Nationwide
Food Consumption
Survey
Report No. 87-M-1

Effects of Procedural Differences Between 1977 and 1987 in the Nationwide Food Consumption Survey on Estimates of Food and Nutrient Intakes

Results of the USDA 1988 Bridging Study

U.S. Department of Agriculture ■ Human Nutrition Information Service

Abstract

The 1988 Bridging Study was conducted to facilitate the comparison of the results from the U.S. Department of Agriculture's 1987-88 Nationwide Food Consumption Survey (NFCS) with results from the 1977-78 NFCS. A field experiment was designed using a split-sample approach to test the effects of changes in interview, food coding, and weight conversion procedures and in the nutrient data base on estimates of mean intakes of food energy and the 14 nutrients reported in 1977-78: fat, protein, carbohydrate, calcium, iron, magnesium, phosphorus, thiamin, riboflavin, niacin, and vitamins A, B-6, B-12, and C. Women 20 to 49 years of age were randomly assigned to one of two treatment groups. A 24-hour recall was administered to Group A (N=348) using 1987-88 interview procedures, and their nutrient intakes were calculated using the 1987-88 food codes, weight conversions, and nutrient data base. Group B (N=349) was interviewed using 1977-78 procedures; dietary recalls were coded twice independently, using 1987-88 and 1977-78 food codes. Group B nutrient intakes were calculated four ways using various combinations of 1987-88 and 1977-78 food codes, weight conversions, and nutrient data bases.

To evaluate overall differences, mean intakes of food energy and the 14 nutrients for the two groups were compared using a two-sample multivariate T-test, and a significant difference was found ($p<.001$). Differences for iron, magnesium, and thiamin—the only three nutrients with significant univariate differences ($p<.10$)—could not be attributed to differences in interview or food coding procedures. Differences related to weight conversions were small, but significant, for all three nutrients. The nutrient data base differences were significant for magnesium and thiamin. The many changes in the nutrient data base reflect both real changes in foods and improvements in the quality of the data. For thiamin, the changes reflected real changes in food; for magnesium, they represented more recent, but still limited data. While not resulting in statistically significant overall differences, other important differences in the data base for vitamins B-6 and B-12 were caused by improvements in the quality of the data. When intakes of 10 major food groups were tested similarly, the overall difference was not significant ($p=.52$). For the most part, effects of the various changes in survey procedures were slight and tended to offset each other.

Key Words: Bridging study, dietary survey, interview procedure, methodology study, nutrient data base, split sample, statistical power.

Suggested Citation: Guenther, P.M., and Perloff, B.P. 1990. Effects of Procedural Differences Between 1977 and 1987 in the Nationwide Food Consumption Survey on Estimates of Food and Nutrient Intakes: Results of the USDA 1988 Bridging Study. Washington: U.S. Dept. of Agriculture, Human Nutrition Information Service. Nationwide Food Consumption Survey 1987-88, NFCS Rep. No. 87-M-1, 48 pp.

December 1990

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Acknowledgments

The authors gratefully acknowledge the contributions of the following individuals. The 1988 USDA Bridging Study was conducted by the Nutrition Monitoring Division, Human Nutrition Information Service, U.S. Department of Agriculture, under the general direction of Robert L. Rizek, Division Director. The sample was designed and the data collected under contract by National Analysts, a division of Booz, Allen and Hamilton, Inc. Lucy B. Wilson was the project director. Robert B. Reese, former chief of the Division's Food Consumption Research Branch, had overall responsibility for planning and supervising the operation of the study; and Eleanor M. Pao, current chief, had overall responsibility for the completion of the study. Howard A. Riddick supervised a team of nutritionists—Sharon J. Mickle, Kathryn H. Fleming, Frances A. Vecchio, Carol A. Tuszynski, Rebecca Bitzer, and Rhonda S. Sebastian—in planning and carrying out the data reduction. Other nutritionists in the branch—Patricia M. Dinkelacker, Katherine E. Sykes, and Amy L. Green—also participated. The staff of the Nutrient Data Research Branch provided the food composition values; Ruth H. Matthews, chief, Dennis Drake, Barbara Anderson, Rena Cutrufelli, Jacob Exler, Jean E. Stewart, and John Weihrauch contributed directly to this study. Brucy C. Gray, Milton R. Goldsamt, Alvin B. Nowverl, and Joseph D. Goldman provided statistical advice and were responsible for creating the analytical data sets and implementing the analyses. We appreciate the thoughtful and helpful comments of the reviewers—Frances J. Cronin, Phillip S. Kott, Christine Lewis, Suzanne Murphy, Susan Pilch, Stanley Presser, Howard A. Riddick, and Katherine S. Tippett. Gerald L. Smith and Cecilia Wilkinson Enns provided editorial assistance. Joanne Rosenthal Levine and Alice M. Moscatelli produced the final copy.

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Introduction

Each Nationwide Food Consumption Survey (NFCS) conducted by the U.S. Department of Agriculture (USDA) is designed to assess the dietary status of the U.S. population at a particular point in time. Changes over time can be evaluated by examining two or more surveys conducted at different times. Variations in measurement procedures may affect the validity of such assessments and ideally should be avoided. The goal of replication of measurement procedures, however, conflicts with the goal of improving the quality of the point estimates (Smith, 1988). Thus, when improvements are made, it is important that their effects on estimates be investigated to determine if and how they may affect to any meaningful degree the validity of comparisons over time.

The 1988 Bridging Study was conducted by USDA to facilitate the comparison of the results of the individual intake component of the surveys conducted in 1977-78 and in 1987-88. This study responds to recommendations that the impact of changes over time in data collection, nutrient data bases, and other improvements be studied and reported (Kasprzyk and Jacobs, 1990; Life Sciences Research Office, 1989; O'Muircheartaigh, 1989).

Guidelines for appropriate use of dietary data to determine differences over time were suggested by an ad hoc expert panel convened by the Life Sciences Research Office of the Federation of American Societies of Experimental Biology under contract with the Food and Drug Administration (S. Anderson, 1988). The Bridging Study addressed two of the guidelines in particular: (1) the methods used should be equivalent and (2) the nutrient data bases should represent foods as they existed at each point in time. NFCS 1977-78 and NFCS 1987-88 met the remaining guidelines: The conceptual basis for the variables was constant between the two surveys, the time interval between the two surveys was long, and the sampling procedures were equivalent.

A brief history of USDA surveys of food intake by individuals and a summary of an earlier USDA bridging study are provided in Appendix A. An introduction to the many types of factors that may affect the validity of survey data in general is given in Appendix B.

Purpose

The purpose of this study was to determine specifically whether differences between interview procedures, food coding and weight conversion procedures, and nutrient data bases used in NFCS 1977-78 and those used in NFCS 1987-88 resulted in differences in estimated food and nutrient intakes based on 1-day dietary recalls. Special emphasis was placed on the potential effects of these differences on estimated fat intake because of the major public health importance of fat intake (Life Sciences Research Office, 1989; Committee on Diet and Health, 1989; U.S. Department of Health and Human Services, 1988) and the consequent importance of accurately measuring trends in fat intake.

Differences Between NFCS 1977-78 and NFCS 1987-88

USDA contracted with National Analysts, a division of Booz, Allen and Hamilton, to conduct both NFCS 1977-78 and NFCS 1987-88. To collect individual dietary intake information, both surveys used an in-home, interviewer-administered, 1-day dietary recall, followed by a self-administered 2-day record. Although the data collection methods were essentially the same for both surveys (Guenther and Pao, 1987), experience, new information, and advances in computer technology had led to modifications in a number of the steps of the survey process from collecting data through reporting results.

Interviewing Procedures—The basic format, flow, and content of the 1977-78 and 1987-88 individual intake questionnaires were very similar. Both were administered by interviewers in the home. The only differences were (1) the addition of a series of probing questions to assist respondents in recalling food items that might be forgotten; (2) the expansion of the Food Instruction Booklet, used during the interview and record-keeping to assist respondents in reporting foods, from 4 to 18 pages to get more important details for descriptions and more accurate estimates of quantities of foods eaten; and (3) a greater emphasis in 1987-88 on the probes for trimming fat from meat and removing skin from poultry.

Food Coding and Weight Conversion Procedures—USDA updated the food code manual between the two surveys. New food products were added, and those no longer marketed were deleted. New codes were also added to capture more detail, and codes were deleted where the level of detail expected was too much for the respondent to provide, for example, unenriched versus enriched baked products. Some codes were combined, such as several varieties of fish having similar nutrient content. A few codes representing mixtures in 1977-78 were deleted and their ingredients coded separately in 1987-88, such as coffee with cream. Some code descriptions for mixtures were made more specific, such as whether vegetables high in vitamin A were included.

The weight conversion factors for each food code in the NFCS 1977-78 manual were reviewed by staff familiar with volume-to-weight equivalents. The source of each weight was identified and evaluated, and the weight was retained if found to be acceptable or revised if unacceptable. Revised weights were based on more recent published data and on results of laboratory studies conducted by USDA staff.

National Analysts replaced the process used in NFCS 1977-78 of selecting food codes by manually searching the USDA food code manual with a partially automated food coding system in NFCS 1987-88.

Nutrient Data Bases—The system used by USDA to determine the nutrient composition of foods underwent several changes. The Nutrient Data Bank, a computer-based system for storing and summarizing nutrient values, had been implemented but was not fully operational when NFCS 1977-78 began (Hepburn, 1982). During the years between the two surveys, the Nutrient Data Bank was expanded in both number of food items and number of nutrients to accommodate increased amounts of available nutrient data and to meet the growing demand for additional reference data on the composition of foods. Using the Nutrient Data Bank, USDA issued standard reference data for over 3,000 food items between 1977 and 1987. The newer data represented updates of previously published USDA values as well as values for nutrients and foods that had not been available previously from USDA.

In addition to changes in the way standard reference nutrient values were generated, an automated system for updating the nutrient data base used with NFCS was introduced. In this system, all survey food codes are linked electronically to the Nutrient Data Bank. Food codes for mixtures are linked through formulas to the nutrient values of their ingredients (Perloff, 1989). When NFCS 1987-88 began, this system was used to update the survey nutrient data base in order to reflect the most current standard reference values.

This update included two different types of changes: (1) real changes in the nutrient composition of foods and (2) improvements in the quality of the food composition data. Nutrient data changes of the first type reflect real changes in foods, whereas changes of the second type do not. Examples of the first type—real changes in food products—were the development of varieties of carrots and sweetpotatoes having higher vitamin A content and the closer trimming of fat from cuts of meat at the retail level. Less obvious changes in nutrient composition may also have resulted from other changes in agricultural or food processing practices.

Many of the nutrient data changes, however, were of the second type, resulting from the continual program of improving the food composition data base. These changes were caused, for example, by more food samples, improved food sampling techniques, and newer or improved analytical techniques. Differences in data for magnesium and vitamins B-6 and B-12 are notable examples of improvements resulting from increased amounts of analytical data.

Representativeness of NFCS—The comparability of results from NFCS 1977-78 and NFCS 1987-88 also depends on how well the samples, after weighting factors were applied, represented the population. Both sampling bias and nonresponse bias are important (Kish, 1965).

Design

Study Design

The Bridging Study was an experiment designed, using a split sample, to determine whether the differences observed between results of NFCS 1977-78 and NFCS 1987-88 were affected by any of the procedural differences between the two surveys. The design allowed the interview, food coding, weight conversion, and nutrient data changes to be investigated separately. The procedures used in collecting, coding, and processing dietary intake data in NFCS 1977-78 and in NFCS 1987-88 were duplicated insofar as possible.

Recalls of 1 day of food intake were collected from 697 women 20 through 49 years of age who resided in private households in the Greater Philadelphia Metropolitan Area. Subjects were randomly assigned to one of two treatment groups having similar personal and household characteristics. The same household questionnaire was used with both groups and included the socioeconomic and demographic variables from the NFCS 1987-88 household questionnaire. Group A (N=348) was interviewed with 1987 data collection procedures and dietary intake questionnaires, and Group B (N=349) with 1977 procedures and dietary intake questionnaires. Copies of the two individual intake questionnaires used are included with this report. Group A dietary recall questionnaires were reviewed and coded using the 1987 food codes and procedures, and nutrient intakes were calculated using the 1987 nutrient data base. Group B dietary recall questionnaires were reviewed according to 1977 review procedures and coded twice independently—using 1987 codes and procedures and using 1977 food codes and procedures. The 1987 food codes were used with the 1987 weight conversion factors and 1987 nutrient data base to calculate nutrient intakes. The 1977 food codes were used with both the 1987 and the 1977 weight conversion factors and with both the 1977 and the 1987 nutrient data bases. Thus, nutrient intakes for respondents interviewed by the 1977 procedures were calculated four ways: (1) using the 1987 codes, weights, and nutrient data base; (2) using the 1977 food codes and the 1987 weights and nutrient data base; (3) using the 1977 codes and weights and the 1987 nutrient data base; and (4) using the 1977 codes, weights, and nutrient data base.

Study Design

	Group A	Group B			
Interview:	1987		1977		
Food coding:	1987	1987		1977	
Weight conversion factors:	1987	1987	1987		1977
Nutrient data base:	1987	1987	1987	1987	1977
Data set:	**A**	**B1**	**B2**	**B3**	**B4**

The differences between data sets A and B4 represent the overall differences between the two groups of subjects resulting from all of the procedural and data base changes. The differences between data sets A and B1 are related to the differences in the interview procedures only, and those between data sets B1 and B2 to food coding. Similarly, the differences between data sets B2 and B3 can be attributed to the differences in the weight conversion factors, and the differences between B3 and B4 to the nutrient data base differences. Intake results were calculated for food energy and the 14 nutrients reported for NFCS 1977-78 (U.S. Department of Agriculture, 1984) and 64 food groups and subgroups.

Limitations

In the Bridging Study, the 1987-88 procedures were identical to those used in NFCS 1987-88. The 1977-78 procedures were duplicated as closely as possible and were very similar to the procedures actually used in 1977-78.

Important known sources of variation in self-reported food intakes that could not be measured in this study are individuals' abilities to recall and record their food intakes accurately and interviewers' skill in obtaining complete and accurate information. It is assumed that respondents and interviewers assigned to each of the two treatment groups, that is, those using the 1987-88 interview procedures (Group A) and those using the 1977-78 interview procedures (Group B), were similar in these respects and that differences in accuracy of reported food intakes were caused by differences in procedures. It has been suggested that characteristics of the interview itself, such as those addressed in this study, are more important sources of error than are characteristics of the respondents and interviewers (Bradburn, 1983).

Both the 1987-88 and the 1977-78 nutrient data bases were used to compute the nutrient content of the foods reported in the Bridging Study. Prior to NFCS 1987-88, the nutrient data base was updated to reflect real changes in foods available. Nutrient data base changes also were made due to improved quality and increased amounts of analytical data for many foods. The individual effects of such nutrient data base changes could not be estimated precisely but were investigated and are discussed in this report.

The cost of collecting dietary information precluded collecting 3 days of dietary information over a year-long period from a sample of the entire U.S. population. Women were chosen for the study because a homogeneous sample was desired to limit variability in intakes so that procedural effects could be detected. Also, women had been the focus of the Continuing Survey of Food Intakes by Individuals in 1985 and in 1986. It is assumed that results based on data collected during a 3-month period can be generalized to a full year.

In both NFCS 1977-78 and NFCS 1987-88, the individual intake data collection followed a lengthy household food use interview. Procedures for this portion of the survey changed substantially between 1977 and 1987. Because of the time required for the household food use interview, and therefore its cost, it was not included in the 1988 Bridging Study.

Sampling Plan

A sample of households in the Greater Philadelphia area, each of which included a woman 20 to 49 years of age in residence, was selected by the contractor using a systematic cluster approach described below. Philadelphia was chosen because a homogeneous sample was needed and because the contractor is located there. The locations of the area segments in the sample were as follows:

	Number of segments
Bucks County, PA	7
Chester County, PA	5
Delaware County, PA	7
Montgomery County, PA	9
Philadelphia County, PA	28
Burlington County, NJ	6
Camden County, NJ	7
Gloucester County, NJ	3
	72

Each segment had at least 150 housing units. To control as many external variables as possible, both 1977 and 1987 interviews were taken in every segment. The housing units in each segment were divided systematically into 10 equal clusters of households. All odd-numbered clusters in each segment were randomly assigned to either the "A" or the "B" condition, and the remaining even-numbered clusters were assigned to the other condition. Four households in each cluster were selected: the first was selected at random, and the three adjacent households were designated as substitutes. Thus, 40 households were selected in each segment. All clusters within a segment were approximately equal in terms of the number of housing units. Interviewers contacted the first household three times before substituting the next household. This process continued until an interview was obtained. Frequently, however, the interviewers had to continue beyond the fourth designated household in a cluster to find an eligible respondent because of a large number of housing units that were vacant, not yet occupied, or had no age-eligible woman. When this occurred, a completed interview was usually obtained at or before the seventh household.

Overall, the numbers of interviews collected in each segment were well balanced between the two treatment groups. In 66 of the 72 segments, equal numbers of 1977 and 1987 interviews were collected. In one of the remaining six segments, the number of interviews collected in each cluster differed by two interviews; and in the other five, the number of interviews collected in each cluster differed by only one.

Households had to meet census criteria for a household; that is, the address was occupied or intended for occupancy as separate living quarters, and no more than nine persons not related to the head of household lived there. Further details of the sample design were reported in the Survey Operations Report (National Analysts, 1988).

The systematic cluster approach was successful in producing two treatment groups that had similar personal and household characteristics, as shown in table 1 (See Glossary for definitions).

Table 1. Characteristics of the respondents

Characteristic		Group A (N=348)	Group B (N=349)
Age (mean)	yr.	34.1	35.0
Height (mean)	in.	64.2	64.0
Not reported	%	.3	0
Weight (mean)	lb.	143.1	145.1
Not reported	%	1.4	.6
Race:			
White	%	74.7	75.1
Black	%	21.6	20.6
Asian/Pacific Islander	%	.6	.9
American Indian/Eskimo/Aleut	%	.3	0
Other	%	2.9	2.9
Not reported	%	0	.6
Ethnicity:			
Non-Hispanic	%	97.4	96.6
Hispanic	%	2.3	3.2
Not reported	%	.3	.3
Employment status:			
Employed	%	61.8	63.3
Full time	%	41.1	42.1
Part time	%	18.7	18.6
Not employed	%	38.2	36.7
Not reported	%	0	0
Educational level (mean)	yr.	12.7	12.8
Less than high school graduate	%	15.2	14.3
High school graduate	%	41.1	47.3
More than high school graduate	%	32.8	32.1
Not reported	%	11.0	6.3
Smokes cigarettes:			
Yes	%	39.9	39.8
No	%	59.8	60.2
Not reported	%	.3	0
Vegetarian:			
Yes	%	2.0	2.0
No	%	98.0	98.0
Not reported	%	0	0

Continued

Table 1. Characteristics of the respondents—Continued

Characteristic		Group A (N=348)	Group B (N=349)
1987 household income (mean)	$	31,926	33,507
Less than $22,500	%	26.4	30.9
$22,500 to $37,500	%	26.1	29.5
More than $37,500	%	32.8	34.1
Not reported	%	14.7	5.4
Household participates in Food Stamp Program:			
Yes	%	11.8	10.6
No	%	88.2	89.1
Not reported	%	0	.3
Household participates in WIC Program:			
Yes	%	4.0	6.0
No	%	95.4	93.1
Not reported	%	.6	.9
Tenure:			
Own home	%	69.0	66.5
Rent	%	30.2	32.1
Occupy without payment	%	.3	1.4
Not reported	%	.6	0
Household composition:			
Size (mean)	no.	3.7	3.7
1	%	3.4	4.3
2	%	19.3	22.3
3	%	22.4	20.1
4	%	28.7	26.1
5	%	14.4	15.2
6 or more	%	11.8	12.0
Male head present	%	25.0	24.6
Children age 0-5 (mean)	no.	.6	.6
Children age 6-18 (mean)	no.	1.0	.9
Degree of urbanization:			
Central city	%	38.8	38.4
Suburban	%	61.2	61.6
Weekend days reported	%	26.1	24.4

Data Collection and Processing

Planning and Preparation

The contract study director and a project supervisor participated in an orientation session conducted by USDA. The contractor prepared and USDA reviewed the questionnaires (copies of which are found at the end of this report), interviewer training manuals, and other documents used in screening for eligibility, inducting participants into the study, and in collecting and coding the study data. Questionnaires and other materials, such as the introductory letter, were based on documents actually used in NFCS 1977-78 and NFCS 1987-88. Revisions were restricted to changes in format. Written instructions for interviewers and reviewers used in training and study operations were virtually identical to those used in NFCS 1977-78 and NFCS 1987-88 (National Analysts, 1987a, 1987b).

Pilot Test

A small, informal pilot test of data collection was conducted in December, 1987. Interviewers were trained in two separate sessions by the study director and a project supervisor. Each interviewer was assigned an area segment that had not been selected for use in the full-scale Bridging Study. Assigned segments were divided into three clusters with one designated household in each cluster. If the designated household was ineligible, unwilling to participate in the study, or nonresponsive for any other reason, the interviewer substituted the next household in the cluster. This process continued until each interviewer completed one interview in each cluster. Four interviewers, two for each method, completed three interviews each.

Two 2-hour interviewer debriefing sessions were held. The interviewers discussed problems encountered in the field and gave their comments and suggestions for each of the study documents, especially the screening questionnaire; for the interviewers' instruction manual; and for the interviewer training sessions. For the most part, interviews had gone smoothly, and no major problems were detected. Changes made as a result of the pilot test were limited to improving the flow of the interview (National Analysts, 1988).

Interviewer Training

From the time of recruitment, interviewers were informed about only the one interview procedure they were to use; this prevented contamination of the two sets of procedures. The training session agendas and procedures were approved by USDA prior to the sessions. The Group A interviewers were trained using NFCS training procedures on January 19 to 21, 1988, by a project supervisor who had conducted interviewer training for NFCS 1987-88, with assistance from the field administrator for the 1987 Bridging interviews. The Group B interviewers were trained using NFCS 1977-78 procedures on January 21 and 22, 1988, by the Bridging Study director, who had been the project director for NFCS 1977-78, with assistance from the field administrator for the 1977 Bridging interviews. Each trainee completed at least two practice interviews. Interviews taken as part of the training used the final questionnaires and procedures used in the study. One USDA staff member who had had experience with NFCS 1987-88 training attended the Group A sessions as an observer and consultant, and another with NFCS 1977-78 experience served the same role for Group B training.

The Bridging Study interviews were conducted by a total of 62 interviewers. Thirty worked with the 1977 procedures, and 32 worked with the 1987 procedures. Of these, 37 were trained during the January sessions, and the others were recruited and trained later by field supervisors. Interviewers had at least a homemaker's experience in food buying and preparation or its equivalent.

Data Collection

Interviewers contacted each designated household and determined whether or not it had in residence a woman 20 to 49 years of age who was willing to participate in the study and then obtained information on individual and household characteristics using the screening questionnaire. Women who were pregnant or lactating were excluded. No more than one participant in each household was inducted. If more than one household member was eligible, the main meal-planner/preparer was inducted if she was eligible. If she was not eligible, the participant was selected by a random procedure. The screening questionnaire included questions on individual and household characteristics for which answers were sought from all eligible persons, including nonparticipants. A very short nonresponse document was used to provide information on households when a respondent was unwilling to coöperate in the induction interview or no contact was made. Questions were restricted to observable characteristics such as the type of dwelling, neighborhood, and, if observable, the race of the nonresponding person.

Interviews were carried out 7 days per week, including evenings, from January 22 to April 11, 1988. The distributions of the interviews by day of the week are shown below:

	Group A	Group B
Sunday	15	8
Monday	12	16
Tuesday	11	15
Wednesday	12	17
Thursday	17	12
Friday	10	9
Saturday	24	24

Respondent cooperation was encouraged by offering an incentive of $5 for satisfactorily completing a food intake questionnaire. A systematic routine was used to assure interviewer integrity, competence, and compliance with instructions, including short follow-up contacts with a sample of respondents. Further details of the interviewer validation procedures were reported in the Survey Operations Report (National Analysts, 1988).

The household questionnaire used in the Bridging Study included only the questions related to household composition, food shopping practices, participation in Government food programs, and household income found in sections 1, 3, and 4 of the NFCS 1987-88 questionnaire. Section 2, the lengthy household food use component, was omitted.

Using the appropriate individual intake questionnaire and food instruction booklet, the interviewer collected information from the respondent about all of the foods she had eaten during the previous day. Foods were reported as ingested in quantities, dimensions, or other measures that could be converted to gram-equivalent weights. The interviewer asked the same set of questions of all participants, including questions concerning use of fat and salt in food preparation, regardless of whether the respondent was the main meal-planner/preparer.

Interviewers used the same sets of measurement aids that were used both in 1977 and in 1987 to assist participants in estimating the quantities of foods consumed. The set included four stainless steel measuring cups (1, 1/2, 1/3, and 1/4 cup); four stainless steel measuring spoons (tablespoon, teaspoon, 1/2 teaspoon, and 1/4 teaspoon); and one clear, plastic, 6-inch ruler.

Review and Coding

Before Bridging Study data collection began, USDA staff reviewed the food code manual and food coding guidelines the contractor had used during NFCS 1977-78. USDA staff updated the 1977-78 food code manual for use in the Bridging Study by adding many new foods to the lists of items that could be included under existing food codes on the basis of their nutrient content (U.S. Department of Agriculture, 1988). USDA used the same criteria that had been used in NFCS 1977-78 for adding new foods. Food codes requiring the most updating were ready-to-eat cereals, fast-food sandwiches, frozen meals, and candies. Coding guidelines that had been used by USDA staff during NFCS 1977-78 were compiled for use when answering requests for coding assistance from the contractor during the Bridging Study. USDA also prepared some additional coding guidelines for the contractor's use when coding with the 1977 procedures.

Three of the four USDA staff members who had worked on the individual intake portion of NFCS 1977-78 worked on the 1977 portion of the Bridging Study, including the team leader. Their responsibilities had been unrelated to food coding since the completion of NFCS 1977-78.

Like the interviewers, reviewers and other Bridging Study personnel were allocated to one of two separate groups working with either 1977 or 1987 data collection, coding, and processing. Reviewers attended the appropriate interviewer training sessions and then were trained by experienced coding/reviewing supervisory personnel.

All questionnaires were reviewed for completeness, legibility, and reasonableness upon receipt, following the appropriate protocols established for NFCS 1977-78 and NFCS 1987-88. Reviews included, but were not limited to, adequacy of food descriptions in terms of their ability to be coded. Within 2 or 3 days, reviewers recontacted interviewers and/or respondents if foods were not adequately described or quantified. All missing, incorrect, or questionable information was listed on the questionnaire and on a review summary sheet. Completed questionnaires were considered to be those which provided food intake information in adequate detail to permit calculation of nutrient intake. The review procedures used and the coding instructions for the screening questionnaire, the household questionnaire, and the nonfood portions of the individual questionnaire were reported in the Survey Operations Report (National Analysts, 1988).

The 1987 questionnaires (Group A) were coded only with the NFCS 1987-88 procedures. The 1977 questionnaires (Group B) were photocopied after review and coded twice by different teams of coders. One team used the NFCS 1977-78 manual procedures, and the other used the NFCS 1987-88 partially automated procedures. The 1977 coding procedures were carried out by a team of three coders who had had NFCS 1977-78 coding experience but had not coded food records since that time. A USDA staff member experienced in NFCS 1977-78 coding met with them to assure a common understanding of what the procedures had been. The 1987 coding procedures were carried out by two experienced

NFCS 1987-88 coders, thereby assuring an equal level of experience among coders.

Both groups of coders assigned food codes for each reported food item using food codes provided by USDA. The 1977 coders searched though the large NFCS 1977-78 food code manual, which contained about 4,500 food descriptions each with a 7-digit code. The 1987 coders searched a similar, but larger, list of food descriptions using the partially automated, computer-based NFCS 1987-88 food coding system. In either case, if a food item did not fit into the food coding system, a detailed description was sent to the appropriate USDA team for assignment of a food code. USDA staff determined that an existing food code was appropriate or assigned a new code. Also, when an amount of food reported did not have a weight conversion factor available in either the manual or the computerized system, USDA staff assigned a gram weight or a new weight conversion factor after carrying out appropriate investigations.

The 1977 and 1987 coding operations for the Bridging Study were carefully kept separate by both the contractor and USDA. The USDA staff who answered the requests from the contractor for coding assistance under the 1987 procedures were the same staff who were working on the individual intake portion of NFCS 1987-88 in progress at the time. The 1977 team at USDA made every effort to answer requests received from the contractor's 1977 coding team as they would have in NFCS 1977-78.

Many of the food items reported were not listed in the 1977 manual, but easily fell under existing 1977 food codes, for example, new varieties of fish and Girl Scout cookies. In some cases, reported food items were assigned existing codes when new codes might have been created. Examples include chicken nuggets, which were coded as "breaded, baked or fried chicken with skin eaten"; wine coolers, which were coded as "sangria"; and aspartame sweetener, which was coded as "sugar substitute, low calorie, powdered, not further specified." The popularity of these foods could have warranted new codes, but creating new codes would have contaminated the 1977 nutrient data base by introducing 1987 nutrient values. It was considered unreasonable to create new food codes by trying to guess what nutrient values they would have been assigned in 1977. New 1977 codes were created for only four items, which were used a total of five times. The nutrient composition of these items—Crispix®, Mueslix®, Fruitful Bran®, and Fruit & Fibre® cereals—was too different from any 1977 code to be included under an existing one. New coding guidelines were written by USDA staff as needed for their use, for example, for coding "lite" products and unspecified portion sizes of soy sauce.

Data Processing

Using 1977 or 1987 data files as appropriate, the contractor converted the reported amount of each food item into its gram weight equivalent, computed each item's energy and nutrient content, and computed daily totals. Thus, three data sets were produced: one for Group A individuals interviewed and coded under 1987 procedures (data set A), one for Group B individuals interviewed and coded under 1977 procedures (data set B4), and one for Group B individuals interviewed under 1977 procedures and coded under 1987 procedures (data set B1).

The contractor compared reported quantities (gram weights) for each food item with high weight limits for each item. These were supplied by USDA based on CSFII 1985 results. When items were above the limits prescribed, the questionnaire was checked and corrections were made when necessary. Verification of extreme values was documented in a check field on the computer record for the food item. Using corrected tapes, the contractor also compared each day's intake values for food energy and selected nutrients with high intake limits supplied by USDA, which were also based on CSFII 1985 results. Food intakes for each individual above the limits were verified, and corrections were made as required. During data cleaning, changes were made only to correct unambiguous errors; decisions requiring judgment were not changed.

Two additional data sets were prepared by USDA staff. Data set B2 consisted of food and nutrient intakes for Group B women calculated using the 1977 food codes with the 1987 weight conversion factors and the 1987 nutrient data base. To create this data set, each Group B woman's food intake records coded under 1977 procedures (data set B4) were compared with her food intake records coded under 1987 procedures (data set B1) by two USDA nutritionists, who then independently assigned to the 1977 codes the gram weights they would have been assigned using the 1987 weight conversion factors. Differences were later reconciled. Each original questionnaire with the 1987 reviewers' and coders' comments and the copy of it that had the 1977 reviewers' and coders' comments were used during the process of assigning the weights. The 1977 coders had shown how they had calculated the weights on the questionnaires.

Data set B3 consisted of food and nutrient intakes for Group B women calculated using the 1977 food codes and 1977 weight conversion factors with the 1987 nutrient data base. This required linking the 1977 food codes with the 1987 codes having matching, or most similar, descriptions. A "linking file" had been created earlier by Moshfegh (1986). Working independently, she and two other USDA nutritionists updated this file for the purpose of this study. They then mutually agreed on the most appropriate links.

The following variables were created for each respondent in each of the data sets:

a. Number of line items coded, excluding those for which no nutritive value is assigned (those starting with 00); number of line items coded from each of the 10 major food groups (meat, poultry, and fish; milk and milk products; eggs; legumes, nuts, and seeds; vegetables; fruits; grain products; fats and oils; sugars and sweets; beverages)

b. Intakes of food energy, fat, protein, carbohydrate, calcium, iron, magnesium, phosphorus, vitamin A, thiamin, riboflavin, niacin, vitamin B-6, vitamin B-12, and vitamin C

c. Intakes of each of the 10 major food groups listed in (a)

d. Intakes of 64 food groups and subgroups

e. Intakes of fat from each of the 10 major food groups listed in (a)

f. Number of meat and poultry items that were coded as not having fat/skin removed or were not specified as to fat/skin removal (code 1), number of meat and poultry items that were coded as having fat/skin removed (code 2), and the ratio of the number of fat/skin removed items to the total (code 2/(code 1 + code 2)).

Data Analysis

Research Questions

The following research questions were investigated in the Bridging Study:

- Did the differences in procedures between NFCS 1977-78 and NFCS 1987-88 result in differences in the mean number of food items reported as eaten per respondent or in the mean intakes of food energy, fat, and other nutrients?

- Did they result in differences in intakes of foods from 10 major food groups or in fat intakes from these food groups?

- Did they result in differences in the frequency of meat and poultry items reported as eaten without fat or skin?

- If any such differences were found, were they caused by the differences in interviewing procedures, in food coding procedures, in the weight conversion factors, or in the nutrient data bases?

Hypothesis Testing

To determine if the overall results obtained using 1977 and 1987 procedures differed significantly, mean intakes of each nutrient by the two independent groups (A and B4) were jointly compared using a two-sample, multivariate T-test. This test was repeated for the food groups. When the test statistic (Hotelling's T^2) was significant ($p<.10$), group differences in mean intakes were interpreted by examining the univariate *F* test results (Norušis, 1988). (The choice of the significance level is discussed below.)

When the *F* test was significant, differences related to interview procedures (A versus B1) were examined first, using univariate *t* tests. Because the differences related to other procedures were analyzed by comparing results obtained from one group, Group B, computed in different ways, a univariate repeated measures analysis of variance was used (B1 versus B2 versus B3 versus B4). Finally, three univariate paired *t* tests were used to determine which pairs of results differed statistically. Comparisons of B1 with B2 represented the effects of the food coding differences, B2 with B3 represented the effects of the weight conversion differences, and B3 with B4 represented the effects of the nutrient data base differences.

All statistical analyses were carried out using version 3.0 of SPSS^X (SPSS Inc., 1988). The hypothesis testing plan is described in more detail in Appendix D.

The most important assumption underlying the statistical tests performed is that of independence of observations (Stevens, 1986). In the Bridging Study, conditions were carefully controlled to assure that the treatments were independently administered. Moreover, the likelihood of correlated responses within particular clusters of the sample was very small. The independence assumption therefore was reasonable.

All underlying assumptions related to the normality of the data and their covariance structures were tested either empirically or graphically, using tests recommended in standard statistical texts (Johnson and Wichern, 1988; Stevens, 1986). The results of these tests were often significant. Nevertheless, a major factor overrode any concern: the number of cases in each treatment group was large and nearly equal (348 and 349). Also, the number of cases in each group was much larger than the number of dependent variables used in the analyses. For example, the number of cases in Group A (348) minus the number of nutrients examined (15) equaled 333. Consequently, the central limit theorem and the law of large numbers could be safely invoked, and the inferential tests could be considered robust with only slight inflation of Type I error rate.

Significance Level

During the planning stage, it was agreed that the most important test would be the one for differences in fat intake, and a meaningful difference would be 2.0 grams of fat per 1,000 kilocalories of energy intake between the two treatment groups. That is, we wanted to be able to detect a difference if the mean fat intake of Group B, calculated under 1977 procedures, was at least 2.0 grams per 1,000 kilocalories higher than the mean value for Group A (1987 procedures). Our estimate of fat intake per 1,000 kilocalories in the spring of 1977 was 45.3 grams for women age 19 to 50; in the spring of 1985, it was 40.7 grams (U.S. Department of Agriculture, 1985). We wanted to be able to detect a difference of less than half that size in this study.

A sample size of 350 for each group was needed so that if the true difference was 2.0 grams per 1,000 kilocalories or more, then the probability of correctly rejecting the null hypothesis of no difference would be at least 80 percent if the significance level (alpha) was set at .10. In statistical terms, the power of the test was .80 (Shavelson, 1981). The sample size was determined by the small difference we wished to be able to detect by statistical testing (Cohen, 1988; Sawyer and Ball, 1981).

With alpha equal to .10, the power of this test, calculated once the actual sample variances were known, was .85. If alpha had been set at .05, the power would have been reduced to .75. Considering the relative risks of rejecting the null hypothesis—the Group B (1977) mean is not greater than the Group A (1987) mean—when it is true (a Type I error) and of not rejecting it when it is false (a Type II error), the alpha of .10 was retained for use throughout the study. For the three paired *t* tests used to determine the significance of differences caused by coding (B1 versus B2), weight conversion (B2 versus B3), and nutrient data bases (B3 versus B4), the level of .03 (.10/3) was used.

Results and Discussion

The results of the Bridging Study are summarized here. Food energy, fat, and other nutrients are discussed first, and the findings related to food intake follow. The supporting data are presented in tables.

Nutrient Intakes

Food Energy—Mean intakes of food energy by the women in Group A (1987 procedures) and by the women in Group B (1977 procedures) calculated in the four different ways were very similar (table 2); no differences were greater than 2 percent (B2 versus B3). The very small difference between 1,638 kilocalories for Group A and 1,635 kilocalories for Group B calculated with all 1977 procedures (B4) was, of course, not statistically significant (p=.95). Differences in median intakes (50th percentile) were no greater than 5 percent (table 3). At the extremes of the distributions (10th and 90th percentiles), the differences were somewhat larger. At the 10th percentile, the largest difference was 9 percent (B2 versus B3); and at the 90th percentile, the largest difference was 7 percent (B1 versus B3).

The NFCS 1987-88 interview contained a question which attempted to remind respondents about food items that are often forgotten when recalling dietary intakes. Food items that were added to the recall as a result of this question were identified on the questionnaire. Such a question was not included on the 1977-78 questionnaire. It had been hypothesized that this question could result in a greater number of food items reported by respondents and, consequently, a greater number of line items coded and higher energy intakes; but this turned out not to be the case, according to this study. The mean number of line items in Sample A, 13.5, was smaller than in Sample B, 14.4. It appears that the 1977 interviewers probed enough to get as complete a listing of food items consumed as did the 1987 interviewers. The effects of the "items often forgotten" question in the Group A interviews are summarized below:

All respondents:	
Mean number of line items added	.2
Mean amount of food energy added (kcal)	23
Mean amount of fat added (g)	.8
Respondents adding at least one item:	
Percent of all respondents	13.2
Mean number of line items added	1.4
Mean amount of food energy added (kcal)	172
Mean amount of fat added (g)	6.4

Fat—Intakes of fat also were very similar between Groups A (68 grams) and B4 (69 grams) (p=.67) (table 2). No differences among any pairs of results were greater than 4 grams (B3 versus B4). Differences in median fat intakes were 5 grams or less (table 3). The overall difference in the percentage of energy from fat was less than 1.0 percentage point (table 4, A versus B4). A meaningful difference in mean fat intake of 2.0 grams per 1,000 kilocalories had been decided on during the planning stages of the study. The difference found between Groups A and B4 was 0.9 grams per 1,000 kilocalories.

While the NFCS 1977-78 food instruction booklet contained explicit probes for whether the skin on poultry and the fat on meat had been eaten, greater emphasis was placed on these probes in NFCS 1987-88. It had been hypothesized that this change in the interview might result in lower estimated fat intakes (Committee on Diet and Health, 1989). A coding effect, however, would not be expected because coding rules related to fat trim and poultry skin had not changed.

Even after probing, respondents were sometimes unable to report the level of detail desired. When desired information was not obtained for a particular food item, a code indicating that a certain attribute was "not specified" was assigned. For example, in the case of milk if a respondent did not know if the milk was whole, lowfat, or skim, the "milk, not further specified" code was assigned. The rules for use of these codes did not change between the two surveys nor did the assumptions associated with the nutrient values for these codes change. For example, "milk, not further specified" was assigned the values for whole milk in both surveys; and if fat on meat or skin on poultry was not specified as eaten or not, it was assumed to have been eaten. Of course, the accuracy of these assumptions in 1977-78 and 1987-88 is unknown. The lack of a coding effect in the Bridging Study suggests the assumptions had little effect.

Table 5 shows, on a per-person-per-day basis, the number of items coded with fat or skin not eaten and the number of items coded with fat or skin eaten or not specified as to whether or not the fat or skin was eaten. (Only meat and poultry items that could have fat trimmed or skin removed are included here. For example, meats coded as ingredients in mixtures and hot dogs are excluded.)

Table 2. Mean food energy and nutrient intakes by interview procedure, food coding procedure, weight conversion factors, and nutrient data base

Interview:	1987		1977		1977		1977		1977	
Food coding:	1987		1987		1977		1977		1977	
Weight factors:	1987		1987		1987		1977		1977	
Nutrient data base:	1987		1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B3)		(B4)	
Nutrient	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Food energy (kcal)	1,638	719	1,647	777	1,647	777	1,607	750	1,635	769
Fat (g)	67. 7	38. 9	67. 3	40. 5	67. 0	40. 6	65. 2	38. 1	69. 0	41. 3
Protein (g)	66. 0	33. 6	68. 9	34. 3	69. 0	33. 9	66. 9	31. 8	66. 1	30. 6
Carbohydrate (g)	187. 8	85. 6	188. 4	92. 6	189. 2	91. 5	186. 1	92. 5	183. 4	92. 5
Calcium (mg)	619	390	637	448	633	442	620	407	615	404
Iron (mg)	12. 0	7. 4	11. 6	7. 7	11. 7	7. 6	11. 4	7. 3	11. 1	6. 2
Magnesium (mg)	206	100	214	103	216	104	212	103	233	114
Phosphorus (mg)	1,015	474	1,034	553	1,030	548	1,003	497	1,018	490
Vitamin A (IU)	4,707	6,318	6,004	8,153	6,151	8,488	6,150	8,262	4,966	5,510
Thiamin (mg)	1. 20	. 73	1. 20	. 71	1. 21	. 72	1. 18	. 72	1. 07	. 71
Riboflavin (mg)	1. 41	. 78	1. 49	. 86	1. 49	. 86	1. 46	. 85	1. 36	. 85
Niacin (mg)	17. 7	10. 4	17. 9	9. 9	18. 1	9. 7	17. 6	9. 0	17. 1	9. 3
Vitamin B-6 (mg)	1. 28	. 80	1. 31	. 74	1. 32	. 75	1. 30	. 74	1. 22	. 68
Vitamin B-12 (mcg)	4. 70	8. 45	4. 92	10. 13	4. 73	9. 60	4. 60	9. 37	4. 01	10. 18
Vitamin C (mg)	83	81	93	86	93	84	94	84	91	85

See Table Notes.

Table 3. Food energy and nutrient intakes at selected percentiles by interview procedure, food coding procedure, weight conversion factors, and nutrient data base

Nutrient					
Interview:	1987	1977	1977	1977	1977
Food coding:	1987	1987	1977	1977	1977
Weight factors:	1987	1987	1987	1977	1977
Nutrient data base:	1987	1987	1987	1987	1977
	(A)	(B1)	(B2)	(B3)	(B4)
Food energy (kcal):					
10th percentile	814	817	819	744	750
25th percentile	1,149	1,097	1,106	1,079	1,078
50th percentile	1,568	1,498	1,496	1,485	1,511
75th percentile	2,025	2,012	2,080	2,015	2,052
90th percentile	2,543	2,734	2,724	2,535	2,607
Fat (g):					
10th percentile	27.0	23.4	24.1	23.9	24.3
25th percentile	41.8	38.0	38.4	36.9	39.2
50th percentile	62.8	59.7	59.2	58.0	63.1
75th percentile	88.1	88.2	86.8	86.7	89.2
90th percentile	113.1	123.2	117.0	118.2	121.2
Protein (g):					
10th percentile	30.7	30.0	30.4	31.0	30.7
25th percentile	45.1	44.3	44.0	45.8	45.9
50th percentile	61.1	63.5	64.6	61.3	61.8
75th percentile	80.1	88.8	88.5	86.7	86.6
90th percentile	108.5	116.1	112.8	109.2	104.9
Carbohydrate (g):					
10th percentile	85.0	85.9	84.1	81.9	81.8
25th percentile	127.6	123.2	125.8	120.7	117.8
50th percentile	174.5	173.7	171.3	168.6	168.1
75th percentile	244.8	240.2	240.2	236.3	231.5
90th percentile	294.9	316.8	321.6	312.1	309.5
Calcium (mg):					
10th percentile	192	206	200	203	194
25th percentile	335	332	329	319	329
50th percentile	542	525	533	532	520
75th percentile	803	808	822	814	794
90th percentile	1,127	1,226	1,236	1,180	1,200

See Table Notes.

Continued

Table 3. Food energy and nutrient intakes at selected percentiles by interview procedure, food coding procedure, weight conversion factors, and nutrient data base—Continued

Interview:	1987	1977	1977	1977	1977
Food coding:	1987	1987	1977	1977	1977
Weight factors:	1987	1987	1987	1977	1977
Nutrient data base:	1987	1987	1987	1987	1977
Nutrient	(A)	(B1)	(B2)	(B3)	(B4)
Iron (mg):					
10th percentile	5.2	4.8	4.8	4.6	4.9
25th percentile	7.8	7.2	7.3	7.1	7.3
50th percentile	10.4	10.1	10.2	10.2	10.3
75th percentile	14.3	14.4	14.5	14.2	13.4
90th percentile	19.8	18.4	18.7	17.7	18.0
Magnesium (mg):					
10th percentile	102	100	100	95	111
25th percentile	145	144	147	144	158
50th percentile	192	197	202	199	217
75th percentile	245	268	274	267	292
90th percentile	331	353	357	345	370
Phosphorus (mg):					
10th percentile	478	441	438	411	420
25th percentile	699	648	663	671	694
50th percentile	943	920	913	908	938
75th percentile	1,279	1,299	1,322	1,267	1,308
90th percentile	1,582	1,785	1,735	1,716	1,680
Vitamin A (IU):					
10th percentile	759	922	942	1,002	902
25th percentile	1,442	1,571	1,629	1,571	1,518
50th percentile	2,812	3,323	3,376	3,484	3,267
75th percentile	5,514	6,492	6,826	6,607	6,635
90th percentile	10,272	13,897	12,895	13,556	11,202
Thiamin (mg):					
10th percentile	.5	.5	.5	.5	.4
25th percentile	.7	.7	.7	.7	.6
50th percentile	1.1	1.0	1.0	1.0	.9
75th percentile	1.5	1.5	1.5	1.5	1.3
90th percentile	2.0	2.1	2.1	2.0	2.0

See Table Notes.

Continued

Table 3. **Food energy and nutrient intakes at selected percentiles by interview procedure, food coding procedure, weight conversion factors, and nutrient data base**—Continued

Interview:	1987	1977	1977	1977	1977
Food coding:	1987	1987	1977	1977	1977
Weight factors:	1987	1987	1987	1977	1977
Nutrient data base:	1987	1987	1987	1987	1977
Nutrient	(A)	(B1)	(B2)	(B3)	(B4)
Riboflavin (mg):					
10th percentile	0. 6	0. 6	0. 6	0. 6	0. 5
25th percentile	. 9	. 9	. 9	. 9	. 8
50th percentile	1. 2	1. 3	1. 3	1. 3	1. 2
75th percentile	1. 8	1. 9	1. 9	1. 9	1. 7
90th percentile	2. 3	2. 6	2. 7	2. 5	2. 4
Niacin (mg):					
10th percentile	7. 6	7. 2	7. 1	7. 1	6. 2
25th percentile	11. 1	11. 2	11. 3	11. 0	10. 6
50th percentile	15. 8	15. 7	15. 9	16. 1	15. 4
75th percentile	22. 3	22. 8	23. 3	22. 8	22. 9
90th percentile	28. 9	30. 9	31. 4	30. 5	30. 8
Vitamin B-6 (mg):					
10th percentile	. 5	. 5	. 5	. 5	. 5
25th percentile	. 8	. 7	. 7	. 7	. 7
50th percentile	1. 1	1. 2	1. 2	1. 2	1. 1
75th percentile	1. 7	1. 7	1. 8	1. 7	1. 6
90th percentile	2. 4	2. 3	2. 3	2. 3	2. 1
Vitamin B-12 (mcg):					
10th percentile	. 8	. 8	. 8	. 7	. 7
25th percentile	1. 8	1. 5	1. 7	1. 6	1. 3
50th percentile	3. 1	3. 0	3. 0	2. 9	2. 5
75th percentile	4. 7	5. 1	5. 2	5. 0	4. 1
90th percentile	8. 3	8. 4	7. 7	7. 4	6. 2
Vitamin C (mg):					
10th percentile	9	16	14	15	12
25th percentile	21	30	30	30	25
50th percentile	59	72	72	73	67
75th percentile	117	129	132	133	129
90th percentile	176	204	206	207	210

See Table Notes.

Table 4. Mean intakes of protein, fat, and carbohydrate expressed as a percentage of food energy by interview procedure, food coding procedure, weight conversion factors, and nutrient data base

Interview:	1987		1977		1977		1977		1977	
Food coding:	1987		1987		1977		1977		1977	
Weight factors:	1987		1987		1987		1977		1977	
Nutrient data base:	1987		1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B3)		(B4)	
Nutrient	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Food energy (kcal)	1,638	719	1,647	777	1,647	777	1,607	750	1,635	769
Protein (%)	16. 5	5. 8	17. 2	5. 7	17. 2	5. 6	17. 1	5. 6	16. 7	5. 5
Fat (%)	36. 0	9. 6	35. 7	10. 3	35. 5	10. 0	35. 5	9. 9	36. 8	10. 8
Carbohydrate (%)	46. 7	11. 7	46. 6	11. 6	46. 8	11. 6	46. 9	11. 5	45. 7	12. 0

See Table Notes.

Table 5. Reports of removing fat and skin: Mean number per woman per day of meat and poultry items coded as fat or skin not eaten and mean number of items coded as eaten with fat or skin or not specified as to whether or not fat or skin was eaten

Fat/skin variable	1987 interview	1977 interview	
	1987 coding (A)	1987 coding (B1)	1977 coding (B2)
		Number	
Meat/poultry items with fat/skin not eaten	0.21	0.15	0.15
Meat/poultry items with fat/skin eaten or not specified	.32	.40	.42
Total meat/poultry items	.53	.55	.57

While the proportion of meat/poultry items reported with fat/skin not eaten was somewhat higher in Group A, this difference did not account for an important difference in the total amount of fat.

The effect of the nutrient data base change between 1977 and 1987 caused by a real change in the fat content of meat because of closer trimming was offset to some extent by an increase in the fat content of grain mixtures (table 2). Food sources of fat are discussed further at the end of this section. Also, the small weight conversion differences partially offset the nutrient data differences.

Other Nutrients—It had been first ascertained that, overall, there was a statistically significant multivariate group difference (table 2, A versus B4) across the 15 intake nutrient variables measured (amounts of food energy and 14 nutrients) ($p<.001$).

Among the 13 nutrients other than fat, intakes differed significantly at the alpha level of .10 only for iron ($p=.07$), magnesium ($p=.001$), and thiamin ($p=.02$). These differences could not be attributed to differences in the interview procedures (A versus B1) (.19 was the smallest of the three *p* values). The four different ways of computing intakes of the three nutrients resulted in statistically significant differences regardless of the analytic approach used. (That is, using the multivariate approach, $p<.001$ for each of the three nutrients; using the averaged univariate approach, adjusting for lack of sphericity, $p=.02$ for iron and $p<.001$ for magnesium and for thiamin (Stevens, 1986)). None of these differences could be attributed to food coding differences (B1 versus B2) (.23 was the smallest of the three *p* values).

Weight conversion differences (B2 versus B3), however, were small but significant ($p<.01$) for all three nutrients. They were probably caused by focusing more on descriptions of amounts as "small," "medium," and "large" in 1977, while more emphasis was placed on the use of dimensions and cubic inches in 1987.

Differences caused by changes in the nutrient data base (B3 versus B4) were statistically significant for magnesium and for thiamin ($p<.001$), but not for iron ($p=.19$). For magnesium, the 9-percent difference was primarily caused by a large decrease in the magnesium value for coffee. This change reflected more recent, but still limited, analytical data (U.S. Department of Agriculture, 1989). While coffee is not usually considered a nutrient source, it does contain small to moderate amounts of a few nutrients, including magnesium. Because coffee is so frequently consumed, it can make a significant contribution to magnesium intake, especially among women. The effect of this artifactual difference in magnesium values will be smaller in other sex-age groups because women get a larger proportion of their magnesium from coffee than do other sex-age groups (U.S. Department of Agriculture, 1984).

Thiamin is widely distributed in foods, and many items in the data base had small changes in thiamin content, which accumulated to a 10-percent increase. Changes in meat and grain products contributed most to the increase. Changes in grain products reflect a combination of data improvements and real food product changes. For example, the 1977 value for thiamin in white bread was based on enrichment standards, while the 1987 value reflects an average of analytical values collected since that time. However, grain products are more frequently fortified now. Among meats, most of the increase was a result of leaner ham, a real change. Although the difference in iron values attributable to changes in the nutrient data base was not statistically significant, major changes had taken place between the two surveys. Iron values in beef and pork decreased because of improvements in the data, an artifactual difference. However, these decreases were more than offset by the real increases in grain products, resulting from a change in the enrichment standards and increased fortification.

Large differences resulting from changes in the nutrient data base were also seen for vitamins A and B-12. The 24-percent difference in vitamin A intake was caused primarily by the increased carotene content of carrots and sweetpotatoes, a real change in these foods. Women in Group A had smaller intakes of foods high in vitamin A, especially carrots, than women in Group B. This chance difference in actual food intakes happened to be in the direction that offset the difference in the nutrient data bases.

The 15-percent difference in vitamin B-12 intakes resulting from the two different data bases was caused primarily by higher B-12 values for meat and fish in 1987, and thus was largely artifactual. These increases resulted from an improved analytical base for the values. The overall difference in B-12 intakes between groups (A=4.7 mcg versus B4=4.0 mcg) was not statistically significant, probably because of the large interindividual variation in 1-day intakes of this nutrient.

Similar nutrient data improvements, especially for potatoes and for meat, accounted for most of the 7-percent difference in vitamin B-6 intakes. However, this difference was not large enough to cause a statistically significant overall difference between groups.

Food Intakes

To determine if food intakes differed significantly between the two groups of women (A versus B4), all foods were categorized into 10 major food groups (table 6). Multivariate results indicated that the difference was not statistically significant across the 10 food group variables measured (p=.53).

The mean intakes of fat from each of the 10 major food groups are presented in table 7. Differences attributable to interview, food coding, and weight conversion procedures in the amounts of fat coming from the major food groups were generally less than 1 gram. For 8 of 10 food groups, the differences caused by nutrient data base changes were also less than 1 gram. The difference of 1.2 grams of fat from grain products was primarily caused by changes in formulas used to compute the nutrient content of some of the food mixtures having grain as a main ingredient, such as pizza and macaroni and cheese. All formulas had been reviewed, and several were revised to represent recipes in current, popular cookbooks.

The somewhat larger difference of 2.8 grams of fat from the meat group primarily reflects results of a recent study on beef trimming practices (Savell et al., 1988). More fat is now trimmed away before marketing than had been in the past. Also, the fat content of meat mixtures decreased slightly as a result of formula revisions and more recent analytical data. Since the fat intake and major food group differences were not found to be statistically significant, no further hypotheses were tested.

Foods were further categorized into 64 groups and subgroups. Mean intakes, percentages of women reporting foods in each group and subgroup, and the mean intakes among users of each group and subgroup are presented in tables 8 to 10.

NFCS 1987-88 included an explicit probe for alcoholic beverages while NFCS 1977-78 did not. It is interesting to note that in the Bridging Study, this probe, "Did you forget any...alcoholic beverages?", did not have a noticeable effect (table 9, A versus B1).

Table 6. Mean intakes of 10 major food groups by interview procedure, food coding procedure, and weight conversion factors

Interview:	1987		1977		1977		1977	
Food coding:	1987		1987		1977		1977	
Weight factors:	1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B4)	
Food group	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	---Grams---		*---Grams---*		*---Grams---*		*---Grams---*	
Meat, poultry, fish	172	148	194	176	191	169	184	169
Milk and milk products	170	211	183	249	181	246	183	250
Eggs	18	45	21	48	19	45	20	47
Legumes, nuts, seeds	12	49	8	31	8	30	8	32
Vegetables	171	178	191	195	195	194	198	194
Fruits	125	183	134	188	142	197	142	197
Grain products	234	221	244	216	248	221	242	227
Fats and oils	15	24	16	26	16	26	16	25
Sugars and sweets	16	30	18	37	18	34	17	33
Beverages	839	551	839	603	832	604	827	596

See Table Notes.

Table 7. Mean intakes of fat from 10 major food groups by interview procedure, food coding procedure, weight conversion factors, and nutrient data base

Interview:	1987		1977		1977		1977		1977	
Food coding:	1987		1987		1977		1977		1977	
Weight factors:	1987		1987		1987		1977		1977	
Nutrient data base:	1987		1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B3)		(B4)	
Food group	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	--*Grams*--		--*Grams*--		--*Grams*--		--*Grams*--		--*Grams*--	
Meat, poultry, fish	21.0	20.1	20.9	20.9	21.6	21.6	21.8	21.8	24.6	25.1
Milk and milk products	10.7	14.1	10.1	15.2	10.0	14.8	9.7	12.3	9.9	12.3
Eggs	2.5	7.0	2.7	6.6	2.7	6.6	2.8	6.9	2.7	6.7
Legumes, nuts, seeds	2.5	11.7	1.4	5.7	1.3	5.3	1.3	5.5	1.3	5.5
Vegetables	6.3	10.8	6.3	9.9	6.0	9.9	6.0	10.1	6.9	11.9
Fruits	.2	.5	.2	.5	.3	1.0	.3	1.0	.4	1.1
Grain products	15.2	18.4	15.7	17.1	14.9	16.4	14.2	15.6	13.0	13.9
Fats and oils	8.5	12.4	8.9	15.2	9.3	15.6	9.1	14.1	9.6	15.1
Sugars and sweets	.8	3.9	1.0	4.9	.9	4.1	.9	3.9	.9	3.8
Beverages	.1	.3	.1	.5	.1	.5	.1	.5	.1	.9

See Table Notes.

Table 8. Mean intakes of 64 food groups and subgroups by interview procedure, food coding procedure, and weight conversion factors

Interview:	1987		1977		1977		1977	
Food coding:	1987		1987		1977		1977	
Weight factors:	1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B4)	
Food group/subgroup	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	---*Grams*---		---*Grams*---		---*Grams*---		---*Grams*---	
Meat, poultry, fish	172	148	194	176	191	169	184	169
Beef	23	60	25	63	26	63	26	60
Pork	14	46	13	40	14	43	14	46
Lamb, veal, game	1	13	2	15	2	16	2	15
Organ meats	0	5	0	9	0	9	0	9
Frankfurters, sausages, luncheon meats	18	49	16	39	16	36	15	32
Poultry	29	63	30	63	31	63	28	56
Chicken	22	55	23	57	24	57	23	52
Fish and shellfish	17	49	22	64	23	65	21	63
Mixtures mainly meat, poultry, fish	63	121	81	163	72	151	71	151
Milk and milk products	170	211	183	249	181	246	183	250
Milk and milk drinks	124	200	142	230	141	229	143	232
Fluid milk	107	190	123	212	120	208	121	208
Whole milk	63	166	40	126	58	150	58	150
Lowfat and skim milk	41	113	62	171	60	166	60	166
Yogurt	8	45	3	21	3	21	3	21
Milk desserts	19	59	17	59	17	59	17	63
Cheese	21	41	19	42	18	42	17	31
Eggs	18	45	21	48	19	45	20	47
Legumes	8	44	6	29	5	27	6	28
Nuts and seeds	4	23	2	10	2	10	2	11
Vegetables and fruits	296	259	325	284	337	291	340	292
Vegetables	171	178	191	195	195	194	198	194
White potatoes	46	79	47	91	47	91	49	94
Tomatoes	22	56	24	64	23	58	24	60
Dark-green vegetables	19	59	16	57	17	56	17	55

See Table Notes.

Continued

Table 8. Mean intakes of 64 food groups and subgroups by interview procedure, food coding procedure, and weight conversion factors—Continued

Interview:	1987		1977		1977		1977	
Food coding:	1987		1987		1977		1977	
Weight factors:	1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B4)	
Food group/subgroup	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	---*Grams*---		---*Grams*---		---*Grams*---		---*Grams*---	
Vegetables, con.:								
Deep-yellow vegetables	5	22	7	29	10	43	9	33
Other vegetables	79	119	97	132	99	135	100	134
Fruits	125	183	134	188	142	197	142	197
Citrus fruits and juices	72	142	73	140	74	141	75	142
Citrus juices	61	136	58	132	59	133	59	133
Dried fruits	0	1	1	9	1	5	1	6
Other fruits, mixtures, juices	53	125	58	115	66	122	65	121
Apples	11	40	17	56	17	56	17	56
Bananas	6	24	7	26	7	26	7	26
Other fruits and mixtures mainly fruit	17	66	19	64	20	65	19	62
Noncitrus juices and nectars	20	87	16	66	23	79	23	79
Grain products	234	221	244	216	248	221	242	227
Yeast breads and rolls	46	45	54	56	53	56	51	57
Quick breads, pancakes, french toast	10	36	9	34	10	35	8	29
Cakes, cookies, pastries, pies	30	58	33	68	32	66	29	58
Crackers, popcorn, pretzels, corn chips	9	26	9	22	9	22	8	22
Cereals and pastas	53	117	56	109	54	106	54	109
Ready-to-eat cereals	8	20	8	21	8	21	7	20
Mixtures mainly grain	85	171	84	178	90	185	91	193

See Table Notes.

Continued

Table 8. Mean intakes of 64 food groups and subgroups by interview procedure, food coding procedure, and weight conversion factors—Continued

Interview:	1987		1977		1977		1977	
Food coding:	1987		1987		1977		1977	
Weight factors:	1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B4)	
Food group/subgroup	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	---*Grams*---		---*Grams*---		---*Grams*---		---*Grams*---	
Fats and oils	15	24	16	26	16	26	16	25
Table fats	5	10	5	14	5	14	5	11
Salad dressings	9	22	10	20	10	20	10	20
Sugars and sweets	16	30	18	37	18	34	17	33
Sugars	6	11	6	12	6	11	6	11
Candy	4	18	6	24	5	21	5	20
Beverages	839	551	839	603	832	604	827	596
Alcoholic	66	255	60	207	60	207	56	182
Beer and ale	41	225	38	194	38	194	35	167
Wine	18	110	15	64	14	61	14	61
Nonalcoholic	773	475	779	558	772	559	771	562
Coffee	271	357	330	485	330	485	329	485
Tea	160	249	144	237	145	237	145	237
Fruit drinks and ades	33	131	44	154	37	149	37	149
Regular	26	123	42	153	32	139	32	139
Low-calorie	8	49	2	21	5	57	5	57
Carbonated soft drinks	309	352	261	334	260	334	260	340
Regular	227	327	179	286	179	286	178	285
Low-calorie	82	214	82	234	81	234	82	245

See Table Notes.

Table 9. Percentage of women using 64 food groups and subgroups by interview procedure and food coding procedure

Food group/subgroup	Interview: 1987 Food coding: 1987 (A)	Interview: 1977 Food coding: 1987 (B1)	Interview: 1977 Food coding: 1977 (B4)
	Percent		
Meat, poultry, fish	86.8	89.4	90.0
Beef	18.4	19.8	22.3
Pork	15.8	18.3	19.2
Lamb, veal, game	1.4	1.4	1.7
Organ meats	.3	.3	.3
Frankfurters, sausages, luncheon meats	22.7	24.9	24.9
Poultry	23.3	25.5	26.1
Chicken	18.7	19.2	20.6
Fish and shellfish	17.2	16.6	17.2
Mixtures mainly meat, poultry, fish	30.2	30.9	28.9
Milk and milk products	79.9	75.1	76.2
Milk and milk drinks	60.3	55.9	55.6
Fluid milk	56.9	53.3	52.7
Whole milk	34.5	18.6	26.9
Lowfat and skim milk	20.4	25.8	25.2
Yogurt	3.4	2.0	2.0
Milk desserts	13.8	10.3	10.6
Cheese	35.9	35.0	34.1
Eggs	19.8	22.1	21.8
Legumes	5.5	5.7	5.4
Nuts and seeds	9.8	6.3	6.9
Vegetables and fruits	86.2	91.1	92.3
Vegetables	77.9	81.9	84.8
White potatoes	40.5	35.0	35.0
Tomatoes	31.3	31.5	32.7
Dark-green vegetables	15.2	12.0	12.3
Deep-yellow vegetables	6.6	8.6	9.5
Other vegetables	59.2	67.3	68.2
Fruits	48.3	50.4	51.6
Citrus fruits and juices	31.0	32.4	32.4
Citrus juices	24.7	25.5	24.9
Dried fruits	.9	3.2	3.2
Other fruits, mixtures, juices	25.6	28.4	31.2

See Table Notes.

Continued

Table 9. Percentage of women using 64 food groups and subgroups by interview procedure and food coding procedure—Continued

Food group/subgroup — Interview: / Food coding:	1987 / 1987 (A)	1977 / 1987 (B1)	1977 / 1977 (B4)
	Percent		
Fruits, other, con.:			
Apples	7.8	10.0	10.3
Bananas	5.7	8.0	8.0
Other fruits and mixtures mainly fruit	9.5	11.2	11.7
Noncitrus juices and nectars	6.3	6.3	8.9
Grain products	94.0	96.0	96.0
Yeast breads and rolls	70.1	72.2	72.5
Quick breads, pancakes, french toast	12.1	10.0	10.9
Cakes, cookies, pastries, pies	35.6	34.1	33.5
Crackers, popcorn, pretzels, corn chips	19.3	23.8	23.5
Cereals and pastas	33.9	35.0	36.4
Ready-to-eat cereals	18.1	16.0	16.6
Mixtures mainly grain	30.2	34.1	34.7
Fats and oils	60.3	63.6	65.0
Table fats	38.5	40.7	41.0
Salad dressings	29.9	33.0	32.7
Sugars and sweets	61.5	64.5	65.0
Sugars	49.7	52.1	52.4
Candy	10.3	10.3	10.6
Beverages	93.7	94.3	93.7
Alcoholic	14.1	14.9	14.9
Beer and ale	5.7	5.7	5.7
Wine	4.9	6.3	6.0
Nonalcoholic	93.4	93.7	93.1
Coffee	51.7	55.0	55.0
Tea	37.1	35.2	35.2
Fruit drinks and ades	9.5	11.7	8.9
Regular	6.9	10.6	7.4
Low-calorie	2.6	1.1	1.4
Carbonated soft drinks	58.0	53.0	53.0
Regular	44.3	38.7	40.1
Low-calorie	17.2	16.6	16.3

See Table Notes.

Table 10. Mean intakes of 64 food groups and subgroups by users by interview procedure, food coding procedure, and weight conversion factors

Interview:	1987		1977		1977		1977	
Food coding:	1987		1987		1977		1977	
Weight factors:	1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B4)	
Food group/subgroup	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	--Grams--		*--Grams--*		*--Grams--*		*--Grams--*	
Meat, poultry, fish	198	142	217	173	212	165	205	166
Beef	127	82	125	89	118	85	114	78
Pork	89	83	70	70	73	72	74	80
Lamb, veal, game	100	40	113	54	112	48	105	40
Organ meats	85	0	162	0	162	0	162	0
Frankfurters, sausages, luncheon meats	81	73	69	53	66	45	60	37
Poultry	126	71	119	72	117	70	109	56
Chicken	120	68	120	75	117	72	111	56
Fish and shellfish	101	76	131	104	131	101	125	101
Mixtures mainly meat, poultry, fish	209	135	261	198	249	185	246	189
Milk and milk products	212	216	244	260	238	257	240	261
Milk and milk drinks	205	223	255	258	253	256	257	260
Fluid milk	187	219	231	243	228	240	229	239
Whole milk	184	241	215	220	214	224	216	223
Lowfat and skim milk	200	177	241	266	239	258	239	258
Yogurt	232	85	138	51	138	51	138	51
Milk desserts	141	89	160	102	160	101	165	114
Cheese	58	50	54	56	54	56	51	34
Eggs	89	61	94	60	87	58	90	63
Legumes	145	129	105	67	98	67	103	71
Nuts and seeds	44	61	34	24	33	24	35	25
Vegetables and fruits	344	248	356	278	366	286	369	286
Vegetables	219	174	233	191	230	191	233	190
White potatoes	114	88	136	109	136	109	141	111
Tomatoes	70	82	75	95	69	84	73	86
Dark-green vegetables	125	100	132	110	134	98	134	96
Deep-yellow vegetables	71	53	85	57	103	102	90	62
Other vegetables	133	130	143	139	145	142	146	140

See Table Notes.

Continued

Table 10. Mean intakes of 64 food groups and subgroups by users by interview procedure, food coding procedure, and weight conversion factors—Continued

Interview:	1987		1977		1977		1977	
Food coding:	1987		1987		1977		1977	
Weight factors:	1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B4)	
Food group/subgroup	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	--Grams--		*--Grams--*		*--Grams--*		*--Grams--*	
Fruits	260	186	265	187	276	196	276	195
Citrus fruits and juices	232	166	225	162	229	161	231	161
Citrus juices	247	171	227	173	237	170	237	170
Dried fruits	8	2	36	35	26	12	30	15
Other fruits, mixtures, juices	208	169	206	127	212	131	210	129
Apples	140	49	165	86	161	87	162	87
Bananas	99	28	90	35	90	35	89	36
Other fruits and mixtures mainly fruit	175	135	171	106	167	104	162	100
Noncitrus juices and nectars	319	155	246	113	255	105	255	106
Grain products	249	220	255	214	258	220	252	227
Yeast breads and rolls	66	39	74	53	73	54	71	56
Quick breads, pancakes, french toast	80	73	90	64	90	63	78	48
Cakes, cookies, pastries, pies	85	69	98	84	96	83	88	71
Crackers, popcorn, pretzels, corn chips	46	43	36	33	36	33	34	34
Cereals and pastas	158	154	160	131	149	131	148	137
Ready-to-eat cereals	44	23	48	30	46	31	44	28
Mixtures mainly grain	283	202	246	230	260	235	261	251
Fats and oils	25	27	25	29	25	29	25	27
Table fats	13	12	12	20	13	20	12	15
Salad dressings	31	30	29	25	29	26	30	26
Sugars and sweets	26	34	28	43	27	39	26	38
Sugars	11	13	11	14	11	13	11	13
Candy	42	38	55	55	51	43	49	40

See Table Notes.

Continued

Table 10. Mean intakes of 64 food groups and subgroups by users by interview procedure, food coding procedure, and weight conversion factors—Continued

Interview:	1987		1977		1977		1977	
Food coding:	1987		1987		1977		1977	
Weight factor:	1987		1987		1987		1977	
	(A)		(B1)		(B2)		(B4)	
Food group/subgroup	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	--Grams--		*--Grams--*		*--Grams--*		*--Grams--*	
Beverages	896	522	890	584	888	583	882	575
Alcoholic	467	526	403	391	403	391	378	321
Beer and ale	717	643	669	495	669	495	615	366
Wine	370	351	240	106	235	105	235	105
Nonalcoholic	828	443	831	538	829	537	827	541
Coffee	524	338	600	516	600	516	598	516
Tea	431	225	409	225	411	225	410	223
Fruit drinks and ades	353	262	373	282	417	309	416	306
Regular	375	300	393	290	430	304	428	301
Low-calorie	293	106	188	51	348	363	351	361
Carbonated soft drinks	533	307	492	311	491	311	490	324
Regular	513	308	463	282	466	282	464	281
Low-calorie	474	284	491	361	498	361	500	399

See Table Notes.

Conclusions

Two main conclusions can be drawn from the 1988 Bridging Study. The first is that the changes and improvements made between NFCS 1977-78 and NFCS 1987-88 in interview procedures, including probes, and in coding procedures had little effect on estimated intakes of all nutrients.

The second is that the weight conversion and nutrient data changes influenced results for some nutrients, but not for others. Specifically, the effects of these changes should be considered when comparing results for iron, magnesium, and vitamins B-12 and B-6. However, they should not compromise the validity of comparisons between results of the two surveys for energy, fat, protein, carbohydrate, calcium, phosphorus, thiamin, riboflavin, niacin, and vitamins A and C.

Statistically significant differences were found in the Bridging Study for magnesium, iron, and thiamin; however, the thiamin difference was caused mostly by real changes in foods and thus poses no problem for comparisons. Differences caused by improvements in the nutrient data bases should also be considered when comparing intakes of vitamins B-12 and B-6 because they were caused mostly by improved food composition data and not real changes in foods. The nutrient data differences for these two nutrients and for magnesium were not unexpected because the values in 1977 were based on more limited data than were values for other nutrients (U.S. Department of Agriculture, 1984). Such changes in nutrient composition data are to be expected as improvements in the data are continually made.

NFCS 1977-78 and NFCS 1987-88 generally conform to the set of guidelines, mentioned in the Introduction, for appropriate use of dietary data to determine differences over time (S. Anderson, 1988). The methods used in the two surveys were generally equivalent although procedures differed somewhat in detail, and the nutrient data bases were created to represent the composition of foods eaten at each point in time. The effects of improvements in procedures and in the nutrient data base were investigated. The conceptual basis for the variables was constant between the two surveys, the time interval between the two surveys was long, and the sampling procedures were equivalent. The sampling guideline implies that the survey results should adequately represent the target populations at the two points in time, and that issue will be investigated. The results of that study should be considered along with the results of the Bridging Study to evaluate appropriately the changes in dietary intakes revealed by the results of NFCS 1977-78 and NFCS 1987-88.

Appendix A
Brief History of USDA Surveys of Individual Food Intake

The USDA nationwide surveys of food intake by individuals were developed as supplements to the household food consumption surveys conducted at approximately 10-year intervals. The first national survey of food intakes by individuals was carried out by USDA during spring of 1965 as a part of the Household Food Consumption Survey 1965-66 (HFCS 1965-66). During an in-home interview, a household respondent reported the amounts, types, and cost of foods used at the household level during the previous 7 days and then provided 1-day recalls of food intake for selected household members.

In the Nationwide Food Consumption Survey (NFCS) 1977-78, the individual intake phase was expanded to include all members of sample households in the spring of 1977. In subsequent quarters of the year-long survey, all members 19 years or under and 50 percent of those 20 years and older were included. Food intakes were obtained for 3 consecutive days (day 1 by recall and days 2 and 3 by diary). During the face-to-face interview, respondents were trained in completing the food diaries. The interviewer later returned, collected and reviewed the food diaries, and made a small cash incentive payment.

Differences between HFCS 1965-66 and NFCS 1977-78 in individual intake data collection procedures are summarized in the following table (National Analysts, 1977):

HFCS 1965-66	NFCS 1977-78
No advance notice; introductory letter handed to respondent at time of interview; no appointment made ahead of time.	Advance notice; introductory letter mailed to respondent shortly before interviewer called to make appointment for interview, which was conducted at least 7 days later.
Individual intake information collected only in the spring quarter.	Individual intake information collected in all four quarters.
Eligible household members were all those under 20 and over 64 years of age and one-half of those 20 through 64.	All household members eligible in spring quarter. In subsequent quarters, eligible members were all those under 19 years of age and one-half of those 19 and older.
One household respondent provided dietary information for all eligible household members.	Each household member interviewed individually.
Measuring utensils not provided for interview.	Measuring utensils provided and used during interview.
No food instruction booklet used during interview.	Food instruction booklet used during interview.
Forms left for absent household members for whom respondent could not provide dietary information were mailed to the contractor.	Forms left for absent household members were picked up later and reviewed by interviewer.
No incentive payment.	$1 paid for each completed dietary recall.

A bridging survey was conducted in the spring of 1977 as part of NFCS 1977-78 to assess the effect of these changes. The household food use component was included, as well as the individual intake component. About 3,800 individuals in about 1,300 households participated in interviews that were conducted using the 1965 procedures (U.S. Department of Agriculture, 1980).

The same interviewers conducted both the bridging and basic interviews, using the same household food use and dietary intake questionnaires. While the 4-page food instruction booklet was not used in the bridging dietary intake interviews, interviewers were instructed to collect the same information as they did in the basic survey and to use the probes suggested in the food instruction booklet.

Mean nutrient intakes of individuals in the bridging sample were compared with those in the spring quarter of the basic sample. Differences between the two samples were minimal (U.S. Department of Agriculture, 1984):

Food energy and nutrients	Bridging	Basic
Food energy (kcal)	1,840	1,865
Protein (g)	74. 9	75. 5
Fat (g)	82. 8	85. 3
Carbohydrate (g)	195. 4	195. 7
Calcium (mg)	754	734
Iron (mg)	12. 8	12. 7
Magnesium (mg)	253	248
Phosphorus (mg)	1,158	1,159
Vitamin A (IU)	5,127	5,069
Thiamin (mg)	1. 26	1. 26
Riboflavin (mg)	1. 71	1. 71
Niacin (mg)	18. 7	18. 7
Vitamin B-6 (mg)	1. 42	1. 44
Vitamin B-12 (mcg)	4. 74	4. 68
Vitamin C (mg)	89	87

The lack of prior notice in the bridging sample also had no effect on the nutrient levels computed from the reported amounts of food used at the household level (U.S. Department of Agriculture, 1981).

The Continuing Survey of Food Intakes by Individuals (CSFII) was instituted in 1985 to meet the need for dietary intake information on an annual basis. In CSFII 1985 and in CSFII 1986, 1-day food intake recalls were obtained from samples of women 19 through 50 years of age and their children 1 to 5 years at 2-month intervals during each year-long survey. The first interviews were conducted face-to-face, and telephone interviews were used in subsequent waves in most cases. The 1-day recall procedures used in NFCS 1977-78 were modified for use in CSFII, particularly in the probing process. Household food use is not measured in CSFII.

NFCS 1987-88 again included a household food use component. Food intake information was requested from all household members for 3 consecutive days via 1-day recall and 2-day record as in NFCS 1977-78. The 1-day recall procedure, including probes, was similar to that used in CSFII 1985 and 1986 with a few minor modifications to meet needs of the 1987-88 survey.

In 1989, CSFII was reinstituted on an annual basis with a design similar to the individual intake portion of NFCS 1987-88. Three consecutive days of dietary information were collected from individuals in a sample of households. A new sample is drawn each year, and results will be reported using moving averages. CSFII 1989 and 1990 contained a follow-up telephone survey of knowledge and attitudes related to diet and health and food safety. In future years, other issues may be addressed.

NFCS and CSFII are core components of the National Nutrition Monitoring System (NNMS) (Harris, 1987; Life Sciences Research Office, 1989). NNMS was created in response to a legislative directive in the Food and Agriculture Act of 1977 (Title XIV, Section 1428) for development of a nutritional monitoring system to identify the extent and risk of nutrition-related health problems in the United States. A National Academy of Sciences committee (Coordinating Committee on Evaluation of Food Consumption Surveys, 1984) has stated that the purpose of a monitoring system is to provide repeated data collection, using similar measurements over time, that contributes to understanding the population's nutritional status. The 1988 Bridging Study is thus an example of methodological research related to nutrition monitoring.

Appendix B
Brief Review of Literature:
Factors Affecting the Validity of Survey Data

The validity or accuracy of survey data can be affected by influences from a variety of sources. Groves (1989) summarizes them in terms of errors. Errors of nonobservation may be caused by incomplete coverage because some individuals are not identified as part of the target population; by sampling error, which is caused by the selection of a subset of the target population for study; and by nonresponse. Observational errors may be introduced by the interviewer, by the respondent, and by the data collection instrument and its mode of administration. Additional errors may be introduced during coding and further processing of the data.

Several types of respondent-induced observational error can result in differences between actual and reported behavior (Sudman and Bradburn, 1982):

(1) Memory—Respondents may forget items or remember them incorrectly.

(2) Motivation—Respondents may not answer truthfully because they want to give a socially desirable answer.

(3) Communication—Respondents may not understand the question or may answer in their own terms.

(4) Knowledge—Respondents may simply not know the answer but give an answer anyway.

Memory is the most important problem with nonthreatening survey questions, especially with low-salience topics that occur frequently, such as food intake (Sudman and Bradburn, 1982; Dwyer et al., 1987). To be retained in memory, information must be attended to, and attention has only limited capacity. This is the main cause of reporting limitations (J. Anderson, 1985). Respondents may have distorted memories of food intake. Recent increases in public awareness of the potential risks of a high-fat diet may contribute to the reporting of more desirable low-fat diets (Dwyer et al., 1987).

Probes are used to help respondents remember. The purpose of probing is to get needed information (Warwick and Lininger, 1975). To probe successfully, the interviewer must understand what constitutes an adequate response. Probes can lead to biased responses if they are not neutral. The types of probes used in NFCS are elaboration, such as "Did you have anything else?", and clarification, such as when more detail about a particular aspect of a reported food item is requested.

The validity of survey data can be enhanced by the wording of questions (Sudman and Bradburn, 1982). However, since the early days of survey research, it has been well known that small changes in wording can result in large differences in responses. Many studies have focused on the effects of changes in the wording and placement of questions on reported opinions (Schuman and Presser, 1977; Kalton et al., 1978; DeLameter, 1982). However, real changes in the content of questions are most likely responsible for important changes in the distribution of responses, rather than minor wording variations (Schuman, 1986). It has been argued that measurement artifacts are most likely to occur when measuring opinions or attitudes that are vague or unstable or when questions are ambiguous (Krosnick, 1989; Martin, 1983). However, such problems have also been found in studies measuring self-reported behaviors (Shapiro, 1987; Belson, 1981).

Unfortunately, it is difficult to predict whether or not a proposed wording change will have an effect (Converse and Presser, 1986; Kalton and Schuman, 1982). Improvements in the format of survey questions, however, are generally desirable (Sudman and Bradburn, 1982).

Comparability of survey results over time requires not only replication of interviewing procedures, but also of coding procedures (Martin, 1983). Coding rules and conventions should be formalized, documented, and retained. The interpretive nature of coding, even when the coding manual and guidelines are very detailed, should not be underestimated (Jacobs et al., 1985; Mishler, 1986; Swain, 1985). The impact of methodological variation of all types over time is minimized when analysis is limited to data collected by a single organization (Presser, 1982).

Appendix C
Hypothesis Testing Plan

Because of the large number of variables related to food and nutrient intakes of interest created in the Bridging Study, it was neither feasible nor desirable to determine the statistical significance of all differences. When testing significance at the .10 level, the chance of rejecting a true null hypothesis is 10 percent. The more tests performed, the more true hypotheses will be rejected. Consequently, the a priori plan listed below was designed so that the research questions could be answered while limiting the number of tests performed. A summary of the results of the hypothesis testing plan follows. Tables providing the related descriptive data are indicated.

Nutrient intakes:

H1. The mean food energy intakes estimated by 1977 and by 1987 procedures are the same.

H2. If H1 is rejected: The difference in food energy intakes estimated by 1977 and by 1987 procedures was attributable to differences in (1) interviewing procedures, (2) food coding procedures, (3) weight conversion factors, or (4) nutrient data bases.

H3. The mean fat intake estimated by 1977 procedures is not greater than that estimated by 1987 procedures.

H4. If H3 is rejected: The difference in mean fat intakes estimated by 1977 and by 1987 procedures was caused by differences in (1) interviewing procedures, (2) food coding procedures, (3) weight conversion factors, or (4) nutrient data bases.

H5. The mean nutrient intakes estimated by 1977 and by 1987 procedures are the same when considered jointly.

H6. If H5 is rejected: The mean intakes of each nutrient estimated by 1977 and by 1987 procedures are the same. (Look at test results for each individual nutrient.)

H7. If H5 and H6 are rejected: The difference in mean nutrient intakes estimated by 1977 and by 1987 procedures was caused by differences in (1) interviewing procedures, (2) food coding procedures, (3) weight conversion factors, or (4) nutrient data bases. (Look at test results for each nutrient for which H6 was rejected.) See table 2.

Food intakes:

H8. Mean intakes of foods from the 10 major food groups estimated with 1977 and with 1987 procedures are the same when considered jointly.

H9. If H8 is rejected: Mean intakes of each major food group estimated with 1977 and with 1987 procedures are the same. (Look at test results for each food group separately.)

H10. If H8 and H9 are rejected: The differences in food intakes estimated by 1977 and by 1987 procedures were caused by differences in (1) interviewing procedures, (2) food coding procedures, or (3) weight conversion factors. (Look at test results for each food group for which H9 was rejected.) See table 6.

H11. If H9 is rejected: Mean intakes by users of each major food group by 1977 and by 1987 procedures are the same. (Look at test results for each food group for which H9 was rejected.) See table 10.

Fat from food groups:

H12. If H3 is rejected: Mean intakes of fat (in grams) from the 10 major food groups estimated by 1977 and by 1987 procedures are the same when considered jointly. See table 7.

H13. If H3 and H12 are rejected: Mean intakes of fat from (1) meat, poultry, and fish; (2) milk and milk products; and (3) fats and oils estimated by 1977 and by 1987 procedures are the same. (Look at test results for each of the three food groups separately.)

H14. If H3, H12, and H13 are rejected: The difference in fat intakes from food groups estimated by 1977 and by 1987 procedures was attributable to differences in (1) interviewing procedures, (2) food coding procedures, (3) weight conversion factors, or (4) nutrient data bases. (Look at results for each food group for which H13 was rejected.)

Fat/skin on meat/poultry:

H15. If H3, H12, H13.1, and H14.1 (for meat) are rejected: The mean proportion of meat/poultry items coded as having fat/skin removed before eating, per woman per day, estimated by 1987 procedures is greater than that estimated by 1977 procedures. See table 5.

H16. If H3, H12, H13.1, H14.1 (for meat), and H15 are rejected: The difference between the mean proportion of meat/poultry items coded as fat/skin removed by 1977 and by 1987 procedures was attributable to differences in (a) interviewing procedures or (b) food coding procedures.

Summary of Results of Hypothesis Testing Plan

Nutrient intakes:

H1:
Was food energy intake the same under 1987 and 1977 procedures overall (A-B4)?

Yes.

H2:
Not tested.

H3:
Was fat intake greater under 1977 than under 1987 procedures overall (A-B4)?

No.

H4:
Not tested.

H5:
Were intakes of all 14 nutrients and food energy the same under 1987 and 1977 procedures overall (A-B4) when considered jointly?

No.

H6:
Were the individual nutrient intakes the same under 1987 and 1977 procedures overall (A-B4)?

No for iron, magnesium, and thiamin.

H7.1:
Were any of the overall individual nutrient differences found caused by differences in interview procedures (A-B4)?

No.

H7.2-7.4:
Were all calculations of the 1977 intakes the same for these three nutrients (B1-B2-B3-B4)?

No.

H7.2:
Were any of the overall differences found attributable to differences in food coding (B1-B2)?

No.

H7.3:
Were any of the overall differences found attributable to differences in weight conversion factors (B2-B3)?

Yes for all three nutrients.

H7.4:
Were any of the overall differences found attributable to differences in nutrient data bases (B3-B4)?

No for iron; yes for magnesium and thiamin.

Food intakes:

H8:
Were the intakes of 10 food groups the same under 1987 and 1977 procedures overall (A-B4) when considered jointly?

Yes.

H9 to H16:
Not tested.

Table Notes

TABLES 2 AND 3—NUTRIENT INTAKES

SD—Standard deviation of the mean.

Vitamin A—Represents vitamin A activity derived from both preformed vitamin A (retinol) and provitamin A carotenoids expressed as international units (IU).

Niacin—Represents nicotinic acid and nicotinamide present in foods. Does not include niacin converted from dietary tryptophan, a niacin precursor.

TABLE 4—PROTEIN, FAT, AND CARBOHYDRATE AS A PERCENTAGE OF FOOD ENERGY

SD—Standard deviation of the mean.

Percentages of energy provided by protein, fat, and carbohydrate were calculated using the general factors 4, 9, and 4 kilocalories per gram, respectively, rather than food-specific factors (Merrill and Watt, 1973).

TABLES 6 TO 10—FOOD INTAKES

Mean intake—Quantities given are for foods as ingested; no inedible parts are included. Means include users and nonusers.

SD—Standard deviation of the mean.

Percentage of women using—User is an individual reporting any food item in the specified group or subgroup.

General note: Many foods reported in the study were mixtures of two or more ingredients. For example, cheese pizza is a mixture of dough, tomato sauce, cheese, and other ingredients. Food mixtures reported as a single item are usually coded as a single item and tabulated under the food group of the major ingredient. Pizza's major ingredient is dough, so pizza is tabulated under total grain products and under mixtures mainly grain. Thus, the secondary ingredients in the pizza (for example, cheese and tomato sauce) are included in the grain table rather than in the tables where they would appear if each ingredient had been reported and coded separately. For some foods (such as cheese and tomatoes) which are commonly eaten as secondary ingredients in mixtures, intakes reported in the tables are considerably smaller than the actual total intakes of those foods.

MEAT, POULTRY, FISH—Includes beef, pork, lamb, veal, game, organ meats, frankfurters, sausages, luncheon meats, poultry, fish, shellfish, and mixtures having meat, poultry, or fish as a main ingredient. Excludes meat, poultry, and fish that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, pepperoni on pizza, which is tabulated under grain products. Meat gravies and unflavored gelatin are included in this total, but not in any of the following subgroups.

Beef—Includes all cuts (including ground and oxtails); pickled beef; corned beef; beef bacon; and pastrami. Excludes organ meats and frankfurters, sausages, and luncheon meats. Excludes beef that was an ingredient in food mixtures coded as a single item.

Pork—Includes all cuts (including ground); pickled, dehydrated, smoked, and cured pork; ham; pork roll; bacon; salt pork; pork cracklings; pig's feet; and pork rinds. Excludes organ meats and frankfurters, sausages, and luncheon meats. Excludes pork that was an ingredient in food mixtures coded as a single item.

Lamb, veal, game—Includes lamb, mutton, goat, veal, rabbit, venison, and other game. Excludes organ meats and frankfurters, sausages, and luncheon meats. Excludes lamb, veal, and game that were ingredients in food mixtures coded as a single item.

Organ meats—Includes liver, heart, kidney, and other organ meats from beef, pork, lamb, veal, game, and poultry. Excludes organ meats that were ingredients in food mixtures coded as a single item.

Frankfurters, sausages, luncheon meats—Includes frankfurters, sausages, and luncheon meats made from beef, pork, ham, veal, game, chicken, and turkey. Excludes frankfurters, sausages, and luncheon meats that were ingredients in food mixtures coded as a single item.

Poultry—Includes chicken, turkey, duck, goose, cornish game hen, dove, quail, and pheasant. Excludes organ meats (giblets) and frankfurters, sausages, and luncheon meats. Excludes poultry that was an ingredient in food mixtures coded as a single item.

Chicken—Includes chicken only. Excludes organ meats (giblets).

Fish and shellfish—Includes finfish; shellfish, such as clams, crabs, lobster, oysters, scallops, and shrimp; and other seafood, such as frogs' legs, fish roe, squid, and turtle. Excludes fish and shellfish that were ingredients in food mixtures coded as a single item.

Mixtures mainly meat, poultry, fish—Includes mixtures having meat, poultry, or fish as a main ingredient, such as chicken cacciatore; beef potpie; tuna-noodle casserole; venison stew; liver dumplings; hash; shrimp salad; corn dog; chicken soup; frozen meals in which the main course is a meat, poultry, or fish item; and meat, poultry, or fish sandwiches coded as a single item, for example, cheeseburger on a bun.

MILK AND MILK PRODUCTS—Includes milk and milk drinks, yogurt, milk desserts, and cheese. Fluid and whipped cream, half-and-half, sour cream, and milk sauces and gravies are included in this total but not in any of the following subgroups. Excludes butter and nondairy sweet cream and sour cream substitutes, which are tabulated under fats and oils. Excludes milk and milk products that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, cheese on pizza, which is tabulated under grain products.

Milk and milk drinks—Includes fluid milk and yogurt. Flavored milk and milk drinks, meal replacements with milk, whey, and unreconstituted dry milk and powdered mixtures are included in this total but not in any of the following subgroups.

Fluid milk—Includes fluid whole, lowfat, skim, acidophilus, and filled cow's milk; buttermilk; goat's milk; reconstituted dry milk; evaporated milk; and sweetened condensed milk.

Whole milk—Includes whole fluid cow's milk, low-sodium whole milk, whole fluid milk filled with vegetable oil, reconstituted whole dry milk, and whole fluid goat's milk.

Lowfat and skim milk—Includes lowfat (1 and 2 percent) and skim fluid cow's milk, buttermilk, acidophilus milk, lowfat fluid milk filled with vegetable oil, and reconstituted lowfat and nonfat dry milk.

Yogurt—Includes plain, flavored, and fruit-variety yogurt and breakfast yogurt. Excludes frozen yogurt.

Milk desserts—Includes ice cream, imitation ice cream, ice milk, milk sherbet, frozen yogurt, and other desserts made with milk, such as pudding and custard.

Cheese—Includes natural hard and soft cheeses, cottage cheese, cream cheese, processed cheeses and spreads, imitation cheeses, and mixtures having cheese as a main ingredient, such as cheese dips and cheese sandwiches coded as a single item.

EGGS—Includes whole eggs, egg whites, egg yolks, meringues, egg substitutes, and mixtures having egg as a main ingredient, such as omelets, egg salad, and egg sandwiches coded as a single item. Excludes eggs that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, eggs in baked goods, which are tabulated under grain products.

LEGUMES—Includes cooked dry beans, peas, and lentils; mixtures having legumes as a main ingredient, such as baked beans and lentil soup; soybean-derived products, such as imitation milk, tofu, soy sauce, and soy-based meal replacements; frozen meals with cooked dry beans or peas as the main course; and meat substitutes that are mainly vegetable protein. Excludes peanuts, which are tabulated under nuts and seeds. Excludes legumes that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, beans in tacos, which are tabulated under grain products.

NUTS AND SEEDS—Includes unroasted, roasted, and honey-roasted nuts and peanuts; coconut; peanut butter; peanut butter sandwiches coded as a single item; coconut milk and cream; nut mixtures; seeds; and carob products. Excludes chocolate-covered and sugar-coated nuts, which are tabulated under candy. Excludes nuts and seeds that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, nuts in baked goods, which are tabulated under grain products.

VEGETABLES AND FRUITS—Includes white potatoes, tomatoes, dark-green and deep-yellow vegetables, other vegetables, citrus fruits and juices, dried fruits, other fruits, mixtures having vegetables or fruits as a main ingredient, and vegetable and fruit juices. Excludes vegetables and fruits that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, potatoes in beef stew, which is tabulated under meat, poultry, and fish, and apples in apple pie, which is tabulated under grain products.

Vegetables—Includes white potatoes, tomatoes, dark-green and deep-yellow vegetables, other vegetables, mixtures having vegetables as a main ingredient, and vegetable juices. Excludes vegetables that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, potatoes in beef stew, which is coded under meat, poultry, and fish.

White potatoes—Includes baked, boiled, mashed, fried, and canned potatoes; potato skins; potato chips; and mixtures having potatoes as a main ingredient, such as potato salad, stuffed baked potatoes, and potato soup.

Tomatoes—Includes raw and cooked tomatoes; tomato juice and soup; catsup, chili sauce, and other tomato sauces; and mixtures having tomatoes as a main ingredient, such as tomato and corn, tomato and okra, and tomato sandwiches coded as a single item.

Dark-green vegetables—Includes raw and cooked broccoli and dark-green leafy vegetables such as chard, collards, escarole, mustard and turnip greens, kale, and spinach; and mixtures having dark-green vegetables as a main ingredient, such as spinach souffle.

Deep-yellow vegetables—Includes raw and cooked deep-yellow or orange vegetables such as carrots, pumpkin, winter squash, and sweetpotatoes; and mixtures having deep-yellow vegetables as a main ingredient, such as peas and carrots and sweetpotato casserole.

Other vegetables—Includes raw and cooked vegetables other than white potatoes, tomatoes, dark-green and deep-yellow vegetables, and their mixtures. Includes vegetable juices and soups; pickles, olives, and relishes; salads; viandas (Puerto Rican starchy vegetables); and mixtures having "other" vegetables as a main ingredient, such as succotash and lettuce-based salads coded as a single item.

Fruits—Includes citrus fruits and juices, dried fruits, and other fruits; mixtures having fruit as a main ingredient; and fruit juices. Excludes fruits that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, apples in apple pie, which is tabulated under grain products.

Citrus fruits and juices—Includes oranges and other citrus fruits, mixtures having citrus fruits as a main ingredient, orange juice and other citrus juices, and mixtures of citrus and other fruit juices. Excludes citrus fruit drinks and ades such as lemonade, which are tabulated under beverages.

Citrus juices—Includes fresh, frozen, canned, or bottled grapefruit, lemon, lime, orange, tangerine, and other citrus juices whether sweetened or unsweetened, and mixtures such as grapefruit and orange juice, apricot-orange juice, and pineapple-grapefruit juice.

Dried fruits—Includes dried apples, apricots, figs, prunes, raisins, and other fruits. Excludes juices such as prune juice, which are tabulated under other fruits, mixtures, and juices.

Other fruits, mixtures, juices—Includes raw, frozen, pickled, cooked, and canned apples, bananas, berries, and other fruits except citrus and dried fruit; mixtures that are mainly noncitrus fruit; and noncitrus juices (including prune juice) and nectars. Excludes fruit drinks and ades, which are tabulated under beverages. Excludes fruit juice bars and sorbets, which are tabulated under total sugars and sweets.

Apples—Includes raw and cooked apples and applesauce. Excludes apples that were ingredients in noncitrus fruit mixtures coded as a single item.

Bananas—Includes raw and cooked bananas. Excludes bananas that were ingredients in noncitrus fruit mixtures coded as a single item. Excludes the starchy vegetables called green bananas, which are tabulated under other vegetables.

Other fruits and mixtures mainly fruit—Includes fruits other than citrus fruits, dried fruits, apples, and bananas; mixtures of apple or banana and other noncitrus fruits coded as a single item; and mixtures having fruit as a main ingredient.

Noncitrus juices and nectars—Includes fruit juices and nectars. Excludes fruit drinks and ades, which are tabulated under beverages.

GRAIN PRODUCTS—Includes yeast breads and rolls; quick breads, pancakes, and french toast; cakes, cookies, pastries, and pies; crackers, popcorn, pretzels, and corn chips; cereals and pastas; and mixtures having a grain product as a main ingredient. Excludes grain products that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, noodles in tuna-noodle casserole, which is tabulated under meat, poultry, and fish, and bread in a cheese sandwich coded as a single item, which is tabulated under milk and milk products.

Yeast breads and rolls—Includes white, whole wheat, "wheat," cracked wheat, rye, pumpernickel, multigrain, and other yeast breads and rolls (excluding sweet rolls), english muffins, and bagels. Excludes yeast breads and rolls that were ingredients in food mixtures coded as a single item.

Quick breads, pancakes, french toast—Includes biscuits, cornbread, tortillas, muffins, other quick breads, pancakes, waffles, french toast, and plain crepes. Excludes quick breads that were ingredients in food mixtures coded as a single item.

Cakes, cookies, pastries, pies—Includes yeast-type sweet rolls, yeast- and crumb- or quick-bread-type coffee cakes, croissants, cakes, cookies, pies, cobblers, eclairs, dessert crepes, turnovers, danish pastries, doughnuts, breakfast bars, granola bars, and sweet crackers.

Crackers, popcorn, pretzels, corn chips—Includes nonsweet crackers, corn- or cornmeal-based salty snacks, popcorn, and pretzels. Excludes potato chips, which are tabulated under white potatoes.

Cereals and pastas—Includes macaroni, noodles, spaghetti, grits, oatmeal, rice, other cooked cereal grains, ready-to-eat cereals, and uncooked cereal grains such as unprocessed bran. Excludes cereals and pastas that were ingredients in food mixtures coded as a single item.

Ready-to-eat cereals—Includes unsweetened and sweetened ready-to-eat cereals.

Mixtures mainly grain—Includes mixtures having a grain product as a main ingredient, such as enchiladas, pizza, egg rolls, quiche, spaghetti with sauce, rice and pasta mixtures, frozen meals in which the main course is a grain mixture, and noodle and rice soups.

FATS AND OILS—Includes table fats; cooking fats such as bacon drippings, lard, and vegetable shortening; vegetable oils; salad dressing; nondairy sweet cream and sour cream substitutes; and hollandaise and other sauces that are mainly fat or oil. Excludes fats and oils that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, fats or oils used to fry chicken, which is tabulated under meat, poultry, and fish; or mayonnaise in cole slaw, which is tabulated under vegetables.

Table fats—Includes butter, margarine, imitation margarine, margarine-like spreads, and blends of butter with margarine or vegetable oil.

Salad dressing—Includes regular and low-calorie salad dressings and mayonnaise.

SUGARS AND SWEETS—Includes sugar, sugar substitutes, syrups, honey, molasses, sweet toppings, frostings, sweet sauces, jellies, jams, preserves, fruit butters, marmalades, sweet pastes, gelatin desserts, ices, fruit bars, sorbets, popsicles, candy (including dietetic sweets), and chewing gum. Excludes sugars that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, sugar in baked goods, which are tabulated under grain products, and sugar in carbonated soft drinks, which are tabulated under beverages.

Sugars—Includes white, brown, maple, and raw sugar; fructose; and sugar substitutes.

Candy—Includes all types of candy (including dietetic sweets), chocolate-covered and sugar-coated nuts, chocolate chips, fruit leather, chewing gum, breath mints, and cough drops.

BEVERAGES—Includes alcoholic and nonalcoholic beverages. Excludes tap water and noncarbonated bottled water. Excludes beverages that were ingredients in food mixtures coded as a single item and tabulated under another food group; for example, wine in beef burgundy, which is tabulated under meat, poultry, and fish.

Alcoholic beverages—Includes wine, beer, ale, liqueurs, cocktails, other mixed drinks, and distilled liquors.

Wine—Includes wine, cooking wine, light wine, and mixtures made with wine, such as wine coolers. Excludes nonalcoholic wine, which is tabulated under nonalcoholic beverages.

Beer and ale—Includes beer, ale, light ("lite") beer, and beer coolers. Excludes near beer, which is tabulated under nonalcoholic beverages.

Nonalcoholic beverages—Includes coffee, tea, fruit drinks and ades, and soft drinks. Several nonalcoholic, nonfruit, noncarbonated beverages (for example, Puerto Rican oatmeal beverage), nonalcoholic wine, and near beer are included under this total but not in any of the following subgroups.

Coffee—Includes decaffeinated and regular coffee made from ground or instant coffee, liquid concentrate, coffee mixes, and coffee substitutes.

Tea—Includes decaffeinated and regular tea made from leaves, from frozen concentrate, or from instant tea mixes with or without lemon, sugar, and/or artificial sweetener; and herb and other teas.

Fruit drinks and ades—Includes regular and low-calorie fruit drinks, punches, and ades, including those made from powdered mix and frozen concentrate. Also includes fruit-based nonalcoholic cocktail mixes, such as pina colada mix. Excludes fruit juices, which are tabulated under fruits, and carbonated fruit drinks, which are tabulated under carbonated soft drinks.

Regular fruit drinks and ades—Includes all fruit drinks, punches, and ades except low-calorie and low-sugar types.

Low-calorie fruit drinks and ades—Includes low-calorie and low-sugar fruit drinks, punches, and ades.

Carbonated soft drinks—Includes regular and low-calorie carbonated soft drinks, such as colas, fruit-flavored and cream sodas, ginger ale, root beer, and carbonated soft drinks containing fruit juice; carbonated fruit juice drinks; and sweetened and unsweetened carbonated water.

Regular carbonated soft drinks—Includes all carbonated soft drinks except unsweetened and sugar-free types.

Low-calorie carbonated soft drinks—Includes unsweetened and sugar-free carbonated soft drinks, seltzer water, and carbonated mineral water.

Glossary

Employment status—Employment includes any full-time or part-time work done during the week prior to the interview for which money, goods, or services were received. Employment includes active duty in the Armed Forces. A respondent was also "employed" if she had a job but was not actually at work that week. Full-time status equals 35 hours or more worked during the week; part-time status equals 1 through 34 hours.

Food coding procedures—Assigning food codes to reported food items.

Food intake—All foods and beverages (except water) ingested by an individual. Does not include inedible parts of foods (such as bones, rinds, and seeds); uneaten portions of food; or vitamin, mineral, or other supplements.

Formula—An expression for deriving the nutrient content of a recipe or food mixture. A formula always includes the amounts of individual ingredients and also frequently includes (1) codes for accessing factors that adjust for vitamin and mineral losses during cooking or processing and (2) factors for calculating the moisture and fat changes in the recipe during cooking.

Household—All persons who regularly share a house, an apartment, a room, or a group of rooms which are used as separate living quarters; includes persons temporarily absent, such as those who were in the hospital or traveling. Excludes individuals who were living away in group quarters such as dormitories, rooming houses, military barracks, and institutions. Residences with nine or more persons unrelated to each other were considered group quarters and were not eligible to participate in the study.

Household income—Estimate of the total income from all sources, before taxes, of all household members for 1987.

Household size—Number of individuals in a household. See "Household."

Interview procedures—Procedures used to collect data in the field and to review questionnaires at contractor's central office.

"Items often forgotten" question—In NFCS 1987-88 individual intake questionnaire item number 12:

"(SHOW CARD F) Some food and drink items consumed at home or away from home are often forgotten in surveys like this. Have you forgotten any: (READ)

Snacks/desserts
Chips, fruits, candy, nuts, cheese, cookies
Nonalcoholic drinks at meals or as snacks
Coffee, tea, soft drinks, other drinks
Alcoholic beverages
Beer, wine, cocktails, other drinks
Accessory foods added to other foods at meals or snacks
Butter/margarine, sugar/sweetener, salad dressing, sauce/gravy, mustard/ketchup, relish, cream/milk, jam/jelly/syrup
Side dishes
Crackers, bread/rolls
Foods eaten or tasted while preparing meals or cleaning up
Other items?"

Method—Method of data collection refers to dietary recall, dietary record, or food frequency as opposed to procedure. Methods used in NFCS 1977-78 and 1987-88 are the same.

Nutrient data base—A file containing nutrient values of food items per 100 grams of food.

Nutrient intake—Nutrient content of all foods and beverages (except water) ingested by the respondent. Excludes vitamin, mineral, and other supplements.

One-day dietary recall—A recall of beverages and foods ingested during the day preceding the interview—the 24 hours from midnight to 11:59 p.m. Also known as a 24-hour recall.

Procedure—Refers to the way a method is carried out such as computer-assisted, structured, and open-ended. Procedures used in NFCS 1977-78 and 1987-88 were different in some respects.

Race—Reported as white, black, Asian/Pacific Islander, Aleut/Eskimo/American Indian, or some other race.

Salience—Importance of the survey topic to the respondent as indicated by the thought and attention that the respondent has given it prior to the interview (Sudman and Bradburn, 1982).

User—Any respondent who reported eating a food item from a specified food group or subgroup at least once during the survey day.

Weight conversion factors—Factors used to translate quantities of foods expressed by respondents in household measures to their gram-weight equivalents.

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NATIONAL ANALYSTS
A Division of Booz·Allen
& Hamilton Inc.

Study #: 09010-070-001
OMB #: 0586-0021
Expires: March 31, 1988

Segment #: [| |]

Housing Unit #: [| |]

Person (line) #: [|]

Interviewer #: [| |]

FOR INTERVIEWER'S USE ONLY

Time began:__________	AM	1
	PM	2
Time ended:__________	AM	1
	PM	2

A

SECTION III

BRIDGING STUDY

UNITED STATES DEPARTMENT OF AGRICULTURE

Individual Intake Record

This record is for: ______________________________
PERSON'S FIRST NAME

This person's date of birth is: [|] MONTH [|] DAY [| | |] YEAR

RECORD is from 12:00 AM to 11:59 PM yesterday. That date was:

(CIRCLE NUMBER FOR DAY OF WEEK)

Sunday	1
Monday	2
Tuesday	3
Wednesday	4
Thursday	5
Friday	6
Saturday	7

[|] MONTH [|] DAY [1 | 9 | 8 |] YEAR

Your cooperation is entirely voluntary. This information will be used to estimate the types and amounts of foods and beverages consumed by people like you. Results will be used to help ensure an adequate and safe food supply for all. This survey is authorized by law. **(IF ASKED, SAY: National Agricultural Research, Extension and Teaching Policy Act of 1977, Section 1428, 7 U.S.C. 3178.)**

All information will be kept confidential and will be reported as statistics only.

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INSTRUCTIONS FOR EACH EATING/DRINKING OCCASION

- ANSWER Q's 1 TO 3 ONCE
- ANSWER Q.4 BY LISTING ALL ITEMS CONSUMED
- ANSWER Q's 5 TO 8 FOR EACH ITEM LISTED IN Q.4
- ANSWER Q's 9 TO 10
- ANSWER Q.11 FOR ALL FOODS NOT FROM HOME SUPPLIES
- DRAW A LINE ACROSS ANSWER SHEET TO SEPARATE EACH OCCASION
- ANSWER Q's 12 TO 34 AT THE END OF THE RECORD

Now think about all of the foods and beverages you had yesterday, that is, beginning after 12:00 AM midnight.

WHEN?

1. Starting with the (first/next) time you ate or drank something yesterday, at about what time did you begin eating or drinking this? **(ENTER TIME IN COL. Q.1 ON ANSWER SHEET. CIRCLE A NUMBER FOR AM OR PM. USE PM FOR 12 NOON)**

WHAT CALLED?

2. Would you call this eating or drinking occasion: **(ENTER A NUMBER IN COL. Q.2)**

1. Breakfast	4. Dinner	6. Snack/beverage break/happy hour
2. Brunch	5. Supper	7. Infant feeding
3. Lunch		0. Something else **(DESCRIBE IN COL. Q.2)**

WITH WHOM?

3. With whom did you eat or drink this? **(ENTER A NUMBER IN COL. Q.3)**

1. Alone
2. With other household member(s)
3. With nonhousehold member(s)
4. With both household and nonhousehold members

WHAT FOODS/DRINKS?

4. What did you have to eat or drink on this occasion? What else? **(RECORD ONE ITEM TO A LINE IN COL. Q.4. "BREAD, BUTTER" GO ON TWO LINES)**

5. Describe each item further. **(RECORD IN COL. Q.5, REFER TO FOOD INSTRUCTION BOOKLET -- FIB)**

QUANTITY CONSUMED?

6a. How much of each item did you actually eat or drink? **(ENTER AMOUNTS IN COL. Q.6a. USE MEASURING UTENSILS AND FIB)**

6b. **FOR INTERVIEWER ONLY: ENTER A NUMBER IN COL. Q.6b TO INDICATE HOW QUANTITY IN Q.6a WAS ESTIMATED**

1. Measuring cup used	5. Amount reported from actual package weight
2. Measuring spoon used	6. Other **(DESCRIBE IN COL. Q.6b)**
3. Ruler used	7. No measuring aids used
4. Household cup, bowl, glass measured	

FOOD SOURCE?

7. **FOR EACH ITEM LISTED:** Was this item: **(ENTER A NUMBER IN COL. Q.7)**

1. Eaten at your home
2. Brought into your home, but later eaten away from home
3. Never brought into your home

IF ANY ITEMS WITH "1" OR "2" IN Q.7, CONTINUE. IF ONLY "3" FOR ALL ITEMS, GO TO Q.11

HOME ITEMS FROM FAST-FOOD PLACES OR MEALS ON WHEELS?

8. **FOR EACH ITEM LISTED:** Was this item brought into your home: **(ENTER A NUMBER IN COL. Q.8)**

1. From fast-food/carryout place
2. From Meals on Wheels
3. From some other place

INTAKE ANSWER SHEET

ANSWER ONCE FOR EACH OCCASION					USE A NEW LINE FOR EACH ITEM. USE FIB AND MEASURING UTENSILS				
Q.1			Q.2	Q.3		Q.4	Q.5	Q.6a	Q.6b
When									
Time	AM	PM	What Called	With Whom	Line #	Name of Food/Drink	Complete Description	Quantity Consumed	How Esti-mated
	1	2			101				
	1	2			102				
	1	2			103				
	1	2			104				
	1	2			105				
	1	2			106				
	1	2			107				
	1	2			108				
	1	2			109				
	1	2			110				
	1	2			111				
	1	2			112				
	1	2			113				
	1	2			114				
	1	2			115				
	1	2			116				
	1	2			117				
	1	2			118				
	1	2			119				
	1	2			120				

INTAKE ANSWER SHEET

ANSWER FOR EACH ITEM				ANSWER IF "1" OR "2" IN Q.7						ANSWER ONLY IF "3" IN Q.7	ANSWER ONLY IF "1" IN Q.12
Q.7			Q.8	Q.9				Q.10		Q.11	Q.12
FOOD SOURCE				(a)	(b)		(c)				
From Home		Not From Home	SOURCE OF HOME ITEMS	Fat in Prep-ration	Fat Used	No Fat Used	Fat Type	Salt Used in Prep-aration	No Salt Used in Prep-aration	Where Obtained	Added/ Changed Item
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1

(CONTINUE ON FOLLOWING PAGE)

INTAKE ANSWER SHEET

ANSWER ONCE FOR EACH OCCASION					USE A NEW LINE FOR EACH ITEM. USE FIB AND MEASURING UTENSILS				
Q.1			Q.2	Q.3		Q.4	Q.5	Q.6a	Q.6b
When									
Time	AM	PM	What Called	With Whom	Line #	Name of Food/Drink	Complete Description	Quantity Consumed	How Estimated
	1	2			121				
	1	2			122				
	1	2			123				
	1	2			124				
	1	2			125				
	1	2			126				
	1	2			127				
	1	2			128				
	1	2			129				
	1	2			130				
	1	2			131				
	1	2			132				
	1	2			133				
	1	2			134				
	1	2			135				
	1	2			136				
	1	2			137				
	1	2			138				
	1	2			139				
	1	2			140				

INTAKE ANSWER SHEET

ANSWER FOR EACH ITEM				ANSWER IF "1" OR "2" IN Q.7						ANSWER ONLY IF "3" IN Q.7	ANSWER ONLY IF "1" IN Q.12
Q.7			Q.8	Q.9				Q.10		Q.11	Q.12
FOOD SOURCE				(a)	(b)		(c)				
From Home		Not From Home	SOURCE OF HOME ITEMS	Fat in Prep-ration	Fat Used	No Fat Used	Fat Type	Salt Used in Prep-aration	No Salt Used in Prep-aration	Where Obtained	Added/ Changed Item
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1
1	2	3			1	2		1	2		1

12. **(SHOW CARD F)** Some food and drink items consumed at home or away from home are often forgotten in surveys like this. Have you forgotten any: **(CIRCLE NUMBER FOR EACH)**

(IF ANY ITEM HAS BEEN FORGOTTEN ("1" CIRCLED), COMPLETE Q's 1 TO 11 AND CIRCLE "1" IN COL. Q.12 FOR EACH SUCH ITEM)

(READ)	Yes	No
Snacks/desserts Chips, fruits, candy, nuts, cheese, cookies	1	2
Nonalcoholic drinks at meals or as snacks Coffee, tea, soft drinks, juice, other drinks	1	2
Alcoholic beverages Beer, wine, cocktails, other drinks	1	2
Accessory foods added to other foods at meals or snacks Butter/margarine, sugar/sweetener, salad dressing, sauce/gravy, mustard/ketchup, relish, cream/milk, jam/jelly/syrup	1	2
Side dishes Crackers, bread/rolls	1	2
Foods eaten or tasted while preparing meals or cleaning up	1	2
Other items	1	2
FOR OFFICE USE ONLY		

TIME Q.12 ENDED: __________

AM	1
PM	2

13a. About how many fluid ounces of water did you drink yesterday other than in coffee, tea, fruitade, and the like? **(IF NONE, ENTER "0" AND GO TO Q.13c)**

______________ FLUID OUNCES

13b. How much of the water you drank yesterday was from your home supplies? Would you say:

None,	1
Some,	2
Most, or	3
All?	4

13c. About how many fluid ounces of water do you usually drink in a 24-hour period?

__________ FLUID OUNCES

14a. Would you say the amount of food and drink you had yesterday was:

	Less than usual,	1
(GO TO Q.15)	Usual, or	2
	More than usual for this day of the week?	3

14b. **IF LESS OR MORE:** Which one of the following reasons best describes why it was different?

Sick or ill	1
Short of money	2
Traveling	3
At a social occasion or on a special day	4
On holiday or vacation	5
Too little time or too busy	6
Not hungry or very hungry	7
Dieting	8
Some other reason? **(DESCRIBE)** ______________	0

15. In general, would you say the healthfulness of your diet is:

Excellent,	1
Very good,	2
Good,	3
Fair, or	4
Poor?	5

16a. How often do you add salt to your food at the table? Would you say:

(GO TO Q.17a)	Never,	1
	Sometimes,	2
	Often, or	3
	Always (almost always)?	4

16b. Would you say that the amount of salt you usually add to foods at the table is:

Light,	1
Moderate, or	2
Heavy?	3

16c. When you use salt at the table, is it:

Regular salt,	1
Lite salt,	2
Salt substitute, or	3
Some other kind? **(DESCRIBE)** ______	4

16d. Do you usually use iodized salt?

Yes	1
No	2
Don't know	3

17a. Are you on a special diet?

	Yes	1
(GO TO Q.18)	No	2

17b. **(SHOW CARD G)** What type of special diet are you on?

(CIRCLE AS MANY AS APPLY)

Low calorie/weight loss diet	1
Low fat/cholesterol diet	2
Low salt diet	3
Low sugar/sugar free diet	4
Diabetic diet	5
Other diet **(DESCRIBE)** ______	0

18. Do you consider yourself to be a vegetarian?

Yes	1
No	2

19. How often, if at all, do you take any vitamin or mineral supplements by mouth, such as a pill or liquid? Would you say:

(CONTINUE)	Every day,	1
	Almost every day,	2
	Every so often, or	3
(GO TO Q.21)	Not at all?	4

20. Do you usually take a:

(CIRCLE AS MANY AS APPLY)

Multivitamin,	1
Multivitamin with iron or other minerals,	2
Combination of Vitamin C and iron,	3
Other combination of vitamins and minerals,	4
Vitamin C,	5
Iron,	6
Calcium, or	7
Other single vitamins/minerals?	8

21. About how much do you weigh without shoes?

_____________ POUNDS

22. How tall are you without shoes?

_________ FEET _________ INCHES

23. In general, would you say your health is:

Excellent,	1
Very good,	2
Good,	3
Fair, or	4
Poor?	5

24. Do you have any disability or handicap that limits your activities?

Yes	1
No	2

25. Has a doctor ever told you that you have: **(CIRCLE A NUMBER FOR EACH)**

	Yes	No
Diabetes?	1	2
High blood pressure (hypertension)?	1	2
Heart disease?	1	2
Cancer?	1	2
Osteoporosis?	1	2

26. Do you have trouble biting or chewing food?

	Yes	1
(GO TO Q.28)	No	2

27. Do you have this trouble because of: **(CIRCLE A NUMBER FOR EACH)**

	Yes	No
Poor fitting dentures?	1	2
Loss of teeth, dentures or replacement?	1	2
Other reasons?	1	2

28. Think now about how you usually spend your leisure time, that is, other than at your job or doing housework. Would you say your usual level of physical activity is:

(READ UNDERLINED WORDS)

	Heavy/Rigorous (running, playing tennis, swimming, doing heavy gardening, etc., three or more times per week),	1
	Moderate (doing rigorous activities one or two times per week or doing steady walking, or other moderate activities three or more times per week), or	2
	Light (playing golf, taking a stroll, or doing nonrigorous activities occasionally)?	3
(GO TO Q.31)	Bedridden	4

29. Do you exercise or play sports regularly?

	Yes	1
(GO TO Q.31)	No	2

30. For how long have you exercised or played sports regularly?

#__________ WEEKS OR #__________ MONTHS OR #__________ YEARS

31. Have you smoked 100 or more cigarettes during your entire life?

	Yes	1
(GO TO Q.35)	No	2

32. Do you smoke cigarettes now?

	Yes	1
(GO TO Q.34)	No	2

33. On the average, how many cigarettes per day do you smoke?

#__________ PER DAY

GO TO Q.35

34. How long has it been since you smoked cigarettes regularly?

#__________ YEARS

Less than one year	00
Never smoked regularly	98

INTERVIEWER COMMENTS

35. Circle a code for all persons who assisted in responding on the intake record.

Sample person	1
Mother	2
Father	3
Sister	4
Brother	5
Grandparent	6
Other person **(DESCRIBE)** ______	0

36. Were the descriptions of foods/beverages consumed yesterday difficult for the respondent to answer?

	Yes	1
(GO TO Q.38)	No	2

37. What were the reasons for this difficulty?

______
______
______
______

38. Were the amounts of foods/beverages consumed yesterday difficult for the respondent to answer?

	Yes	1
(TERMINATE)	No	2

39. What were the reasons for this difficulty?

______
______
______
______

- **IF ANY ITEMS FOR THIS OCCASION ARE "1" OR "2" IN Q.7, CONTINUE**
- **IF ALL ITEMS FOR THIS OCCASION ARE "3" IN Q.7, GO TO Q.11**

FAT USED IN PREPARATION?

9a. Think about the preparation of the foods/drinks you consumed on this occasion. By preparation, I mean the seasoning or cooking of the foods/drinks before they were brought to the table. Were any fats or oils used in preparing any of these items? **(ENTER A NUMBER IN COL. Q.9a, ONCE FOR THIS OCCASION)**

1. Yes	2. No **(GO TO Q.10)**

9b. For which items from your home food supplies did you use fats or oils in the preparation? **(IN COL. Q.9b, CIRCLE THE APPROPRIATE NUMBER)**

9c. **FOR EACH ITEM WHERE FAT/OIL WAS USED:** What type of fat or oil was used for this item? Was it: **(READ AND ENTER A NUMBER IN COL. Q.9c)**

1. Olive oil,	6. Any diet margarine,
2. Corn, cottonseed, safflower or sunflower oil,	7. Margarine blend,
3. Soybean oil or other vegetable oil (include nut oils),	8. Butter,
	9. Animal shortening (meat/bacon drippings), or
4. Regular tub or liquid margarine,	10. Vegetable shortening?
5. Regular stick margarine,	11. Don't know/remember **(DO NOT READ)**

SALT USED IN PREPARATION?

10. For which items from your home food supplies did you use salt in the preparation? **(IN COL. Q.10, CIRCLE THE APPROPRIATE NUMBER)**

- **REFER TO Q.7. IF ANY ITEM FOR THIS OCCASION IS "3," CONTINUE**
- **IF NO ITEM IS "3," DRAW LINE ACROSS ANSWER PAGES AND ANSWER Q's 1 TO 11 FOR NEXT OCCASION. WHEN ALL OCCASIONS HAVE BEEN RECORDED, GO TO Q.12 ON NEXT PAGE**

WHERE OBTAINED/SERVICE?

11. Where did you get this food/beverage which was not from your home food supplies?

1.	Restaurant with waiter/waitress service at a table or counter
2.	Cafeteria or self-serve buffet restaurant
3.	Restaurant where food was ordered and picked up at a counter or drive-up window (include fast-food places)
4.	School
5.	Day-care center or summer day camp
6.	Community feeding program (include those for senior citizens, disabled, or needy persons)
7.	Vending machine **(MUST RECORD ADDITIONAL NUMBER FOR LOCATION)**
8.	Store
9.	At someone else's home
10.	Some other place? **(DESCRIBE IN COL. Q.11)**

DRAW LINE ACROSS ANSWER PAGES AND ANSWER Q's 1 TO 11 UNTIL ALL EATING/DRINKING OCCASIONS HAVE BEEN RECORDED. IF ALL FOOD/DRINKS RECORDED, GO TO Q.12 ON NEXT PAGE

Segment #: ____________
Housing Unit #: ____________
Person (line) #: ____________ {8,9}
Interviewer #: ____________

____________ {1-5} ID

CD 1 3 {6,7}

Study #: 09010-070-001
OMB NO.: 0586-0021
Expires: March 31, 1988

FOR INTERVIEWER'S USE ONLY

CD 1 4 {6,7}

{8,9}
Time Started: ________ {10-13}

{14}	
AM	1
PM	2

Time Ended: ________ {15-18}

{19}	
AM	1
PM	2

This record is for ______________________
FIRST NAME

B

SECTION III

Bridging Study
United States Department of Agriculture

Individual Intake Record

RECORD is from 12 A.M. to 11:59 P.M. on ________ DAY ________ / ________ MONTH {20,21} DATE {22,23}

Your cooperation is entirely voluntary. The information you supply will be used to estimate types and amounts of foods and beverages consumed by people like yourself. Results will be used to help insure an adequate and safe food supply for all. Information supplied by you will appear as statistics. It will, in no way, be connected to you or your household. This survey is authorized by law (7 U.S.C. 10).

DAILY INTAKE RECORD

- ANSWER QUESTIONS 1-3 ONCE FOR EACH EATING/DRINKING OCCASION
- ANSWER QUESTIONS 4-6
- ANSWER QUESTION 7 FOR EACH ITEM LISTED
- ANSWER QUESTIONS 8-11 AS APPLICABLE
- DRAW A LINE ACROSS BOTH PAGES TO SEPARATE ONE EATING/DRINKING OCCASION FROM THE OTHER
- ANSWER QUESTIONS 12-16 AT THE END OF EACH DAY

Start with the first time you ate or drank something on this day (after 12:00 A.M., midnight)...

1. At about what time did you begin eating/drinking this? (ENTER HOUR AND CIRCLE THE CODE FOR EITHER A.M. OR P.M. IN COL. Q.1)

2. What do you usually call this? (ENTER A NUMBER IN COL. Q.2)

   1 Breakfast
   2 Brunch
   3 Lunch
   4 Dinner
   5 Supper
   6 Coffee (beverage) break
   7 Snack
   8 Other (EXPLAIN IN COL. Q.2)

3. With whom did you eat/drink this? (ENTER A NUMBER IN COL. Q.3)

   1 Alone
   2 With other household member(s)
   3 With non-household member(s)
   4 With both household member(s) and non-household member(s)

4. What did you eat or drink on this occasion? (ENTER ONE ITEM TO A LINE IN COL. Q.4. FOR EXAMPLE, "BREAD AND BUTTER" WILL TAKE UP TWO LINES)

5. Describe this item further. (ENTER IN COL. Q.5.)

6. How much did you actually eat or drink? (ENTER AMOUNT IN COL. Q.6.)

COMPLETE Q'S 4-6 FOR THIS OCCASION AND THEN CONTINUE WITH Q.7 ON NEXT PAGE --→

LEFT FLAP

INTAKE RECORD

ANSWER ONCE FOR EACH OCCASION					FOOD/DRINK CONSUMED: ONE ITEM PER LINE		
Q.1			Q.2	Q.3	Q.4	Q.5	Q.6
CD 1 3 When? {10-13}	{14}		{15}	{16}			
Time	AM	PM	Usually Called	With Whom	Name of Food/Drink	Complete Description	Amount Actually Consumed
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
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	1	2					
	1	2					
	1	2					

		ANSWER FOR EACH ITEM			IF "NO" (CODE 3) TO Q.7 -- FOLLOW INSTRUCTIONS ON FLAP				
		Q.7			Q.8	Q.9	Q.10	Q.11	
		{36} Home Supply			{37,38}	{39}	{40}	{41-45} IF "YES" TO Q.10	
{17-32} DO NOT WRITE IN THIS SPACE	{33-35}	Yes Eaten at Home	Yes Eaten Away	No	Where Obtained	Kind of Service	Did You Pay?	Amount Paid?	END CD 1 3
	101	1	2	3					
	102	1	2	3					
	103	1	2	3					
	104	1	2	3					
	105	1	2	3					
	106	1	2	3					
	107	1	2	3					
	108	1	2	3					
	109	1	2	3					
	110	1	2	3					
	111	1	2	3					
	112	1	2	3					
	113	1	2	3					
	114	1	2	3					
	115	1	2	3					
	116	1	2	3					
	117	1	2	3					
	118	1	2	3					
	119	1	2	3					
	120	1	2	3					
	121	1	2	3					
	122	1	2	3					
	123	1	2	3					
	124	1	2	3					

CONTINUE WITH QUESTIONS →

ANSWER ONCE FOR EACH OCCASION					FOOD/DRINK CONSUMED: ONE ITEM PER LINE		
Q.1			Q.2	Q.3	Q.4	Q.5	Q.6
CD 1 3 When? {10-13}	{14}		{15}	{16}			
Time	AM	PM	Usually Called	With Whom	Name of Food/Drink	Complete Description	Amount Actually Consumed
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
	1	2					
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	1	2					
	1	2					
	1	2					
	1	2					

		ANSWER FOR EACH ITEM			IF "NO" (CODE 3) TO Q.7 -- FOLLOW INSTRUCTIONS ON FLAP				
		Q.7			Q.8	Q.9	Q.10	Q.11	
		{36} Home Supply			{37,38}	{39}	{40}	{41-45} IF "YES" TO Q.10	END CD
{17-32} DO NOT WRITE IN THIS SPACE	{33-35}	Yes Eaten at Home	Yes Eaten Away	No	Where Obtained	Kind of Service	Did You Pay?	Amount Paid?	1 3
	201	1	2	3					
	202	1	2	3					
	203	1	2	3					
	204	1	2	3					
	205	1	2	3					
	206	1	2	3					
	207	1	2	3					
	208	1	2	3					
	209	1	2	3					
	210	1	2	3					
	211	1	2	3					
	212	1	2	3					
	213	1	2	3					
	214	1	2	3					
	215	1	2	3					
	216	1	2	3					
	217	1	2	3					
	218	1	2	3					
	219	1	2	3					
	220	1	2	3					
	221	1	2	3					
	222	1	2	3					
	223	1	2	3					
	224	1	2	3					

CONTINUE WITH QUESTIONS ⟶

12. Did you drink any water on this day (other than in coffee, fruitade, etc.)? (CIRCLE ONE NUMBER)

{24}

Yes	1
No	2

If yes, about how many cups?

NUMBER OF:_____cups (8 fl. oz.)
{25,26}

13. Did you chew any gum on this day? (CIRCLE ONE NUMBER)

{27}

Yes	1
No	2

If yes, about how many sticks or pieces?

NUMBER OF:_____sticks or pieces
{28,29}

14. Did you consume any cough drops on this day? (CIRCLE ONE NUMBER)

{30}

Yes	1
No	2

If yes, how many pieces?

NUMBER OF:_____ cough drops
{31,32}

15. Was your food/drink consumption on this day typical of what you usually eat/drink on this day of week (Sunday, Monday, etc)? (CIRCLE ONE NUMBER)

{33}

Yes	1
No	2

If no, why is it different? (CIRCLE ONE NUMBER)

{34}

Ill	1
Short of cash	2
Traveling	3
Social occasion	4
Holiday	5
Not enough time to eat	6
Other reason: (EXPLAIN)	7

16. Did anyone help you keep this record? (CIRCLE ONE NUMBER)

{35}

Yes	1
No	2

If yes, who helped? (CIRCLE ONE OR MORE NUMBERS)

{36}

Interviewer	1
Household member, first name _____	2
Non-household member	3

17. What was the month, day, and year of your birth?

_____/_____/_____
MONTH {37,38} DAY {39,40} YEAR {41,42}

18. What is your height?

_____ FEET {43} _____ INCHES {44,45}

19. What is your weight?

_____POUNDS
{46-48}

20. Are you on a special diet? (CIRCLE ONE NUMBER)

{49}

Yes	1
No	2

If yes, how would you describe it? (CIRCLE ONE NUMBER)

{50}

Doctor prescribed what I should or should not eat	1
Group diet program such as Weight Watchers or Tops	2
Diet I read or heard about elsewhere	3
Other (PLEASE DESCRIBE)	4

21. Do you take any vitamin, mineral, or other supplement by mouth (such as tablets, capsules, oil)? (CIRCLE ONE NUMBER)

{51}

No	1
Yes, regularly	2
Yes, irregularly	3

If yes, circle the number following each supplement taken:

Multiple vitamins	1	52
Multiple minerals	2	
Multiple vitamins and minerals	3	
Vitamin A	4	
Vitamin C	5	
Vitamin D	6	
Vitamin E	7	
B vitamins/B-complex	8	
Iron	9	
Calcium	0	
Zinc	1	53
Fluoride	2	
Other (Which?)	3	

22. Have you eaten any of the following in the past 30 days? (CIRCLE THE NUMBER OR THE ASTERISK (*) AFTER EACH FOOD. IF YOUR ANSWER IS "YES", PLEASE INDICATE HOW MANY TIMES IN THE PAST 30 DAYS YOU HAVE EATEN THAT KIND OF FOOD)

	{54} Yes	No	# of Times
Liver: Beef or calf's	1	*	55,56
Liver: Chicken	2	*	57,58
Liver: Pork	3	*	59,60
Kidney: Beef, lamb or veal	4	*	61,62
Heart: Beef or calf's	5	*	63,64
Sweetbreads	6	*	65,66
Brains	7	*	67,68
Other organ meats (Which?)	8	*	69,70

23. Are you a vegetarian? (CIRCLE ONE NUMBER)

{71}

Yes	1
No	2

If yes, indicate which of the following foods you eat: (CIRCLE ONE OR MORE NUMBERS)

{72}

Poultry	1
Fish	2
Eggs	3
Dairy products	4
Fruits	5
Nuts	6
Dried beans or peas	7
Vegetables	8
Cereal or grain products	9
Vegetable-based meat substitute	0

24. These are some things that might affect what a person eats and drinks. Indicate which ones, if any, pertain to you. (CIRCLE A NUMBER FOR EACH ONE WHICH APPLIES)

{73}

I'm on a diet to lose weight	1
I'm on a diet to put weight on	2
I have a chewing problem because of teeth	3
I have a medical problem like diabetes or allergy	4
Some foods do not agree with me	5
I don't feel like eating breakfast early in the morning	6
I have no interest in cooking for one person	7
I do not like certain foods	8
Other (EXPLAIN) ______	9
FOR OFFICE USE ONLY	0

25. As of now, how would you describe your health? (CIRCLE ONE NUMBER)

{74}

Excellent	1
Good	2
Fair	3
Poor	4

26. Do you have any disability or handicap that limits your activities? (CIRCLE ONE NUMBER)

{75}

Yes	1
No	2

27. Have you smoked 100 or more cigarettes during your entire life?

{76}

	Yes	1
(TERMINATE)	No	2

28. Do you smoke cigarettes now?

{77}

Yes	1
No	2

RECORD TIME ON FRONT COVER

END CD 1 4

7. Was this from your home food supply? Home food supply includes food brought into the home, or taken from the home and eaten elsewhere. (CIRCLE A CODE IN COL, Q.7)

1 Yes, and eaten at home
2 Yes, but eaten away from home
3 No, obtained and eaten elsewhere

- IF NO ITEMS IN Q.7 ARE CODE 3, YOU HAVE COMPLETED THE ENTRY FOR THIS OCCASION
- IF ANY ITEMS IN Q.7 ARE CODE 3, CONTINUE WITH Q'S 8-11

8. Where did you get this food/beverage which was not from home food supplies? (ENTER A NUMBER IN COL. Q.8)

1 Restaurant
2 Fast food place
3 Other public eating place
4 Dining room or cafeteria at work
5 Other place at work
7 Day care center
8 Summer day camp
9 Community feeding program for senior citizens
10 Grocery or other food store
11 Drugstore or other store
12 At someone else's home (DO NOT ANSWER Q'S 9-11)
13 Other (EXPLAIN IN COL. Q.8)
14 School - complete plate meal (lunch or breakfast)
15 School - individually purchased foods (a la carte).

9. What kind of service was used to deliver the food/beverage you had at this time? (ENTER ONLY ONE NUMBER IN COL. Q.9. IF A COMBINATION, ENTER THE MAIN NUMBER)

1 Served at a table (waiter/waitress)
2 Counter service
3 Cafeteria or buffet style (include fast food eaten on premises)
4 Vending machine
5 Carry out
6 Car service
7 Other

10. Did you or any member of your household pay for any of the food or beverage you had? (ENTER A NUMBER IN COL. Q.10)

1 Yes -- ANSWER Q.11
2 No -- DO NOT ANSWER Q.11

11. How much did you or the household member pay? Include tax and tip, if any. (ENTER AMOUNT IN COL. Q.11)

RECORD TOTAL COST OF ALL FOOD/BEVERAGES NOT FROM HOME FOOD SUPPLY FOR THAT OCCASION. IF EASIER, RECORD SEPARATE COST OF EACH ITEM NOT FROM HOME FOOD SUPPLY.

RIGHT FLAP