218.35	264.8
All ages	1804	78.47 (74.43-82.51)	155.38 (147.00-166.64)	195.15 (179.12-212.07)	279.79 (263.48-336.17)
Males					
14 or under	348	78.44	160.97	190.68	336.98
15 - 44	565	104.57	191.29	227.56	316.69
45 or older	467	101.46	188.77	259.85	333.18
All ages	1380	98.59 (93.16-104.03)	184.53 (173.46-194.13)	224.89 (210.00-250.28)	328.18 (310.42-348.49)
Both Sexes					
14 or under	663	73.62	153.2	176.9	337.24
15 - 44	1339	89.93	171.88	209.17	308.06
45 or older	1182	92.19	178.33	223.82	314.44
All ages	3184	87.77 (83.74-91.80)	169.39 (167.00-173.65)	209.50 (198.11-221.73)	320.41 (292.80-341.88)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Acute Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-23. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only by Age and Gender - As Consumed (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	378	69.54	126.22	165.27	338.04
15 - 44	952	88.8	170.01	212.56	361.04
45 or older	879	96.47	184.42	226.25	310.12
All ages	2209	88.47 (83.98-92.97)	170.10 (166.63-173.88)	220.56 (201.97-236.00)	340.71 (289.17-368.51)
Males					
14 or under	429	79.72	161.62	190	308.59
15 - 44	702	124.78	230.77	296.66	397.7
45 or older	587	119.44	224.82	262.43	434.28
All ages	1718	114.18 (108.79-119.56)	219.96 (209.17-229.91)	272.49 (254.99-301.51)	411.68 (371.43-447.85)
Both Sexes					
14 or under	807	74.8	153.7	178.08	337.46
15 - 44	1654	106.06	203.33	271.66	372.77
45 or older	1466	106.62	209.34	254.69	407.14
All ages	3927	100.63 (96.66-104.60)	197.44 (188.74-205.12)	253.38 (231.51-264.45)	371.59 (359.29-401.61)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Acute Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-24. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only Aged 18 Years and Older by Habitat - As Consumed

			90% Interval	
Habitat	Statistic	Estimate	Lower Bound	Upper Bound
Fresh/Estuarine	Mean	70.91	64.16	77.65
n = 1,541	50th %	42.45	37.24	46.91
N = 37,166,000	90th %	176.58	165.08	193.26
	95th %	230.41	224.00	255.55
	99th %	402.56	358.58	518.41
Marine	Mean	91.49	87.35	95.64
n = 2,432	50th %	77.56	74.89	78.52
N = 57,830,000	90th %	172.29	168.00	182.00
	95th %	215.62	201.99	225.63
	99th %	313.05	292.80	324.81
All Fish	Mean	106.39	102.37	110.41
n = 3,007	50th %	85.36	84.00	87.36
N = 70,949,000	90th %	206.76	197.84	213.00
	95th %	258.22	241.00	266.86
	99th %	399.26	336.50	423.56

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Note: Consumers only are individuals who consumed fish at least once during the 3-day reporting period; n = sample size; N = population size. Estimates are projected from a sample of consumers only 18 years of age and older to the population of consumers only 18 years of age and older using 3-year combined survey weights. The population for this survey consisted of individuals in the 48 conterminous states.
Source: U.S. EPA, 1996a.

Table 10-25. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumers Only by Age and Gender - As Consumed (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females	0	0	0	0	0
14 or under	138	1639.20	3915.56	6271.09	10113.24
15 - 44	445	961.58	2578.81	3403.75	6167.24
45 or older	453	927.85	2229.97	2894.18	4338.36
All ages	1036	1037.29 (905.50-1169.09)	2582.5 (2248.8-2734.5)	3434.16 (2927.72-3979.82)	6923.5 (4757.8-9134.9)
Males	0	0	0	0	0
14 or under	157	1798.24	3759.29	3952.99	7907.38
15 - 44	356	1004.96	2744.61	3348.86	4569.62
45 or older	343	992.11	2448.54	3281.38	5716.41
All ages	856	1117.74 (1011.55-1223.94)	2789.95 (2526.87-3132.65)	3399.26 (3256.87-3907.77)	5259.97 (4834.34-6593.97)
Both Sexes	0	0	0	0	0
14 or under	295	1721.99	3760.67	4208.18	9789.49
15 - 44	801	983.19	2616.63	3360.85	5089.78
45 or older	796	958.20	2394.21	3121.09	5157.95
All ages	1892	1076.80 (980.00-1173.61)	2695.81 (2546.77-2819.33)	3399.46 (3132.65-3839.47)	6526.10 (5270.61-6931.61)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-26. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumers Only by Age and Gender - As Consumed (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	315	2591.57	5074.80	6504.67	9970.44
15 - 44	774	1227.41	2469.67	3007.98	4800.68
45 or older	715	1293.99	2642.60	3565.34	4237.73
All ages	1804	1486.90 (1400.58-1573.23)	2992.38 (2841.13-3303.96)	3961.24 (3768.48-4192.13)	6521.73 (5792.54-7794.41)
Males					
14 or under	348	2471.15	4852.33	5860.72	8495.57
15 - 44	565	1302.62	2390.20	2882.91	3887.23
45 or older	467	1242.49	2251.43	2877.73	4016.80
All ages	1380	1505.19 (1411.84-1598.55)	2899.23 (2797.30-3199.05)	3836.02 (3563.32-4581.61)	5859.85 (5247.79-7895.62)
Both Sexes					
14 or under	663	2532.95	5068.69	6376.47	8749.02
15 - 44	1339	1263.35	2464.80	2961.92	4251.47
45 or older	1182	1271.92	2461.37	3383.46	4220.78
All ages	3184	1495.37 (1422.63-1568.12)	2956.38 (2838.46-3083.70)	3887.52 (3770.65-4113.22)	6510.73 (5772.57-6852.01)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-27. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumer Only by Age and Gender - As Consumed (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	378	2683.51	5299.68	7160.73	12473.65
15 - 44	952	1414.54	2726.46	3740.83	6703.25
45 or older	879	1449.43	2838.76	3736.61	4693.94
All ages	2209	1637.08 (1546.08-1728.08)	3122.82 (2992.63-3308.93)	4312.16 (3969.22-4710.75)	7163.38 (6852.67-7794.41)
Males					
14 or under	429	2568.93	4714.97	5818.08	9350.89
15 - 44	702	1545.93	2854.49	3773.51	5254.04
45 or older	587	1451.06	2841.35	3366.84	5091.31
All ages	1718	1715.79 (1636.68-1794.90)	3399.26 (3290.97-3766.18)	4244.32 (4015.03-4581.61)	6818.35 (5792.54-7588.15)
Both Sexes					
14 or under	807	2624.35	5020.14	6904.83	10384.82
15 - 44	1654	1477.57	2798.37	3747.88	5386.43
45 or older	1466	1450.15	2839.04	3515.81	4922.99
All ages	3927	1674.31 (1606.79-1741.83)	3299.54 (3133.69-3462.35)	4258.69 (4065.32-4483.83)	7126.90 (6644.11-7794.41)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-28. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumers Only Aged 18 Years and Older by Habitat - As Consumed

		Milligrams/kilogram/person/day		
			90% Interval	
Habitat	Statistic	Estimate	Lower Bound	Upper Bound
Fresh/Estuarine	Mean	959.15	867.58	1,050.72
n = 1,541	50th %	601.88	532.31	656.86
N = 37,166,000	90th %	2,442.97	2,233.16	2,606.66
	95th %	3,116.28	2,839.90	3,303.96
	99th %	5,151.98	4,432.30	6,931.61
Marine	Mean	1,270.78	1,214.65	1,326.90
n = 2,432	50th %	1,062.93	1,019.60	1,087.06
N = 57,830,000	90th %	2,467.68	2,331.88	2,585.09
	95th %	3,116.74	2,906.16	3,264.98
	99th %	4,250.22	4,037.74	4,387.96
All Fish	Mean	1,461.71	1,406.34	1,517.09
n = 3,007	50th %	1,189.29	1,156.77	1,225.43
N = 70,949,000	90th %	2,802.28	2,685.81	2,868.73
	95th %	3,588.11	3,308.93	3,798.54
	99th %	5,355.90	5,095.58	5,766.99

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Note: Consumers only are individuals who consumed fish at least once during the 3-day reporting period; n = sample size; N = population size
Estimates are projected from a sample of consumers only 18 years of age and older to the population of consumers only 18 years of age and older using 3-year combined survey weights. The population for this survey consisted of individuals in the 48 conterminous states.
Source: U.S. EPA, 1996a.

Table 10-29. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population by Age and Gender - Uncooked Fish Weight (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	1.99 (1.34-2.64)	1.81 (0.00-4.63)	15.88 (7.89-18.38)	46.82 (36.72-54.55)
15 - 44	2891	5.50 (4.53-6.48)	13.62 (9.99-18.11)	36.68 (32.53-40.31)	94.93 (75.74-114.34)
45 or older	2340	6.65 (5.30-8.00)	24.18 (18.11-27.41)	46.91 (37.94-52.92)	108.90 (92.06-123.72)
All ages	6662	5.13 (4.37-5.88)	13.31 (10.48-16.67)	35.63 (28.92-40.07)	94.61 (77.70-109.09)
Males					
14 or under	1546	2.69 (1.62-3.76)	1.07 (0.33-8.67)	18.47 (14.39-25.91)	57.07 (47.32-65.37)
15 - 44	2151	7.87 (6.46-9.29)	22.10 (13.43-31.80)	63.26 (50.62-70.12)	126.61 (108.54-162.80)
45 or older	1553	8.87 (7.32-10.43)	28.74 (24.23-33.07)	61.15 (52.57-71.59)	125.90 (112.28-147.62)
All ages	5250	6.91 (6.07-7.75)	19.00 (14.99-23.69)	51.43 (47.32-54.82)	112.11 (108.54-127.19)
Both Sexes					
14 or under	2977	2.35 (1.70-3.00)	1.72 (0.00-5.00)	17.46 (12.78-18.68)	50.14 (43.58-55.00)
15 - 44	5042	6.64 (5.71-7.56)	18.30 (14.99-21.14)	47.31 (36.22-59.65)	109.66 (94.43-127.19)
45 or older	3893	7.66 (6.50-8.81)	26.11 (21.95-28.85)	52.92 (45.73-61.51)	113.10 (107.18-133.74)
All ages	11912	5.98(5.29-6.67)	15.89(14.39-17.76)	40.03(37.94-44.75)	107.63(98.25-109.09)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-30. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population by Age and Gender - Uncooked Fish Weight (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	8.61 (6.67-10.56)	31.23 (26.85-37.29)	49.75 (41.46-57.49)	104.26 (83.35-140.07)
15 - 44	2891	12.84 (11.51-14.18)	46.66 (38.35-54.30)	72.16 (63.12-77.18)	133.69 (121.33-142.82)
45 or older	2340	16.26 (14.68-17.84)	56.01 (50.00-61.97)	84.71 (75.05-93.29)	131.43 (112.07-156.01)
All ages	6662	13.05 (11.97-14.12)	46.70 (44.49-49.72)	72.22 (65.55-75.47)	130.73 (121.33-137.18)
Males					
14 or under	1546	9.40 (7.36-11.45)	31.32 (25.20-44.12)	65.37 (54.60-73.39)	118.42 (82.34-176.52)
15 - 44	2151	17.11 (15.31-18.90)	66.06 (62.21-73.20)	93.32 (81.26-106.67)	155.16 (136.77-181.18)
45 or older	1553	17.22 (15.19-19.25)	62.64 (59.39-68.44)	84.96 (79.93-99.44)	146.78 (142.58-185.44)
All ages	5250	15.27 (13.86-16.68)	61.12 (56.59-63.09)	81.89 (77.91-87.16)	147.09 (134.55-174.31)
Both Sexes					
14 or under	2977	9.02 (7.28-10.75)	31.52 (30.19-35.75)	56.35 (50.22-62.25)	117.75 (91.82-140.07)
15 - 44	5042	14.88 (13.57-16.19)	55.99 (53.04-61.33)	80.70 (75.19-87.16)	138.23 (128.40-157.23)
45 or older	3893	16.69 (15.34-18.04)	59.12 (52.84-64.53)	84.92 (76.67-93.32)	142.92 (134.55-155.13)
All ages	11912	14.11(13.07-15.14)	52.10(47.83-55.93)	76.51(74.58-80.89)	138.22(132.98-155.13)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-31. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population by Age and Gender - Uncooked Fish Weight (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	10.60 (8.40-12.81)	41.10 (35.80-47.57)	56.16 (49.78-65.55)	130.78 (83.35-160.66)
15 - 44	2891	18.35 (16.67-20.02)	62.21 (54.47-73.56)	93.13 (82.29-108.03)	155.75 (137.18-174.31)
45 or older	2340	22.91 (20.78-25.04)	74.56 (65.37-79.67)	107.66 (97.64-111.71)	159.97 (157.17-173.74)
All ages	6662	18.17 (16.82-19.53)	61.08 (56.94-63.12)	92.03 (86.94-96.11)	157.08 (147.34-168.83)
Males					
14 or under	1546	12.09 (9.70-14.49)	45.59 (34.69-53.11)	68.18 (64.28-79.90)	127.20 (87.29-176.52)
15 - 44	2151	24.98 (22.79-27.17)	87.15 (80.89-94.63)	122.29 (111.05-124.83)	197.15 (179.86-198.87)
45 or older	1553	26.09 (23.52-28.67)	81.76 (76.67-88.03)	112.33 (109.65-130.36)	211.20 (190.74-223.72)
All ages	5250	22.18 (20.52-23.83)	76.13 (74.22-79.92)	110.88 (108.54-118.56)	180.90 (174.39-198.87)
Both Sexes					
14 or under	2977	11.36 (9.49-13.24)	43.00 (34.69-47.32)	65.34 (56.28-68.51)	130.41 (107.12-160.66)
15 - 44	5042	21.51 (19.97-23.06)	75.15 (73.56-79.71)	109.57 (106.72-117.47)	175.73 (162.80-198.63)
45 or older	3893	24.35 (22.46-26.24)	77.57 (72.07-84.02)	110.13 (100.42-119.87)	180.74 (164.76-210.75)
All ages	11912	20.08(18.82-21.35)	70.11 (65.37-74.20)	102.01 (99.26-106.67)	173.18 (162.80-176.52)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-32. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for the U.S. Population Aged 18 Years and Older by Habitat - Uncooked Fish Weight

			90% Interval	
Habitat	Statistic	Estimate	Lower Bound	Upper Bound
Fresh/Estuarine	Mean	7.09	6.22	7.96
	50th %	0.00	0.00	0.00
	90th %	21.72	18.52	25.82
	95th %	49.89	47.32	54.67
	99th %	111.13	107.18	116.38
Marine	Mean	16.01	14.89	17.12
	50th %	0.00	0.00	0.00
	90th %	59.35	56.59	61.49
	95th %	82.95	80.37	88.36
	99th %	142.78	131.02	156.89
All Fish	Mean	23.10	21.62	24.58
	50th %	0.00	0.00	0.00
	90th %	76.84	74.37	80.13
	95th %	110.28	106.67	115.32
	99th %	177.44	171.73	198.63

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
NOTE: Estimates are projected from a sample of 8,478 individuals of age 18 and older to the U.S. population of 177,807,000 individuals of age 18 and older using 3-year combined survey weights.
Source: U.S. EPA, 1996a.

Table 10-33. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population by Age and Gender - Uncooked Fish Weight (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	84.78 (58.06-111.50)	70.75 (0.00-143.13)	599.06 (266.71-722.58)	1713.06 (1511.78-2313.50)
15 - 44	2891	85.15 (70.68-99.62)	202.83 (153.48-259.97)	584.79 (538.05-631.86)	1411.42 (1236.72-1659.15)
45 or older	2340	98.97 (79.89-118.04)	333.38 (269.96-379.98)	733.74 (606.36-820.68)	1561.40 (1331.46-1667.88)
All ages	6662	89.54 (76.51-102.58)	225.51 (176.38-280.11)	625.30 (552.99-713.85)	1558.08 (1394.99-1659.15)
Males					
14 or under	1546	91.62 (55.18-128.05)	38.98 (12.26-281.50)	868.97 (485.33-1063.50)	1642.60 (1599.78-1693.88)
15 - 44	2151	96.91 (78.91-114.90)	281.17 (165.37-387.46)	740.91 (546.79-850.52)	1589.97 (1353.43-1992.23)
45 or older	1553	107.87 (88.47-127.28)	361.99 (304.96-455.29)	702.35 (628.25-810.62)	1612.49 (1344.07-1848.39)
All ages	5250	98.86 (87.19-110.52)	292.58 (217.42-342.11)	755.53 (677.47-790.85)	1596.61 (1538.89-1711.41)
Both Sexes					
14 or under	2977	88.26 (66.69-109.83)	66.00 (0.00-143.13)	717.37 (485.60-880.64)	1688.55 (1511.78-1824.44)
15 - 44	5042	90.77 (78.37-103.16)	250.26 (194.04-289.19)	631.31 (538.05-773.91)	1529.94 (1352.50-1659.15)
45 or older	3893	103.00 (87.86-118.15)	345.69 (291.80-423.39)	719.81 (637.94-790.85)	1590.13 (1373.97-1668.93)
All ages	11912	93.99 (83.41-104.57)	251.82 (222.54-282.58)	677.66 (631.86-729.11)	1593.28 (1511.78-1659.15)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-34. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population by Age and Gender - Uncooked Fish Weight (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	333.99 (267.25-400.72)	1132.99 (864.83-1407.24)	1959.91 (1780.61-2347.02)	3776.60 (3173.86-5736.90)
15 - 44	2891	206.03 (183.95-228.11)	762.54 (617.86-857.55)	1137.58 (1036.38-1211.86)	2174.21 (2014.41-2393.16)
45 or older	2340	246.73 (221.45-272.00)	829.52 (777.87-944.26)	1236.00 (1174.14-1413.34)	2161.65 (1952.51-2303.80)
All ages	6662	246.47 (223.28-269.66)	847.60 (811.19-893.29)	1305.49 (1215.53-1385.66)	2615.85 (2365.65-2857.62)
Males					
14 or under	1546	296.99 (241.85-352.13)	1089.46 (1003.46-1256.97)	1907.65 (1685.30-2186.58)	3723.81 (3274.93-4574.13)
15 - 44	2151	212.88 (190.31-235.44)	800.79 (741.29-859.61)	1191.75 (1096.61-1245.94)	1890.42 (1685.30-1969.63)
45 or older	1553	212.15 (187.25-237.04)	792.86 (747.56-890.31)	1100.20 (1039.02-1210.66)	1842.38 (1749.67-2219.32)
All ages	5250	233.07 (209.65-256.49)	859.01 (798.27-907.76)	1255.35 (1204.46-1382.05)	2520.94 (2263.58-2733.15)
Both Sexes					
14 or under	2977	315.12 (260.95-369.29)	1123.28 (993.12-1371.24)	1909.37 (1785.09-2062.64)	3820.21 (3370.59-4574.13)
15 - 44	5042	209.30 (190.68-227.92)	780.16 (722.86-843.41)	1174.69 (1104.42-1215.53)	2019.59 (1918.45-2237.22)
45 or older	3893	231.06 (212.18-249.95)	813.12 (747.56-907.76)	1193.22 (1076.85-1333.72)	2029.16 (1863.17-2219.32)
All ages	11912	240.07 (220.14-260.01)	855.63 (809.67-909.76)	1271.54 (1227.16-1371.24)	2575.29 (2393.16-2708.59)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-35. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population by Age and Gender - Uncooked Fish Weight (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	1431	418.76 (339.58-497.95)	1389.10 (1150.77-1785.09)	2341.90 (2062.64-2860.52)	4985.96 (3971.54-5736.90)
15 - 44	2891	291.18 (263.86-318.50)	993.92 (854.63-1127.32)	1436.00 (1234.66-1631.25)	2726.50 (2406.11-3044.81)
45 or older	2340	345.69 (312.49-378.90)	1122.26 (1050.15-1230.68)	1669.72 (1556.83-1784.37)	2684.71 (2303.80-3064.38)
All ages	6662	336.01 (307.83-364.20)	1120.91 (1054.05-1172.38)	1720.84 (1642.63-1855.69)	3093.76 (2973.66-3265.54)
Males					
14 or under	1546	388.61 (320.66-456.56)	1476.31 (1371.24-1632.55)	2038.58 (1909.00-2631.42)	4294.12 (3556.31-4574.13)
15 - 44	2151	309.78 (281.55-338.02)	1096.57 (1044.57-1194.06)	1566.39 (1410.20-1609.35)	2275.15 (2047.18-2465.77)
45 or older	1553	320.02 (287.79-352.25)	1013.05 (955.37-1096.43)	1459.73 (1340.97-1601.79)	2392.05 (2233.16-2806.51)
All ages	5250	331.93 (306.46-357.40)	1126.66 (1081.06-1225.66)	1621.80 (1599.78-1696.20)	3031.31 (2806.51-3274.93)
Both Sexes					
14 or under	2977	403.38 (343.65-463.12)	1442.72 (1279.82-1672.75)	2191.90 (2021.16-2536.75)	4425.27 (4000.27-4669.59)
15 - 44	5042	300.06 (277.94-322.19)	1040.98 (1003.55-1097.08)	1514.82 (1421.34-1572.40)	2481.23 (2383.54-2773.15)
45 or older	3893	334.07 (307.87-360.26)	1069.14 (978.95-1140.98)	1579.43 (1373.97-1696.20)	2653.45 (2292.45-2806.51)
All ages	11912	334.06 (311.25-356.88)	1123.14 (1090.76-1178.95)	1684.23 (1620.48-1718.51)	3092.77 (2973.66-3250.20)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Source: U.S. EPA, 1996a.

Table 10-36. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for the U.S. Population Aged 18 Years and Older by Habitat - Uncooked Fish Weight

			90% Interval	
Habitat	Statistic	Estimate	Lower Bound	Upper Bound
Fresh/Estuarine	Mean	95.99	84.30	107.69
	50th %	0.00	0.00	0.00
	90th %	306.74	259.97	334.58
	95th %	677.39	626.01	734.34
	99th %	1,547.81	1,411.56	1,599.78
Marine	Mean	222.86	207.34	238.37
	50th %	0.00	0.00	0.00
	90th %	810.43	778.50	859.61
	95th %	1,190.45	1,145.61	1,219.60
	99th %	2,033.92	1,870.09	2,263.58
All Fish	Mean	318.85	298.20	339.49
	50th %	0.00	0.00	0.00
	90th %	1,061.14	1,016.87	1,105.01
	95th %	1,548.77	1,464.72	1,609.14
	99th %	2,559.07	2,444.24	2,764.50

Percentile intervals were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
NOTE: Estimates are projected from a sample of 8,478 individuals of age 18 and older to the population of 177,807,000 individuals of age 18 and older using 3-year combined survey weights.
Source: U.S. EPA, 1996a.

Table 10-37. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only by Age and Gender - Uncooked Fish Weight (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	138	48.3	117.27	161.44	230.63
15 - 44	445	78.56	191.95	242.76	472.21
45 or older	453	78.77	192.32	258.56	368.84
All ages	1036	74.67 (65.46-83.88)	181.08 (171.19-197.59)	239.59 (220.69-284.70)	409.00 (345.96-671.54)
Males					
14 or under	157	64.91	141.35	193.79	287.28
15 - 44	356	104.86	269.96	343.66	494.38
45 or older	343	102.56	234.28	326.96	539.77
All ages	856	98.12 (88.60-107.64)	246.93 (212.93-283.90)	324.53 (283.28-381.58)	499.19 (488.41-532.32)
Both Sexes					
14 or under	295	56.95	134.89	166.32	262.87
15 - 44	801	91.66	237.27	322.06	494.64
45 or older	796	90	220.76	295.41	523.94
All ages	1892	86.19 (78.41-93.97)	217.92 (205.28-237.27)	290.04 (267.10-325.61)	489.29 (424.87-534.20)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-38. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only by Age and Gender - Uncooked Fish Weight (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	315	89.92	169.23	198.62	432.51
15 - 44	774	98.53	194.59	231.22	317.42
45 or older	715	110	214.73	279.67	345.37
All ages	1804	101.30 (95.90-106.69)	195.37 (186.67-213.33)	252.43 (231.53-278.16)	372.17 (314.67-428.00)
Males					
14 or under	348	101.5	205.49	242.28	408.68
15 - 44	565	133.86	244.46	297.67	393.14
45 or older	467	131.2	243.33	327.14	428.72
All ages	1380	126.85 (119.75-133.94)	238.64 (225.57-247.01)	296.68 (279.95-316.81)	425.98 (403.66-481.95)
Both Sexes					
14 or under	663	95.56	189.32	231.72	442.87
15 - 44	1339	115.41	223.99	263.76	383.16
45 or older	1182	119.08	226.55	288.16	418.23
All ages	3184	113.11 (107.79-118.43)	222.67 (216.50-225.56)	271.70 (260.62-279.95)	415.88 (367.26-440.45)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-39. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only by Age and Gender - Uncooked Fish Weight (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	378	89.73	163.47	204.14	476.56
15 - 44	952	114.04	220.63	277.69	461.54
45 or older	879	123.61	236.3	298.66	397.43
All ages	2209	113.58 (107.69-119.47)	220.44 (206.27-226.80)	287.08 (257.09-312.42)	448.57 (393.68-531.63)
Males					
14 or under	429	102.01	205.25	244.46	386.47
15 - 44	702	160.06	305.61	379.38	495.51
45 or older	587	152.52	292.95	350.26	555.11
All ages	1718	146.18 (138.99-153.38)	283.46 (261.72-297.95)	350.99 (328.70-382.33)	520.51 (488.41-591.47)
Both Sexes					
14 or under	807	96.07	195.35	232.85	466.09
15 - 44	1654	136.12	262.15	343.86	488.9
45 or older	1466	136.38	263.95	326.94	510.25
All ages	3927	129.00 (123.74-134.27)	249.09 (240.99-264.10)	326.00 (306.02-335.58)	497.54 (469.23-519.67)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-40. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (g/day) for Consumers Only Aged 18 Years and Older by Habitat - Uncooked Fish Weight

Habitat	Statistic	Estimate	90% Interval	
			Lower Bound	Upper Bound
Fresh/Estuarine	Mean	89.88	81.41	98.35
n = 1,541	50th %	53.64	46.44	57.81
N = 37,166,000	90th %	223.11	206.58	237.27
	95th %	296.89	283.90	325.61
	99th %	502.93	448.23	654.55
Marine	Mean	117.83	112.47	123.20
n = 2,432	50th %	98.79	95.69	100.76
N = 57,830,000	90th %	225.51	222.67	234.00
	95th %	279.50	261.47	289.44
	99th %	403.48	369.10	427.73
All Fish	Mean	136.33	131.11	141.55
n = 3,007	50th %	111.50	108.53	112.00
N = 70,949,000	90th %	262.03	253.24	272.71
	95th %	328.66	323.61	340.52
	99th %	506.02	435.44	531.63

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Note: Consumers only are individuals who consumed fish at least once during the 3-day reporting period; n = sample size; and N = population size. Estimates are projected from a sample of consumers only 18 years of age and older to the population of consumers only 18 years of age and older using 3-year combined survey weights. The population for this survey consisted of individuals in the 48 conterminous states.
Source: U.S. EPA, 1996a.

Table 10-41. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumers Only by Age and Gender - Uncooked Fish Weight (Freshwater and Estuarine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	138	2070.41	4450.54	6915.31	13269.61
15 - 44	445	1229.97	3045.41	4191.25	7711.43
45 or older	453	1171.17	2886.48	3519.87	5577.34
All ages	1036	1317.18 (1150.10-1484.26)	3250.31 (2988.81-3491.38)	4240.89 (3710.16-5025.02)	8912.52 (6385.55-11533.98)
Males					
14 or under	157	2229.31	4638.34	5071.41	9622.15
15 - 44	356	1294.27	3318.89	4275.83	5974.96
45 or older	343	1235.55	2898.00	4097.24	7217.68
All ages	856	1411.35 (1278.61-1544.08)	3579.06 (3225.84-4060.30)	4615.66 (4121.91-5081.65)	6594.61 (5980.19-7944.55)
Both Sexes					
14 or under	295	2153.11	4634.82	5756.93	12388.27
15 - 44	801	1261.99	3276.06	4246.63	6625.15
45 or older	796	1201.57	2892.52	3981.84	6378.11
All ages	1892	1363.44 (1242.24-1484.65)	3325.14 (3232.58-3676.99)	4408.18 (4085.55-4781.34)	7957.50 (6979.20-8920.99)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-42. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumers Only by Age and Gender - Uncooked Fish Weight (Marine)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females	0	0	0	0	0
14 or under	315	3359.10	6058.97	8573.62	13050.09
15 - 44	774	1582.77	3129.41	3854.14	5961.80
45 or older	715	1669.73	3429.24	4397.07	5476.02
All ages	1804	1920.77 (1804.28-2037.26)	3793.20 (3618.55-4328.00)	5083.63 (4953.40-5552.65)	8576.60 (7527.83-9743.01)
Males	0	0	0	0	0
14 or under	348	3180.45	6434.20	8089.26	10764.01
15 - 44	565	1666.42	3102.24	3651.10	4998.14
45 or older	467	1604.71	2931.17	3725.63	5373.82
All ages	1380	1934.12 (1812.97-2055.28)	3736.16 (3548.08-4072.42)	4884.60 (4454.15-5710.83)	8066.96 (6852.67-9869.52)
Both Sexes	0	0	0	0	0
14 or under	663	3272.13	6278.74	8424.77	11838.54
15 - 44	1339	1622.75	3120.60	3682.17	5517.95
45 or older	1182	1641.87	3320.87	4328.34	5406.76
All ages	3184	1926.95 (1829.50-2024.39)	3752.89 (3631.98-4001.16)	5018.74 (4852.08-5267.31)	8448.28 (7215.72-9136.89)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-43. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumer Only by Age and Gender - Uncooked Fish Weight (All Fish)

Age	Sample Size	Mean (90% C.I.)	90th % (90% B.I.)	95th % (90% B.I.)	99th % (90% B.I.)
Females					
14 or under	378	3448.73	7100.43	9012.18	15381.13
15 - 44	952	1818.32	3506.20	4661.96	8789.33
45 or older	879	1857.64	3520.90	4740.11	6561.13
All ages	2209	2102.20 (1982.89-2221.51)	4092.51 (3842.15-4282.08)	5545.07 (5080.72-6007.28)	9630.23 (8166.44-9796.61)
Males					
14 or under	429	3273.63	5734.46	7570.83	11891.85
15 - 44	702	1983.16	3720.05	4769.44	6121.56
45 or older	587	1850.69	3534.61	4311.83	6374.34
All ages	1718	2193.24 (2089.20-2297.28)	4385.06 (4121.91-4776.34)	5351.38 (5055.10-5727.01)	8596.82 (7816.70-10199.24)
Both Sexes					
14 or under	807	3358.33	6333.46	8611.73	12406.35
15 - 44	1654	1897.40	3674.88	4709.78	7276.18
45 or older	1466	1854.57	3522.43	4615.22	6440.17
All ages	3927	2145.26 (2055.92-2234.61)	4223.91 (4085.76-4454.15)	5477.86 (5163.33-5686.04)	9171.52 (8605.35-9796.61)

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Consumers only are individuals with reported fish consumption at least once during the three day reporting period.
Source: U.S. EPA, 1996a.

Table 10-44. Per Capita Distribution of Fish (Finfish and Shellfish) Intake (mg/kg-day) for Consumers Only Aged 18 Years and Older by Habitat - Uncooked Fish Weight

Habitat	Statistic	Estimate	90% Interval Lower Bound	90% Interval Upper Bound
Fresh/Estuarine	Mean	1,216.82	1,101.74	1,331.90
n = 1,541	50th %	740.93	639.11	822.65
N = 37,166,000	90th %	3,050.95	2,931.26	3,270.80
	95th %	4,025.44	3,639.76	4,121.91
	99th %	6,638.62	6,007.28	8,920.99
Marine	Mean	1,637.10	1,564.27	1,709.92
n = 2,432	50th %	1,370.42	1,302.29	1,422.69
N = 57,830,000	90th %	3,169.02	3,006.55	3,328.98
	95th %	3,926.74	3,632.70	4,156.98
	99th %	5,452.75	5,353.12	5,596.31
All Fish	Mean	1,873.84	1,801.93	1,945.75
n = 3,007	50th %	1,515.91	1,477.99	1,570.40
N = 70,949,000	90th %	3,599.04	3,443.64	3,676.99
	95th %	4,665.15	4,264.03	4,812.97
	99th %	7,022.47	6,459.64	7,294.80

Percentile intervals (B.I.) were estimated using the percentile bootstrap method with 1,000 bootstrap replications.
Note: Consumers only are individuals who consumed fish at least once during the 3-day reporting period; n = sample size; and N = population size. Estimates are projected from a sample of consumers only 18 years of age and older to the population of consumers only 18 years of age and older using 3-year combined survey weights. The population for this survey consisted of individuals in the 48 conterminous states.
Source: U.S. EPA, 1996a.

Table 10-45. Distribution of Quantity of Fish Consumed (in grams) Per Eating Occasion, by Age and Sex

			Percentiles						
Age (years)-Sex Group	Mean	SD	5th	25th	50th	75th	90th	95th	99th
1-2 Male-Female	52	38	8	28	43	58	112	125	168
3-5 Male-Female	70	51	12	36	57	85	113	170	240
6-8 Male-Female	81	58	19	40	72	112	160	170	288
9-14 Male	101	78	28	56	84	113	170	255	425
9-14 Female	86	62	19	45	79	112	168	206	288
15-18 Male	117	115	20	57	85	142	200	252	454
15-18 Female	111	102	24	56	85	130	225	270	568
19-34 Male	149	125	28	64	113	196	284	362	643
19-34 Female	104	74	20	57	85	135	184	227	394
35-64 Male	147	116	28	80	113	180	258	360	577
35-64 Female	119	98	20	57	85	152	227	280	480
65-74 Male	145	109	35	75	113	180	270	392	480
65-74 Female	123	87	24	61	103	168	227	304	448
75+ Male	124	68	36	80	106	170	227	227	336
75+ Female	112	69	20	61	112	151	196	225	360
Overall	117	98	20	57	85	152	227	284	456

Source: Pao et al., 1982.

Table 10-46. Mean Fish Intake in a Day, by Sex and Age[a]

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

[a] Based on USDA Nationwide Food Consumption Survey 1987-88 data for one day.
[b] Intake for users only was calculated by dividing the per capita consumption rate by the fraction of the population consuming fish in one day.
Source: USDA, 1992b.

Table 10-47. Percent of Respondents That Responded Yes, No, or Don't Know to Eating Seafood in 1 Month (including shellfish, eels, or squid)

Population Group	Total N	Response: No N	No %	Yes N	Yes %	DK N	DK %
Overall	4663	1811	38.8	2780	59.6	72	1.5
Gender							
*	2	1	50.0	1	50.0	*	*
Male	2163	821	38.0	1311	60.6	31	1.4
Female	2498	989	39.6	1468	58.8	41	1.6
Age (years)							
*	84	25	29.8	42	50.0	17	20.2
1-4	263	160	60.8	102	38.8	1	0.4
5-11	348	177	50.9	166	47.7	5	1.4
12-17	326	179	54.9	137	42.0	10	3.1
18-64	2972	997	33.5	1946	65.5	29	1.0
>64	670	273	40.7	387	57.8	10	1.5
Race							
*	60	20	33.3	22	36.7	18	30.0
White	3774	1475	39.1	2249	59.6	50	1.3
Black	463	156	33.7	304	65.7	3	0.6
Asian	77	21	27.3	56	72.7	*	*
Some Others	96	39	40.6	56	58.3	1	1.0
Hispanic	193	100	51.8	93	48.2	*	*
Hispanic							
*	46	10	21.7	412	43.0	28	41.3
No	4243	1625	31.2	1366	67.7	21	1.2
Yes	348	165	35.4	236	62.3	9	*
DK	26	11	40.4	766	58.5	14	*
Employment							
*	958	518	54.1	412	43.0	28	2.9
Full Time	2017	630	31.2	1366	67.7	21	1.0
Part Time	379	134	35.4	236	62.3	9	2.4
Not Employed	1309	529	40.4	766	58.5	14	1.1
Education							
*	1021	550	53.9	434	42.5	37	3.6
< High School	399	196	49.1	198	49.6	45	1.3
High School Graduate	1253	501	40.0	739	59.0	13	1.0
< College	895	304	34.0	584	65.3	7	0.8
College Graduate	650	159	24.5	484	74.5	7	1.1
Post Graduate	445	101	22.7	341	76.6	3	0.7
Census Region							
Northeast	1048	370	35.3	655	62.5	23	2.2
Midwest	1036	449	43.3	575	55.5	12	1.2
South	1601	590	36.9	989	61.8	22	1.4
West	978	402	41.1	561	57.4	15	1.5
Day of Week							
Weekday	3156	1254	39.7	1848	58.6	54	1.7
Weekend	1507	557	37.0	932	61.8	18	1.2
Season							
Winter	1264	462	36.6	780	61.7	22	1.7
Spring	1181	469	39.7	691	58.5	21	1.8
Summer	1275	506	39.7	745	58.4	24	1.9
Fall	943	374	39.7	564	59.8	5	0.5
Asthma							
No	4287	1674	39.0	2563	59.8	50	1.2
Yes	341	131	38.4	207	60.7	3	0.9
DK	35	6	17.7	10	28.6	19	54.3
Angina							
No	4500	1750	38.9	2698	60.0	52	1.2
Yes	125	56	44.8	68	54.4	1	0.8
DK	38	50	13.2	14	36.8	19	50.0
Bronchitis/Emphysema							
No	4424	1726	9.0	2648	59.6	50	1.1
Yes	203	80	39.4	121	59.6	2	1.0
DK	36	5	13.9	11	30.6	20	55.6

Note: * = Missing data; DK = Don't know; % = Row percentage; N = Sample size
Source: Tsang and Klepeis, 1996.

Table 10-48. Number of Respondents Reporting Consumption of a Specified Number of Servings of Seafood in 1 Month

Population Group	Total N	Number of Servings in a Month					
		1-2	3-5	6-10	11-19	20+	DK
Overall	2780	918	990	519	191	98	64
Gender							
*	1311	405	458	261	101	57	29
Male	1468	512	532	258	90	41	35
Female	1	1	*	*	*	*	*
Age (years)							
*	42	13	16	5	4	1	3
1-4	102	55	29	12	2	*	4
5-11	166	72	57	21	6	4	6
12-17	137	68	54	9	2	1	3
18-64	1946	603	679	408	145	79	32
>64	387	107	155	64	32	13	16
Race							
*	2249	731	818	428	155	76	41
White	304	105	103	56	16	10	14
Black	56	15	17	11	5	5	3
Asian	56	22	18	6	5	3	2
Some Others	93	41	25	14	9	2	2
Hispanic	22	4	9	4	1	2	2
Hispanic							
*	2566	844	922	480	175	88	57
No	182	68	52	34	15	8	5
Yes	15	5	8	2	*	*	*
DK	17	1	8	3	1	2	2
Employment							
*	399	190	140	40	11	5	13
Full Time	1366	407	466	307	107	57	22
Part Time	236	70	95	46	14	8	3
Not Employed	766	249	285	124	57	26	25
Refused	13	2	4	2	2	2	1
Education							
*	434	205	149	47	12	7	14
< High School	198	88	62	20	6	10	12
High School Graduate	739	267	266	119	46	21	20
< College	584	161	219	122	48	26	8
College Graduate	484	115	183	121	43	17	5
Post Graduate	341	82	111	90	36	17	5
Census Region							
Northeast	655	191	241	137	62	12	12
Midwest	575	199	221	102	17	22	14
South	989	336	339	175	70	41	28
West	561	192	189	105	42	23	10
Day of Week							
Weekday	1848	602	661	346	129	70	40
Weekend	932	316	329	173	62	28	24
Season							
Winter	780	262	284	131	60	28	15
Spring	691	240	244	123	45	25	14
Summer	745	220	249	160	59	31	26
Fall	564	196	213	105	27	14	9
Asthma							
No	2563	846	917	475	180	88	57
Yes	207	69	71	42	11	9	5
DK	10	3	2	2	*	1	2
Angina							
No	2698	896	960	509	183	95	55
Yes	68	19	27	8	7	1	6
DK	14	3	3	2	1	2	3
Bronchitis/Emphysema							
No	2648	877	940	495	185	91	60
Yes	121	37	47	23	6	6	2
DK	11	4	3	1	*	1	2

Note: * = Missing data; DK = Don't know; % = Row percentage; N = Sample size; Refused = Respondent refused to answer.
Source: Tsang and Klepeis, 1996.

Table 10-49. Numer of Respondents Reporting Monthly Consumption of Seafood That Was Purchased or Caught by Someone They Knew					
Population Group	Total N	*	Mostly Purchased	Mostly Caught	DK
Overall	2780	3	2584	154	39
Gender					
*	1311	1	1206	85	19
Male	1468	2	1377	69	20
Female	1	*	1	*	*
Age (years)					
*	42	*	39	3	*
1-4	102	*	94	8	*
5-11	166	*	153	9	4
12-17	137	*	129	6	2
18-64	1946	3	1810	106	27
>64	387	*	359	22	6
Race					
*	2249	1	2092	124	32
White	304	1	280	19	4
Black	56	*	50	4	2
Asian	56	*	55	*	1
Some Others	93	*	86	7	*
Hispanic	22	1	21	*	*
Hispanic					
*	2566	2	2387	140	37
No	182	*	169	13	*
Yes	15	*	12	1	2
DK	17	1	16	*	*
Employment					
*	399	*	368	25	6
Full Time	1366	2	1285	64	15
Part Time	236	1	217	15	3
Not Employed	766	*	701	50	15
Refused	13	*	13	*	*
Education					
*	434	*	401	26	7
< High School	198	*	174	20	4
High School Graduate	739	*	680	48	11
< College	584	2	547	28	7
College Graduate	484	*	460	19	5
Post Graduate	341	1	322	13	5
Census Region					
Northeast	655	2	627	21	5
Midwest	575	*	547	20	8
South	989	1	897	73	18
West	561	*	513	40	8
Day of Week					
Weekday	1848	2	1724	100	22
Weekend	932	1	860	54	17
Season					
Winter	780	*	741	35	4
Spring	691	*	655	27	9
Summer	745	2	674	54	15
Fall	564	1	514	38	11
Asthma					
No	2563	2	2384	142	35
Yes	207	1	190	12	4
DK	10	*	10	*	*
Angina					37
No	2698	3	2507	151	2
Yes	68	*	63	3	*
DK	14	*	14	*	
Bronchitis/Emphysema					
No	2648	3	2457	149	39
Yes	121	*	116	5	*
DK	11	*	11	*	*

Note: * = Missing data; DK = Don't know; N = Sample size; Refused = Respondent refused to answer.
Source: Tsang and Klepeis, 1996.

Table 10-50. Estimated Number of Participants in Marine Recreational Fishing by State and Subregion

Subregion	State	Coastal Participants	Non Coastal Participants	Out of State [a]	Total Participants [a]
Pacific	So. California	902	8	159	910
	N. California	534	99	63	633
	Oregon	265	19	78	284
	TOTAL	1,701	126		
North Atlantic	Connecticut	186	*[b]	47	186
	Maine	93	9	100	102
	Massachusetts	377	69	273	446
	New Hampshire	34	10	32	44
	Rhode Island	97	*	157	97
	TOTAL	787	88		
Mid-Atlantic	Delaware	90	*	159	90
	Maryland	540	32	268	572
	New Jersey	583	9	433	592
	New York	539	13	70	552
	Virginia	294	29	131	323
	TOTAL	1,046	83		
South Atlantic	Florida	1,201	*	741	1,201
	Georgia	89	61	29	150
	N. Carolina	398	224	745	622
	S. Carolina	131	77	304	208
	TOTAL	1,819	362		
Gulf of Mexico	Alabama	95	9	101	104
	Florida	1,053	*	1,349	1,053
	Louisiana	394	48	63	442
	Mississippi	157	42	51	200
	TOTAL	1,699	99		
	GRAND TOTAL	8,053	760		

[a] Not additive across states. One person can be counted as "OUT OF STATE" for more than one state.
[b] An asterisk (*) denotes no non-coastal counties in state.
Source: NMFS, 1993.

Table 10-51. Estimated Weight of Fish Caught (Catch Type A and B1) by Marine Recreational Fishermen, by Wave and Subregion

	Atlantic and Gulf		Pacific	
	Region	Weight (1000 kg)	Region	Weight (1000 kg)
Jan/Feb	South Atlantic	1,060	So. California	418
	Gulf	3,683	N. California	101
			Oregon	165
	TOTAL	4,743	TOTAL	684
Mar/Apr	North Atlantic	310	So. California	590
	Mid Atlantic	1,030	N. California	346
	South Atlantic	1,913	Oregon	144
	Gulf	3,703	TOTAL	1,080
	TOTAL	6,956		
			So.California	1,195
May/Jun	North Atlantic	3,272	N. California	563
	Mid Atlantic	4,815	Oregon	581
	South Atlantic	4,234	TOTAL	2,339
	Gulf	5,936		
	TOTAL	18,257	So. California	1,566
			N. California	1,101
Jul/Aug	North Atlantic	4,003	Oregon	39
	Mid Atlantic	9,693	TOTAL	2,706
	South Atlantic	4,032		
	Gulf	5,964	So. California	859
	TOTAL	23,692	N. California	1,032
			Oregon	724
Sep/Oct	North Atlantic	2,980	TOTAL	2,615
	Mid Atlantic	7,798		
	South Atlantic	3,296	So. California	447
	Gulf	7,516	N. California	417
	TOTAL	21,590	Oregon	65
			TOTAL	929
Nov/Dec	North Atlantic	456		
	Mid Atlantic	1,649	GRAND TOTAL	10,353
	South Atlantic	2,404		
	Gulf	4,278		
	TOTAL	8,787		
	GRAND TOTAL	84,025		

Source: NMFS, 1993.

Table 10-52. Average Daily Intake (g/day) of Marine Finfish, by Region and Coastal Status

	Intake Among Anglers				
Region[a]	Mean	95th Percentile	Per-Capita (Coastal)[b]	Per-Capita (Coastal & Non-Coastal)[c]	Proportion of Population Coastal
N. Atlantic	6.2	20.1	1.2	1.1	0.82
Mid-Atlantic	6.3	18.9	1.2	0.9	0.70
S. Atlantic	4.7	15.9	1.5	1.0	0.51
All Atlantic	5.6	18.0	1.3	0.9	0.66
Gulf	7.2	26.1	3.0	1.9	0.60
S. California	2.0	5.5	0.2	0.2	0.96
N. California	2.0	5.7	0.3	0.3	0.70
Oregon	2.2	8.9	0.5	0.5	0.87
All Pacific	2.0	6.8	0.3	0.3	0.86

[a] N. Atlantic - ME, NH, MA, RI, and CT; Mid-Atlantic - NY, NJ, MD, DE, and VA; S. Atlantic - NC, SC, GA, and FL (Atlantic Coast); Gulf - AL, MS, LA, and FL (Gulf Coast).
[b] Mean intake rate among entire coastal population of region.
[c] Mean intake rate among entire population of region.
Source: NMFS, 1993.

Table 10-53. Estimated Weight of Fish Caught (Catch Type A and B1)[a] by Marine Recreational Fishermen by Species Group and Subregion, Atlantic and Gulf

	North Atlantic (1,000 kg)	Mid Atlantic (1,000 kg)	South Atlantic (1,000 kg)	Gulf (1,000 kg)	All Regions (1,000 kg)
Cartilaginous fishes	66	1,673	162	318	2,219
Eels	14	9	*[b]	0[c]	23
Herrings	118	69	1	89	177
Catfishes	0	306	138	535	979
Toadfishes	0	7	0	*	7
Cods and Hakes	2,404	988	4	0	1,396
Searobins	2	68	*	*	70
Sculpins	1	*	0	0	1
Temperate Basses	837	2,166	22	4	2,229
Sea Basses	22	2,166	644	2,477	5,309
Bluefish	4,177	3,962	1,065	158	5,362
Jacks	0	138	760	2,477	3,375
Dolphins	65	809	2,435	1,599	4,908
Snappers	0	*	508	3,219	3,727
Grunts	0	9	239	816	1,064
Porgies	132	417	1,082	2,629	4,160
Drums	3	2,458	2,953	9,866	15,280
Mullets	1	43	382	658	1,084
Barracudas	0	*	356	244	600
Wrasses	783	1,953	46	113	2,895
Mackerels and Tunas	878	3,348	4,738	4,036	13,000
Flounders	512	4,259	532	377	5,680
Triggerfishes/Filefishes	0	48	109	544	701
Puffers	*	16	56	4	76
Other fishes	105	72	709	915	1,801

[a] For Catch Type A and B1, the fish were not thrown back.
[b] An asterisk (*) denotes data not reported.
[c] Zero (0) = < 1000 kg.
Source: NMFS, 1993.

Table 10-54. Estimated Weight of Fish Caught (Catch Type A and B1)[a] by Marine Recreational Fishermen by Species Group and Subregion, Pacific

Species Group	Southern California (1,000 kg)	Northern California (1,000 kg)	Oregon (1,000 kg)	Total
Cartilaginous fish	35	162	1	198
Sturgeons	0[b]	89	13	102
Herrings	10	15	40	65
Anchovies	*[c]	7	0	7
Smelts	0	71	0	71
Cods and Hakes	0	0	0	0
Silversides	58	148	0	206
Striped Bass	0	51	0	51
Sea Basses	1,319	17	0	1,336
Jacks	469	17	1	487
Croakers	141	136	0	277
Sea Chubs	53	1	0	54
Surfperches	74	221	47	342
Pacific Barracuda	866	10	0	876
Wrasses	73	5	0	78
Tunas and Mackerels	1,260	36	1	1,297
Rockfishes	409	1,713	890	3,012
California Scorpionfish	86	0	0	86
Sablefishes	0	0	5	5
Greenlings	22	492	363	877
Sculpins	6	81	44	131
Flatfishes	106	251	5	362
Other fishes	89	36	307	432

[a] For Catch Type A and B1, the fish were not thrown back.
[b] Zero (0) = <1000 kg.
[c] An asterisk (*) denotes data not reported.
Source: NMFS, 1993.

Table 10-55. 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 (years)		
< 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.

Table 10-56. Cumulative Distribution of Total Fish/Shellfish Consumption by Surveyed Sport Fishermen in the Metropolitan Los Angeles Area

Percentile	Intake rate (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

Source: Puffer et al. (1981).

Table 10-57. Catch Information for Primary Fish Species Kept by Sport Fishermen (n = 1059)

Species	Average Weight (Grams)	Percent of Fishermen who Caught
White Croaker	153	34
Pacific Mackerel	334	25
Pacific Bonito	717	18
Queenfish	143	17
Jacksmelt	223	13
Walleye Perch	115	10
Shiner Perch	54	7
Opaleye	307	6
Black Perch	196	5
Kelp Bass	440	5
California Halibut	1752	4
Shellfish[a]	421	3

[a] Crab, mussels, lobster, abalone.
Source: Modified from Puffer et al., 1981.

Table 10-58. 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.

Table 10-59. Selected Percentile Consumption Estimates (g/day) for the Survey and Total Angler Populations Based on the Reanalysis of the Puffer et al. (1981) and Pierce et al. (1981) Data

	50th Percentile	90th Percentile
Survey Population		
Puffer et al. (1981)	37	225
Pierce et al. (1981)	19	155
Average	28	190
Total Angler Population		
Puffer et al. (1981)	2.9[a]	35[b]
Pierce et al. (1981)	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.

Table 10-60. Means and Standard Deviations of Selected Characteristics by Subpopulation Groups in Everglades, Florida

Variables (N[a]=330)	Mean ± Std. Dev.[b]	Range
Age (years)	38.6 ± 18.8	2 - 81
Sex		
Female	38%	--
Male	62%	--
Race/ethnicity		
Black	46%	--
White	43%	--
Hispanic	11%	--
Number of Years Fished	15.8 ± 15.8	0 - 70
Number Per Week Fished in Past 6 Months of Survey Period	1.8 ± 2.5	0 - 20
Number Per Week Fished in Last Month of Survey Period	1.5 ± 1.4	0 - 12
Aware of Health Advisories	71%	--

[a] Number of respondents who reported consuming fish
[b] Std. Dev. = standard deviation
Source: U.S. DHHS, 1995

Table 10-61. Mean Fish Intake Among Individuals Who Eat Fish and Reside in Households With Recreational Fish Consumption

Group	All Fish meals/week	Recreational Fish meals/week	n	Total Fish grams/day	Recreational Fish grams/day	Total Fish grams/ kg/day	Recreational Fish grams/ kg/day
All household members	0.686	0.332	2196	21.9	11.0	0.356	0.178
Respondents (i.e., licensed anglers)	0.873	0.398	748	29.4	14.0	0.364	0.168
Age Groups (years)							
1-5	0.463	0.223	121	11.4	5.63	0.737	0.369
6 to 10	0.49	0.278	151	13.6	7.94	0.481	0.276
1 to 20	0.407	0.229	349	12.3	7.27	0.219	0.123
21 to 40	0.651	0.291	793	22	10.2	0.306	0.139
40 to 60	0.923	0.42	547	29.3	14.2	0.387	0.186
60 to 70	0.856	0.431	160	28.2	14.5	0.377	0.193
71 to 80	1.0	0.622	45	32.3	20.1	0.441	0.271
80+	0.8	0.6	10	26.5	20	0.437	0.345

Source: U.S. EPA analysis using data from West et al., 1989.

Table 10-62. Comparison of Seven-Day Recall and Estimated Seasonal Frequency for Fish Consumption

Usual Fish Consumption Frequency Category	Mean Fish Meals/Week 7-day Recall Data	Usual frequency Value Selected for Data Analysis (times/week)
Almost daily	no data	4 [if needed]
2-4 times a week	1.96	2
Once a week	1.19	1.2
2-3 times a month	0.840 (3.6 times/month)	0.7 (3 times/month)
Once a month	0.459 (1.9 times/month)	0.4 (1.7 times/month)
Less often	0.306 (1.3 times/month)	0.2 (0.9 times/month)

Source: U.S. EPA analysis using data from West et al., 1989.

Table 10-63. Distribution of Usual Fish Intake Among Survey Main Respondents Who Fished and Consumed Recreationally Caught Fish

	All Fish Meals/Week	Recreational Fish Meals/Week	All Fish Intake grams/day	Recreational Fish Intake grams/day	All Fish Intake grams/ kg/day	Recreational Fish Intake grams/kg/day
n	738	738	738	738	726	726
mean	0.859	0.447	27.74	14.42	0.353	0.1806
10%	0.300	0.040	9.69	1.29	0.119	0.0159
25%	0.475	0.125	15.34	4.04	0.187	0.0504
50%	0.750	0.338	24.21	10.90	0.315	0.1357
75%	1.200	0.672	38.74	21.71	0.478	0.2676
90%	1.400	1.050	45.20	33.90	0.634	0.4146
95%	1.800	1.200	58.11	38.74	0.747	0.4920

Source: U.S. EPA analysis using data from West et al., 1989.

Table 10-64. 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, streams 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: Chemrisk, 1991; Ebert et al., 1993.

Table 10-65. Analysis of Fish Consumption by Ethnic Groups for "All Waters" (g/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.
d Calculated by rank without any assumption of statistical distribution.
e Fish consumption rate recommended by U.S. EPA (1984) for use in establishing ambient water quality standards.
Source: Chemrisk, 1991.

Table 10-66. 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 (x10³) Consumed	Quantity Consumed (#)	Grams (x10³) Consumed	Quantity Consumed (#)	Grams (x10³) 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.

Table 10-67. Mean Sport-Fish Consumption by Demographic Variables, Michigan Sport Anglers Fish Consumption Study, 1991-1992

	N	Mean (g/day)	95% C.I.
Income[a]			
<$15,000	290	21.0	16.3 - 25.8
$15,000 - $24,999	369	20.6	15.5 - 25.7
$25,000 - $39,999	662	17.5	15.0 - 20.1
>$40,000	871	14.7	12.8 - 16.7
Education			
Some High School	299	16.5	12.9 - 20.1
High School Degree	1,074	17.0	14.9 - 19.1
Some College-College Degree	825	17.6	14.9 - 20.2
Post Graduate	231	14.5	10.5 - 18.6
Residence Size[b]			
Large City/Suburb (>100,000)	487	14.6	11.8 - 17.3
Small City (20,000-100,000)	464	12.9	10.7 - 15.0
Town (2,000-20,000)	475	19.4	15.5 - 23.3
Small Town (100-2,000)	272	22.8	16.8 - 28.8
Rural, Non Farm	598	17.7	15.1 - 20.3
Farm	140	15.1	10.3 - 20.0
Age (years)			
16-29	266	18.9	13.9 - 23.9
30-39	583	16.6	13.5 - 19.7
40-49	556	16.5	13.4 - 19.6
50-59	419	16.5	13.6 - 19.4
60+	596	16.2	13.8 - 18.6
Sex[a]			
Male	299	17.5	15.8 - 19.1
Female	1,074	13.7	11.2 - 16.3
Race/Ethnicity[b]			
Minority	160	23.2	13.4 - 33.1
White	2,289	16.3	14.9 - 17.6

[a] P < .01, F test
[b] P < .05, F test
Source: West et al., 1993

Table 10-68. Distribution of Fish Intake Rates
(from all sources and from sport-caught sources)
For 1992 Lake Ontario Anglers

Percentile of Lake Ontario Anglers	Fish from All Sources (g/day)	Sport-Caught Fish (g/day)
25%	8.8	0.6
50%	14.1	2.2
75%	23.2	6.6
90%	34.2	13.2
95%	42.3	17.9
99%	56.6	39.8

Source. Connelly et al., 1996.

Table 10-69. Mean Annual Fish Consumption (g/day)
for Lake Ontario Anglers, 1992,
by Sociodemographic Characteristics

	Mean Consumption	
Demographic Group	Fish from all Sources	Sport-Caught Fish
Overall	17.9	4.9
Residence		
Rural	17.6	5.1
Small City	20.8	6.3
City (25-100,000)	19.8	5.8
City (> 100,000)	13.1	2.2
Income		
< $20,000	20.5	4.9
$21,000-34,000	17.5	4.7
$34,000-50,000	16.5	4.8
>$50,000	20.7	6.1
Age (years)		
<30	13.0	4.1
30-39	16.6	4.3
40-49	18.6	5.1
50+	21.9	6.4
Education		
< High School	17.3	7.1
High School Graduate	17.8	4.7
Some College	18.8	5.5
College Graduate	17.4	4.2
Some Post Grad.	20.5	5.9

Note - Scheffe's test showed statistically significant differences between residence types (for all sources and sport caught) and age groups (all sources).
Source: Connelly et al., 1996.

Table 10-70. Percentile and Mean Intake Rates for Wisconsin Sport Anglers

Percentile	Annual Number of Sport Caught Meals	Intake Rate of Sport-Caught Meals (g/day)
25th	4	1.7
50th	10	4.1
75th	25	10.2
90th	50	20.6
95th	60	24.6
98th	100	41.1
100th	365	150
Mean	18	7.4

Source: Raw data on sport-caught meals from Fiore et al., 1989. EPA calculated intake rates using a value of 150 grams per fish meal; this value is dervied from Pao et al., 1982.

Table 10-71. Sociodemographic Characteristics of Respondents

Category	Subcategory	Percent of Total[a]
Geographic Distribution	Upper Hudson	18 %
	Mid Hudson	35 %
	Lower Hudson	48 %
Age Distribution (years)	< 14	3 %
	15 - 29	26 %
	30 - 44	35 %
	45 - 59	23 %
	> 60	12 %
Annual Household Income	< $10,000	16 %
	$10 - 29,999	41 %
	$30 - 49,999	29 %
	$50 - 69,999	10 %
	$70 - 89,999	2 %
	> $90,000	3 %
Ethnic Background	Caucasian American	67 %
	African American	21 %
	Hispanic American	10 %
	Asian American	1 %
	Native American	1 %

[a] A total of 336 shore-based anglers were interviewed
Source: Hudson River Sloop Clearwater, Inc., 1993

Table 10-72. 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%	64.8	80.6%
1.6	9.0%	72.9	81.2%
3.2	10.4%	77.0	81.4%
4.0	10.8%	81.0	83.3%
4.9	10.9%	97.2	89.3%
6.5	12.8%	130	92.2%
7.3	12.9%	146	93.7%
8.1	13.7%	162	94.4%
9.7	14.4%	170	94.8%
12.2	14.9%	194	97.2%
13.0	16.3%	243	97.3%
16.2	22.8%	259	97.4%
19.4	24.0%	292	97.6%
20.2	24.1%	324	98.3%
24.3	27.9%	340	98.7%
29.2	28.1%	389	99.0%
32.4	52.5%	486	99.6%
38.9	52.9%	648	99.7%
40.5	56.5%	778	99.9%
48.6	67.6%	972	100%

N = 500
Weighted Mean = 58.7 grams/day (g/d)
Weighted SE = 3.64
90th Percentile: 97.2 g/d < (90th) < 130 g/d
95th Percentile ≈ 170 g/d
99th Percentile = 389 g/d
Source: CRITFC, 1994

Table 10-73. 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 (years)			
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.

Table 10-74. 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
Unweighted SE = 1.94

Source: CRITFC, 1994.

Table 10-75. Sociodemographic Factors and Recent Fish Consumption

	Peak Consumption[a]		Recent Consumption[b]			
	Average[c]	≥3[d] (%)	Walleye	N. Pike	Muskellunge	Bass
All participants (N-323)	1.7	20	4.2	0.3	0.3	0.5
Gender						
Male (n-148)	1.9	26	5.1	0.5[a]	0.5	0.7[a]
Female (n-175)	1.5	15	3.4	0.2	0.1	0.3
Age (y)						
<35 (n-150)	1.8	23	5.3[a]	0.3	0.2	0.7
≥35 (n-173)	1.6	17	3.2	0.4	0.3	0.3
High School Graduate						
No (n-105)	1.6	18	3.6	0.2	0.4	0.7
Yes (n-218)	1.7	21	4.4	0.4	0.2	0.4
Unemployed						
Yes (n-78)	1.9	27	4.8	0.6	0.6	1.1
No (n-245)	1.6	18	4.0	0.3	0.2	0.3

a Highest number of fish meals consumed/week.
b Number of meals of each species in the previous 2 months.
c Average peak fish consumption.
d Percentage of population reporting peak fish consumption of ≥3 fish meals/week.
Source: Peterson et al., 1994.

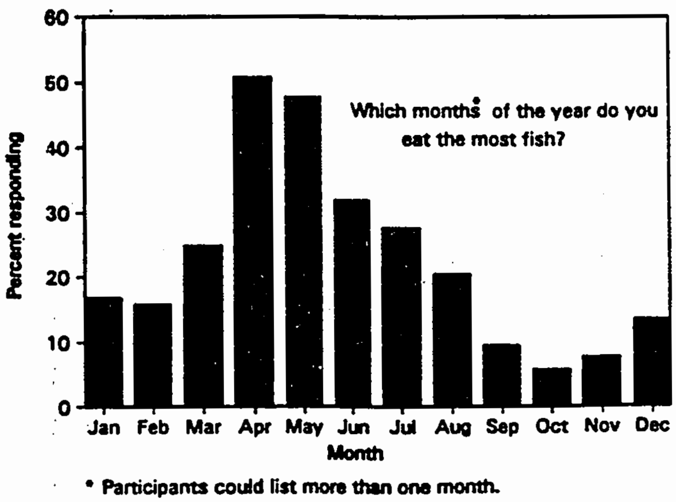

Figure 10-1. Sesonal Fish Consumption: Wisconsin Chippewa, 1990

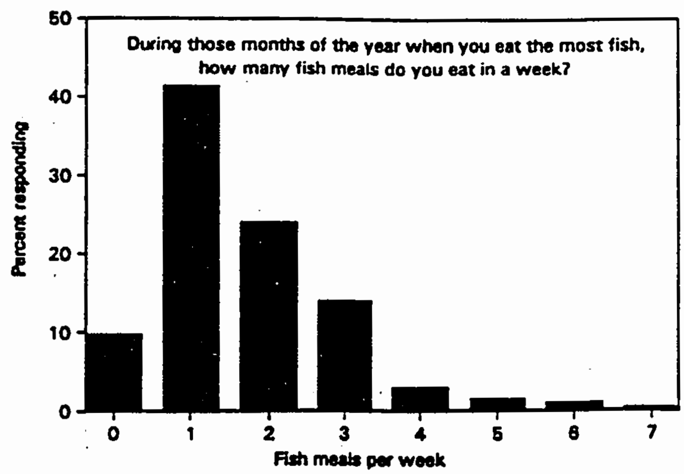

Figure 10-2. Peak Fish Consumption: Wisconsin Chippewa, 1990.

Source: Peterson et al., 1994.

Table 10-76. Number of Local Fish Meals Consumed Per Year by Time Period for All Respondents

Number of Local Fish Meals Consumed Per Year	Time Period											
	During Pregnancy				≤1 Yr. Before Pregnancy[a]				>Yr. Before Pregnancy[b]			
	Mohawk		Control		Mohawk		Control		Mohawk		Control	
	N[c]	%	N[c]	%	N[c]	%	N[c]	%	N[c]	%	N[c]	%
None	63	64.9	109	70.8	42	43.3	99	64.3	20	20.6	93	60.4
1 - 9	24	24.7	24	15.6	40	41.2	31	20.1	42	43.3	35	22.7
10 - 19	5	5.2	7	4.5	4	4.1	6	3.9	6	6.2	8	5.2
20 - 29	1	1.0	5	3.3	3	3.1	3	1.9	9	9.3	5	3.3
30 - 39	0	0.0	2	1.3	0	0.0	3	1.9	1	1.0	1	0.6
40 - 49	0	0.0	1	0.6	1	1.0	1	0.6	1	1.0	1	0.6
50+	4	4.1	6	3.9	7	7.2	11	7.1	18	18.6	11	7.1
Total	97	100.0	154	100.0	97	100.0	154	100.0	97	100.0	154	100.0

[a] $p < 0.05$ for Mohawk vs. Control.
[b] $p < 0.001$ for Mohawk vs. Control.
[c] N = number of respondents.
Source: Fitzgerald et al., 1995.

Table 10-77. Mean Number of Local Fish Meals Consumed Per Year by Time Period for All Respondents and Consumers Only

	All Respondents (N=97 Mohawks and 154 Controls)			Consumers Only (N=82 Mohawks and 72 Controls)		
	During Pregnancy	≤1 Yr. Before Pregnancy	>1 Yr. Before Pregnancy	During Pregnancy	≤1 Yr. Before Pregnancy	>1 Yr. Before Pregnancy
Mohawk	3.9 (1.2)	9.2 (2.3)	23.4 (4.3)[a]	4.6 (1.3)	10.9 (2.7)	27.6 (4.9)
Control	7.3 (2.1)	10.7 (2.6)	10.9 (2.7)	15.5 (4.2)[a]	23.0 (5.1)[b]	23.0 (5.5)

[a] $p < 0.001$ for Mohawk vs. Control.
[b] $p < 0.05$ for Mohawk vs. Control
( ) = standard error.
Test for linear trend:
$p < 0.001$ for Mohawk (All participants and consumers only);
$p = 0.07$ for Controls (All participants and consumers only).
Source: Fitzgerald et al., 1995.

Table 10-78. Mean Number of Local Fish Meals Consumed Per Year by Time Period and Selected Characteristics for All Respondents (Mohawk, N=97; Control, N=154)

	Time Period					
	During Pregnancy		≤1 Year Before Pregnancy		>1 Year Before Pregnancy	
Background Variable	Mohawk	Control	Mohawk	Control	Mohawk	Control
Age (Yrs)						
<20	7.7	0.8	13.5	13.9	27.4	10.4
20 - 24	1.3	5.9	5.7	14.5	20.4	15.9
25 - 29	3.9	9.9	15.5	6.2	25.1	5.4
30 - 34	12.0	7.6	9.5	2.9	12.0	5.6
>34	1.8	11.2	1.8	26.2	52.3	22.1[a]
Education (Yrs)						
<12	6.3	7.9	14.8	12.4	24.7	8.6
12	7.3	5.4	8.1	8.4	15.3	11.4
13 - 15	1.7	10.1	8.0	15.4	29.2	13.3
>15	0.9	6.8	10.7	0.8	18.7	2.1
Cigarette Smoking						
Yes	3.8	8.8	10.4	13.0	31.6	10.9
No	3.9	6.4	8.4	8.3	18.1	10.8
Alcohol Consumption						
Yes	4.2	9.9	6.8	13.8	18.0	14.8
No	3.8	6.3[b]	12.1	4.7[c]	29.8	2.9[d]

[a] F (4,149) = 2.66, p=0.035 for Age Among Controls.
[b] F (1,152) = 3.77, p=0.054 for Alcohol Among Controls.
[c] F (1,152) = 5.20, p=0.024 for Alcohol Among Controls.
[d] F (1,152) = 6.42, p=0.012 for Alcohol Among Controls.
Source: Fitzgerald et al., 1995.

Table 10-79. Percentage of Individuals Using Various Cooking Methods at Specified Frequencies

Study	Use Frequency	Bake	Pan Fry	Deep Fry	Broil or Grill	Poach	Boil	Smoke	Raw	Other
Connelly et al., 1992	Always	24(a)	51	13		24(a)				
	Ever	75(a)	88	59		75(a)				
Connelly et al., 1996	Always	13	4	4						
	Ever	84	72	42						
CRITFC, 1994	At least monthly	79	51	14	27	11	46	31	1	34(b) 29(c) 49(d)
	Ever	98	80	25	39	17	73	66	3	67(b) 71(c) 75(d)
Fitzgerald et al., 1995	Not Specified		94(e)(f)	71(e)(g)						
Puffer et al., 1981	As Primary Method	16.3	52.5	12					0.25	19(h)

[a] 24 and 75 listed as bake, BBQ, or poach
[b] Dried
[c] Roasted
[d] Canned
[e] Not specified whether deep or pan fried
[f] Mohawk women
[g] Control population
[h] boil, stew, soup, or steam

Table 10-80. Percent Moisture and Fat Content for Selected Species[a]

Species	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	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
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

Table 10-80. Percent Moisture and Fat Content for Selected Species[a] (continued)

Species	Moisture Content (%)	Total Fat Content (%)[b]	Comments
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
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
	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

Table 10-80. Percent Moisture and Fat Content for Selected Species[a] (continued)

Species	Moisture Content (%)	Total Fat Content (%)[b]	Comments
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
	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 in the Handbook
[b] Total Fat Content - saturated, monosaturated and polyunsaturated
NA = Not available

Source: USDA, 1979-1984 - U.S. Agricultural Handbook No. 8

Table 10-81. Recommendations - General Population

Mean Intake (g/day)	95th Percentile of Long-term Intake Distribution (g/day)	Study (Reference)
	63 (Value of 42 from Javitz was adjusted upward by 50 percent to account for recent increase in fish consumption)	TRI (Javitz, 1980; Ruffle et al., 1994)
20.1 (Total Fish) 14.1 (Marine Fish) 6.0 (Freshwater/Estuarine Fish)		U.S. EPA Analysis of CSFII, 1989-91

Table 10-82. Recommendations - General Population - Fish Serving Size

Mean Intake (grams)	95th Percentile (grams)	Study (Reference)
129	326	1989-1991 CSFII (U.S. EPA, 1996)

Table 10-83. Recommendations - Recreational Marine Anglers

Mean Intake (g/day)	95th Percentile (g/day)	Study Location	Study
5.6	18.0	Atlantic	NMFS, 1993
7.2	26.0	Gulf	
2.0	6.8	Pacific	

Table 10-84. Recommendations - Freshwater Anglers

Mean Intake (g/day)	Upper Percentile (g/day)	Study Location	Reference
5	13 (95th percentile)	Maine	Ebert et al., 1992
5	18 (95th percentile)	New York	Connelly et al., 1996
12	39 (96th percentile)	Michigan	West et al, 1989
17	---	Michigan	West et al, 1993

Table 10-85. Recommendations - Native American Subsistence Populations			
Per-Capita (or Mean) Intake (g/day)	Upper Percentile (g/day)	Study Population	Reference
59	170 (95th)	4 Columbia River Tribes	CRITFC, 1994
16	---	94 Alaska Communities (Lowest of 94)	Wolfe and Walker, 1989
81	---	94 Alaska Communities (Median of 94)	Wolfe and Walker, 1989
770	---	94 Alaska Communities (Highest of 94)	Wolfe and Walker, 1989

Table 10-86. Summary of Fish Intake Studies

Source of Data (Reference)	Population Surveyed	Survey Time Period/Type	Analyses Performed (References)	Limitations/Advantages
General Population Key Studies				
Javitz, 1980 - TRI Survey	25,162 individuals - general population; the TRI Survey sample	Sept. 1973-Aug. 1974 (1 year survey). Completed diary over 1 month period 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. Lognormal distribution fit to fish intake distribution by age and region by Ruffle et al. (1994).	High response rate (80%); population was large and geographically and seasonally representative; consumption rates based on one month of diary data; survey data is over 20 years out of date
U.S. EPA, 1996a	11,912 individuals - general population	Participants provided 3 consecutive days of dietary data. Three survey years (1989-1991) combined into one data set.	Analysis of CSFII 1989-91. Fish grouped by habitat (freshwater vs. marine) and type (finfish vs. shellfish). Per capita fish intake rates calculated using cooked and uncooked equivalent weight and reported in g/day and g/kg-day; also intake distribution per day eating fish.	Large, geographically representative study; relatively recent. Based on short-term (3 day) data so long-term percentiles of fish intake distribution could not be estimated.
Relevant Studies				
AIHC, 1994	--	--	Distributions using @Risk simulation software.	Limited reviews of supporting studies; good alternative source of information.
Pao et al., 1982	37,874 individuals - general population	Participants provided 3 consecutive days of dietary data. Survey conducted between April 1977 and March 1978.	Mean and distribution of average daily fish intake and average fish intake per eating occasion; by age-sex groups and overall.	Population was large and geographically representative; data were based on short-term dietary recall; data are almost 20 years out of date.
Tsang and Klepeis, 1996	9,386 individuals - general population	Participants provided 24-hour diary data. Follow-up questionnaires, survey conducted between October 1992 and September 1994.	Frequency of eating fish and number of servings per month provided.	Population large and geographically and seasonally balanced; data based on recall; intake data not provided.
USDA, 1992	10,000 individuals-general population	Participants provided 3 consecutive days of dietary data. Survey conducted between April 1987 and March 1988.	Per capita fish intake rates and percent of population consuming fish in one day; by age and sex.	Population was large and geographically and seasonally balanced; data based on short-term dietary recall.

Table 10-86. Summary of Fish Intake Studies (continued)

Source of Data (Reference)	Population Surveyed	Survey Time Period/Type	Analyses Performed (References)	Limitations/Advantages
Recreational-Marine Fish				
Key Study				
NMFS 1986a, b, c; 1993	Atlantic and Gulf Coasts - 41,000 field interviews and 58,000 telephone interviews; Pacific Coast - 38,000 field interviews and 73,000 telephone interviews.	Telephone interviews with residents of coastal counties; information on fishing frequency and mode of fishing trips. Field interviews with marine anglers; information on area and mode fished, fishing frequency, species caught, weight of fish, and whether fish were intended to be consumed.	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; fish caught were weighed in the field. No information on number of potential consumers of catch.
Relevant Studies				
Pierce et al., 1981	~500 anglers in Commencement Bay, Washington	July-November 1980; creel survey interviews conducted consisting of 5 summer days and 4 fall days.	Distribution of fishing frequency; total weight of catch grouped by species. Re-analysis by Price et al. (1994) using inverse fishing frequency as sample weights.	Local survey. Original analysis by Pierce et al. (1981) did not calculate intake rates; analysis over-estimated fishing frequency distribution by oversampling frequent anglers. Re-analysis by Price et. al. (1994) involved several assumptions; thus results are questionable.
Puffer et al., 1981	1,067 anglers in the Los Angeles, California area.	Creel survey conducted for the full 1980 calendar year.	Distribution of sport fish intake rates. Median rates by age, ethnicity and fish species. Re-analysis by Price et al. (1994) using inverse fishing frequency as sample weights.	Local survey. Original (unweighted) analysis over-estimated fish intake by oversampling frequent anglers. Re-analysis by Price et al. (1994) involves several assumptions; thus results are questionable.
U.S. DHHS, 1995	330 everglade residents/ subsistence fishermen or both	1992-1993; questionnaire with demographic information and fishing and eating habits.	Provides data for fishing frequency by sex, age, and ethnicity.	Intake rates were not reported, study not representative of the U.S. population; one of few studies that target subsistence fishermen.

Table 10-86. Summary of Fish Intake Studies (continued)

Source of Data (Reference)	Population Surveyed	Survey Time Period/Type	Analyses Performed (References)	Limitations/Advantages
Recreational Fresh Water Fish				
Key Studies				
Chemrisk, 1991; Ebert et al., 1993	1,612 licensed Maine anglers	1989-1990 ice fishing season and 1990 open water season; mailed survey; one year recall of frequency of fishing trips, number and length of fish species caught.	Mean and distribution of fish consumption rates by ethnic groups and overall. Mean and distribution of fish consumption rates for fish from rivers and streams. EPA analysis of fish intake for household members.	Data based on one year recall; high response rate; area-specific consumption patterns.
Connelly et al., 1996	825 anglers with NY State fishing licenses intending to fish Lake Ontario.	Survey consisted of self-recording information in a diary for 1992 fishing trips and fish consumption.	Distribution of intake rates of sport caught fish.	Meal size estimated by comparison with pictures of 8 oz. fish meals.
West et al., 1993	2,681 persons with Michigan fishing licenses	January 1991 through January 1992; mailed survey; 7-day recall; demographics information requested, and quantity of fish eaten, if any, at each meal based on a photograph of 1/2 lb of fish (more about same, or less).	Mean consumption rate for sport and total fish by demographic category (West et al., 1993) and 50th, 90th, and 95th percentile (U.S. EPA, 1995).	Relatively low response made and only three categories were used to assign fish portion size. Relatively large-scale study and reliance on short-term recall.
West et al., 1989	1,171 Michigan residents with fishing licenses	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 and mean and percentiles of self-caught fish intake based on one year recall.	Weight of fish consumed was estimated using a picture of an 8 oz. fish meal; smaller meals were judged to be 5 oz., larger ones 10 oz.
Relevant Studies				
Connelly et al., 1992	1,030 anglers licensed in New York	Survey mailed out in Jan. 1992; one year recall of the period Oct. 1990-Sept. 1991	Knowledge and effects of fish health advisories. Mean number of sport-caught fish meals.	Response rate of 52.8%; only number of fish mealsreported.
Fiore et al., 1989	801 individuals with Wisconsin fish or sporting licenses	1985 summer; mailed survey; one year recall of sport fish consumption.	Mean number of sport caught fish meals of Wisconsin anglers.	Constant meal size assumed.
Hudson River Sloop Clearwater, Inc. (1993)	336 shore-based anglers	Survey conducted June-November 1991; April-July 1992. Onsite interview with anglers	Knowledge and adherance to health advsisories	Data collected from personal interviews; intake data not provided; fish meal data provided.

Table 10-86. Summary of Fish Intake Studies (continued)

Source of Data (Reference)	Population Surveyed	Survey Time Period/Type	Analyses Performed (References)	Limitations/Advantages
Native American				
Key Studies				
CRITFC, 1994	Four tribes in Washington state; total of 513 adults and 204 children under five	Fall and Winter of 1991-1992; stratified random sampling approach; in-person interviews; information requested included 24-hour dietary recall, seasonal and annual number of fish meals, average weight of fish meals and species consumed.	Mean and distribution of fish intake rates for adults and for children. Mean intake rates by age and gender. Frequency of cooking and preparation methods.	Survey was done at only one time of the year and involved one year recall; fish intake rates were based on all fish sources but great majority was locally caught; study provides consumption and habits for subsistence subpopulation group.
Fitzgerald et al. 1995	97 Mohawk women in New York; 154 Caucasian women; nursing mothers	1988-1992, up to 3-year recall	Mean number of sport-caught fish meals per year.	Survey for nursing mothers only, recall for up to 3 years; small sample size; may be representative of Mohawk women; measured in fish meals.
Petersen et al., 1994	327 residents of Chippewa reservation, Wisconsin	Self-administered questionaire completed in May, 1990.	Mean number of fish meals per year.	Did not distinguish between commercial and sport-caught meals.
Wolfe and Walker, 1987	Ninety-eight communities in Alaska surveyed by various researchers	Surveys conducted between 1980 and 1985; data based on 1-year recall period. Annual per capita harvest of fish, land mammals, marine mammals and other resources estimated for each community.	Distribution among communities of annual per-capita harvests for each resource category.	Data based on 1-year recall; data provided are harvest data that must be converted to individual intake rates; surveyed communities are only a sample of all Alaska communities.

[a] NFMS - National Marine Fisheries Services.

Table 10-87. Confidence in Fish Intake Recommendations for General Population		
Considerations	Rationale	Rating
Study Elements		
• Level of peer review	Peer reviewed by USDA and EPA.	High
• Accessibility	CSFII data are publicly available. Javitz is a contractor report to EPA.	High (CSFII) Medium (Javitz)
• Reproducibility	Enough information is available to reproduce results.	High
• Focus on factor of interest	The studies focused on fish ingestion.	High
• Data pertinent to U.S.	The studies were conducted for U.S. population.	High
• Primary data	The studies are primary studies.	High
• Currency	Studies were conducted from 1973-1974 to 1989-1991.	Medium (mean) Low (Long-Term Distribution)
• Adequacy of data collection period	Long-term distribution are based on one month data collection period.	High (Mean) Medium (Long-term distribution)
• Validity of approach	Data are collected using diaries and one-day recall. However, data adjusted to account for changes in eating pattern.	Medium
• Study size	The Range of samples was 10,000 -37,000.	High
• Representativeness of the population	The data are representative of overall U.S. population.	High
• Characterization of variability	Long-term distribution (generated from 1973-1974 data) was shifted upward based on recent increase in mean consumption.	Medium
• Lack of bias in study design (high rating is desirable)	Response rates were fairly high; there was no obvious source of bias.	High
• Measurement error	Estimates of intake amounts were imprecise.	Medium
Other Elements		
• Number of studies	There was 1 study for the mean, the results of 2 studies were utilized for long-term distribution.	Low
• Agreement between researchers		Medium
Overall Rating		Medium (Mean) Low (Long-term distribution)

Table 10-88. Confidence in Fish Intake Recommendations for Recreational Marine Anglers

Considerations	Rationale	Rating
Study Elements		
• Level of peer review	Data were reviewed by NMFS and EPA.	High
• Accessibility	The analysis of the NMFS data is presented in the Handbook and NMFS data can be found in NMFS publications.	High
• Reproducibility	Enough information is available to reproduce results.	High
• Focus on factor of interest	Studies focused on fish catch rather than fish consumption per se.	Medium
• Data pertinent to U.S.	The studies were conducted in the U.S.	High
• Primary data	Data are from primary studies.	High
• Currency	The data were based on 1993 studies.	High
• Adequacy of data collection period	Data were collected once for each angler. The yearly catch of anglers were estimated from catch on intercepted trip and reported fishing frequency.	Medium
• Validity of approach	The creel survey provided data on fishing frequency and fish weight; telephone survey data provided number of anglers. An average value was used for the number of intended fish consumers and edible fraction.	Medium
• Study size	Studies encompassed a population of over 100,000.	High
• Representativeness of the population	Data were representative of overall U.S. coastal state population.	High
• Characterization of variability	Distributions were generated.	High
• Lack of bias in study design (high rating is desirable)	Response rates were fairly high; There was no obvious source of bias.	High
• Measurement error	Fish were weighed in the field.	High
Other Elements		
• Number of studies	There was 1 study.	Low
• Agreement between researchers	N/A	
Overall Rating		Medium

Table 10-89. Confidence in Recommendations for Fish Consumption - Recreational Freshwater

Considerations	Rationale	Rating
Study Elements		
• Level of peer review	Studies can be found in peer reviewed journals and has been reviewed by the EPA.	High
• Accessibility	The original study analyses are reported in accessible journals. Subsequent EPA analyses are detailed in Handbook.	High
• Reproducibility	Enough information is available to reproduce results.	High
• Focus on factor of interest	Studies focused on ingestion of fish by the recreational freshwater angler.	High
• Data pertinent to U.S.	The studies were conducted in the U.S.	High
• Primary data	Data are from primary references.	High
• Currency	Studies were conducted between 1988-1992.	High
• Adequacy of data collection period	Data were collected for one year period for 3 studies; and a one week period for one study.	High
• Validity of approach	Data presented are as follows: one year recall of fishing trips (2 studies), one week recall of fish consumption (1 study), and one year diary survey (1 study). Weight of fish consumed was estimated using approximate weight of fish catch and edible fraction or approximate weight of fish meal.	Medium
• Study size	Study population ranged from 800-2600.	High
• Representativeness of the population	Each study was localized to a single state or area.	Low
• Characterization of variability	Distributions were generated.	High
• Lack of bias in study design (high rating is desirable)	Response rates were fairly high. One year recall of fishing trips may result in overestimate.	Medium
• Measurement error	Weight of fish portions were estimated in one study, fish weight was estimated from reported fish length in another study.	Medium
Other Elements		
• Number of studies	There are 4 key studies.	High
• Agreement between researchers	Intake rates in different parts of country may be expected to show some variation.	Medium
Overall Rating	The main drawback is that studies are not nationally representative and not representative of long-term consumption.	Medium

Table 10-90. Confidence in Recommendations for Native American Subsistence Fish Consumption

Considerations	Rationale	Rating
Study Elements		
• Level of peer review	Studies are from peer reviewed journal (1 study), and technical reports (1study).	Medium
• Accessibility	Journal articles are publicly available. CRITFC is a technical report.	Medium
• Reproducibility	The studies were adequately detailed.	High
• Focus on factor of interest	Studies focused on fish ingestion and fish harvest.	High
• Data pertinent to U.S.	All studies were specific to area in the U.S.	High
• Primary data	One study used primary data, the other used secondary data.	Medium
• Currency	Data were from early 1980's to 1992.	Medium
• Adequacy of data collection period	Data collected for one year period.	High
• Validity of approach	One study used fish harvest data; EPA used a factor to convert to individual intake. Other study measured individual intake directly.	Medium
• Study size	The sample population was 500 for the study with primary data.	Medium
• Representativeness of the population	Only two states were represented.	Low
• Characterization of variability	Individual variation were not described in summary study.	Medium
• Lack of bias in study design (high rating is desirable)	The response rate was 69% in study with primary data. Bias was hard to evaluate in summary study.	Medium
• Measurement error	The weight of the fish was estimated.	Medium
Other Elements		
• Number of studies	There were two studies; only one study described individual variation in intake.	Medium
• Agreement between researchers	Range of per-capita rates from summary study includes per-capita rate from study with primary data.	High
Overall Rating	Studies are not nationally representative. Upper percentiles are based on only one study.	Medium (per capita intake) Low (upper percentiles)

APPENDIX 10A

RESOURCE UTILIZATION DISTRIBUTION

Appendix 10A. Resource Utilization Distribution

The percentiles of the resource utilization distribution of Y are to be distinguished from the percentiles of the (standard) distribution of Y. The latter percentiles show what percentage of individuals in the population are consuming below a given level. Thus, the 50th percentile of the distribution of Y is that level such that 50 percent of individuals consume below it; on the other hand, the 50th percentile of the resource utilization distribution is that level such that 50 percent of the overall consumption in the population is done by individuals consuming below it.

The percentiles of the resource utilization distribution of Y will always be greater than or equal to the corresponding percentiles of the (standard) distribution of Y, and, in the case of recreational fish consumption, usually considerably exceed the standard percentiles.

To generate the resource utilization distribution, one simply weights each observation in the data set by the Y level for that observation and performs a standard percentile analysis of weighted data. If the data already have weights, then one multiplies the original weights by the Y level for that observation, and then performs the percentile analysis.

Under certain assumptions, the resource utilization percentiles of fish consumption may be related (approximately) to the (standard) percentiles of fish consumption derived from the analysis of creel studies. In this instance, it is assumed that the creel survey data analysis did not employ sampling weights (i.e., weights were implicitly set to one); this is the case for many of the published analyses of creel survey data. In creel studies the fish consumption rate for the ith individual is usually derived by multiplying the amount of fish consumption per fishing trip (say C_i) by the frequency of fishing (say f_i). If it is assumed that the probability of sampling of an angler is proportional to fishing frequency, then sampling weights of inverse fishing frequency ($1/f_i$) should be employed in the analysis of the survey data. Above it was stated that for data that are already weighted the resource utilization distribution is generated by multiplying the original weights by the individual's fish consumption level to create new weights. Thus, to generate the resource utilization distribution from the data with weights of ($1/f_i$), one multiplies ($1/f_i$) by the fish consumption level of $f_i C_i$ to get new weights of C_i.

Now if C_i (amount of consumption per fishing trip) is constant over the population, then these new weights are constant and can be taken to be one. But weights of one is what (it is assumed) were used in the original creel survey data analysis. Hence, the resource utilization distribution is exactly the same as the original (standard) distribution derived from the creel survey using constant weights.

The accuracy of this approximation of the resource utilization distribution of fish by the (standard) distribution of fish consumption derived from an unweighted analysis of creel survey data depends then on two factors, how approximately constant the C_i 's are in the population and how approximately proportional the relationship between sampling probability and fishing frequency is. Sampling probability will be roughly proportional to frequency if repeated sampling at the same site is limited or if re-interviewing is performed independent of past interviewing status.

Note: For any quantity Y that is consumed by individuals in a population, the percentiles of the "resource utilization distribution" of Y can be formally defined as follows: Y_p (R) is the pth percentile of the resource utilization distribution if p percent of the overall consumption of Y in the population is done by individuals with consumption below Y_p (R) and 100-p percent is done by individuals with consumption above Y_p(R).

APPENDIX 10B

FISH PREPARATION AND COOKING METHODS

Table 10B-1. Percent of Fish Meals Prepared Using Various Cooking Methods by Residence Size[a]

Residence Size	Large City/Suburb	Small City	Town	Small Town	Rural Non-Farm	Farm
			Total Fish			
Cooking Method						
Pan Fried	32.7	31.0	36.0	32.4	38.6	51.6
Deep Fried	19.6	24.0	23.3	24.7	26.2	15.7
Boiled	6.0	3.0	3.4	3.7	3.4	3.5
Grilled/Broiled	23.6	20.8	13.8	21.4	13.7	13.1
Baked	12.4	12.4	10.0	10.3	12.7	6.4
Combination	2.5	6.0	8.3	5.0	2.3	7.0
Other (Smoked, etc.)	3.2	2.8	5.2	1.9	2.9	1.8
Don't Know	0.0000	0.0000	0.0000	0.5	0.2	--
Total (N)[b]	393	317	388	256	483	94
			Sport Fish			
Pan Fried	45.8	45.7	47.6	41.4	51.2	63.3
Deep Fried	12.2	14.5	17.5	15.2	21.9	7.3
Boiled	2.8	2.3	2.9	0.5	3.6	0
Grilled/Broiled	20.2	17.6	10.6	25.3	8.2	10.4
Baked	11.8	8.8	6.3	8.7	9.7	6.9
Combination	2.7	8.5	10.4	6.7	1.9	9.3
Other (smoked, etc.)	4.5	2.7	4.9	1.5	3.5	2.8
Don't Know	0	0	0	0.7	0	0
Total (N)	205	171	257	176	314	62

[a] Large City = over 100,000; Small City = 20,000-100,000; Town = 2,000-20,000; Small Town = 100-2,000.
[b] N = Total number of respondents
Source: West et al., 1993.

Table 10B-2. Percent of Fish Meals Prepared Using Various Cooking Methods by Age

Age (years)	17-30	31-40	41-50	51-64	>64	Overall
			Total Fish			
Cooking Method						
Pan Fried	45.9	31.7	30.5	33.9	40.7	35.3
Deep Fried	23.0	24.7	26.9	23.7	14.0	23.5
Boiled	0.0000	6.0	3.6	3.9	4.3	3.9
Grilled or Boiled	15.6	15.2	24.3	16.1	18.8	17.8
Baked	10.8	13.0	8.7	12.8	11.5	11.4
Combination	3.1	5.2	2.2	6.5	6.8	4.7
Other (Smoked, etc.)	1.6	4.2	3.5	2.7	4.0	3.2
Don't Know	0.0000	0.0000	0.3	0.4	0.0000	0.2
Total (N)[a]	246	448	417	502	287	1946
			Sport Fish			
Pan Fried	57.6	42.6	43.4	46.6	54.1	47.9
Deep Fried	18.2	21.0	17.3	14.8	7.7	16.5
Boiled	0.0000	4.4	0.8	3.2	3.1	2.4
Grilled/Broiled	15.0	10.1	25.9	12.2	12.2	14.8
Baked	3.6	10.4	6.4	11.7	9.9	8.9
Combination	3.8	7.2	3.0	7.5	8.2	5.9
Other (Smoked, etc.)	1.7	4.3	3.2	3.5	4.8	3.5
Don't Know	0.0000	0.0000	0.0000	0.4	0.0000	0.1
Total (N)	174	287	246	294	163	1187

[a] N = Total number of respondents.
Source: West et al., 1993.

Table 10B-3. Percent of Fish Meals Prepared Using Various Cooking Methods by Ethnicity

Ethnicity	Black	Native American	Hispanic	White	Other
		Total Fish			
Cooking Method					
Pan Fried	40.5	37.5	16.1	35.8	18.5
Deep Fried	27.0	22.0	83.9	22.7	18.4
Boiled	0	1.1	0	4.3	0
Grilled/Broiled	19.4	9.8	0	17.7	57.6
Baked	1.9	16.3	0	11.7	5.4
Combination	9.5	6.2	0	4.5	0
Other (Smoked, etc.)	1.6	4.2	3.5	2.7	4.0
Don't Know	0	0	0.3	0.4	0
Total (N)[a]	52	84	12	1,744	33
		Sport Fish			
Pan Fried	44.9	47.9	52.1	48.8	22.0
Deep Fried	36.2	20.2	47.9	15.7	9.6
Boiled	0	0	0	2.7	0
Grilled/Broiled	0	1.5	0	14.7	61.9
Baked	5.3	18.2	0	8.6	6.4
Combination	13.6	8.6	0	5.6	0
Other (Smoked, etc.)	0	3.6	0	3.7	0
Total (N)	19	60	4	39	0

[a] N = Total number of respondents.
Source: West et al., 1993.

Table 10B-4. Percent of Fish Meals Prepared Using Various Cooking Methods by Education

Education	Through Some H.S.	H.S. Degree	College Degree	Post Graduate Education
		Total Fish		
Cooking Method				
Pan Fried	44.7	41.8	28.8	22.9
Deep Fried	23.6	23.6	23.8	19.4
Boiled	2.2	2.8	5.1	5.8
Grilled/Broiled	8.9	10.9	23.8	34.1
Baked	8.1	12.1	11.6	12.8
Combination	10.0	5.1	3.0	3.8
Other (Smoked, etc.)	2.1	3.4	4.0	1.3
Don't Know	0.5	0.3	0	0
Total (N)[a]	236	775	704	211
		Sport Fish		
Pan Fried	56.1	52.4	41.8	36.3
Deep Fried	13.6	15.8	18.6	12.9
Boiled	2.8	2.4	3.0	0
Grilled/Baked	6.3	9.4	21.7	28.3
Baked	7.4	10.6	6.1	14.9
Combination	10.1	6.3	3.9	6.5
Other (Smoked, etc.)	2.8	3.3	4.6	1.0
Don't Know	0.8	0	0	0
Total (N)	146	524	421	91

[a] N = Total number of respondents.
Source: West et al., 1993.

Table 10B-5. Percent of Fish Meals Prepared Using Various Cooking Methods by Income			
Income	0 - $24,999	$25,000 - $39,999	$40,000 - or more
	Total Fish		
Cooking Method			
Pan Fried	44.8	39.1	26.5
Deep Fried	21.7	22.2	23.4
Boiled	2.1	3.5	5.6
Grilled/Broiled	11.3	15.8	25.0
Baked	9.1	12.3	13.3
Combination	8.7	2.9	2.5
Other (Smoked, etc.)	2.4	4.0	3.5
Don't Know	0	0.2	0.3
Total (N)[a]	544	518	714
	Sport Fish		
Pan Fried	51.5	51.4	42.0
Deep Fried	15.8	15.8	17.2
Boiled	1.8	2.1	3.7
Grilled/Broiled	12.0	12.2	19.4
Baked	7.2	10.0	10.0
Combination	9.1	3.8	3.5
Other (Smoked, etc.)	2.7	4.6	3.8
Don't Know	0	0	0.3
Total (N)	387	344	369

[a] N = Total number of respondents.
Source: West et al., 1993.

Table 10B-6. Percent of Fish Meals Where Fat was Trimmed or Skin was Removed, by Demographic Variables

	Total Fish		Sport Fish	
Population	Trimmed Fat (%)	Skin Off (%)	Trimmed Fat (%)	Skin Off (%)
Residence Size				
Large City/Suburb	51.7	31.6	56.7	28.9
Small City	56.9	34.1	59.3	36.2
Town	50.3	33.4	51.7	33.7
Small Town	52.6	45.2	55.8	51.3
Rural Non-Farm	42.4	32.4	46.2	34.6
Farm	37.3	38.1	39.4	42.1
Age (years)				
17-30	50.6	36.5	53.9	39.3
31-40	49.7	29.7	51.6	29.9
41-50	53.0	32.2	58.8	37.0
51-65	48.1	35.6	48.8	37.2
Over 65	41.6	43.1	43.0	42.9
Ethnicity				
Black	25.8	37.1	16.0	40.1
Native American	50.0	41.4	56.3	36.7
Hispanic	59.5	7.1	50.0	23.0
White	49.3	34.0	51.8	35.6
Other	77.1	61.6	75.7	65.5
Education				
Some High School	50.8	43.9	49.7	47.1
High School Degree	47.2	37.1	49.5	37.6
College Degree	51.9	31.9	55.9	33.8
Post-Graduate	47.6	26.6	53.4	38.7
Income				
<$25,000	50.5	43.8	50.6	47.3
$25-39,999	47.8	34.0	54.9	34.6
$40,000 or more	50.2	28.6	51.7	27.7
Overall	49.0	34.7	52.1	36.5

Source: Modified from West et. al., 1993.

Table 10B-7. Method of Cooking of Most Common Species Kept by Sportfishermen						
Species	Percent of Anglers Catching Species	Use as Primary Cooking Method (Percent)				
		Deep Fry	Pan Fry	Bake and Charcoal Broil	Raw	Other[b]
White Croaker	34%	19%	64%	12%	0%	5%
Pacific Mackerel	25%	10%	41%	28%	0%	21%
Pacific Bonito	18%	5%	33%	43%	2%	17%
Queenfish	17%	15%	70%	6%	1%	8%
Jacksmelt	13%	17%	57%	19%	0%	7%
Walleye Perch	10%	12%	69%	6%	0%	13%
Shiner Perch	7%	11%	72%	8%	0%	11%
Opaleye	6%	16%	56%	14%	0%	14%
Black Perch	5%	18%	53%	14%	0%	15%
Kelp Bass	5%	12%	55%	21%	0%	12%
California Halibut	4%	13%	60%	24%	0%	3%
Shellfish[a]	3%	0%	0%	0%	0%	100%

(n = 1059)
[a] Crab, mussels, lobster, abalone
[b] Boil, soup, steam, stew
Source: Modified from Puffer et al., 1981.

Table 10B-8. Adult Consumption of Fish Parts							
		Weighted Percent Consuming Specific Parts					
Species	Number Consuming	Fillet	Skin	Head	Eggs	Bones	Organs
Salmon	473	95.1%	55.8%	42.7%	42.8%	12.1%	3.7%
Lamprey	249	86.4%	89.3%	18.1%	4.6%	5.2%	3.2%
Trout	365	89.4%	68.5%	13.7%	8.7%	7.1%	2.3%
Smelt	209	78.8%	88.9%	37.4%	46.4%	28.4%	27.9%
Whitefish	125	93.8%	53.8%	15.4%	20.6%	6.0%	0.0%
Sturgeon	121	94.6%	18.2%	6.2%	11.9%	2.6%	0.3%
Walleye	46	100%	20.7%	6.2%	9.8%	2.4%	0.9%
Squawfish	15	89.7%	34.1%	8.1%	11.1%	5.9%	0.0%
Sucker	42	89.3%	50.0%	19.4%	30.4%	9.8%	2.1%
Shad	16	93.5%	15.7%	0.0%	0.0%	3.3%	0.0%

Source: CRITFC, 1994.

APPENDIX 10C

PER CAPITA ESTIMATES BY SPECIES BASED ON THE USDA CSFII DATA

Table 10C-1. Daily Average Per Capita Estimates of Fish Consumption
U.S. Population - Mean Consumption by Species Within Habitat - As Consumed Fish

Habitat	Species	Estimated Mean Grams/Person/Day
Estuarine	Shrimp	1.37241
	Perch	0.52580
	Flatfish (Estuarine)	0.43485
	Crab (Estuarine)	0.29086
	Flounder	0.24590
	Oyster	0.17840
	Clam (Estuarine)	0.14605
	Mullet	0.07089
	Croaker	0.05021
	Herring	0.02937
	Smelts	0.02768
	Scallop (Estuarine)	0.00247
	Anchovy	0.00228
	Scup	0.00050
	Sturgeon	0.00040
Freshwater	Catfish	1.06776
	Trout	0.43050
	Carp	0.04846
	Pike	0.01978
	Salmon (Freshwater)	0.00881
Marine	Tuna	4.19998
	Clam (Marine)	1.66153
	Cod	1.22627
	Flatfish (Marine)	1.06307
	Salmon (Marine)	0.73778
	Haddock	0.51533
	Pollock	0.44970
	Crab (Marine)	0.33870
	Ocean Perch	0.31878
	Porgy	0.29844
	Scallop (Marine)	0.21805
	Sea Bass	0.20794
	Lobster	0.20001
Marine (Cont)	Swordfish	0.13879
	Squid	0.12196
	Sardine	0.10013
	Pompano	0.09131
	Sole	0.07396
	Mackerel	0.06379
	Whiting	0.05498
	Halibut	0.02463
	Mussels	0.02217
	Shark	0.01901
	Whitefish	0.00916
	Seafood	0.00574
	Snapper	0.00539
	Octopus	0.00375
	Barracuda	0.00111
	Abalone	0.00075
Unknown	Fish	0.00186
All Species	Tuna	4.19998
	Clam (Marine)	1.66153
	Shrimp	1.38883
	Cod	1.22827
	Catfish	1.06776
	Faltfish (Marine)	1.06307
	Salmon (Marine)	0.73778
	Perch	0.52580
	Haddock	0.51533
	Pollock	0.44970
	Flatfish (Estuarine)	0.43485
	Trout	0.43050
	Crab (Marine)	0.33870
	Ocean Perch	0.31878
	Porgy	0.29844
	Crab (Estuarine)	0.29088
All Species (Cont)	Flounder	0.24590
	Scallop (Marine)	0.21805
	Sea Bass	0.20794
	Lobster	0.20001
	Oyster	0.17840
	Clam (Estuarine)	0.14605
	Swordfish	0.13879
	Squid	0.12196
	Sardine	0.10313
	Pompano	0.09131
	Sole	0.07396
	Mullet	0.07089
	Mackarel	0.06379
	Whiting	0.05498
	Croaker	0.05021
	Carp	0.04846
	Herring	0.02937
	Smelts	0.02768
	Halibut	0.02463
	Mussels	0.02217
	Pike	0.01978
	Shark	0.01901
	Whitefish	0.00916
	Salmon (Freshwater)	0.00881
	Seafood	0.00574
	Snapper	0.00539
	Octopus	0.00375
	Scallop (Estuarine)	0.00247
	Anchovy	0.00228
	Fish	0.00166
	Barracuda	0.00111
	Abalone	0.00075
	Scup	0.00050
	Sturgeon	0.00040

Notes: Estimates are projected from a sample of 11,912 individuals to the U.S. population of 242,707,000 using 3-year combined survey weights. The population for this survey consisted of individuals in the 48 conterminous states.

Source of individual consumption data: USDA Combined 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals (CSFII).

The fish component of foods containing fish was calculated using data from the recipe file for release 7 of the USDA's Nutrient Data Base for Individual Food Intake Surveys.

Table 10C-2. Daily Average Per Capita Estimates of Fish Consumption
U.S. Population - Mean Consumption by Species Within Habitat - Uncooked Fish

Habitat	Species	Estimated Mean Grams/Person/Day	Habitat	Species	Estimated Mean Grams/Person/Day	Habitat	Species	Estimated Mean Grams/Person/Day
Estuarine	Shrimp	1.78619	Marine	Swordfish	0.17903	All Species	Flounder	0.28559
	Perch	0.66494	(Cont)	Squid	0.14420	(Cont)	Lobster	0.27563
	Flatfish (Estuarine)	0.50832		Sardine	0.13750		Sea Bass	0.26661
	Crab (Estuarine)	0.40848		Pompano	0.12160		Scallop (Marine)	0.26199
	Flounder	0.28559		Mackerel	0.09866		Oyster	0.18827
	Oyster	0.18827		Sole	0.08339		Swordfish	0.17903
	Mullet	0.08959		Whiting	0.06514		Squid	0.14420
	Croaker	0.06539		Mussels	0.03718		Sardine	0.13750
	Smelts	0.03470		Halibut	0.03030		Pompano	0.12160
	Herring	0.03408		Shark	0.02385		Mackarel	0.09866
	Clam (Estuarine)	0.03339		Whitefish	0.00916		Mullet	0.08958
	Anchovy	0.00304		Snapper	0.00551		Sole	0.08339
	Scallop (Estuarine)	0.00297		Octopus	0.00457		Croaker	0.06539
	Scup	0.00050		Barracuda	0.00130		Whiting	0.06514
	Sturgeon	0.00040		Abalone	0.00094		Carp	0.06012
				Seafood	0.00043		Mussels	0.03718
Freshwater	Catfish	1.38715					Smelts	0.03470
	Trout	0.53777	Unknown	Fish	0.00248		Herring	0.03406
	Carp	0.06012					Clam (Estuarine)	0.03339
	Pike	0.02244	All Species	Tuna	5.67438		Halibut	0.03030
	Salmon (Freshwater)	0.01183		Shrimp	1.78619		Shark	0.02385
				Cod	1.47609		Pike	0.02244
Marine	Tuna	5.67438		Catfish	1.38715		Salmon (Freshwater)	0.01183
	Cod	1.47609		Flatfish (Marine)	1.24268		Whitefish	0.00916
	Flatfish (Marine)	1.24268		Salmon (Marine)	0.99093		Snapper	0.00551
	Salmon (Marine)	0.99093		Perch	0.66494		Octopus	0.00457
	Haddock	0.62219		Haddock	0.62219		Anchovy	0.00304
	Pollock	0.52906		Trout	0.53777		Scallop (Estuarine)	0.00297
	Crab (Marine)	0.47567		Pollock	0.52906		Fish	0.00248
	Porgy	0.42587		Flatfish (Estuarine)	0.50832		Barracuda	0.00130
	Ocean Perch	0.39327		Crab (Marine)	0.47567		Abalone	0.00094
	Clam (Marine)	0.37982		Porgy	0.42587		Scup	0.00050
	Lobster	0.27583		Crab (Estuarine)	0.40848		Seafood	0.00043
	Sea Bass	0.26661		Ocean Perch	0.39327		Sturgeon	0.00040
	Scallop (Marine)	0.26199		Clam (Marine)	0.37982			

Notes: Estimates are projected from a sample of 11,912 individuals to the U.S. population of 242,707,000 using 3-year combined survey weights. The population for this survey consisted of individuals in the 48 conterminous states.

Source of individual consumption data: USDA Combined 1989, 1990, and 1991 Continuing Survey of Food Intakes by Individuals (CSFII).

Amount of consumed fish recorded by survey respondents was converted to uncooked fish quantities using data from the recipe file for release 7 of USDA's Nutrient Data Base for Individual Food Intake Surveys. The fish component of foods containing fish was calculated using data from the recipe file for release 7 of the USDA's Nutrient Data Base for Individual Food Intake Surveys.

Table 10C-3. Daily Average Per Capita Estimates Of Fish Consumption
As Consumed Fish - Mean Consumption by Species Within Habitat
U.S. Population

Habitat	Species	Estimated Mean Grams/person/day	Habitat	Species	Estimated Mean Grams/person/day	Habitat	Species	Estimated Mean Grams/person/day
Estuarine	Shrimp	1.37241	Marine (Con't.)	Swordfish	0.13879	All Species	Flounder	0.24590
	Perch	0.52580		Squid	0.12196	(Con't.)	Scallop (Marine)	0.21805
	Flatfish	0.43485		Sardine	0.10313		Sea Bass	0.20794
	Crab	0.29086		Pompano	0.09131		Lobster	0.20001
	Flounder	0.24590		Sole	0.07396		Oyster	0.17419
	Oyster	0.17419		Mackerel	0.06379		Swordfish	0.13879
	Mullet	0.07089		Whiting	0.05498		Squid	0.12196
	Croaker	0.05021		Halibut	0.02463		Sardine	0.10313
	Herring	0.02937		Mussels	0.02217		Pompano	0.09131
	Smelts	0.02768		Shark	0.01901		Sole	0.07396
	Clam	0.02691		Whitefish	0.00916		Mullet	0.07089
	Scallop	0.00247		Snapper	0.00539		Mackerel	0.06379
	Anchovy	0.00228		Octopus	0.00375		Whiting	0.05498
	Scup	0.00050		Barracuda	0.00111		Croaker	0.05021
	Sturgeon	0.00040		Abalone	0.00075		Carp	0.04846
				Seafood	0.00043		Herring	0.02937
Freshwater	Catfish	1.06776					Smelts	0.02768
	Trout	0.43050	Unknown	Fish	0.00186		Clam (Estuarine)	0.02691
	Carp	0.04846					Halibut	0.02463
	Pike	0.01978	All Species	Tuna	4.19998		Mussels	0.02217
	Salmon	0.00881		Shrimp	1.37241		Pike	0.01978
				Cod	1.22827		Shark	0.01901
Marine	Tuna	4.19998		Catfish	1.06776		Whitefish	0.00916
	Cod	1.22827		Flatfish (Marine)	1.06307		Salmon	0.00881
	Flatfish	1.06307		Salmon (Marine)	0.73778		(Freshwater)	0.00539
	Salmon	0.73778		Perch	0.52580		Snapper	0.00375
	Haddock	0.51533		Haddock	0.51533		Octopus	0.00247
	Pollock	0.44970		Pollock	0.44970		Scallop (Estuarine)	0.00228
	Crab	0.33870		Flatfish (Estuarine)	0.43485		Anchovy	0.00186
	Ocean Perch	0.31878		Trout	0.43050		Fish	0.00111
	Clam	0.30617		Crab (Marine)	0.33870		Barracuda	0.00075
	Porgy	0.29844		Ocean Perch	0.31878		Abalone	0.00050
	Scallop	0.21805		Clam (Marine)	0.30617		Scup	0.00043
	Sea Bass	0.20794		Porgy	0.29844		Seafood	0.00040
	Lobster	0.20001		Crab (Estuarine)	0.29086		Sturgeon	

Estimates are projected from a sample of 11,912 individuals to the U.S. population of 242,707,000 using 3-year combined survey weights.
Source: U.S. EPA, 1996a.

Table 10C-4. Daily Average Per Capita Estimates Of Fish Consumption
Uncooked Fish** - Mean Consumption by Species Within Habitat
U.S. Population

Habitat	Species	Estimated Mean Grams/person/day	Habitat	Species	Estimated Mean Grams/person/day	Habitat	Species	Estimated Mean Grams/person/day
Estuarine	Shrimp	1.78619	Marine (Con't.)	Swordfish	0.17903	All Species (Con't.)	Flounder	0.28559
	Perch	0.66494		Squid	0.14420		Lobster	0.27563
	Flatfish	0.50832		Sardine	0.13750		Sea Bass	0.26661
	Crab	0.40848		Pompano	0.12160		Scallop (Marine)	0.26199
	Flounder	0.28559		Mackerel	0.09866		Oyster	0.18827
	Oyster	0.18827		Sole	0.08339		Swordfish	0.17903
	Mullet	0.08958		Whiting	0.06514		Squid	0.14420
	Croaker	0.06539		Mussels	0.03718		Sardine	0.13750
	Smelts	0.03470		Halibut	0.03030		Pompano	0.12160
	Herring	0.03408		Shark	0.02385		Mackerel	0.09866
	Clam	0.03339		Whitefish	0.00916		Mullet	0.08958
	Anchovy	0.00304		Snapper	0.00551		Sole	0.08339
	Scallop	0.00297		Octopus	0.00457		Croaker	0.06539
	Scup	0.00050		Barracuda	0.00130		Whiting	0.06514
	Sturgeon	0.00040		Abalone	0.00094		Carp	0.06012
				Seafood	0.00043		Mussels	0.03718
Freshwater	Catfish	1.38715					Smelts	0.03470
	Trout	0.53777	Unknown	Fish	0.00248		Herring	0.03408
	Carp	0.06012					Clam (Estuarine)	0.03339
	Pike	0.02244	All Species	Tuna	5.67438		Halibut	0.03030
	Salmon	0.01183		Shrimp	1.78619		Shark	0.02385
				Cod	1.47609		Pike	0.02244
Marine	Tuna	5.67438		Catfish	1.38715		Salmon (Freshwater)	0.01183
	Cod	1.47609		Flatfish (Marine)	1.24268		Whitefish	0.00916
	Flatfish	1.24268		Salmon (Marine)	0.99093		Snapper	0.00551
	Salmon	0.99093		Perch	0.66494		Octopus	0.00457
	Haddock	0.62219		Haddock	0.62219		Anchovy	0.00304
	Pollock	0.52906		Trout	0.53777		Scallop (Estuarine)	0.00297
	Crab	0.47567		Pollock	0.52906		Fish	0.00248
	Porgy	0.42587		Flatfish (Estuarine)	0.50832		Barracuda	0.00130
	Ocean Perch	0.39327		Crab (Marine)	0.47567		Abalone	0.00094
	Clam	0.37982		Porgy	0.42587		Scup	0.00050
	Lobster	0.27563		Crab (Estuarine)	0.40848		Seafood	0.00043
	Sea Bass	0.26661		Ocean Perch	0.39327		Sturgeon	0.00040
	Scallop	0.26199		Clam (Marine)	0.37982			

Estimates are projected from a sample of 11,912 individuals to the U.S. population of 242,707,000 using 3-year combined survey weights.
Source: U.S. EPA, 1996a.

11. INTAKE OF MEAT 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 are exposed to contaminated media (i.e., soil, water, or feed crops).

The U.S. Department of Agriculture's (USDA) Nationwide Food Consumption Survey (NFCS) and Continuing Survey of Food Intakes by Individuals (CSFII) are the primary sources of information on intake rates of meat and dairy products in the United States. Data from the NFCS have been used in various studies to generate consumer-only and per capita intake rates for both individual meat and dairy products and total meat and dairy products. CSFII 1989-91 survey data have been analyzed by EPA to generate per capita intake rates for various food items and food groups. As described in Volume II, Chapter 9 - Intake of Fruits and Vegetables, consumer-only intake is defined as the quantity of meat and dairy products 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 assessments 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.

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. Fat content data are also presented for various meat and dairy products. These data are needed for converting between residue levels on a whole-weight or as consumed basis and lipid basis. Intake data from the individual component of the NFCS and CSFII are based on "as eaten" (i.e., cooked or prepared) forms of the food items/groups. Thus, corrections to account for changes in portion sizes from cooking losses are not required.

The purpose of this section is to provide: (1) intake data for individual meat and dairy products, total meat, and total dairy; (2) guidance for converting between as consumed and dry weight intake rates; and (3) data on the fat content in meat and dairy products. 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 considerations discussed in Volume I, Section 1.3.1 of the Introduction. Recommendations are based on data from the 1989-91 CSFII survey, which was considered the only key intake study for meats and dairy products. Other relevant studies are also presented to provide the reader with added perspective on this topic. It should be noted that most of the studies presented in this section are based on data from USDA's NFCS and CSFII. The USDA NFCS and CSFII are described below.

11.1. INTAKE STUDIES

11.1.1. U.S. Department of Agriculture Nationwide Food Consumption Survey and Continuing Survey of Food Intake by Individuals

The NFCS and CSFII are the basis of much of the data on meat and dairy intake presented in this section. Data from the 1977-78 NFCS are presented because the data have been published by USDA in various reports 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 1994 and 1995 CSFII are also presented. Recently, EPA conducted an analysis of USDA's 1989-91 CSFII. These data were the most recent food survey data that were available to the public at the time that EPA analyzed the data for this Handbook. The results of EPA's analyses are presented here. Detailed descriptions of the NFCS and CSFII data are presented in Volume II, Chapter 9 - Intake of Fruits and Vegetables.

Individual average daily intake rates calculated from NFCS and CSFII 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 intake rates representative of both short-term and long-term consumption. However, the distribution of average daily intake rates generated using short term data (e.g., 3 day) do not necessarily reflect the long-term distribution of average daily intake rates. The distributions generated from short term and long term data will differ to the extent that each individual's intake varies from day to day; the distributions will be similar to the extent that individuals' intakes are constant from day to day.

Day-to-day variation in intake among individuals will be great for food item/groups that are highly seasonal and for items/groups that are eaten year around but that are not typically eaten every day. For these foods, the intake distribution generated from short term data will not be a good reflection of the long term distribution. On the other hand, for broad categories of foods (e.g., total meats) which are eaten on a daily basis throughout the year with minimal seasonality, the short term distribution may be a reasonable approximation of the true long term distribution, although it will show somewhat more variability. In this and the following section then, distributions are shown only for the following broad categories of foods: total meats and total dairy products. Because of the increased variability of the short-term distribution, the short-term upper percentiles shown will overestimate somewhat the corresponding percentiles of the long-term distribution.

11.1.2. Key Meat and Dairy Products Intake Study Based on the CSFII

U.S. EPA Analysis of 1989-91 USDA CSFII Data - EPA conducted an analysis of USDA's 1989-91 CSFII data set. The general methodology used in analyzing the data is presented in Volume II, Chapter 9 - Intake of Fruits and Vegetables of this Handbook. Intake rates were generated for the following meat and dairy products: total meats, total dairy, beef, pork, poultry, game, and eggs. Appendix 9B presents the food categories and codes used in generating intake rates for these food groups. These data have been corrected to account for mixtures as described in Volume II, Chapter 9 - Intake of Fruits and Vegetables and Appendix 9A. However, it should be noted that although total meats account for items such as luncheon meats, sausages, and organ meats, these items are not included in the individual meat groups (i.e., beef, poultry, etc.). Per capita intake rates for total meat and total dairy are presented in Tables 11-1 and 11-2 at the end of this Chapter. Tables 11-3 to 11-7 present per capita intake data for individual meats and eggs. The results are presented in units of g/kg-day. Thus, use of these data in calculating potential dose does not require the body weight factor to be included in the denominator of the average daily dose (ADD) equation. It should be noted that converting these intake rates into units of g/day by multiplying by a single average body weight is inappropriate, because individual intake rates were indexed to the reported body weights of the survey respondents. However, if there is a need to compare the intake data presented here to intake data in units of g/day, a body weight less than 70 kg (i.e., approximately 60 kg; calculated based on the number of respondents in each age category and the average body weights for these age groups, as presented in Volume I, Chapter 7, Body Weight) should be used because the total survey population included children as well as adults.

The advantages of using the 1989-91 CSFII data set are that the data are expected to be representative of the U.S. population and that it includes data on a wide variety of food types. The data set was the most recent of a series of publicly available USDA data sets (i.e., NFCS 1977-78; NFCS 1987-88; CSFII 1989-91) at the time the analysis was conducted for this Handbook, and should reflect recent eating patterns in the United States. The data set includes three years of intake data combined. However, the 1989-91 CSFII data are based on a three day survey period. Short-term dietary data may not accurately reflect long-term eating patterns. This is particularly true for the tails of the distribution of food intake. In addition, the adjustment for including mixtures adds uncertainty to the intake rate distributions. The calculation for including mixtures assumes that intake of any mixture includes all of the foods identified and the proportions specified in Appendix Table 9A-1. This assumption yields valid estimates of per capita consumption, but results in overestimates of the proportion of the population consuming individual meats; thus, the quantities reported in Tables 11-3 to 11-7 should be interpreted as upper bounds on the proportion consuming beef, pork, poultry, game, and eggs.

The data presented in this handbook for the USDA 1989-91 CSFII is not the most up-to-date information on food intake. USDA has recently made available the data from its 1994 and 1995 CSFII. Over 5,500 people nationwide participated in both of these surveys, providing recalled food intake information for 2 separate days. Although the two-day data analysis has not been conducted, USDA published the results for the respondents' intakes on the first day surveyed (USDA, 1996a,b). USDA 1996 survey data will be made available later in 1997. As soon as 1996 data are available, EPA will take steps to get the 3-year data (1994, 1995, and 1996) analyzed and the food ingestion factors updated. Meanwhile, Table 11-8 presents a comparison of the mean daily intakes per individual in a day for the major meat and dairy groups from USDA survey data from years

1977-78, 1987-88, 1989-91, 1994, and 1995. This table shows that food consumption patterns have changed for beef and meat mixtures when comparing 1977 and 1995 data. In particular, consumption of beef decreased by 50 percent when comparing data from 1977 and 1995, while consumption of meat mixtures increased by 44 percent. However, consumption of the food items presented in Table 11-8 has remained fairly constant when comparing values from 1989-91 with the most recent data from 1994 and 1995. Meat mixtures show the largest change with an increase of 16 percent from 1989 to 1995. This indicates that the 1989-91 CSFII data are probably adequate for assessing ingestion exposure for current populations; however, these data should be used with caution.

It is interesting to note that there was not much variation in beef and poultry consumption from 1989-91 to 1995. This seems to contradict the other USDA reports that show that in recent years the U.S. population has been substituting beef for other sources of protein such as poultry and fish. One of those reports is the report titled Meat and Poultry Inspection; 1994 Report of the Secretary of Agriculture to the U.S. Congress (USDA, 1994). This USDA report shows a 39% increase in the number of poultry inspected at federally inspected plants in 1994 compared to 1984. In contrast, the number of meat animals inspected at federally inspected plants increased only by 2% from 1984 to 1994. This trend in food consumption patterns was also reported in the USDA report titled Food Consumption, Prices, and Expenditures, 1970-92 (USDA, 1993). This report shows that in 1992, consumption among Americans averaged 18 pounds less red meat, 26 pounds more poultry, and 3 pounds more fish and shellfish than in 1970. This apparent contradiction may be explained by assuming that most of the increase in poultry consumption has occured in the meat mixtures and grain mixtures categories. There has been a considerable shift from consuming individual food items to food in mixtures (such as pizza, tacos, burritos, frozen entrees, and salads from grocery stores). This may explain why, in Table 11-8, domestic consumption has remained fairly constant in the past few years.

11.1.3. Relevant Meat and Dairy Products Intake Studies

The U.S. EPA's Dietary Risk Evaluation System (DRES) - U.S. EPA, Office of Pesticide Programs (OPP) - EPA OPP's DRES contains per capita intake rate data for various items of meat, poultry, and dairy products for 22 subgroups (age, regional, and seasonal) of the population. As described in Volume II, Chapter 9 - Intake of Fruits and Vegetables, intake data in DRES were generated by determining the composition of 1977/78 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 11-9. 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 11-9 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 reported body weights of the survey respondents and are expressed in units of grams of food consumed per kg body weight 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 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. In addition, consumption patterns may have changed since the data were collected in 1977-78. OPP is in the process of translating consumption information from the USDA CSFII 1989-91 survey to be used in DRES.

Food and Nutrient Intakes of Individuals in One Day in the U.S., USDA (1980, 1992, 1996a, 1996b) - USDA calculated mean per capita intake rates for meat and dairy products using NFCS data from 1977-78 and 1987-88 (USDA, 1980; 1992) and CSFII data from 1994 and 1995 (USDA, 1996a; 1996b). The mean per capita intake rates for meat and dairy products are presented in

Tables 11-10 and 11-11 for meats and Tables 11-12 and 11-13 for dairy based on intake data for one day from the 1977-78 and 1987-88 USDA NFCSs. Tables 11-14 and 11-15 present similar data from the 1994 and 1995 CSFII for meats and dairy products, respectively.

The advantages of using these data are that they provide mean intake estimates for all meat, poultry, and dairy products. The consumption estimates are based on short-term (i.e., 1-day) dietary data which may not reflect long-term consumption.

U.S. EPA - Office of Radiation Programs - The U.S. EPA Office of Radiation Programs (ORP) has also used the USDA 1977-78 NFCS to estimate daily food intake. ORP uses food consumption data to assess human intake of radionuclides in foods (U.S. EPA, 1984a; 1984b). The 1977-78 NFCS data have been reorganized by ORP, and food items have been classified according to the characteristics of radionuclide transport. The mean per capita dietary intake of food sub classes (milk, other dairy products, eggs, beef, pork, poultry, and other meat) grouped by age for the U.S. population is presented in Table 11-16. The mean daily intake rates of meat, poultry, and dairy products for the U.S. population grouped by regions are presented in Table 11-17. Because this study was based on the USDA NFCS, the limitations and advantages associated with the USDA NFCS data also apply to these data. Also, consumption patterns may have changed since the data were collected in 1977-78.

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 1977-78 NFCS and the second National Health and Nutrition Examination Survey (NHANES II), 1976-80 (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 11-18 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 11-18. 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 (1984a, 1984b) 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. These data, however, may not reflect current consumption patterns because they are based on 1977-78 data.

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 are generated. These are based on the flow of food items from production to end uses. Total available supply is estimated as the sum of production (i.e., some products are 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" is 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) calculates 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 assume all food was sold through retail foodstores; therefore, conversion factors (Table 11-19) 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 11-19 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 meats are more representative of what people would actually consume. Table 11-20 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 will overestimate daily consumption because they are based on the total quantity of marketable commodity utilized. Therefore, these data may be useful for estimating bounding exposure estimates. It should also be noted that per capita estimates based on food disappearance are 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 (NLMB) (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 a 2,000 household panels 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 MRCA's Nutrient Intake Database (NID) (based on the 1987-88 USDA Food Intake Study) and information on food attitudes were also collected. It should be noted, however, that the 14 daily diaries provided only the incidence of eating each food product by an individual, but not the quantity eaten by each person. The intake rate for each individual was estimated by multiplying the eating frequency of a particular food item by the average amount eaten per eating occasion. The data on the average amount eaten per eating occasion were obtained from the USDA NFCS survey.

Table 11-21 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 (NLMB, 1993). Beef consumption was high in all regions compared to other meats and poultry (Table 11-21). The average daily consumption of meat in the U.S. was 114.2 g/day which included beef (57 percent), veal (0.5 percent), lamb (0.5 percent), game/variety meats (8 percent), processed meats (18 percent), and pork (16 percent) (NLMB, 1993). Table 11-22 shows the amount of meat consumed by the adult population grouped as non-meat eaters (1 percent), light meat eaters (30 percent), medium meat eaters (33 percent), and heavy meat eaters (36 percent).

The advantage of this study is that the survey period is longer (i.e., 14 days) than any other food consumption survey. The survey is also based on a nationally representative sample. The survey also accounts for foods eaten as mixtures. However, only mean values are provided. Therefore, distribution of long-term consumption patterns cannot be derived. In addition, the survey collects data on incidence of eating each food item and not actual consumption rates. This may introduce some bias in the results. The direction of this bias is unknown.

AIHC (1994) - Exposure Factors Sourcebook - The AIHC Sourcebook (AIHC, 1994) uses the data presented in the 1989 version of the Exposure Factors Handbook which reported data from the USDA 1977-78 NFCS. In this Handbook, new analyses of more recent data from the USDA 1989-91 CSFII are presented. Numbers, however, cannot be directly compared with previous values since the results from the new analysis are presented on a body weight basis. The Sourcebook was selected as a relevant study because it was not the primary source for the data used to make recommendations in this document. However, it is an alternative information source.

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 quantities of meat, poultry, and dairy products consumed per eating occasion by members of the U.S. population. 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. Quantities consumed per eating occasion, are presented in Table 11-23.

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 of serving sizes 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. Although these data are based on the 1977-78 NFCS, serving size data have been collected but not published for the more recent USDA surveys.

11.2. 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. This may be particularly true for lipophilic compounds. 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:

$$\frac{residue\ level}{g\text{-}product} = \frac{residue\ level}{g\text{-}fat} \times \frac{g\text{-}fat}{g\text{-}product} \quad \text{(Eqn. 11-1)}$$

The resulting residue levels may then be used in conjunction with "as consumed" consumption rates. 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 11-24 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 11-25 along 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 0.08 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 contribute 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 11-26 (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 to 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 percent 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 82 g) 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 11A for detailed calculation). Table 11-27 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, based on this calculation.

11.3. 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 11-28 and the following equation:

$$IR_{dw} = IR_{ac} * [(100-W)/100] \qquad \text{(Eqn. 11-2)}$$

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

$$IR_{ac} = IR_{dw}/[(100-W)/100] \qquad \text{(Eqn. 11-3)}$$

where:

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

11.4. RECOMMENDATIONS

The 1989-91 CSFII data 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. The general design of both key and relevant studies are summarized in Table 11-29. The recommended values for intake of meat and dairy products are summarized in Table 11-30 and the confidence ratings for the recommended values for meat and dairy intake rates are presented in Table 11-31. Per capita intake rates for specific meat items, on a g/kg-day basis, may be obtained from Tables 11-3 to 11-7. Percentiles of the intake rate distribution in the general population for total meat and total dairy are presented in Tables 11-1 and 11-2. From these tables, the mean and 95th percentile intake rates for meats are 2.1 g/kg-day and 5.1 g/kg-day, respectively. The mean and 95th percentile intake rates for dairy products are 8.0 g/kg-day and 29.7 g/kg-day. It is important to note that the data presented in Tables 11-1 through 11-7 are based on data collected over a 3-day period and may not necessarily reflect the long-term distribution of average daily intake rates. However, for these broad categories of food (i.e., total meats and total dairy products), because they may be eaten on a daily basis throughout the year with minimal seasonality, the short-term distribution may be a reasonable approximation of the long-term distribution, although it will display somewhat increased variability. This implies that the upper percentiles shown here will tend to overestimate the corresponding percentiles of the true long-term distribution. Intake rates for the homeproduced form of these food items/groups are presented in Volume II, Chapter 13. It should be noted that because these recommendations are based on 1989-91 CSFII data, they may not reflect recent the most changes in consumption patterns. However, as indicated in Table 11-8, intake has remained fairly constant between 1989-91 and 1995. Thus, the 1989-91 CSFII data are believed to be appropriate for assessing ingestion exposure for current populations.

11.5. REFERENCES FOR CHAPTER 11

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Table 11-1. Per Capita Intake of Total Meats (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	96.4%	2.146	0.014	0	0.33	0.63	1.13	1.84	2.78	4.06	5.06	7.67	25.67
Age (years)													
< 01	66.7%	2.867	0.187	0	0	0	0	2.34	4.72	6.52	8.56	11.52	25.67
01-02	95.6%	4.384	0.116	0	1.07	1.58	2.70	4.13	5.38	7.69	8.41	11.88	21.61
03-05	97.5%	3.873	0.092	0	1.12	1.38	2.21	3.50	5.04	6.64	8.23	11.25	15.00
06-11	97.6%	3.011	0.052	0	0.66	1.02	1.80	2.78	3.98	5.12	6.08	8.38	11.68
12-19	97.7%	2.078	0.034	0	0.42	0.67	1.19	1.99	2.79	3.49	4.40	5.95	8.28
20-39	97.9%	1.923	0.019	0	0.39	0.64	1.09	1.73	2.54	3.49	4.14	5.46	8.37
40-69	97.3%	1.700	0.017	0	0.36	0.59	1.03	1.58	2.20	2.95	3.47	4.73	7.64
70 +	97.1%	1.531	0.028	0	0.32	0.49	0.89	1.42	2.03	2.73	3.20	4.28	6.63
Season													
Fall	97.1%	2.182	0.029	0	0.37	0.66	1.15	1.85	2.80	4.11	5.16	8.06	25.67
Spring	95.8%	2.053	0.027	0	0.26	0.61	1.09	1.75	2.63	3.93	4.91	7.31	15.00
Summer	96.3%	2.178	0.031	0	0.35	0.63	1.11	1.86	2.84	4.10	5.18	7.86	18.19
Winter	96.4%	2.173	0.029	0	0.30	0.63	1.18	1.88	2.87	4.06	5.05	7.35	14.61
Urbanization													
Central City	96.7%	2.163	0.028	0	0.25	0.59	1.09	1.79	2.82	4.14	5.22	7.97	25.67
Nonmetropolitan	95.7%	2.168	0.028	0	0.30	0.63	1.15	1.90	2.79	4.04	5.12	7.69	14.61
Suburban	96.6%	2.126	0.021	0	0.39	0.64	1.13	1.84	2.74	4.03	4.94	7.31	15.00
Race													
Asian	89.3%	2.233	0.131	0	0	0.60	1.10	1.86	3.23	4.49	4.66	6.86	8.13
Black	95.5%	2.434	0.053	0	0.33	0.62	1.15	1.94	3.02	5.03	6.14	9.87	25.67
Native American	86.5%	2.269	0.131	0	0	0.41	1.32	1.87	3.38	4.64	5.09	7.32	8.57
Other/NA	95.1%	2.628	0.109	0	0	0.65	1.40	2.29	3.34	4.90	6.03	11.25	11.25
White	96.9%	2.083	0.015	0	0.34	0.63	1.12	1.81	2.72	3.87	4.87	7.18	18.19
Region													
Midwest	96.5%	2.204	0.029	0	0.44	0.69	1.21	1.85	2.82	4.08	5.05	7.86	21.61
Northeast	96.5%	2.148	0.033	0	0.35	0.67	1.16	1.89	2.75	3.98	4.99	8.27	15.00
South	96.7%	2.249	0.025	0	0.37	0.68	1.18	1.90	2.88	4.35	5.34	7.73	13.42
West	95.8%	1.903	0.030	0	0.08	0.47	0.92	1.60	2.54	3.69	4.57	6.64	25.67

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-2. Per Capita Intake of Total Dairy Products (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	97.1%	8.015	0.147	0	0.15	0.40	1.36	3.61	8.18	18.55	29.72	72.16	390.53
Age (years)													
< 01	89.6%	62.735	2.800	0	0	0.61	24.68	45.78	91.12	136.69	170.86	210.72	390.53
01-02	95.6%	26.262	0.743	0	2.69	8.19	15.22	23.48	36.13	45.72	55.07	69.42	108.95
03-05	97.5%	21.149	0.517	0	3.27	6.75	11.89	19.52	28.31	39.54	44.16	57.58	62.88
06-11	97.4%	13.334	0.264	0	1.81	3.54	6.72	11.88	18.58	25.38	28.76	39.60	62.55
12-19	97.9%	6.293	0.147	0	0.27	0.61	2.31	5.29	9.20	12.75	15.12	23.58	53.47
20-39	97.9%	3.618	0.062	0	0.12	0.30	0.95	2.64	5.04	8.15	10.64	17.23	43.31
40-69	96.9%	3.098	0.053	0	0.10	0.26	0.94	2.23	4.36	6.99	9.05	12.99	34.42
70 +	97.6%	3.715	0.104	0	0.16	0.47	1.46	3.03	4.93	8.03	9.63	16.49	26.33
Season													
Fall	97.7%	8.262	0.286	0	0.17	0.38	1.32	3.53	8.31	20.16	32.71	75.83	351.48
Spring	96.8%	8.273	0.335	0	0.13	0.39	1.37	3.50	7.88	18.02	27.02	116.00	390.53
Summer	96.8%	7.561	0.257	0	0.14	0.37	1.37	3.51	7.93	18.01	30.86	64.95	347.93
Winter	97.1%	7.964	0.293	0	0.16	0.43	1.39	3.90	8.77	17.60	27.34	63.27	307.54
Urbanization													
Central City	97.2%	8.528	0.309	0	0.17	0.41	1.44	3.78	8.05	18.25	29.51	106.93	318.93
Nonmetropolitan	96.6%	7.224	0.261	0	0.10	0.28	1.08	3.34	7.82	17.28	24.70	59.17	390.53
Suburban	97.4%	8.058	0.209	0	0.17	0.43	1.42	3.61	8.45	19.50	32.04	69.42	351.48
Race													
Asian	94.0%	8.730	1.264	0	0	0.14	0.63	3.86	7.23	21.62	36.16	72.01	124.26
Black	94.8%	7.816	0.498	0	0.03	0.11	0.64	2.49	7.29	17.28	27.78	116.00	347.93
Native American	88.9%	6.987	1.057	0	0.02	0.14	0.81	2.83	8.06	20.20	24.17	66.71	139.37
Other/NA	97.1%	10.727	1.002	0	0.12	0.33	1.03	4.15	11.28	34.64	40.33	121.50	166.48
White	97.7%	7.943	0.156	0	0.22	0.49	1.50	3.76	8.24	18.16	28.76	66.11	390.53
Region													
Midwest	97.3%	9.291	0.341	0	0.20	0.50	1.66	4.20	9.61	21.33	34.35	90.88	390.53
Northeast	97.2%	7.890	0.330	0	0.18	0.42	1.42	3.41	7.54	18.07	32.04	78.15	307.54
South	97.3%	6.926	0.225	0	0.11	0.27	1.01	3.10	7.49	15.86	25.76	54.94	347.93
West	96.7%	8.454	0.313	0	0.17	0.49	1.60	3.93	8.67	19.88	29.89	84.46	174.65

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-3. Per Capita Intake of Beef (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	91%	0.825	0.007	0	0	0.055	0.268	0.626	1.163	1.804	2.327	3.478	7.959
Age (years)													
< 01	64%	0.941	0.075	0	0	0	0	0.488	1.417	2.536	3.205	5.776	7.959
01-02	93%	1.46	0.056	0	0	0.187	0.531	1.339	2.166	2.783	3.65	4.741	7.571
03-05	95%	1.392	0.05	0	0	0.14	0.506	1.162	1.905	3.163	3.573	5.908	6.769
06-11	95%	1.095	0.028	0	0.028	0.102	0.337	0.924	1.56	2.376	2.92	3.944	6.024
12-19	95%	0.83	0.02	0	0.032	0.114	0.3	0.654	1.204	1.775	2.192	3.108	4.508
20-39	94%	0.789	0.012	0	0	0.087	0.297	0.644	1.109	1.662	2.165	3.059	6.086
40-69	90%	0.667	0.011	0	0	0.031	0.221	0.536	0.977	1.458	1.76	2.474	4.968
70 +	87%	0.568	0.018	0	0	0	0.151	0.427	0.817	1.324	1.651	2.62	4.02
Season													
Fall	92%	0.834	0.014	0	0	0.063	0.296	0.665	1.167	1.785	2.277	3.339	6.086
Spring	91%	0.797	0.014	0	0	0.046	0.254	0.595	1.132	1.788	2.295	3.531	7.959
Summer	90%	0.845	0.017	0	0	0.045	0.254	0.605	1.187	1.887	2.519	3.707	7.085
Winter	92%	0.823	0.015	0	0	0.066	0.272	0.636	1.157	1.767	2.271	3.266	7.571
Urbanization													
Central City	91%	0.808	0.013	0	0	0.037	0.271	0.611	1.13	1.777	2.329	3.325	6.182
Nonmetropolitan	91%	0.841	0.015	0	0	0.064	0.269	0.637	1.196	1.852	2.308	3.531	6.66
Suburban	92%	0.828	0.011	0	0	0.059	0.265	0.63	1.163	1.797	2.337	3.511	7.959
Race													
Asian	89%	0.895	0.072	0	0	0.08	0.228	0.694	1.251	2.065	2.444	3.135	5.862
Black	87%	0.665	0.019	0	0	0	0.151	0.42	0.963	1.488	2.177	3.126	6.769
Native American	82%	0.995	0.088	0	0	0.016	0.182	0.73	1.299	2.338	2.825	4.958	6.66
Other/NA	90%	1.159	0.069	0	0	0	0.389	0.739	1.63	2.756	3.269	5.908	6.182
White	93%	0.833	0.008	0	0	0.068	0.284	0.651	1.18	1.784	2.28	3.41	7.959
Region													
Midwest	92%	0.853	0.015	0	0	0.07	0.31	0.66	1.191	1.853	2.345	3.65	6.468
Northeast	93%	0.805	0.017	0	0	0.054	0.253	0.595	1.136	1.816	2.352	3.41	6.769
South	90%	0.846	0.013	0	0	0.058	0.268	0.648	1.195	1.805	2.324	3.511	7.959
West	92%	0.775	0.016	0	0	0.039	0.235	0.562	1.105	1.73	2.226	3.219	6.66

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-4. Per Capita Intake of Pork (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	90.2%	0.261	0.005	0	0	0.005	0.031	0.083	0.263	0.735	1.137	2.384	8.231
Age (years)													
< 01	63.0%	0.291	0.04	0	0	0	0	0.078	0.228	0.69	1.671	3.269	5.431
01-02	92.4%	0.492	0.041	0	0	0.033	0.071	0.182	0.424	1.525	2.633	3.633	6.94
03-05	95.0%	0.473	0.035	0	0	0.021	0.057	0.147	0.362	1.372	2.35	3.309	8.231
06-11	94.5%	0.352	0.018	0	0	0.015	0.052	0.116	0.311	1.098	1.418	2.869	5.024
12-19	94.0%	0.27	0.013	0	0	0.012	0.039	0.09	0.289	0.742	1.118	2.699	5.157
20-39	92.5%	0.23	0.007	0	0	0.009	0.031	0.08	0.233	0.704	1.039	1.747	6.363
40-69	88.3%	0.212	0.007	0	0	0	0.025	0.068	0.242	0.613	0.915	1.865	4.342
70 +	86.5%	0.207	0.011	0	0	0	0.016	0.061	0.223	0.667	0.924	1.74	3.035
Season													
Fall	91.9%	0.254	0.008	0	0	0.01	0.037	0.098	0.267	0.723	1.045	2.118	5.338
Spring	88.8%	0.264	0.009	0	0	0	0.027	0.076	0.265	0.728	1.19	2.762	6.94
Summer	89.4%	0.245	0.01	0	0	0	0.027	0.072	0.22	0.688	1.097	2.43	8.231
Winter	90.6%	0.279	0.009	0	0	0.006	0.032	0.084	0.3	0.819	1.195	2.608	5.946
Urbanization													
Central City	89.5%	0.258	0.009	0	0	0.001	0.027	0.076	0.235	0.736	1.085	2.699	6.94
Nonmetropolitan	90.3%	0.299	0.01	0	0	0.007	0.038	0.099	0.324	0.863	1.212	2.808	8.231
Suburban	90.6%	0.244	0.006	0	0	0.006	0.03	0.078	0.253	0.678	1.098	2.269	5.946
Race													
Asian	85.9%	0.256	0.049	0	0	0.003	0.027	0.057	0.192	0.72	1.157	2.487	3.966
Black	89.2%	0.418	0.019	0	0	0.002	0.035	0.123	0.48	1.19	2.108	3.178	8.231
Native American	83.6%	0.188	0.024	0	0	0	0.027	0.08	0.179	0.473	0.889	1.317	1.662
Other/NA	88.3%	0.191	0.021	0	0	0	0.027	0.075	0.183	0.48	0.845	1.638	5.252
White	90.6%	0.241	0.005	0	0	0.006	0.031	0.081	0.249	0.685	1.061	2.035	5.946
Region													
Midwest	91.3%	0.284	0.009	0	0	0.006	0.034	0.095	0.318	0.776	1.113	2.487	6.362
Northeast	90.4%	0.236	0.01	0	0	0.005	0.027	0.071	0.227	0.699	1.064	2.11	5.338
South	89.5%	0.283	0.008	0	0	0.005	0.032	0.09	0.281	0.802	1.212	2.769	8.231
West	89.7%	0.22	0.009	0	0	0	0.028	0.072	0.198	0.59	1.009	1.944	5.946

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-5. Per Capita Intake of Poultry (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	91.7%	0.598	0.007	0	0	0.015	0.097	0.344	0.83	1.506	2.035	3.273	12.239
Age (years)													
< 01	64.9%	0.816	0.087	0	0	0	0	0.178	1.07	2.467	3.453	7.373	12.239
01-02	94.2%	1.156	0.064	0	0.017	0.08	0.211	0.636	1.695	2.931	4.144	5.429	11.747
03-05	95.0%	1.068	0.049	0	0	0.044	0.18	0.607	1.647	2.662	3.603	5.024	7.565
06-11	95.7%	0.871	0.028	0	0.022	0.047	0.166	0.556	1.364	2.182	2.851	3.861	6.936
12-19	94.3%	0.558	0.017	0	0	0.02	0.088	0.378	0.813	1.476	1.806	2.394	3.535
20-39	94.6%	0.53	0.01	0	0.005	0.021	0.098	0.332	0.768	1.35	1.744	2.666	3.801
40-69	90.5%	0.477	0.01	0	0	0.011	0.084	0.294	0.696	1.192	1.528	2.358	6.219
70 +	86.7%	0.463	0.017	0	0	0	0.072	0.286	0.692	1.189	1.539	2.284	4.092
Season													
Fall	92.9%	0.635	0.015	0	0	0.022	0.112	0.366	0.867	1.571	2.209	3.543	12.239
Spring	91.0%	0.538	0.013	0	0	0.009	0.071	0.305	0.74	1.368	1.829	3.052	11.543
Summer	90.4%	0.625	0.015	0	0	0.013	0.089	0.359	0.905	1.562	2.171	3.863	6.596
Winter	92.6%	0.595	0.014	0	0	0.025	0.113	0.372	0.82	1.443	1.94	3.091	8.418
Urbanization													
Central City	91.7%	0.627	0.014	0	0	0.011	0.095	0.333	0.877	1.589	2.218	3.518	12.239
Nonmetropolitan	90.6%	0.54	0.013	0	0	0.014	0.093	0.314	0.781	1.321	1.71	3.077	11.543
Suburban	92.4%	0.608	0.011	0	0	0.02	0.1	0.37	0.842	1.542	2.06	3.111	8.306
Race													
Asian	88.6%	0.79	0.068	0	0	0.035	0.112	0.503	1.15	1.901	2.368	2.939	4.745
Black	91.9%	0.798	0.025	0	0	0.02	0.143	0.521	1.133	1.867	2.352	4.288	12.239
Native American	80.7%	0.54	0.051	0	0	0	0.071	0.324	0.985	1.343	1.545	2.348	4.158
Other/NA	91.7%	0.81	0.049	0	0	0.005	0.169	0.467	1.252	2.11	2.695	3.863	4.002
White	92.0%	0.559	0.007	0	0	0.016	0.092	0.318	0.771	1.419	1.906	3.091	11.543
Region													
Midwest	91.7%	0.551	0.014	0	0	0.013	0.095	0.318	0.735	1.328	1.938	3.244	11.747
Northeast	92.7%	0.651	0.017	0	0	0.016	0.093	0.391	0.934	1.687	2.134	3.38	8.306
South	91.7%	0.643	0.012	0	0	0.02	0.106	0.394	0.93	1.581	2.173	3.426	8.418
West	91.0%	0.526	0.014	0	0	0.011	0.086	0.28	0.754	1.33	1.766	2.942	12.239

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-6. Per Capita Intake of Game (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1.2%	0.01	0.01	0	0	0	0	0	0	0	0	0.098	5.081
Age (years)													
< 01	0.5%	0.014	0.091	0	0	0	0	0	0	0	0	1.113	1.866
01-02	0.9%	0.026	0.125	0	0	0	0	0	0	0	0	0.692	2.638
03-05	1.5%	0.01	0.04	0	0	0	0	0	0	0	0	0	2.953
06-11	1.1%	0.004	0.016	0	0	0	0	0	0	0	0	0	1.176
12-19	1.0%	0.004	0.019	0	0	0	0	0	0	0	0	0	1.78
20-39	1.3%	0.01	0.021	0	0	0	0	0	0	0	0	0.098	5.081
40-69	1.3%	0.012	0.017	0	0	0	0	0	0	0	0	0.462	2.882
70 +	1.1%	0.002	0.01	0	0	0	0	0	0	0	0	0	2.261
Season													
Fall	1.7%	0.016	0.022	0	0	0	0	0	0	0	0	0.521	3.488
Spring	0.7%	0.006	0.019	0	0	0	0	0	0	0	0	0	2.882
Summer	0.7%	0.003	0.012	0	0	0	0	0	0	0	0	0	1.78
Winter	1.6%	0.013	0.021	0	0	0	0	0	0	0	0	0.446	5.081
Urbanization													
Central City	0.7%	0.005	0.014	0	0	0	0	0	0	0	0	0	1.8
Nonmetropolitan	2.0%	0.019	0.018	0	0	0	0	0	0	0	0	0.822	1.866
Suburban	1.1%	0.008	0.018	0	0	0	0	0	0	0	0	0	5.081
Race													
Asian	0.0%	0	0	0	0	0	0	0	0	0	0	0	0
Black	0.1%	0.001	0.027	0	0	0	0	0	0	0	0	0	0.887
Native American	0.6%	0.001	0.012	0	0	0	0	0	0	0	0	0	0.255
Other/NA	0.3%	0.003	0.046	0	0	0	0	0	0	0	0	0	0.636
White	1.4%	0.011	0.011	0	0	0	0	0	0	0	0	0.329	5.081
Region													
Midwest	2.2%	0.012	0.012	0	0	0	0	0	0	0	0	0.588	1.866
Northeast	0.5%	0.005	0.026	0	0	0	0	0	0	0	0	0	2.055
South	0.8%	0.009	0.025	0	0	0	0	0	0	0	0	0	5.081
West	1.3%	0.012	0.022	0	0	0	0	0	0	0	0	0.446	2.953

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-7. Per Capita Intake of Eggs (g/kg-day as consumed)

Population Group	Percent Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	41.4%	0.317	0.009	0	0	0	0	0	0.445	0.968	1.422	2.953	13.757
Age (years)													
< 01	32.3%	0.791	0.126	0	0	0	0	0	1.537	2.744	3.645	5.487	13.757
01-02	43.3%	0.822	0.087	0	0	0	0	0	1.381	2.604	3.299	5.242	8.577
03-05	39.6%	0.677	0.088	0	0	0	0	0	0.89	2.224	3.106	7.475	10.799
06-11	36.6%	0.414	0.033	0	0	0	0	0	0.735	1.312	1.617	3.037	6.331
12-19	36.0%	0.244	0.023	0	0	0	0	0	0.345	0.828	1.26	2.137	4.12
20-39	43.3%	0.271	0.012	0	0	0	0	0	0.439	0.897	1.193	1.764	5.392
40-69	44.0%	0.225	0.009	0	0	0	0	0	0.375	0.725	1.029	1.496	3.216
70 +	42.0%	0.218	0.017	0	0	0	0	0	0.328	0.653	0.969	1.582	2.791
Season													
Fall	40.1%	0.291	0.017	0	0	0	0	0	0.422	0.871	1.237	2.744	6.331
Spring	42.7%	0.307	0.017	0	0	0	0	0	0.402	1.015	1.42	2.604	13.548
Summer	40.5%	0.344	0.02	0	0	0	0	0	0.476	1.035	1.496	3.533	13.757
Winter	42.2%	0.325	0.019	0	0	0	0	0	0.47	0.98	1.409	2.841	11.39
Urbanization													
Central City	41.6%	0.315	0.018	0	0	0	0	0	0.423	0.924	1.422	3.106	13.757
Nonmetropolitan	43.8%	0.338	0.018	0	0	0	0	0	0.493	1.043	1.438	2.826	13.548
Suburban	39.7%	0.309	0.013	0	0	0	0	0	0.434	0.95	1.399	2.73	11.39
Race													
Asian	38.9%	0.452	0.094	0	0	0	0	0	0.615	1.47	2.604	2.672	2.672
Black	48.9%	0.385	0.023	0	0	0	0	0	0.595	1.134	1.486	2.881	6.213
Native American	49.7%	0.491	0.17	0	0	0	0	0	0.457	1.395	1.61	10.799	13.548
Other/NA	55.1%	0.472	0.056	0	0	0	0	0	0.712	1.26	2.247	3.292	5.997
White	39.5%	0.297	0.01	0	0	0	0	0	0.408	0.922	1.368	2.906	13.757
Region													
Midwest	36.9%	0.288	0.019	0	0	0	0	0	0.35	0.893	1.44	3.106	13.548
Northeast	35.9%	0.264	0.02	0	0	0	0	0	0.376	0.791	1.229	2.815	11.39
South	44.3%	0.325	0.014	0	0	0	0	0	0.469	0.999	1.422	2.531	8.737
West	46.6%	0.392	0.022	0	0	0	0	0	0.563	1.135	1.603	3.08	13.757

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analyses of the 1989-91 CSFII

Table 11-8. Main Daily Intake of Meat and Dairy Products Per Individual in a Day for USDA 1977-78, 87-88, 89-91, 94, and 95 Surveys

Food Product	77-78 Data (g-day)	87-88 Data (g/day)	89-91 Data (g/day)	94 Data (g/day)	95 Data (g/day)
Beef	52	32	26	24	27
Poultry	25	26	27	29	24
Meat Mixtures[1]	69	86	90	95	104
Dairy Products[2]	314	290	286	277	284

[1] Includes mixtures having meat, poultry, or fish as a main ingredient; frozen meals in which the main course is a meat, poultry, or fish item; meat, poultry, or fish sandwiches coded as a single item; and baby-food meat and poultry mixtures.

[2] Includes total milk, cream, milk desserts, and cheese. Total milk includes fluid milk, yogurt, flavored milk, milk drinks, meal replacements with milk, milk-based infant formulas, and unreconstituted dry milk and powdered mixtures.

Sources: USDA, 1980; 1992; 1996a; 1996b.

Table 11-9. Mean Per Capita Intake Rates for Meat, Poultry, and Dairy Products (g/kg-d as consumed) 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 (Food additive)	0.9033354	0.0134468
Milk-Fat Solids	0.4297199	0.0060264
Milk-Fat Solids (Food additive)	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	NA
Goat (Organ Meats) - Other	0.0000000	NA
Goat (Boneless) - Fat	0.0000397	0.0000238
Goat (Organ Meats) - Kidney	0.0000000	NA
Goat (Organ Meats) - Liver	0.0000000	NA
Goat (Boneless) - Lean (w/o Removeable Fat)	0.0001891	0.0001139
Horse	0.0000000	NA
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	NA
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
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	NA
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	NA
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

NA = Not applicable
[a] Consumed in any raw or prepared form.
Source: DRES database (based on 1977-78 NFCS)

Table 11-10. Mean Meat Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1977-1978

Group Age (yrs.)	Total Meat, Poultry and Fish	Beef	Pork	Lamb, Veal, Game	Frankfurters, Sausages, Luncheon Meats, Spreads	Total Poultry	Chicken Only	Meat Mixtures[c]
Males and Females								
1 and Under	72	9	4	3	2	4	1	51
1-2	91	18	6	(b)	15	16	13	32
3-5	121	23	8	(b)	15	19	19	49
6-8	149	33	15	1	17	20	19	55
Males								
9-11	188	41	22	3	19	24	21	71
12-14	218	53	18	(b)	25	27	24	87
15-18	272	82	24	1	25	37	32	93
19-22	310	90	21	2	33	45	43	112
23-34	285	86	27	1	30	31	29	94
35-50	295	75	28	1	26	31	28	113
51-64	274	70	32	1	29	31	29	86
65-74	231	54	25	2	22	29	26	72
75 and Over	196	41	39	7	19	28	25	54
Females								
9-11	162	38	17	1	20	27	23	55
12-14	176	47	19	1	18	23	22	61
15-18	180	46	14	2	16	28	27	61
19-22	184	52	19	1	18	26	24	61
23-34	183	48	17	1	16	24	22	66
35-50	187	49	19	2	14	24	21	63
51-64	187	52	19	2	12	26	24	60
65-74	159	34	21	4	12	30	25	47
75 and Over	134	31	17	2	9	19	16	49
Males and Females								
All Ages	207	54	20	2	20	27	24	72

[a] Based on USDA Nationwide Food Consumption Survey 1977-78 data for one day.
[b] Less than 0.5 g/day but more than 0.
[c] Includes mixtures containing meat, poultry, or fish as a main ingredient.
Source: USDA, 1980.

Table 11-11. Mean Meat Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1987-1988

Group Age (yrs.)	Total Meat, Poultry, and Fish	Beef	Pork	Lamb, Veal, Game	Frankfurters, Sausages, Luncheon Meats	Total Poultry	Chicken Only	Meat Mixturess[b]
Males and Females								
5 and Under	92	10	9	<0.5	11	14	12	39
Males								
6-11	156	22	14	<0.5	13	27	24	74
12-19	252	38	17	1	20	27	20	142
20 and over	250	44	19	23	2	31	25	108
Females								
6-11	151	26	9	1	11	20	17	74
12-19	169	31	10	<0.5	18	17	13	80
20 and over	170	29	12	1	13	24	18	73
All individuals	193	32	14	1	17	26	20	86

[a] Based on USDA Nationwide Food Consumption Survey 1987-88 data for one day.
[b] Includes mixtures containing meat, poultry, or fish as a main ingredient.
Source: USDA, 1992.

Table 11-12. Mean Dairy Product Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1977-1978

Group Age (yrs.)	Total Milk	Fluid Milk	Cheese	Eggs
1 and Under	618	361	1	5
1-2	404	397	8	20
3-5	353	330	9	22
6-8	433	401	10	18
9-11	432	402	8	26
12-14	504	461	9	28
15-18	519	467	13	31
19-22	388	353	15	32
23-34	243	213	21	38
35-50	203	192	18	41
51-64	180	173	17	36
65-74	217	204	14	36
75 and Over	193	184	18	41
9-11	402	371	7	14
12-14	387	343	11	19
15-18	316	279	11	21
19-22	224	205	18	26
23-34	182	158	19	26
35-50	130	117	18	23
51-64	139	128	19	24
65-74	166	156	14	22
75 and Over	214	205	20	19
All Ages	266	242	15	27

[a] Based on USDA Nationwide Food Consumption Survey 1977-78 data for one day.
Source: USDA, 1980.

Table 11-13. Mean Dairy Product Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1987-1988

Group Age (yrs.)	Total Fluid 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 1987-88 data for one day.
Source: USDA, 1992.

Table 11-14. Mean Meat Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1994 and 1995

Group Age (yrs.)	Total Meat, Poultry, and Fish		Beef		Pork		Lamb, Veal, Game		Frankfurters, Sausages, Luncheon Meats		Total Poultry		Chicken Only		Meat Mixtures[c]	
	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
Males and Females																
5 and Under	94	87	10	8	6	4	(b)	(b)	17	18	16	15	14	14	41	39
Males																
6-11	131	161	19	18	9	7	0	(b)	22	27	19	25	16	22	51	68
12-19	238	256	31	29	11	11	1	1	21	27	40	26	29	23	119	150
20 and over	266	283	35	41	17	14	2	1	29	27	39	31	30	27	124	149
Females																
6-11	117	136	18	16	5	5	(b)	(b)	18	20	19	17	15	14	51	69
12-19	164	158	23	22	5	7	(b)	0	16	10	20	19	15	18	94	82
20 and over	168	167	18	21	9	11	1	1	16	15	25	22	20	19	87	83
All individuals	195	202	24	27	11	10	1	1	21	21	29	24	23	21	98	104

[a] Based on USDA CSFII 1994 and 1995 data for one day.
[b] Less than 0.5 g/day but more than 0.
[c] Includes mixtures containing meat, poultry, or fish as a main ingredient.
Source: USDA, 1996a; 1996b.

Table 11-15. Mean Dairy Product Intakes Per Individual in a Day, by Sex and Age (g/day as consumed)[a] for 1994 and 1995

Group Age (yrs.)	Total Fluid Milk		Whole Milk		Lowfat Milk		Cheese		Eggs	
	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
Males and Females										
5 and under	424	441	169	165	130	129	12	9	11	13
Males										
6-11	407	400	107	128	188	164	11	12	13	15
12-19	346	396	105	105	160	176	19	20	18	24
20 and over	195	206	50	57	83	88	19	16	23	23
Females										
6-11	340	330	101	93	136	146	17	13	12	15
12-19	239	235	75	71	88	107	14	13	13	17
20 and over	157	158	37	32	56	57	16	15	15	16
All individuals	229	236	65	66	89	92	17	15	17	19

[a] Based on USDA CSFII 1994 and 1995 data for one day.
Source: USDA, 1996a; 1996b.

Table 11-16. Mean and Standard Error for the Dietary Intake of Food Sub Classes Per Capita by Age (g/day as consumed)

Age (yrs.)	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, 1984a (based on 1977-78 NFCS).

Table 11-17. Mean and Standard Error for the Per Capita Daily Intake of Food Class and Sub Class by Region (g/day 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

NOTE: Northeast = Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

North Central = Ohio, Illinois, Indiana, Wisconsin, Michigan, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

South = Maryland, Delaware, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma.

West = Montana, Idaho, Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada, Washington, Oregon, and California.

Source: U.S. EPA, 1984b (based on 1977-78 NFCS).

Table 11-18. 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.

Produce	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 Intake[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:

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

where IR = the intake rate for a specific age group.
Source: U.S. EPA, 1989 (based in 1977-78 NFCS and NHANES II data).

Table 11-19. Per Capita Consumption of Meat and Poultry in 1991[a]

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]
Red Meat				
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
Poultry				
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 were presented in lbs; converted to g/day by multiplying by a factor of 453.6 g/lb and dividing by 365 days/yr.
[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.

Table 11-20. Per Capita Consumption of Dairy Products in 1991[a]

Food Item	Per Capita Consumption (g/day)[j]	Food Item	Per Capita Consumption (g/day)[j]
Eggs		Cheese	
Farm Weight[b,c]	37.8	American	
Retail Weight[c,e]	37.3	Cheddar	11.2
		Other[d]	2.5
Fluid Milk and Cream	289.7	Italian	
Plain Whole Milk	105.3	Provolone	0.8
Lowfat Plain Milk (2%)	98.1	Romano	0.2
Lowfat Plain Milk (1%)	25.8	Parmesan	0.6
Skim Plain Milk	29.7	Mozzarella	9.0
Whole Flavored Milk and Drink	3.4	Ricotta	1.0
Lowfat Flavored Milk and Drink	8.5	Other	0.07
Buttermilk (lowfat and skim)	4.2	Miscellaneous	
Half and Half Cream	3.9	Swiss[f]	1.5
Light Cream	0.4	Brick	0.07
Heavy Cream	1.6	Muenster	0.5
Sour Cream	3.2	Cream	1.9
Eggnog	0.5	Neufchatel	0.3
		Blue[g]	0.2
Evaporated and Condensed Milk[i]		Other	1.2
Canned Whole Milk	2.6	Processed Products	
Bulk Whole Milk	1.4	Cheese	6.1
Bulk and Canned Skim Milk	6.2	Foods and spreads	4.7
Total[e]	10.2	Cheese Content	8.5
		Consumed as Natural	22.6
Dry Milk Products[i]		Cottage Cheese (lowfat)	1.6
Dry Whole Milk	0.5		
Nonfat Dry Milk	3.2	Frozen Dairy Products	
Dry Buttermilk	0.3	Ice Cream	20.3
Total[e]	4.0	Ice Milk	9.2
Dried Whey	4.5	Sherbet	1.5
		Other Frozen Products[h]	5.3
Butter	5.2	Total[e]	36.4
		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 11-21. Adult Mean Daily Intake (as consumed) 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.

NOTE: Pacific = Washington, Oregon and California

Mountain = Montana, Idaho, Wyoming, Utah, Colorado, New Mexico, Arizona, and Nevada

North Central = Ohio, Illinois, Indiana, Wisconsin, Michigan, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

Northeast = Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

South = Maryland, Delaware, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma.

Source: National Livestock and Meat Board, 1993.

Table 11-22. Amount (as consumed) of Meat Consumed by Adults Grouped by Frequency of Eatings[c]

Frequency of Eatings	Percent of Total Eaters	Percent of Eaters: Male	Percent of Eaters: 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 Eaters[c]	33%	39	61	1025-1584	93
Heavy Meat Eaters[d]	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.

Table 11-23. Quantity (as consumed) of Meat, Poultry, and Dairy Products Consumed Per Eating Occasion and the Percentage of Individuals Using These Foods in Three Days

Food category	% Indiv. using food in 3 days	Quantity consumed per eating occasion (g)		Consumers-only Quantity consumed per eating occasion at Specified Percentiles (g)						
		Average	Standard Deviation	5	25	50	75	90	95	99
Meat[a]	84.6	107	85	16	46	86	140	224	252	432
Beef	67.3	133	85	41	84	112	168	224	280	448
Pork	49.9	69	69	8	16	44	92	160	194	320
Lamb	1.5	146	84	43	88	123	184	227	280	448
Veal	2.3	130	71	42	84	112	168	224	276	352
Poultry	42.8	128	77	42	82	112	168	224	280	388
Chicken	38.7	131	76	43	84	112	170	224	280	388
Turkey	5.8	105	73	28	57	86	129	172	240	350
Dairy Products										
Eggs	54.3	82	44	40	50	64	100	128	150	237
Butter	31.4	12	13	2	5	7	14	28	28	57
Margarine	43.1	11	11	2	5	7	14	28	28	57
Milk[b]	82.5	203	134	15	122	244	245	366	488	552
Cheese[c]	40	41	28	14	28	28	56	58	85	140

[a] Meat - beef, pork, lamb, and veal.
[b] Milk - fluid milk, milk beverages, and milk-based infant formulas.
[c] Cheese - natural and processed cheese.
Source: Pao et al., 1982 (based on 1977-78 NFCS).

Table 11-24. Percentage Lipid Content (Expressed as Percentages of 100 Grams of Edible Portions) of Selected Meat and Dairy Products[a]

Product	Fat Percentage	Comment
Meats		
Beef		
Lean only	6.16	Raw
Lean and fat, 1/4 in. fat trim	9.91	Cooked
Brisket (point half)	19.24	Raw
Lean and fat	21.54	Cooked
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

Table 11-24. Percentage Lipid Content (Expressed as Percentages of 100 Grams of Edible Portions) of Selected Meat and Dairy Products[a] (continued)

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

[a] Based on the lipid content in 100 grams, edible portion.
Source: USDA, 1979-1984.

Table 11-25. 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

Table 11-26. 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 11-27. 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 11-28. Percentage 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	
Pork	70.00	Raw
Rabbit - domestic	72.81	Raw
	69.11	Raw, roasted
Turkey	74.16	Cooked, roasted
Dairy Products		
Eggs	74.57	Raw
Butter	15.87	Raw
Cheese American pasteurized	39.16	Regular
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 water content in 100 grams, edible portion.
Source: USDA, 1979-1984.

Table 11-29. Summary of Meat, Poultry, and Dairy Intake Studies

Study	Survey Population Used in Calculating Intake	Types of Data Used	Units	Food Items
KEY STUDIES				
EPA Analysis of 1989-91 CSFII Data	Per capita	1989-91 CSFII data; Based on 3-day average individual intake rates.	g/kg-day; as consumed	Distributions of intake rates for total meats and total dairy; individual food items.
RELEVANT STUDIES				
AIHC, 1994	Adults, Per Capita	USDA NFCS 1977-78 data presented in the 1989 version of the Exposure Factors Handbook that were analyzed by Finley and Paustenbach (1992).	g/day	Distribution for beef consumption presented in @Risk format.
EPA's DRES (White et al., 1983)	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
NLMB, 1993	Adult daily mean intake rates	MRCA's Menu Census	g/day; as consumed	Intake rates for various meats by region and gender.
Pao et al., 1982	Consumers only serving size data provided	1977-78 NFCS 3-day individual intake data	g; as consumed	Distributions of serving sizes for meats, poultry, and diary products.
USDA, 1980; 1992; 1996a; 1996b	Per capita and consumer only grouped by age and sex	1977-78 and 1987-88 NFCS, and 1994 and 1995 CSFII 1-day individual intake data	g/day; as consumed	Total meat, poultry and fish, total poultry, total milk, cheese and eggs.
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.
U.S. EPA/ORP, 1984a; 1984b	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

Table 11-30. Summary of Recommended Values for Per Capita Intake of Meat and Dairy Products and Serving Size

Mean	95th Percentile	Multiple Percentiles	Study
Total Meat Intake			
2.1 g/kg-day	5.1 g/kg-day	see Table 11-1	EPA Analysis of CSFII 1989-91 Data
Total Dairy Intake			
8.0 g/kg-day	29.7 g/kg-day	see Table 11-2	EPA Analysis of CSFII 1989-91 Data
Individual Meat and Dairy Products			
see Tables 11-3 to 11-7	see Tables 11-3 to 11-7	see Tables 11-3 to 11-7	EPA Analysis of CSFII 1989-91 Data

Table 11-31. Confidence in Meats and Dairy Products Intake Recommendations

Considerations	Rationale	Rating
Study Elements		
• Level of peer review	USDA CSFII survey receives high level of peer review. EPA analysis of these data has been peer reviewed outside the Agency.	High
• Accessibility	CSFII data are publicly available.	High
• Reproducibility	Enough information is included to reproduce results.	High
• Focus on factor of interest	Analysis is specifically designed to address food intake.	High
• Data pertinent to U.S.	Data focuses on the U.S. population.	High
• Primary data	This is new analysis of primary data.	High
• Currency	Were the most current data publicly available at the time the analysis was conducted for this Handbook.	High
• Adequacy of data collection period	Survey is designed to collect short-term data.	Medium confidence for average values; Low confidence for long term percentile distribution
• Validity of approach	Survey methodology was adequate.	High
• Study size	Study size was very large and therefore adequate.	High
• Representativeness of the population	The population studied was the U.S. population.	High
• Characterization of variability	Survey was not designed to capture long term day-to-day variability. Short term distributions are provided for various age groups, regions, etc.	Medium
• Lack of bias in study design (high rating is desirable)	Response rate was adequate.	Medium
• Measurement error	No measurements were taken. The study relied on survey data.	N/A
Other Elements		
• Number of studies	1 CSFII was the most recent data set publicly available at the time the analysis was conducted for this Handbook. Therefore, it was the only study classified as key study.	Low
• Agreement between researchers	Although the CSFII was the only study classified as key study, the results are in good agreement with earlier data.	High
Overall Rating	The survey is representative of U.S. population. Although there was only one study considered key, these data are the most recent and are in agreement with earlier data. The approach used to analyze the data was adequate. However, due to the limitations of the survey design, estimation of long-term percentile values (especially the upper percentiles) is uncertain.	High confidence in the average; Low confidence in the long-term upper percentiles

APPENDIX 11A

SAMPLE CALCULATION OF MEAN DAILY FAT INTAKE BASED ON CDC (1994) DATA

Sample Calculation of Mean Daily Fat Intake Based on CDC (1994) Data

CDC (1994) provided data on the mean daily total food energy intake (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 82 g) of their TFEI was from total dietary fat (CDC, 1994). Based on this information, the amount of fat per kcal was calculated as shown in the following example.

$$0.34 \times 2{,}095 \ \frac{\text{kcal}}{\text{day}} \times X \ \frac{\text{g-fat}}{\text{day}} = 82 \ \frac{\text{g-fat}}{\text{day}}$$

$$\therefore X = 0.12 \ \frac{\text{g-fat}}{\text{kcal}}$$

where 0.34 is the fraction of fat intake, 2,095 is the total food intake, and X is the conversion factor from kcal/day to g-fat/day.

Using the conversion factor shown above (i.e., 0.12 g-fat/kcal) and the information on the mean daily TFEI and percentage of TFEI for the various age/gender groups, the daily fat intake was calculated for these groups. An example of obtaining the grams of fat from the daily TFEI (1,591 kcal/day) for children ages 3-5 and their percent TFEI from total dietary fat (33 percent) is as follows:

$$1{,}591 \ \frac{\text{kcal}}{\text{day}} \times 0.33 \times 0.12 \ \frac{\text{g-fat}}{\text{kcal}} = 63 \ \frac{\text{g-fat}}{\text{day}}$$

12. INTAKE OF GRAIN PRODUCTS

Consumption of grain products is a potential pathway of exposure to toxic chemicals. These food sources can become contaminated by absorption or deposition of ambient air pollutants onto the plants, contact with chemicals dissolved in rainfall or irrigation waters, or absorption of chemicals through plant roots from soil and ground water. The addition of pesticides, soil additives, and fertilizers may also result in contamination of grain products.

The U.S. Department of Agriculture's (USDA) Nationwide Food Consumption Survey (NFCS) and Continuing Survey of Food Intakes by Individuals (CSFII) are the primary sources of information on intake rates of grain products in the United States. Data from the NFCS have been used in various studies to generate consumer-only and per capita intake rates for both individual grain products and total grains. CSFII 1989-91 survey data have been analyzed by EPA to generate per capita intake rates for various food items and food groups. As described in Volume II, Chapter 9 - Intake of Fruits and Vegetables, consumer-only intake is defined as the quantity of grain products 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 assessments 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.

This Chapter provides intake data for individual grain products and total grains. 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 considerations discussed in Volume I, Section 1.3.1 of the Introduction. Recommendations are based on data from the 1989-91 CSFII survey, which was considered the only key intake study for grain products. Other relevant studies are also presented to provide the reader with added perspective on this topic. It should be noted that most of the key and relevant studies presented in this Chapter are based on data from USDA's NFCS and CSFII. The USDA NFCS and CSFII are described below.

12.1. INTAKE STUDIES

12.1.1. U.S. Department of Agriculture Nationwide Food Consumption Survey and Continuing Survey of Food Intake by Individuals

The NFCS and CSFII are the basis of much of the data on grain intake presented in this section. Data from the 1977-78 NFCS are presented because the data have been published by USDA in various reports 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 1994 and 1994 CSFII are also presented. Recently, EPA conducted an analysis of USDA's 1989-91 CSFII. These data were the most recent food survey data available to the public at the time that EPA analyzed the data for this Handbook. The results of EPA's analyses are presented here. Detailed descriptions of the NFCS and CSFII data are presented in Volume II, Chapter 9 - Intake of Fruits and Vegetables.

Individual average daily intake rates calculated from NFCS and CSFII 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 intake rates representative of both short-term and long-term consumption. However, the distribution of average daily intake rates generated using short term data (e.g., 3-day) do not necessarily reflect the long-term distribution of average daily intake rates. The distributions generated from short term and long term data will differ to the extent that each individual's intake varies from day to day; the distributions will be similar to the extent that individuals' intakes are constant from day to day.

Day-to-day variation in intake among individuals will be great for food item/groups that are highly seasonal and for items/groups that are eaten year around, but that are not typically eaten every day. For these foods, the intake distribution generated from short term data will not be a good reflection of the long term distribution. On the other hand, for broad categories of foods (e.g., total grains) which are eaten on a daily basis throughout the year with minimal seasonality, the short term distribution may be a reasonable approximation of the true long term distribution, although it will show somewhat more variability. In this Chapter, distributions are shown for the various grain categories. Because of the increased variability of the short-term distribution, the short-term upper percentiles shown will overestimate somewhat the corresponding percentiles of the long-term distribution.

12.1.2. Key Grain Products Intake Studies Based on the CSFII

U.S. EPA Analysis of 1989-91 USDA CSFII Data - EPA conducted an analysis of USDA's 1989-91 CSFII data set. The general methodology used in analyzing the data is presented in Volume II, Chapter 9 - Intake of Fruits and Vegetables of this Handbook. Intake rates were generated for the following grain products: total grains, breads, sweets, snacks, breakfast foods, pasta, cooked cereals, rice, ready-to-eat cereals, and baby cereals. Appendix 12A provides the food codes and descriptions used in this grain analysis. The data for total grains have been corrected to account for mixtures as described in Volume II, Chapter 9 - Intake of Fruits and Vegetables and Appendix 9A using an assumed grain content of 31 percent for grain mixtures and 13 percent for meat mixtures. Per capita intake rates for total grains are presented in Tables 12-1. Table 12-2 through 12-10 present per capita intake data for individual grain products. The results are presented in units of g/kg-day. Thus, use of these data in calculating potential dose does not require the body weight factor to be included in the denominator of the average daily dose (ADD) equation. It should be noted that converting these intake rates into units of g/day by multiplying by a single average body weight is inappropriate, because individual intake rates were indexed to the reported body weights of the survey respondents. However, if there is a need to compare the intake data presented here to intake data in units of g/day, a body weight less than 70 kg (i.e., approximately 60 kg; calculated based on the number of respondents in each age category and the average body weights for these age groups, as presented in Volume I, Chapter 7) should be used because the total survey population included children as well as adults.

The advantages of using the 1989-91 CSFII data set are that the data are expected to be representative of the U.S. population and that it includes data on a wide variety of food types. The data set was the most recent of a series of publicly available USDA data sets (i.e., NFCS 1977-78; NFCS 1987-88; CSFII 1989-91) at the time the analysis was conducted for this Handbook, and should reflect recent eating patterns in the United States. The data set includes three years of intake data combined. However, the 1989-91 CSFII data are based on a three day survey period. Short-term dietary data may not accurately reflect long-term eating patterns. This is particularly true for the tails of the distribution of food intake. In addition, the adjustment for including mixtures adds uncertainty to the intake rate distributions. The calculation for including mixtures assumes that intake of any mixture includes grains in the proportions specified in Appendix Table 9A-1. This assumption yields valid estimates of per capita consumption, but results in overestimates of the proportion of the population consuming total grains; thus, the quantities reported in Table 12-1 should be interpreted as upper bounds on the proportion of the population consuming grain products.

The data presented in this handbook for the USDA 1989-91 CSFII is not the most up-to-date information on food intake. USDA has recently made available the data from its 1994 and 1995 CSFII. Over 5,500 people nationwide participated in both of these surveys providing recalled food intake informatin for 2 separate days. Although the 2-day data analysis has not been conducted, USDA published the results for the respondents' intakes on the first day surveyed (USDA, 1996a; 1996b). USDA 1996 survey data will be made available later in 1997. As soon as 1996 data are available, EPA will take steps to get the 3-year data (1994, 1995, and 1996) analyzed and the food ingestion factors updated. Meanwhile, Table 12-11 presents a comparison of the mean daily intakes per individual in a day for grains from the USDA survey data from years 1977-78, 1987-88, 1989-91, 1994, and 1995. This table shows that food consumption patterns have changed for grains and grain mixtures when comparing 1977 and 1995 data. When comparing data from 1977 and 1995, consumption of grains mixtures and grain increased by 106 percent and 41 percent, respectively. However, consumption of grains has remained fairly constant when comparing values from 1989-91 with the most recent data from 1994 and 1995. Grain mixtures and grains increase 20 percent and 11 percent, respectively from 1989 to 1995. The 1989-91 CSFII data are probably adequate for assessing ingestion exposure for current populations, but these data should be used with caution.

12.1.3. Relevant Grain Products Intake Studies

The U.S. EPA's Dietary Risk Evaluation System (DRES) - USEPA, Office of Pesticide Programs (OPP) - EPA OPP's DRES contains per capita intake rate data for various grain products for 22 subgroups (age, regional, and seasonal) of the population. As described in Volume II, Chapter 9 - Intake of Fruits and Vegetables, intake data in DRES were generated by determining the composition of 1977/78 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 12-12. 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 12-12 may be useful for estimating the risks of exposure associated with the consumption of the various grain products presented. It should be noted that these data are indexed to the reported body weights of the survey respondents and are expressed in units of grams of food consumed per kg body weight 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 variety of grains. 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. In addition, consumption patterns may have changed since the data were collected in 1977-78. OPP is in the process of translating consumption information from the USDA CSFII 1989-91 survey to be used in DRES.

Food and Nutrient Intakes of Individuals in One Day in the U.S., USDA (1980, 1992; 1996a; 1996b) - USDA calculated mean per capita intake rates for total and individual grain products using NFCS data from 1977-78 and 1987-88 (USDA 1980; 1992) and CSFII data from 1994 and 1995 (USDA, 1996a; 1996b). The mean per capita intake rates for grain products are presented in Tables 12-13 and 12-14 for the two NFCS survey years, respectively. Table 12-15 presents similar data from the 1994 and 1995 CSFII for grain products.

The advantages of using these data are that they provide mean intake estimates for various grain products. The consumption estimates are based on short-term (i.e., 1-day) dietary data which may not reflect long-term consumption.

U.S. EPA - Office of Radiation Programs - The U.S. EPA Office of Radiation Programs (ORP) has also used the USDA 1977-78 NFCS to estimate daily food intake. ORP uses food consumption data to assess human intake of radionuclides in foods (U.S. EPA, 1984a; 1984b). The 1977-78 NFCS data have been reorganized by ORP, and food items have been classified according to the characteristics of radionuclide transport. The mean dietary per capita intake of grain products, grouped by age, for the U.S. population are presented in Table 12-16. The mean daily intake rates of grain products for the U.S. population grouped by regions are presented in Table 12-17. Because this study was based on the USDA NFCS, the limitations and advantages associated with the USDA-NFCS data also apply to this data set. Also, consumption patterns may have changed since the data were collected in 1977-78.

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 1977-78 NFCS and the second National Health and Nutrition Examination Survey (NHANES II), 1976-80 (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 12-18 presents intake rates for grain products for various age groups. Estimated lifetime ingestion rates derived by U.S. EPA (1989) are also presented in Table 12-18. 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 USDA (1980; 1992) and U.S. EPA (1984a, 1984b) 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. These data, however, may not reflect current consumption patterns because they are based on 1977-78 data.

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 are generated. These are based on the flow of food items from production to end uses. Total available supply is estimated as the sum of production (i.e., some products are 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" is 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) calculates 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 grain products from 1970-1992 (1992 data are preliminary). In this section, the 1991 values, which are the most recent final data, are presented. Table 12-19 presents per capita consumption in 1991 for grains.

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. Therefore, these data may be useful for estimating bounding exposure estimates. It should also be noted that per capita estimates based on food disappearance are 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 grains 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.

12.1.4. Key Grain Products Serving Size Study 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 quantities of grain products consumed per eating occasion by members of the U.S. population. 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. Quantities consumed per eating occasion, are presented in Table 12-20.

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 of serving sizes for a number of commonly eaten grain products, but the list of foods is limited and does not account for grain 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. Although these data are based on the 1977-78 NFCS, serving size data have been collected, but not published, for the more recent USDA surveys.

12.2. 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 grain products presented in Table 12-21 and the following equation:

$$IR_{dw} = IR_{ac} * [(100-W)/100] \quad \text{(Eqn. 12-1)}$$

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

$$IR_{ac} = IR_{dw}/[(100-W)/100] \quad \text{(Eqn. 12-2)}$$

where:

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

12.3. RECOMMENDATIONS

The 1989-91 CSFII data described in this section were used in selecting recommended grain, product intake rates for the general population and various subgroups of the United States population. The general design of both key and relevant studies are summarized in Table 12-22 The recommended values for intake of grain products are summarized in Table 12-23 and the confidence ratings for the recommended values for grain intake rates are presented in Table 12-24. Per capita intake rates for specific grain items, on a g/kg-day basis, may be obtained from Tables 12-2 through 12-10. Percentiles of the intake rate distribution in the general population for total grains, are presented in Table 12-1. From these tables, the mean and 95th percentile intake rates for grains are 4.1 g/kg-day and 10.8 g/kg-day, respectively. It is important to note that the data presented in Tables 12-1 through 12-10 are based on data collected over a 3-day period and may not necessarily reflect the long-term distribution of average daily intake rates. However, for the broad categories of foods (i.e., total grains, breads), because they may be eaten on a daily basis throughout the year with minimal seasonality, the short-term distribution may be a reasonable approximation of the long-term distribution, although it will display somewhat increased variability. This implies that the upper percentiles shown will tend to overestimate the corresponding percentiles of the true long-term distribution. It should be noted that because these recommendations are based on 1989-91 CSFII data, they may not reflect the most recent changes in consumption patterns. However, as indicated in Table 12-11, intake has remained fairly constant between 1989-19 and 1995. Thus, the 1989-91 CSFII data are believed to be appropriate for assessing ingestion exposure for current populations.

12.4. REFERENCES FOR CHAPTER 12

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Table 12-1. Per Capita Intake of Total Grains Including Mixtures (g/kg-day as consumed)[a]

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	97.5%	4.061	0.033	0	0.74	1.16	1.90	3.06	4.96	8.04	10.77	18.53	42.98
Age (years)													
< 01	80.4%	7.049	0.361	0	0	0	1.46	6.05	10.18	16.75	19.50	27.61	37.41
1-2	95.8%	10.567	0.285	0	2.86	4.34	6.55	9.59	14.06	18.92	21.57	28.22	42.98
3-5	97.5%	9.492	0.201	0	3.13	4.35	6.09	8.91	11.88	15.13	19.14	23.87	33.08
6-11	97.7%	6.422	0.117	0	2.14	2.88	4.07	5.70	7.82	10.26	12.85	21.40	31.93
12-19	98.2%	3.764	0.065	0	1.15	1.52	2.16	3.31	4.81	6.46	8.03	10.92	19.30
20-39	98.4%	3.095	0.035	0	0.70	1.08	1.75	2.73	4.00	5.47	6.55	9.57	25.71
40-69	98.3%	2.792	0.031	0	0.69	0.98	1.59	2.47	3.54	4.96	6.09	8.40	20.34
70 +	98.7%	3.263	0.066	0.38	0.89	1.24	1.86	2.72	4.04	5.81	7.63	10.47	21.45
Season													
Fall	97.9%	4.282	0.066	0	0.84	1.24	2.07	3.19	5.19	8.54	11.88	19.10	37.77
Spring	97.0%	3.983	0.071	0	0.70	1.10	1.79	2.95	4.73	7.78	10.52	23.87	31.93
Summer	97.5%	3.948	0.062	0	0.74	1.13	1.82	2.99	4.96	7.98	10.16	15.34	30.13
Winter	97.6%	4.031	0.063	0	0.70	1.17	1.95	3.17	4.99	8.00	10.48	16.86	42.98
Urbanization													
Central City	97.6%	4.159	0.061	0	0.75	1.13	1.91	3.06	5.07	8.71	11.61	17.69	37.77
Nonmetropolitan	96.9%	4.013	0.067	0	0.60	1.11	1.85	3.12	4.93	7.81	10.08	21.05	31.93
Suburban	97.8%	4.02	0.049	0	0.80	1.18	1.90	3.04	4.91	7.79	10.63	18.53	42.98
Race													
Asian	94.0%	6.479	0.402	0	0	1.46	3.02	5.44	9.07	14.13	14.63	20.65	23.78
Black	96.9%	4.372	0.103	0	0.55	0.94	1.81	3.05	5.69	9.47	12.47	18.96	40.07
Native American	87.7%	3.98	0.276	0	0	0.61	1.63	3.67	5.81	6.90	9.00	20.43	21.84
Other/NA	97.1%	4.561	0.208	0	0	1.21	2.26	3.56	5.36	8.87	11.72	22.07	30.51
White	97.9%	3.962	0.035	0	0.79	1.18	1.90	3.03	4.80	7.79	10.20	18.07	42.98
Region													
Midwest	97.3%	4.016	0.07	0	0.79	1.17	1.90	2.92	4.69	7.80	11.04	20.36	31.93
Northeast	97.6%	4.255	0.079	0	0.78	1.26	2.02	3.19	5.37	8.44	11.61	17.73	42.98
South	97.9%	3.943	0.052	0	0.71	1.10	1.83	3.06	4.89	8.13	10.20	16.42	40.07
West	97.2%	4.116	0.072	0	0.69	1.13	1.92	3.13	5.03	7.98	10.90	19.50	25.89

[a] Includes breads; sweets such as cakes, pie, and pastries; snack and breakfast foods made with grains; pasta; cooked ready-to-eat, and baby cereals, rice and grain mixtures.

Note: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-2. Per Capita Intake of Breads (g/kg-day as consumed)[a]

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	91.6%	1.133	0.010	0	0	0.19	0.48	0.90	1.50	2.31	3.04	4.67	12.99
Age (years)													
< 01	50.9%	1.072	0.102	0	0	0	0	0.34	1.65	3.29	4.06	6.09	12.99
1-2	88.9%	2.611	0.089	0	0	0.44	1.17	2.39	3.86	4.68	5.42	8.23	10.29
3-5	91.9%	2.217	0.063	0	0	0.44	1.19	2.03	3.04	4.01	5.14	6.95	12.35
6-11	93.4%	1.668	0.037	0	0	0.40	0.88	1.44	2.18	3.16	3.98	5.95	9.17
12-19	91.8%	1.068	0.025	0	0	0.21	0.45	0.91	1.46	2.15	2.78	3.43	7.44
20-39	92.9%	0.936	0.012	0	0	0.18	0.43	0.81	1.27	1.81	2.27	3.41	7.04
40-69	93.7%	0.915	0.011	0	0	0.20	0.46	0.81	1.25	1.77	2.08	2.83	11.16
70 +	95.1%	0.976	0.021	0	0.15	0.29	0.56	0.87	1.31	1.76	2.15	2.76	11.81
Season													
Fall	91.3%	1.181	0.020	0	0	0.17	0.50	0.94	1.57	2.45	3.16	5.27	11.81
Spring	91.4%	1.095	0.018	0	0	0.18	0.48	0.89	1.45	2.18	2.91	4.54	12.35
Summer	92.4%	1.126	0.018	0	0	0.21	0.48	0.90	1.51	2.24	2.98	4.43	9.17
Winter	91.2%	1.129	0.019	0	0	0.19	0.47	0.89	1.50	2.37	3.07	4.66	12.99
Urbanization													
Central City	91.2%	1.127	0.017	0	0	0.18	0.49	0.91	1.50	2.33	2.98	4.50	11.81
Nonmetropolitan	91.7%	1.184	0.020	0	0	0.18	0.48	0.93	1.54	2.51	3.24	4.97	12.99
Suburban	91.8%	1.113	0.014	0	0	0.19	0.49	0.89	1.49	2.20	2.89	4.68	12.35
Race													
Asian	78.5%	0.981	0.078	0	0	0	0.34	0.86	1.51	2.57	2.61	3.34	3.34
Black	88.8%	1.159	0.030	0	0	0.11	0.37	0.84	1.55	2.59	3.29	5.58	8.94
Native American	81.3%	1.336	0.133	0	0	0.13	0.41	0.72	1.80	2.91	4.13	9.09	11.71
Other/NA	89.1%	1.333	0.067	0	0	0	0.62	1.11	1.70	2.66	3.79	6.16	9.98
White	92.5%	1.121	0.010	0	0	0.20	0.51	0.91	1.48	2.23	2.95	4.51	12.99
Region													
Midwest	91.2%	1.109	0.018	0	0	0.20	0.50	0.90	1.49	2.22	2.91	4.43	7.97
Northeast	91.1%	1.104	0.021	0	0	0.18	0.51	0.90	1.48	2.26	2.83	4.50	9.98
South	91.8%	1.155	0.017	0	0	0.18	0.46	0.92	1.54	2.41	3.13	4.89	12.99
West	92.1%	1.153	0.022	0	0	0.19	0.49	0.91	1.48	2.35	3.12	5.14	12.35

[a] Includes breads, rolls, muffins, bagels, biscuits, cornbread, and tortillas.

Note: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-3. Per Capita Intake of Sweets (g/kg-day as consumed) [a]

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	50.2%	0.508	0.011	0	0	0	0	0.13	0.71	1.50	2.12	3.96	13.39
Age (years)													
< 01	28.1%	0.447	0.096	0	0	0	0	0	0.41	1.42	2.26	5.51	9.35
1-2	49.6%	1.144	0.111	0	0	0	0	0.43	1.75	3.32	4.87	6.51	13.39
3-5	59.2%	1.139	0.079	0	0	0	0	0.56	1.82	3.01	4.33	6.78	9.25
6-11	63.7%	0.881	0.046	0	0	0	0	0.43	1.29	2.33	3.28	5.39	12.97
12-19	54.0%	0.511	0.030	0	0	0	0	0.22	0.75	1.47	1.99	3.25	9.65
20-39	45.0%	0.383	0.015	0	0	0	0	0	0.59	1.24	1.66	2.48	7.45
40-69	49.1%	0.381	0.015	0	0	0	0	0.08	0.55	1.13	1.58	2.70	5.70
70 +	56.3%	0.444	0.029	0	0	0	0	0.16	0.63	1.29	1.64	2.73	6.94
Season													
Fall	52.9%	0.533	0.022	0	0	0	0	0.14	0.76	1.55	2.21	3.82	13.39
Spring	48.3%	0.466	0.021	0	0	0	0	0.10	0.65	1.36	1.82	3.58	9.35
Summer	48.5%	0.527	0.025	0	0	0	0	0.06	0.70		2.35	4.54	8.73
Winter	51.2%	0.508	0.022	0	0	0	0	0.19	0.71	1.50	2.00	4.00	10.84
Urbanization													
Central City	45.3%	0.495	0.021	0	0	0	0	0.11	0.65	1.55	2.12	4.24	9.94
Nonmetropolitan	52.3%	0.593	0.025	0	0	0	0	0.25	0.82	1.58	2.34	4.52	13.39
Suburban	52.4%	0.477	0.015	0	0	0	0	0.10	0.69	1.42	2.00	3.55	9.65
Race													
Asian	37.6%	0.515	0.101	0	0	0	0	0.05	0.78	1.82	2.22	2.52	4.06
Black	39.3%	0.387	0.030	0	0	0	0	0	0.46	1.20	1.71	3.51	9.67
Native American	33.9%	0.325	0.075	0	0	0	0	0	0.33	1.47	1.48	2.44	3.78
Other/NA	32.3%	0.283	0.088	0	0	0	0	0	0.21	0.64	1.45	3.04	9.94
White	53.2%	0.537	0.012	0	0	0	0	0.17	0.77	1.55	2.17	4.09	13.39
Region													
Midwest	53.0%	0.573	0.024	0	0	0	0	0.17	0.79	1.65	2.41	4.00	12.97
Northeast	55.9%	0.587	0.027	0	0	0	0	0.22	0.83	1.63	2.21	4.60	13.39
South	47.5%	0.471	0.018	0	0	0	0	0.09	0.65	1.39	1.98	3.89	10.84
West	46.7%	0.416	0.022	0	0	0	0	0	0.55	1.25	1.91	3.33	9.65

[a] Includes cakes, cookies, pies, pastries, doughnuts, breakfast bars, and coffee cakes.

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-4. Per Capita Intake of Snacks Containing Grain (g/kg-day as consumed) [a]

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	40.3%	0.160	0.005	0	0	0	0	0	0.18	0.47	0.78	1.74	6.73
Age (years)													
< 01	31.4%	0.321	0.064	0	0	0	0	0	0.35	1.24	1.82	4.66	5.73
1-2	46.7%	0.398	0.040	0	0	0	0	0.10	0.65	1.30	1.61	2.03	6.73
3-5	48.9%	0.393	0.034	0	0	0	0	0.12	0.58	1.22	1.65	2.20	4.76
6-11	43.1%	0.269	0.023	0	0	0	0	0	0.32	0.86	1.24	2.43	4.00
12-19	40.2%	0.170	0.016	0	0	0	0	0	0.21	0.50	0.74	1.94	3.51
20-39	38.2%	0.123	0.007	0	0	0	0	0	0.15	0.41	0.60	1.21	4.60
40-69	40.3%	0.104	0.006	0	0	0	0	0	0.14	0.33	0.46	1.06	2.85
70 +	40.9%	0.074	0.007	0	0	0	0	0	0.10	0.20	0.36	0.70	1.47
Season													
Fall	41.6%	0.180	0.012	0	0	0	0	0	0.18	0.50	0.87	1.99	6.73
Spring	38.3%	0.136	0.009	0	0	0	0	0	0.15	0.43	0.67	1.29	3.43
Summer	37.5%	0.165	0.010	0	0	0	0	0	0.18	0.52	0.86	1.72	5.73
Winter	43.9%	0.160	0.010	0	0	0	0	0	0.19	0.44	0.76	1.77	4.60
Urbanization													
Central City	36.5%	0.158	0.010	0	0	0	0	0	0.16	0.46	0.81	1.81	3.70
Nonmetropolitan	39.8%	0.144	0.009	0	0	0	0	0	0.17	0.44	0.66	1.32	4.76
Suburban	43.3%	0.169	0.008	0	0	0	0	0	0.18	0.50	0.80	1.75	6.73
Race													
Asian	22.1%	0.077	0.035	0	0	0	0	0	0.04	0.27	0.37	1.09	1.34
Black	25.9%	0.107	0.014	0	0	0	0	0	0.07	0.33	0.59	1.19	4.76
Native American	30.4%	0.142	0.050	0	0	0	0	0	0.16	0.32	0.44	1.29	4.60
Other/NA	28.3%	0.139	0.026	0	0	0	0	0	0.17	0.43	0.69	1.27	1.91
White	43.7%	0.170	0.006	0	0	0	0	0	0.19	0.49	0.81	1.80	6.73
Region													
Midwest	45.2%	0.202	0.012	0	0	0	0	0	0.23	0.57	0.99	1.95	6.73
Northeast	35.8%	0.113	0.010	0	0	0	0	0	0.10	0.35	0.61	1.28	5.73
South	39.8%	0.162	0.008	0	0	0	0	0	0.19	0.46	0.80	1.63	4.76
West	39.4%	0.155	0.011	0	0	0	0	0	0.16	0.46	0.76	1.81	4.60

[a] Includes grain snacks such as crackers, salty snacks, popcorn, and pretzels.

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-5. Per Capita Intake of Breakfast Foods (g/kg-day as consumed) [a]

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	15.0%	0.144	0.012	0	0	0	0	0	0	0.46	0.95	2.46	13.61
Age (years)													
< 01	13.2%	0.255	0.108	0	0	0	0	0	0	0.57	2.08	3.82	5.72
1-2	20.9%	0.418	0.103	0	0	0	0	0	0.37	1.54	2.50	4.62	9.92
3-5	24.5%	0.446	0.078	0	0	0	0	0	0.56	1.63	2.33	3.92	11.90
6-11	25.0%	0.307	0.045	0	0	0	0	0	0.31	1.12	1.69	2.82	13.61
12-19	18.4%	0.193	0.038	0	0	0	0	0	0	0.65	1.16	3.06	5.38
20-39	13.2%	0.086	0.014	0	0	0	0	0	0	0.31	0.61	1.53	4.41
40-69	10.8%	0.063	0.011	0	0	0	0	0	0	0.23	0.51	0.95	2.98
70 +	12.5%	0.096	0.025	0	0	0	0	0	0	0.41	0.65	1.37	3.09
Season													
Fall	15.1%	0.146	0.021	0	0	0	0	0	0	0.49	0.93	2.61	6.83
Spring	13.2%	0.120	0.023	0	0	0	0	0	0	0.34	0.71	2.32	6.23
Summer	14.8%	0.145	0.022	0	0	0	0	0	0	0.53	0.98	2.02	7.41
Winter	17.0%	0.168	0.027	0	0	0	0	0	0	0.55	1.04	2.94	13.61
Urbanization													
Central City	15.1%	0.142	0.021	0	0	0	0	0	0	0.42	0.93	2.61	7.17
Nonmetropolitan	13.3%	0.120	0.020	0	0	0	0	0	0	0.39	0.85	1.97	7.41
Suburban	15.9%	0.157	0.019	0	0	0	0	0	0	0.52	1.06	2.45	13.61
Race													
Asian	10.1%	0.076	0.060	0	0	0	0	0	0	0.24	0.61	1.04	1.46
Black	11.9%	0.114	0.032	0	0	0	0	0	0	0.20	0.78	2.46	7.41
Native American	18.7%	0.156	0.073	0	0	0	0	0	0.21	0.53	0.61	1.23	6.83
Other/NA	13.7%	0.079	0.037	0	0	0	0	0	0	0.40	0.43	1.40	2.33
White	15.6%	0.152	0.013	0	0	0	0	0	0	0.51	0.97	2.56	13.61
Region													
Midwest	14.7%	0.121	0.020	0	0	0	0	0	0	0.38	0.75	2.06	7.41
Northeast	15.2%	0.158	0.034	0	0	0	0	0	0	0.43	1.02	2.61	13.61
South	12.3%	0.130	0.019	0	0	0	0	0	0	0.42	0.92	2.33	4.59
West	19.7%	0.184	0.024	0	0	0	0	0	0	0.67	1.14	2.58	6.96

[a] Includes breakfast foods made with grains such as pancakes, waffles, and french toast.

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analysis of the 1989-91.

Table 12-6. Per Capita Intake of Pasta (g/kg-day as consumed)

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	13.6%	0.233	0.018	0	0	0	0	0	0	0.90	1.60	3.67	24.01
Age (years)													
< 01	7.3%	0.172	0.124	0	0	0	0	0	0	0.00	1.18	3.79	6.43
1-2	14.0%	0.569	0.212	0	0	0	0	0	0	1.72	5.14	6.68	24.01
3-5	15.3%	0.543	0.142	0	0	0	0	0	0	2.19	3.37	6.51	7.72
6-11	15.9%	0.338	0.063	0	0	0	0	0	0	1.47	2.35	3.43	7.72
12-19	14.3%	0.194	0.047	0	0	0	0	0	0	0.77	1.47	3.36	7.24
20-39	15.2%	0.232	0.027	0	0	0	0	0	0	0.96	1.57	2.83	7.17
40-69	12.5%	0.172	0.028	0	0	0	0	0	0	0.62	1.32	2.67	10.20
70 +	9.9%	0.083	0.029	0	0	0	0	0	0	0.03	0.76	1.57	2.62
Season													
Fall	14.0%	0.239	0.038	0	0	0	0	0	0	0.94	1.72	3.77	24.01
Spring	13.9%	0.250	0.036	0	0	0	0	0	0	0.96	1.65	3.28	9.47
Summer	13.6%	0.251	0.039	0	0	0	0	0	0	0.97	1.72	3.80	11.12
Winter	12.9%	0.193	0.034	0	0	0	0	0	0	0.68	1.33	3.22	8.73
Urbanization													
Central City	12.9%	0.197	0.034	0	0	0	0	0	0	0.65	1.34	3.43	24.01
Nonmetropolitan	11.4%	0.171	0.032	0	0	0	0	0	0	0.63	1.33	2.48	11.12
Suburban	15.4%	0.286	0.028	0	0	0	0	0	0	1.12	1.96	3.92	10.20
Race													
Asian	18.8%	0.918	0.355	0	0	0	0	0	0.70	3.80	5.78	6.51	10.20
Black	6.6%	0.138	0.054	0	0	0	0	0	0	0.00	1.08	3.27	5.14
Other/NA	8.6%	0.115	0.083	0	0	0	0	0	0	0.00	1.16	2.43	3.86
White	15.1%	0.243	0.019	0	0	0	0	0	0	0.94	1.65	3.46	24.01
Region													
Midwest	12.8%	0.182	0.030	0	0	0	0	0	0	0.74	1.24	2.76	9.46
Northeast	21.9%	0.367	0.043	0	0	0	0	0	0	1.47	2.14	4.62	24.01
South	9.2%	0.179	0.035	0	0	0	0	0	0	0.45	1.32	3.63	11.12
West	14.7%	0.252	0.038	0	0	0	0	0	0	1.07	1.63	3.25	10.20

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-7. Per Capita Intake of Cooked Cereals (g/kg-day as consumed)

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	17.1%	0.441	0.035	0	0	0	0	0	0	1.37	2.79	8.18	28.63
Age (years)													
< 01	17.9%	1.350	0.417	0	0	0	0	0	0	7.17	8.60	20.47	24.16
1-2	23.6%	1.783	0.365	0	0	0	0	0	1.39	7.00	9.41	14.84	28.63
3-5	21.2%	1.335	0.258	0	0	0	0	0	0	4.99	8.18	12.51	18.66
6-11	18.1%	0.669	0.142	0	0	0	0	0	0	2.32	4.49	10.76	16.42
12-19	11.0%	0.156	0.065	0	0	0	0	0	0	0	1.26	3.34	11.85
20-39	10.5%	0.166	0.040	0	0	0	0	0	0	0	1.33	3.33	13.18
40-69	18.3%	0.307	0.036	0	0	0	0	0	0	1.30	2.20	3.97	18.23
70 +	35.3%	0.782	0.079	0	0	0	0	0	1.08	2.71	3.80	7.37	10.03
Season													
Fall	21.2%	0.573	0.066	0	0	0	0	0	0	1.90	3.71	9.15	28.63
Spring	15.8%	0.439	0.082	0	0	0	0	0	0	1.07	2.29	12.28	21.84
Summer	12.1%	0.288	0.069	0	0	0	0	0	0	0.55	1.98	5.37	24.16
Winter	19.1%	0.463	0.062	0	0	0	0	0	0	1.57	3.12	7.00	24.34
Urbanization													
Central City	19.3%	0.523	0.068	0	0	0	0	0	0	1.52	3.27	10.03	28.63
Nonmetropolitan	20.0%	0.483	0.066	0	0	0	0	0	0	1.52	2.72	7.41	20.94
Suburban	13.9%	0.369	0.052	0	0	0	0	0	0	1.09	2.35	7.37	24.34
Race													
Black	30.3%	0.838	0.092	0	0	0	0	0	0.65	2.95	4.45	10.03	28.63
Native American	17.5%	0.372	0.196	0	0	0	0	0	0	2.15	2.99	4.80	5.73
Other/NA	12.6%	0.510	0.293	0	0	0	0	0	0	1.12	3.18	7.60	20.94
White	15.1%	0.382	0.039	0	0	0	0	0	0	1.11	2.32	7.38	24.34
Region													
Midwest	15.5%	0.507	0.083	0	0	0	0	0	0	1.39	3.01	10.32	21.85
Northeast	13.2%	0.395	0.093	0	0	0	0	0	0	1.00	2.73	7.02	24.34
South	21.4%	0.396	0.044	0	0	0	0	0	0	1.40	2.48	5.53	28.63
West	15.2%	0.483	0.086	0	0	0	0	0	0	1.45	3.12	9.41	16.47

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-8. Per Capita Intake of Rice (g/kg-day as consumed)

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	20.0%	0.357	0.022	0	0	0	0	0	0	1.26	2.15	4.85	17.59
Age (years)													
< 01	11.8%	0.405	0.209	0	0	0	0	0	0	1.40	2.89	7.87	15.54
1-2	24.4%	0.811	0.192	0	0	0	0	0	0.36	3.36	4.52	9.81	17.59
3-5	25.0%	0.736	0.127	0	0	0	0	0	0.76	2.83	3.77	6.70	14.35
6-11	20.8%	0.504	0.090	0	0	0	0	0	0	1.71	3.33	7.86	13.39
12-19	20.1%	0.316	0.052	0	0	0	0	0	0	1.26	1.91	3.74	9.60
20-39	21.3%	0.341	0.037	0	0	0	0	0	0	1.20	1.90	5.02	12.69
40-69	19.6%	0.259	0.028	0	0	0	0	0	0	0.94	1.64	3.35	12.00
70 +	14.9%	0.229	0.050	0	0	0	0	0	0	0.81	1.73	3.12	7.97
Season													
Fall	18.8%	0.307	0.041	0	0	0	0	0	0	0.94	2.13	4.92	16.74
Spring	21.5%	0.395	0.046	0	0	0	0	0	0	1.34	2.47	5.05	15.54
Summer	19.3%	0.376	0.045	0	0	0	0	0	0	1.31	2.05	5.02	12.55
Winter	20.5%	0.350	0.041	0	0	0	0	0	0	1.37	2.09	4.17	17.59
Urbanization													
Central City	26.1%	0.449	0.039	0	0	0	0	0	0.18	1.51	2.51	5.54	16.74
Nonmetropolitan	15.9%	0.311	0.046	0	0	0	0	0	0	1.04	1.90	5.02	12.91
Suburban	18.3%	0.320	0.031	0	0	0	0	0	0	1.16	2.01	4.30	17.59
Race													
Asian	72.5%	2.353	0.316	0	0	0	0	1.32	2.83	6.20	10.39	15.06	17.59
Black	37.2%	0.603	0.048	0	0	0	0	0	0.87	2.08	2.93	5.16	12.91
Other/NA	37.7%	0.655	0.116	0	0	0	0	0	0.80	2.15	3.78	6.06	10.71
White	15.9%	0.281	0.023	0	0	0	0	0	0	0.94	1.79	4.30	15.54
Region													
Midwest	12.3%	0.207	0.046	0	0	0	0	0	0	0.62	1.25	3.59	13.39
Northeast	20.3%	0.378	0.050	0	0	0	0	0	0	1.45	2.15	4.65	16.74
South	25.2%	0.455	0.036	0	0	0	0	0	0	1.62	2.71	5.21	15.54
West	20.4%	0.349	0.045	0	0	0	0	0	0	1.25	1.84	4.52	17.59

NOTE: SE = Standard error
P = Percentile of the distribution
Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-9. Per Capita Intake of Ready-to-Eat Cereals (g/kg-day as consumed)[a]

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	45.6%	0.306	0.007	0	0	0	0	0	0.42	0.92	1.37	2.61	7.12
Age (years)													
< 01	38.9%	0.431	0.059	0	0	0	0	0	0.64	1.55	1.94	3.40	4.40
1-2	70.7%	0.954	0.057	0	0	0	0	0.74	1.46	2.28	2.89	4.77	6.47
3-5	77.3%	1.026	0.044	0	0	0	0.31	0.83	1.48	2.35	2.99	3.67	5.65
6-11	69.0%	0.631	0.025	0	0	0	0	0.45	0.92	1.55	1.97	3.12	7.12
12-19	50.8%	0.317	0.019	0	0	0	0	0.16	0.48	0.90	1.14	2.61	4.06
20-39	34.3%	0.174	0.010	0	0	0	0	0	0.23	0.61	0.88	1.51	5.11
40-69	37.1%	0.166	0.008	0	0	0	0	0	0.25	0.55	0.74	1.32	3.36
70 +	52.4%	0.222	0.013	0	0	0	0	0.08	0.36	0.64	0.83	1.55	2.71
Season													
Fall	45.2%	0.293	0.014	0	0	0	0	0	0.40	0.94	1.42	2.38	7.12
Spring	45.6%	0.320	0.015	0	0	0	0	0	0.44	0.95	1.42	2.69	5.88
Summer	46.6%	0.330	0.016	0	0	0	0	0	0.45	0.99	1.42	2.82	5.65
Winter	44.8%	0.280	0.014	0	0	0	0	0	0.39	0.81	1.22	2.61	6.47
Urbanization													
Central City	46.6%	0.319	0.014	0	0	0	0	0	0.43	0.94	1.42	2.86	5.11
Nonmetropolitan	43.6%	0.283	0.014	0	0	0	0	0	0.38	0.85	1.33	2.52	7.12
Suburban	46.0%	0.307	0.011	0	0	0	0	0	0.44	0.93	1.36	2.46	6.47
Race													
Asian	33.6%	0.218	0.065	0	0	0	0	0	0.24	0.81	1.28	2.79	3.12
Black	41.1%	0.269	0.018	0	0	0	0	0	0.40	0.82	1.16	2.50	4.46
Native American	38.6%	0.298	0.078	0	0	0	0	0	0.32	0.76	1.23	3.26	4.40
Other/NA	42.9%	0.340	0.050	0	0	0	0	0	0.43	1.12	1.59	2.69	4.18
White	46.7%	0.311	0.008	0	0	0	0	0	0.42	0.94	1.39	2.61	7.12
Region													
Midwest	48.7%	0.328	0.015	0	0	0	0	0	0.47	0.98	1.37	2.55	7.12
Northeast	46.9%	0.286	0.017	0	0	0	0	0	0.38	0.89	1.33	2.70	6.47
South	41.4%	0.284	0.012	0	0	0	0	0	0.40	0.81	1.26	2.34	5.88
West	47.7%	0.336	0.016	0	0	0	0	0	0.46	1.05	1.47	2.84	5.11

[a] Includldes dry ready-to-eat corn, rice, wheat, and bran cereals in the form of flakes, puffs, etc.

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-10. Per Capita Intake of Baby Cereals (g/kg-day as consumed)

Population Group	Percent Consuming	MEAN	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1.1%	0.037	0.051	0	0	0	0	0	0	0	0	0	22.57
Age (years)[a]													
< 01	28.5%	1.205	0.280	0	0	0	0	0	0.64	4.59	6.94	16.99	22.57
Season													
Fall	1.1%	0.036	0.075	0	0	0	0	0	0	0	0	0.69	14.94
Spring	1.1%	0.059	0.138	0	0	0	0	0	0	0	0	0.13	16.99
Summer	1.0%	0.017	0.068	0	0	0	0	0	0	0	0	0	12.03
Winter	1.0%	0.035	0.107	0	0	0	0	0	0	0	0	0	22.57
Urbanization													
Central City	1.3%	0.048	0.088	0	0	0	0	0	0	0	0	1.05	22.57
Nonmetropolitan	0.9%	0.011	0.040	0	0	0	0	0	0	0	0	0	9.41
Suburban	1.0%	0.042	0.093	0	0	0	0	0	0	0	0	0	16.99
Race													
Asian	0.7%	0.017	0.137	0	0	0	0	0	0	0	0	1.10	1.10
Black	2.1%	0.092	0.151	0	0	0	0	0	0	0	0	4.59	22.57
Native American	1.2%	0.010	0.088	0	0	0	0	0	0	0	0	0	1.63
Other/NA	3.1%	0.050	0.133	0	0	0	0	0	0	0	0	2.94	13.42
White	0.8%	0.029	0.059	0	0	0	0	0	0	0	0	0	16.99
Region													
Midwest	1.1%	0.020	0.050	0	0	0	0	0	0	0	0	0	12.50
Northeast	1.0%	0.084	0.208	0	0	0	0	0	0	0	0	1.25	16.99
South	1.0%	0.016	0.060	0	0	0	0	0	0	0	0	0	22.57
West	1.1%	0.046	0.101	0	0	0	0	0	0	0	0	1.18	10.18

[a] Data presented only for children less than 1 year of age. Available data for other age groups was based on a very small number of observations

NOTE: SE = Standard error
P = Percentile of the distribution

Source: Based on EPA's analysis of the 1989-91 CSFII.

Table 12-11. Mean Daily Intakes of Grains Per Individual in a Day for USDA 1977-78, 87-88, 89-91, 94, and 95 Surveys

Food Product	77-78 Data (g/day)	87-88 Data (g/day)	89-91 Data (g/day)	94 Data (g/day)	95 Data (g/day)
Grains	215	237	273	300	303
Grains Mixtures	52	72	89	112	107

Source: USDA, 1980; 1992; 1996a; 1996b.

Table 12-12. Mean Per Capita Intake Rates for Grains Based on All Sex/Age/Demographic Subgroups

Raw Agricultural Commodity[a]	Average Consumption (Grams/kg Body Weight-Day)	Standard Error
Oats	0.0825748	0.0026061
Rice-rough	0.0030600	0.0004343
Rice-milled	0.1552627	0.0083546
Rye-rough	0.0000010	--
Rye-germ	0.0002735	0.0000483
Rye-flour	0.0040285	0.0002922
Wheat-rough	0.1406118	0.0050410
Wheat-germ	0.0008051	0.0000789
Wheat-bran	0.0121575	0.0004864
Wheat-flour	1.2572489	0.0127412
Millet	0.0000216	0.0000104

[a] Consumed in any raw or prepared form.
Source: DRES data base (based on 1977-78 NFCS).

Table 12-13. Mean Grain Intake Per Individual in a Day by Sex and Age (g/day as consumed)[a] for 1977-1978

Group Age (years)	Total Grains	Breads, Rolls, Biscuits	Other Baked Goods	Cereals, Pasta	Mixtures, Mainly Grain[b]
Males and Females					
Under 1	42	4	5	30	3
1-2	158	27	24	44	63
3-5	181	46	37	54	45
6-8	206	53	56	60	38
Males					
9-11	238	67	56	51	64
12-14	288	76	80	57	74
15-18	303	91	77	53	82
19-22	253	84	53	64	52
23-34	256	82	60	40	74
35-50	234	82	58	44	50
51-64	229	78	57	48	46
65-74	235	71	60	69	35
75 and Over	196	70	50	58	19
Females					
9-11	214	58	59	44	53
12-14	235	57	61	45	72
15-18	196	57	43	41	55
19-22	161	44	36	33	48
23-34	163	49	38	32	44
35-50	161	49	37	32	43
51-64	155	52	40	36	27
65-74	175	57	42	47	29
75 and Over	178	54	44	58	22
Males and Females					
All Ages	204	62	49	44	49

[a] Based on USDA Nationwide Food Consumption Survey 1977-78 data for one day.
[b] Includes mixtures containing grain as the main ingredient.
Source: USDA, 1980.

Table 12-14. Mean Grain Intakes Per Individual in a Day by Sex and Age (g/day as consumed)[a] for 1987-1988

Group Age (years)	Total Grains	Yeast Breads and Rolls	Quick Breads, Pancakes, French Toast	Cakes, Cookies, Pastries, Pies	Crackers, Popcorn, Pretzels, Corn Chips	Cereals and Pastas	Mixtures, Mostly Grain[b]
Males and Females 5 and Under	167	30	8	22	4	52	51
Males						74	83
6-11	268	51	16	37	8	72	82
12-19	304	65	28	45	10	58	83
20 and Over	272	65	20	37	8		
Females							
6-11	231	43	19	30	6	66	68
12-19	239	45	13	29	7	52	91
20 and Over	208	45	14	28	6	53	62
All Individuals	237	52	16	32	7	57	72

[a] Based on USDA Nationwide Food Consumption Survey 1987-88 data for one day.
[b] Includes mixtures containing grain as the main ingredient.
Source: USDA, 1992.

Table 12-15. Mean Grain Intakes Per Individual in a Day by Sex and Age (g/day as consumed)[a] for 1994 and 1995														
Group Age (years)	Total Grains		Yeast Breads and Rolls		Quick Breads, Pancakes, French Toast		Cakes, Cookies, Pastries, Pies		Crackers, Popcorn, Pretzels, Corn Chips		Cereals and Pastas		Mixtures, Mostly Grain[b]	
	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995	1994	1995
Males and Females 5 and Under	213	210	26	28	11	11	22	23	8	7	58	57	89	84
Males														
6-11	285	341	51	45	15	21	42	46	12	18	66	97	101	115
12-19	417	364	53	54	30	21	54	43	17	22	82	84	180	138
20 and Over	357	365	64	61	22	24	43	46	13	15	86	91	128	128
Females														
6-11	260	286	43	46	16	21	37	51	11	14	57	54	94	100
12-19	317	296	40	37	16	14	39	35	17	16	63	52	142	143
20 and Over	254	257	44	45	16	15	33	34	9	10	59	69	92	83
All Individuals	300	303	50	49	18	19	38	39	12	13	70	76	112	107

[a] Based on USDA CSFII 1994 and 1995 data for one day.
[b] Includes mixtures containing grain as the main ingredient.
Source: USDA, 1996a; 1996b.

Table 12-16. Mean and Standard Error for the Daily Per Capita Intake of Grains, by Age (g/day as consumed)			
Age (years)	Breads	Cereals	Other Grains
All ages	147.3±1.4	29.9±1.3	22.9±1.7
Under 1	16.2±9.2	37.9±8.2	1.8±10.9
1 to 4	104.6±4.5	38.4±4.0	14.8±5.4
5 to 9	154.3±3.8	39.5±3.4	22.7±4.5
10 to 14	186.2±3.6	36.4±3.2	25.6±4.2
15 to 19	188.5±3.7	28.8±3.3	27.8±4.4
20 to 24	166.5±4.9	20.2±4.3	25.0±5.8
25 to 29	170.0±5.0	18.2±4.4	26.6±5.9
30 to 39	156.8±3.9	18.8±3.5	26.4±4.6
40 to 59	144.4±3.1	24.7±2.7	23.3±3.6
60 and over	122.1±3.4	42.5±3.0	19.3±4.0

Source: U.S. EPA, 1984a (based on 1977-78 NFCS).

Table 12-17. Mean and Standard Error for the Daily Intake of Grains, by Region (g/day as consumed)

Region	Total Grains	Breads	Cereals	Other Grains
All Regions	200.0±3.0	147.3±1.4	29.9±1.3	22.9±1.7
Northeast	203.5±5.8	153.1±2.8	24.6±2.5	25.9±3.3
North Central	192.8±5.6	150.9±2.7	28.7±2.4	13.3±3.2
South	202.2±4.7	143.9±2.3	34.6±2.0	23.7±2.7
West	202.6±6.9	139.5±3.3	30.9±3.0	32.1±4.0

NOTE: Northeast = Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, and Pennsylvania.

North Central = Ohio, Illinois, Indiana, Wisconsin, Michigan, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

South = Maryland, Delaware, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma.

West = Montana, Idaho, Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada, Washington, Oregon, and California.

Source: U.S. EPA, 1984b (based on 1977-78 NFCS).

Table 12-18. Consumption of Grains (g dry weight/day) for Different Age Groups and Estimated Lifetime Average Daily Food Intakes for a U.S. Citizen (averaged across sex) Calculated from the FDA Diet Data

	Age (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	12.83	14.82	12.01
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	76.12	84.19

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

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

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

Source: U.S. EPA, 1989 (based on 1977-78 NFCS and NHANES II data).

Table 12-19. Per Capita Consumption of Flour and Cereal Products in 1991[a]

Food Item	Per Capita Consumption (g/day)[a]
Total Wheat Flour[b]	169.8
Rye Flour	0.7
Rice[c]	20.9
Total Corn Products[d]	27.2
Oat Products[e]	10.7
Barley Products[f]	1.1
Total Flour and Cereal Products[g]	230.6

[a] Original data were presented in lbs/yr; data were converted to g/day by multiplying by a factor of 454 g/lb and dividing by 365 days/yr. Consumption of most items at the processing level. Excludes quantities used in alcoholic beverages and fuel.
[b] Includes white, whole wheat, and durum flour.
[c] Milled basis.
[d] Includes corn flour and meal, hominy and grits, and corn starch.
[e] Includes rolled oats, ready-to-eat cereals, oat flour, and oat bran.
[f] Includes barley flour, pearl barley, and malt and malt extract used in food processing.
[g] Excludes wheat not ground into flour, for example, shredded wheat breakfast cereals.
Source: USDA, 1993.

Table 12-20. Quantity (as consumed) of Grain Products Consumed Per Eating Occasion and the Percentage of Individuals Using These Foods in Three Days

Food category	% Indiv. using food in 3 days	Quantity consumed per eating occasion (g)		Consumers-only Quantity consumed per eating occasion at specified percentiles (g)						
		Average	Standard Deviation	5	25	50	75	90	95	99
Yeast Breads	93.7	46	26	21	25	44	50	75	100	140
Pancakes	8.3	113	85	27	54	81	146	219	282	438
Waffles	2.9	87	74	20	40	78	100	158	200	400
Tortillas	2.9	69	39	28	30	60	90	120	140	210
Cakes and Cupcakes	25.5	79	59	23	41	63	99	144	184	284
Cookies	30.8	32	30	7	14	26	40	60	84	144
Pies	11.9	129	60	57	97	120	150	195	236	360
Doughnuts	9.9	64	40	26	42	43	84	106	126	208
Crackers	26.2	22	21	6	12	15	24	42	57	113
Popcorn	5.6	19	22	5	9	15	18	36	45	108
Pretzels	2.2	29	28	3	12	21	36	57	85	160
Corn-based Salty Snacks	5.9	33	30	9	18	21	40	60	80	156
Pasta	11.4	153	108	35	70	140	210	280	320	560
Rice	18.5	147	91	41	88	165	125	263	350	438
Cooked Cereals	12.4	203	110	31	123	240	245	360	480	490
Ready-to-Eat Cereals	43.4	36	25	8	22	29	45	60	84	120

Source: Pao et al., 1982 (based on 1977-78 NFCS).

Table 12-21. Mean Moisture Content of Selected Grains Expressed as Percentages of Edible Portions

Food	Moisture Content (Percent)		Comments
	Raw	Cooked	
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.

Table 12-22. Summary of Grain Intake Studies

Study	Survey Population Used in Calculating Intake	Types of Data Used	Units	Food Items
KEY STUDIES				
EPA Analysis of 1989-91 CSFII Data	Per capita	1989-91 CSFII data; Based on 3-day average individual intake rates.	g/kg-day;.as consumed	Distributions of intake rates for total grain; individual grain items
RELEVANT STUDIES				
EPA's DRES (White et al., 1983)	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 grain products presented; complex food groups were disaggregated
Pao et al., 1982	Consumers only serving size data provided	1977-78 NFCS 3-day individual intake data	g; as consumed	Distributions of serving sizes for grain products
USDA, 1980; 1992; 1996a; 1996b	Per capita and consumer only grouped by age and sex	1977-78 and 1987-88 NFCS, and 1994 and 1995 CSFII 1-day individual intake data	g/day; as consumed	Total grains and various grain products
USDA, 1993b	Per capita consumption based on "food disappearance"	Based on food supply and utilization data	g/day; as consumed	Intake rates of grain products
U.S. EPA/ORP, 1984a; 1984b	Per capita	1977-78 NFCS Individual intake data	g/day; as consumed	Mean intake rates for total grain products, and individual grain 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

Table 12-23. Summary of Recommended Values for Per Capita Intake of Grain Products

Mean	95th Percentile	Multiple Percentiles	Study
Total Grain Intake			
4.1 g/kg-day	10.8 g/kg-day	see Table 12-1	EPA Analysis of CSFII 1989-91 Data
Individual Grain Products			
see Tables 12-2 to 12-10	see Tables 12-2 to 12-10	see Table 12-2 to 12-10	EPA Analysis of CSFII 1989-91 Data

Table 12-24. Confidence in Grain Products Intake Recommendation		
Considerations	Rationale	Rating
Study Elements		
• Level of peer review	USDA CSFII survey receives high level of peer review. EPA analysis of these data has been peer reviewed outside the Agency.	High
• Accessibility	CSFII data are publicly available.	High
• Reproducibility	Enough information is included to reproduce results.	High
• Focus on factor of interest	Analysis is specifically designed to address food intake.	High
• Data pertinent to U.S.	Data focuses on the U.S. population.	High
• Primary data	This is new analysis of primary data.	High
• Currency	Were the most current data publicly available at the time the analysis was conducted for this Handbook.	High
• Adequacy of data collection period	Survey is designed to collect short-term data.	Medium confidence for average values; Low confidence for long term percentile distribution
• Validity of approach	Survey methodology was adequate.	High
• Study size	Study size was very large and therefore adequate.	High
• Representativeness of the population	The population studied was the U.S. population.	High
• Characterization of variability	Survey was not designed to capture long term day-to-day variability. Short term distributions are provided for various age groups, regions, etc.	Medium
• Lack of bias in study design (high rating is desirable)	Response rate was adequate.	Medium
• Measurement error	No measurements were taken. The study relied on survey data.	N/A
Other Elements		
• Number of studies	1 CSFII was the most recent data set publicly available at the time the analysis was conducted for this Handbook. Therefore, it was the only study classified as key study.	Low
• Agreement between researchers	Although the CSFII was the only study classified as key study, the results are in good agreement with earlier data.	High
Overall Rating	The survey is representative of U.S. population. Although there was only one study considered key, these data are the most recent and are in agreement with earlier data. The approach used to analyze the data was adequate. However, due to the limitations of the survey design estimation of long-term percentile values (especially the upper percentiles) is uncertain.	High confidence in the average; Low confidence in the long-term upper percentiles

APPENDIX 12A

FOOD CODES AND DEFINITIONS USED IN THE ANALYSIS OF THE 1989-91 USDA CSFII GRAINS DATA

Table 12A-1. Food Codes and Definitions Used in the Analysis of the 1989-91 USDA CSFII Grains Data

Food Product	Food Codes and Descriptions		Food Product	Food Codes and Descriptions	
Total Grains	51- 52- 53- 54- 55- 561- 562- 57-	breads tortillas sweets snacks breakfast foods pasta cooked cereals and rice ready-to-eat and baby cereals	Pasta	561-	macaroni noodles spaghetti
	Also includes the average portion of grain mixtures (i.e., 31 percent) and the average portion of meat mixtures (i.e., 13 percent) made up by grain.				
Breads	51- 52-	breads rolls muffins bagel biscuits corn bread tortillas	Cooked Cereals	56200- 56201- 56202- 56203- 562069- 56207- 56208- 56209-	includes grits,oatmeal, cornmeal mush, millet, etc.
Sweets	53-	cakes cookies pies pastries doughnuts breakfast bars coffee cakes	Rice	56204- 56205- 5620601	includes all varieties of rice
Snacks	54-	crackers salty snacks popcorn pretzels	Ready-to-eat Cereals	570- 571- 572- 573- 574- 575- 576-	includes all varieties of ready-to-eat cereals
Breakfast Foods	55-	pancakes waffles french toast	Baby Cereals	578-	baby cereals
Grain Mixtures	58-	grain mixtures	Meat Mixtures	27- 28-	meat mixtures

13. INTAKE RATES FOR VARIOUS HOME PRODUCED FOOD ITEMS

13.1. BACKGROUND

Ingestion of contaminated foods is a potential pathway of exposure to toxic chemicals. Consumers of home produced 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 13-1 contains demographic data on vegetable gardening in 1986 by region/section, community size, and household size.

Table 13-1. 1986 Vegetable Gardening by Demographic Factors

Demographic Factor	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 13-2 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. Home produced foods can become contaminated in a variety of ways. Ambient pollutants in the air may be deposited on plants, adsorbed onto or absorbed by the plants, or dissolved in rainfall or irrigation waters that contact the plants. Pollutants may also be adsorbed onto 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

Table 13-2. 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.

can become contaminated if animals consume contaminated soil, water, or feed crops. Intake rates for home produced 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 home produced foods. The methods used and the results of these analyses are presented below.

13.2. METHODS

Nationwide Food Consumption Survey (NFCS) data were used to generate intake rates for home produced 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 conterminous 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 households, and the types, amount, value, and sources of foods consumed by the household (USDA, 1994). The individual intake 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.

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 non-response 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).

For the purposes of this study, home produced 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 home produced 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 13A presents the codes used to determine the various food groups.

Although the individual intake component of the NFCS gives the best measure of the amount of each food item eaten by each individual in the household, it could not be used directly to measure consumption of home produced food because the individual component does not identify the source of the food item (i.e., as home produced or not). Therefore, an analytical method which incorporated data from both the household and individual survey components was developed to estimate individual home produced food intake. The USDA household data were used to determine (1) the amount of each home produced food item used during a week by household members and (2) the number of meals eaten in the household by each household member during a week. Note that the household survey reports the total amount of each food item used in the household (whether by guests or household members); the amount used by household members was derived by multiplying the total amount used in the household by the proportion of all meals served in the household (during the survey week) that were consumed by household members.

The individual survey data were used to generate average sex- and age-specific serving sizes for each food item. The age categories used in the analysis were as follows: 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 (intake rates were not calculated for children under 1; the rationale for this is discussed below). These serving sizes were used during subsequent analyses to generate homegrown food intake rates for individual 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 sex- and age-specific serving size for each family member, individual intakes of home produced food were calculated for all members of the survey population using SAS programming in which the following general equation was used:

$$w_i = W_f \cdot \left[\frac{m_i q_i}{\sum_{i=1}^{n} m_i q_i} \right] \qquad \text{(Eqn. 13-1)}$$

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. Intake rates were indexed to the self-reported body weight of the survey respondent and reported in units of g/kg-day. Intake rates were not calculated for children under one year of age because their diet differs markedly from that of other household members, and thus the assumption that all household members share all foods would be invalid for this age group. In Section 13.5, a method for estimating per-capita homegrown intake in this age group is suggested.

For the major food groups (fruits, vegetables, meats, dairy, and fish) and individual foods consumed by at least 30 households, distributions of home produced intake among consumers were generated for the entire data set and according to the following subcategories: age groups, urbanization categories, seasons, racial classifications, regions, and responses to the questionnaire.

Consumers were defined as members of survey households who reported consumption of the food item/group of interest during the one week survey period. In addition, for the major food groups, distributions were generated for each region by season, urbanization, and responses to the questionnaire. Table 13-3 presents the codes, definitions, and a description of the data included in each of the subcategories. Intake rates were not calculated for food items/groups for which less than 30 households reported home produced usage because the number of observations may be inadequate for generating distributions that would be representative of that segment of consumers. Fruits and vegetables were also classified as exposed, protected, or roots, as shown in Appendix 13A 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 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.

As disccussed in Section 13.3, percentiles of average daily intake derived from short time intervals (e.g., 7 days) will not, in general, be reflective of long term patterns. This is especially true regarding consumption of many homegrown products (e.g., fruits, vegetables), where there is often a strong seasonal component associated with their use. To try to derive, for the major food categories, the long term distribution of average daily intake rates from the short-term data available here, an approach was developed which attempted to account for seasonal variability in consumption. This approach used regional "seasonally adjusted distributions" to approximate regional long term distributions and then combined these regional adjusted distributions (in proportion to the weights for each region) to obtain a U.S. adjusted distribution which approximated the U.S. long term distribution.

The percentiles of the seasonally adjusted distribution for a given region were generated by averaging the corresponding percentiles of each of the four seasonal distributions of the region. More formally, the seasonally adjusted distribution for each region is such that its inverse cumulative distribution function is the average of the inverse cumulative distribution functions of each of the seasonal distributions of that region. The use of regional seasonally adjusted distributions to

Table 13-3. 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.

approximate regional long term distributions is based on the assumption that each individual consumes at the same regional percentile levels for each season and consumes at a constant weekly rate throughout a given season. Thus, for instance, if the 60th percentile weekly intake level in the South is 14.0 g in the summer and 7.0 g in each of the three other seasons, then an individual in the South with an average weekly intake of 14.0 g over the summer would be assumed to have an intake of 14.0 g for each week of the summer and an intake of 7.0 g for each week of the other seasons.

Note that the seasonally adjusted distributions derived above were generated using the overall distributions, i.e., both consumers and non-consumers. However, since all the other distributions presented in this section are based on consumers only, the percentiles for the adjusted distributions have been revised to reflect the percentiles among consumers only. Given the above assumption about how each individual consumes, the percentage consuming for the seasonally adjusted distributions give an estimate of the percentage of the population consuming the specified food category at any time during the year.

The intake data presented here for consumers of home produced foods and the total number of individuals surveyed may be used to calculate the mean and the percentiles of the distribution of home produced food consumption in the overall population (consumers and non-consumers) as follows:

Assuming that IR_p is the homegrown intake rate of food item/group at the p^{th} percentile and N_c is the weighted number of individuals consuming the homegrown food item, and N_T is the weighted total number of individuals surveyed, then N_T - N_c is the weighted number of individuals who reported zero consumption of the food item. In addition, there are ($p/100$ x N_c) individuals below the p^{th} percentile. Therefore, the percentile that corresponds to a particular intake rate (IR_p) for the overall distribution of homegrown food consumption (including consumers and nonconsumers) can be obtained by:

$$P^{th}_{overall} = 100 \; x \; \frac{\left(\frac{P}{100} \; x \; N_c + (N_T - N_c)\right)}{N_T} \qquad \text{(Eqn. 13-2)}$$

For example, the percentile of the overall population that is equivalent to the 50th percentile consumer only intake rate for homegrown fruits would be calculated as follows:

From Table 13-8, the 50th percentile homegrown fruit intake rate (IR_{50}) is 1.07 g/kg-day. The weighted number of individuals consuming fruits (N_c) is 14,744,000. From Table 13-4, the weighted total number of individuals surveyed (N_T) is 188,019,000. The number of individuals consuming fruits below the 50th percentile is:

$p/100$ x N_c = (0.5) x (14,744,000)
= 7,372,000

The number of individuals that did not consume fruit during the survey period is:

N_T - N_c = 188,019,000 - 14,744,000
= 173,275,000

The total number of individuals with homegrown intake rates at or below 1.07 g/kg-day is

($p/100$ x N_c) + (N_T - N_c) = 7,372,000 + 173,275,000
= 180,647,000

The percentile of the overall population that is represented by this intake rate is:

$$P^{th}_{overall} = 100 \; x \; (180{,}647{,}000 \; / \; 188{,}109{,}000)$$
$$= 96th \; percentile$$

Therefore, an intake rate of 1.07 g/kg-day of homegrown fruit corresponds to the 96th percentile of the overall population.

Following the same procedure described above, 5.97 g/kg-day, which is the 90th percentile of the consumers only population, corresponds to the 99th percentile of the overall population. Likewise, 0.063 g/kg-day, which is the 1st percentile of the consumers only population, corresponds to the 92nd percentile of the overall population. Note that the consumers only distribution corresponds to the tail of the distribution for the overall population. Consumption rates below the 92nd percentile are very close to zero. The mean intake rate for the overall population can be calculated by multiplying the mean intake rate among consumers by the proportion of individuals consuming the homegrown food item, N_c/N_T.

Table 13-4 displays the weighted numbers N_T, as well as the unweighted total survey sample sizes, for each subcategory and overall. It should be noted that the total unweighted number of observations in Table 13-4 (9,852) 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.

Table 13-4. Weighted and Unweighted Number of Observations (Individuals) 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 (years)										
< 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

As mentioned above, the intake rates derived in this section are based on the amount of household food consumption. As measured by the NFCS, the amount of food "consumed" by the household is a measure of consumption in an economic sense, i.e., a measure of the weight of food brought into the household that has been consumed (used up) in some manner. In addition to food being consumed by persons, food may be used up by spoiling, by being discarded (e.g., inedible parts), through cooking processes, etc.

USDA estimated preparation losses for various foods (USDA, 1975). For meats, a net cooking loss, which includes dripping and volatile losses, and a net post cooking loss, which involves losses from cutting, bones, excess fat, scraps and juices, were derived for a variety of cuts and cooking methods. For each meat type (e.g., beef) EPA has averaged these losses across all cuts and cooking methods to obtain a mean net cooking loss and a mean net post cooking loss; these are displayed in Table 13-5. For individual fruits and vegetables, USDA (1975) also gave cooking and post-cooking losses. These data are presented in Tables 13-6 and 13-7.

The following formulas can be used to convert the intake rates tabulated here to rates reflecting actual consumption:

$$I_A = I \times (1 - L_1) \times (1 - L_2) \quad \text{(Eqn. 13-3)}$$

$$I_A = I \times (1 - L_P) \quad \text{(Eqn. 13-4)}$$

where I_A is the adjusted intake rate, I is the tabulated intake rate, L_1 is the cooking loss, L_2 is the post-cooking loss and L_P is the paring or preparation loss. For fruits, corrections based on postcooking losses only apply to fruits that are eaten in cooked forms. For raw forms of the fruits, paring or preparation loss data should be used to correct for losses from removal of skin, peel, core, caps, pits, stems, and defects, or draining of liquids from canned or frozen forms. To obtain preparation losses for food categories, the preparation losses of the individual foods making up the category can be averaged.

In calculating ingestion exposure, assessors should use consistent forms in combining intake rates with contaminant concentrations. This issue has been previously discussed in the other food Chapters.

13.3. RESULTS

The intake rate distributions (among consumers) for total home produced fruits, vegetables, meats, fish and dairy products are shown, respectively, in Tables 13-8 through 13-32 (displayed at the end of Chapter 13). Also shown in these tables is the proportion of respondents consuming the item during the (one-week) survey period. Homegrown vegetables were the most commonly consumed of the major food groups (18.3%), followed by fruit (7.8%), meat (4.9%), fish (2.1%), and dairy products (0.7%). 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 home produced foods are higher among populations in non-metropolitan and suburban areas and lowest in central city areas. Results of the regional analyses indicate that intake of homegrown fruits, vegetables, meat and dairy products is generally highest for individuals in the Midwest and South and lowest for those in the Northeast. Intake rates of home caught fish were generally highest among consumers in the South. 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; however, seasonal intake varied based on individual regions. Seasonally adjusted intake rate distributions for the major food groups are presented in Table 13-33.

Tables 13-34 through 13-60 present distributions of intake for individual home produced food items for households that reported consuming the homegrown form of the food during the survey period. Intake rate distributions among consumers for homegrown foods categorized as exposed fruits and vegetables, protected fruits and vegetables, and root vegetables are presented in Tables 13-61 through 13-65; the intake distributions for various USDA classifications (e.g., dark green vegetables) are presented in Tables 13-66 through 13-70. The results are presented in units of g/kg-day. Table 13-71 presents the fraction of household intake attributed to home produced forms of the food items/groups evaluated. Thus, use of these data in calculating potential dose does not require the body weight factor to be included in the denominator of the average daily dose (ADD) equation. It should be noted that converting these intake rates into units of g/day by multiplying by a single average body

Table 13-5. Percent Weight Losses from Preparation of Various Meats

	Mean Net Cooking Loss (%)[a]			Mean Net Post Cooking Loss (%)[b]		
Meat Type	Mean	Range of Means	Standard Deviation	Mean	Range of Means	Standard Deviation
Beef	27	11 to 42	7	24	10 to 46	9
Pork	28	1 to 67	10	36	14 to 52	11
Chicken	32	7 to 55	9	31	16 to 51	8
Turkey	32	11 to 57	7	28	8 to 48	10
Lamb	30	25 to 37	5	34	14 to 61	14
Veal	29	10.to 45	11	25	18 to 37	9
Fish[c]	30	-19 to 81	19	11	1 to 26	6
Shellfish[d]	33	1 to 94	30	10	10 to 10	0

a Includes dripping and volatile losses during cooking. Averaged over various cuts and preparation methods.
b Includes losses from cutting, shrinkage, excess fat, bones, scraps, and juices. Averaged over various cuts and preparation methods.
c Averaged over a variety of fish, to include: bass, bluefish, butterfish, cod, flounder, haddock, halibut, lake trout, makerel, perch, porgy, red snapper, rockfish, salmon, sea trout, shad, smelt, sole, spot, squid, swordfish steak, trout, and whitefish.
d Averaged over a variety of shellfish, to include: clams, crab, crayfish, lobster, oysters, and shrimp and shrimp dishes.

Source: USDA, 1975.

Table 13-6. Percent Weight Losses from Preparation of Various Fruits

	Mean Net Post Cooking Loss (%)[a]			Mean Paring or Preparation Loss (%)[b,c]		
Type of Fruit	Mean	Range of Means	Standard Deviation	Mean	Range of Means	Standard
Apples	25	3 to 42	13	22[b]	13 to 40[b]	NA[b]
Pears	--	--	--	22[b]	12 to 60[b]	NA[b]
				41[c]	25 to 47[c]	NA[c]
Peaches	36	19 to 50	12	24[b]	6 to 68[b]	NA[b]
Strawberries	--	--	--	10[b]	6 to 14[b]	NA[b]
				30[c]	96 to 41[c]	15[c]
Oranges	--	--	--	29[b]	19 to 38[b]	NA[b]

a Includes losses from draining cooked forms.
b Includes losses from removal of skin or peel, core or pit, stems or caps, seeds and defects.
c Includes losses from removal of drained liquids from canned or frozen forms.

Source: USDA, 1975

Table 13-7. Percent Weight Losses from Preparation of Various Vegetables

	Mean Net Cooking Loss (%)[a]			Mean Net Post Cooking Loss (%)[b]		
Type of Vegetable	Mean	Range of Means	Standard Deviation	Mean	Range of Means	Standard Deviation
Asparagus	23	5 to 47	16	--	--	--
Beets	28	4 to 60	17	--	--	--
Broccoli	14	0 to 39	13	--	--	--
Cabbage	11	4 to 20	6	--	--	--
Carrots	19	2 to 41	12	--	--	--
Corn	26	-1 to 64	22	--	--	--
Cucumbers	18	5 to 40	14	--	--	--
Lettuce	22	6 to 36	12	--	--	--
Lima Beans	-12	-143 to 56	69	--	--	--
Okra	12	-10 to 40	16	--	--	--
Onions	5	-90 to 63	38	--	--	--
Peas, green	2	-147 to 62	63	--	--	--
Peppers	13	3 to 27	9	--	--	--
Pumpkins	19	8 to 30	11	--	--	--
Snap Beans	18	5 to 42	13	--	--	--
Tomatoes	15	2 to 34	10	--	--	--
Potatoes	-22	-527 to 46	121	22	1 to 33	11

a Includes losses due to paring, trimming, flowering the stalk, thawing, draining, scraping, shelling, slicing, husking, chopping, and dicing and gains from the addition of water, fat, or other ingredients. Averaged over various preparation methods.

b Includes losses from draining or removal of skin.

Source: USDA, 1975

weight is inappropriate, because individual intake rates were indexed to the reported body weights of the survey respondents. However, if there is a need to compare the total intake data presented here to other intake data in units of g/day, a body weight less than 70 kg (i.e., approximately 60 kg; calculated based on the number of respondents in each age category and the average body weights for these age groups, as presented in Volume I, Chapter 7) should be used because the total survey population included children as well as adults.

13.4. 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 the intake distributions generated from them may not accurately reflect long-term intake patterns, particularly with respect to the tails (extremes) of the distributions. Also, the two survey components (i.e., household and individual) do not define food items/groups in a consistent manner; as a result, some errors may be introduced into these analyses because the two survey components are linked. The results presented here may also be biased by assumptions that are inherent in the analytical method utilized. The analytical method may not capture all high-end consumers within households because average serving sizes are used in calculating the proportion of homegrown food consumed by each household member. Thus, for instance, in a two-person household where one member had high intake and one had low intake, the method used here would assume that both members had an equal and moderate level of intake. In addition, the analyses assume that all family members consume a portion of the home produced food used within the household. However, not all family members may consume each home produced food item and serving sizes allocated here may not be entirely representative of the portion of household foods consumed by each family member. As was mentioned in Section 13.2, no analyses were performed for the under 1 year age group due to the above concerns. Below, in

Section 13.5, a recommended approach for dealing with this age group is presented.

The preparation loss factors discussed in Section 13.2 are intended to convert intake rates based on "household consumption" to rates reflective of what individuals actually consume. However, these factors do not include losses to spoilage, feeding to pets, food thrown away, etc.

It should also be noted that because this analysis is based on the 1987-88 NFCS, it may not reflect recent changes in food consumption patterns. The low response rate associated with the 1987-88 NFCS also contributes to the uncertainty of the homegrown intake rates generated using these data.

13.5. 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. Table 13-72 presents the confidence ratings for homegrown food intake. The recommended values for mean intake rates among consumers for the various home produced foods can be taken from the tables presented here; these can be converted to per capita rates by multiplying by the fraction consuming. The data presented here for consumers of home produced foods represent average daily intake rates of food items/groups over the seven-day survey period and do not account for variations in eating habits during the rest of the year; thus the percentiles presented here (except the seasonally adjusted) are only valid when considering exposures over time periods of about one week. Similarly, the figures for percentage consuming are also only valid over a one week time period. Since the tabulated percentiles reflect the distribution among consumers only, Eqn. 13-2 must be used to convert the percentiles shown here to ones valid for the general population.

In contrast, the seasonally adjusted percentiles are designed to give percentiles of the long term distribution of average daily intake and the percentage consuming shown with this distribution is designed to estimate the percent of the population consuming at any time during a year. However, because the assumptions mentioned in Section 13.2 can not be verified to hold, these upper percentiles must be assigned a low confidence rating. Eqn. 13-2 may also be used with this distribution to convert percentiles among consumers to percentiles for the general population.

For all the rates tabulated here, preparation loss factors should be applied, where appropriate. The form of the food used to estimate intake should be consistent with the form used to measure contaminant concentration.

As described above, the tables do not display rates for children under 1 year of age. For this age group, it is recommended that per-capita homegrown consumption rates be estimated using the following approach. First, for each specific home produced food of interest, the ratio of per capita intake for children under 1 year compared to that of children 1 to 2 years is calculated using the USDA CSFII 1989-1991 results displayed in Volume II, Chapters 9 and 11. Note these results are based on individual food intakes; however, they consider all sources of food, not just home produced. Second, the per-capita intake rate in the 1 to 2 year age group of the home produced food of interest is calculated as described above by multiplying the fraction consuming by the mean intake rate among consumers (both these numbers are displayed in the tables). Finally, the per capita homegrown intake rate in children under 1 year of the food of interest is estimated by multiplying the homegrown per-capita intake rate in the 1 to 2 year age group by the above ratio of intakes in the under 1 year age group as compared to the 1 to 2 year age group.

The AIHC Sourcebook (AIHC, 1994) used data presented in the 1989 version of the Exposure Factors Handbook which reported data from the USDA 1977-78 NFCS. In this Handbook, new analyses of more recent data from USDA were conducted. Numbers, however, cannot be directly compared with previous values since the results from the new analyses are presented on a body weight basis.

13.6. REFERENCES FOR CHAPTER 13

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National Gardening Association. (1987) National gardening survey: 1986-1987. Burlington, Vermont: The National Gardening Association, Inc.

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USDA. (1992) Changes in food consumption and expenditures in American households during the 1980's. U.S. Department of Agriculture. Washington, D.C. Statistical Bulletin No. 849.

USDA. (1993) Food and nutrient intakes by individuals in the United States, 1 Day, 1987-88. Nationwide Food Consumption Survey 1987-88, NFCS Report No. 87-I-1.

USDA. (1994) Food consumption and dietary levels of households in the United States, 1987-88. U.S. Department of Agriculture, Agricultural Research Service. Report No. 87-H-1.

Table 13-8. Consumer Only Intake of Homegrown Fruits (g/kg-day) - All Regions Combined

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	14744000	817	7.84	2.68E+00	1.89E-01	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 (years)															
01-02	360000	23	6.32	8.74E+00	3.10E+00	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	6.79	4.07E+00	1.48E+00	1.00E-02	1.00E-02	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	6.25	3.59E+00	6.76E-01	1.00E-02	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	5.80	1.94E+00	3.66E-01	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	5.13	1.95E+00	3.33E-01	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	9.93	2.66E+00	3.04E-01	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	16.50	2.25E+00	2.34E-01	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	6.58	1.57E+00	1.59E-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	6.42	1.58E+00	1.37E-01	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	9.58	3.86E+00	6.40E-01	1.00E-02	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	8.80	3.08E+00	3.41E-01	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	6.51	2.31E+00	2.64E-01	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	9.15	2.41E+00	3.09E-01	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
Suburban	6898000	394	7.97	3.07E+00	3.22E-01	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	2.07	1.87E+00	8.53E-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
White	14185000	793	9.00	2.73E+00	1.94E-01	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															
Households who garden	12742000	709	18.70	2.79E+00	2.10E-01	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
Households who farm	1917000	112	26.16	2.58E+00	2.59E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987/88 NFCS

Table 13-9. Consumer Only Intake of Homegrown Fruits (g/kg-day) - Northeast

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1279000	72	3.11	9.29E-01	2.20E-01	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
Season															
Fall	260000	8	2.77	*	*	*	*	*	*	*	*	*	*	*	*
Spring	352000	31	3.34	8.80E-01	2.32E-01	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	2.86	*	*	*	*	*	*	*	*	*	*	*	*
Winter	396000	24	3.36	7.10E-01	1.13E-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	0.52	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	176000	10	3.19	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	1053000	59	4.05	1.05E+00	2.63E-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
Questionnaire Response															
Households who garden	983000	59	7.86	1.04E+00	2.64E-01	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
Households who farm	132000	4	15.90	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-10. Consumer Only Intake of Homegrown Fruits (g/kg-day) - Midwest

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4683000	302	10.09	3.01E+00	4.13E-01	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
Season															
Fall	1138000	43	7.90	1.54E+00	1.86E-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	10.83	1.69E+00	2.76E-01	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	12.70	7.03E+00	1.85E+00	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	9.83	1.18E+00	1.80E-01	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	6.08	1.84E+00	3.93E-01	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	13.43	2.52E+00	5.43E-01	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
Suburban	1705000	113	11.60	4.29E+00	8.72E-01	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
Response to Questionnaire															
Households who garden	4060000	267	18.17	3.27E+00	4.69E-01	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
Households who farm	694000	57	25.89	2.59E+00	3.01E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-11. Consumer Only Intake of Homegrown Fruits (g/kg-day) - South

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4148000	208	6.45	2.97E+00	3.00E-01	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
Season															
Fall	896000	29	6.80	1.99E+00	4.39E-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	3.69	2.05E+00	2.55E-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	7.48	2.84E+00	6.50E-01	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	7.86	4.21E+00	6.51E-01	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	6.18	3.33E+00	5.39E-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	8.10	2.56E+00	3.87E-01	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
Suburban	1534000	80	5.48	3.14E+00	6.02E-01	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
Response to Questionnaire															
Households who garden	3469000	174	16.91	2.82E+00	2.94E-01	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
Households who farm	296000	16	13.26	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulatins for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-12. Consumer Only Intake of Homegrown Fruits (g/kg-day) - West

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4574000	233	12.68	2.62E+00	3.07E-01	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
Season															
Fall	843000	28	7.88	1.47E+00	2.49E-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	10.26	1.37E+00	1.59E-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	17.51	2.47E+00	4.72E-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	16.22	4.10E+00	7.91E-01	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	12.41	1.99E+00	4.24E-01	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	7.76	2.24E+00	5.25E-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
Suburban	2606000	142	14.54	3.04E+00	4.63E-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
Response to Questionnaire															
Households who garden	4170000	207	32.77	2.76E+00	3.39E-01	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
Households who farm	795000	35	50.13	1.85E+00	2.59E-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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-13. Consumer Only Intake of Homegrown Vegetables (g/kg-day) - All Regions Combined

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	34392000	1855	18.29	2.08E+00	6.76E-02	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															
01-02	951000	53	16.69	5.20E+00	8.47E-01	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	15.24	2.46E+00	2.79E-01	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	18.10	2.02E+00	2.54E-01	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	16.07	1.48E+00	1.35E-01	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	13.95	1.47E+00	9.59E-02	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	22.62	2.07E+00	1.02E-01	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	25.20	2.51E+00	1.94E-01	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	23.13	1.88E+00	1.28E-01	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	14.17	1.36E+00	7.23E-02	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	24.36	2.86E+00	1.93E-01	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	11.79	1.79E+00	1.14E-01	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	10.97	1.40E+00	1.23E-01	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	30.67	2.68E+00	1.19E-01	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
Suburban	14341000	747	16.56	1.82E+00	9.12E-02	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															
Black	1872000	111	8.61	1.78E+00	2.33E-01	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
White	31917000	1714	20.26	2.10E+00	7.09E-02	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															
Households who garden	30217000	1643	44.34	2.17E+00	7.09E-02	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
Households who farm	4319000	262	58.93	3.29E+00	2.51E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-14. Consumer Only Intake of Homegrown Vegetables (g/kg-day) - Northeast

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4883000	236	11.86	1.78E+00	1.68E-01	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
Seasons															
Fall	1396000	41	14.87	1.49E+00	4.06E-01	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	11.43	8.18E-01	1.07E-01	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	16.32	2.83E+00	4.67E-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	6.27	1.67E+00	2.74E-01	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	3.93	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	787000	48	14.25	3.05E+00	5.41E-01	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
Suburban	3716000	174	14.30	1.59E+00	1.74E-01	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
Response to Questionnaire															
Households who garden	4381000	211	35.05	1.92E+00	1.84E-01	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
Households who farm	352000	19	42.41	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations
NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-15. Consumer Only Intake of Homegrown Vegetables (g/kg-day) - Midwest

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12160000	699	26.21	2.26E+00	1.20E-01	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
Seasons															
Fall	4914000	180	34.13	1.84E+00	1.76E-01	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	19.22	1.65E+00	1.49E-01	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	32.45	3.38E+00	3.87E-01	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	16.91	2.05E+00	2.64E-01	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	18.26	1.36E+00	1.91E-01	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	37.38	2.73E+00	1.86E-01	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
Suburban	3639000	207	24.75	2.35E+00	2.16E-01	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
Response to Questionnaire															
Households who garden	10927000	632	48.89	2.33E+00	1.27E-01	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
Households who farm	1401000	104	52.26	3.97E+00	4.31E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-16. Consumer Only Intake of Homegrown Vegetables (g/kg-day) - South

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11254000	618	17.49	2.19E+00	1.21E-01	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
Seasons															
Fall	2875000	101	21.80	2.07E+00	2.82E-01	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	12.47	1.55E+00	1.13E-01	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	24.07	2.73E+00	3.16E-01	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	12.12	1.88E+00	1.37E-01	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	6.63	1.10E+00	1.62E-01	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	34.37	2.78E+00	1.84E-01	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
Suburban	3545000	187	12.67	1.44E+00	1.13E-01	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
Response to Questionnaire															
Households who garden	9447000	522	46.04	2.27E+00	1.22E-01	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
Households who farm	1609000	91	72.09	3.34E+00	4.57E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-17. Consumer Only Intake of Homegrown Vegetables (g/kg-day) - West

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	6035000	300	16.73	1.81E+00	1.38E-01	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
Seasons															
Fall	1841000	72	17.21	2.01E+00	2.93E-01	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	14.61	1.06E+00	1.74E-01	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	23.60	2.39E+00	3.71E-01	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	12.11	1.28E+00	1.72E-01	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	12.31	1.80E+00	2.76E-01	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	18.21	1.52E+00	2.24E-01	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
Suburban	3441000	179	19.20	1.90E+00	1.98E-01	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
Response to Questionnaire															
Households who garden	5402000	276	42.45	1.91E+00	1.04E-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
Households who farm	957000	48	60.34	2.73E+00	3.32E-03	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-18 Consumer Only Intake of Home Produced Meats (g/kg-day) - All Regions Combined

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	9257000	569	4.92	2.21E+00	1.07E-01	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															
01-02	276000	22	4.84	3.65E+00	6.10E-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	4.89	3.61E+00	5.09E-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	6.37	3.65E+00	4.51E-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	6.21	1.70E+00	1.68E-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	4.43	1.82E+00	1.53E-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	5.06	1.72E+00	1.11E-01	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	2.78	1.39E+00	2.34E-01	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	5.98	1.57E+00	1.39E-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	3.74	2.37E+00	1.52E-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	5.21	3.10E+00	3.82E-01	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	4.74	1.98E+00	1.74E-01	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	1.31	1.15E+00	1.83E-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	10.95	2.70E+00	1.76E-01	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
Suburban	3589000	226	4.15	1.77E+00	1.03E-01	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	0.59	*		*	*	*	*	*	*	*	*	*	*
White	8995000	556	5.71	2.26E+00	1.09E-01	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															
Households who raise animals	5256000	343	52.06	2.80E+00	1.45E-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
Households who farm	3842000	243	52.42	2.86E+00	1.85E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-19. Consumer Only Intake of Home Produced Meats (g/kg-day) - Northeast

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1113000	52	2.70	1.46E+00	2.10E-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
Seasons															
Fall	569000	18	6.06	*	*	*	*	*	*	*	*	*	*	*	*
Spring	66000	8	0.63	*	*	*	*	*	*	*	*	*	*	*	*
Summer	176000	6	1.86	*	*	*	*	*	*	*	*	*	*	*	*
Winter	302000	20	2.56	2.02E+00	5.56E-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															
Central City	0	0	0.00												
Nonmetropolitan	391000	17	7.08	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	722000	35	2.78	1.49E+00	1.53E-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
Response to Questionnaire															
Households who raise animals	509000	25	43.21	2.03E+00	3.85E-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
Households who farm	373000	15	44.94	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations
NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-20. Consumer Only Intake of Home Produced Meats (g/kg-day) - Midwest

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3974000	266	8.57	2.55E+00	1.81E-01	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
Seasons															
Fall	1261000	49	8.76	1.76E+00	2.31E-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	8.82	2.58E+00	2.24E-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	9.09	4.10E+00	7.45E-01	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	7.59	2.00E+00	2.41E-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	2.64	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	2477000	175	17.33	3.15E+00	2.58E-01	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
Suburban	1037000	73	7.05	1.75E+00	1.99E-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
Response to Questionnaire															
Households who raise animals	2165000	165	57.86	3.20E+00	2.23E-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
Households who farm	1483000	108	55.32	3.32E+00	2.91E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-21. Consumer Only Intake of Home Produced Meats (g/kg-day) - South

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2355000	146	3.66	2.24E+00	1.94E-01	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
Seasons															
Fall	758000	28	5.75	1.81E+00	2.87E-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	3.04	2.33E+00	2.66E-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	2.94	*	*	*	*	*	*	*	*	*	*	*	*
Winter	564000	47	3.40	1.80E+00	2.45E-01	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	0.23	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	1687000	97	8.83	2.45E+00	2.59E-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
Suburban	628000	48	2.24	1.79E+00	2.30E-01	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
Response to Questionnaire															
Households who raise animals	1222000	74	46.95	3.16E+00	3.16E-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
Households who farm	1228000	72	55.02	2.85E+00	3.24E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-22. Consumer Only Intake of Home Produced Meats (g/kg-day) - West

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1815000	105	5.03	1.89E+00	2.12E-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
Seasons															
Fall	264000	12	2.47	*	*	*	*	*	*	*	*	*	*	*	*
Spring	209000	20	2.56	1.86E+00	2.27E-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	9.27	2.20E+00	3.18E-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	6.53	2.11E+00	4.55E-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	1.96	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	377000	26	6.17	2.10E+00	7.00E-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
Suburban	1202000	70	6.71	1.95E+00	1.99E-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
Response to Questionnaire															
Households who raise animals	1360000	79	52.84	2.12E+00	2.65E-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
Households who farm	758000	48	47.79	2.41E+00	4.26E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-23. Consumer Only Intake of Home Caught Fish (g/kg-day) - All Regions Combined

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3914000	239	2.08	2.07E+00	2.38E-01	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
Age															
01-02	82000	6	1.44	*	*	*	*	*	*	*	*	*	*	*	*
03-05	142000	11	1.75	*	*	*	*	*	*	*	*	*	*	*	*
06-11	382000	29	2.29	2.78E+00	8.40E-01	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
12-19	346000	21	1.69	1.52E+00	4.07E-01	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
20-39	962000	59	1.56	1.91E+00	3.34E-01	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
40-69	1524000	86	2.69	1.79E+00	2.56E-01	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	1.08E+01
70 +	450000	24	2.83	1.22E+00	2.30E-01	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
Season															
Fall	1220000	45	2.56	1.31E+00	2.16E-01	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
Spring	1112000	114	2.41	3.08E+00	5.55E-01	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
Summer	911000	29	2.00	1.88E+00	4.24E-01	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
Winter	671000	51	1.38	2.05E+00	3.68E-01	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
Urbanization															
Central City	999000	46	1.77	1.79E+00	3.40E-01	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
Nonmetropolitan	1174000	94	2.61	3.15E+00	5.74E-01	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
Suburban	1741000	99	2.01	1.50E+00	2.30E-01	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
Race															
Black	593000	41	2.73	1.81E+00	3.74E-01	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
White	3228000	188	2.05	2.07E+00	2.81E-01	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
Response to Questionnaire															
Households who fish	3553000	220	8.94	2.22E+00	2.58E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-24. Consumer Only Intake of Home Caught Fish (g/kg-day) - Northeast

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	334000	12	0.81	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	135000	4	1.44	*	*	*	*	*	*	*	*	*	*	*	*
Spring	14000	2	0.13	*	*	*	*	*	*	*	*	*	*	*	*
Summer	132000	3	1.40	*	*	*	*	*	*	*	*	*	*	*	*
Winter	53000	3	0.45	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City		0													
Nonmetropolitan	42000	4	0.76	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	292000	8	1.12	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who fish	334000	12	5.61	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-25. Consumer Only Intake of Home Caught Fish (g/kg-day) - Midwest

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1113000	71	2.40	2.13E+00	4.19E-01	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
Season															
Fall	362000	13	2.51	*	*	*	*	*	*	*	*	*	*	*	*
Spring	224000	27	2.10	3.45E+00	1.22E+00	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
Summer	264000	8	2.58	*	*	*	*	*	*	*	*	*	*	*	*
Winter	263000	23	2.37	2.38E+00	5.33E-01	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
Urbanization															
Central City	190000	9	1.09	*		*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	501000	40	3.50	3.42E+00	7.17E-01	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
Suburban	422000	22	2.87	9.09E-01	1.81E-01	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
Response to Questionnaire															
Households who fish	956000	60	7.57	2.35E+00	4.85E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-26. Consumer Only Intake of Home Caught Fish (g/kg-day) - South

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1440000	101	2.24	2.74E+00	4.76E-01	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
Season															
Fall	274000	11	2.08	*	*	*	*	*	*	*	*	*	*	*	*
Spring	538000	58	3.20	4.00E+00	9.42E-01	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
Summer	376000	14	2.12	*	*	*	*	*	*	*	*	*	*	*	*
Winter	252000	18	1.52	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	281000	16	1.63	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	550000	41	2.88	3.33E+00	1.06E+00	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
Suburban	609000	44	2.18	2.73E+00	4.98E-01	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
Response to Questionnaire															
Households who fish	1280000	95	9.42	3.00E+00	5.14E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standrad error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-27. Consumer Only Intake of Home Caught Fish (g/kg-day) - West

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1027000	55	2.85	1.57E+00	2.72E-01	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
Season															
Fall	449000	17	4.20	*	*	*	*	*	*	*	*	*	*	*	*
Spring	336000	27	4.12	1.35E+00	2.94E-01	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
Summer	139000	4	1.74	*	*	*	*	*	*	*	*	*	*	*	*
Winter	103000	7	1.12	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	528000	21	4.38	2.03E+00	5.25E-01	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
Nonmetropolitan	81000	9	1.33	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	418000	25	2.33	1.09E+00	2.49E-01	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
Response to Questionnaire															
Households who fish	983000	53	12.99	1.63E+00	2.81E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-28. Consumer Only Intake of Home Produced Dairy (g/kg-day) - All Regions

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1409000	89	0.75	1.40E+01	1.62E+00	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															
01-02	79000	6	1.39	*	*	*	*	*	*	*	*	*	*	*	*
03-05	57000	5	0.70	*	*	*	*	*	*	*	*	*	*	*	*
06-11	264000	16	1.58	*	*	*	*	*	*	*	*	*	*	*	*
12-19	84000	5	0.41	*	*	*	*	*	*	*	*	*	*	*	*
20-39	612000	36	0.99	7.41E+00	1.02E+00	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	0.38	*	*	*	*	*	*	*	*	*	*	*	*
70 +	77000	3	0.48	*	*	*	*	*	*	*	*	*	*	*	*
Seasons															
Fall	211000	7	0.44	*	*	*	*	*	*	*	*	*	*	*	*
Spring	253000	27	0.55	1.78E+01	4.27E+00	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	1.21	1.53E+01	2.73E+00	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	0.81	8.08E+00	1.99E+00	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	0.20	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	988000	59	2.19	1.68E+01	2.10E+00	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
Suburban	306000	23	0.35	9.86E+00	2.38E+00	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															
Black	0	0	0.00												
White	1382000	86	0.88	1.43E+01	1.65E+00	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															
Households who raise animals	1228000	80	12.16	1.59E+01	1.73E+00	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
Households who farm	1020000	63	13.92	1.71E+01	1.99E+00	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-29. Consumer Only Intake of Home Produced Dairy (g/kg-day) - Northeast

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	312000	16	0.76	*	*	*	*	*	*	*	*	*	*	*	*
Seasons															
Fall	48000	2	0.51	*	*	*	*	*	*	*	*	*	*	*	*
Spring	36000	4	0.34	*	*	*	*	*	*	*	*	*	*	*	*
Summer	116000	4	1.23	*	*	*	*	*	*	*	*	*	*	*	*
Winter	112000	6	0.95	*	*	*	*	*	*	*	*	*	*	*	*
Urbanizations															
Central City	0	0	0.00												
Nonmetropolitan	240000	10	4.35	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	72000	6	0.28	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who raise animals	312000	16	26.49	*	*	*	*	*	*	*	*	*	*	*	*
Households who farm	312000	16	37.59	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-30. Consumer Only Intake of Home Produced Dairy (g/kg-day) - Midwest

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	594000	36	1.28	1.86E+01	3.15E+00	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
Seasons															
Fall	163000	5	1.13	*	*	*	*	*	*	*	*	*	*	*	*
Spring	94000	12	0.88	*	*	*	*	*	*	*	*	*	*	*	*
Summer	252000	11	2.46	*	*	*	*	*	*	*	*	*	*	*	*
Winter	85000	8	0.76	*	*	*	*	*	*	*	*	*	*	*	*
Urbanizations															
Central City	43000	1	0.25	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	463000	31	3.24	2.33E+01	3.40E+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
Suburban	88000	4	0.60	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who raise animals	490000	32	13.09	2.23E+01	3.33E+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
Households who farm	490000	32	18.28	2.23E+01	3.33E+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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-31. Consumer Only Intake of Home Produced Dairy (g/kg-day) - South

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	242000	17	0.38	*	*	*	*	*	*	*	*	*	*	*	*
Seasons															
Fall	0	0	0.00												
Spring	27000	3	0.16	*	*	*	*	*	*	*	*	*	*	*	*
Summer	131000	5	0.74	*	*	*	*	*	*	*	*	*	*	*	*
Winter	84000	9	0.51	*	*	*	*	*	*	*	*	*	*	*	*
Urbanizations															
Central City	27000	3	0.16	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	215000	14	1.13	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	0	0	0.00												
Response to Questionnaire															
Households who raise animals	215000	14	8.26	*	*	*	*	*	*	*	*	*	*	*	*
Households who farm	148000	8	6.63	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-32. Consumer Only Intake of Home Produced Dairy (g/kg-day) - West

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	261000	20	0.72	1.00E+01	2.75E+00	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
Seasons															
Fall	0	0	0.00												
Spring	96000	8	1.18	*	*	*	*	*	*	*	*	*	*	*	*
Summer	50000	2	0.63	*	*	*	*	*	*	*	*	*	*	*	*
Winter	115000	10	1.25	*	*	*	*	*	*	*	*	*	*	*	*
Urbanizations															
Central City	45000	3	0.37	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	70000	4	1.15	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	146000	13	0.81	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who raise animals	211000	18	8.20	*	*	*	*	*	*	*	*	*	*	*	*
Households who farm	70000	7	4.41	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-33. Seasonally Adjusted Consumer Only Homegrown Intake (g/kg-day)

Population Group	Percent Consuming	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total Vegetables											
Northeast	16.50	1.16E-03	1.59E-02	3.56E-02	1.99E-01	4.55E-01	1.37E+00	3.32E+00	5.70E+00	8.78E+00	1.01E+01
Midwest	33.25	3.69E-03	4.11E-02	8.26E-02	2.91E-01	8.11E-01	1.96E+00	4.40E+00	7.41E+00	1.31E+00	2.01E+01
South	24.00	4.78E-03	3.24E-02	5.58E-02	2.05E-01	6.10E-01	1.86E+00	3.95E+00	5.63E+00	1.20E+01	1.62E+01
West	23.75	1.80E-03	1.91E-02	3.83E-02	1.14E-01	4.92E-01	1.46E+00	2.99E+00	5.04E+00	8.91E+00	1.12E+01
All Regions	24.60	5.00E-03	2.90E-02	5.90E-02	2.19E-01	6.38E-01	1.80E+00	4.00E+00	6.08E+00	1.17E+01	2.01E+01
Total Fruit											
Northeast	3.50	3.96E-03	1.97E-02	4.76E-02	1.73E-01	3.61E-01	6.55E-01	1.48E+00	3.00E+00	5.10E+00	5.63E+00
Midwest	12.75	1.22E-03	7.01E-03	1.46E-02	1.36E-01	7.87E-01	2.98E+00	5.79E+00	9.52E+00	2.22E+01	2.71E+01
South	8.00	6.13E-03	3.23E-02	1.09E-01	3.84E-01	9.47E-01	2.10E+00	6.70+00	1.02E+01	1.49E+01	1.64E+01
West	17.75	5.50E-04	5.66E-02	8.82E-02	2.87E-01	6.88E-01	1.81E+00	4.75E+00	8.54E+00	1.45E+01	1.84E+01
All Regions	10.10	2.00E-03	1.90E-02	6.20E-02	2.50E-01	7.52E-01	2.35E+00	5.61E+00	9.12E+00	1.76E+01	2.71E+01
Total Meat											
Northeast	6.25	3.78E-03	3.01E-02	7.94E-02	1.25E-01	2.11E-01	7.00E-01	1.56E+00	1.91E+00	4.09E+00	4.80E+00
Midwest	9.25	1.77E-03	3.68E-02	2.21E-01	5.25E-02	1.61E+00	3.41E+00	5.25E+00	7.45E+00	1.19E+01	1.36E+01
South	5.75	6.12E-03	2.88E-02	5.02E-02	1.86E-01	5.30E-01	1.84E+00	3.78E+00	4.95E+00	8.45E+00	9.45E+00
West	9.50	7.24E-04	2.83E-02	9.56E-02	2.35E-01	5.64E-01	1.30E+00	2.29E+00	3.38E+00	7.20E+00	9.10E+00
All Regions	7.40	3.20E-03	3.90E-02	9.20E-02	2.20E-01	6.55E-01	1.96E+00	4.05E+00	5.17E+00	9.40E+00	1.36E+01

Table 13-34. Consumer Only Intake of Homegrown Apples (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5306000	272	2.82	1.19E+00	7.58E-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															
01-02	199000	12	3.49	*	*	*	*	*	*	*	*	*	*	*	*
03-05	291000	16	3.59	*	*	*	*	*	*	*	*	*	*	*	*
06-11	402000	25	2.41	1.28E+00	1.88E-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	1.44	*	*	*	*	*	*	*	*	*	*	*	*
20-39	1268000	61	2.06	7.95E-01	1.07E-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	3.03	9.61E-01	1.37E-01	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	6.68	1.45E+00	1.41E-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	3.58	1.28E+00	1.24E-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	1.38	9.50E-01	1.14E-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	4.25	1.12E+00	1.69E-01	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	2.10	1.30E+00	1.78E-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	1.62	1.24E+00	2.60E-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	4.70	1.27E+00	1.26E-01	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
Suburban	2276000	120	2.63	1.09E+00	9.16E-02	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	0.39	*	*	*	*	*	*	*	*	*	*	*	*
White	5222000	268	3.31	1.18E+00	7.67E-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	4.41	1.38E+00	1.45E-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	1.07	*	*	*	*	*	*	*	*	*	*	*	*
South	1310000	65	2.04	1.10E+00	1.07E-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	4.19	1.20E+00	1.29E-01	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															
Households who garden	4707000	246	6.91	1.21E+00	8.22E-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
Households who farm	1299000	68	17.72	1.39E+00	1.31E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distibution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-35. Consumer Only Intake of Homegrown Asparagus (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	763000	66	0.41	5.59E-01	5.12E-02	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	0.14	*	*	*	*	*	*	*	*	*	*	*	*
03-05	25000	3	0.31	*	*	*	*	*	*	*	*	*	*	*	*
06-11	31000	3	0.19	*	*	*	*	*	*	*	*	*	*	*	*
12-19	70000	5	0.34	*	*	*	*	*	*	*	*	*	*	*	*
20-39	144000	11	0.23	*	*	*	*	*	*	*	*	*	*	*	*
40-69	430000	38	0.76	4.65E-01	5.38E-02	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	0.35	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	62000	2	0.13	*	*	*	*	*	*	*	*	*	*	*	*
Spring	608000	59	1.32	6.12E-01	5.75E-02	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
Summer	0	0	0.00												
Winter	93000	5	0.19	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	190000	9	0.34	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	215000	27	0.48	7.59E-01	1.19E-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
Suburban	358000	30	0.41	4.27E-01	4.05E-02	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															
Black	0	0	0.00												
White	763000	66	0.48	5.59E-01	5.12E-02	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	0.79	4.78E-01	6.49E-02	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	0.66	7.17E-01	9.99E-02	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	0.15	*	*	*	*	*	*	*	*	*	*	*	*
West	30000	4	0.08	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who garden	669000	59	0.98	5.33E-01	5.50E-02	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
Households who farm	157000	16	2.14	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-36. Consumer Only Intake of Home Produced Beef (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4958000	304	2.64	2.45E+00	1.49E-01	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															
01-02	110000	8	1.93	*	*	*	*	*	*	*	*	*	*	*	*
03-05	234000	13	2.89	*	*	*	*	*	*	*	*	*	*	*	*
06-11	695000	38	4.16	3.77E+00	5.94E-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	3.20	1.72E+00	1.63E-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	2.43	2.06E+00	2.00E-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	2.63	1.84E+00	1.41E-01	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	1.18	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	1404000	55	2.95	1.55E+00	1.74E-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	1.97	2.32E+00	1.63E-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	3.86	3.48E+00	4.12E-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	1.82	1.95E+00	2.75E-01	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	0.18	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	3070000	194	6.82	2.80E+00	2.18E-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
Suburban	1788000	105	2.07	1.93E+00	1.50E-01	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															
Black	0	0	0.00												
White	4950000	303	3.14	2.45E+00	1.50E-01	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	4.87	2.83E+00	2.31E-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	1.42	1.44E+00	2.13E-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	1.62	2.45E+00	3.46E-01	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	2.96	2.20E+00	2.83E-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															
Households who raise animals	3699000	239	36.63	2.66E+00	1.60E-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
Households who farm	2850000	182	38.89	2.63E+00	1.96E-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	1.13E+01	1.94E+01

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-37. Consumer Only Intake of Homegrown Beets (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2214000	125	1.18	5.12E-01	4.96E-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	0.47	*	*	*	*	*	*	*	*	*	*	*	*
03-05	51000	4	0.63	*	*	*	*	*	*	*	*	*	*	*	*
06-11	167000	10	1.00	*	*	*	*	*	*	*	*	*	*	*	*
12-19	227000	13	1.11	*	*	*	*	*	*	*	*	*	*	*	*
20-39	383000	22	0.62	3.81E-01	6.26E-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	1.68	4.28E-01	4.34E-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	2.57	5.80E-01	8.80E-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	1.18	5.45E-01	9.36E-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	1.21	4.70E-01	8.98E-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	1.49	3.85E-01	4.54E-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	0.86	7.30E-01	1.54E-01	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	1.16	5.18E-01	1.15E-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	1.68	5.77E-01	9.06E-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
Suburban	805000	47	0.93	4.45E-01	5.77E-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															
Black	0	0	0.00												
White	2186000	124	1.39	5.18E-01	4.99E-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	1.91	6.30E-01	7.93E-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	0.56	*	*	*	*	*	*	*	*	*	*	*	*
South	545000	31	0.85	4.51E-01	1.17E-01	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	1.54	3.96E-01	7.75E-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															
Households who garden	2107000	120	3.09	5.26E-01	5.16E-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
Households who farm	229000	11	3.12	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-38. Consumer Only Intake of Homegrown Broccoli (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1745000	80	0.93	4.20E-01	4.75E-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															
01-02	0	0	0.00												
03-05	13000	1	0.16	*	*	*	*	*	*	*	*	*	*	*	*
06-11	187000	9	1.12	*	*	*	*	*	*	*	*	*	*	*	*
12-19	102000	4	0.50	*	*	*	*	*	*	*	*	*	*	*	*
20-39	486000	19	0.79	*	*	*	*	*	*	*	*	*	*	*	*
40-69	761000	37	1.34	4.12E-01	6.50E-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	1.23	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	624000	20	1.31	2.87E-01	3.70E-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	0.56	5.43E-01	1.18E-01	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	1.50	5.08E-01	1.05E-01	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	0.37	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	165000	5	0.29	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	647000	34	1.44	4.23E-01	4.21E-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
Suburban	933000	41	1.08	4.29E-01	8.26E-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															
Black	0	0	0.00												
White	1719000	79	1.09	4.22E-01	4.81E-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	1.71	2.63E-01	5.86E-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	1.04	*	*	*	*	*	*	*	*	*	*	*	*
South	373000	16	0.58	*	*	*	*	*	*	*	*	*	*	*	*
West	153000	7	0.42	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who garden	1729000	78	2.54	4.22E-01	4.83E-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
Households who farm	599000	29	8.17	4.66E-01	8.37E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distibution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-39. Consumer Only Intake of Homegrown Cabbage (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2019000	89	1.07	1.03E+00	1.00E-01	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															
01-02	14000	2	0.25	*	*	*	*	*	*	*	*	*	*	*	*
03-05	29000	1	0.36	*	*	*	*	*	*	*	*	*	*	*	*
06-11	61000	3	0.37	*	*	*	*	*	*	*	*	*	*	*	*
12-19	203000	9	0.99	*	*	*	*	*	*	*	*	*	*	*	*
20-39	391000	16	0.63	*	*	*	*	*	*	*	*	*	*	*	*
40-69	966000	44	1.70	1.14E+00	1.80E-01	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	2.05	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	570000	21	1.20	1.28E+00	3.24E-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	0.27	*	*	*	*	*	*	*	*	*	*	*	*
Summer	1142000	39	2.51	9.65E-01	9.35E-02	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	0.37	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	157000	5	0.28	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	1079000	48	2.40	9.37E-01	8.83E-02	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
Suburban	783000	36	0.90	1.26E+00	2.11E-01	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	0.03	*	*	*	*	*	*	*	*	*	*	*	*
White	1867000	83	1.19	1.05E+00	1.07E-01	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	1.91	7.42E-01	7.35E-02	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	0.67	*	*	*	*	*	*	*	*	*	*	*	*
South	616000	32	0.96	1.11E+00	1.34E-01	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	0.67	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who garden	1921000	86	2.82	1.07E+00	1.03E-01	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
Households who farm	546000	26	7.45	9.96E-01	1.15E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-40. Consumer Only Intake of Homegrown Carrots (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4322000	193	2.30	4.38E-01	4.29E-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															
01-02	51000	4	0.89	*	*	*	*	*	*	*	*	*	*	*	*
03-05	53000	3	0.65	*	*	*	*	*	*	*	*	*	*	*	*
06-11	299000	14	1.79	*	*	*	*	*	*	*	*	*	*	*	*
12-19	389000	17	1.90	*	*	*	*	*	*	*	*	*	*	*	*
20-39	1043000	46	1.69	2.83E-01	3.46E-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	3.26	4.25E-01	3.42E-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	3.61	4.44E-01	5.50E-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	3.80	4.61E-01	9.77E-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	0.58	5.55E-01	1.01E-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	3.39	3.88E-01	3.95E-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	1.44	4.44E-01	7.44E-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	1.71	2.82E-01	3.86E-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	3.72	5.18E-01	8.98E-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	1.94	4.48E-01	4.02E-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															
Black	107000	7	0.49	*	*	*	*	*	*	*	*	*	*	*	*
White	3970000	178	2.52	4.13E-01	2.58E-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	4.31	4.57E-01	3.99E-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	1.79	4.05E-01	8.79E-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	0.59	6.27E-01	3.60E-01	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	3.35	3.68E-01	3.24E-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															
Households who garden	4054000	182	5.95	4.04E-01	2.67E-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
Households who farm	833000	40	11.37	3.60E-01	5.95E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA' analyses of the 1987-88 NFCS

Table 13-41. Consumer Only Intake of Homegrown Corn (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	6891000	421	3.67	8.92E-01	6.48E-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															
01-02	205000	13	3.60	*	*	*	*	*	*	*	*	*	*	*	*
03-05	313000	24	3.86	1.25E+00	2.57E-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	4.12	9.32E-01	1.66E-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	2.59	5.92E-01	9.56E-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	3.11	5.97E-01	6.00E-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	3.99	8.64E-01	1.05E-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	5.48	9.43E-01	2.59E-01	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	5.16	5.44E-01	8.37E-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	2.99	6.35E-01	5.57E-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	3.91	1.82E+00	2.62E-01	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	2.62	5.45E-01	4.67E-02	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	1.33	7.37E-01	1.41E-01	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	9.16	9.63E-01	8.18E-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
Suburban	2021000	126	2.33	8.04E-01	1.30E-01	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	0.86	*	*	*	*	*	*	*	*	*	*	*	*
White	6703000	412	4.26	8.87E-01	6.51E-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	5.51	9.34E-01	9.74E-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	1.42	6.14E-01	8.42E-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	4.27	8.73E-01	9.52E-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	2.78	9.99E-01	2.77E-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															
Households who garden	6233000	387	9.15	8.75E-01	6.30E-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
Households who farm	1739000	114	23.73	1.20E+00	1.77E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distributions
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-42. Consumer Only Intake of Homegrown Cucumbers (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3994000	141	2.12	1.02E+00	1.55E-01	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	2.32	*	*	*	*	*	*	*	*	*	*	*	*
03-05	107000	4	1.32	*	*	*	*	*	*	*	*	*	*	*	*
06-11	356000	12	2.13	*	*	*	*	*	*	*	*	*	*	*	*
12-19	254000	10	1.24	*	*	*	*	*	*	*	*	*	*	*	*
20-39	864000	29	1.40	5.04E-01	9.27E-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	3.32	1.33E+00	3.01E-01	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	2.51	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	370000	12	0.78	*	*	*	*	*	*	*	*	*	*	*	*
Spring	197000	15	0.43	*	*	*	*	*	*	*	*	*	*	*	*
Summer	3427000	114	7.53	1.06E+00	1.83E-01	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
Winter	0	0	0.00												
Urbanization															
Central City	640000	18	1.14	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	1530000	64	3.40	1.74E+00	3.43E-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
Suburban	1824000	59	2.11	6.71E-01	7.52E-02	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															
Black	86000	2	0.40	*	*	*	*	*	*	*	*	*	*	*	*
White	3724000	132	2.36	9.35E-01	1.62E-01	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	2.09	1.00E+00	3.92E-01	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	1.67	1.92E+00	6.78E-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	2.05	8.85E-01	1.05E-01	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	2.83	6.01E-01	1.06E-01	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															
Households who garden	3465000	123	5.08	1.05E+00	1.75E-01	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
Households who farm	710000	29	9.69	6.99E-01	1.07E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-43. Consumer Only Intake of Home Produced Eggs (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2075000	124	1.10	7.31E-01	1.00E-01	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															
01-02	21000	3	0.37	*	*	*	*	*	*	*	*	*	*	*	*
03-05	20000	2	0.25	*	*	*	*	*	*	*	*	*	*	*	*
06-11	170000	12	1.02	*	*	*	*	*	*	*	*	*	*	*	*
12-19	163000	14	0.80	*	*	*	*	*	*	*	*	*	*	*	*
20-39	474000	30	0.77	6.32E-01	9.23E-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	1.27	5.91E-01	5.77E-02	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	3.08	*	*	*	*	*	*	*	*	*	*	*	*
Seasons															
Fall	542000	18	1.14	*	*	*	*	*	*	*	*	*	*	*	*
Spring	460000	54	1.00	1.31E+00	2.88E-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	1.59	4.96E-01	8.14E-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	0.72	8.60E-01	9.50E-02	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	0.45	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	1076000	65	2.39	7.34E-01	1.23E-01	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
Suburban	748000	50	0.86	8.54E-01	1.98E-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	0.29	*	*	*	*	*	*	*	*	*	*	*	*
White	2012000	115	1.28	7.41E-01	1.05E-01	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	1.43	7.93E-01	1.96E-01	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	0.21	*	*	*	*	*	*	*	*	*	*	*	*
South	823000	44	1.28	5.36E-01	6.46E-02	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	1.39	9.21E-01	2.75E-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															
Households who raise animals	1824000	113	18.06	7.46E-01	1.11E-01	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
Households who farm	741000	44	10.11	8.98E-01	1.70E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-44. Consumer Only Intake of Home Produced Game (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2707000	185	1.44	9.67E-01	6.14E-02	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	1.56	*	*	*	*	*	*	*	*	*	*	*	*
03-05	94000	8	1.16	*	*	*	*	*	*	*	*	*	*	*	*
06-11	362000	28	2.17	1.09E+00	1.44E-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	2.25	1.04E+00	1.39E-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	1.37	8.24E-01	1.08E-01	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	1.22	9.64E-01	1.40E-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	0.47	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	876000	31	1.84	9.97E-01	1.56E-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	1.20	9.06E-01	8.78E-02	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	0.60	*	*	*	*	*	*	*	*	*	*	*	*
Winter	1004000	77	2.06	1.07E+00	1.05E-01	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	0.90	6.89E-01	1.27E-01	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	2.80	9.45E-01	8.91E-02	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
Suburban	942000	64	1.09	1.15E+00	1.04E-01	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															
Black	0	0	0.00												
White	2605000	182	1.65	9.77E-01	6.30E-02	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	2.85	8.83E-01	8.32E-02	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	0.96	1.13E+00	2.16E-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	0.95	1.26E+00	1.29E-01	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	1.06	6.28E-01	7.21E-02	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															
Households who hunt	2357000	158	11.66	1.04E+00	6.84E-02	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-45. Consumer Only Intake of Home Produced Lettuce (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1520000	80	0.81	3.87E-01	3.18E-02	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															
01-02	54000	4	0.95	*	*	*	*	*	*	*	*	*	*	*	*
03-05	25000	2	0.31	*	*	*	*	*	*	*	*	*	*	*	*
06-11	173000	7	1.04	*	*	*	*	*	*	*	*	*	*	*	*
12-19	71000	3	0.35	*	*	*	*	*	*	*	*	*	*	*	*
20-39	379000	17	0.62	*	*	*	*	*	*	*	*	*	*	*	*
40-69	485000	26	0.86	4.84E-01	6.07E-02	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	2.00	4.52E-01	7.17E-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	0.45	*	*	*	*	*	*	*	*	*	*	*	*
Spring	352000	35	0.76	4.52E-01	4.86E-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	1.88	3.02E-01	3.96E-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	0.20	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	268000	8	0.48	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	566000	36	1.26	3.67E-01	4.78E-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
Suburban	686000	36	0.79	3.49E-01	4.32E-02	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															
Black	51000	3	0.23	*	*	*	*	*	*	*	*	*	*	*	*
White	1434000	75	0.91	3.79E-01	3.33E-02	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	1.36	3.83E-01	5.54E-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	0.82	*	*	*	*	*	*	*	*	*	*	*	*
South	305000	20	0.47	3.52E-01	5.74E-02	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	0.69	*	*	*	*	*	*	*	*	*	*	*	*
Responses to Questionnaire															
Households who garden	1506000	78	2.21	3.90E-01	3.22E-02	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
Households who farm	304000	18	4.15	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-46. Consumer Only Intake of Home Produced Lima Beans (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1917000	109	1.02	4.53E-01	4.11E-02	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															
01-02	62000	3	1.09	*	*	*	*	*	*	*	*	*	*	*	*
03-05	35000	2	0.43	*	*	*	*	*	*	*	*	*	*	*	*
06-11	95000	7	0.57	*	*	*	*	*	*	*	*	*	*	*	*
12-19	108000	6	0.53	*	*	*	*	*	*	*	*	*	*	*	*
20-39	464000	20	0.75	3.84E-01	6.87E-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	1.33	4.54E-01	6.30E-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	2.27	5.23E-01	1.05E-01	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	0.79	*	*	*	*	*	*	*	*	*	*	*	*
Spring	316000	39	0.68	4.19E-01	5.50E-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	1.94	4.99E-01	9.68E-02	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	0.70	5.27E-01	6.25E-02	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	0.36	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	1075000	69	2.39	2.99E-01	3.22E-02	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
Suburban	638000	32	0.74	7.53E-01	9.60E-02	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	0.98	*	*	*	*	*	*	*	*	*	*	*	*
White	1704000	100	1.08	3.83E-01	3.27E-02	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	1.27	4.28E-01	6.17E-02	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	0.17	*	*	*	*	*	*	*	*	*	*	*	*
South	1261000	67	1.96	4.72E-01	5.62E-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
West	0	0	0.00												
Response to Questionnaire															
Households who garden	1610000	97	2.36	4.47E-01	4.49E-02	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
Households who farm	62000	6	0.85	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-47. Consumer Only Intake of Homegrown Okra (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1696000	82	0.90	3.91E-01	3.81E-02	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															
01-02	53000	2	0.93	*	*	*	*	*	*	*	*	*	*	*	*
03-05	68000	3	0.84	*	*	*	*	*	*	*	*	*	*	*	*
06-11	218000	11	1.30	*	*	*	*	*	*	*	*	*	*	*	*
12-19	194000	9	0.95	*	*	*	*	*	*	*	*	*	*	*	*
20-39	417000	18	0.68	*	*	*	*	*	*	*	*	*	*	*	*
40-69	587000	32	1.03	4.00E-01	4.73E-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	0.82	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	228000	9	0.48	*	*	*	*	*	*	*	*	*	*	*	*
Spring	236000	24	0.51	3.87E-01	6.22E-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	2.52	3.86E-01	5.75E-02	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	0.18	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	204000	6	0.36	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	1043000	55	2.32	3.65E-01	4.99E-02	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
Suburban	449000	21	0.52	5.14E-01	6.97E-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															
Black	236000	13	1.09	*	*	*	*	*	*	*	*	*	*	*	*
White	1419000	68	0.90	4.26E-01	4.40E-02	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	0.24	*	*	*	*	*	*	*	*	*	*	*	*
Northeast															
South	1443000	70	2.24	3.73E-01	4.21E-02	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	0.39	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who garden	1564000	77	2.29	3.84E-01	4.05E-02	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
Households who farm	233000	14	3.18	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-48. Consumer Only Intake of Homegrown Onions (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	6718000	370	3.57	2.96E-01	1.87E-02	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															
01-02	291000	17	5.11	*	*	*	*	*	*	*	*	*	*	*	*
03-05	178000	9	2.20	*	*	*	*	*	*	*	*	*	*	*	*
06-11	530000	31	3.17	3.03E-01	5.61E-02	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	3.18	2.11E-01	3.65E-02	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	2.54	2.88E-01	3.40E-02	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	4.23	2.50E-01	2.07E-02	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	6.54	4.33E-01	8.86E-02	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	3.27	3.75E-01	6.93E-02	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	3.11	1.95E-01	1.96E-02	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	6.36	3.06E-01	2.91E-02	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	1.72	2.88E-01	3.86E-02	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	1.58	2.16E-01	2.85E-02	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	6.54	3.24E-01	2.06E-02	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
Suburban	2884000	156	3.33	2.92E-01	3.70E-02	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	1.16	*	*	*	*	*	*	*	*	*	*	*	*
White	6266000	345	3.98	3.08E-01	1.99E-02	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	5.36	2.70E-01	1.94E-02	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	2.13	2.32E-01	4.43E-02	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	2.98	3.32E-01	2.93E-02	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	3.98	3.32E-01	6.90E-02	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															
Households who garden	6441000	356	9.45	3.00E-01	1.93E-02	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
Households who farm	1390000	81	18.97	3.75E-01	3.84E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distributions
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-49. Consumer Only Intake of Homegrown Other Berries (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1626000	99	0.86	4.80E-01	4.24E-02	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															
01-02	41000	2	0.72	*	*	*	*	*	*	*	*	*	*	*	*
03-05	53000	3	0.65	*	*	*	*	*	*	*	*	*	*	*	*
06-11	106000	10	0.63	*	*	*	*	*	*	*	*	*	*	*	*
12-19	79000	5	0.39	*	*	*	*	*	*	*	*	*	*	*	*
20-39	309000	20	0.50	3.90E-01	6.31E-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	1.54	4.89E-01	5.72E-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	1.00	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	379000	13	0.80	*	*	*	*	*	*	*	*	*	*	*	*
Spring	287000	29	0.62	3.06E-01	4.11E-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	1.10	*	*	*	*	*	*	*	*	*	*	*	*
Winter	458000	39	0.94	5.35E-01	7.39E-02	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	0.67	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	466000	37	1.04	6.43E-01	8.96E-02	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
Suburban	722000	45	0.83	4.48E-01	5.32E-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	0.35	*	*	*	*	*	*	*	*	*	*	*	*
White	1490000	93	0.95	5.03E-01	4.43E-02	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	1.59	4.57E-01	6.26E-02	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	0.51	*	*	*	*	*	*	*	*	*	*	*	*
South	204000	12	0.32	*	*	*	*	*	*	*	*	*	*	*	*
West	415000	18	1.15	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who garden	1333000	84	1.96	4.72E-01	4.83E-02	1.00E-02	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
Households who farm	219000	16	2.99	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-50 Consumer Only Intake of Homegrown Peaches (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2941000	193	1.56	1.67E+00	1.70E-01	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															
01-02	103000	8	1.81	*	*	*	*	*	*	*	*	*	*	*	*
03-05	65000	6	0.80	*	*	*	*	*	*	*	*	*	*	*	*
06-11	329000	26	1.97	3.11E+00	6.32E-01	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	0.86	*	*	*	*	*	*	*	*	*	*	*	*
20-39	573000	35	0.93	1.17E+00	1.74E-01	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	1.90	1.53E+00	2.83E-01	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	3.77	1.01E+00	1.97E-01	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	1.02	*	*	*	*	*	*	*	*	*	*	*	*
Spring	756000	91	1.64	1.67E+00	3.04E-01	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	2.38	2.26E+00	4.78E-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	1.27	1.25E+00	1.03E-01	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	0.76	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	1110000	99	2.47	1.87E+00	2.59E-01	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
Suburban	1402000	82	1.62	1.47E+00	1.75E-01	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	0.18	*	*	*	*	*	*	*	*	*	*	*	*
White	2861000	191	1.82	1.70E+00	1.73E-01	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	1.78	1.39E+00	2.91E-01	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	0.18	*	*	*	*	*	*	*	*	*	*	*	*
South	852000	51	1.32	1.67E+00	2.57E-01	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	3.30	1.80E+00	3.26E-01	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															
Households who garden	2660000	174	3.90	1.75E+00	1.85E-01	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
Households who farm	769000	54	10.49	1.56E+00	2.49E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-51. Consumer Only Intake of Homegrown Pears (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1513000	94	0.80	9.37E-01	9.68E-02	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	0.42	*	*	*	*	*	*	*	*	*	*	*	*
03-05	45000	3	0.56	*	*	*	*	*	*	*	*	*	*	*	*
06-11	145000	10	0.87	*	*	*	*	*	*	*	*	*	*	*	*
12-19	121000	7	0.59	*	*	*	*	*	*	*	*	*	*	*	*
20-39	365000	23	0.59	6.19E-01	6.42E-02	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	0.98	6.57E-01	5.53E-02	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	1.61	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	308000	11	0.65	*	*	*	*	*	*	*	*	*	*	*	*
Spring	355000	39	0.77	6.87E-01	7.89E-02	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	1.04	*	*	*	*	*	*	*	*	*	*	*	*
Winter	376000	28	0.77	1.48E+00	2.77E-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	0.39	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	634000	44	1.41	7.81E-01	8.52E-02	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
Suburban	657000	39	0.76	8.50E-01	1.17E-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	0.23	*	*	*	*	*	*	*	*	*	*	*	*
White	1462000	91	0.93	9.65E-01	9.88E-02	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	1.48	8.71E-01	9.49E-02	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	0.04	*	*	*	*	*	*	*	*	*	*	*	*
South	377000	13	0.59	*	*	*	*	*	*	*	*	*	*	*	*
West	430000	22	1.19	1.14E+00	2.89E-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															
Households who garden	1312000	85	1.93	9.45E-01	1.04E-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
Households who farm	528000	35	7.20	1.09E+00	2.10E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13.52. Consumer Only Intake of Homegrown Peas (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	4252000	226	2.26	5.05E-01	3.23E-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															
01-02	163000	9	2.86	*	*	*	*	*	*	*	*	*	*	*	*
03-05	140000	7	1.73	*	*	*	*	*	*	*	*	*	*	*	*
06-11	515000	26	3.08	6.05E-01	8.91E-02	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	1.84	4.08E-01	4.28E-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	1.82	4.08E-01	6.21E-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	2.41	4.58E-01	4.61E-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	2.88	3.34E-01	5.58E-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	2.60	3.03E-01	2.97E-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	1.66	4.38E-01	4.26E-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	3.33	5.85E-01	7.36E-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	1.50	7.53E-01	8.86E-02	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	0.99	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	2028000	126	4.50	4.81E-01	3.55E-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
Suburban	1666000	81	1.92	5.13E-01	4.63E-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															
Black	355000	19	1.63	*	*	*	*	*	*	*	*	*	*	*	*
White	3784000	203	2.40	4.95E-01	3.35E-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	2.16	4.03E-01	7.24E-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	0.59	*	*	*	*	*	*	*	*	*	*	*	*
South	2449000	132	3.81	5.67E-01	4.30E-02	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	1.55	3.77E-01	5.70E-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															
Households who garden	3980000	214	5.84	5.13E-01	3.39E-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
Households who farm	884000	55	12.06	4.59E-01	5.83E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-53. Consumer Only Intake of Homegrown Peppers (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5153000	208	2.74												
Age															
01-02	163000	6	2.86	*	*	*	*	*	*	*	*	*	*	*	*
03-05	108000	5	1.33	*	*	*	*	*	*	*	*	*	*	*	*
06-11	578000	26	3.46	2.26E-01	4.09E-02	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	1.67	*	*	*	*	*	*	*	*	*	*	*	*
20-39	1048000	40	1.70	2.24E-01	6.10E-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	3.92	2.50E-01	2.78E-02	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	4.07	2.56E-01	6.22E-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	3.62	1.97E-01	2.51E-02	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	0.55	2.95E-01	7.15E-02	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	5.87												
Winter	500000	33	1.03												
Urbanization															
Central City	865000	30	1.53	2.46E-01	4.23E-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	4.40	2.42E-01	3.93E-02	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
Suburban	2246000	87	2.59	2.47E-01	3.00E-02	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															
Black	127000	6	0.58	*	*	*	*	*	*	*	*	*	*	*	*
White	4892000	198	3.11	2.47E-01	2.23E-02	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	3.86	2.34E-01	4.06E-02	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	1.91												
South	1739000	72	2.70	2.30E-01	2.89E-02	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	2.16	2.13E-01	5.04E-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															
Households who garden	4898000	199	7.19	2.35E-01	2.09E-02	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
Households who farm	867000	35	11.83	3.03E-01	7.50E-02	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-54. Consumer Only Intake of Home Produced Pork (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1732000	121	0.92	1.23E+00	9.63E-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	0.67	•	•	•	•	•	•	•	•	•	•	•	•
03-05	26000	3	0.32	•	•	•	•	•	•	•	•	•	•	•	•
06-11	129000	11	0.77	•	•	•	•	•	•	•	•	•	•	•	•
12-19	291000	20	1.42	1.28E+00	2.42E-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	0.83	1.21E+00	1.80E-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	0.98	1.02E+00	1.15E-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	1.13	•	•	•	•	•	•	•	•	•	•	•	•
Season															
Fall	362000	13	0.76	•	•	•	•	•	•	•	•	•	•	•	•
Spring	547000	59	1.19	1.13E+00	1.29E-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	0.83	•	•	•	•	•	•	•	•	•	•	•	•
Winter	444000	34	0.91	1.40E+00	2.39E-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	0.16	•	•	•	•	•	•	•	•	•	•	•	•
Nonmetropolitan	1178000	77	2.62	1.39E+00	1.31E-01	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
Suburban	464000	42	0.54	8.77E-01	1.20E-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															
Black	0	0	0.00												
White	1732000	121	1.10	1.23E+00	9.63E-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	1.82	1.06E+00	1.19E-01	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	0.24	•	•	•	•	•	•	•	•	•	•	•	•
South	554000	32	0.86	1.35E+00	1.46E-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	0.66	1.15E+00	3.09E-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															
Households who raise animals	1428000	100	14.14	1.34E+00	9.86E-02	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
Households who farm	1218000	82	16.62	1.30E+00	1.11E-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

• Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-55. Consumer Only Intake of Home Produced Poultry (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	1816000	105	0.97	1.57E+00	1.15E-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															
01-02	91000	8	1.60	*	*	*	*	*	*	*	*	*	*	*	*
03-05	70000	5	0.86	*	*	*	*	*	*	*	*	*	*	*	*
06-11	205000	12	1.23	*	*	*	*	*	*	*	*	*	*	*	*
12-19	194000	12	0.95	*	*	*	*	*	*	*	*	*	*	*	*
20-39	574000	33	0.93	1.17E+00	1.47E-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	1.00	1.51E+00	2.43E-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	0.50	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	562000	23	1.18	1.52E+00	1.75E-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	0.81	1.87E+00	2.79E-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	0.69	*	*	*	*	*	*	*	*	*	*	*	*
Winter	568000	37	1.17	1.55E+00	2.00E-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	0.41	*	*	*	*	*	*	*	*	*	*	*	*
Nonmetropolitan	997000	56	2.21	1.48E+00	1.32E-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
Suburban	589000	41	0.68	1.94E+00	2.30E-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	0.20	*	*	*	*	*	*	*	*	*	*	*	*
White	1772000	103	1.12	1.57E+00	1.17E-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	1.65	1.60E+00	1.40E-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	0.16	*	*	*	*	*	*	*	*	*	*	*	*
South	654000	38	1.02	1.67E+00	2.50E-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	0.92	1.24E+00	1.80E-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															
Households who raise animals	1333000	81	13.20	1.58E+00	1.18E-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
Households who farm	917000	59	12.51	1.54E+00	1.79E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-56. Consumer Only Intake of Homegrown Pumpkins (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2041000	87	1.09	7.78E-01	6.83E-02	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															
01-02	73000	4	1.28	*	*	*	*	*	*	*	*	*	*	*	*
03-05	18000	2	0.22	*	*	*	*	*	*	*	*	*	*	*	*
06-11	229000	9	1.37	*	*	*	*	*	*	*	*	*	*	*	*
12-19	244000	10	1.19	*	*	*	*	*	*	*	*	*	*	*	*
20-39	657000	26	1.07	8.01E-01	1.29E-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	0.73	8.22E-01	1.57E-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	2.35	*	*	*	*	*	*	*	*	*	*	*	*
Season															
Fall	1345000	49	2.82	8.19E-01	8.91E-02	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	0.10	*	*	*	*	*	*	*	*	*	*	*	*
Summer	405000	13	0.89	*	*	*	*	*	*	*	*	*	*	*	*
Winter	243000	19	0.50	*	*	*	*	*	*	*	*	*	*	*	*
Urbanization															
Central City	565000	20	1.00	6.29E-01	1.08E-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	1.92	6.44E-01	9.64E-02	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
Suburban	613000	23	0.71	1.10E+00	1.34E-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	0.10	*	*	*	*	*	*	*	*	*	*	*	*
White	2019000	86	1.28	7.82E-01	6.90E-02	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	2.95	8.21E-01	9.68E-02	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	0.04	*	*	*	*	*	*	*	*	*	*	*	*
South	179000	10	0.28	*	*	*	*	*	*	*	*	*	*	*	*
West	477000	22	1.32	7.87E-01	9.65E-02	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 Questionnaire															
Households who garden	1987000	85	2.92	7.70E-01	6.93E-02	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
Households who farm	449000	18	6.13	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-57. Consumer Only Intake of Homegrown Snap Beans (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12308000	739	6.55	8.00E-01	3.02E-02	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															
01-02	246000	17	4.32	*	*	*	*	*	*	*	*	*	*	*	*
03-05	455000	32	5.62	1.49E+00	2.37E-01	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	5.16	8.97E-01	1.15E-01	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	5.62	6.38E-01	6.10E-02	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	4.35	6.13E-01	4.09E-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	8.79	7.19E-01	3.20E-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	11.34	9.15E-01	1.16E-01	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	8.00	8.12E-01	8.19E-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	5.86	9.00E-01	5.44E-02	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	6.48	6.33E-01	4.81E-02	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	5.84	8.64E-01	5.28E-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	3.91	5.97E-01	5.59E-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	12.65	9.61E-01	5.06E-02	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
Suburban	4347000	255	5.02	7.04E-01	3.76E-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															
Black	634000	36	2.92	7.55E-01	1.43E-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
White	11519000	694	7.31	8.10E-01	3.12E-02	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	10.02	8.60E-01	6.11E-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	2.40	5.66E-01	6.63E-02	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	7.39	8.82E-01	4.04E-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	5.14	5.92E-01	4.35E-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															
Households who garden	11843000	700	17.38	7.90E-01	3.08E-02	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
Households who farm	2591000	157	35.35	7.95E-01	4.78E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-58. Consumer Only Intake of Homegrown Strawberries (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2057000	139	1.09	6.52E-01	5.15E-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															
01-02	30000	2	0.53	*	*	*	*	*	*	*	*	*	*	*	*
03-05	66000	6	0.81	*	*	*	*	*	*	*	*	*	*	*	*
06-11	153000	15	0.92	*	*	*	*	*	*	*	*	*	*	*	*
12-19	201000	11	0.98	*	*	*	*	*	*	*	*	*	*	*	*
20-39	316000	22	0.51	3.21E-01	6.41E-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	1.47	6.44E-01	6.37E-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	2.83	6.36E-01	1.11E-01	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	0.52	*	*	*	*	*	*	*	*	*	*	*	*
Spring	598000	66	1.30	8.30E-01	1.03E-01	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	0.85	*	*	*	*	*	*	*	*	*	*	*	*
Winter	821000	54	1.69	5.13E-01	6.42E-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	0.90	7.54E-01	1.22E-01	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	1.47	6.18E-01	1.05E-01	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
Suburban	888000	64	1.03	6.20E-01	5.88E-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															
Black	0	0	0.00												
White	2057000	139	1.31	6.52E-01	5.15E-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	2.42	6.85E-01	8.28E-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	0.93	6.35E-01	1.01E-01	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	0.52	6.69E-01	8.41E-02	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	0.61	*	*	*	*	*	*	*	*	*	*	*	*
Response to Questionnaire															
Households who garden	1843000	123	2.70	6.37E-01	5.48E-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
Households who farm	87000	9	1.19	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-59. Consumer Only Intake of Homegrown Tomatoes (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	16737000	743	8.90	1.18E+00	5.26E-02	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															
01-02	572000	26	10.04	3.14E+00	5.30E-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	6.37	1.61E+00	2.65E-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	6.54	1.63E+00	2.68E-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	6.89	7.15E-01	8.52E-02	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	6.77	8.54E-01	1.03E-01	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	11.92	1.05E+00	5.23E-02	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	12.53	1.26E+00	9.40E-02	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	11.57	1.02E+00	8.55E-02	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	2.74	8.39E-01	6.26E-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	17.86	1.30E+00	8.75E-02	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	3.77	1.37E+00	1.77E-01	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	4.76	1.10E+00	1.27E-01	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	16.41	1.26E+00	7.35E-02	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
Suburban	6668000	275	7.70	1.13E+00	9.14E-02	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															
Black	743000	28	3.42	6.14E-01	8.60E-02	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
White	15658000	703	9.94	1.22E+00	5.54E-02	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	14.54	1.18E+00	8.91E-02	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	6.02	1.17E+00	1.64E-01	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	6.77	1.15E+00	9.07E-02	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	8.74	1.23E+00	9.90E-02	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															
Households who garden	14791000	661	21.70	1.21E+00	5.70E-02	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
Households who farm	2269000	112	30.96	1.42E+00	1.58E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-60. Consumer Only Intake of Homegrown White Potatoes (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5895000	281	3.14	1.66E+00	1.05E-01	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															
01-02	147000	10	2.58	*	*	*	*	*	*	*	*	*	*	*	*
03-05	119000	6	1.47	*	*	*	*	*	*	*	*	*	*	*	*
06-11	431000	24	2.58	2.19E+00	3.85E-01	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	3.67	1.26E+00	1.85E-01	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	2.44	1.24E+00	1.21E-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	3.27	1.86E+00	2.29E-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	6.43	1.27E+00	1.22E-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	4.76	1.63E+00	2.23E-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	1.14	1.23E+00	1.28E-01	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	5.28	1.63E+00	1.82E-01	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	1.43	2.17E+00	1.98E-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	1.20	9.60E-01	1.51E-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	6.77	1.96E+00	1.55E-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
Suburban	2110000	95	2.44	1.49E+00	1.67E-01	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	0.64	*	*	*	*	*	*	*	*	*	*	*	*
White	5550000	269	3.52	1.67E+00	1.09E-01	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	5.58	1.77E+00	1.47E-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	1.59	1.28E+00	2.04E-01	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	2.79	2.08E+00	2.39E-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	2.21	7.61E-01	1.05E-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															
Households who garden	5291000	250	7.76	1.65E+00	1.09E-01	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
Households who farm	1082000	62	14.76	1.83E+00	1.78E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-61. Consumer Only Intake of Homegrown Exposed Fruit (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11770000	679	6.26	1.49E+00	8.13E-02	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															
01-02	306000	19	5.37	*	*	*	*	*	*	*	*	*	*	*	*
03-05	470000	30	5.80	2.60E+00	7.78E-01	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	5.48	2.52E+00	4.24E-01	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	4.37	1.33E+00	2.06E-01	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	4.09	1.09E+00	1.44E-01	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	7.53	1.25E+00	1.10E-01	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	14.39	1.39E+00	1.17E-01	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	6.04	1.37E+00	1.16E-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	5.34	1.49E+00	1.51E-01	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	7.89	1.75E+00	2.50E-01	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	5.83	1.27E+00	1.06E-01	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	4.53	1.34E+00	1.98E-01	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	8.64	1.78E+00	1.67E-01	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
Suburban	5267000	309	6.08	1.36E+00	9.00E-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	1.15	*	*	*	*	*	*	*	*	*	*	*	*
White	11411000	663	7.24	1.51E+00	8.33E-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	9.55	1.60E+00	1.42E-01	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	2.96	7.55E-01	1.18E-01	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	3.94	1.51E+00	1.84E-01	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	9.79	1.60E+00	1.43E-01	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															
Households who garden	10197000	596	14.96	1.55E+00	9.12E-02	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
Households who farm	1917000	112	26.16	2.32E+00	2.50E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-62. Consumer Only Intake of Homegrown Protected Fruits (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	3855000	173	2.05	5.74E+00	6.25E-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															
01-02	79000	5	1.39	*	*	*	*	*	*	*	*	*	*	*	*
03-05	80000	4	0.99	*	*	*	*	*	*	*	*	*	*	*	*
06-11	181000	9	1.08	*	*	*	*	*	*	*	*	*	*	*	*
12-19	377000	20	1.84	2.96E+00	9.93E-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	1.23	4.51E+00	1.08E+00	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	3.00	5.65E+00	8.66E-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	3.78	4.44E+00	6.91E-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	0.83	*	*	*	*	*	*	*	*	*	*	*	*
Spring	497000	36	1.08	2.08E+00	3.47E-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	3.13	7.39E+00	1.45E+00	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	3.16	6.24E+00	9.10E-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	2.33	3.94E+00	5.80E-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	1.12	*	*	*	*	*	*	*	*	*	*	*	*
Suburban	2037000	104	2.35	6.83E+00	9.38E-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	0.92	*	*	*	*	*	*	*	*	*	*	*	*
White	3655000	165	2.32	5.91E+00	6.48E-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	1.42	1.07E+01	2.60E+00	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	0.26	*	*	*	*	*	*	*	*	*	*	*	*
South	1805000	74	2.81	4.77E+00	6.47E-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	3.57	4.85E+00	9.26E-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															
Households who garden	3360000	146	4.93	5.90E+00	6.97E-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
Households who farm	357000	14	4.87	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-63. Consumer Only Intake of Homegrown Exposed Vegetables (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	28762000	1511	15.30	1.52E+00	5.10E-02	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															
01-02	815000	43	14.30	3.48E+00	5.14E-01	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	13.19	1.74E+00	2.20E-01	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	14.68	1.39E+00	1.76E-01	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	12.74	1.07E+00	9.43E-02	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	11.31	1.05E+00	8.14E-02	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	19.38	1.60E+00	8.32E-02	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	22.15	1.68E+00	1.21E-01	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	18.60	1.31E+00	9.80E-02	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	10.54	1.14E+00	6.35E-02	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	22.32	2.03E+00	1.26E-01	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	10.02	1.21E+00	9.50E-02	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	8.62	1.11E+00	1.02E-01	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	25.71	1.87E+00	8.79E-02	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
Suburban	12266000	625	14.17	1.35E+00	7.01E-02	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															
Black	1713000	100	7.88	1.23E+00	1.27E-01	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
White	26551000	1386	16.85	1.53E+00	5.41E-02	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	22.42	1.48E+00	8.91E-02	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	9.84	1.65E+00	1.78E-01	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	14.36	1.55E+00	7.79E-02	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	13.90	1.43E+00	1.02E-01	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															
Households who garden	25737000	1361	37.76	1.57	5.50E-02	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
Households who farm	3596000	207	49.07	2.17	1.61E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-64. Consumer Only Intake of Homegrown Protected Vegetables (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	11428000	656	6.08	1.01E+00	4.95E-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															
01-02	348000	21	6.11	2.46E+00	4.91E-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	5.43	1.30E+00	2.13E-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	6.30	1.10E+00	1.34E-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	4.44	7.76E-01	8.71E-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	5.24	7.62E-01	6.03E-02	1.13E-01	1.52E-01	1.71E-01	2.41E-01	5.08E-01	9.67E-01	1.73E+00	2.51E+00	3.63E+00	4.76E+00
40-69	3818000	226	6.73	9.30E-01	7.32E-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	9.08	1.05E+00	1.62E-01	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	8.20	8.51E-01	7.02E-02	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	4.52	7.02E-01	4.48E-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	7.82	1.40E+00	1.56E-01	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	3.85	9.30E-01	7.70E-02	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	2.38	9.96E-01	1.51E-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	13.18	1.07E+00	6.36E-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
Suburban	4152000	216	4.80	9.26E-01	7.97E-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															
Black	479000	27	2.20	1.50E+00	2.25E-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
White	10836000	625	6.88	9.93E-01	4.83E-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	9.40	1.01E+00	7.38E-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	1.96	7.01E-01	8.99E-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	6.92	1.08E+00	7.17E-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	5.03	9.57E-01	1.62E-01	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															
Households who garden	10286000	602	15.09	1.01E+00	4.73E-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
Households who farm	2325000	142	31.72	1.30E+00	1.45E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-65. Consumer Only Intake of Homegrown Root Vegetables (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	13750000	743	7.31	1.16E+00	5.84E-02	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															
01-02	371000	22	6.51	2.52E+00	6.10E-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	4.81	1.28E+00	3.24E-01	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	6.62	1.32E+00	2.14E-01	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	7.15	9.37E-01	1.19E-01	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	5.28	8.74E-01	7.39E-02	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	8.64	1.13E+00	9.86E-02	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	13.20	1.22E+00	1.02E-01	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	8.45	1.42E+00	1.53E-01	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	5.53	6.87E-01	6.08E-02	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	11.02	1.19E+00	1.20E-01	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	4.44	1.17E+00	1.19E-01	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	4.23	7.49E-01	8.40E-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	13.54	1.43E+00	9.81E-02	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	6.02	1.06E+00	8.62E-02	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															
Black	521000	31	2.40	8.83E-01	3.93E-01	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
White	12861000	697	8.16	1.18E+00	5.97E-02	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	12.01	1.31E+00	9.54E-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	4.18	8.38E-01	1.03E-01	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	5.97	1.38E+00	1.38E-01	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	7.08	7.68E-01	6.43E-02	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															
Households who garden	12578000	682	18.46	1.15E+00	5.72E-02	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
Households who farm	2367000	136	32.30	1.39E+00	1.26E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-66. Consumer Only Intake of Homegrown Dark Green Vegetables (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	8855000	428	4.71	3.91E-01	2.95E-02	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															
01-02	180000	8	3.16	*	*	*	*	*	*	*	*	*	*	*	*
03-05	226000	12	2.79	*	*	*	*	*	*	*	*	*	*	*	*
06-11	826000	39	4.94	3.05E-01	5.19E-02	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	3.07	4.20E-01	1.47E-01	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	3.21	3.36E-01	6.09E-02	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	6.54	4.01E-01	4.24E-02	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	7.89	4.08E-01	7.27E-02	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	5.63	4.41E-01	7.42E-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	2.71	5.59E-01	7.90E-02	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	7.87	3.39E-01	4.10E-02	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	2.75	2.72E-01	3.92E-02	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	2.30	2.69E-01	3.68E-02	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	7.15	3.31E-01	3.54E-02	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
Suburban	4279000	211	4.94	4.79E-01	5.23E-02	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															
Black	724000	49	3.33	1.04E+00	1.80E-01	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
White	7963000	373	5.05	3.21E-01	2.20E-02	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	5.75	2.81E-01	3.54E-02	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	3.77	5.08E-01	9.14E-02	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	4.58	4.78E-01	5.07E-02	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	4.51	3.18E-01	7.25E-02	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															
Households who garden	8521000	412	12.50	3.95E-01	3.03E-02	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
Households who farm	1450000	66	19.78	3.80E-01	6.08E-02	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-67. Consumer Only Intake of Homegrown Deep Yellow Vegetables (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	5467000	245	2.91	6.43E-01	4.44E-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															
01-02	124000	8	2.18	*	*	*	*	*	*	*	*	*	*	*	*
03-05	61000	4	0.75	*	*	*	*	*	*	*	*	*	*	*	*
06-11	382000	17	2.29	*	*	*	*	*	*	*	*	*	*	*	*
12-19	493000	21	2.41	4.73E-01	9.18E-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	2.39	5.32E-01	7.54E-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	3.66	5.39E-01	5.15E-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 +	76[illegible]000	32	4.79	7.81E-01	9.20E-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	5.59	7.38E-01	8.18E-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	0.68	5.64E-01	7.52E-02	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	3.56	5.09E-01	6.37E-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	1.78	6.29E-01	9.15E-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	2.32	5.07E-01	7.07E-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	4.66	6.66E-01	7.72E-02	4.16E-02	5.55E-02	9.07E-02	2.20E-01	3.70E-01	8.65E-01	1.39E+00	2.[illegible]2E+00	4.37E+00	6.63E+00
Suburban	2059000	84	2.38	7.07E-01	6.99E-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															
Black	129000	8	0.59	*	*	*	*	*	*	*	*	*	*	*	*
White	5093000	229	3.23	6.45E-01	4.03E-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	6.02	7.52E-01	6.01E-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	1.79	3.96E-01	8.06E-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	0.87	5.39E-01	2.08E-01	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	3.83	5.97E-01	7.07E-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															
Households who garden	5177000	233	7.60	6.23E-01	3.93E-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
Households who farm	1088000	51	14.85	6.06E-01	8.52E-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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table13-68 Consumer Only Intake of Homegrown Other Vegetables (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	25221000	1437	13.41	1.38E+00	5.00E-02	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															
01-02	613000	38	10.76	3.80E+00	6.27E-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	10.95	2.15E+00	2.67E-01	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	12.86	1.30E+00	1.38E-01	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	11.61	9.80E-01	8.56E-02	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	9.77	9.30E-01	6.00E-02	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	17.01	1.40E+00	8.72E-02	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	20.31	1.58E+00	1.41E-01	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	14.55	1.19E+00	8.62E-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	11.71	1.16E+00	6.19E-02	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	18.59	1.79E+00	1.53E-01	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	9.09	1.19E+00	7.28E-02	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	7.36	9.66E-01	8.81E-02	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	23.81	1.78E+00	8.99E-02	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	11.89	1.14E+00	5.98E-02	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															
Black	1347000	84	6.19	1.30E+00	1.70E-01	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
White	23367000	1327	14.83	1.39E+00	5.26E-02	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	17.88	1.43E+00	9.25E-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	7.08	1.33E+00	1.65E-01	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	14.33	1.53E+00	7.82E-02	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	13.12	1.08E+00	9.85E-02	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															
Households who garden	22417000	1291	32.89	1.44E+00	5.25E-02	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
Households who farm	3965000	239	54.10	1.95E+00	1.63E-01	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

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.
Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-69. Consumer Only Intake of Homegrown Citrus (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	2530000	125	1.35	4.76E+00	6.05E-01	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															
01-02	54000	4	0.95	*	*	*	*	*	*	*	*	*	*	*	*
03-05	51000	3	0.63	*	*	*	*	*	*	*	*	*	*	*	*
06-11	181000	9	1.08	*	*	*	*	*	*	*	*	*	*	*	*
12-19	194000	14	0.95	*	*	*	*	*	*	*	*	*	*	*	*
20-39	402000	18	0.65	*	*	*	*	*	*	*	*	*	*	*	*
40-69	1183000	55	2.09	4.54E+00	8.06E-01	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	2.88	4.43E+00	7.58E-01	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	0.59	*	*	*	*	*	*	*	*	*	*	*	*
Spring	437000	33	0.95	2.31E+00	3.76E-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	0.73	*	*	*	*	*	*	*	*	*	*	*	*
Winter	1479000	73	3.04	6.47E+00	9.53E-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	1.87	3.57E+00	5.18E-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
Nonmetropolitan	0	0	0.00												
Suburban	1477000	82	1.71	5.61E+00	9.14E-01	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	0.92	*	*	*	*	*	*	*	*	*	*	*	*
White	2330000	117	1.48	4.93E+00	6.31E-01	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	0.14	*	*	*	*	*	*	*	*	*	*	*	*
Northeast	0	0	0.00												
South	1240000	55	1.93	5.18E+00	7.37E-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	3.40	4.56E+00	9.79E-01	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															
Households who garden	2151000	102	3.16	4.55E+00	6.61E-01	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
Households who farm	130000	5	1.77	*	*	*	*	*	*	*	*	*	*	*	*

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distributions
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Sources: Based on EPA's analyses of the 1987-88 NFCS

Table 13-70. Consumer Only Intake of Homegrown Other Fruit (g/kg-day)

Population Group	Nc wgtd	Nc unwgtd	% Consuming	Mean	SE	P1	P5	P10	P25	P50	P75	P90	P95	P99	P100
Total	12615000	706	6.71	2.20E+00	1.86E-01	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															
01-02	306000	19	5.37	*	*	*	*	*	*	*	*	*	*	*	*
03-05	499000	31	6.16	2.66E+00	7.60E-01	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	5.48	2.60E+00	4.38E-01	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	4.98	1.62E+00	2.77E-01	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	4.48	1.85E+00	3.72E-01	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	8.13	2.09E+00	3.08E-01	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	14.65	1.66E+00	1.84E-01	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	6.13	1.39E+00	1.14E-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	5.47	1.47E+00	1.51E-01	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	9.51												
Winter	2839000	192	5.83	1.29E+00	1.08E-01	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	4.76	1.79E+00	2.88E-01	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	9.15	2.43E+00	3.10E-01	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
Suburban	5756000	324	6.65	2.25E+00	3.06E-01	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	1.15	*	*	*	*	*	*	*	*	*	*	*	*
White	12256000	690	7.78	2.24E+00	1.91E-01	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	9.96	3.07E+00	4.25E-01	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	3.11	9.32E-01	2.20E-01	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	4.67	1.99E+00	2.59E-01	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	10.13	1.76E+00	1.64E-01	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															
Households who garden	10926000	619	16.03	2.38E+00	2.12E-01	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
Households who farm	1917000	112	26.16	2.57E+00	2.65E-01	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

* Intake data not provided for subpopulations for which there were less than 20 observations

NOTE: SE = standard error
P = percentile of the distribution
Nc wgtd = weighted number of consumers; Nc unwgtd = unweighted number of consumers in survey.

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-71. Fraction of Food Intake that is Home Produced

	Total Fruits	Total Vegetables	Total Meats	Total Dairy	Total Fish	Exposed Vegetables	Protected Vegetables	Root Vegetables	Exposed Fruits	Protected Fruits
Total	0.040	0.068	0.024	0.012	0.094	0.095	0.069	0.043	0.050	0.037
Season										
Fall	0.021	0.081	0.020	0.008	0.076	0.106	0.073	0.06	0.039	0.008
Spring	0.021	0.037	0.020	0.011	0.160	0.05	0.039	0.02	0.047	0.008
Summer	0.058	0.116	0.034	0.022	0.079	0.164	0.101	0.066	0.068	0.054
Winter	0.059	0.041	0.022	0.008	0.063	0.052	0.048	0.026	0.044	0.068
Urbanization										
Central City	0.027	0.027	0.003	0.000	0.053	0.037	0.027	0.016	0.030	0.026
Nonmetropolitan	0.052	0.144	0.064	0.043	0.219	0.207	0.134	0.088	0.100	0.025
Surburban	0.047	0.058	0.018	0.004	0.075	0.079	0.054	0.035	0.043	0.050
Race										
Black	0.007	0.027	0.001	0.000	0.063	0.037	0.029	0.012	0.008	0.007
White	0.049	0.081	0.031	0.014	0.110	0.109	0.081	0.050	0.059	0.045
Regions										
Northeast	0.005	0.038	0.009	0.010	0.008	0.062	0.016	0.018	0.010	0.002
Midwest	0.059	0.112	0.046	0.024	0.133	0.148	0.109	0.077	0.078	0.048
South	0.042	0.069	0.017	0.006	0.126	0.091	0.077	0.042	0.040	0.044
West	0.062	0.057	0.023	0.007	0.108	0.079	0.060	0.029	0.075	0.054
Questionnaire Response										
Households who garden	0.101	0.173				0.233	0.178	0.106	0.116	0.094
Households who raise animals			0.306	0.207						
Households who farm	0.161	0.308	0.319	0.254		0.420	0.394	0.173	0.328	0.030
Households who fish					0.325					

Table 13-71. Fraction of Food Intake that is Home Produced (continued)

	Dark Green Vegetables	Deep Yellow Vegetables	Other Vegetables	Citrus Fruits	Other Fruits	Apples	Peaches	Pears	Strawberries	Other Berries
Total	0.044	0.065	0.069	0.038	0.042	0.030	0.147	0.067	0.111	0.217
Season										
Fall	0.059	0.099	0.069	0.114	0.027	0.032	0.09	0.038	0.408	0.163
Spring	0.037	0.017	0.051	0.014	0.025	0.013	0.206	0.075	0.064	0.155
Summer	0.063	0.08	0.114	0.01	0.07	0.053	0.133	0.066	0.088	0.232
Winter	0.018	0.041	0.044	0.091	0.03	0.024	0.183	0.111	0.217	0.308
Urbanization										
Central City	0.012	0.038	0.026	0.035	0.022	0.017	0.087	0.038	0.107	0.228
Nonmetropolitan	0.090	0.122	0.154	0.000	0.077	0.066	0.272	0.155	0.133	0.282
Surburban	0.054	0.058	0.053	0.056	0.042	0.024	0.121	0.068	0.101	0.175
Race										
Black	0.053	0.056	0.026	0.012	0.004	0.007	0.018	0.004	0.000	0.470
White	0.043	0.071	0.082	0.045	0.051	0.035	0.164	0.089	0.125	0.214
Regions										
Northeast	0.039	0.019	0.034	0.000	0.008	0.004	0.027	0.002	0.085	0.205
Midwest	0.054	0.174	0.102	0.001	0.083	0.052	0.164	0.112	0.209	0.231
South	0.049	0.022	0.077	0.060	0.031	0.024	0.143	0.080	0.072	0.177
West	0.034	0.063	0.055	0.103	0.046	0.043	0.238	0.093	0.044	0.233
Questionnaire Response										
Households who garden	0.120	0.140	0.180	0.087	0.107	0.070	0.316	0.169	0.232	0.306
Households who farm	0.220	0.328	0.368	0.005	0.227	0.292	0.461	0.606	0.057	0.548

Table 13-71. Fraction of food Intake that is Home Produced (continued)

	Asparagus	Beets	Broccoli	Cabbage	Carrots	Corn	Cucumbers	Lettuce	Lima Beans	Okra	Onions
Total	0.063	0 203	0 015	0 038	0 043	0 078	0.148	0.010	0.121	0.270	0 056
Season											
Fall	0.024	0.199	0.013	0.054	0.066	0.076	0 055	0.013	0 07	0.299	0 066
Spring	0.103	0.191	0.011	0.011	0.015	0.048	0.04	0 01	0.082	0.211	0.033
Summer	0	0.209	0.034	0.08	0.063	0.118	0.32	0.017	0.176	0.304	0.091
Winter	0.019	0.215	0.006	0.008	0.025	0.043	0	0.002	0.129	0.123	0.029
Urbanization											
Central City	0.058	0.212	0.004	0.004	0.018	0.025	0.029	0.009	0.037	0.068	0.017
Nonmetropolitan	0.145	0.377	0.040	0.082	0.091	0.173	0.377	0.017	0.132	0.411	0.127
Surburban	0.040	0.127	0.016	0.045	0.039	0.047	0.088	0.009	0.165	0.299	0.050
Race											
Black	0.000	0.000	0.000	0.001	0.068	0.019	0.060	0.007	0.103	0.069	0.009
White	0.071	0.224	0.018	0.056	0.042	0.093	0.155	0.011	0.135	0.373	0.068
Regions											
Northeast	0.091	0.074	0.020	0.047	0.025	0.020	0.147	0.009	0.026	0.000	0.022
Midwest	0.194	0.432	0.025	0.053	0.101	0.124	0.193	0.020	0.149	0.224	0.098
South	0.015	0.145	0.013	0.029	0.020	0.088	0.140	0.006	0.140	0.291	0.047
West	0.015	0.202	0.006	0.029	0.039	0.069	0.119	0.009	0.000	0.333	0.083
Questionnaire Response											
Households who garden	0.125	0.420	0.043	0.099	0.103	0.220	0.349	0.031	0.258	0.618	0.148
Households who farm	0.432	0.316	0.159	0.219	0.185	0.524	0.524	0.063	0.103	0.821	0.361

Table 13-71. Fraction of Food Intake that is Home Produced (continued)

	Peas	Peppers	Pumpkin	Snap Beans	Tomatoes	White Potatoes	Beef	Game	Pork	Poultry	Eggs
Total	0.069	0.107	0.155	0.155	0.184	0.038	0.038	0.276	0.013	0.011	0.014
Season											
Fall	0.046	0.138	0.161	0.199	0.215	0.058	0.028	0.336	0.012	0.011	0.009
Spring	0.048	0.031	0.046	0.152	0.045	0.01	0.027	0.265	0.015	0.012	0.022
Summer	0.126	0.194	0.19	0.123	0.318	0.06	0.072	0.1	0.01	0.007	0.013
Winter	0.065	0.03	0.154	0.147	0.103	0.022	0.022	0.33	0.014	0.014	0.011
Urbanization											
Central City	0.033	0.067	0.130	0.066	0.100	0.009	0.001	0.146	0.001	0.002	0.002
Nonmetropolitan	0.123	0.228	0.250	0.307	0.313	0.080	0.107	0.323	0.040	0.026	0.029
Surburban	0.064	0.086	0.127	0.118	0.156	0.029	0.026	0.316	0.006	0.011	0.014
Race											
Black	0.047	0.039	0.022	0.046	0.060	0.007	0.000	0.000	0.000	0.001	0.002
White	0.076	0.121	0.187	0.186	0.202	0.044	0.048	0.359	0.017	0.014	0.017
Regions											
Northeast	0.021	0.067	0.002	0.052	0.117	0.016	0.014	0.202	0.006	0.002	0.004
Midwest	0.058	0.188	0.357	0.243	0.291	0.065	0.076	0.513	0.021	0.021	0.019
South	0.106	0.113	0.044	0.161	0.149	0.042	0.022	0.199	0.012	0.012	0.012
West	0.051	0.082	0.181	0.108	0.182	0.013	0.041	0.207	0.011	0.008	0.021
Questionnaire Response											
Households who garden	0.193	0.246	0.230	0.384	0.398	0.090					
Households who farm	0.308	0.564	0.824	0.623	0.616	0.134	0.485		0.242	0.156	0.146
Households who raise animals							0.478		0.239	0.151	0.214
Households who hunt								0.729			

Source: Based on EPA's analyses of the 1987-88 NFCS

Table 13-72. Confidence in Homegrown Food Consumption Recommendations

Considerations	Rationale	Rating
Study Elements		
• Level of Peer Review	USDA and EPA review	High
• Accessibility	Methods described in detail in Handbook	High
• Reproducibility	see above	High
• Focus on factor of interest	Yes	High
• Data pertinent to U.S.	U.S. population	High
• Primary data	Yes	High
• Currency	1987-88	Medium
• Adequacy of data collection period	Statistical method used to estimate long-term distribution from one-week survey data.	High (Means & Short-term distributions) Low (Long-term distributions)
• Validity of approach	Individual intakes inferred from household consumption.	Medium (Means) Low (Distributions)
• Study size	10,000 individuals, 4500 households	High
• Representativeness of the population	Nationwide survey representative of general U.S. population	High
• Bias in study design (high rating desirable)	Non-response bias can not be ruled out due to low response rate.	Medium
• Measurement Error (high rating desirable)	Individuals' estimates of food weights imprecise	Medium
Other Elements		
• Number of studies	1	Low
• Agreement between researchers	N/A	
Overall Rating	Highest confidence in means, lowest confidence in long term percentiles	**Medium** (Means) **Medium** (Short-term distributions) **Low** (Long-term distributions)

APPENDIX 13A

FOOD CODES AND DEFINITIONS USED IN ANALYSIS OF THE 1987-88 USDA NFCS DATA

Appendix 13A. Food 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- Asceptically 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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
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)
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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	**Household Code/Definition**	**Individual Code**
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 13A. Food 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

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
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)
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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
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)
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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
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)
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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
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 Nectar 67109- Pears, baby 6711455 Pears, dry, baby (includes baby food; except mixtures)
EXPOSED/PROTECTED FRUITS/VEGETABLES, ROOT VEGETABLES		

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Exposed Fruits	5022- Strawberries, fresh	62101- Apple, dried
	5023101 Acerola, fresh	62104- Apricot, dried
	5023401 Currants, fresh	62108- Currants, dried
	5031- Apples/Applesauce, fresh	62110- Date, dried
	5033- Berries other than Strawberries, fresh	62116- Peaches, dried
	5034- Cherries, fresh	62119- Pears, dried
	5036- Peaches, fresh	62121- Plum, dried
	5037- Pears, fresh	62122- Prune, dried
	50381- Apricots, Nectarines, Loquats, fresh	62125- Raisins
	5038305 Dates, fresh	63101- Apples/applesauce
	50384- Grapes, fresh	63102- Wi-apple
	50386- Plums, fresh	63103- Apricots
	50387- Rhubarb, fresh	63111- Cherries, maraschino
	5038805 Persimmons, fresh	63112- Acerola
	5038901 Sapote, fresh	63113- Cherries, sour
	51221- Apples/Applesauce, canned	63115- Cherries, sweet
	51222- Apricots, canned	63117- Currants, raw
	51223- Cherries, canned	63123- Grapes
	51224- Peaches, canned	6312601 Juneberry
	51225- Pears, canned	63131- Nectarine
	51228- Berries, canned	63135- Peach
	5122903 Grapes with sugar, canned	63137- Pear
	5122904 Grapes without sugar, canned	63139- Persimmons
	5122905 Plums with sugar, canned	63143- Plum
	5122906 Plums without sugar, canned	63146- Quince
	5122907 Plums, canned, baby	63147- Rhubarb/Sapodillo
	5122911 Prunes, canned, baby	632- Berries
	5122912 Prunes, with sugar, canned	64101- Apple Cider
	5122913 Prunes, without sugar, canned	64104- Apple Juice
	5122914 Raisin Pie Filling	64105- Cranberry Juice
	5222- Frozen Strawberries	64116- Grape Juice
	52231- Apples Slices, frozen	64122- Peach Juice
	52233- Berries, frozen	64132- Prune/Strawberry Juice
	52234- Cherries, frozen	6420101 Apricot Nectar
	52236- Peaches, frozen	64205- Peach Nectar
	52239- Rhubarb, frozen	64215- Pear Nectar
	53321- Canned Apple Juice	67102- Applesauce, baby
	53322- Canned Grape Juice	67108- Peaches, baby

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Exposed Fruits (continued)	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)	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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Protected Fruits	501- Citrus Fruits, fresh	61- Citrus Fr., Juices (incl. cit. juice mixtures)
	5021- Cantaloupe, fresh	62107- Bananas, dried
	5023201 Mangoes, fresh	62113- Figs, dried
	5023301 Guava, fresh	62114- Lychees/Papayas, dried
	5023601 Kiwi, fresh	62120- Pineapple, dried
	5023701 Papayas, fresh	62126- Tamarind, dried
	5023801 Passion Fruit, fresh	63105- Avocado, raw
	5032- Bananas, Plantains, fresh	63107- Bananas
	5035- Melons other than Cantaloupe, fresh	63109- Cantaloupe, Carambola
	50382- Avocados, fresh	63110- Cassaba Melon
	5038301 Figs, fresh	63119- Figs
	5038302 Figs, cooked	63121- Genip
	5038303 Figs, home canned	63125- Guava/Jackfruit, raw
	5038304 Figs, home frozen	6312650 Kiwi
	50385- Pineapple, fresh	6312651 Lychee, raw
	5038801 Pomegranates, fresh	6312660 Lychee, cooked
	5038902 Cherimoya, fresh	63127- Honeydew
	5038903 Jackfruit, fresh	63129- Mango
	5038904 Breadfruit, fresh	63133- Papaya
	5038905 Tamarind, fresh	63134- Passion Fruit
	5038906 Carambola, fresh	63141- Pineapple
	5038907 Longan, fresh	63145- Pomegranate
	5121- Citrus, canned	63148- Sweetsop, Soursop, Tamarind
	51226- Pineapple, canned	63149- Watermelon
	5122901 Figs with sugar, canned	64120- Papaya Juice
	5122902 Figs without sugar, canned	64121- Passion Fruit Juice
	5122909 Bananas, canned, baby	64124- Pineapple Juice
	5122910 Bananas and Pineapple, canned, baby	64133- Watermelon Juice
	5122915 Litchis, canned	6420150 Banana Nectar

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Protected Fruits (continued)	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)	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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Exposed Veg.	491- Fresh Dark Green Vegetables	721- Dark Green Leafy Veg.
	493- Fresh Tomatoes	722- Dark Green Nonleafy Veg.
	4941- Fresh Asparagus	74- Tomatoes and Tomato Mixtures
	4943- Fresh Beans, Snap or Wax	7510050 Alfalfa Sprouts
	4944- Fresh Cabbage	7510075 Artichoke, Jerusalem, raw
	4945- Fresh Lettuce	7510080 Asparagus, raw
	4946- Fresh Okra	75101- Beans, sprouts and green, raw
	49481- Fresh Artichokes	7510275 Brussel Sprouts, raw
	49483- Fresh Brussel Sprouts	7510280 Buckwheat Sprouts, raw
	4951- Fresh Celery	7510300 Cabbage, raw
	4952- Fresh Cucumbers	7510400 Cabbage, Chinese, raw
	4955- Fresh Cauliflower	7510500 Cabbage, Red, raw
	4958103 Fresh Kohlrabi	7510700 Cauliflower, raw
	4958111 Fresh Jerusalem Artichokes	7510900 Celery, raw
	4958112 Fresh Mushrooms	7510950 Chives, raw
	4958113 Mushrooms, home canned	7511100 Cucumber, raw
	4958114 Mushrooms, home frozen	7511120 Eggplant, raw
	4958118 Fresh Eggplant	7511200 Kohlrabi, raw
	4958119 Eggplant, cooked	75113- Lettuce, raw
	4958120 Eggplant, home frozen	7511500 Mushrooms, raw
	4958200 Fresh Summer Squash	7511900 Parsley
	4958201 Summer Squash, cooked	7512100 Pepper, hot chili
	4958202 Summer Squash, home canned	75122- Peppers, raw
	4958203 Summer Squash, home frozen	7512750 Seaweed, raw
	4958402 Fresh Bean Sprouts	7512775 Snowpeas, raw
	4958403 Fresh Alfalfa Sprouts	75128- Summer Squash, raw
	4958504 Bamboo Shoots	7513210 Celery Juice
	4958506 Seaweed	7514100 Cabbage or cole slaw
	4958508 Tree Fern, fresh	7514130 Chinese Cabbage Salad
	4958601 Sauerkraut	7514150 Celery with cheese
	5111- Dark Green Vegetables (all are exposed)	75142- Cucumber salads
	5113- Tomatoes	75143- Lettuce salads
	5114101 Asparagus, comm. canned	7514410 Lettuce, wilted with bacon dressing
	51144- Beans, green, snap, yellow, comm. canned	7514600 Greek salad
	5114704 Snow Peas, comm. canned	7514700 Spinach salad
	5114801 Sauerkraut, comm. canned	7520600 Algae, dried
	5114901 Artichokes, comm. canned	75201- Artichoke, cooked
	5114902 Bamboo Shoots, comm. canned	75202- Asparagus, cooked
	5114903 Bean Sprouts, comm. canned	75203- Bamboo shoots, cooked
	5114904 Cabbage, comm. canned	752049- Beans, string, cooked
	5114905 Cabbage, comm. canned, no sauce	75205- Beans, green, cooked/canned
	5114906 Cauliflower, comm. canned, no sauce	75206- Beans, yellow, cooked/canned
	5114907 Eggplant, comm. canned, no sauce	75207- Bean Sprouts, cooked
	5114913 Mushrooms, comm. canned	752085- Breadfruit
	5114914 Okra, comm. canned	752090- Brussel Sprouts, cooked
	5114918 Seaweeds, comm. canned	75210- Cabbage, Chinese, cooked
	5114920 Summer Squash, comm. canned	75211- Cabbage, green, cooked

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
Exposed Veg. (cont.)	5114923 Chinese or Celery Cabbage, comm. canned	75212- Cabbage, red, cooked
	51152- Tomatoes, canned, low sod.	752130- Cabbage, savoy, cooked
	5115301 Asparagus, canned, low sod.	75214- Cauliflower
	5115302 Beans, Green, canned, low sod.	75215- Celery, Chives, Christophine (chayote)
	5115303 Beans, Yellow, canned, low sod.	752167- Cucumber, cooked
	5115309 Mushrooms, canned, low sod.	752170- Eggplant, cooked
	51154- Greens, canned, low sod.	752171- Fern shoots
	5115501 Sauerkraut, low sodium	752172- Fern shoots
	5211- Dark Gr. Veg., comm. frozen (all exp.)	752173- Flowers of sesbania, squash or lily
	52131- Asparagus, comm. froz.	7521801 Kohlrabi, cooked
	52133- Beans, snap, green, yellow, comm. froz.	75219- Mushrooms, cooked
	5213407 Peapods, comm froz.	75220- Okra/lettuce, cooked
	5213408 Peapods, with sauce, comm froz.	7522116 Palm Hearts, cooked
	5213409 Peapods, with other veg., comm froz.	7522121 Parsley, cooked
	5213701 Brussel Sprouts, comm. froz.	75226- Peppers, pimento, cooked
	5213702 Brussel Sprouts, comm. froz. with cheese	75230- Sauerkraut, cooked/canned
	5213703 Brussel Sprouts, comm. froz. with other veg.	75231- Snowpeas, cooked
	5213705 Cauliflower, comm. froz.	75232- Seaweed
	5213706 Cauliflower, comm. froz. with sauce	75233- Summer Squash
	5213707 Cauliflower, comm. froz. with other veg.	7540050 Artichokes, stuffed
	5213708 Caul., comm. froz. with other veg. & sauce	7540101 Asparagus, creamed or with cheese
	5213709 Summer Squash, comm. froz.	75403- Beans, green with sauce
	5213710 Summer Squash, comm. froz. with other veg.	75404- Beans, yellow with sauce
	5213716 Eggplant, comm. froz.	7540601 Brussel Sprouts, creamed
	5213718 Mushrooms with sauce, comm. froz.	7540701 Cabbage, creamed
	5213719 Mushrooms, comm. froz.	75409- Cauliflower, creamed
	5213720 Okra, comm. froz.	75410- Celery/Chiles, creamed
	5213721 Okra, comm. froz., with sauce	75412- Eggplant, fried, with sauce, etc.
	5311- Canned Tomato Juice and Tomato Mixtures	75413- Kohlrabi, creamed
	5312102 Canned Sauerkraut Juice	75414- Mushrooms, Okra, fried, stuffed, creamed
	5321- Frozen Tomato Juice	754180- Squash, baked, fried, creamed, etc.
	5371- Fresh Tomato Juice	7541822 Christophine, creamed
	5381102 Aseptically Packed Tomato Juice	7550011 Beans, pickled
	5413101 Dry Algae	7550051 Celery, pickled
	5413102 Dry Celery	7550201 Cauliflower, pickled
	5413103 Dry Chives	755025- Cabbage, pickled
	5413109 Dry Mushrooms	7550301 Cucumber pickles, dill
	5413111 Dry Parsley	7550302 Cucumber pickles, relish
	5413112 Dry Green Peppers	7550303 Cucumber pickles, sour
	5413113 Dry Red Peppers	7550304 Cucumber pickles, sweet
	5413114 Dry Seaweed	7550305 Cucumber pickles, fresh
	5413115 Dry Tomatoes	7550307 Cucumber, Kim Chee
	(does not include soups, sauces, gravies, mixtures, and	7550308 Eggplant, pickled
	ready-to-eat dinners; includes baby foods except mixtures)	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)

Appendix 13A. Food 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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

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)

Appendix 13A. Food Codes and Definitions Used in Analysis of the 1987-88 USDA NFCS Data (continued)

Food Product	Household Code/Definition	Individual Code
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

14. BREAST MILK INTAKE

14.1. BACKGROUND

Breast milk is a potential source of exposure to toxic substances for nursing infants. Lipid soluble chemical compounds accumulate in body fat 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 the criteria described in the Introduction (Volume I, Section 1.3.1). 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, breast-feeding duration and frequency, and the estimated percentage of the U.S. population that breast-feeds are also presented.

14.2. KEY STUDIES ON BREAST MILK INTAKE

Pao et al. (1980) - 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 14-1. 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 were slightly higher than for girls.

Table 14-1. 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 which would account for some individual variability. However, the number of infants in the study was relatively small and may not be entirely representative of the U.S. population, based on race and socioeconomic status, which may introduce some bias in the results. In addition, this study did not account for insensible water loss which may underestimate the amount of breast milk ingested.

Dewey and Lönnerdal (1983) - Milk and Nutrient Intakes of Breast-fed Infants from 1 to 6 Months - Dewey and Lönnerdal (1983) monitored the dietary intake of 20 breast-fed infants between the ages of 1 and 6 months. 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 Lönnerdal (1983), the mothers were all well educated and recruited through Lamaze childbirth classes in 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 14-2. 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 apparently were not made. Also, the number of infants in the study was relatively small and may not be representative of U.S. population, based on race and socioeconomic status.

Table 14-2. 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.

Butte et al. (1984) - 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 mother/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 ± 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 14-3). Intakes were also calculated on the basis of body weight (Table 14-3). 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±3.6 percent.

Table 14-3. 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)	Body Weight[b] (kg)
1	37	751.0 ± 130.0	159.0 ± 24.0	4.7
2	40	725.0 ± 131.0	129.0 ± 19.0	5.6
3	37	723.0 ± 114.0	117.0 ± 20.0	6.2
4	41	740.0 ± 128.0	111.0 ± 17.0	6.7

[a] Data expressed as mean ± standard deviation.
[b] Calculated by dividing breast milk intake (g/day) by breast milk intake (g/kg-day).
Source: Butte et al., 1984.

The advantage of this study is that data for a larger number of exclusively breast-fed infants were collected than were collected by Pao et al. (1980). However, data were collected over a shorter time period (i.e., 4 months compared to 6 months) and day-to-day variability was not characterized for all infants. In addition, the population studied may not be representative of the U.S. population based on race and socioeconomic status.

Neville et al. (1988) - 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 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 14-4. 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) and they were corrected for insensible weight loss. However, the intake rates presented in Table 14-4 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, based on race and socioeconomic status.

Table 14-4. Breast Milk Intake During a 24-Hour Period

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.

Dewey et al. (1991a; 1991b) - 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 aged 3 months were included in the study. 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 14-5). 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).

Table 14-5. 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).

The advantages of this study are that data were collected over a relatively long-time (4 days) period at each test interval which would account for some 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, based on race and socioeconomic status.

14.3. RELEVANT STUDIES ON BREAST MILK INTAKE

Hofvander et al. (1982) - The Amount of Milk Consumed by 1- to 3-Month Old Breast- or Bottle-Fed 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 14-6). Also, boys consumed breast milk or breast milk substitutes at a slightly higher rate than girls (Table 14-7). 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 14-6. 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 14-7. Milk Intake for Boys and Girls

	Boys		Girls	
Age	Mean (g/day)	N	Mean (g/day)	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 a small number of 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. (1984) - Food Intake and Growth of Infants Between Six and Twenty-six Weeks of Age on Breast Milk, Cow's Milk, Formula, and Soy Formula - 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 14-8 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.

Table 14-8. Intake of Breast Milk and Formula

Age (wks)	Breast Milk N	Breast Milk Mean (g/day)	Breast Milk SD (g/day)	Cow's Formula N	Cow's Formula Mean (g/day)	Cow's Formula SD (g/day)	Soy Formula N	Soy Formula Mean (g/day)	Soy Formula SD (g/day)
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.

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. (1987) - 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, a small number of infants, 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.

14.4. KEY STUDIES ON LIPID CONTENT AND FAT INTAKE FROM BREAST MILK

Human milk contains over 200 constituents including lipids, various proteins, carbohydrates, vitamins, minerals, and trace elements as well as enzymes and hormones (NAS, 1991). The lipid content of 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 performing exposure assessments for nursing infants when the contaminant(s) have residue concentrations that are indexed to the fat portion of human breast milk.

Butte et al. (1984) - 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 14-9. 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).

The number of women included in this study was small, and 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

Table 14-9. 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 deviations.
[b] Percents calculated from lipid content reported in mg/g.

Source: Butte, et al., 1984.

the U.S. population. Also, these estimates are based on short-term data and day-to-day variability was not characterized.

Maxwell and Burmaster (1993) - A Simulation Model to Estimate a Distribution of Lipid Intake from Breast Milk Intake During the First Year of Life -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 14-10). The model assumes 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 (35.6 mg/g or 3.6%) and 40.2 g/L (39.0 mg/g or 3.9%) at 12 months.

The advantage of this study is that it provides a "snapshot" of daily lipid intake from breast milk for breast-fed infants. These results are, however, based on a simulation model and there are uncertainties associated with the assumptions made. 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.

Table 14-10. 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.

14.5. OTHER FACTORS

Other factors associated with breast milk intake include: 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.

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 number of meals for these age groups was approximately 5 meals/day (Table 14-11). Neville et al. (1988) reported slightly higher mean feeding 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.

Table 14-11. 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.

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 14-12 (NAS, 1991).

Intake Rates Based on Nutritional Status - 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. 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.

14.6. 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 are relatively consistent. There are, however, limitations with the data. Data are not available for infants under 1 month of age. This subpopulation may be of particular concern since a larger number of newborns are totally breast fed. In addition, with the exception of Butte (1984), data were not presented on a body weight basis. This is particularly important since intake rates may be higher on a body weight basis for younger infants. Also, the data used to derive the recommendations are over 10 years old and the sample size of the studies was small. Other subpopulations of concern such as mothers highly committed to breast feeding, sometimes for periods longer than 1 year, may not be captured by the studies presented in this chapter. Further research is needed to identify these subgroups and to get better estimates of breast milk intake rates. The general designs of both key and relevant studies and their limitations are summarized in Table 14-13. Table 14-14 presents the confidence rating for breast milk intake recommendations.

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 14-15. Based on the combined results of these studies, 742 mL/day is recommended to represent an average breast milk intake rate, and 1,033 mL/day represents an upper-percentile intake rate (based on the middle range of the mean plus 2 standard deviations) for infants between the ages of 1 and 6 months of age. The average value is the mean of the average intakes at 1, 3, and 6 months from the key studies listed in Table 14-15. 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, averaging 413 mL/day for 12-month olds (Neville et al. 1988; Dewey et al. 1991a; 1991b). When a time weighted average is calculated for the 12-month period, average breast milk intake is approximately 688 mL/day, and upper-percentile intake is approximately 980 mL/day. Table 14-16 summarizes these recommended intake rates.

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), Butte et al. (1984), and Maxwell and Burmaster (1993).

14.7. REFERENCES FOR CHAPTER 14

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Table 14-12. 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 infant when in the hospital, at age 1 week, at months 1 through 5, and on the day preceding completion of the survey. Numbers in 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.

Table 14-13. Breast Milk Intake Studies					
Study	Number of Individuals	Type of Feeding	Sampling Time and Interval	Population Studied	Comments
KEY STUDIES					
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; corrected 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
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 breast milk intake; did not correct for insensible water loss
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 14-13. Breast Milk Intake Studies (continued)

Study	Number of Individuals	Type of Feeding	Sampling Time and Interval	Population Studied	Comments
<u>RELEVANT STUDIES</u>					
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	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 based on nutritional status; not 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
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 based on nutritional status; no corrections for insensible water loss among breast-fed infants
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

Table 14-14. Confidence in Breast Milk Intake Recommendations

Considerations	Rationale	Rating
Study Elements		
• Level of peer review	All key studies are from peer review literature.	High
• Accessibility	Papers are widely available from peer review journals.	High
• Reproducibility	Methodology used was clearly presented.	High
• Focus on factor of interest	The focus of the studies was on estimating breast milk intake.	High
• Data pertinent to U.S.	Subpopulations of the U.S. were the focus of all the key studies.	High
• Primary data	All the studies were based on primary data.	High
• Currency	Studies were conducted between 1980-1986. Although incidence of breast feeding may change with time, breast milk intake among breastfed infants may not.	Medium
• Adequacy of data collection period	Infants were not studied long enough to fully characterize day to day variability.	Medium
• Validity of approach	Methodology uses changes in body weight as a surrogate for total ingestion. This is the best methodology there is to estimate breast milk ingestion. Mothers were instructed in the use of infant scales to minimize measurement errors. Three out of the 5 studies corrected data for insensible water loss.	Medium
• Study size	The sample sizes used in the key studies were fairly small (range 13-73).	
• Representativeness of the population	Population is not representative of the U.S.; only mid-upper class, well nourished mothers were studied. Socioeconomic factors may affect the incidence of breastfeeding. Mother's nourishment may affect milk production.	Low
• Characterization of variability	Not very well characterized. Infants under 1 month not captured, mothers committed to breast feeding over 1 year not captured.	Low
• Lack of bias in study design (high rating is desirable)	Bias in the studies was not characterized. Three out of 5 studies corrected for insensible water loss. Not correcting for insensible water loss may underestimate intake. Mothers selected for the studies were volunteers; therefore response rate does not apply. Population studied may introduce some bias in the results (see above).	Low
• Measurement error	All mothers were well educated and trained in the use of the scale which helped minimize measurement error.	Medium
Other Elements		
• Number of studies	There are 5 key studies.	High
• Agreement between researchers	There is good agreement among researchers.	High
Overall Rating	Studies were well designed. Results were consistent. Sample size was fairly low and not representative of U.S. population or population of nursing mothers. Variability cannot be characterized due to limitations in data collection period.	Medium

Table 14-15. Breast Milk Intake Rates Derived From Key Studies

Mean (mL/day)	N	Upper Percentile (mL/day) (mean plus 2 standard deviations)	Reference
Age: 1 Month			
600	11	918	Pao et al., 1980
729	37	981	Butte et al., 1984
747	13	1,095	Neville et al., 1988
673	16	1,057	Dewey and Lönnerdal, 1983
weighted avg = 702		1,007[a]	
Age: 3 Months			
833	2	---	Pao et al., 1980
702	37	923	Butte et al., 1984
712	12	934	Neville et al., 1988
782	16	1,126	Dewey and Lönnerdal, 1983
788	73	1,046	Dewey et al., 1991b
weighted avg = 759		1,025[a]	
Age: 6 Months			
682	1	---	Pao et al., 1980
744	13	978	Neville et al., 1988
896	11	1,140	Dewey and Lönnerdal, 1983
747	60	1,079	Dewey et al., 1991b
weighted avg = 765		1,059[a]	
Age: 9 Months			
600	12	1,027	Neville et al., 1988
627	50	1,049	Dewey et al., 1991b
avg = 622		1,038	
Age: 12 Months			
391	9	877	Neville et al., 1988
435	42	923	Dewey et al., 1991a; 1991b
weighted avg = 427		900	
12-MONTH TIME WEIGHTED AVERAGE			
688		Range 900-1,059 (middle of the range 980)	

[a] Middle of the range.

Table 14-16. Summary of Recommended Breast Milk and Lipid Intake Rates

Age	Mean	Upper Percentile
Breast Milk		
1-6 Months	742 mL/day	1,033 mL/day
12 Month Average	688 mL/day	980 mL/day
Lipids[a]		
<1 Year	26.0 mL/day	40.4 mL/day

[a] The recommended value for the lipid content of breastmilk is 4.0 percent.

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