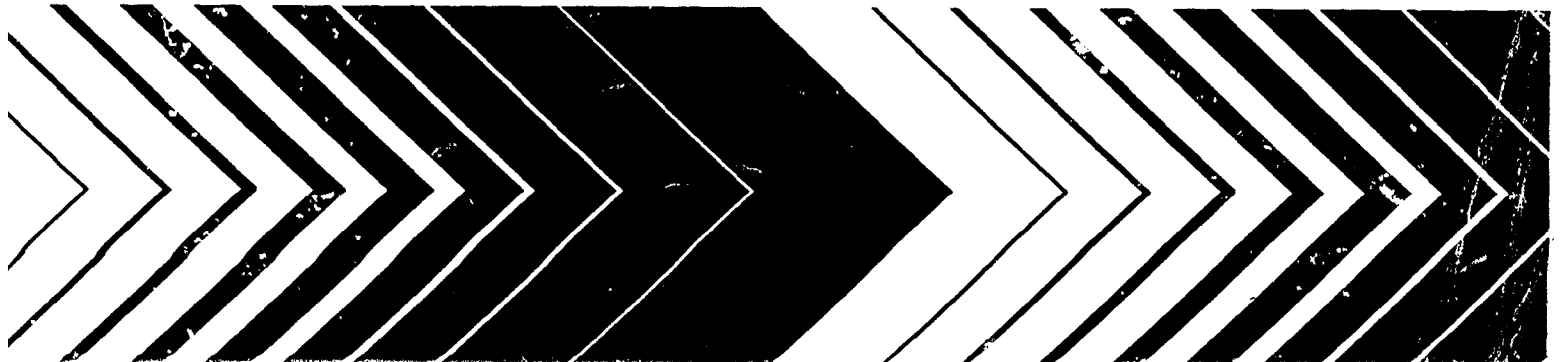




Time Spent in Activities, Locations, and Microenvironments:

A California-
National Comparison

Project Report



1/11/91 14:10:00 1/14/91

**Time Spent In Activities, Locations, and
Microenvironments: A California-National
Comparison**

Prepared by:

**John P. Robinson
SURVEY RESEARCH CENTER
University of Maryland
College Park, Maryland 20742**

**Jacob Thomas
GENERAL SCIENCES CORPORATION
Laurel, Maryland 20707**

Contract No. 68-01-7325, Delivery Order 12

**Project Officer
Joseph V. Behar
Exposure Assessment Research Division
Environmental Monitoring Systems Laboratory
U. S. Environmental Protection Agency
Las Vegas, Nevada 89114**

January 1991

Notice

The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under contract 68-01-7325, Delivery order 12 to General Sciences Corporation. It has been subject to the Agency's peer and administrative review, and it has been approved for publication as an EPA document.

TABLE OF CONTENTS

	<i>Page</i>
Abstract	vi
1.0 Background	1-1
2.0 Report Objectives	2-1
3.0 General Methodological Considerations	3-1
4.0 Methodology of the 1985 American's use of Time Project	4-1
5.0 Methodology of the California (CARB) Study	5-1
6.0 Results of Comparisons of Overall Averages	6-1
7.0 Synopsis of National-California Differences	7-1
8.0 Constructing a Code for Microenvironments	8-1
9.0 California-National Comparisons on Microenvironments	9-1
10.0 Summary and Conclusions	10-1
List of References	R-1
 Appendices	
A Activity Codes for 1985 National Study	A-1
B Original Location Codes for 1985 National Study	B-1

LIST OF TABLES

<i>Tables</i>	<i>Page</i>
3-1	Activity Codes for the CARB Study 3-5
3-2	CARB Study Location Codes 3-7
5-1	Summary Comparison of CARB and 1985 National Studies 5-2
6-1	Difference in Average Time Spent in Different Activities Between California and National Studies 6-2
6-2	Differences in Average Time Per Day Spent in Activities Between California and National Studies by Gender . 6-5
6-3	Difference in Average Time Per Day in Different Location, Total Sample and by Gender Between California and National Samples 6-9
6-4	Revised Location Codes for Time Diaries (New Codes Noted with Capitals and with Asterisk) 6-13
6-5	Location Recode Results 6-15
6-6	Revised Time Spent in Different Locations in National Study Compared to California Study 6-17
6-7	Proportion of All Time Spent Outdoors at or Near Home by Activity (1985 National Data) 6-19
8-1	Collapsed Activity Codes Used to Construct Microenvironments Code 8-2
8-2	Collapsed Location Codes Used to Construct Microenvironments Code 8-4
8-3	Derived Microenvironments for National and CARB Data 8-5

LIST OF TABLES (cont'd)

8-4	Time Indoor, Outdoor and In-Vehicle California vs. National	8-7
9-1	Time in Various Activities, Locations, and Microenvironments California vs. National	9-2
9-2	Time Spent in Various Microenvironments By Gender	9-3
9-3	Time Spent in Various Microenvironments By Type of Day	9-7
9-4	Time Spent in Various Microenvironments By Age Groups	9-9

LIST OF ILLUSTRATIONS

<i>Figure</i>		<i>Page</i>
3-1	Sample Time Diary Page	3-3

ABSTRACT

In this report, we review data on the methodological background and results from the 1987-88 California Air Resources Board (CARB) time activity study and from a similar 1985 national study of Americans' Use of Time conducted at the University of Maryland, College Park. In order to facilitate comparisons, data from the national study were recoded to be as comparable as possible to the CARB code categories. For the same reason, these initial comparative analyses were restricted to the 18-64 age group "working population" in the two samples.

In general, the data on average distributions of time in activities matched up rather well across the two samples. Californians tended to report more average time at work and commuting to work in the diaries than was true nationally. They also reported less average time doing housework and caring for children than was found nationally. Time spent shopping in the CARB study was slightly higher. In general, the above differences in family care activities were greater among women than among men across the two samples. CARB respondents also reported more time sleeping and eating meals away from home, less time eating meals at home, less time grooming and less time on non-ascertained activities.

Californians also reported more time spent at fairs and other entertainment events, and more time reading than was true in the national sample, and these differences were also more pronounced among women in the two samples. California women reported less time doing domestic craft activities and in conversation. At the same time, Californians also reported more time traveling and these differences were mainly found among men.

Despite these differences, the two data sets overall showed remarkably similar patterns of *activity*. That was less true for the location codes, however. Several sources of discrepancy were found in the comparison of these data, including time spent in automobiles vs. other modes of transit. A recoding of the location data from the national study provided some resolution of the differences that were found, but several differences remained — particularly the greater amounts of time spent at home and in the yard in the national sample.

The strong similarities of the average time for the activity data indicate that the California data could be used to generate a better set of location codings for the national data. This is particularly true for estimates of outdoor time spent doing paid work, which was not differentiated in the 1985 national data. It also means that the supplemental CARB data on specific exposure (e.g., passive cigarette smoke, gasoline and service station visitations) may have national implications. Nevertheless, a separate national study that could build and expand upon the developmental work initiated in the CARB study and oriented to exposure assessment is needed.

Microenvironments

A major reason for analyzing time-diary data is to estimate time spent in various microenvironments. Microenvironments refer neither solely to activities nor solely to locations but to the *combination* of activities and locations that yield potential exposures. For this report, 16 separate microenvironments (combinations of location and activity) were defined for the purpose of comparing the estimates from the U.S. national and CARB studies. These were based on a collapsing of the original 34 and 44 location codes to 10 and the activity codes from 90+ to 10. This revised list of locations include residences (both indoor and outdoor), work locations, restaurants and bars, travel modes, and places automobiles are parked serviced and maintained. Similarly, activity distinctions include family care, shopping, work/study, recreation and travel. Known sources of carbon monoxide, benzene, and other VOC's also were reflected in our classifications.

Notable differences were found in the estimates from the national and California data for the microenvironment codes created for this report. These resulted mainly from differences in the location coding schemes used in the two studies. Many of these gaps were closed by the recoding of selected location codes in the national study, but that exercise also produced some new divergences. Most notably, these recoded data suggest that Californians spend most of their outdoor time in away-from-home settings in contrast to the greater time spent in yards and other at-home outdoor environments in the national study. Although this would be consistent with an image of more cramped outdoor living environments in

California (or of more attractive outdoor environments away from home), this result needs confirmation from independent data sources.

Many of the location coding differences, therefore, seem to account for the differences in microenvironments. This includes the greater times reported in California inside garages (autoplaces), restaurants/bars, and motor vehicles. It also includes the longer time spent doing physical activities in outdoor locations and travel by other transit modes mainly done outdoor in the form of walking or waiting for buses. On the other hand, we find Californians reporting less time in such microenvironments as work/school locations, kitchens, and family care settings for house chores, child care and shopping activities.

Nonetheless, some of the differences in microenvironments that occur appear to be related to location coding differences in the two studies rather than to actual differences in activity patterns. Indeed, the relation of microenvironmental time and gender, age, and type of day were remarkably similar in the two data sets, indicating that they do tap the same basic elements of time expenditure.

1.0 BACKGROUND

The standard approach to monitoring environmental pollutants in the air has been fixed-site monitoring, which consists of taking readings from air monitoring equipment that measures concentrations of pollutants in outdoor air at specific fixed locations in urban areas. This monitoring approach has certain fundamental problems for exposure assessment, chief among them being that humans spend the majority of their time indoors, a component of exposure that fixed-site monitoring fails to take into account. To provide a completely realistic and comprehensive assessment of population exposure, the pollutants generated by indoor sources must be measured.

To determine this important component of human pollutant exposure, the U. S. Environmental Protection Agency (EPA) conducted two field studies in the cities of Denver, Colorado and Washington, D.C. in the winter of 1982-1983 to measure the personal carbon monoxide (CO) exposure for a randomly-selected population from both cities (Akland and Ott, 1984; Akland et al., 1985; Hartwell et al., 1984; Johnson, 1984). This involved having the study participants carry miniaturized Personal Exposure Monitors (PEMs) as they went about their normal daily activities over a one- to two-day period of time. Additional field studies were carried out in other cities to determine indoor human exposure to Volatile Organic Compounds (VOCs). The studies indicated that a large percentage of exposure to CO and VOC was generated by sources in a person's immediate surroundings (referred to as "microenvironments"), such as the home, office, and car (Pellizzari et al., 1987a; 1987b; Wallace, 1987).

Unfortunately, although the PEM studies provide a direct and more realistic means of assessing the total human exposure, they do not permit predictions to be made. Therefore, a complimentary method is required to calculate the total air pollution exposure through computerized mathematical models (Behar, et al, 1989; Duan, 1982; Johnson, et al, 1984; Ott, 1984; Ott et al, 1988). The models, utilizing activity pattern data and the concentration data in various microenvironments, predict pollutant exposure based on the time spent in these microenvironments. The estimates of the concentrations of pollutants in various microenvironments come

either from knowledge of the source and emission rates of the pollutants or from empirical measurements of concentration distributions.

The key factor in this complimentary, “indirect” approach is the activity patterns of representative populations around the country which provide the basic input to the simulation models. The activity pattern data used in the indirect approach come from various time-diary studies (Johnson, 1986; Juster and Stafford, 1985; Robinson and Wiley, 1990).

As the indirect approach grows in popularity and more simulation models are developed, it becomes important to examine these time-diary studies, and the activity data they provide, in more detail. This is necessary not only to quantify and refine the procedures used to gather the activity data and to obtain more up-to-date and precise activity data but also to objectively assess the value of the data provided.

2.0 REPORT OBJECTIVES

This report presents a general comparison of the activity and location time expenditures in a 1985 national time-diary study with parallel data on Californians' activity patterns that were collected in a 1987-88 study conducted by the California Air Resources Board (CARB). It provides an initial examination of the average amounts of time spent in various activities and various locations in the two studies. The primary goal of this report is to determine whether these two surveys, although conducted from different perspectives and using different methods of gathering the data (but with common activity codes), could identify convergent patterns of time spent on various activities, in various locations and in various microenvironments.

This report is a preliminary effort to answer this important question. By nature, the analyses that are carried out are limited and the report is mainly descriptive in nature. Of major concern is the fact that the activity and location data in this report are compared using only population averages. The majority of the comparisons made involve times spent in various activities and locations over all the days of the week and across the entire population, which includes the many "zero" values for people who did not participate in particular activities or who did not spend any time in a particular location. This kind of direct comparison of gross population averages is needed as a first step to determine whether or not further comparative work is warranted.

In Section 9 of this report, the data are compared in a manner that is more relevant to exposure assessment: by examining the proportions of the population who do and who do not report spending time in a given activity or a given location, and the means of those groups within each of the data sets who do spend time in these activities and locations. An attempt is made to identify those activities and locations most relevant to pollutant exposure in these two data sets. The limitation of examining only population averages is that similar population averages between the California and national data sets could still reflect extremely different exposure patterns between the two groups. For example, one group could have a higher proportion of its members spending a little time in a given activity or location, while the other population could have just a few members spending a great deal of time

in that activity or location. This situation would yield similar population averages, and yet the two groups' exposure patterns are clearly and meaningfully different. This difference is critical in exposure assessment since the *duration* of exposure directly determines dose and the accompanying adverse health effect. Therefore, relevant frequency distributions should be compared using more sophisticated statistics than is presented here. In addition, comparisons based on specific factors known to affect exposure for the pollutants of immediate interest are needed.

An attempt is made in the concluding sections of this report to illustrate how time spent in certain microenvironments can be estimated from these two data sets. The 16-category coding scheme we developed for microenvironments, however, is mainly an attempt to obtain a standard set of microenvironments to compare these two data sets from large representative sample bases.

In the CARB time-diary study, a probability cross-section sample of 1762 residents aged 12 and over in telephone households across the state of California provided detailed generalizable data on the following items:

- Time spent in 44 various locations, with special attention given to the rooms of the home in which activities occur and to specific microenvironments that are especially likely sites of pollution exposure (e.g. garages, kitchens).
- Time spent in various activities, initially broken down into more than 90 discrete types of activities. These types have been identified and coded in more detail in previous studies, as in the 1985 national study in which more than 250 codes were employed (see Appendix A).
- Time spent on an associated facet of these daily activities that has great implications for air pollution exposure, namely the presence of smokers.

Since no data were collected on this latter aspect of activities in the 1985 national study, only the first two aspects (location and activity) are examined in this report.

As in the national study, CARB interviews were distributed across all days of the week and across different months of the year — although not across all months as in the 1985 national study and with greater frequency on weekend days. In addition,

demographic and other background data were collected for each respondent in the survey. This included a series of questions related to work and household sources of air pollution that were especially developed for the CARB study. More details on the CARB study procedures are described in Section 5 of this report.

An important breakthrough in the CARB study was that these data were collected and coded at the University of California at Berkeley using the computer-assisted telephone interviewing system (CATI) developed at that institution's Survey Research Center to process complicated data. The CATI system greatly facilitated the data collection efforts and assured greater standardization of activity reporting. Using already-developed computer processing programs at the University of Maryland, these complex variable-length records were simplified for analysis on mainframe computers and on personal computers.

3.0 GENERAL METHODOLOGICAL CONSIDERATIONS

Most surveys study people's activities in isolation from the natural temporal context in which they are embedded. Thus, most survey activity questions ask people to compress their actual behavioral experiences by telling interviewers whether they "often" or "usually" do something, rather than examining these activities as they naturally and sequentially occur in daily life.

This is one of the main reasons why studies of the actual use of time represent such an important and needed advance in understanding the nature of everyday activity. Studies of time use provide the opportunity to study human activities in "real time" —as individuals are actually involved in the stream of daily behavior.

The most general technique for the study of time use is the "time diary." Time diaries can be seen as a prime example of the "micro-behavioral" approach to survey research. This micro-behavioral approach recognizes the limited ability of respondents to report very complex behavior in a survey context. Following this approach, survey questions are limited to the most elementary experiences about which respondents can accurately report. For example, a micro-behavioral approach would ask about the details of a recent unhappy episode at work or in marriage, rather than just a global question on job or marital dissatisfaction. It would ask for accounts of activities that happened "yesterday" and not "in general" or "typically," which are phrasings that can occasion different meanings and frames of reference across respondents. It would combine direct questions concerning a respondent's specific information about a topic with questions about that respondent's specific mass media usage over a short time period—rather than expecting respondents to give a meaningful response to a single question about "main sources" of information about all the things happening in the world.

The micro-behavioral approach thus provides researchers with a more basic, complex, comprehensive and flexible data base from which to draw conclusions about virtually all human activity. The time diary is a micro-behavioral technique for collecting self-reports of an individual's daily behavior in an open-ended fashion on an activity-by-activity basis. Individual respondents keep or report on these

activity accounts for a short, manageable period such as a day or a week—usually across the full 24 hours of a single day.

In that way, the technique capitalizes on the most attractive measurement properties of the time variable; i.e.:

- All daily activity is potentially recorded (including that which occurs in early morning hours when most people may be asleep).
- All 1440 minutes of the day are equally distributed across respondents (thus allowing certain “tradeoffs” between activities to be examined).
- Respondents are allowed to use a time frame and accounting variable that is maximally understandable to them and accessible to memory.

The open-ended nature of activity reporting means these activity accounts are automatically geared to detecting new and unanticipated activities, (e.g., aerobic exercises, use of new household products involving chemicals), as well as capturing the context and sequences of how daily life is experienced.

In a typical diary instrument, respondents report on each activity in which they engage across the full 24 hours of the day, as well as where they were and various aspects of each activity. Figure 3-1 shows a sample time-diary page from the self-completion form used in the 1985 mail-back study and illustrates the basic structure of the diary instrument. As adapted for the CARB telephone study, this structure was stored in the computer without the “with whom” or “secondary activity” information; this information was replaced with information on the presence of smokers. Respondents filled out one such entry line for each activity in which they engaged over the 24-hour period.

Prior to the 1987-88 California study, four national time-diary studies had been conducted using this general approach. The four studies and the organizations involved are as follows:

- *Mutual Broadcasting Corporation* (1954) study, in which more than 8000 American adults 15-59 kept time diaries for a two day period (more exact details are given in De Grazia, 1962).

WHAT YOU DID FROM MIDNIGHT UNTIL 9 IN THE MORNING						
Time	What did you do?	Time Began	Time Ended	Where	List Other Persons With You	Doing Anything Else?
Midnight						
↓						
↓						
1 AM						
2 AM						
3 AM						
4 AM						
5 AM						
↓						
↓						
6 AM						
↓						
↓						
7 AM						
↓						
↓						
8 AM						
↓						
↓						
↓						
↓						

Figure 3-1. Sample Time Diary Page

- *Survey Research Center, University of Michigan* (1965) study, in which 1244 adult respondents aged 18-64 kept a single- day diary of activities, mainly in the Fall of that year. Respondents living in rural and non-employed household were excluded (Robinson, 1977).
- *Survey Research Center, University of Michigan* (1975) study, in which 1519 adult respondents aged 18 and over reported their activities for a single day in the Fall of that year (Robinson, 1976). In addition, diary accounts were obtained from 788 spouses of these designated respondents. These respondents became part of a panel who were subsequently reinterviewed in the Winter, Spring and Summer months of 1976; about 1500 respondents remained in this four wave panel. Some 677 of these respondents were reinterviewed in 1981, again across all four seasons of the year (Juster and Stafford, 1985).
- *Survey Research Center, University of Maryland* (1985) study, in which single day diaries were collected from more than 5000 respondents aged 12 and over across the entire calendar year of 1985. Three modes of diary collection were used for comparison: mailback, telephone, and personal, with little difference in obtained estimates (Robinson, 1988).

Comparison across certain of these studies – mainly to detect trends in time usage, particularly in relation to this latest (1985) national survey – is the topic of another report of this series.

These open-ended diary entries were coded and arranged in a variety of ways. The most widely-used activity coding scheme was the one developed for the 1965 Multinational Time Budget Research Project (as described in Szalai et. al., 1972). As shown in outline form in Table 3-1 (as adapted for the CARB study), the Szalai et. al. code first divides activities into non-free activities and free- time activities. Non-free time activities are further subdivided into paid work, family care and personal care, with free time activities being further subdivided under the five general headings of adult education, organizational activity, social life, recreation and communication.

Activities are coded to identify the actual activity and not its purpose or benefits. Thus, very enjoyable aspects of work are still coded as work, and visiting or TV viewing done as work or school obligation is still coded as a free-time activity. An actor in a play is working, while an audience member watching his performance is

Table 3-1. Activity Codes for the CARB Study

00-49 NON-FREE TIME		50-99 FREE TIME	
00- 08	PAID WORK	00-99	EDUCATIONAL
00	(not used)	50	Students' classes
01	Main job	51	Other classes
02	Unemployment	52	(not used)
03	Travel during work	53	(not used)
04	(not used)	54	Homework
05	Second job	55	Library
06	Eating	56	Other education
07	Before/after work	57	(not used)
08	Breaks	58	(not used)
09	Travel to/from work	59	Travel, education
10-19	HOUSEHOLD WORK	60-69	ORGANIZATIONAL
10	Food preparation	60	Professional/union
11	Meal cleanup	61	Special interest
12	Cleaning house	62	Political/civic
13	Outdoor cleaning	63	Volunteer/helping
14	Clothes care	64	Religious groups
15	Car repair/maintenance (by R)	65	Religious practice
16	Other repairs (by R)	66	Fraternal
17	Plant care	67	Child/youth/family
18	Animal care	68	Other organizations
19	Other household	69	Travel, organizational
20-29	CHILD CARE	70-79	ENTERTAINMENT/SOCIAL
20	Baby car	70	Sports events
21	Child care	71	Entertainment
22	Helping/teaching	72	Movies
23	Talking/reading	73	Theatre
24	Indoor playing	74	Museums
25	Outdoor playing	75	Visiting
26	Medical care-child	76	Parties
27	Other child care	77	Bars/lounges
28	(At dry cleaners)	78	Other social
29	Travel, child care	79	Travel, social
30-39	OBTAINING GOODS, SERVICES	80-89	RECREATION
30	Everyday shopping	80	Active sports
31	Durable/house shop	81	Outdoor
32	Personal services	82	Walking/hiking
33	Medical appointments	83	Hobbies
34	Govt/financial services	84	Domestic crafts
35	Car repair services	85	Art
36	Other repair services	86	Music/drama/dance
37	Other services	87	Games
38	Errands	88	Computer use
39	Travel, goods and services	89	Travel, recreation
40-49	PERSONAL NEEDS AND CARE	90-99	COMMUNICATIONS
40	Washing, etc.	90	Radio
41	Medical care	91	TV
42	Help and care	92	Records/tapes
43	Meals at home	93	Read books
44	Meals out	94	Magazines/etc.
45	Night sleep	95	Reading newspaper
46	Naps/day sleep	96	Conversations
47	Dressing, etc.	97	Writing
48	N.A. activities	98	Think, relax
49	Travel, personal care	99	Travel, communication

engaged in a free time activity. More fine-grained distinctions within these categories were captured in the more than 250 categories developed in the 1985 national study (as shown in Appendix A) that reveal further distinctions under these broader headings. Appendix A also shows certain important differences in the California and national activity codes. The main value of this open-ended diary approach, then, is that these various activities can be recoded or recombined depending on the analyst's unique assumptions or purposes.

The Table 3-1 (and Appendix A) code has several attractive features: (1) it has been tested and found reliable in several countries around the world; (2) extensive prior national normative data are available for comparison purposes; and (3) it can be easily adapted to include new code categories of interest to environmental researchers.

Nonetheless, the Table 3-1 division of activities is focused more on economic or social distinctions than on environmental features, such as proximity to pollutant sources or personal inhalation rates. One does not know from the present data whether meal preparation involves cooking with gas stoves or simply consists of making a sandwich or pouring a glass of milk. This leads to some serious difficulties in relating activities to microenvironments or situations of crucial interest to exposure research. These could be flagged in future studies by the use of a third or fourth digit in the activity or location code.

Locations as described in the "where" category of the diary can now be coded into one of the 44 basic location categories developed for the CARB study, as shown in Table 3-2. The coding can easily be aggregated to estimate aggregate time spent in travel or time spent outdoors, both important parameters for exposure estimation purposes.

These new CARB codes were developed to distinguish the type of room in the home (kitchen, TV room, bedroom, etc.) and to distinguish between various types of other indoor and outdoor locations — especially for locations known to be likely areas of high pollution (such as parking garages or automobile repair shops). The codes were developed with the help of the California Air Resources Board staff, and perhaps

Table 3-2. CARB Study Location Codes

A. Where in your house were you?

1	Kitchen	7	Garage
2	Living rm, family room, den	8	Basement
3	Dining room	9	Utility/Laundry room
4	Bathroom	10	Pool, Spa (outside)
5	Bedroom	11	Yard, Patio, other outside house
6	Study/office	12	Moving from room to room in the house
		13	Other (SPECIFY)

B. Where were you? (if not home)?

21	Office building, bank, post office
22	Industrial plant, factory
23	Grocery store (convenience store to supermarket)
24	Shopping mall or (non-grocery) store
25	School
26	Public bldg. (library, museum, theater)
27	Hospital, health care facility, or Dr.'s office
28	Restaurant
29	Bar, nightclub
30	Church
31	Indoor gym, sports or health club
32	Other people's home
33	Auto repair shop, indoor parking garage, gas station
34	Park, playground, sports stadium (outdoor)
35	Hotel, motel
36	Dry cleaners
37	Beauty parlor; barber shop; hairdressers
38	Work; no specific main location; moving among locations
39	Other indoors (SPECIFY)
40	Other outdoors (SPECIFY)

C. How were you traveling? Were you in a car, walking, in a truck, or something else?

51	Car	56	Train/rapid transit
52	Pick-up truck or van	57	Other truck
53	Walking	58	Airplane
54	Bus/train/ride stop	59	Bicycle
55	Bus	60	Motorcycle, scooter
		61	Other (SPECIFY)

should be seen as the major focus of the time diary, unlike earlier time-diary studies which have focused mainly on activities.

The full location codings for the 1985 national study are shown in Appendix B. A more restricted set of codes was used for the telephone part of the national study, because of its greater demand on interviewer; these interviewers were not able to work with a full CATI diary instrument, such as that developed for the CARB study.

When aggregated, such open-ended diary data have been shown to provide generalizable national estimates of the full range of alternative daily activities in a society: from “contracted” time (e.g., work or the commute to work), to “committed” time (e.g., family care), to personal care (e.g., sleeping, eating, hygiene), and to all the types of activities that occur in free time. The multiple uses and perspectives afforded by time-diary data have led to a recent proliferation of research and literature in this field. Comparable national time-diary data have been collected in over 25 countries over the last two decades, including most all Eastern and Western European countries, usually by the main governmental statistical agency in each country.

Reliability: Time-diary estimates thus far have been able to produce rather reliable and replicable results at the aggregate level. For example, Robinson (1977) found a .95 correlation between time use patterns found in the 1965-66 national time diaries ($n = 1244$) and the aggregate figures for the single site of Jackson, Michigan ($n = 788$). Similar high correspondence was found for the American data and for time-diary data from Canada, both in 1971 and in 1982 (Harvey and Elliot, 1983). A correlation of .85 was found between time expenditure patterns (found in the U.S. and Jackson portions of the 1965-66 time study) using the “day after” approach and time expenditure for a random tenth of the samples who also filled out a “day

before” diary¹. In a smaller replication study in Jackson in 1973, an aggregate correlation of .88 was obtained.

Validity: Almost all diary studies depend on the self-report method rather than on some form of observation. This is unfortunate because it leaves these self-report data open to basic questions of validity, in the sense of being verifiable by some independent method of observation or report. However, there are encouraging signs from those observational studies that have been done.

Several studies bear more directly on the validity of the time diary, in the sense of there being an independent source or quasi-observer of reported behavior. The first of these studies did not involve the time diary directly, but rather the conclusion from the time diaries that standard television rating service figures on TV time expenditure provided high estimates of viewing behavior. In this small scale study (Bechtel, Achepohl and Akers, 1972), the TV viewing behavior of a sample of 20 households was monitored over a week’s time by means of a video camera; the camera was mounted on top of that set, and the video camera/microphone recorded all behavior in front of the TV screen. Household members also kept rating service “viewing diaries,” in which they recorded the names and times of all TV programs they had watched.

The results of this study, as in the earlier camera monitoring of TV audiences by Allen (1968), indicated that both rating-service methods of TV exposure (the audiometers and the viewing diaries) produced estimates of viewing that were 20 to 50 percent higher than primary or secondary activities reported in time diaries. In brief, the study provided considerable support for an explanation of the lower viewing times reported in time diaries than by commercial rating services. It also illustrated the need for a complete open-end diary rather than one focused on a specific set of activities (like television or child care).

1 These results provided the rationale for using the much less expensive day “yesterday” diary approach in the 1975 study rather than the more expensive tomorrow diary approach in which the respondent fills out the diary for the following day and which requires a separate second visit to the respondent’s home. The tomorrow approach did pick up less detailed activities, but only about 10% less detail. At the same time, telephone diaries include much less missing data, since interviewers have more control over the activity reporting process.

Three more general validity studies subsequent to Bechtel et. al. provided further evidence bearing on the validity of time-diary data. These examined the full range of activities (and not just television viewing) and employed larger and more representative samples. However, none involved the independent observations of behavior as had the Bechtel et. al. study.

In the first study (Robinson, 1985), a 1973 random sample of 60 residents of Ann Arbor and Jackson, Michigan kept beepers for a one-day period and reported their activity whenever the beeper was activated (some 30 to 40 times across the day). Averaged across all 60 respondents, the correlation of activity durations from the beeper and from the diaries was .81 for the Ann Arbor sample and .68 for the Jackson sample (across the non-sleep periods of the day).

In a second study, a telephone sample of 249 respondents were interviewed as part of a 1973 national panel survey. These respondents were asked to report their activities for a particular “random hour” during which they were awake that day—with no hint from the interviewer about what they had previously reported for that hour in their diary. An overall correlation of .81 was found between the two aggregate sets of data, that is between the activities reported in the random hours and in the full-time diary entries for those same random hours (Robinson 1985).

In a more recent study, Juster (1985) compared the “with whom” reports in the 1975-76 diaries of respondents with those of their spouses across the same day. Juster found that in over 80% of the diary entries, these independently-obtained husband and wife diaries agreed that their spouses were present or absent. In a separate analysis of these 1975 data, Hill (1985) found a .93 correlation between time spent on various home energy-related activities and aggregate time-of-day patterns of energy use derived from utility meters.

In conjunction with the reliability studies, then, the data from these studies provide a considerable degree of assurance about the basic generalizability of time diary data. This has been the case as well in methodological studies conducted in other countries (e.g., Gershuny et. al., 1985; Michelson, 1978). Nonetheless, a definitive

well- controlled study has yet to be conducted. It is especially needed for the specific types of locations and activities of interest to exposure assessment researchers.

4.0 METHODOLOGY OF THE 1985 AMERICANS' USE OF TIME PROJECT

The 1985 Americans' Use of Time study employed the same basic open-ended diary approach as the 1965 and 1975 national studies. In the 1985 study, however, an explicit attempt was made to spread the collection of diary days across the entire calendar year—from January through December of 1985 for the two main data collection methods: mailback and telephone. A representative national sample of personal interviews also was conducted beginning in September of 1985 and continuing through May of 1986.

The methods for the three different samples were as follows:

1) *Mail-back Sample*: The data for the main (mail-back) study were collected from a sample of Americans who were first contacted by telephone, using the random-digit-dial (RDD) method of selecting telephone numbers. All calls were made from the central telephone facility at the Survey Research Center of the University of Maryland, College Park.

Once a working telephone household was contacted, one respondent aged 18 and older in each household was selected at random. That person was given a brief (2-5 minute) orientation interview, followed by an invitation to participate in the diary/mail-out part of the study. If that respondent agreed, diaries were then mailed out for each member of the participating household aged 12 and above to complete for a particular day for the subsequent week.

Brief Call-2 and Call-3 interviews were made 4-6 days later to ensure that respondents had received these materials and understood how to complete them. After respondents completed these diaries, they then mailed all their completed forms back to the University of Maryland for coding and analysis. Some 3349 diaries were returned using this mail-out procedure during the full 12 months of 1985. However, it is the diaries obtained from adults aged 18 to 64 with less than two hours of missing diary data (1980 in number) that form the data base for the analyses described in the first part of this report. Other 1985 data not examined in this report included parallel diary reports from 809 additional respondents interviewed in a separate personal interview sample in the Fall of 1985 through the Spring of 1986,

and from an additional 1210 “yesterday” diaries obtained by telephone as part of the initial contact for the mail-back diaries.

Collection of the mail-back data, then, was obtained using basically the same “tomorrow” approach as employed in the 1965-66 study. In this “tomorrow” approach, respondents know and agree ahead of time that they will be keeping the diary, rather than the “yesterday” approach used in the telephone portion of the study. The main procedural difference was that a personal interviewer was not present to check on the adequacy of diary entries. This check was instead performed when the diaries were received at the University of Maryland for coding and analysis. If any discrepancies were detected (e.g. significant gaps of missing times or indecipherable diary entries), the respondent involved was recontacted by telephone to clarify any ambiguities.

Households were given special monetary incentives and gifts (a pen with a digital watch) to ensure that all family members in the selected households over the age of 11 participated in keeping a diary. This also ensured that the sample would be approximately self-weighting (for individuals over the age 11), as well as covering approximately an entire year’s activities.

In addition to the estimates of daily time use from the diary, the study also obtained information on the employment status, age, education, race and sex on each member of the household. Additional questions ascertained the presence of certain home appliance technology available in the household as well as certain physical characteristics of the dwelling unit.

The sample was designed to represent all telephone households in the contiguous United States. The sample first covered 173 area codes/three-digit prefixes selected at random from a master random-digit-dial sampling frame of 500 base numbers prepared by the Sampling Department of the Institute for Social Research at the University of Michigan to represent all telephone households in the United States. If that base number located a working household telephone number, it was then used to generate additional clusters of random numbers within that area code and prefix. The initial list of 500 numbers had been stratified by geographical region

of the country. This ensured that the sample telephone numbers had an adequate representation from all regions of the country. The sample was designed to yield about 1800 households (and 4000 individuals) across the calendar year.

2) *Telephone Sample:* Additional diary data were obtained from a national telephone sample that consisted of a random sample of the U.S. population who were contacted in the first phase of the mail-back procedure. This telephone sample consisted of the randomly-selected adult (aged 18 and older) who responded to the first interview. In the telephone interviews conducted in the first six months of 1985 (January through June), each third respondent in this initial telephone contact was also asked to complete a diary for the prior day's activities. In the second six-month period of the study, all telephone respondents completed the prior day's diary.

A problem arose for those respondents who agreed to complete the diary forms but subsequently did not return the forms to the Center. When contacted, most of these respondents claimed to have returned the forms—even though none ever arrived at the Center. That meant that several important demographic variables (e.g. family size and composition, age) were missing for this portion of the telephone sample. It is for that reason that the telephone sample is excluded from this analysis.

Some 67% of respondents initially contacted by telephone, however, did complete a day-before diary over the telephone. This was the highest response rates for any of the three data collection modes. The response rate for the mail-back was less than 50% (about 3/4 of those contacted by telephone) and for the personal mode just about 60 %.

3) *Personal Sample:* In addition to the mail-back and telephone diaries, a separate national sample of 809 diaries were collected by personal in-home interviews. This sample was drawn from a subset of 20 primary sampling units (PSUs) of counties or metropolitan areas, which were selected using a random probability methods from the continuing national samples of the Institute for Survey Research at Temple University in Philadelphia. This stratified sample was further stratified and subjected to a "controlled selection" to ensure that the subset of 20 PSUs retained

sufficient representation of rural-urban-suburban character within each of the four regions of the country. (The urban-rural factor could not be controlled through stratification either in the telephone portion of the sample or in the mail-back portion of the sample. Nonetheless, the final representation of rural and urban areas does not appear to be problematic in these three national surveys.)

Respondents in this sample were asked to follow much the same procedures as on the initial telephone sample. One adult selected at random was to complete a retrospective diary from memory for the previous day. The interviewer then left diaries for all adult respondents in the household to complete for the following day. The interviewer returned the day following that day to collect the diaries and to ensure that they were filled out adequately and accurately. For example, if the interviewer contacted the household on a Tuesday, the random adult respondent first filled out a retrospective diary for Monday; the interviewer then left diary forms for that respondent and other household adults to fill out for Wednesday, and the interviewer returned to collect those completed forms and ask additional questions about the household on Thursday. As in the mail-back diary procedure, respondents were given monetary and other incentives for participating.

Diary Coding: In the first page of the 1985 time-diary form presented in Figure 3-1, it can be seen that each respondent is expected to write out each primary activity in which they engaged, the time that the activity began and ended, where it took place, who was present during the activity and what other activities were performed during this same time period as well. In this way, the diary form remained basically the same as that used in the 1965 and 1975 studies.

In order to illustrate the types of activities and level of detail that was expected of the respondents in their completed diaries, an example of a completed diary form was enclosed in each packet mailed to the household (or left behind in the personal mode). This example form was filled out in considerable detail, with several hand-written comments by the presumed "diary keeper" to help the interpretation of unusual diary entries (e.g. going home during work; caring for children while playing sports). In general, this was intended to ensure that respondents would include enough detail in their diaries; that measure seems successful in that

mail-back diaries contained about the same number of primary activities (about 26 per day) as found in the 1965 “tomorrow” diaries.

Once received and checked, these diaries were then entered into a PDP1144 computer by trained coding staff using the direct data entry features of the University of California at Berkeley CATI system. Activities were coded into one of more than 250 activity codes, shown in Appendix A, which were elaborated from the 174 categories developed at the University of Michigan for the 1975 data; this in turn represented an elaboration of the 96 basic code categories that Szalai et. al. (1972) had developed for their 1965 Multinational Time-Use Project.

The Table 3-1 scheme described above shows the adapted activity coding scheme that was developed from that multinational project and that applies to the activity data tables in this report. Nonetheless, this is not the only activity category scheme that has been developed, and the value of the open-end diary approach (as well as the Table 3-1 scheme) is that activities can be recoded or recombined depending on the researchers’ unique assumptions or purposes.

The Table 3-1 activity code for the CARB study mainly differs from the one used in the 1985 national study in the following respects:

- Code 03 (travel during work) was coded as part of regular work (code 00) in the 1985 study.
- Code 28 was used to isolate activities at a dry cleaning establishment in the CARB study; this was included along with other personal service (code 32) in the national study.
- Code 47 in the CARB study included all grooming activities in the bathroom, not just bathing and washing as in the national study; dressing activities were included as code 40 in the national study.
- Code 49 in the CARB data included all travel that could not be linked to a particular other activity or purpose.

Otherwise, the coding categories were virtually identical in the two studies, with the coding changes and rearrangements designated in Appendix A being used to make the activity coding as comparable as possible.

The location codes in the two studies were, in contrast, rather different. Indeed, the CARB location codes in Table 3-2 represented a major advance in the coding of location in time-diary studies. In contrast, the location codes for the 1985 study are much more ambiguous and less complete—and also varied across the three study modes in the 1985 study. Ideally, these data can be recoded and standardized in future efforts using the CARB categories.

The University of Maryland coders were extensively trained on the activity code category system and used the same complete document of coding conventions that had been developed by the Survey Research Center at the University of Michigan for its 1975 time diary project. Each activity in the diary was coded descriptively as a separate block of 21 digits in length. This block comprised the primary activity (a 3-digit code) during the period, the time the activity began and ended coded in 4-digit military time, (e.g. 8AM = 0800; 8PM = 2000), location (1 digit), social partners (2 digits), secondary activity (3 digits), enjoyment level (1 digit) and media use (3 digits). When this 21-digit data entry for all activities in the diary was entered and computed, the totals were programmed into the machine to ensure that each day's diary entries added to exactly 1440 minutes (24.0 hours). These "variable-field" data (i.e. varying depending on the number of activities reported) were then processed by a special computer program to provide "fixed-field" compilations of diary time spent on 96 activities for each day, i.e. total daily minutes spent working, cooking, watching TV, etc. for that respondent for that day.

It is the averages of these fixed-field totals that are presented in the analytic tables that follow. The daily minute data in these tables have been weighted by day of the week and by certain demographic factors (sex, household size and region) to ensure that all days of the week are equally represented in these tables and that the overall sample figures reflect appropriate 1985 and 1987-88 U.S. Census Bureau figures for these demographic variables. In other words, if the proportion of the sample on some characteristic was too high in relation to population figures (as in the case of females), then that group was multiplied by some number less than 1.0 to make the proportion match the true population proportion.

5.0 METHODOLOGY OF THE CALIFORNIA (CARB) STUDY

All data in the CARB study were collected by telephone. One adult 18 or older in each contacted household was selected at random and asked to complete a diary for the previous day's activities. In order to reflect appropriate geographic divisions in this statewide sample, households in the San Francisco Bay area had twice the chance of falling into the sample as households in the greater Los Angeles and San Diego areas and households in the remaining areas of the state were sampled at four times this rate. The weightings needed to offset these sampling fractions are applied in the tables that follow; no such geographic sampling differences were used in the national sample, so that it is self-weighted by region.

Each respondent in the CARB study was asked to describe each activity on the previous day and the location of that activity. Locations were precoded into the categories using the CATI software available on the Berkeley system, so that this was directly coded into the computer. Activities were coded using the same basic codes (Table 3-1) as used in the national study (with the amendments noted in the previous section) and all activity codes were assigned by University of Maryland coders who had extensive familiarity with the 1985 coding scheme. For each reported activity, respondents were also asked whether there was a smoker present during the activity (information which is not reported in the following tables). Further details are provided in Wiley and Robinson (1990).

Table 5-1 summarizes the main distinguishing features of the CARB and national surveys. It can be seen that both studies were based on probability random-digit-dial (RDD) designs in telephone households, one conducted across the state of California and the other across the nation as a whole. Both were also spread across the entire year, although certain months were not covered in the CARB study. However, the national data were mainly collected by prospective mail-back diaries, while the CARB study employed the retrospective recall of activities done "yesterday".

The CARB study has a somewhat higher overall response rate, although not higher than the telephone portion of the national study. The telephone portion of the national study used essentially the same study approach as the CARB study,

**Table 5-1. Summary Comparison of CARB and 1985
National Studies**

STUDY ASPECT	CARB	NATIONAL
Year	1987 - 88	1985
Months	October - August	January - December
Sample	Full Probability	Full Probability
Mode	RDD Telephone	Mail-Back 2762 Telephone 1210 RDD Personal 809 TOTAL 5358
Sample Used in Tables 6-1 thru 6-7	Aged 18-64	Mail-Back, Aged 18-64
DAYS OF WEEK (18-64)	ALL	ALL
Weekday	851 (54%)	1416 (72%)
Saturday	223 (14%)	325 (16%)
Sunday	285 (18%)	239 (12%)
TOTAL DIARY DAYS	1359	1980
DAILY PERIOD	Full 24 Hours	Full 24 Hours
NUMBER OF DIARY DAYS	One	One
DIARY FORMAT		
Activities	Open	Open
Location	Closed (With Options)	Open
Time Periods	Open	Open (Some directed)
Social Partners	Not Recorded	Open
Special Features	Smokers Present	Enjoyment Media Use
ACTIVITY CODES	90+ (Modified Szalai)	270+ (Szalai)
LOCATION CODES	44 New	34 (Mail-Back; Personal) 10 (Telephone portion)
TOTAL SAMPLE CHARACTERISTICS		
SAMPLE SIZE	1762 TOTAL	5358 TOTAL
AGES	12+	12+
RESPONSE RATES	61%	51%; 67%; 60%
NUMBER PER HOUSEHOLD	One	All; One; All
SAMPLE SIZE (Over Age 18)	1579	4940
Female	53%	56%
Female Employed	57%	53%
Male Employed	76%	71%
Married	59%	64%
Child Under 18 in Household	16%	37%
Child Under 5 in Household	NA	11%
Age 65+	14%	14%
College Graduate	28%	22%
OVERSAMPLES	Portions of state outside LA/San Diego area	None

although the CARB diaries were all done using automated CATI procedures developed at the University of California at Berkeley, while the national diaries were first recorded verbatim by interviewers on paper and only CATI entered after editing. Moreover, the lack of substantial differences in activity durations across the three modes (including telephone) in the 1985 national study indicates that these data could be aggregated for a meaningful comparison with the CARB data with minimal concern over study design differences. Nonetheless, more detailed analysis may reveal significant differences once attention focuses on specific activities or types of activities of relevance for exposure assessment.

The national study had more spread across the year and across days of the week, while the CARB study oversampled weekend days, especially Sundays. Both studies used open-end diary entries across the full 24 hours of a single day and essentially the same basic diary code for activities – although the national study employed more than twice as many activity codes in the initial coding. The location codes for the CARB study were more numerous and more systematically organized, both in general and around exposure assessment needs. The CARB diary was unique in including data on the presence of smokers for each activity.

The national study interviewed more than three times the number of adult respondents, both over age 12 (total $n = 5358$ vs $n = 1762$ for CARB) and over age 18 ($n = 4940$ vs. $n = 1579$ for CARB). The sample characteristics of adults in both samples were rather similar in terms of proportions of women and of people aged 65 and older. Slightly higher proportions of men and women adult respondents were employed and had college degrees in the California sample, while more national respondents were married and presumably had children in the household (only data on teenage children were collected in the California study, so that information comparable to the national study are not available on young children in the household in the CARB sample).

6.0 RESULTS OF COMPARISONS OF OVERALL AVERAGES

The overall durations of time spent in various activities and in various locations are shown in Tables 6-1 through 6-3. The tables are first shown for activities and then for locations, with the data for the overall sample aged 18-64 described first, followed by the data for men and then for women. The sample sizes in Table 6-1 (1359 and 1980) are lower than the totals in Table 5-1 because respondents aged 65 and older and aged under 18 have been excluded. This was done to standardize the population base by limiting comparison to the “working segment” of the population. Only the mailback diaries from the national sample are analyzed.

Data are reported in minutes per day, averaged across seasons of the year and days of the week so that seasons and days are equivalently represented. The data have been weighted to be project able to both the California and national population in terms of days of the week, region, numbers of respondents per household, and for 3 monthly seasons of the year. That means that whatever sampling differences that occur in the sample that lead to disproportionate numbers of days of the week, respondents in each region or respondents per household are corrected for in the calculations.

Before embarking on these analyses, it again needs to be stated that these initial comparisons are confined to the basic activity categories employed in the study. As noted in Table 3-1, these categories are based on economic and social distinctions in activity and are not intended as most relevant for exposure analysis at this stage of analysis. The subsequent attention to microenvironments in the latter sections of this report attempts to address parameters of greater potential interest to exposure researchers. In this section we first look at the activities and then at the locations that later make up these microenvironments.

Activity: Table 6-1 shows the activity means for the overall sample. It can be seen that the figures for work are higher in California than in the national study, both for time at work and for the commute to work. The overall California figures for work also come out higher because of the 8 minutes per day that CARB respondents reported as travel activities during work (code 03); this travel activity was not

**Table 6-1. Differences in Average Time Spent in
Different Activities Between California and National Studies
(Minutes Per Day for Age 18-64)**

00-49 NON-FREE TIME		California 1987-88 n = (1359)	National 1985 (1980)	50-99 FREE TIME		California 1987-88 n = (1359)	National 1985 (1980)
00-09 PAID WORK				50-99 EDUCATION AND TRAINING			
00	(not used)			50	Students' Classes	9	5
01	Main Job	224	211	51	Other Classes	1	3
02	Unemployment	1	1	52	(Not Used)	-	-
03	Travel during work	8	NR	53	(Not Used)	-	-
04	(not used)	-	-	54	Homework	8	7
05	Second job	3	3	55	Library	*	1
06	Eating	6	8	56	Other Education	1	1
07	Before/after Work	1	2	57	(Not Used)	-	-
08	Breaks	2	2	58	(Not Used)	-	-
09	Travel To/From Work	28	25	59	Travel, Education	3	2
10-19 HOUSEHOLD WORK				60-69 ORGANIZATIONAL ACTIVITIES			
10	Food Preparation	29	36	60	Professional/Union	0	1
11	Meal Cleanup	10	11	61	Special Interest	*	1
12	Cleaning House	21	24	62	Political/Civic	0	*
13	Outdoor Cleaning	9	7	63	Volunteer/Helping	1	1
14	Clothes Care	7	11	64	Religious Groups	1	2
15	Car Repair/Maintenance (by R)	5	5	65	Religious Practice	5	7
16	Other Repairs (by R)	8	6	66	Fraternal	0	*
17	Plant Care	3	5	67	Child/Youth/Family	1	*
18	Animal Care	3	5	68	Other Organizations	2	1
19	Other Household	7	8	69	Travel, Organizations	2	4
20-29 CHILD CARE				70-79 ENTERTAINMENT/SOCIAL ACTIVITIES			
20	Baby Care	3	8	70	Sports Events	2	2
21	Child care	7	5	71	Entertainment, Events	5	1
22	Helping/Teaching	2	1	72	Movies	2	3
23	Talking/Reading	1	1	73	Theatre	1	1
24	Indoor Playing	2	3	74	Museums	1	*
25	Outdoor Playing	2	1	75	Visiting	26	25
26	Medical care - Care	*	1	76	Parties	6	7
27	Other Child care	2	1	77	Bars/Lounges	4	6
28	(At Dry Cleaners)	*	NR	78	Other Social	*	1
29	Travel, Child care	4	4	79	Travel, Events/Social	13	16
30-39 OBTAINING GOODS AND SERVICES				80-89 RECREATION			
30	Everyday Shopping	6	5	80	Active Sports	15	13
31	Durable/House Shop	19	20	81	Outdoor	3	7
32	Personal Services	1	1	82	Walking/Hiking	5	4
33	Medical Appointments	2	2	83	Hobbies	1	1
34	Govt/Financial Service	3	2	84	Domestic Crafts	3	6
35	Car Repair services	2	1	85	Art	*	1
36	Other Repair Services	*	1	86	Music/Drama/Dance	3	2
37	Other Services	2	2	87	Games	5	7
38	Errands	*	1	88	Computer Use/Other	3	3
39	Travel, Goods and Services	24	20	89	Travel, Recreation	5	6
40-49 PERSONAL NEEDS AND CARE				90-99 COMMUNICATION			
40	Washing, Etc.	21	25	90	Radio	1	3
41	Medical Care	3	1	91	TV	130	126
42	Help and Care	3	4	92	Records/Tapes	3	1
43	Meals At Home	44	50	93	Read Books	4	7
44	Meals Out	27	20	94	Reading Magazines/Other	16	10
45	Night sleep	480	469	95	Reading Newspaper	11	9
46	Naps/Day Sleep	16	16	96	Conversations	15	25
47	Dressing, Etc.	24	32	97	Writing	8	9
48	N A Activity	2	12	98	Think, Relax	9	6
49	Travel, Personal Care/NA	22	13	99	Travel, Communication	5	*
NR = Not Recorded In National Survey * = Less Than 0.5 Min. Per Day				Total Travel (Codes 08, 29, 29, 49, 59, 69, 79, 89, 99)			
				108 90			

distinguished from other work activities in the national data, so that no comparisons for the national data are possible.

Time spent doing most household tasks is generally lower in California, especially cooking, laundry, and house cleaning. The California sample does report more housework time for outdoor chores (e.g., yard work) and for indoor and outdoor household maintenance/repair.

Time spent on child care, including chauffeuring them to various of their activities, is slightly lower in the CARB study. That could be due to smaller numbers of young children in California households; no data on presence of young children in the household were collected with CARB study to see what role this might play in the differences that are observed. This may account for the lower time spent in “baby care” (code 20) in the CARB data; since age of children was not ascertained, much of what is coded as “child care” (code 21) could be “baby care” in the CARB data.

On the other hand, time spent on shopping activities, especially for groceries and other necessities, is slightly higher in California. That is also reflected in the greater time in travel for shopping in the CARB data.

Personal care activity times show a similarly mixed picture. CARB respondents reported less time washing and grooming than did national respondents but more time sleeping. Less time was also reported in eating meals at home in the CARB data, but more time was spent eating out and its related travel. Non-ascertained times (code 48) are lower in the CARB data, although this is largely a function of the telephone mode used in the CARB study; similarly low non-report times are found in the telephone portion of the national study, indicating that this is a methodological rather than a regional difference.

Time spent in adult education activities is slightly higher in the CARB data, while time spent in organizations (especially religious activity) is lower than in the national data. Time spent in social activities is much the same in both samples although CARB respondents reported much more time going to fairs and other entertainment events. Californians reported more time in active sports activities,

but slightly less time in outdoor activities like hunting and fishing. Reported time spent in domestic crafts was lower in California.

Finally, with regard to communication activities, reported time spent listening to radio was lower in the CARB study, but was slightly higher for listening to recordings. Californians spend more time reading, especially periodicals, but less time in family telephone conversations. Relaxing and thinking time is slightly higher in the CARB survey, as is travel related to communication activities.

Overall average travel time is about 18% higher in California than nationally. That is mainly due to the travel times in connection with work, going to shops and restaurants and travel related to communication and personal care.

We now turn to an examination of how these differences are related to gender.

Men: The first pairs of columns of Table 6-2 show the same comparisons as Table 6-1 but for the male portion of the two samples; female differences are shown in the second pair of columns in Table 6-2. It can be seen that the longer work times in the CARB data hold for men and women, while the greater work travel times (both to work and during work) are greater in California men but not California women.

Times reported for doing housework tasks tend to be more similar for men in the two samples, although still lower in California for cleaning house and for plant care, and higher for outdoor yard work. A general similarity in national and California data is found for child care activities and for shopping, although time for shopping, travel, and obtaining government services is longer in California.

The same differences in personal care in Table 6-1 are found again for men in Table 6-2, with California men spending more time eating out and related travel but less time in dressing and grooming activities (but not washing activities). Sleep and nap times are about the same in the two samples.

Adult education and organizational activities are also similar in time expenditure across the California and national samples of men, and the same holds true for most

**Table 6-2. Differences in Average Time Per Day Spent in
Activities Between California and National Studies by Gender
(Minutes Per Day for Age 18-64)**

		MEN		WOMEN	
		Calif 1987/88 n = (639)	Nat 1985 (921)	Calif 1987/88 (720)	Nat 1985 (1059)
00 - 49	NON-FREE TIME				
00 - 09	PAID WORK				
00	(not used)				
01	Main job	280	271	168	159
02	Unemployment	1	1	*	1
03	Travel during work	13	NR	3	NR
04	(not used)	-	-	-	-
05	Second job	4	4	3	2
06	Eating	7	10	4	6
07	Before/after work	2	3	1	1
08	Breaks	2	3	2	2
09	Travel to/from work	37	31	19	19
10 - 19	HOUSEHOLD WORK				
10	Food preparation	13	14	44	55
11	Meal clean-up	4	4	17	18
12	Cleaning house	6	9	36	38
13	Outdoor cleaning	13	10	4	4
14	Clothes care	2	2	13	19
15	Car repair/maintenance (by R)	8	10	3	1
16	Other repairs (by R)	10	11	6	2
17	Plant care	1	7	4	4
18	Animal care	3	4	4	6
19	Other household	8	8	6	8
20 - 29	CHILD CARE				
20	Baby care	1	2	6	13
21	Child care	2	2	12	8
22	*Helping/teaching	1	*	3	2
23	Talking/reading	1	1	1	2
24	Indoor playing	2	2	3	4
25	Outdoor playing	2	1	2	2
26	Medical care - child	0	*	*	1
27	*Other child care	1	1	4	2
28	At Dry cleaners	*	NR	*	NR
29	Travel, child care	2	2	5	6
30 - 39	OBTAINING GOODS AND SERVICES				
30	Everyday shopping	4	5	12	10
31	Durable/house shop	13	13	25	21
32	Personal services	*	1	2	1
33	Medical appointments	2	2	2	3
34	Govt/financial services	3	1	2	2
35	Car repair services	2	1	1	*
36	Other repair services	0	1	*	1
37	Other services	3	2	2	2
38	Errands	*	1	1	1
39	Travel, goods and services	21	17	26	21
40 - 49	PERSONAL NEEDS AND CARE				
40	Washing, etc.	22	22	20	29
41	Medical care	2	*	4	1
42	Help and care	2	4	5	5
43	Meals at home	44	50	45	50
44	Meals out	26	21	27	20
45	Night sleep	471	489	489	488
46	Naps/day sleep	17	17	14	17
47	Dressing, etc.	17	26	31	32
48	N.A. Activities	2	12	2	11
49	Travel, personal care	25	15	18	12

NR = Not Recorded in National Survey

* = Less than 0.5 min. per day

**Table 6-2. Differences in Average Time Per Day Spent in
Activities Between California and National Studies by Gender— cont'd.
(Minutes Per Day for Age 18-64)**

		MEN		WOMEN	
		Calif 87/88 n = (839)	Nat 1985 (921)	Calif 87/88 (720)	Nat 1985 (1059)
50 - 99	FREE TIME				
50 - 59	EDUCATION AND TRAINING				
50	Students' classes	10	7	8	4
51	Other classes	1	3	1	3
52	(not used)	-	-	-	-
53	(not used)	-	-	-	-
54	Homework	10	8	7	6
55	Library	*	*	*	1
56	Other education	1	1	1	*
57	(not used)	-	-	-	-
58	(not used)	-	-	-	-
59	Travel, education	3	2	3	2
60 - 69	ORGANIZATIONAL ACTIVITIES				
60	Professional/union	0	*	0	1
61	Special interest	*	1	*	1
62	Political/civic	0	0	0	*
63	Volunteer/helping	1	1	1	1
64	Religious groups	*	1	2	3
65	Religious practice	5	5	4	9
66	Fraternal	0	*	0	*
67	Child/ youth/family	*	0	1	*
68	Other organizations	2	1	3	1
69	Travel, organizations	3	3	2	4
70 - 79	ENTERTAINMENT/SOCIAL ACTIVITIES				
70	Sports events	3	2	1	2
71	Entertainment, events	2	2	2	1
72	Movies	1	2	4	4
73	Theatre	*	1	1	1
74	Museums	*	*	1	*
75	Visiting	26	24	25	26
76	Parties	5	6	7	8
77	Bars/lounges	6	9	2	4
78	Other social	*	1	*	1
79	Travel, events/social	14	17	12	15
80 - 89	RECREATION				
80	Active sports	20	30	6	8
81	Outdoor	5	10	2	4
82	Walking/hiking	6	4	3	3
83	Hobbies	1	3	*	*
84	Domestic crafts	1	2	5	9
85	Art	1	1	*	2
86	Music/drama/dance	4	2	2	1
87	Games	4	6	6	8
88	Computer use	4	2	3	4
89	Travel, recreation	7	9	4	4
90 - 99	COMMUNICATION				
90	Radio	1	4	1	2
91	TV	129	137	132	117
92	Records/tapes	3	1	2	1
93	Read books	3	5	6	9
94	Reading magazines/other	12	11	20	9
95	Reading newspaper	12	10	11	9
96	Conversations	11	17	20	31
97	Writing	8	6	8	10
98	Think, relax	9	6	9	6
99	Travel, communication	4	*	5	*
Total Travel		118	96	94	83
(Codes 09, 29, 39, 49, 59, 69, 79, 89, 99)					

social activities. California men do report more time at bars and lounges than the men in the national sample, as well as less time in fishing-hunting type outdoor activities and in hobbies and crafts activities.

California men report a little less time watching television than men nationally, and less time listening to the radio as a primary activity; they report more time listening to records and tapes and relaxing. Conversation time is also lower in the CARB data.

California men spent almost 20% more time in all categories of travel time than do men in the national sample.

Women: The second pairs of columns in Table 6-2 show the parallel comparisons for women. It can be seen that California women report more time working than in the national sample, but about the same time commuting to work. They also report less time in housework activities, particularly cooking and doing laundry and in caring for children than women nationally. On the other hand, women in the CARB sample spend slightly more time in repair and maintenance activities (especially for non-grocery items) and in shopping-related travel.

Patterns of time spent in various personal care activities are much the same as they are in Table 6-1 for men and women together, although with much less time on washing as well as on grooming. As in Table 6-1, women in California report more time eating out and less time eating meals at home. Unlike the situation for men, women in California spend more time sleeping.

California women report slightly more time taking classes than women nationally. They spend much less time on religious activities, but they spend much more time going to entertainment events than women nationally. They report less time than women nationally on sewing and other domestic hobbies and on hunting- fishing type outdoor activities.

California women report more 15 minutes more time watching television per day than women in the national sample. Unlike the men in the California sample, they spend somewhat more time reading; but like California men, they report less time

on family and telephone conversations than is true nationally and also more time in relaxing and thinking activity than is true for women nationally.

Women in California spend about 10% more time traveling than women in the nation as a whole.

In summary, many of the patterns of differences found for the California and national samples in Table 6-1 are replicated in the separate patterns of time durations found for men and women in Table 6-2. Both male and female respondents in the CARB study report more time doing work, eating meals at home, dressing and grooming, engaging in family and telephone conversations, and thinking/relaxing than is found nationally. Male and female California respondents also reported more time eating meals away from home and in travel. The greater travel times were related to travel for shopping, for eating out and for communication and not-ascertained activities for both men and women.

On the other hand, some marked gender differences were found in Table 6-2. The lower housework, washing, domestic crafts, and religious activities in California are, however, primarily found among women. This is also true for the higher shopping and sleeping times—and the higher adult education, TV viewing, and reading times—in the California data. On the other hand, the greater time spent commuting to work and listening to the radio and lower time in plant care are mainly concentrated within the male portion of the CARB sample. The differential in overall travel times in the California and national data sets are twice as high among California men as among California women.

Location Differences: The data on time spent in various locations in the California and national samples are shown in Table 6-3. The first pair of columns shows the overall California and national comparisons. The next pair of columns (third and fourth) shows the comparison for the male portion of the sample and the final pair of columns (fifth and sixth) for the female portion. In general, the rows of location time are divided into three general categories: time at home (CARB codes WC01-13), time away from home (CARB codes 21-40) and travel time (CARB codes 51-61).

**Table 6-3. Difference in Average Time Per Day in Different
Location, Total Sample and by Gender
Between California and National Samples (Minutes Per Day Age 18-64)**

		TOTAL		MEN		WOMEN	
		California 1987 - 88 (n = 1359)	National 1985 (n = 1980)	California 1987 - 88 (n = 639)	National 1985 (n = 921)	California 1987 - 88 (n = 720)	National 1985 (n = 1059)
AT HOME	Variable						
Kitchen	WC01	72	96	46	56	96	135
Living Room	WC02	189	137	181	136	196	160
Dining Room	WC03	19	14	18	10	22	18
Bathroom	WC04	33	36	27	27	38	43
Bedroom	WC05	508	503	481	478	534	531
Study	WC06	7	8	8	10	6	7
Garage	WC07	10	3	14	5	6	1
Basement	WC08	*	5	*	4	*	6
Utility Room	WC09	2		1	0	3	5
Pool, Spa	WC10	1	NR	1	NR	1	NR
Yard	WC11	27		33		21	
Room to Room	WC12	21	137	9	180	34	118
Other NR Room	WC13	3		3		4	
Total At Home	WC01 - 13	892	954	822	886	963	1022
AWAY FROM HOME							
Office	WC21	86	204	78	261	94	155
Plant	WC22	42		73		12	
Grocery Store	WC23	13	26	12	18	14	33
Shopping Mall	WC24	35		30		40	
School	WC25	27	16	25	13	29	11
Other Public Places	WC26	14	12	18	13	10	11
Hospital	WC27	17	NR	9	NR	24	NR
Restaurant	WC28	30	20	35	22	25	18
Bar-Night Club	WC29	10		15		5	
Church	WC30	6	10	7	8	5	11
Indoor Gym	WC31	4	NR	4	NR	4	NR
Other's Home	WC32	61	44	60	42	61	45
Auto Repair	WC33	11	NR	18	NR	4	NR
Playground	WC34	12	16	16	27	8	16
Hotel-Motel	WC35	8	NR	7	NR	8	NR
Dry Cleaners	WC36	1	NR	*	NR	1	NR
Beauty Parlor	WC37	2	NR	*	NR	4	NR
Other Locations	WC38	2	NR	3	NR	1	NR
Other Indoor	WC39	12	32	17	41	7	24
Other Outdoor	WC40	37	20	60	NR	13	NR
Total Away	WC21 - 40	430	384	487	445	371	324
TRAVEL							
Car	WC51	76	81	76	86	77	77
Van	WC52	20		30		11	
Walking	WC53	9	13	10	15	8	10
Bus Stop	WC54	1		*		1	
Bus	WC55	4	13	6	15	2	10
Rapid Train	WC56	1		1		2	
Other Travel	WC57	1	13	2	15	1	10
Airplane	WC58	1		1		*	
Bicycle	WC59	1	13	1	15	*	10
Motorcycle	WC60	1		2		*	
Other or Missing	WC61	1		1		*	
Total In Travel	WC51 - 61	116	94	130	101	102	87
Not ascertained	WC99	2	8	1	8	4	7
TOTAL		1440	1440	1440	1440	1440	1440

* Less than 0.5 minutes per day
NR = not reported

In terms of time spent at home, respondents in the national sample report almost half an hour more time in the kitchen of the home, while the California sample reports about a half hour more time in the living room or den. The two samples show rather similar times spent in dining rooms, in bathrooms, in bedrooms and in an office/study in the home. Times spent in laundry rooms or utility rooms are also about the same.

The California sample reported considerably more time in garages and basements than the national sample. The little time spent in laundry/utility rooms are about the same in the two samples.

Times spent outdoors and in other indoor locations in or near the home (code 00 in the national study location code, as shown in Appendix B) are very difficult to compare in these data sets, because, as noted above, time spent in outdoor locations was not clearly distinguished in the national survey. Some 124 minutes per day was coded in location code 00, which included outdoor as well as general or unspecified locations near the home. Overall, all such times in such residual categories (which includes indoor as well as outdoor activities) is far greater in the national sample (137 minutes = 124 in code 00 + 3 in code 09 + 10 in code 19) than in the California sample (27 minutes). This residual code, in fact, accounts for most of the 58 minute greater time in all at-home locations in the national sample (954 minutes) than in California (894 minutes).

Turning to time spent away from home (exclusive of its related travel), time reported in offices and plants is considerably higher at general “work” locations in the national sample. Much of this difference, however, is due to certain coding conventions employed in the CARB study; respondent work times while employed at stores, restaurants, etc. in the CARB study were coded in terms of these specific locations rather than as at “the work place”. This, in turn, would account for the larger times in California spent in grocery stores and shopping malls. Time spent in schools and other educational settings are higher in California while the reported time spent at other public places is about the same. (All of the above patterns could change if one were to analyze these location differences using *both* the location and activity data in combination — an analysis task that is outside the scope of the present

report and of our intention here to highlight the differences in the straightforward univariate coding of the two data sets.)

Time reported in restaurants and bars is higher in California, consistent with the activity findings for eating out in Table 6- 1. Time spent in other people's homes is also higher in California. Time spent in churches and other religious buildings is less in California than nationally, consistent with the Table 6-1 averages reported for religious activity time in the California sample.

Comparisons of time in the remaining away-from-home location categories are very difficult to make between the two surveys, given the large differences in coding conventions in the two studies. Nonetheless, the data suggests that Californians spend overall more than 40 minutes more each day in these away-from- home locations than is found nationally.

Consistent with their greater travel activity times in Table 6-1, Californians also spend more time in transit than is true nationally. Most of this seems to be accounted for by time spent inside automobiles or motor vehicles. The travel times in Table 6-3 are greater than in Table 6-1 because travel as part of other activities (e.g., work, taking a walk) is included as travel in the "where" code.

In general, these overall findings in the first two columns of Table 6-3 are replicated for the separate figures for both men and women as shown in the last four columns of Table 6-3. The times spent at home between women in the national and California samples (59 minutes difference = 1022-963) is about the same as among men (64 minute difference, 886-822). The same gap is true for time spent in "other" outdoor locations away from home, with California men spending far more time there than is found nationally. The greater male-female gap is also true for time spent traveling; main factors here are the greater times California men spent in travel while doing work, and in walking/jogging; both are again coded as travel locations in the CARB study and are not broken out separately in the national study.

Revised Location Codes: The Table 6-3 analysis of the many gaps in the location data for the Table 6-3 data stands in marked contrast to the basic similarities found for the activity data in Tables 6-1 and 6-2. This suggests the need for a reanalysis

of the location data from the national survey with these differences in mind. In order to make the location coding for the 1985 study more consistent with that used in the California study, the location data for the mail-back diaries in this study were subjected to a limited recoding at the Survey Research Center of the University of Maryland during the spring and summer of 1990. This was not done for the telephone and personal interviews because of the different coding procedures and the irretrievability of certain data from the telephone and personal diaries.

For this recoding exercise, a new and expanded coding scheme was developed. While largely based on the original code, the new code had a clearly defined and mutually-exclusive category for activities done outside in yards and other outdoor locations at or near the home. This is the new code 00 shown at the top of Table 6-4; Table 6-4 also shows the other new code categories alongside the old ones, with new categories designated in capital letters and noted with an asterisk in this table.

In this recoding exercise, it was necessary for coders to use the activity reports as a guide to understanding where the activity was likely to have taken place. To make the exercise maximally interpretable, strong assumptions were made about certain activities. As shown in Table 6-4 in parentheses, unless otherwise specifically noted by the respondent, all personal hygiene was coded as taking place in a bathroom, all sleeping and grooming in a bedroom, all TV in a family room, all cooking and eating in a kitchen, and all clothes care in a laundry/utility room. To the extent that these assumptions are not accurate, the results of the subsequent analyses are subject to question. Nonetheless, these are not unreasonable assumptions and represent the best current estimate of where vast amounts of unclear location time was spent.

It can be seen that in addition to the new category for at-home outdoor activities, at-home activities done in hallways (code 14), in "other" rooms in the home (code 17), and in multiple rooms or the whole house (code 18) are also distinguished. A final at-home category (code 19) was added to identify activities for which the coders could not tell whether the activity was done inside or outside the home. Further distinctions were added for other travel modes—buses (code 23),

**Table 6-4. Revised Location Codes for Time Diaries
(New Codes Noted with Capitals and with Asterisk)**

HOME	<ul style="list-style-type: none"> * 00 = RESPONDENT'S YARD/DRIVEWAY/GENERAL /OUTDOOR 01 = Basement/Cellar 02 = Bathroom (Washing, Shower, Etc.) 03 = Bedroom (Sleep, Getting Ready, Etc.) 04 = Dining Room 05 = Computer Room 06 = Den 07 = Family Room/Front Room/ Living Room (TV, Etc.) 08 = Gameroom/Recreation Room 09 = Garage 10 = Kitchen (Eating, Cooking) 11 = Laundry/Utility Room (Washing Clothes, Etc.) 12 = Office/Study 13 = Porch * 14 = HALL * 17 = OTHER ROOM INSIDE HOUSE * 18 = SEVERAL ROOMS/WHOLE HOUSE * 19 = OTHER HOME-UNCLEAR INDOOR/OUTDOOR
TRAVEL	<ul style="list-style-type: none"> 20 = Transit (N.A. Mode) 21 = Car 22 = Truck/Van * 23 = BUS * 24 = TRAIN/SUBWAY * 25 = WALKING, HIKING, JOGGING, BIKING * 26 = OTHER MODE * 27 = AIRPLANE
OTHER	<ul style="list-style-type: none"> * 30 = WORK, PLACE NOT KNOWN * 31 = OFFICE * 32 = FACTORY, PLANT * 33 = INDOOR WORK SITE * 34 = OUTDOOR WORK SITE * 35 = HOSPITAL * 36 = CONSTRUCTION SITE * 40 = FRIEND'S/RELATIVE'S HOME – INSIDE * 41 = FRIEND'S/RELATIVE'S HOME – OUTSIDE 50 = Restaurant/Bar/Fast Food Place 60 = Indoor Place of Leisure (Hotel) 70 = Outdoor Place of Leisure (Park) * 79 = MISSING 80 = School 81 = Church 82 = Stores/Shopping Centers/Beauty Parlors, Etc. 83 = Banks/Offices/Library, Etc. * 84 = REPAIR SHOP * 88 = OTHER – OUTDOOR * 89 = OTHER – INDOOR * 90 = CANNOT TELL INDOOR/OUTDOOR * 99 = NA-REF (ABSOLUTELY CANNOT TELL OR GUESS)

trains/subways (code 24), walking and biking and the like (code 25), airplanes (code 27) and other modes (code 26).

An attempt was also made to refine work location codes into offices (code 31), factories or plants (code 32), other indoor work sites (code 33) and hospitals (code 36); construction sites (codes 36) and other outdoor workplaces (code 34) were also distinguished. Time spent inside (code 40) and outside (code 41) at another person's home were distinguished, as well as time spent at repair shops (code 84). Finally, uncertain or missing codes were assigned either as missing (code 79), other outdoors (code 88), other indoors (code 89), unclear about whether indoors or outdoors (code 90) and not ascertained/refused (code 99).

This revised code was then applied in recoding locations that had been coded into one of the nine most ambiguous categories in the original 1985 coding: 00 (outdoors and non-specified rooms at home), 09 (garages), 13 (porches), 20 (transit mode not ascertained), 22 (other transit), 30 (work), 40 (friends'/relatives' homes) and 89 (other). These locations were identified through computer sorting and the coders reexamined the original handwritten diary for each respondent and recoded the location for that respondent's activity into the most appropriate of the categories in Table 6-4. That code was then added to the new data file for each respondent, making it possible to sort these revised location codes by the old code, by activity or any other factor originally coded.

The results of this recoding exercise are shown in Table 6-5 where the entries represent aggregate minutes per day across the 18-64 age sample of 1980 mail-back diaries. Thus, the entry 113,591 (minutes) in the first row and column of that table indicates that this is the total number of minutes after recoding that was spent in outdoor activities at or near the home; that is, it was coded both as 00 in the original code and as 00 in the revised code. That is the second largest entry in Table 6-5, with a slightly larger entry (125,474 minutes) being found in Table 6-5 for multiple rooms inside the home (code 18). Additional large entries are found in the first column of Table 6-5 for bedrooms (mainly for the activity of sleeping), for family rooms (mainly for TV viewing), for the kitchen (mainly for cooking) and for missing

Table 6-5. Location Recode Results
Total Minutes Per Day (n = 1980)

Revised Code	Original Code*							
	00	09	13	20	22	30	40	88
0 Outdoor	113591	0	0	0	0	0	0	25
1 Basement	504	15	0	5	0	0	135	0
2 Bathroom	5587	480	0	170	40	690	237	15
3 Bedroom	51780	80	10	125	122	195	1872	975
4 Dining	2328	0	30	53	0	10	55	0
5 Computer	15	0	0	0	0	0	0	0
6 Den	1202	275	80	0	0	0	75	0
7 Family	30684	140	105	50	324	490	2417	150
8 Gameroom	130	0	0	0	0	0	0	0
9 Garage	334	8970	0	0	0	0	45	0
10 Kitchen	15583	30	80	75	188	1000	411	210
11 Laundry	2175	0	30	0	0	345	0	105
12 Study	245	0	0	0	0	0	0	0
13 Porch	1195	0	10120	0	0	0	0	0
14 Hall	343	0	0	10	0	0	0	0
17 Other	2498	0	0	15	0	1971	0	15
18 Multiple rooms	125474	115	5	155	88	180	568	305
19 Other	15449	0	0	10	0	0	0	0
20 Transit	1118	0	0	34879	2398	20	255	285
21 Car	578	10	0	908	588	810	50	45
22 Truck/Van	38	0	0	18	24887	480	0	0
23 Bus	42	0	0	175	7145	945	40	30
24 Subway	17	0	0	0	1157	0	0	0
25 Walking, etc.	1180	0	0	419	3508	585	5	125
26 Other mode	0	0	0	0	721	785	0	0
27 Airplane	0	0	0	0	8990	0	0	0
30 Work	2540	330	0	1045	620	390502	0	970
31 Office	120	0	0	10	0	47502	0	195
32 Factory	0	0	0	0	0	10157	0	375
33 Indoor Site	0	0	0	0	0	0	0	0
34 Outdoor Site	550	0	0	0	0	689	0	600
35 Hospital	0	0	0	0	0	4540	10	1768
36 Construction	0	0	0	0	0	2053	0	35
40 Inside Friend's House	1588	95	0	132	11	2120	127534	107
41 Outside Friend's House	510	0	30	0	0	0	1332	150
50 Restaurant	255	0	0	395	128	5147	53	15
60 Hotel, etc.	205	0	0	0	25	2734	860	10263
70 Park, etc.	341	0	0	165	53	0	30	885
79 Missing	0	0	0	0	0	0	0	0
80 School	355	0	0	33	0	3718	0	675
81 Church	70	0	0	0	0	480	0	295
82 Stores	805	0	0	180	0	8414	45	1573
83 Banks	30	0	0	0	0	690	120	539
84 Repair	130	240	0	0	0	2092	0	240
88 Outdoor, other	3230	0	0	15	90	1300	0	3155
89 Indoor, other	620	0	0	127	0	570	60	27983
90 Unclear	515	0	0	0	0	0	0	2370
99 Not Ascertained	8672	113	0	140	0	90	0	180
	391390	8853	10450	39307	42761	491284	136009	54858

* Appendix B

locations (mainly when the location was completely unclear either from the location or activity information provided in the original diary).

This first column of Table 6-5 is of major interest because it helps to pinpoint how the 124 minutes of “unclear at home” location time in the 1985 national survey (which is part of the bracketed residual home category in the second column of Table 6- 3) was spent. Taking the 113,591 minute per day figure and dividing by the column total of 391,390 minutes gives a proportion of roughly 30% of all time in this original code 00 category that was recoded as being actually outdoors. Multiplying this 30% by the 124 minutes gives a new figure of about 37 minutes in yards and other outdoor locations at home. Similarly calculated, the new estimated figures for time spent in multiple rooms in the home works out to 40 minutes, for the bedroom to about an additional 17 minutes per day, for the family room or living room to an additional 10 minutes per day, for kitchens to an additional 5 minutes per day and for still unclear locations (code 19) to an additional 5 minutes per day.

The changes for the other eight originally ambiguous categories (categories 09, 13, 20, 22, 30, 40 and 89) in Table 6-5 are not as dramatic as those for code 00. Thus, 79% (6970/8853) of the time originally coded as being spent in garages was recoded as garages, as was 97% of the time coded as porches and almost 90% of the time spent in non-ascertained vehicles. Most (58%) of the “other vehicle” code was recoded as time spent in trucks or vans. Most (79%) of the times spent at work locations again could not be sorted into more exact categories – and of those that could, relatively little was spent at construction sites or other outdoor locations. Of time spent at friends’ and relatives’ homes, 94% was recoded as inside that residence and only 1% as outdoors. Most (51%) of the “other” location times remained as “other indoor”; in terms of its indoor/outdoor character, about 6% of those that could be sorted fell into one of the outdoor types of facilities (mainly in the “other outdoor category”).

The end result of all these recodings as far as the overall location coding is concerned is shown in Table 6-6. The main general result is that time spent outdoors at the home is actually larger in the national study (37 minutes per day)

**Table 6-6. Revised Time Spent in Different Locations in
National Study Compared to California Study
(Minutes Per Day for Age 18-64)**

		TOTAL	
		California 1987-88 (n = 1359)	National 1985 (n = 1980)
Variable			
Kitchen	WC01	72	104
Living Room	WC02	189	158
Dining Room	WC03	19	15
Bathroom	WC04	33	38
Bedroom	WC05	508	521
Study	WC06	7	8
Garage	WC07	19	2
Basement	WC08	*	5
Utility Room	WC09	2	4
Pool, Spa	WC10	1	NR
Yard	WC11	27	37
Room To Room	WC12	21	40
Other NR Room	WC13	3	22
TOTAL AT HOME	WC01-13	892	954
Office	WC21	86	} 193
Plant	WC22	42	
Grocery Store	WC23	13	} 30
Shopping Mall	WC24	35	
School	WC25	27	15
Other Public Place	WC26	14	12
Hospital	WC27	17	3
Restaurant	WC28	30	} 23
Bar-Nightclub	WC29	10	
Church	WC30	6	10
Indoor Gym	WC31	4	NR
Other's Home (Inside)	WC32	61	43
Auto Repair	WC33	11	1
Playground, Park	WC34	12	20
Hotel-Motel	WC35	8	NR
Dry Cleaners	WC36	1	NR
Beauty Parlor	WC37	2	NR
Varying Locations	WC38	2	NR
Other Indoor	WC39	12	24
Other Outdoor	WC40	37	6
TOTAL AWAY	WC21-40	430	383
Car	WC51	76	} 88
Van/Truck	WC52	20	
Walking	WC53	9	2
Bus Stop	WC54	1	} 3
Bus	WC55	4	
Rapid Train	WC56	1	1
Other Travel	WC57	1	*
Airplane	WC58	1	1
Bicycle	WC59	1	NR
Motorcycle	WC60	1	NR
Other Or Missing	WC61	1	NR
TOTAL IN TRAVEL	WC51-61	116	94
Not ascertained		2	9
TOTAL		1440	1440
Time Outdoors		88	70

* Less than 0.5 minutes per day

than in California (27 minutes per day), as is time spent in multiple rooms in the home (40 minutes vs. 21 minutes in California). The gap in time spent in kitchens increases (72 to 104 minutes nationally), but the gaps in other locations tend to close: by 10 minutes for living rooms (189 vs. 158 minutes nationally), by 1 minute for dining rooms (19 vs. 15 minutes) as is true for bedrooms (508 vs. 521 minutes nationally) because the greater sleeping time picked up in the recoding process.

The times spent in away-from-home locations in Table 6-6 are much the same as they were in Table 6-3, mainly because so little further distinction could be made for these other codes after the recoding process.

One new calculation is shown at the bottom of Table 6-6 and that is for the total time spent at outdoor locations. It is the sum of WCs (Where Codes 10, 11, 34, 40, 53, 54, 59, 60, and 61). This sum works out to 88 minutes per day for the CARB data and only to 70 minutes for the national data. However, examination of the individual categories shows that virtually the entire 30 minutes difference is accounted for in the "other outdoor" category in the CARB data. A very large portion of the 37 minutes per day in the CARB data can be linked to time spent working in outdoor locations in that data set. Including such outdoor work activity in the national data set may well have closed the gap. Such a step can only be done approximately from the national data (e.g., by extrapolating from the respondent's occupation), since no such indoor-outdoor distinctions were requested of respondents in the 1985 national study.

Table 6-7 shows these recoded location data from the national sample from a somewhat different perspective, by demonstrating the unexpectedly wide range of activities that are performed in outdoor locations near the home. It brings home the difficulty that analysts face in predicting locations from activities. This cross-tabulation of activities by location does show that most of the types of activities that one expects to be outdoor activities are, in fact, the one most likely to be performed outdoors. Thus, among household activities (which take up more than half the time spent outdoors near the home), yard work (15%) and plant/pet care (16%) are the activities that fall mainly into the outdoor category. However, almost as much "indoor-type" as outdoor-type housework activity is done

Table 6-7. Proportion of All Time Spent Outdoors at or Near Home by Activity (1985 National Data)

Activity		Percent of Outdoor Time By Activity	Sub Total (%)
00-08	Work	7	7
10	Cooking	1	
11-12	Cleaning	5	
13	Yard work	15	
14	Laundry	2	
15-16	Repairs, Maintenance	11	
17-18	Pet/plant care	16	
19	Other household	6	
	TOTAL HOUSEWORK		56
20-28	Child care	3	3
30-39	Shopping	*	
40-42	Personal care	2	
43-44	Eating	2	
45-46	Sleeping	5	
	TOTAL PERSONAL		9
50-58	Education	*	
60-68	Organizations	1	1
70-74	Cultural events	*	
75-78	Visiting/social	2	
	TOTAL CULTURE AND SOCIAL		2
80-82	Sports/Walking	3	
83-88	Hobbies	5	
	TOTAL SPORTS AND HOBBIES		8
91	TV	6	
90, 92-95	Reading	2	
96-99	Talking	3	
98	Relaxing	3	
	TOTAL COMMUNICATION		14
		TOTAL	100

* Less than 0.5%

outdoors—such as cooking outside (1%), cleaning carpets and other nousehold objects outside (5%), putting laundry out to dry or other clothes care (2%), repairing appliances/other household objects outside (11%) and performing household management tasks outside (6%).

As expected, one also finds a fair amount of outdoor time near the home in Table 6-7 spent on sports activities (3%), on (mainly play) activities with children (2%), on meals (2%) and on relaxing (3%). But more outdoor time is on hobby activities (5%), and watching TV (6%) than on any of these “usual” outdoor activities. Six percent of home outdoor/yard time is even spent sleeping and 7% doing paid work, which further illustrates how little these “usual outdoor” activities take up the time that people spend outdoors near the home.

7.0 SYNOPSIS OF NATIONAL-CALIFORNIA DIFFERENCES

In this report, we have reviewed data on the methodological background and results from the California (CARB) time activity study and from the 1985 national study of Americans' Use of Time conducted at the University of Maryland, College Park. In order to facilitate comparisons, data from the national study were recoded to be as comparable as possible to the California code categories. For the same reason, analysis was restricted to the 18-64 age group.

In general, the data on average durations of activity matched up rather well across the two samples. Californians tended to report more average time at work and commuting to work in their diaries than was true nationally. They also reported less average time doing housework and caring for children than was found nationally. Time spent shopping in the CARB study was slightly higher. In general, the above California-national differences in family care activities (housework, child care, sleeping) were higher among women than among men across the two samples.

CARB respondents also reported more time sleeping and eating meals away from home than respondents in the national sample. CARB respondents reported less time working and grooming and eating meals at home; they also reported less not-ascertained time, mainly due to the telephone method of data collection. These differences also tended to be greater among women than among men.

Californians also spent more time in attending fairs and other entertainment and reading than was true in the national sample, and these differences were also more pronounced among women in the two samples. At the same time, Californians also reported more time traveling. This difference was mainly found among men.

Despite these differences, the two data sets showed remarkably similar overall patterns of activity. This was less true for the location codes. Several sources of discrepancy were found in the comparisons of these data, including time spent in automobiles vs. other modes of transit. In terms of time spent at home, CARB respondents reported about an hour less time at home per day than national respondents, with about 40 minutes more time in away-from-home locations and 20 minutes more time in travel. CARB respondents report more time at home in

living rooms/family rooms and garages and less time in kitchens and basements than was true in the national sample.

A recoding of the location data from the national study provided some resolution of the differences that were found, but several anomalies remained — particularly the greater amounts of time spent in yards and other outdoor sites at the home in the national study. That could be explained by smaller yards or more crowded housing conditions in California, but the result clearly needs further study. Overall, however, CARB respondents reported more time outdoors (about 88 minutes per day vs. 70 minutes for the national sample), but much of this greater time appeared as paid work outdoors which was not ascertained from the national data. The only way to retrieve estimates of the total amount of paid work time that was spent outdoors from the diaries is to make some strong assumptions based on the respondents' reported occupations.

The strong comparability of the figures on average time for the activity data do indicate that the California data could be used to generate a better set of location codings for the national data. It also means that the CARB data on specific exposure (e.g. passive cigarette smoke, gasoline and service station visitations) collected in California may have national implications. Nonetheless, the only way to be certain of this conclusion would be to conduct a separate new national study — one that could build and expand upon the developmental work initiated in the California study that designed a diary specifically oriented to exposure assessment needs.

One might also conduct further analyses of these existing data sets to further examine differences, but to control (as covariates in analysis of variance and covariance) for the respondent's occupation, household composition (e.g., children) and other demographic differences. The relationships between specific exposures and activities and locations reported in the CARB study could also be analyzed.

The analyses thus far described in this report are for the total durations of time spent in each location/activity category. Also important for exposure assessment

and modeling is the identification of the specific time(s) of day when these activities occur. Many outdoor air pollutants exhibit diurnal patterns and peak periods and it is important to know whether exposures occurred during morning/evening peak traffic periods (for exposure to CO, NO₂, and probably benzene) or during the mid-day (for O₃ and other photochemical species). Further analyses of this kind should be feasible with the existing data sets.

More can also be learned by cross-tabulating the activities with locations to identify the rare combinations and those that are not of interest from an exposure perspective. This has the advantage of also identifying combinations that are unlikely or that may indicate errors in reporting or in coding.

8.0 CONSTRUCTING A CODE FOR MICROENVIRONMENTS

A major reason for analyzing time-diary data is to estimate time spent in various microenvironments. Microenvironments refer neither solely to activities nor solely to locations but to the combinations of activities and locations that yield potential exposures. In some cases, it is the activity that is the more important determinant of likely exposure (as in activities that likely require more exertion or that involve use of pollutants). In other cases, it is the location that is more important (as in locations in which pollutant concentrations are likely to be higher—such as being in automobiles, dry cleaning establishments, bars and kitchens).

In the analysis below, a set of 16 separate microenvironments were defined for the purpose of comparing the estimates from the U.S. national and CARB studies. It needs to be emphasized that this 16-category set of distinctions is intended only as an initial, exploratory breakdown for general comparison purposes. It is in no way intended as a definitive or ideal coding scheme, since that will vary with the particular pollutants under consideration or the particular behavioral assumptions the analyst wishes to make.

Thus, in our Table 8-1 collapsed activity code, we group all child-care activity with housework, even though some of these child-related activities may involve strenuous play activity (activities 24 and 25) or medical care (activity 26). Similarly, we group attending sports events, playing music and doing hobbies with TV viewing, even though these may involve higher breathing rates or more physical exertion than TV. We leave such distinctions to future analysts, who will be in a better position to judge which assumptions they feel comfortable in making or which pollutants they wish to model.

In the same way, we have included bathrooms and basements with “other rooms” in the house—even though, for modeling VOC exposures, time in the bathroom should be treated separately and even though time spent in basements is crucial for modeling radon exposures. In much the same way, analysts may wish to separate hospitals and beauty parlors from “other indoor” locations when modeling exposure to benzene or other pollutants.

**Table 8-1. Collapsed Activity Codes Used to Construct
Microenvironments Code**

Activity	1985 National Codes	1987 - 88 CARB Codes	Relevance for Exposure Assessment
0 Travel	09, 29, 39, 49, 59, 69,79, 89, 99	03, 09, 29, 39, 49, 59, 69, 79, 89, 99	Potential exposure to carbon monoxide and benzene
1 Sleep	45, 46	45, 46	
2 Family & Personal Care	11-19, 20-28, 40, 41, 48	11-19, 20-28, 40, 41, 47, 48, 124, 165-169 474, 971	
3 Cook	10	10	Potential exposure to smoke and gas from cooking
4 Eat	06, 43, 44	06, 43, 44, 914, 954	
5 Shopping/ Errands	30-38	30-38	
6 Work/School	00-02, 05, 07, 08 50-58	01,02, 05, 07 08, 50-58	Highly elevated breathing rate
7 TV-Read-Resting	90-95, 97, 98, 70-74, 83-88	90-95, 97, 98, 70-74, 83-88,939-940	
8 Physical Activities	80-82	80-82, 801-830	
9 Social/ Cultural	75-78, 96, 87, 60-68, 42	75-78, 96, 87, 60-68, 42	

The set of 16 microenvironments derived in Table 8-3 from Tables 8-1 and 8-2, then, are proposed as an initial illustrative set of microenvironments rather than as the optimal set that could be constructed.

These 16 microenvironments were based on a collapsing of the original activity codes (see Table 3-1 and Appendix A) in the two studies from 90 + to 10 (in Table 8-1) and a collapsing of the original 34 - 44 location codes (see Table 3-2 and Appendix B) to 10 (in Table 8-2). The collapsing scheme for activities is shown in Table 8-1 and the 10 collapsed codes are shown in the ten rows of the table along with the applicable codes from the national and CARB studies. The parallel location reduced codes are shown in Table 8-2. A brief rationale for certain distinctions is given in the final columns of Tables 8-1 and 8-2.

Cooking and eating activities are distinguished based on their likely proximity to smoke and gas used for cooking. Travel activities are isolated because of their higher likelihood of proximity to carbon monoxide and other by-products of internal combustion engines. Sports and physical activities are separated because of their elevated breathing rates.

The basis for the ten collapsed location codes is shown in Table 8-2, along with the specific location codes from the national and California studies. The first five codes refer to indoor locations. As the most likely sites for cooking activities and their by-products, the kitchen is the first environment that is distinguished. All other rooms inside a home are grouped in the next category, including rooms in friend's and other's homes that the respondent was visiting. Workplace locations comprise the third location code and bars/restaurants, etc. comprise the fourth — particularly because of the high likelihood of exposure to cigarette smoke and other smoke and gas. The fifth and final indoor location code includes a wide variety of "other" locations, including stores, churches, schools, offices and hotels; until more is learned about the likely exposure levels in these locations, there seems little reason to differentiate them here.

The next set of location codes includes outdoor settings. The main divisions here are between those activities that occur at or near home (mainly in the yard of one's

**Table 8-2. Collapsed Location Codes Used to Construct
Microenvironments Code**

Location	1985 National* Codes	1987 - 88 CARB Codes	Relevance for Exposure Assessment
INDOOR			
0 Garage/Auto Repair/ Dry Cleaners	09	07, 33, 36, 37	Potential high exposure CO and VOCs
1 Kitchen	01	01	Potential exposure to smoke and gas
2 Other Rooms	01, 02, 03, 04, 05, 06, 07, 08, 11, 12, 13, 14, 17	02, 03, 04, 05, 06, 08, 09, 12, 13	
3 Workplace	30-39, 80	21, 22, 25, 27	Potential exposure to several pollutants depending on job duties
4 Restaurant/Bar	50	22, 28, 29	High potential exposure to cigarette smoke, other smoke and gas
5 Other Indoor	40, 60, 81, 82, 83, 89, 99, 79	23, 24, 26, 27, 30, 31, 32, 35, 37, 38,39	
OUTDOOR			
6 Yard, Outside Residence	00,19	10, 11	Ambient exposure
7 Parks/Other	41, 70, 88, 90, 25	34, 40, 53, 54, 59, 60	Ambient exposure
IN VEHICLE			
8 Vehicle - Internal Combustion	20, 21, 22, 23,	51, 52, 55	Potential exposure to carbon monoxide and benzene
9 Other Vehicle	24, 26, 27	56, 57, 58, 61	

* Reduced Location Codes for Microenvironment

**Table 8-3. Derived Microenvironments for National
and CARB Data**

Activity (0-9)	Location (0-9)									
	Auto-places	Kitchen Residence	Res. Other Rooms	Off/ Fact School	Resaurnt Bar	Indoor Not Res.	Outdoor Res.	Outdoor Not Res.	Int. Comb Vehicle	Other Vehicle
Travel	1	0	15	15	0	15	13	13	3	4
Sleep	1	0	16	0	0	16	0	13	3	4
Household Work-Child	1	10	11	11	0	11	13	13	3	0
Cook	0	9	9	0	0	9	9	0	0	0
Eat	1	10	15	15	2	15	13	13	3	0
Shop/Errands	1	0	12	12	2	12	0	13	3	0
Work/Study	1	10	7	8	2	8	13	13	0	0
Leisure/Commun.	1	10	15	15	2	15	13	13	3	0
Physical Activity	1	0	6	6	0	6	5	5	0	0
Cultural/Social	1	10	14	14	2	14	13	13	3	4

MICROENVIRONMENTS

- | | |
|-------------------------------|-------------------------------------|
| 1 Autoplaces | 9 Cooking |
| 2 Restaurant/Bar | 10 Oth. Activities in Kitchen |
| 3 In Int. Cmbstn Vehicle | 11 House Hold Chores/Child Care |
| 4 In Non Int. Cobstn. Vehicle | 12 Shop/Errands |
| 5 Physical Activity Outdoor | 13 Other activities Outdoor |
| 6 Physical Activity Indoor | 14 Social and Cultural Activity |
| 7 Work/Study-Residence | 15 Leisure-Eat-Communication Indoor |
| 8 Wrk/Stdy-Not In Residence | 16 Sleep/Indoor |

home) and those that occur away from home (mainly at parks and playgrounds). These away-from-home outdoor locations almost always entail some travel to reach.

The final two locations concern travel modes. Code 8 contains those travel modes in which an internal combustion engine is involved—mainly automobiles, vans, trucks and buses. Code 9 includes all modes of travel that do not involve internal combustion engines.

When the ten activity codes in Table 8-1 and the ten location codes in Table 8-2 codes are cross-classified, they result in a potential set of 100 microenvironments. However, for practical purposes, most of these 100 microenvironments are largely redundant; they are also difficult to keep track of and to remember. Because of this, a subset of 16 of the microenvironments that stood out as important to distinguish were identified and these are defined in terms of the cross-classification of activities and locations in Table 8-3. These microenvironments will be examined in the remaining tables in this report.

For this analysis, the total samples—including adolescents aged 12-17 and senior citizens aged 65 and over in both the CARB study and in the mailback portion of the national study—are used. The sample sizes rose to 1872 for the CARB study and to 2762 for the 1985 national study. The national sample was weighted to provide a ratio of 46.5 males to 53.5 females, in equal proportion for each day of the week, and for each quarter of the year. The time weights provided for the CARB study (which adjusts for strata as well as weekday and season) were used in weighting the California data.

Before embarking on these analyses of microenvironments, it is useful to review some basic data on three types of locations for exposure analysis: time spent indoors, time spent outdoors and time spent in travel.

Table 8-4 shows the duration of time for the total age 12 and above sample as allocated across the three type of locations. It can be seen that the most prevalent

set of locations are indoor — 1255 minutes for the CARB study and 1279 minutes for the national study. These represent 87-89% of all daily time.

**Table 8-4. Time Indoor, Outdoor and In-Vehicle
California vs. National
(In Minutes Per Day for Population Aged 12+)**

CODE	DESCRIP	MEAN DURATION			
		CARB	S.E. ^a	NAT	S.E.
		(n=1762)		(n=2762)	
1	INDOOR	1255	28	1279	21
2	OUTDOOR	86	5	74	4
3	IN-VEHICLE	98	4	87	2
	TOTAL	1440		1440	
	a. Standard Error of Mean				
	* Weighted number				

The California data shows less indoor time and thus more outdoor time and time in vehicles than in the national sample. Also shown in Table 8-4 is the standard error of the mean for each of these estimated times. Since the standard errors for indoor time (21 and 28 minutes) are about the same as the differences between the two sample means (24 minutes = 1255 - 1279), this difference is not statistically significant.

However, the greater California times for both outdoor times (12 minutes) and vehicle times (11 minutes) are more than twice as high as the standard errors, meaning that they are significant at the .05 level.

9.0 CALIFORNIA-NATIONAL COMPARISONS ON MICROENVIRONMENTS

The tables in this section provide a comparison of “doers” proportions and durations for the two studies. The standard errors are provided in these tables for the whole sample’s comparative durations.

Table 9-1 shows the national and California comparisons, first for the collapsed activity and location codes described in the previous section, and then for the 16-category code for microenvironments that results from their cross-classification. Consistent with earlier tables, there is greater convergence in the national-California figures for activities than there is for locations. As in earlier tables, these mainly revolve around the lower times reported in California on family/personal care activity (code 2), cooking (code 3), and social/cultural activities (code 9), and the greater times Californians reported in work (code 6), sleeping (code 1), eating (code 4), and particularly traveling (code 0). Time spent in shopping (code 5), physical (code 8) and communication/leisure activities (code 7) are roughly the same in the two samples.

The difference for locations are more pronounced, not only for travel and location (codes 8 and 9), but for the greater times Californians spend in parks and other outdoor locations (code 7, mainly including outdoor places of work), in restaurants and bars (code 4), in other (non-home) indoor areas (code 5), and in autoplaces, garages, etc (code 0); with respect to this last difference, it is important to remember that times spent in such locations involving motor vehicles (plus time at dry-cleaning establishments) was coded specifically for those locations in California, but is hidden inside other location codes in the national data. This is responsible for many of the large discrepancies in Table 9-2. As in Table 6-3, Californians also spend less time in several locations: in kitchens (code 1), in their yards (code 6) and at work locations (code 3). These lower times at work locations, of course, are mainly a function of many California work locations being coded more specifically by type, e.g., working in a store, a school, or a hospital and thus being recorded in other location categories in Table 9-1.

**Table 9-1. Time in Various Activities, Locations, and
Microenvironments
(In Minutes Per Day For Population Ages 12+)**

CODE	DESCRIP	CARB (mts.) (n=1762)*	MEAN DURATION		S.E. (mts.)	MEAN DOER		% DOER	
			S.E. ^a (mts.)	NAT (mts.) (n=2762)*		CA (mts.)	NAT (mts.)	CA (%)	NAT (%)
ACTIVITY									
0	TRAVEL	109	4	87	2	120	96	91	91
1	SLEEP	504	12	498	9	505	498	100	100
2	HW/CHORE/PER	144	5	175	5	152	176	95	100
3	COOK	27	1	35	1	55	57	49	61
4	EAT	89	3	81	2	93	82	95	98
5	SHOP/ERRNDS	35	2	34	2	71	69	49	49
6	WORK/STUDY	232	11	207	7	472	396	49	52
7	LEISR/COMM	211	6	209	5	230	221	92	94
8	PHYSICAL	25	2	27	2	105	115	24	23
9	CULTRE/SOCIAL	64	4	89	3	118	126	54	71
LOCATIONS									
0	AUTOPLACES	20	4	3	0	108	66	19	5
1	ID.RES.KITCH	74	3	105	3	96	120	77	87
2	ID.RES.OTHER	813	19	814	14	820	821	99	99
3	ID.OFF./FACT/	145	8	186	7	368	395	40	47
4	ID.RESTRNT/BA	36	3	21	1	102	77	35	28
5	ID.OTHER	167	8	150	5	231	191	72	78
6	OD.RES	28	2	47	3	91	115	30	41
7	OD.OTHER	59	5	27	3	124	140	47	19
8	INT.CMBSTN	95	4	87	2	111	97	86	90
9	OTH,VEH	3	1	1	0	94	91	4	1
MICROENVIRONMENTS									
1	AUTOPLACES	20	4	3	0	108	66	19	5
2	RESTRNT/BAR	36	3	21	1	102	77	35	28
3	IN-VEH/IC	95	4	87	2	111	97	86	90
4	IN-VEH/OTH	3	1	1	0	94	91	4	1
5	PHYSICAL/OD	17	2	17	2	107	135	16	13
6	PHYSICAL/ID	7	1	8	1	68	74	10	11
7	WORK/STDY-RES	13	2	16	1	131	142	10	11
8	WRK/STD-OTH	184	9	179	6	450	390	41	46
9	COOKING	27	1	34	1	55	57	49	61
10	OTH.ACTV/KITC	49	2	73	2	74	88	67	83
11	CHORES/CHILD	100	4	123	3	109	124	92	99
12	SHOP/ERRND	31	2	31	1	70	67	45	46
13	OTHER/OD	69	5	56	4	117	120	59	47
14	SOC/CULTURAL	53	3	73	3	112	118	47	62
15	LESURE-EAT/ID	237	7	224	5	250	232	95	97
16	SLEEP/ID	498	12	494	9	501	495	99	100

a S.E. = Standard Error of Mean
* Weighted Number

**Table 9-2. Time Spent in Various Microenvironments
By Gender
(In Minutes Per Day For Population Ages 12 +)**

MEN		MEAN DURATION				MEAN DOER		% DOER	
CODE	DESCRIP	CARB	S.E. ^a	NAT	S.E.	CA	NAT	CA	NAT
		(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(%)	(%)
		(n=867)*		(n=1284)*					
1	AUTOPLACES	31	8	5	1	142	90	22	6
2	RESTRNT/BAR	45	4	22	2	106	73	42	31
3	IN-VEH/IC	105	7	92	3	119	99	88	92
4	IN-VEH/OTH	4	1	1	1	79	166	5	1
5	PHYSICAL/OD	25	3	24	3	131	139	19	18
6	PHYSICAL/ID	8	1	11	1	63	84	13	13
7	WORK/STDY-RES	14	3	17	2	126	153	11	11
8	WRK/STD-OTH	213	14	221	10	398	429	54	52
9	COOKING	12	1	14	1	43	35	28	41
10	OTH.ACTV/KITC	38	3	54	3	65	69	58	78
11	CHORES/CHILD	66	4	88	3	75	89	88	99
12	SHOP/ERRND	21	3	23	2	61	56	35	42
13	OTHER/OD	95	9	70	6	153	131	62	53
14	SOC/CULTURAL	47	4	71	4	112	118	42	60
15	LESURE-EAT/ID	223	10	235	8	240	241	93	97
16	SLEEP/ID	492	17	491	14	499	492	99	100

a S.E. = Standard Error of Mean

* Weighted Number

WOMEN		MEAN DURATION				MEAN DOER		% DOER	
CODE	DESCRIP	CARB	S.E. ^a	NAT	S.E.	CA	NAT	CA	NAT
		(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(%)	(%)
		(n=895)*		(n=1478)*					
1	AUTOPLACES	9	2	1	0	50	35	18	3
2	RESTRNT/BAR	28	3	20	2	86	79	32	26
3	IN-VEH/IC	85	4	82	3	100	94	85	88
4	IN-VEH/OTH	3	2	1	0	106	69	3	1
5	PHYSICAL/OD	8	1	11	2	86	101	10	11
6	PHYSICAL/ID	5	1	6	1	70	57	8	10
7	WORK/STDY-RES	11	2	15	2	120	150	9	10
8	WRK/STD-OTH	156	11	142	7	383	384	41	37
9	COOKING	42	2	52	2	65	67	63	78
10	OTH.ACTV/KITC	60	4	90	4	82	102	73	89
11	CHORES/CHILD	134	6	153	5	140	154	95	100
12	SHOP/ERRND	41	3	38	2	78	74	52	52
13	OTHER/OD	44	4	43	4	82	97	53	45
14	SOC/CULTURAL	59	5	75	4	114	110	51	68
15	LESURE-EAT/ID	251	10	215	7	263	224	96	96
16	SLEEP/ID	504	15	496	11	506	497	100	100

a S.E. = Standard Error of Mean

* Weighted Number

Many of these location coding differences, then, account for the major differences in microenvironments found at the bottom of Table 9-1. This includes the greater times reported in California inside autoplaces (code 1), restaurants/bars (code 2), and motor vehicles (code 3). On the other hand, we find Californians having much lower reported times in such microenvironments as kitchens (codes 9, 10), family care settings for house chores, child care (code 11) and social/cultural settings (code 14). Nonetheless, many of these differences in microenvironments that occur may be related to coding differences in the two studies rather than to differences in activity patterns or in locations per se.

With these adjustments for participation taken into account, it can be seen that the same "leveling" of duration times appears for many other microenvironments, which have low overall mean figures. The restaurant/bar figures rise to 102 and 77 minutes in terms of durations per participant. In "other" (non-combustion engine) vehicles rise to 94 and 91 minutes, while in physical indoor activities, from 68 and 74 minutes, in work and study at home to 131 and 142 minutes, and in work to 450 and 390 minutes (which translates to 7 1/2 and 6 1/2 hours of work per workday). In shopping they rise to 70 and 67 minutes and in social/cultural activities to 112 and 118 minutes per day. The largest discrepancy in California and national figures occurs for autoplaces (102 minutes vs. 66 nationally) and for physical outdoor activities (107 vs. 135 minutes). Otherwise the figures from the two surveys come much more into line on a per participant basis.

In Tables 9-1 through 9-4, the standard errors have been estimated for the whole sample estimated average times. In general, when the differences between the national and California averages exceed the (weighted average of the) standard errors of the two estimates by a factor of about two (1.96 to be exact), the differences can be said to be statistically significant beyond a 1 in 20 (5%) chance. Thus, the 22 minute difference in travel activities between the California average (109 minutes) and the national average (87 minutes) is statistically significant because it is more than 5 times larger than the average standard errors of means (4 and 2 minutes), respectively. On the other hand, the difference in average sleeping times of only 6 minutes (504-498) is not significantly greater than the 12 and 9 minutes standard error estimates.

Table 9-1 also introduces two new statistical parameters associated with each activity, location and microenvironment code. These are the mean time for respondents who report participating in the activity and the percentage of respondents who do report participation. Thus, 91% of both the California and national samples report at least one episode of travel on the diary day, so that the mean travel times for those who travel increase to 120 minutes for the CARB data and to 96 minutes for the national data. On the other hand, only 24% of the California sample and 23% of the national sample report engaging in sports or other physical activities during the day so that the average figures per participant rise to 105 and 115 minutes respectively. Note that 100% of both samples report some sleeping during the diary day so that the original means and means per doers are identical.

This distinction becomes especially crucial for many of the microenvironment codes, because many of them involve low participation. Less than 20% of CARB respondents and only 5% of national respondents, for example, reported being in "autoplaces". On a per participant basis, however, this translates to 108 minutes per participant in the CARB study and 66 minutes in the national study, which indicates more similarity in the two studies than is evident from the sample mean durations. It also emphasizes the important point of the high durations of times that are involved for those who go to such places and the greater risk of exposure to pollutants at those locations.

Gender: Differences between the microenvironment figures for men and women are shown in Table 9-2, using the same format as in Table 9-1. The major differences found in Table 9-1 by the larger national vs. California differences again dominate this table, although there are some striking and non-surprising gender differences as well. For example, women spend about twice as much time as men cooking and doing other activities in the kitchen and also much more time doing chores and other family care in other rooms of the house--as well as shopping--in both the California and the national data. Men spend much more time in garages (autoplaces), doing physical activity, and other outdoor locations, at workplaces, and in motor vehicles in both studies.

Thus, the most important consistency in Table 9-2 is that the same patterns of findings are replicated in the two studies. Both sets of data agree that men spend more time traveling, working, and doing sports/physical activities, while women do more family/personal care activities, far more cooking, and more shopping as well. This, then, is reflected in the major microenvironmental consistencies by gender apparent in the table — men spending much more time in autoplaces, garages, in motor and other vehicles, in strenuous physical activity outdoors, in other outdoor sites, and in work locations. In contrast, women spend more time cooking, doing other activities in the kitchen, and doing other chores and shopping.

Many of these differences remain on a per participant basis. Men who spend time at autoplaces, at restaurants/bars, in motor vehicles and in physical outdoor activities still spend more time in such places than women who spend time there. In the same way, women still spend more time in cooking, home care and shopping activities on a per participant basis — as do men in these microenvironments.

There are some areas where the two studies agree less well, however. Men spend more time in restaurant/bar locations in California, but not in the national data. That again may be due to the inclusion of workers in such locations in the California data. Men in California also report less time in communication activities in the national sample, while women report less such leisure time in the national sample. The reasons for these differences are not entirely clear and need to be checked by further, multivariate analysis involving careful statistical controls.

Type of Day: Table 9-3 shows differences in the two samples on a weekday vs. weekend day basis. Again, leaving the overall California-national differences aside, the patterns of results are highly similar. Weekends are marked by higher amounts of time spent in restaurants/bars (in California), in motor vehicles, in outdoor sporting environments, in other outdoor activities, in social-cultural settings, in leisure/communication activities and in sleep. All of these differences, of course, result from the lower times spent at places of paid work activity.

Put more directly, almost all leisure activities increase on the weekend when the work week is finished for most people. Nonetheless, many of these are not dramatic

**Table 9-3. Time Spent in Various Microenvironments
By Type of Day
(In Minutes Per Day For Population Ages 12+)**

Weekday

CODE	DESCRIP	MEAN DURATION				MEAN DOER		% DOER	
		CARB (mts.) (n=1259)*	S.E. ^a (mts.)	NAT (mts.) (n=1973)*	S.E. (mts.)	CA (mts.)	NAT (mts.)	CA (%)	NAT (%)
1	AUTOPLACES	21	5	3	1	108	73	19	4
2	RESTRNT/BAR	29	3	20	2	83	73	35	28
3	IN-VEH/IC	90	5	85	2	104	95	86	90
4	IN-VEH/OTH	3	1	1	0	71	116	4	1
5	PHYSICAL/OD	14	2	15	2	106	118	14	13
6	PHYSICAL/ID	7	1	8	1	64	68	10	11
7	WORK/STDY-RES	14	2	16	2	116	147	12	11
8	WRK/STD-OTH	228	11	225	8	401	415	57	54
9	COOKING	27	2	35	2	58	57	47	60
10	OTH.ACTV/KITC	51	3	73	3	76	87	68	85
11	CHORES/CHILD	99	5	124	4	108	125	92	99
12	SHOP/ERRND	30	2	30	2	67	63	44	47
13	OTHER/OD	67	6	51	4	117	107	57	48
14	SOC/CULTURAL	42	3	62	3	99	101	43	62
15	LESURE-EAT/ID	230	9	211	6	244	218	94	97
16	SLEEP/ID	490	14	481	10	495	483	99	100

^a S.E. = Standard Error of Mean

* Weighted Number

WEEKEND

CODE	DESCRIP	MEAN DURATION				MEAN DOER		% DOER	
		CARB (mts.) (n=503)*	S.E. ^a (mts.)	NAT (mts.) (n=789)*	S.E. (mts.)	CA (mts.)	NAT (mts.)	CA (%)	NAT (%)
1	AUTOPLACES	19	4	3	1	82	62	23	5
2	RESTRNT/BAR	55	6	23	2	127	84	43	28
3	IN-VEH/IC	108	8	91	6	125	100	87	91
4	IN-VEH/OTH	5	3	0	0	130	30	4	0
5	PHYSICAL/OD	23	3	23	4	134	132	17	18
6	PHYSICAL/ID	7	1	9	2	72	80	10	11
7	WORK/STDY-RES	10	2	15	3	155	165	6	9
8	WRK/STD-OTH	74	11	64	6	328	361	23	18
9	COOKING	27	2	34	2	60	55	44	61
10	OTH.ACTV/KITC	44	3	73	4	71	90	61	81
11	CHORES/CHILD	103	7	120	5	114	121	91	99
12	SHOP/ERRND	35	4	35	3	81	75	44	47
13	OTHER/OD	74	7	67	7	126	132	59	51
14	SOC/CULTURAL	79	7	99	6	140	141	57	70
15	LESURE-EAT/ID	256	12	257	11	273	268	94	96
16	SLEEP/ID	520	20	525	17	521	525	100	100

^a Standard Error of Mean

* Weighted Number

differences. Thus, there is virtually no change in time spent in kitchens, in garages, (autoplaces), and other microenvironments where house and family obligations are performed. In fact, there is a slight increase in such activities on the weekends in both samples looked at on a per participant basis; many of these differences thus become less-pronounced. Most importantly, average work time for those who work drops from 401-415 minutes per day on weekdays to 328-361 minutes per day on weekends. Translated into hours, the average workday during the week is just short of 7 hours per day while on weekends it drops to 5 1/2-6 hours. In contrast, the durations of social/cultural and of communicative activities rise on the weekends in both the California and national data sets.

Age: Microenvironmental differences by age are shown in Table 9-4, again after weighting to control for day-of-the-week and other factors. Once again, the patterns of results are strikingly similar in the two samples.

Thus, in both samples we find largest amounts of time spent in restaurants and bars in the 18-24 and 25-44 year-old age groups, and the same is true generally for travel microenvironments, both for motor vehicles and for other travel modes. The 12-17 age group generally reports most time in both outdoor and indoor sports activities, and conversely in sleeping. They also report lowest times in family care activities, like housework and shopping.

The 18-24 age group also reports higher than average times in physical activities, and in school-related activities as well. This groups reports by far the highest times on social-cultural microenvironments.

The 25-44 age group, in addition to their higher than average times at restaurants/bars and in travel, reports higher than average time in work microenvironments as well. The 45-64 age group is marked only by their higher than average time spent in kitchens, while not cooking.

The oldest age group, ages 65 and older, reports the highest times in such kitchen environments, both for cooking and for other activities. They also report highest times watching television and in other communication activities, but not more time sleeping.

**Table 9-4. Time Spent in Various Microenvironments
By Age Groups
(In Minutes Per Day For Population Ages 12+)**

Age Group = 12-17

CODE	DESCRIP	MEAN DURATION				MEAN DOER		% DOER	
		CARB	S.E. ^a	NAT	S.E.	CA	NAT	CA	NAT
		(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(%)	(%)
		(n=183)*		(n=340)*					
1	AUTOPLACES	16	8	2	1	124	73	13	3
2	RESTRNT/BAR	16	4	9	2	44	60	36	15
3	IN-VEH/IC	78	11	79	7	89	88	88	89
4	IN-VEH/OTH	1	0	0	0	19	12	5	1
5	PHYSICAL/OD	32	7	32	8	110	130	29	25
6	PHYSICAL/ID	20	4	15	3	65	87	31	18
7	WORK/STDY-RES	25	5	22	4	76	82	32	26
8	WRK/STD-OTH	196	30	159	14	339	354	58	45
9	COOKING	3	1	11	3	19	40	15	27
10	OTH.ACTV/KITC	31	4	53	4	51	64	61	83
11	CHORES/CHILD	72	11	91	7	77	92	93	99
12	SHOP/ERRND	14	3	26	4	50	68	27	38
13	OTHER/OD	58	8	70	13	78	129	75	54
14	SOC/CULTURAL	63	14	87	10	109	120	57	73
15	LEISURE-EAT/ID	260	27	237	16	270	242	96	98
16	SLEEP/ID	557	44	548	31	560	551	99	99

^a S.E. = Standard Error of Mean

* Weighted Number

Age Group = 18-24

CODE	DESCRIP	MEAN DURATION				MEAN DOER		% DOER	
		CARB	S.E. ^a	NAT	S.E.	CA	NAT	CA	NAT
		(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(%)	(%)
		(n=250)*		(n=330)*					
1	AUTOPLACES	16	4	7	2	71	137	22	5
2	RESTRNT/BAR	40	8	28	3	98	70	41	40
3	IN-VEH/IC	111	13	103	8	122	109	91	94
4	IN-VEH/OTH	3	1	2	1	60	160	5	1
5	PHYSICAL/OD	13	3	17	4	88	110	15	15
6	PHYSICAL/ID	5	2	8	2	77	76	7	10
7	WORK/STDY-RES	30	11	29	6	161	185	19	16
8	WRK/STD-OTH	201	24	207	20	344	391	58	53
9	COOKING	14	2	18	2	40	39	36	46
10	OTH.ACTV/KITC	31	5	42	3	55	55	57	76
11	CHORES/CHILD	79	8	124	9	85	125	93	99
12	SHOP/ERRND	35	7	31	4	71	65	49	48
13	OTHER/OD	80	15	34	4	130	84	61	40
14	SOC/CULTURAL	65	10	100	12	110	141	59	71
15	LEISURE-EAT/ID	211	19	182	11	234	189	90	96
16	SLEEP/ID	506	30	511	26	510	512	99	100

^a S.E. = Standard Error

* Weighted Number

**Table 9-4. Time Spent in Various Microenvironments
By Age Groups (cont'd.)
(In Minutes Per Day For Population Ages 12+)**

Age Group = 24-44

CODE	DESCRIP	MEAN DURATION				MEAN DOER		% DOER	
		CARB	S.E. ^a	NAT	S.E.	CA	NAT	CA	NAT
		(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(%)	(%)
		(n=749)*		(n=1061)*					
1	AUTOPLACES	25	9	2	1	114	43	21	4
2	RESTRNT/BAR	44	5	25	3	116	86	38	29
3	IN-VEH/IC	98	5	94	4	111	101	88	93
4	IN-VEH/OTH	5	2	1	0	143	80	4	1
5	PHYSICAL/OD	17	3	19	4	128	164	13	12
6	PHYSICAL/ID	6	1	7	1	61	71	9	10
7	WORK/STDY-RES	7	2	16	2	137	181	5	9
8	WRK/STD-OTH	215	14	220	11	410	422	52	52
9	COOKING	32	2	38	2	59	57	54	67
10	OTH.ACTV/KITC	43	3	70	4	65	86	65	81
11	CHORES/CHILD	110	6	133	6	119	134	92	99
12	SHOP/ERRND	33	4	33	2	71	66	47	50
13	OTHER/OD	68	8	48	6	127	105	54	46
14	SOC/CULTURAL	50	5	56	3	122	94	41	59
15	LEASURE-EAT/ID	202	9	200	8	215	208	94	96
16	SLEEP/ID	487	17	479	14	491	480	99	100

^a S.E. = Standard Error

* Weighted Number

Age Group 45-64

CODE	DESCRIP	MEAN DURATION				MEAN DOER		% DOER	
		CARB	S.E. ^a	NAT	S.E.	CA	NAT	CA	NAT
		(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(mts.)	(%)	(%)
		(n=406)*		(n=579)*					
1	AUTOPLACES	20	5	4	1	94	73	22	6
2	RESTRNT/BAR	31	4	19	2	82	67	38	28
3	IN-VEH/IC	100	11	82	5	117	91	86	90
4	IN-VEH/OTH	2	1	1	1	56	198	3	1
5	PHYSICAL/OD	14	3	7	1	123	79	12	9
6	PHYSICAL/ID	5	1	7	2	77	77	7	9
7	WORK/STDY-RES	10	3	9	2	139	169	7	5
8	WRK/STD-OTH	173	20	180	13	429	429	40	42
9	COOKING	31	3	43	3	68	64	46	68
10	OTH.ACTV/KITC	62	6	90	6	91	101	68	90
11	CHORES/CHILD	99	8	121	6	109	122	91	99
12	SHOP/ERRND	32	3	33	3	77	67	41	49
13	OTHER/OD	76	12	60	7	134	118	56	51
14	SOC/CULTURAL	50	5	73	6	107	116	47	63
15	LEASURE-EAT/ID	248	15	238	11	261	244	95	98
16	SLEEP/ID	485	23	472	15	491	472	99	100

^a S.E. = Standard Error

* Weighted Number

**Table 9-4. Time Spent in Various Microenvironments
By Age Groups (cont'd.)
(In Minutes Per Day For Population Ages 12 +)**

Age Group = 65+

CODE	DESCRIP	MEAN DURATION				MEAN DOER		% DOER	
		CARB	S.E. ^a	NAT	S.E.	CA	NAT	CA	NAT
		(mts.) (n=158)*	(mts.)	(mts.) (n=295)*	(mts.)	(mts.)	(mts.)	(%)	(%)
1	AUTOPLACES	9	2	4	2	53	57	17	7
2	RESTRNT/BAR	25	7	20	5	99	74	36	28
3	IN-VEH/IC	63	8	62	5	89	80	71	78
4	IN-VEH/OTH	2	1	1	1	53	277	3	0
5	PHYSICAL/OD	15	4	15	4	104	81	15	19
6	PHYSICAL/ID	3	1	7	1	48	51	7	13
7	WORK/STDY-RES	5	3	5	3	195	297	3	2
8	WRK/STD-OTH	30	11	35	6	336	341	9	10
9	COOKING	41	7	50	5	69	65	59	77
10	OTH.ACTV/KITC	97	14	108	9	119	119	82	91
11	CHORES/CHILD	123	15	119	7	141	121	87	99
12	SHOP/ERRND	35	5	35	5	76	69	46	50
13	OTHER/OD	55	7	82	13	101	140	55	58
14	SOC/CULTURAL	49	7	85	8	114	122	43	70
15	LESURE-EAT/ID	386	34	303	20	394	312	98	97
16	SLEEP/ID	502	31	507	26	502	509	100	100

b S.E. = Standard Error

* Weighted Number

There are some patterns found nationally but not in California, and vice-versa. In the national sample, family care microenvironments are high for the 65+ age group, while in California they are below the average. The same pattern is found for time spent outdoors not doing physical activities or in transit. And among 18-24 year-olds in California, time spent in sleep and in communication activities is well above average, but that is not found in the national sample.

10.0 SUMMARY AND CONCLUSIONS

There are some notable differences in the estimates from the national and California data for the microenvironment codes created for this report. This is mainly a result of differences in the location coding schemes used in the two studies. Many of these gaps have been closed by recoding of selected location codes in the national study, but that exercise also produced some new differences. Most notably, these recoded data suggest that Californians spend most of their outdoor time in away-from-home settings in contrast to the greater time spent in yards and outdoor environments nearer the home in the national study. While that would be consistent with an image of more cramped outdoor living environments in California (or of more attractive outdoor environments away from home), this result needs confirmation with independent data sources. Further similarities may appear when a full recoding of both the national and California data can be undertaken. On the other hand, narrowing these gaps for some locations may be all but impossible. For example, respondents in the national sample were never asked to break out their work environments by indoor vs. outdoor, restaurant/bar vs. school vs. factory vs. construction, and the like. The same is true for the specific codes that were created for the CARB study to identify dry-cleaning establishments, parking garages (autoplaces), and the like and which were never used nationally. Such detailed location information, then, can only be obtained from a new data collection, one that can take advantage of the many technological advances made in the California study to produce a set of estimates more directly designed for the needs of exposure assessment research and policy.

LIST OF REFERENCES

- Akland, G. G., and W. Ott. 1984. Human Exposure Assessment: Background concepts, purpose, and overview of the Washington, D.C. – Denver, Colorado field studies. Paper No. 121.1 presented at the 77th Annual Meeting of the Air Pollution Control Association, San Francisco, California.
- Akland, G. G., T. D. Hartwell, T. R. Johnson, and R. W. Whitmore. 1985. Measuring human exposure to carbon monoxide in Washington, D. C., and Denver, Colorado, during the Winter of 1982-83. Environ. Sci. Techno. 19: 911-918.
- Allen, C. 1968. Photographing the TV Audience. Journal of Advertising Research. 8 (1): 2-8.
- Bechtel, R., C. Achepohl, and R. Akers. 1972. Correlations between observed behavior and questionnaire responses in television viewing. In Television and social behavior, reports, and papers, Volume 4: Television in a day-to-day life: patterns and user. ed. E.A. Rubenstein, G.A. Comstock, and J.P. Murray. Washington, D.C.: U.S. Government Printing Office.
- Behar, J.V., J. Thomas, and M.D. Pandian. 1989. Development of the Benzene Exposure Assessment Model (BEAM). Presented at the EPA/Air and Waste Management Association International Symposium on Total Exposure Assessment Methodology: New Horizons. Las Vegas, NV. A&WMA VIP-16.
- DeGrazia, S. 1962. Of time, work, and leisure. New York: Twentieth Century Fund.
- Duan, N. 1982. Models for Human Exposure to Air Pollution. Environment International. 8: 305-309.
- Gershuny, J. et al. 1986. Time budgets: Preliminary analyses of a national survey. Quarterly Journal of Social Affairs (2).
- Hartwell, T. D., A. C. Carlisle, R. M. Michie Jr., Whitmore, R. W., H. S. Zelon, and D. A. Whitehurst. 1984. A study of carbon monoxide exposure of residents in Washington, D. C., and Denver, Colorado. Research Triangle Park, North

Carolina: Environmental Monitoring Systems Laboratory, U. S. EPA.
EPA-600/S4-84-031, PB 84-183516.

Harvey, A. and D. Elliot. 1983. Time and time again. Ottawa- Hull, Canada:
Employment and Immigration Commission.

Hill, D. 1985. Implications of home production and inventory adjustment processes
for time-of-day demand for electricity. In Time, Goods, and Well-Being, ed.
F. T. Juster and F. P. Stafford. Ann Arbor, Michigan: Institute for Social
Research, University of Michigan.

Johnson, T. 1984. A study of personal exposure to carbon monoxide in Denver,
Colorado. Paper No. 121.3 presented at the 77th Annual Meeting of the Air
Pollution Control Association, San Francisco, California.

Johnson, T. 1986. A study of human activity patterns in Cincinnati, Ohio. Durham,
North Carolina: PEI Associates.

Johnson, T. and R. A. Paul. 1984. The NAAQS Exposure Model (NEM) applied to
carbon monoxide. Research Triangle Park, NC: Office of Air Quality Planning
and Standards, U. S. EPA. NTIS PB84-242551.

Juster, F. T. 1985. The validity and quality of time use estimates obtained from recall
diaries. In Time, Goods, and Well-Being, ed. F. T. Juster and F. P. Stafford.
Ann Arbor, Michigan: Institute for Social Research, University of Michigan.

Michelson, W. 1978. Public policy in temporal perspective. The Hague, Netherlands:
Mouton.

Ott, W. R. 1984. Exposure estimates based on computer generated activity patterns.
Journal of Toxicology: Clinical Toxicology. Special Symposium Issue on
Exposure Assessment: Problems and Prospects. 21 (1 and 2): 97-128.

Ott, W.R., J. Thomas, D. Mage, and L. Wallace. 1988. Validation of the Simulation
of Human Activity and Pollutant Exposure (SHAPE) model using paired days

from the Denver, CO, carbon monoxide field study. Atmospheric Environment, 22, 10, 2101-2113.

Pellizzari, E.D., K. Perritt, T.D. Hartwell, L.C. Michael, R. Whitmore, R.W. Handy, D. Smith, and H. Zelon. 1987a Total exposure assessment methodology (TEAM) study: Elizabeth and Bayonne, New Jersey; Devil's Lake, North Dakota; and Greensboro, North Carolina. Volume II. Washington D.C.: U.S. EPA.

Pellizzari, E.D., K. Perritt, T.D. Hartwell, L.C. Michael, R. Whitmore, R.W. Handy, D. Smith, H. and Zelon. 1987b Total exposure assessment methodology (TEAM) study: Selected communities in Northern and Southern California. Volume III. Washington, D.C.: U.S. EPA.

Robinson, J. P. 1977. How Americans use time: A social- psychological analysis of everyday behavior. New York: Prager. (Further analyses were published in How Americans used time in 1965-66. Ann Arbor, Michigan: University Microfilms, Monograph Series.)

Robinson, J. P. 1985. The validity and reliability of diaries versus alternative time use measure. In Time, Goods, and Well- Being, ed. F. T. Juster and F. P. Stafford, 33-62. Ann Arbor, Michigan: Institute for Social Research, University of Michigan.

Robinson, J. P., V. Andreyenkov, and Vasily Petruchev. 1988. The rhythm of everyday life. Boulder, Colorado: Westview Press.

Robinson, J. P., and J. A. Wiley. 1989. Activity patterns of California Residents: Final Report. ARB Contract No. A6-177-33. California Air Resources Board. Berkeley, California: Survey Research Center, University of California.

Szalai, A. et al. 1972. The use of time. The Hague, Netherlands: Mouton Press.

Wallace, L.A. 1987. The total exposure assessment methodology (TEAM) study: Summary and analysis. Volume I. Washington D.C.: U. S. EPA.

APPENDIX A:
ACTIVITY CODES FOR 1985 NATIONAL TIME DIARIES STUDY

** 2 asterisks next to an activity code indicates the code
is to be used in coding children's diaries only.

00: NO ACTIVITY
000 NO ACTIVITY REPORTED

WORK AND OTHER INCOME PRODUCING ACTIVITIES

CARB

- | | | |
|----|------------|--|
| 01 | <u>01:</u> | <u>WORK</u> |
| 01 | 011 | Main job: activities at the main job, travel which is part of the job, and overtime; "working," "at work." |
| 01 | 012 | Work at home; work activities for pay done in the home when home is the main workplace. (Include travel as 011.)
i.e., Self-employed people running a business out of the home. |
| 01 | 013 | Additional work home; additional job (i.e., consulting, cottage industry). |
| 01 | 014 | Work at home for no pay, work connected with main job. |
| 01 | 015 | Other work at home - general. |
| 01 | 016 | Reading (work brought home).
(formerly 944*) |
| 02 | <u>02:</u> | <u>UNEMPLOYMENT</u> |
| 02 | 022 | Job search; looking for work, including visits to employment agencies, phone calls to prospective employers, answering want ads. |
| 02 | 023 | Unemployment benefits; applying for or collecting unemployment compensation. |
| 02 | 024 | Welfare; food stamps; applying for or collecting welfare food stamps. |

CARB

03 03: TRAVEL DURING WORK

05 05: SECOND JOB

05 059 Other paid work; second job; paid work activities which are not part of the main job (use this code when R clearly indicates a second job or "other" job); paid work for those not having main job; garage sales, rental property.

(CHILD DEFINITION) Part-time jobs when R is full-time student.

06 06: EATING

06 068 Eating while working; smoking, drinking coffee as a secondary activity while working (at work place).

06 069 Lunch at workplace; lunch eaten at work, cafeteria lunchroom when "where" = work (lunch at a restaurant, code 449; lunch at home, code 439).

07 07: ACTIVITIES AT WORK

07 078 Activities before or after work; activities at the workplace before starting or after stopping work; include - "conversations," other work. Do not code secondary activities with this primary activity.

07 079 Other work related.

08 08: BREAKS

08 089 Coffee breaks and other breaks at the workplace; breaks during non-work during work hours at the workplace; "took a break;" "had coffee" (as a primary activity). Do not code secondary activities with this primary activity.

CARB

09 09: TRAVEL RELATED TO WORK ACTIVITIES

09 097 Travel related to job search, unemployment benefits, welfare, food stamp, waiting for related travel.

09 098 Interrupted travel to work; travel to and from workplace when R's trips to and from work were both interrupted by stops; waiting for related travel.

09 099 Travel to and from workplace, including time spent waiting for transportation.

HOUSEHOLD ACTIVITIES

CARB

10 10: FOOD

10 108 Meal preparation; cooking, fixing lunches.

10 109 Serving food, setting table, putting groceries away, unloading car after grocery shopping.

11 11: CLEANUP

11 118 Doing dishes, rinsing dishes, loading dishwasher.

11 119 Meal cleanup, clearing table, unloading dishwasher.

12 12: CLEANING

12 128 Miscellaneous "work around house"; NA if indoor or outdoor.

12 129 Routine indoor cleaning and chores, picking up, dusting, making beds, washing windows, vacuuming, "cleaning," "fall/spring cleaning," "housework."

13 13: OUTDOOR CLEANING

13 139 Routine outdoor cleaning and chores; yard work, raking leaves, mowing grass, garbage removal, snow shoveling, putting on storm windows, cleaning garage, cutting wood.

14 14: CLOTHES CARE

14 148 Washing clothes.

14 149 Other clothes care.

CARB

16: REPAIRS

- 16 161 Indoor repairs, maintenance, fixing, furnace, plumbing, painting a room.
- 16 162 Outdoor repairs; maintenance, exterior; fixing repairs outdoors, painting the house, fixing the roof, repairing the driveway (patching).
- 15 163 Routine car care; necessary repairs and routine care to cars; tune up.
- 16 164 Home improvements; additions to and remodeling done to the house garage; new roof.
- 16 165 Repairing appliances.
- 16 166 Repairing furniture.
- 16 167 Car maintenance; changed oil, changed tires, washed cars; "worked on car" except when clearly as hobby--(code 832).
- 16 168 Improvements to grounds around house; repaved driveway.

17: PLANT CARE

- 17 171 Gardening; flower or vegetable gardening; spading, weeding, composting, picking, "worked in garden."
- 17 173 Care of house plants

18: PET CARE

- 18 188 Play with animals (formerly 844*).
- 18 189 Care of household pets.

19: OTHER HOUSEHOLD

- 19 191 Other indoor chores; NA whether cleaning or repair.

CARB

- 19 192 Other outdoor chores; "worked outside," "puttering in garage."
- 97 193 Household paperwork; paying bills, balancing the check-book, making lists, getting mail, working on the budget.
- 19 194** Watching another person do typically female household tasks (108, 109, 118, 119, 148, 149).
- 19 195** Watching another person do typically male household tasks.
- 19 196** Watching another person do household tasks, not listed above.
- 19 197 Other household chores; (no travel), picking up things at home, e.g., "picked up deposit slips" (related travel to purpose).

CHILD CARE

CARB

20 20: BABY CARE

20 209 Baby care; care to children age 4 and under.

21 21: CHILD CARE

21 218 Child care; mixed ages or NA ages of children.

21 219 Care to children ages 5 - 17.

22 22: HELPING/TEACHING

22 221 Helping/teaching children learn, fix, make things; helping son
bake cookies; helping daughter fix bike.

22 222 Helping kids with homework or supervising homework.

23 23: TALKING/READING

23 236 Giving child orders or instructions; asking them to help; telling
them to behave.

23 237 Disciplining child; yelling at kids, spanking children.

23 238 Reading to child.

23 239 Conversations with household children only; listening to children.

24 24: INDOOR PLAYING

24 248** Playing with babies aged 0-2; "playing with baby," indoors or
outdoors.

24 249 Indoor playing with kids; other indoor activities with children
including games ("playing" unless obviously outdoor games).

CARB

25 25: OUTDOOR PLAYING

25 258 Leading outdoor activities; coaching, non-organizational activities.

25 259 Outdoor playing with kids; including sports, walks, biking with, other outdoor games.

26 26: MEDICAL CARE - CHILD

26 269 Medical care at home or outside home; activities associated with children's health; "took son to doctor," "gave daughter medicine."

27 27: OTHER CHILD CARE

27 277 Coordinating child's social or instructional non-school activities (travel related code 298).

27 278 Babysitting (unpaid) or child care outside R's home or to children not residing in HH.

27 279 Other child care, including phone conversations relating to child care other than medical.

29 29: TRAVEL RELATED TO CHILD CARE

29 298 Travel related to non-school activities.

29 299 Other travel related to child care.

OBTAINING GOODS AND SERVICES

CARB

30: EVERYDAY SHOPPING

30 301 Shopping for food.

31 302 Other shopping; including for clothing, small appliances; at drug stores, hardware stores, department stores, "downtown" or "uptown," shopping center, buying gas, window shopping.

31: DURABLE/HOUSE SHOP

31 311 Shopping for durable goods; shopping for large appliances, cars, furniture.

31 312 Shopping for house or apartment; activities connected by buying, selling, renting, looking for house, apartment, including phone calls; showing house, including traveling around looking at real estate property (for own use).

32: PERSONAL CARE SERVICES

32 320 Phone calling for goods.

32 321 Phone calling for services.

32 329 Personal care services; beauty, barber shop; hairdressers.

28 At dry cleaners.

33: MEDICAL APPOINTMENTS

33 339 Medical care for self.

34: GOVT/FINANCIAL SERVICES

34 341 Financial services; activities related to taking care of financial business; going to the bank, paying utility bills (not by mail), going to accountant, tax office, loan agency, insurance office.

CARB

34 342 Other government services; post office, driver's license, sporting licenses, marriage licenses, police station.

35: REPAIR SERVICES

35 351 Auto services; repair and other auto services including waiting for such services.

36 352 Clothes repair and cleaning; cleaners, laundromat, tailor.

36 353 Appliance repair; including furnace, water heater, electric or battery operated appliances; including watching repair person.

36 354 Household repair services; including furniture; other repair services NA type; including watching repair person.

55 36: LIBRARY

55 360 Time spent at library.

55 361 Travel to/from library.

55 369** Getting gifts or money from adult, e.g., got lunch money.

37 37: OTHER SERVICES

37 377 Other professional services; lawyer, counseling (therapy).

37 379 Other services; "going to the dump."

38 38: ERRANDS

38 389 Running errands; NA whether for goods or services; borrowing goods.

39 39: TRAVEL RELATED TO GOODS AND SERVICES

39 399 Travel related to obtaining goods.

PERSONAL NEEDS AND CARE

CARB

40: WASHING/DRESSING

40 408 Bathing; washing, showering.

47,40 409 Personal hygiene; getting dressed, packing and unpacking clothes, going to the bathroom.

41: MEDICAL CARE

41 411 Medical care at home to self.

41 412 Medical care to adults in HH.

42: HELP AND CARE

42 421 Non-medical care to adults in HH; routine non-medical care to adults in household; "got my wife up," "ran a bath for my husband."

42 422 Help to relatives not in HH; helping caring for, providing for needs of relatives; (except travel) helping move, bringing food, assisting in emergencies, doing housework for relatives; visiting when sick.

42 423 Help to neighbors, friends.

42 423 Help to others, NA relationship to R; (same as 422 for others).

43: MEALS AT HOME

43 439 Meals at home; including coffee, drinking, smoking, food from a restaurant eaten at home, "breakfast," "lunch."

44: MEALS OUT

44 448 Meals at friend's home; eaten at a friend's home (inc. coffee, drinking, smoking).

CARB

44 449 Meals at restaurants.

45 45: NIGHT SLEEP

45 458 Longest sleep of the day; including in bed but not asleep (formerly 459*).

45 459 Beginning of longest sleep of next night, night sleep (formerly 460*).

46 46: NAPS/SLEEP

46 469 Naps and resting.

48 48: N.A. ACTIVITIES

48 481 Time gap of more than 10-minutes.

48 482 Personal/private; "none of your business."

48 483 Sex, making out.

48 484 Affection between household members: giving and getting hugs, kisses, sitting on laps.

48 485 Interview/questionnaire; completing time diaries (formerly 978*).

48 487** At babysitters before and after school or if child does not attend school. (NOTE: all secondary activities should be coded when this is a primary activity.)

48 488** Receiving child care; child is passive recipient of personal care; e.g., "Mom braided my hair."

48 489 Other personal care activities; watching personal care activities.

CARB

49 49: TRAVEL RELATED TO PERSONAL CARE

49 498 Travel related to helping, related to codes 421, 422, 423, 424, including travel which is the helping activity; waiting for related travel.

49 499 Other personal travel.

EDUCATION AND PROFESSIONAL TRAINING

CARB

50 50: STUDENTS' CLASSES

50 500 Television-based education.

50 509 Student attending classes full-time; includes daycare, nursery school for children not in school.

51 51: OTHER CLASSES

51 519 Other classes, courses, lectures, academic or professional; R not a full time student or NA whether a student; being tutored.

54 54: HOMEWORK

54 548 Reading (class related) (formerly 945*).

54 549 Homework, studying, research.

56 56: OTHER EDUCATION

56 568** At day care/nursery before or after school only (NOTE: all secondary activities should be coded when this is a primary activity).

56 569 Other education.

59 59: TRAVEL RELATED TO EDUCATION

59 597** Travel directly from home to school.

59 598** Travel directly from school to home.

(NOTE: 597 and 598 are child codes only.)

59 599 Other school-related travel; waited for related travel; travel to school not originating from home.

ORGANIZATIONAL ACTIVITIES

60 60: PROFESSIONAL/UNION ORGANIZATIONS

60 601 Meetings of professional/union groups.

60 602 Other activities, professional/union group including social activities and meals.

61 61: SPECIAL INTEREST IDENTITY ORGANIZATIONS

Includes groups based on sex, race national origin; NOW, NAACP, Polish-American Society, neighborhood, block organizations, CR groups, senior citizens, Weight Watchers, etc.

61 611 Meetings of identity organization.

61 612 Other activities, identity organizations and special interest groups, including social activities and meals.

62 62: POLITICAL PARTY AND CIVIC PARTICIPATION

62 621 Meetings political/citizen organizations; including city council.

62 622 Other activities, political/citizen organizations, including social activities, voting, jury duty, helping with election, and meals.

63 63: VOLUNTEER/HELPING ORGANIZATIONS

Hospital volunteer group, United Fund, Red Cross, Big Brother/Sister.

63 631 Attending meetings of volunteer, helping organizations.

63 632 Officer work; work as an officer or volunteer, helping organizations, R must indicate he/she is an officer to be coded here.

63 633 Fund raising activities as a member of volunteer helping organization, collecting, money planning a collection drive.

63 634 Direct voluntary help as a member of volunteer group; visiting, bringing food, driving.

CARB

63 635 Other volunteer activities, including social events and meals.

64 64: RELIGIOUS PRACTICE

64 641 Meetings of religious helping groups; ladies aid circle, missionary society, Knights of Columbus.

64 642 Other activities of religious helping groups listed in 641 including social activities and meals.

64 643 Meetings, other church groups; attending meetings of church groups which are not primarily helping oriented or NA if helping oriented.

64 644 Other activities, other church groups; other activities as a member of church groups which are not helping oriented or NA if helping, including social activities and meals; choir practice; bible class.

65 65: RELIGIOUS PRACTICE

65 651 Attending services of a church or synagogue, including participating in the service; ushering, singing in choir, leading youth group, going to church, funerals.

65 652 Individual practice, or religious practice carried out in a small group; praying, meditating, Bible study group (not at church), visiting graves.

66 66: FRATERNAL ORGANIZATIONS

Moose, VFW, Kiwanis, Lions, Civitan, Chamber of Commerce, Shriners, American Legion.

66 661 Meetings fraternal organizations.

66 662 Other activities as a member of a fraternal organization including social activities and helping activities and meals.

CARB

67 67: CHILD/YOUTH/FAMILY ORGANIZATIONS

67 671 Meetings, family/youth/child organizations.

67 672 Other activities as a member of child/youth/family organizations including social activities and meals.

68 68: OTHER ORGANIZATIONS

68 688** Meetings practices for team sports (formerly 883* and 884*).

68 689 Other organizations; any activities as a member of an organization not fitting into above categories; (meetings and other activities included here).

69 69: TRAVEL RELATED TO ORGANIZATIONAL ACTIVITY

69 698 Travel related to organizational activities as a member of a volunteer organization; including travel which is the helping activity, waiting for related travel.

69 699 Travel related to all other organizational activities; waiting for related travel.

ENTERTAINMENT/SOCIAL ACTIVITIES

CARB

70 70: SPORT EVENTS

70 708 Watch other people do active leisure activities (formerly 882*).

70 709 Attending sports events.

71 71: MISCELLANEOUS EVENTS

71 719 Miscellaneous spectacles, events; circus, fairs, rock concerts, accidents.

72 72: MOVIES

72 729 Attending movies; "went to the show."

73 73: THEATER

73 739 Theater, opera, concert, ballet.

74 74: MUSEUMS

74 749 Attending museums, zoos, art galleries, exhibitions.

75 75: VISITING

75 752 Visiting with others; socializing with people other than R's own HH members either at R's home or another home (visiting on the phone, code 965); talking/chatting in the context of receiving a visit or paying a visit.

76 76: PARTIES

76 768 Picnicking (*new code).

76 769 Party, reception, wedding.

CARB

77: BARS/LOUNGES

77 771 At bar, cocktail lounge, nightclub; socializing or hoping to socialize at bar, lounge.

86 772 Dancing.

78 78: OTHER EVENTS

78 789 Other events, of socializing that do not fit above.

79 79: TRAVEL RELATED TO EVENTS/SOCIAL ACTIVITIES

79 799 Related travel; waiting for related travel.

SPORTS AND ACTIVE LEISURE

CARB

80 80: ACTIVE SPORTS

- 80 800 Lessons in sports (formerly 885*); swimming, golf, tennis, skating, roller skating (codes 801-807, 811-817, 821-826).
- 80 801 Football, basketball, baseball, volleyball, hockey, soccer, field hockey.
- 80 802 Tennis, squash, racquetball, paddleball.
- 80 803 Golf, miniature golf.
- 80 804 Swimming, waterskiing.
- 80 805 Skiing, ice skating, sledding, roller skating.
- 80 806 Bowling, pool, ping-pong, pinball.
- 80 807 Frisbee, catch
- 80 808 Exercises, yoga, weightlifting
- 80 809 Judo, boxing, wrestling.

81 81: OUTDOORS

- 81 811 Hunting.
- 81 812 Fishing.
- 81 813 Boating, sailing, canoeing.
- 81 814 Camping, at the beach.
- 81 815 Snowmobiling, dune-buggies.
- 81 816 Gliding, ballooning, flying.
- 81 817 Excursions, pleasure drives (no destination), rides with the family.

CARB

82 82: WALKING/BIKING

82 821 Walking for pleasure.

82 822 Hiking.

82 823 Jogging, running.

82 824 Bicycling

82 825 Motorcycling.

82 826 Horseback riding.

83 83: HOBBIES

83 831 Photography

83 832 Working on cars--not necessarily to their running; customizing, painting.

83 833 Working on leisure time equipment repair (repairing the boat, "sorting out fishing tackle").

83 834 Collections, scrapbooks

83 835 Carpentry, woodworking

83 836 Making movies (formerly 925*).

84 84: DOMESTIC CRAFTS

84 841 Preserving foodstuffs (cleaning, pickling).

84 842 Knitting, needle-work, weaving, crocheting (including classes), crewel, embroidery, quilting, quilling, macrame.

84 843 Sewing.

CARB

85: ART/LITERATURE

- 85 851 Sculpture, painting, potting, drawing.
- 86 852 Literature, poetry, writing (not letters), writing a diary.

86: MUSIC/DRAMA/DANCE

- 86 860 Other lessons; (formerly 888*).
(931-835, 841-844, 851-852, 871-888)
- 86 861 Playing a musical instrument, (include practicing), whistling.
- 86 862 Singing.
- 86 863 Acting (rehearsal for play).
- 86 864 Non-social dancing; ballet, modern dance, body movement.
- 86 865 Gymnastics.
- 86 866 Pretend, dress-up.
- 86 867 Lessons in music, dance, gym, judo, singing, body movement
(formerly 886* and 887*).
(808-809, 864-865, 861-863)
- 86 869 Other active leisure; "hanging around" (formerly 889*).

87: GAMES

- 87 871 Playing card games (bridge, poker)
- 87 872 Playing board games (Monopoly, Yahtzee, Bingo, dominoes,
Trivial Pursuit).
- 87 873 Playing social games (scavenger hunts), "played games"--NA kind.
- 87 874 Puzzles.
- 87 875 Played with toys.

CARB

87 876 Played outdoors.

87 877 Played indoors.

88 88: COMPUTER USE

88 884 Using computer - general (formerly 894*).

88 885 Computer use for education (formerly 895*).

88 886 Computer games - child (formerly 896*).

88 887 Computer games - adult (formerly 897*).

88 888 Other computer use (formerly 898*).

88 889 Other active leisure.

89 89: TRAVEL RELATED TO ACTIVE LEISURE

89 899 Related travel.

PASSIVE LEISURE

CARB

90 90: RADIO USE

90 900 Radio transmitting/CB radio (formerly 910*).

90 909 Radio use.

91 91: TV USE

91 914 VCR/Home Movies (formerly 920*).

91 918 Cable TV.

91 919 TV viewing.

92 92: RECORDS/TAPES

92 926 Recording music (formerly 930*).

92 927 Records

92 928 Tapes

92 929 Records, tapes, stereo, listening to music, listening to others playing a musical instrument.

93 93: READ BOOKS

93 939 Reading books for pleasure.

94 94: READING MAGAZINES/NA

94 941 Reading magazines, reviews, pamphlets.

94 942 Reading NA what; or other.

94 943** Being read to.

CARB

95 95: READING NEWSPAPER

95 959 Reading newspaper (formerly 949*).

96 96: CONVERSATIONS

96 960** Receiving instructions (formerly 967*).

96 961 Being disciplined (formerly 966*).

96 962 Other talking/arguing with non-HH members (formerly 962* & 964*).

96 963 Conversations/arguing with HH members (formerly 965* & 963*).

96 964 Local calls placed (formerly 957*).

96 965 Local calls received (formerly 958*).

96 966 Long distance calls placed (formerly 959*).

96 967 Long distance call received (formerly 960*).

96 968 Telephone use for organizational activities.

96 969 Other phone conversations (formerly 961*).

97 97: LETTERS

97 977 Typing (formerly 980*).

97 979 Letters, (reading or writing) reading mail.

98 98: OTHER PASSIVE LEISURE

98 981 Relaxing.

98 982 Thinking, planning, reflecting.

98 983 Doing nothing.

CARB

- 98 984 Activities of others reported.
- 98 989 Other passive leisure; smoking dope, pestering, teasing, joking around, messing around, laughing.
- 99 99: TRAVEL RELATED TO PASSIVE LEISURE
- 99 997** Waiting in car for adult
- 99 998** Travel of child with adult when not clear whether child participated in adult's purpose of trip, e.g., went to bank (with parent) and waited in car; code travel portion 998.
- 99 999 Related travel; waiting for related travel.

Appendix B: Original Location Codes for National 1985 Mail-Back Study

HOME

00	Respondent's home, rad-general
01	Basement/cellar
02	Bathroom
03	Bedroom
04	Dining room
05	Computer room
06	Den
07	Family room/front room/living room
08	Gameroom/recreation room
09	Garage
10	Kitchen
11	Laundry/utility room
12	Office
13	Porch
14	Hall
19	Other home

AWAY FROM HOME

20	Transit(NA mode)
21	Car transit
22	Other Transit
30	Work
40	Friend's/relative's home
50	Restaurant/bar/fast food
60	Indoor place of leisure
70	Outdoor place of leisure
80	School
81	Church
82	Stores, etc.
83	Banks, office, library
89	Other
99	Na/ref