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ANALYSIS OF NONRESPONSE TO THE 1986 CONTINUING SURVEY OF
FOOD INTAKES BY INDIVIDUALS

Human
Nutrition
Information
Service

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INTRODUCTION

Although a survey sample may be carefully selected to represent all segments of a population of interest, some portion of the selected sample typically will fail to respond. If nonresponse is random throughout the selected sample, the respondents can still be expected to represent the population of interest. However, if nonresponse occurs systematically in the sample, the respondents may not represent the target population, and the survey results may be biased. The magnitude of this bias is determined by the overall response rate and the level of difference between the mean values of survey variables for respondents and the mean values of survey variables for nonrespondents. Unfortunately, because nonrespondents did not respond, their mean values for the entire range of survey variables are unknown. In fact, only the most general information regarding geographic location is typically available for nonrespondents. An assessment of nonresponse bias is, therefore, difficult.

The 1986 Continuing Survey of Food Intakes by Individuals (CSFII 1986), a survey of food consumption, was designed to include a sample representing women 19 to 50 years of age and their children 1 to 5 years of age from all households in the 48 conterminous United States.¹ However, not all of the households selected for the sample responded to the survey. A followup survey was conducted 7 months after the initial CSFII interview to obtain limited information on nonresponding households. Data from this Followup survey were analyzed to assess the extent to which nonresponse biased the CSFII 1986 data. The results of this analysis are included in this report.

CSFII 1986 SAMPLE AND RESPONSE RATES

The CSFII 1986 sample was drawn from all private households in the conterminous United States. The survey was designed to provide a multistage stratified area probability sample representative of the 48 conterminous States. The sampling frame was organized using estimates of the U.S. population in 1985. Adjustments were made at the time of the survey to reflect the 1986 population. The stratification plan took into account geographic location, degree of urbanization, and socioeconomic considerations. Each successive sampling stage selected increasingly smaller, more specific locations.

The 48 States were grouped into the nine census geographic divisions; then all land areas within the divisions were divided into three urbanization classifications: central

¹Two separate samples were drawn for the CSFII 1986--an all-income, or core, sample and a low-income sample. Only the core sample is discussed in this report.

city, suburban, and nonmetropolitan. The stratification process resulted in a total of 60 strata--17 central city, 28 suburban, and 15 nonmetropolitan--which correspond to the geographic distribution, urbanization, and density of the population within the conterminous United States as defined by the Bureau of the Census.

Counties, cities, or parts of cities within each stratum were grouped together into smaller, relatively homogeneous units called primary sampling units (PSU), based on political, economic, and demographic characteristics, as well as geographical proximity. Two PSU were sampled with a probability proportional to size in each stratum for a total of 120 PSU overall.

Each selected PSU was divided geographically along census boundaries into smaller clusters, known as area segments, each containing a minimum of 100 housing units. A total of 206 area segments were drawn into the sample. Each area segment was selected with a probability proportional to the relative size of the segment within the PSU.

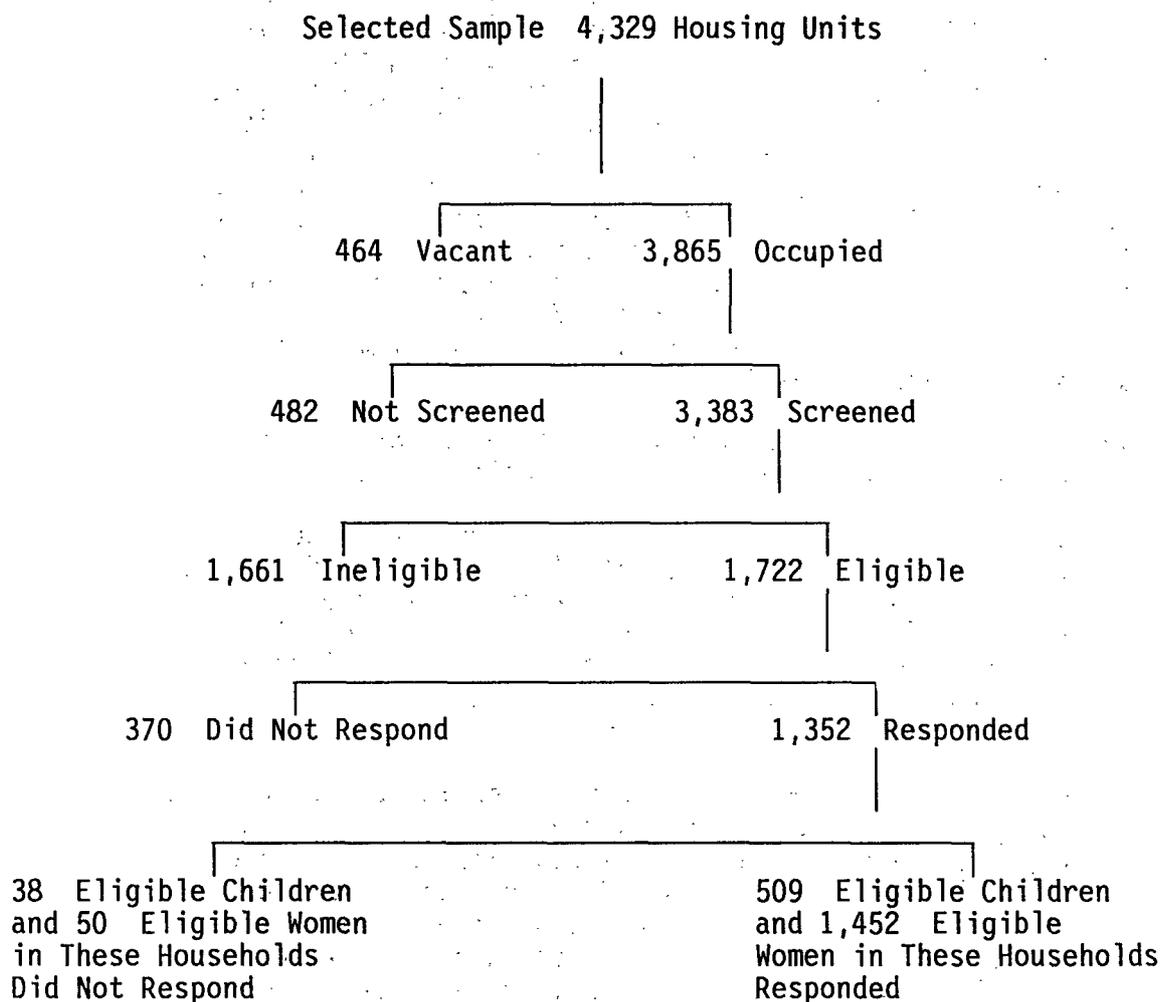
All area segments were prelisted prior to the CSFII 1985 to identify the existing housing units within the area boundaries at the time of the first year's survey. To ensure comparability between 1985 and 1986 survey data, the housing units drawn into the CSFII 1986 sample came from the same area segments. However, different housing units were selected for the CSFII 1986.

The prelisted number of housing units in the area as of 1985, together with census information, served as the basis for determining the initial number of housing units to be selected for the CSFII 1986 sample from that area. In addition, new housing units which came into existence between the 1985 and 1986 surveys had a chance of being sampled.

A systematic random sample of housing units was identified for contact in each area segment. The number of sample housing units was about equal in each segment. As shown in figure 1, 4,329 sample housing units were identified for contact. Of these, 464 were vacant at the time of field contact.² Of the remainder, 3,383 were successfully screened; 1,722 of these were eligible to participate in the survey, and 1,352 participated. These participating households included 547

²This 89 percent occupancy rate is very close to the expected occupancy rate of 90 percent employed in designing the survey.

Figure 1.--Disposition of CSFII 1986 Sample Housing Units



SOURCE: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986

eligible 1-to-5-year-old children and 1,502 eligible 19-to-50-year-old women. Five hundred and nine of the eligible children and 1,452 of the eligible women responded to the survey.

The screening response rate for the CSFII 1986 was 87.5 percent (3,383/3,865). The completion rate for screened CSFII 1986 households was 78.5 percent (1,352/1,722). Calculation of a precise overall CSFII 1986 household completion rate is not possible. The eligibility status of the 482 unscreened households is unknown. If none of

the unscreened households had been eligible for the CSFII (i.e., none containing at least one woman 19 to 50 years of age) then the overall household completion rate for the CSFII would have been 78.5 percent (1,352/1,722). Alternatively, if all of the unscreened households had been eligible for the CSFII, then the overall household completion rate for the CSFII would have been 61.3 percent (1,352/2,204). Neither of these extremes is likely; hence the actual household completion rate for the CSFII lies somewhere between 61.3 percent and 78.5 percent. This completion rate is similar to the 60-65 percent rate reported by the American Statistical Association (ASA) as typical for general population surveys. According to ASA, completion rates declined from 80-85 percent in the 1960's to 60-65 percent in the 1970's (American Statistical Assn., 1974).

Weighting was used to adjust the CSFII data for nonresponse. The weighting procedure employed is outlined below:

- 1) Household weights for each area segment were determined by estimating the total number of eligible occupied households and dividing this number by the actual number of interviewed households in the segment. The resulting household weights were adjusted so that the weighted number of households equaled the unweighted number of households, except for rounding differences.
- 2) Separate initial weights were required for children and for women. The adjustment for eligible children for whom complete dietary intake information was not collected was made on an age basis across all households in a segment. All eligible children in participating households were divided into two age groups: those under 2-1/2 years and those 2-1/2 years and over. Children in each age group were listed by area segment. If complete dietary intake data were provided for all eligible children within an area segment, each child was given an initial weighting factor of 1.00. In area segments having children with missing dietary data, participating children received initial weighting factors that summed to the number of eligible children within the same age group in that segment. For example, if dietary data were missing or incomplete for one of five eligible children in the same area segment and age group, the other four children for whom intake data were obtained were assigned an initial weighting factor of 1.25.

The adjustment for eligible women for whom complete dietary intake information was not collected was made within a sample household. First, the number of age-eligible women and the number of participating women in each household were determined. Second, in households where all eligible

women participated, each woman was given an initial weighting factor of 1.00. In households where not all of the age-eligible women participated, the women in that particular household who did participate received weighting factors that summed to the number of eligible women in that household.

- 3) The initial weighting factor for each child or woman was then multiplied by the household weight to obtain the final individual weight.

Overall unweighted and weighted counts for the CSFII 1986 are shown below:

	<u>Unweighted count</u>	<u>Weighted count</u>
Children:		
1 to 2-1/2 years.....	132	148
2-1/2 to 5 years.....	377	399
Women:		
19-to-50 years.....	1,451	1,510
All individuals.....	1,960	2,057
Households.....	1,352	1,351

REASONS FOR
NONRESPONSE

In telephone and personal interview surveys, generally the two major reasons for nonresponse are refusals and inability of the interviewers to find sample members at home ("not-at-homes") (Wilcox, 1977). Cochran also includes the inability of respondents to provide the information requested as another cause of nonresponse (Cochran, 1977).

As part of the CSFII 1986 interview procedure, interviewers were requested to note reasons for household nonresponse to the CSFII 1986.³ Table 1 shows that reasons given for household nonresponse by CSFII interviewers were similar to those listed by Wilcox and Cochran. "Not-at-homes" accounted for 32.9 percent of total nonresponding households, while refusals--people who were "not interested," "too busy," or

³Information on reasons for nonresponse was collected only at the household level. Reasons for nonresponse were not elicited from interviewers for nonresponding women in households where at least one of the eligible women in the household participated in the survey.

Table 1.--Reason for Original Nonresponse--All CSFII Nonresponding Households

Reason for Nonresponse	All CSFII Nonresponding Households (n=852)
	<u>Percent</u>
Not at home.....	32.9
Not interested, do not want to be bothered, family crisis, other, NFS.....	26.1
Too busy, do not want to take the time.....	21.2
Do not answer surveys, do not give out personal information.....	4.2
Locked community.....	3.9
Language barrier.....	2.9
Sick, disabled.....	1.8
In CSFII 1985 ^a	1.4
Moving soon, out of area part of the year.....	0.9
Interviewer did not give a reason.....	4.0
Screening form missing.....	0.7

^aSamples for CSFII 1985 and 1986 were drawn from the same area segments. Households who moved within their area segment may have been drawn into both the CSFII 1985 and CSFII 1986 samples.

SOURCE: NFCS-Continuing Survey of Food Intakes by Individuals, Core, 1986

"unwilling to respond to surveys in general"--accounted for 51.5 percent of total nonresponding households. Locked communities contributed to the response problem because interviewers were prevented from visiting some sample households. Illness and language barriers also prevented some households from participating. Two additional reasons given by small numbers of CSFII nonrespondents were participation in the survey the previous year and plans to move within the year.

The CSFII 1986, as mentioned above, was conducted in most of the same geographic area segments as the similarly designed CSFII 1985. Although addresses which were included in the 1985 sample were excluded from the 1986 frame, several of the 1985 sample households had moved to different dwellings in the same area segments and were reselected for the 1986 sample by chance. Plans to move within a year precluded participation by some households because of the longitudinal nature of the survey. The survey design included six interviews conducted at approximately 2-month intervals. Households which did not expect to remain at their current addresses for this length of time were allowed to participate, but some declined.

CHARACTERISTICS OF NONRESPONDENTS

A large body of research designed to characterize nonrespondents has been conducted. The objective of this work is to assess potential biases caused by nonresponse and to obtain information about nonparticipants that might suggest methods for improving response rates. For many characteristics the results of this work have been contradictory; however, some traits have been consistently identified as predictors of nonresponse. Much of this work is based on comparisons between initial respondents and a subset of nonrespondents that later agreed to participate ("temporary refusals" [Smith, 1984]) rather than on comparisons of respondents to the entire group of nonrespondents, because of the difficulty of obtaining additional information for persons or households who could not be enlisted into the original survey. Of the variables to be considered in this report, the effect on nonresponse of three--urbanization, region, and race--has been described extensively in the literature.

Urbanization and region seem to have some effect on nonresponse. With respect to urbanization, rural residents have frequently been found more willing to participate than urbanites (Smith, 1984; DeMaio, 1980). Both Smith (1984) and DeMaio (1980) found people in the Northeast relatively unwilling to respond at initial contact but willing to participate upon a later request. When initial and followup interview response rates were combined, DeMaio found people in the West to be least likely to respond.

Results regarding nonresponse across different racial groups have been somewhat less consistent. O'Neill (1979) found blacks more likely to respond than whites, while DeMaio (1980) found no differences between races. Smith (1984) found Asians and Native Americans less likely to respond than whites or blacks, but he found no differences between blacks and whites or whites and nonwhites (blacks and all other races combined). Smith also noted that Hispanics and recent immigrants are less likely to respond to surveys.

Associations between response rates and occupation, education, income, age, ancestry, home ownership, sex, and marital status are also discussed in the literature (DeMaio, 1980; O'Neill, 1979; Smith, 1984; Jones, 1983). With the exception of sex, which these authors consistently found unrelated to response rates, results have been equivocal. Survey characteristics such as topic and method of administration may influence the willingness of certain subgroups to respond to specific surveys. This makes it difficult to describe a general nonresponding population.

CSFII 1986 NONRESPONSE ANALYSIS

The remainder of this report details an analysis of nonresponse in the CSFII 1986. The objective of this analysis is to determine whether weighting of the CSFII 1986 data adequately compensated for nonresponse. Two approaches are taken to assess this question. First, estimates from the weighted CSFII sample for selected geographic and socioeconomic variables are compared to the U.S. population. Large differences between these estimates may indicate a potential for nonresponse bias that remained uncorrected after CSFII weighting procedures were applied. Second, characteristics of the CSFII respondents are compared with characteristics of the subset of CSFII nonrespondents who took part in a followup survey of nonrespondents. Information from the followup survey is then used to assess the possibility of biased results from CSFII analyses.

Comparison of CSFII 1986 Respondents and the General U.S. Population

Estimates from the weighted CSFII sample for selected geographic and socioeconomic variables are compared to the U.S. population. Although differences between the CSFII and U.S. estimates may be due to factors other than nonresponse, if the U.S. estimate is not significantly different from the CSFII estimate and there is power to distinguish a difference, one can presume that weighting has compensated for any bias.

Comparing estimates from the CSFII sample to estimates for the U.S. population is difficult, however. As discussed above, the CSFII sample was drawn only from households containing a woman 19 to 50 years of age and included only women 19 to 50 years of age and their children 1 to 5 years of age; separate data at the U.S. level for these households and for women 19 to 50 years are not available. Data used in the comparisons shown below are therefore approximate.

Household data at the U.S. level were taken from the Current Population Survey (CPS) of the Bureau of the Census. To more closely match the CSFII sample, household data were restricted

to households with a householder 20 to 54 years of age (25 to 54 years of age when data for households with a householder 20 to 54 years of age were not available). Households with a householder 20 to 54 years of age were chosen because they account for 92 percent of the households with women 18 to 44 years of age (table 2). (Eighty-four percent of households with women 18 to 44 years of age are headed by householders who are 25 to 54 years of age.) The remaining 8 percent of households with a woman 18 to 44 years of age are headed by householders who are 55 to 64 years of age (5 percent) or 65 years or older (2.4 percent). Individual data at the U.S. level were taken from the CPS and were for women 18 to 54 years of age; of the available age breaks, this group is closest to the CSFII sample.

The CPS and CSFII surveys define households similarly. Each survey excludes institutional housing units such as military barracks, hospitals, etc. and group quarters housing nine or more unrelated persons (U.S. Department of Commerce, 1987; National Analysts, 1986). CPS individual data, however, include persons living in group quarters housing nine or more unrelated persons, while the CSFII sampling frame excludes these persons.

Tables 3 and 4 compare the CSFII sample and the U.S. population.⁴ The variables compared include urbanization, region, geographic division, race, ethnic origin, household size, tenancy, household income, food stamp participation, proportion employed, and distribution by age.

In general, weighted CSFII participants closely resemble the U.S. population. For the location variables--urbanization and region--the U.S. household estimate of metropolitan households (table 3) falls within the 99 percent confidence interval (99% CI) around the CSFII estimate as do the U.S. estimates of households by region. Estimates of proportions of individuals

⁴Confidence intervals were calculated for CSFII 1986 estimates of socioeconomic characteristics but not for the CPS estimates. Standard errors were not available for CPS data for the subgroups of the population needed for this analysis. A 99 percent confidence interval was constructed around each CSFII estimate. Since the CSFII confidence intervals are being compared to point estimates rather than to confidence intervals, the likelihood of finding a "significant" difference is increased and the true significance level of the test is less than that of the interval around the CSFII value. For this reason, 99 percent confidence intervals were computed rather than the more standard 95 percent confidence intervals.

Table 2.--U.S. Households With Women 18 to 44 Years of Age by Age of Householder

Householder's Age	Households with Women 18-44 Years of Age
	<u>Percent</u>
Less than 20 years.....	0.6
20-24 years.....	8.3
25-54 years.....	83.6
55-64 years.....	5.2
65 years or older.....	2.4

SOURCE: U.S. Department of Commerce, Household and Family Characteristics: March 1986, Current Population Reports, Series P-20, No. 419, Table 25, p. 137.

living in metropolitan areas and in each region for the U.S. population (table 4) also fall within the 99 percent confidence interval around the respective CSFII estimates. CSFII weighting procedures, as detailed above, are designed specifically to adjust for nonresponse by urbanization and region, which may account for the close agreement between these estimates. CSFII-participating households and individuals, when weighted, generally match the racial and ethnic characteristics of the appropriate segment of the U.S. population (tables 3 and 4). Again, U.S. population estimates for these variables fall within the 99 percent confidence intervals around the weighted CSFII estimates at both the household and individual levels.

Table 3 also compares the U.S. population and the weighted CSFII participants for household size, tenancy, household income, and food stamp participation. Data for these variables indicate some differences between the U.S. population and the CSFII sample. CSFII-participating households appear to have a significantly larger mean household size than comparable U.S. households. The estimate of mean household size for U.S. households (3.0) falls below the CSFII 99 percent confidence interval for mean household size (3.2-3.8). In addition, the CSFII sample contains a higher proportion of households in which the home is owned (99% CI = 57.1-69.5 percent) than does the U.S. (56.7 percent). CSFII participating households have a lower mean household income (99% CI = \$26,025.2- \$30,332.2) than the comparable U.S. household population (\$33,243) and proportionately more households reporting \$10,000-\$19,999 in annual income (99% CI = 19.5-26.7 percent)

Table 3.--Comparison of CSFII 1986 Wave 1 Responding Households and the U.S. Household Population--Urbanization, Region, Race, Ethnic Origin, Household Size, Tenancy, Household Income, Food Stamp Participation

	U.S. Households With Householder Age 20-54	CSFII Responding Households (99% Confidence Interval)
		-----Percent-----
Urbanization		
Metropolitan.....	79.1	74.3 - 83.1
Region		
Northeast.....	19.9	14.9 - 25.3
Midwest.....	24.6	20.0 - 29.2
South.....	34.1	26.5 - 38.3
West.....	21.4	18.1 - 27.9
Race		
White.....	85.5	81.2 - 90.0
Ethnic Origin		
Hispanic.....	7.1	3.9 - 10.7
		-----Number-----
Household Size		
Mean.....	3.0	3.2 - 3.8
		-----Percent-----
Tenancy		
Owned.....	56.7	57.1 - 69.5
Household Income ^a		
Less than \$10,000.....	12.7	11.4 - 19.2
\$10,000-\$19,999.....	18.8	19.5 - 26.7
\$20,000 or more.....	68.5	57.2 - 66.0
		-----Dollars-----
Mean.....	\$33,243	\$26,025.2 - \$30,332.2
		-----Percent-----
Food Stamp Participation ^a		
Yes.....	8.2	6.4 - 13.2

^aU.S. household data is for households with a householder age 25-54 years.

SOURCES: (first column) U.S. Department of Commerce, Household and Family Characteristics: March 1986, Current Population Reports, Series P-20, No. 419, Table 21, pp. 121 and 124, Table 22, p. 125, Table 23, pp. 128-130; Table 24, p. 132.; U.S. Department of Commerce, Receipt of Selected Noncash Benefits: 1985, Current Population Reports, Series P-60, No. 155, Tables 1 and 5, pp. 7 and 20.

Table 4.--Comparison of CSFII 1986 Wave 1 Respondents and the U.S. Female Population--Urbanization, Region, Race, Ethnic Origin, Proportion Working, Distribution by Age

	U.S. Female Population Age 18-54 Years	CSFII Respondents (99% Confidence Interval)
	-----Percent-----	
Urbanization ^a		
Metropolitan.....	76.1	74.1 - 83.3
Region		
Northeast.....	21.1	15.0 - 25.8
Midwest.....	24.4	19.3 - 29.1
South.....	34.3	25.8 - 40.2
West.....	20.2	17.0 - 27.8
Race		
White.....	84.4	80.9 - 90.1
Ethnic Origin		
Hispanic.....	7.2	3.8 - 11.0
Proportion Working ^b		
Working.....	65.9	59.9 - 68.7
Distribution by Age ^b		
20-24 years.....	19.5	12.3 - 19.5
25-29 years.....	20.0	17.0 - 23.2
30-34 years.....	19.0	15.6 - 21.8
35-39 years.....	16.7	15.8 - 21.0
40-44 years.....	13.6	11.7 - 17.9
45-49 years.....	11.2	9.5 - 14.7

^a U.S. data are for all individuals, male and female, all ages.

^b U.S. and CSFII data are for women 20-49 years of age only.

SOURCES: (first column) U.S. Department of Commerce, Patterns of Metropolitan Area and County Population Growth: 1980 to 1984, Current Population Reports, Series P-25, No. 976, Table 1, p. 15.; U.S. Department of Commerce, State Population and Household Estimates with Age, Sex, and Components of Change: 1981-1986, Current Population Reports, Series P-25, No. 1010, Table 5, pp. 20, 21, 24, 27, and 31.; U.S. Department of Commerce, Marital Status and Living Arrangements: March 1985, Current Population Reports, Series P-20, No. 410, Table 1, pp. 17-19.; U.S. Department of Labor, Employment and Earnings, January 1986, Table 3, pp. 154-156.

and fewer reporting annual income over \$20,000 (99% CI = 57.2-66.0 percent) than the U.S. household population (18.8 and 68.5 percent, respectively). No difference appears between CSFII-participating households and U.S. households with respect to food stamp participation.

Table 4 shows the proportion of women working and the distribution of 20-to-49-year-old women by age. CSFII participants report having worked for pay the week prior to interview with the same frequency as the U.S. female population 20 to 49 years of age (99% CI = 59.9- 68.7 percent; U.S. estimate 65.9 percent). The U.S. estimate of the proportion of 20 to 49 year olds who are 20 to 24 years of age (19.5 percent) is at the upper end of the CSFII range (99% CI = 12.3-19.5 percent), indicating that the CSFII sample may contain fewer 20-to-24-year-olds than the U.S. population. Differences between the age distribution of the U.S. population and of the CSFII respondents may be the result of the exclusion of persons living in group quarters, such as dormitories, from the CSFII. The CPS includes such persons.

Household size, tenancy, and income are closely associated with household composition. In some cases, the lack of U.S. data matching the CSFII sample of households with women 19 to 50 years of age may result in spurious differences between CSFII respondents and the U.S. population. For example, U.S. data shown for household size in table 3 includes single-person male households. Since the CSFII estimate does not include such households, the mean household size for the U.S. relative to that for the CSFII may appear lower.

In regard to tenancy, as was shown in table 2, 8 percent of households with women 18 to 44 years of age have a householder 55 years of age or older. Households with householders 55 years of age or older have a 77 percent ownership rate (U.S. Department of Commerce, 1987). The ownership rate for these 'older' households is much higher than the 57 percent rate shown in table 3 for households with a householder 20 to 54 years of age. Since these 'older' households are included in the CSFII but excluded from the U.S. data, they may account for the higher ownership rate shown by CSFII participants.

Household income data at the U.S. level cover households with a householder 25 to 54 years of age. Again, as was shown in table 2, 8 percent of households with a woman 18 to 44 years of age have householders who are under 25 years of age, and another 2.4 percent have householders 65 years of age or older. Mean household income for households with a householder under 25 years of age is \$17,708 (U.S. Department of Commerce, 1987). Mean income for households with a householder 65 years of age or older is \$18,800 (U.S. Department of Commerce, 1987). Both of these mean incomes are

far below the mean income of \$33,243 shown in table 3 for households with a householder 25 to 54 years of age. Since households from both of these lower income groups are included in the CSFII sample and not in the U.S. data shown, the somewhat lower household income of CSFII participants may in part be due to the noncomparability of the population groups.

In summary, weighted data for CSFII 1986 wave 1 participants indicate that these participants are fairly representative of the U.S. population. Some real differences between the U.S. and CSFII populations, which are not adjusted for by weighting, may exist. Variables of concern are household size, tenancy, household income, and the number of women under 25 years of age. The magnitude of differences between the CSFII sample and the U.S. population for these variables is difficult to judge because of the lack of completely comparable population data. Data from the nonresponse followup survey, discussed below, were analyzed to further examine these differences.

CSFII 1986 Nonresponse Followup Survey

As shown in figure 1, at the end of wave 1 of CSFII 1986, 852 households in the core sample were nonresponsive. Of these households, 370 were presumed to be eligible for the survey based on responses they gave to the initial three-page screening form (table 5). The remaining 482 households failed to provide answers to the screening form either because they refused, were not at home, or had language or other difficulties (table 5); for these unscreened households, CSFII eligibility is unknown.

The nonresponse followup survey sought to collect information from all nonresponding households, screened as well as unscreened. A limited number of socioeconomic and food consumption variables were chosen for the followup questionnaire:

- Number of persons
- Number of children 1 to 5 years of age
- Number of women 19 to 50 years of age
- Race
- Ethnic origin
- Food stamp participation⁵
- WIC participation⁵
- Money spent per week or month on food at home and away⁵
- Whether they had enough of the kinds of food they wanted⁵
- Whether household income was above or below a specified level based on household size (asked to determine eligibility of nonrespondents for the low-income sample)⁵

⁵Not asked of proxy respondents

Table 5.-- CSFII 1986 Nonresponse Cases by Screener Nonresponse Category

	Nonresponding Cases	
	Number	Percent
Screened:		
Refused or not at home.....	370	43.4
Not Screened:		
Refused.....	187	22.0
Not at home.....	226	26.5
Other.....	69	8.1
TOTAL.....	482	56.6
TOTAL.....	852	100.0

SOURCE: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986

Although the followup survey took place in November and December of 1986, respondents were asked about household status at the time of the initial CSFII 1986 contact (April-June, 1986).

Three methods were used to gather Followup information about CSFII 1986 nonresponding households. The methods differed in the approach used to collect the data as well as the sources from which the information was obtained. The methods are detailed below:

Method 1: Exclusively Mail--households were sent a brief self-administered questionnaire and cover letter from USDA urging cooperation and return of the completed questionnaire. Households that did not respond to the first mailing were sent a second questionnaire. No other contact was attempted with these households.

Method 2: Personal Visit with Mail Leave-Behind--interviewers went to each sample household in person and attempted to complete a short interview with a knowledgeable adult member of the household, preferably the male or female head. If the household could not be contacted after two visits or refused to be interviewed in person, the interviewer left a self-administered questionnaire for the household to complete and return.

Method 3: Personal Visit with Use of Proxy Respondents-- interviewers went to each sample household in person and attempted to complete a short interview with a knowledgeable adult member of the household, preferably the male or female head. If the household could not be contacted after two visits or refused to be interviewed in person, the interviewer attempted to complete an interview with a proxy respondent. A proxy respondent was someone who was not a member of the sample household but who could report knowledgeably about it, such as a next-door neighbor.

Proxy respondents interviewed in method 3 were asked only the size of the nonresponding household, the number of children 1 to 5 years of age, the number of women 19 to 50 years of age, and the race and origin of the household. Questions about food program participation, money spent on food, and food sufficiency were not asked of proxy respondents.

CSFII nonresponding households were randomly assigned to one of these three interview methods across the screener nonresponse categories shown in table 5. That is, approximately one-third of the previously screened households received only mail questionnaires, one-third were visited by an interviewer who left a mail questionnaire if no contact was made, and one-third were contacted by an interviewer who interviewed a proxy respondent if no contact with the nonresponding household was made.

The overall response rate achieved for the followup survey was 37 percent. Response rates across methods and across original CSFII nonresponse categories are shown in tables 6 and 7. Response rates for method 3 (Personal-Proxy) were considerably higher than response rates obtained for methods 1 and 2 (59 percent versus 15 percent and 36 percent, respectively) (table 6). The Personal-Mail and Personal-Proxy methods were equally successful in obtaining a personal interview with the nonresponding household (31 percent and 34 percent, respectively). For the Personal-Proxy method, however, information for an additional 25 percent of the nonresponding households was obtained from interviews with proxy respondents while information for only an additional 4 percent of the nonresponding households was obtained from mail questionnaires in the Personal-Mail method. The large number of households coded 'not further specified' in the Personal-Mail and Personal-Proxy methods are likely the result of confusion in the coding process. These households are presumed to actually represent unreturned mail questionnaires and not-at-homes or refusals by proxy households, respectively.

Table 6.--Response Rates For the Nonresponse Followup Survey by Interview Method

	TOTAL (n=852)	Method 1 (Mail) (n=285)	Method 2 (Personal- Mail) (n=284)	Method 3 (Personal- Proxy) (n=283)
	-----Percent-----			
Response:				
Personal interview.....	21.7	---	31.3	33.9
Proxy interview.....	8.3	---	---	25.1
Mail questionnaire.....	6.6	15.4	4.2	---
TOTAL.....	36.6	15.4	35.6	59.0
Nonresponse:				
Not-at-home.....	1.6	---	---	4.9
Refusal.....	3.0	---	---	9.2
Mail questionnaire not returned or returned blank.....	35.8	70.5	36.6	---
Housing unit vacant....	1.2	---	1.8	1.8
Sample household no longer at address.....	4.3	0.7	6.0	6.4
Mail questionnaire not deliverable.....	4.3	13.0	---	---
Not further specified..	13.0	0.3	20.1	18.7
TOTAL.....	63.4	84.6	64.4	41.0

SOURCE: CSFII Nonresponse Followup Survey

Response rates across original CSFII nonresponse categories were similar, except for those households who had originally completed the screening form (table 7). Previously screened households exhibited a somewhat higher participation rate (45 percent) than that shown by any other response category (28-33 percent). The higher rate shown by previously screened households may be due to a greater willingness on the part of these households to answer a short questionnaire, as demonstrated by their willingness to complete the screening form.

Two questions need to be asked about the followup survey: 1) how representative are followup participants of all nonresponding households and 2) how accurate is information obtained in the followup survey?

Table 7.--Response Rates For the Nonresponse Followup Survey by Screener
Nonresponse Category

	Number	Response	Nonresponse
		-----Percent-----	
Screened:			
Refused or not at home.....	370	44.6	55.4
Not Screened:			
Refused.....	187	32.6	67.4
Not at home.....	226	27.9	72.1
Other.....	69	33.3	66.7
TOTAL.....	482	30.5	69.5
TOTAL.....	852	36.6	63.4

SOURCE: CSFII Nonresponse Followup Survey

Table 8 presents the distributions of participating followup households and all CSFII 1986 nonresponding households across urbanization and region. Distributions are fairly similar; differences between participating and all nonresponding households do not exceed four percentage points. The statistical significance of these differences is difficult to test, however, because the complex survey design and low followup response rate preclude computation of meaningful standard errors for the followup survey.⁶

⁶Computation of meaningful standard errors from a complex survey such as the CSFII depends on adjustment for survey design and nonresponse. To make survey design adjustments, available software packages require that at least one individual or household from every stratum and from at least two PSU's within each stratum respond to the survey. Adjustments for nonresponse require that the responding sample be weighted to represent the surveyed population, a procedure which assumes that the responding sample adequately represents the entire sample. Given the low response rate obtained for the followup survey, there is reason to expect that each stratum and PSU will not be represented among the followup participants and that the followup participants may not represent all CSFII nonrespondents. Therefore, since only highly biased standard error estimates could have been computed, no standard error estimates were made for the followup survey.

Table 8.--Comparison of Followup Participating Households and All CSFII Nonresponding Households--Region and Urbanization

	All CSFII Nonresponding Households (n=852)	Followup Participating Households (n=312)
	-----Percent-----	
Urbanization:		
Central city.....	33.8	30.8
Suburb.....	50.1	52.2
Nonmetropolitan.....	16.1	17.0
Region:		
Northeast.....	18.3	20.2
Midwest.....	19.8	22.4
South.....	35.4	33.6
West.....	26.4	23.7

SOURCES: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986; CSFII Nonresponse Followup Survey

Data in table 9 compare the original reasons for nonresponse given by households participating in the followup survey and by all CSFII 1986 nonresponding households. It does not appear that followup participants are concentrated in any one of these categories. Followup participants appear slightly less likely to be households which were originally not at home (28 percent and 33 percent, respectively) and slightly more likely to be those who were originally too busy for the CSFII survey (25 percent and 21 percent, respectively). The distributions across all of the remaining categories are almost identical between followup participants and all nonrespondents. Again, the statistical significance of these differences is difficult to test.

Eighty percent of households participating in the followup survey contained one or more women 19 to 50 years of age (table 10). Previously screened households were more likely to report having a woman 19 to 50 years of age in the household at the time of the original CSFII interview (94 percent) than unscreened households (64 percent). This result is to be expected as previously screened households include only those households who were determined to be eligible for

Table 9.--Comparison of Followup Participating Households and All CSFII Nonresponding Households--Reason for Original Nonresponse

Reason for Nonresponse	All CSFII Nonresponding Households (n=852)	Followup Participating Households (n=312)
	-----Percent-----	
Not at home.....	32.9	28.5
Not interested, do not want to be bothered, family crisis, other, NFS....	26.1	26.7
Too busy, do not want to take the time...	21.2	25.3
Do not answer surveys, do not give out personal information.....	4.2	4.8
Locked community.....	3.9	3.2
Language barrier.....	2.9	2.6
Sick, disabled.....	1.8	2.2
In CSFII 1985 ^a	1.4	1.9
Moving soon, out of area part of year....	0.9	0.6
Interviewer did not give a reason.....	4.0	4.2
Screening form missing.....	0.7	0.0

^aSamples for CSFII 1985 and 1986 were drawn from the same area segments. Households who moved within their area segment may have been drawn into both the CSFII 1985 and CSFII 1986 samples.

SOURCES: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986; CSFII Nonresponse Followup Survey

the CSFII survey. It is not clear why some 5 percent of the households previously screened as eligible reported in the followup survey that no women 19 to 50 years of age had been present in the household at the time of initial CSFII contact. Since an age category (19 to 50 years) was used in both the screener and the followup survey, it was not possible to determine how many households might have had women who were close to an eligibility cut-off (19 or 50 years of age) at the time of first contact. Among the not-screened response households, those in the refused and not-at-home categories were about equally likely to report the presence of a woman 19 to 50 years of age (about 60 percent), while 83 percent of 'other' households reported the presence of a woman 19 to 50 years of age.

Table 10.--Age Eligible Women in Participating Followup Households by Screener Nonresponse Category

	Number	Age Eligible Women		
		None	One or more	Not reported
		-----Percent-----		
Screened:				
Refused or not at home....	165	5.4	94.5	0.0
Not Screened:				
Refused.....	61	32.8	62.3	4.9
Not at home.....	63	38.1	58.7	3.2
Other.....	23	13.0	82.6	4.3
TOTAL.....	147	32.0	63.9	4.1
TOTAL.....	312	17.9	80.1	1.9

SOURCE: CSFII Nonresponse Followup Survey

Eligibility for the core sample of CSFII 1986 was based solely on the presence of women 19 to 50 years of age. Table 10, therefore, reflects eligibility for the CSFII. Eighty percent of all followup participating households would have been eligible for the CSFII. Again, previously screened households were more likely to have been eligible for the CSFII survey than those not previously screened (94 percent to 64 percent, respectively).

The discrepancy shown above between answers given by previously screened households in regard to the number of women 19 to 50 years of age in the household raises questions about the accuracy of information obtained in the followup survey. Changes in household composition due to divorce, young adult children leaving home, or other factors may have occurred during the 7 to 8 month period between the initial CSFII interview and the followup interview and contributed to these discrepancies.

For previously screened households, the screening form contains information on household size, number of women 19 to 50 years of age, and number of children 1 to 5 years of age. Table 11 presents data obtained by matching answers from the screening form and followup survey questionnaire (excluding blanks) for these household composition variables. Agreement

Table 11.--Matching of Screener and Followup Survey Information--Household Size, Number of Women 19 to 50 Years of Age, and Number of Children 1 to 5 Years of Age

Method of Reporting	Degree of agreement		
	Household Size (n=165)	Number of Women 19 to 50 Years of Age (n=165)	Number of Children 1 to 5 Years of Age (n=163)
	-----Percent-----		
Self.....	79.2	80.0	90.2
Proxy.....	83.3	86.7	90.3
Overall.....	80.0	81.2	90.2

SOURCES: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986; CSFII Nonresponse Followup Survey

was stronger for the number of children 1 to 5 years of age (90 percent) than for the number of women 19 to 50 years of age (81 percent) or for the overall household size (80 percent). Use of proxy respondents does not appear to account for the lack of agreement. Recall problems are likely to be causing a portion of these mismatches, the number of children 1 to 5 years of age being perhaps more stable over a 7 to 8 month period than the number of women 19 to 50 years of age or the overall household size.

Table 12 presents the degree of matching of answers to race and origin questions for all nonresponding households from the initial CSFII screening form and the followup questionnaire. Interviewers were asked on the screening form to estimate the race and origin for all nonresponding households. Interviewer answers given on the original screening form were compared to respondent answers given on the followup questionnaire (excluding blanks), and the level of agreement was calculated. Agreement for these variables is much higher (93-94 percent) than for the variables shown in table 11. This high level of agreement may be the result of several factors. First, changes in household composition over a 7 to 8 month period may be more likely to alter reported household size than

Table 12.--Matching of Screener and Followup Survey Information--Race and Ethnic Origin

Method of Reporting	Degree of agreement	
	Race (n=169)	Ethnic Origin (n=124)
	-----Percent-----	
Self.....	94.5	94.6
Proxy.....	92.7	93.5
Overall.....	94.1	94.4

SOURCES: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986; CSFII Nonresponse Followup Survey

reported household race or origin. Second, interviewers left a large number of blanks or codes representing "uncertain" for the race and origin questions on the screener. Only 47 percent of the screeners provided information about race, and only 35 percent provided information about origin. It appears that interviewers may have answered the question only when they were very sure of the race and origin of the household.

To summarize, the nonresponse followup survey achieved an overall response rate of 37 percent. However, the response rate was 59 percent in the subsample for which proxy interviews were attempted. The representativeness of followup survey participants for all nonresponding households cannot be determined with certainty, although they appear to be distributed across urbanization areas and regions in the same way as all nonrespondents. In addition, followup participants share the same distribution as all nonrespondents in terms of their original reasons for not participating in the CSFII 1986. For household characteristics that change over time, recall or reporting errors may have contributed to a somewhat inaccurate reflection of household characteristics at the time of the CSFII interview. Race, origin, household size, number of women 19 to 50 years of age, and number of children 1-to-5 years of age were examined for consistency over time. Differences were not evident for race or origin data. Differences did, however, appear for the household composition variables (number of 19-to-50-year-old women, total household size, and

possibly number of 1-to-5-year-old children). Equal or greater differences may be expected for variables such as food program participation and money spent on food.⁷

Comparison Of Followup Participants and CSFII Respondents

Characteristics of eligible followup participating households were compared with those of the original CSFII sample. Urbanization, region, household size, race, ethnic origin, food program participation, and food sufficiency are shown for followup participants and CSFII respondents in table 13.⁸

CSFII respondents appear to differ from followup participants with respect to level of urbanization. The followup sample includes a significantly greater proportion of metropolitan residents (82.0 percent) than the CSFII sample (99% CI = 72.2-81.2 percent). For region, there are slight differences between the followup and CSFII samples but none reach statistical significance.

Average household size and average number of 1-to-5-year-old children per household do not differ significantly between the CSFII sample and followup sample, nor do race or ethnic origin. The proportion of Hispanics in the followup sample (9.5 percent), however, falls at the upper end of the

⁷Seasonal changes in food spending may result in higher spending in November and December than earlier in the year. This seasonal change could exacerbate any recall or reporting errors for money spent on food resulting from the 7 to 8 month gap between the followup and CSFII interviews. Money spent for food was, therefore, dropped as a variable in the analysis.

⁸Unweighted CSFII values were used for this comparison because weighted CSFII values include adjustments for nonresponse. Confidence intervals were computed for the unweighted CSFII values but not for the followup data (see footnote 5, page 18). In the weighting scheme employed for the CSFII data, response rates are assumed to remain constant across area segments. By computing standard errors on unweighted CSFII data, all households are implicitly assigned an equal weight. This assumption means that response rates are assumed to remain constant across categories of the variables of interest for the unweighted CSFII data, (i.e., with respect to race, whites and nonwhites are assumed equally likely to respond) as well as to remain constant across area segments.

Table 13.--Comparison of CSFII Responding Households and Followup Participating Households--Urbanization, Region, Household Size, Race, Ethnic Origin, Food Stamp Participation, WIC Participation, Food Sufficiency Assessment

	CSFII Responding Households (99% Confidence Interval) (n=1,352)	Followup Participating Households (n=250)
	-----Percent-----	
Urbanization:		
Metropolitan.....	72.2 - 81.2	82.0
Region:		
Northeast.....	16.0 - 26.8	19.2
Midwest.....	20.2 - 31.8	23.2
South.....	25.3 - 37.5	36.4
West.....	15.5 - 26.9	21.2
	-----Number-----	
Household Size:		
Total number of people.....	3.3 - 3.7	3.4
Number of children 1-5 ^a	0.3 - 0.5	0.4
	-----Percent-----	
Race: ^a		
White.....	82.3 - 90.5	86.1
Ethnic Origin: ^a		
Hispanic.....	3.6 - 10.2	9.5
Food Stamp Participation: ^a		
Yes.....	6.4 - 12.2	3.6
WIC Participation: ^a		
Yes.....	2.1 - 5.3	2.7
Food Sufficiency Assessment: ^a		
Enough of the kinds.....	65.8 - 74.2	74.9
Enough but not the kind.....	22.4 - 30.2	23.1
Sometimes not enough.....	1.8 - 3.8	1.5
Often not enough.....	0.2 - 1.6	0.5

^aNot all of the 1,352 households in the CSFII and 250 households in the Followup Survey responded to all questions. (Proxy respondents in the Followup were not asked about food program participation or food sufficiency.) Confidence intervals and proportions shown were calculated using only households who responded to each question.

SOURCES: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986; CSFII Nonresponse Followup Survey

proportion of Hispanics in the CSFII sample (99% CI = 3.6-10.2 percent).

Rates of food stamp participation are significantly different in the CSFII and followup samples. The followup sample included significantly fewer food stamp users (3.6 percent) than the CSFII sample (99% CI = 6.4-12.2 percent). While not significantly different, the proportion of WIC users in the followup sample (2.7 percent) is at the lower end of the 99 percent confidence interval of WIC users in the CSFII sample (2.1-5.3 percent).

Finally, the CSFII and followup samples appear different with respect to food sufficiency. A significantly greater proportion of the Followup sample reported having adequate quantities of the kinds of foods they like (74.9 percent) compared to the CSFII sample (99% CI = 65.8-74.2 percent).

To summarize, the followup participants seem very similar to the CSFII sample with respect to region, household size, number of 1-to-5-year-old children per household, and race. The followup participants appear slightly different from the CSFII sample with respect to urbanization, food sufficiency, and possibly ethnic origin and WIC participation. The followup participants are quite different from the CSFII sample with respect to food stamp use.

Comparison Of the Projected CSFII Sample and the Weighted CSFII Sample

Information obtained from the eligible participating followup households was combined with data from the original CSFII to project characteristics of the sample which might have been obtained if all eligible selected households had participated in the original CSFII. This "projected" CSFII sample was then compared with the weighted and unweighted CSFII sample and the U.S. population. An important assumption in this analysis is that followup participants are representative of the entire group of nonrespondents. The method employed for computing this projected sample may be summarized as follows:

First, the total number of eligible households among all nonresponding households was estimated. For this estimate, 100% of the 370 screened households coded eligible at screening were assumed eligible. Sixty-seven percent of the 482 nonscreened households in the sample were assumed eligible. Sixty-seven percent is the fraction of nonscreened households participating in the followup which were determined to meet the CSFII eligibility criteria (table 10). This provides an estimate of 691 eligible nonresponding households.

Second, distributions of the variables of interest were determined for eligible, participating followup households as shown in table 13. For example, 82 percent of the eligible followup participating households lived in metropolitan areas, while 18 percent lived in nonmetropolitan areas.

Third, estimates of the total number of eligible nonresponding households at each level of each variable were determined. The distributions determined in step 2 were applied to the total determined in step 1. Continuing the example, $82\% \times 691 = 567$ metropolitan households and $18\% \times 691 = 124$ nonmetropolitan households.

Fourth, the numbers of responding households in the original CSFII sample at each level of each variable were recalled. For this example, of the total 1,352 households in the 1986 CSFII core sample, 1,037 were metropolitan and 315 were nonmetropolitan.

Fifth, the total number of eligible households at each level of each variable was projected by adding the values from step 3 (representing the followup sample) to the values from step 4 (representing the CSFII sample). For the example, this sum produced estimates of $567 + 1,037 = 1,604$ metropolitan households and $124 + 315 = 439$ nonmetropolitan households.

Finally, the projected distributions were computed. Completing the example, $1,604 / (1,604 + 439) = 78.5\%$ metropolitan households and $439 / (1,604 + 439) = 21.5\%$ nonmetropolitan households were projected.

Table 14 includes the unweighted and weighted CSFII values, the projected values, and U.S. population data (where available).⁹ As the projected values are considered, one point of interest is the effect on the unweighted CSFII values of weighting the data relative to the effect of incorporating information from the followup survey as was done in making the projections. The effect of weighting versus projecting can be analyzed by assessing whether both weighting and projecting move unweighted CSFII values in the same direction and whether weighting or projecting move the unweighted CSFII values toward the corresponding values for the general U.S. population.

⁹The method used to compute the projected values provides only single point estimates for which standard errors cannot be estimated; therefore, standard errors are not included in this table.

Table 14.--Comparison of the Actual CSFII Sample, Projected CSFII Sample, and U.S. Population--Urbanization, Region, Household Size, Race, Ethnic Origin, Food Stamp Participation, WIC Participation, Food Sufficiency Assessment

	CSFII Sample (unweighted) (n=1,352)	CSFII Sample (weighted) (n=1,351)	Projected CSFII Sample (n=2,043)	U.S. Popu- lation
	-----Percent-----			
Urbanization:				
Metropolitan.....	76.7	78.6	78.5	79.1
Region:				
Northeast.....	21.4	20.1	20.6	19.9
Midwest.....	26.0	24.6	25.0	24.6
South.....	31.4	32.4	33.1	34.1
West.....	21.2	23.0	21.2	21.4
	-----Number-----			
Household Size:				
Total number of people.....	3.5	3.5	3.5	3.0
Number of children 1-5.....	0.4	0.4	0.4	---
	-----Percent-----			
Race:				
White.....	86.4	85.6	86.3	85.0
Ethnic Origin:				
Hispanic.....	6.9	7.3	7.8	7.1
Food Stamp Participation:				
Yes.....	9.3	9.8	7.4	8.2
WIC Participation:				
Yes.....	3.7	3.8	3.4	---
Food Sufficiency Assessment:				
Enough of the kinds.....	70.0	69.7	71.6	---
Enough but not the kind.....	26.3	26.6	25.2	---
Sometimes not enough.....	2.8	2.7	2.4	---
Often not enough.....	0.9	1.0	0.8	---

SOURCES: NFCS - Continuing Survey of Food Intakes by Individuals, Core, 1986; CSFII Nonresponse Followup Survey; U.S. Department of Commerce, Household and Family Characteristics: March 1986, Current Population Reports, Series P-20, No. 419, Table 21, pp. 121 and 124, Table 22, p. 125, Table 23, pp. 128-130, and Table 24, p. 132.; U.S. Department of Commerce, Receipt of Selected Noncash Benefits: 1986, Current Population Reports, Series P-60, No. 155, Tables 1 and 5, pp. 7 and 20.

The projected and weighted proportions of metropolitan residents shown in table 14 (78.5 percent and 78.6 percent, respectively) represent almost equal movement of the unweighted proportion (76.7 percent) toward the proportion in the general population (79.1 percent). Therefore, it seems the weighted CSFII values are unlikely to be influenced by nonresponse bias related to urbanization.

With respect to region, projecting and weighting also have similar effects on the unweighted CSFII distribution. For example, the unweighted proportion of Northeast residents (21.4 percent) moves toward the proportion in the general population (19.9 percent) when the data are weighted (20.1 percent) and when projections are estimated (20.6 percent). Again, it seems unlikely that the weighted CSFII data are affected by nonresponse bias related to region. Since one of the purposes of weighting the CSFII data was to adjust for nonresponse by urbanization and region, the distributions of weighted CSFII values are expected to be similar to those of the general population across regions and levels of urbanization. These results confirm that expectation.

With respect to average household size and average number of 1-to-5-year-old children per household, the projected values and the weighted and unweighted CSFII sample values agree perfectly (3.5 people, 0.4 children). This household size value (3.5 people), however, appears higher than the average household size in the U.S. population (3.0) and may be the result of imperfectly matched census data, as discussed previously.

With respect to race, projecting had almost no effect on the proportion of whites in the unweighted CSFII sample. Weighting decreased the unweighted proportion of whites slightly (from 86.4 percent to 85.6 percent), moving it closer to that of the general population (85.0 percent). However, given the small amount of change, there seems to be no reason to suspect nonresponse bias related to race in the weighted CSFII data.

For ethnic origin, both weighting and projecting increased the proportion of Hispanics above the unweighted proportion (from 6.9 percent to 7.3 percent and 7.8 percent, respectively). Projecting created a somewhat larger increase than weighting, but it seems unlikely that the unweighted, weighted, or projected distributions are significantly different from the distribution of the general population. The large proportion of Hispanics in the followup sample (table 13) suggests that there may be some nonresponse bias with respect to ethnic

origin, however, based on the comparison of the weighted and projected values in table 14, weighting seems to have adjusted for any potential nonresponse bias related to ethnic origin.

Food Stamp Program participation illustrates a more obvious difference between the effects of weighting and projecting on the unweighted distributions. Due to the low proportion of food stamp users in the followup sample (table 13), the projected proportion of food stamp users (7.4 percent) is noticeably lower than the unweighted proportion (9.3 percent). This change is in the opposite direction from that caused by weighting, which slightly increased the proportion of food stamp users (to 9.8 percent). Although the projected proportion of food stamp users (7.4 percent) is itself actually below the proportion in the comparable U.S. population (8.2 percent), the difference between the projected and weighted CSFII proportions of food stamp users suggests the possibility of nonresponse bias. It seems that nonresponse may have resulted in slightly higher estimates of food stamp usage and that weighting did not compensate for nonresponse in this area.

The very narrow range of the projected, weighted, and unweighted values related to WIC participation (3.4, 3.8, and 3.7 percent, respectively) suggest that there are no real differences among them. Nonresponse bias related to WIC participation seems unlikely.

With respect to food sufficiency, the projected proportion of households reporting the availability of enough of the kinds of food they want (71.6 percent) is slightly above the unweighted proportion (70.0 percent). Weighting had almost no effect on this variable. As with WIC usage, the narrow range of these values suggests no real differences between the unweighted, weighted, and projected distributions. If there is nonresponse bias related to food satisfaction, it is likely to be minimal.

Overall, on the basis of these comparisons, we conclude that nonresponse bias is unlikely to have affected the results of the CSFII 1986 for region, urbanization, household size, number of 1-to-5-year-old children, race, ethnicity, WIC usage, or food sufficiency. It seems possible that the weighted CSFII data may overestimate food stamp usage, but we cannot rule out the possibility that the followup participants failed to represent all CSFII nonrespondents.

SUMMARY AND CONCLUSIONS

Lack of strictly comparable U.S. level data precluded definitive significance testing, but the weighted responding CSFII sample appeared similar to the U.S. population with respect to urbanization, region, race, ethnic origin, Food

Stamp Program participation, and proportion of women working. Differences were noted between the CSFII sample and the U.S. population for household size, tenancy, household income, and possibly proportion of women 20 to 24 years of age.

Information obtained from a followup survey conducted 7 to 8 months after the initial CSFII interviews was used to further examine the effects of nonresponse on the CSFII sample. Eligible participating followup households were compared to the unweighted responding CSFII sample. Significance testing was hampered by difficulties in estimating standard errors for the followup survey and for the unweighted CSFII data. Eligible participating followup households and the CSFII responding sample were very similar in regard to region, race, household size, and average number of 1-to-5-year-old children. Slight differences between these two groups were noted for urbanization, food sufficiency, and possibly for ethnic origin and WIC participation, while large differences were noted in food stamp use.

A projected CSFII sample was created to represent the CSFII sample that might have been obtained had all eligible sample households responded. Characteristics of this sample were compared to the weighted and unweighted responding CSFII samples and to the U.S. population. Differences in the direction of movement of the unweighted CSFII responding sample resulting from weighting the sample or projecting the sample were not found for urbanization, region, household size, number of children 1 to 5 years of age, race, ethnicity, WIC usage, or food sufficiency. A difference in Food Stamp Program participation was noted, and this variable deserves careful attention in future nonresponse analyses. Food stamp usage has been shown to influence food consumption (Basiotis, 1987; Akin, 1987). If food stamp users are indeed over-represented in the sample, their food consumption patterns may be over-weighted in the data.

In order to make a definitive statement on the effect of nonresponse on survey results, accurate information on key variables is required from all nonrespondents. The analysis discussed in this report indicates that immediate followup of nonrespondents is necessary to ensure accurate information. The preceding analysis, in addition, indicates that a Personal-Proxy approach is successful for obtaining information on the household size, household composition, race, and ethnic origin of nonresponding households. A Personal-Proxy approach has limitations, however, when information on economic characteristics such as household income and participation in food assistance programs is required for an assessment of the effects of nonresponse.

LITERATURE CITED

Akin, J.S., D. Guilkey, B. Popkin, and K. Smith. 1987. Determinants of Nutrient Intake of the Elderly. *J. Appl. Gerontol.* 6:227-258.

American Statistical Association. 1974. Report on the ASA Conference on Surveys of Human Populations. *Amer. Statistician* 28:30-34.

Basiotis, P.P., S. Johnson, K. Morgan, and J. Chen. 1987. Food Stamps, Food Costs, Nutrient Availability and Nutrient Intake. *J. Policy Modeling* 9:383-404.

Cochran, W.G. 1977. *Sampling Techniques*. 3rd ed. New York: John Wiley and Sons, Inc., 428 pp.

DeMaio, T. 1980. Refusals: Who, Where, and Why? *Public Opinion Quart.* 44:223-233.

Jones, R.G. 1983. An Examination of Methods of Adjusting for Nonresponse to a Mail Survey: A Mail-Interview Comparison. In *Incomplete Data in Sample Surveys*, ed. W.G. Maddow, H. Nisselson, and I. Olkin, vol 3, pp. 271-290. New York: Academic Press, Inc.

National Analysts. [unpublished] 1986 CSFII Interviewer Instructions. pp. 107-109.

O'Neill, M.J. 1979. Estimating the Nonresponse Bias Due to Refusals in Telephone Surveys. *Public Opinion Quart.* 43:218-232.

Smith, T.W. 1984. Estimating Nonresponse Bias with Temporary Refusals. *Sociol. Persp.* 27:473-489.

U.S. Department of Commerce. 1987. Household and Family Characteristics: March 1986. *Current Population Reports, Series P- 20, No. 419*, 153pp.

Wilcox, J.R. 1977. The Interaction of Refusal and Not-at-Home Sources of Nonresponse Bias. *J. Marketing Res.* 14:592-597.