Appendix C. Source and Accuracy Statement

SOURCE OF DATA

The SIPP universe is the noninstitutionalized resident population living in the United States. This population includes persons living in group quarters, such as dormitories, rooming houses, and religious group dwellings. Crew members of merchant vessels, Armed Forces personnel living in military barracks, and institutionalized persons, such as correctional facility inmates and nursing home residents, were not eligible to be in the survey. Also, United States citizens residing abroad were not eligible to be in the survey. Foreign visitors who work or attend school in this country and their families were eligible; all others were not eligible. With the exceptions noted above, persons who were at least 15 years of age at the time of the interview were eligible to be interviewed in the survey.

The 1987 panel SIPP sample is located in 230 Primary Sampling Units (PSU's) each consisting of a county or a group of contiguous counties. Within these PSU's, expected clusters of two living quarters (LQ's) were systematically selected from lists of addresses prepared for the 1980 decennial census to form the bulk of the sample. To account for LQ's built within each of the sample areas after the 1980 census, a sample containing clusters of four LQ's was drawn from permits issued for construction of residential LQ's up until shortly before the beginning of the panel.

In jurisdictions that don't issue building permits or have incomplete addresses, small land areas were sampled and expected clusters of four LQ's within were listed by field personnel and then subsampled. In addition, sample LQ's were selected from a supplemental frame that included LQ's identified as missed in the 1980 census.

The first interview was conducted during February, March, April, and May of 1987. Approximately one-fourth of the sample was interviewed in each of these months. Each sample person was visited every 4 months thereafter. At each interview, the reference period was the 4 months preceding the interview month.

Occupants of about 93 percent of all eligible living quarters participated in the first interview of the panel. For subsequent interviews, only original sample persons and persons living with them were eligible to be interviewed. Original sample persons were followed if they moved to a new address, unless the new address was more than 100 miles from a SIPP sample area. Then, telephone interviews were attempted. All first wave noninterviewed households were automatically designated as noninterviews for all subsequent interviews. When original sample persons moved to remote parts of the country and couldn't be reached by telephoning, moved without leaving a forwarding address, or refused to be interviewed, additional noninterviews resulted.

Noninterviews. Tabulations in this report were drawn from interviews conducted from October 1988 through January 1989. Table 1 summarizes information on nonresponse for the interview months in which the data used to produce this report were collected.

Table C-1. **Household Sample Size, by Month and Interview Status**

Month	Initially eligible	Classified as interviewed	Person nonresponse rate[1]
October 1988	3,100	2,700	12%
November 1988	3,200	2,700	14%
December 1988	3,100	2,700	12%
January 1989	3,200	2,800	13%

[1]Due to rounding of all numbers at 100, there are some inconsistencies. The percentage was calculated using unrounded numbers.

Some respondents did not respond to some of the questions; therefore, the overall nonresponse rate for some items, especially sensitive income and money related items, is higher than the person nonresponse rate. For more discussion of nonresponse, see the Quality Profile for the Survey of Income and Program Participation, May 1990, by T. Jabine, K. King and R. Petroni, available from Customer Services, Data Users Services Division (301-763-6100).

As a part of most waves, subjects are covered that don't require repeated measurement during the panel—subjects are covered once during the panel or annually—and are of particular interest to data users and policy makers. Also, respondent burden is reduced by collecting data once for the panel or annually. A specific set of topical questions are referred to as a topical module. For this report, the topical modules analyzed include questions on support of nonhousehold members. They were implemented in wave 6 of the 1987 panel.

ESTIMATION

The estimation procedure used to derive SIPP person weights in each panel involved several stages of weight adjustments. In the first wave, each person received a base weight equal to the inverse of his/her probability of selection. For each subsequent interview, each person received a base weight that accounted for following movers.

A noninterview factor was applied to the weight of every occupant of interviewed households to account for persons in noninterviewed occupied households which were eligible for the sample. (Individual nonresponse within partially interviewed households was treated with imputation. No special adjustment was made for noninterviews in group quarters.)

A factor was applied to each interviewed person's weight to account for the SIPP sample areas not having the same population distribution as the strata from which they were selected.

The Bureau has used complex techniques to adjust the weights for nonresponse. For a further explanation of the techniques used, see the "Nonresponse Adjustment Methods for Demographic Surveys at the U.S. Bureau of the Census," November 1988, Working paper 8823, by R. Singh and R. Petroni. The success of these techniques in avoiding bias is unknown. An example of successfully avoiding bias can be found in "Current Nonresponse Research for the Survey of Income and Program Participation" (paper by Petroni presented at the Second International Workshop on Household Survey Nonresponse in October 1991).

An additional stage of adjustment to persons' weights was performed to reduce the mean square errors of the survey estimates. This was accomplished by ratio adjusting the sample estimates to agree with monthly Current Population Survey (CPS) type estimates of the civilian (and some military) noninstitutional population of the United States by demographic characteristics including age, sex, and race as of the specified date. The CPS estimates by age, race, and sex were themselves brought into agreement with estimates from the 1980 decennial census which have been adjusted to reflect births, deaths, immigration, emigration, and changes in the Armed Forces since 1980. In addition, SIPP estimates were controlled to independent Hispanic controls and an adjustment was made so that husbands and wives within the same household were assigned equal weights. All of the above adjustments are implemented for each reference month and the interview month.

ACCURACY OF ESTIMATES

SIPP estimates are based on a sample; they may differ somewhat from the figures that would have been obtained if a complete census had been taken using the same questionnaire, instructions, and enumerators. There are two types of errors possible in an estimate based on a sample survey: nonsampling and sampling. We are able to provide estimates of the magnitude of SIPP sampling error, but this is not true of nonsampling error. Found in the next sections are descriptions of sources of SIPP nonsampling error, followed by a discussion of sampling error, its estimation, and its use in data analysis.

Nonsampling variability. Nonsampling errors can be attributed to many sources, e.g., inability to obtain information about all cases in the sample; definitional difficulties; differences in the interpretation of questions; inability or unwillingness on the part of the respondents to provide correct information; inability to recall information, errors made in the following: collection such as in recording or coding the data, processing the data, estimating values for missing data; biases resulting from the differing recall periods caused by the interviewing pattern used; and undercoverage. Quality control and edit procedures were used to reduce errors made by respondents, coders, and interviewers. However, it is possible, due to the nature of the information collected for this report, that the estimates in this report are biased. More detailed discussions of the existence and control of nonsampling errors in the SIPP can be found in the *SIPP Quality Profile*.

Undercoverage in SIPP results from missed living quarters and missed persons within sample households. It is known that undercoverage varies with age, race, and sex. Generally, undercoverage is larger for males than for females and larger for Blacks than for non-Blacks. Ratio estimation to independent age-race-sex population controls partially corrects for the bias due to survey undercoverage. However, biases exist in the estimates to the extent that persons in missed households or missed persons in interviewed households have characteristics different from those of interviewed persons in the same age-race-sex group. Further, the independent population controls used have not been adjusted for undercoverage in the census.

Comparability with other estimates. Caution should be exercised when comparing data from this report with data from other SIPP publications or with data from other surveys. The comparability problems are caused by such sources as the seasonal patterns for many characteristics, different nonsampling errors, and different concepts and procedures. Refer to the *SIPP Quality Profile* for known differences with data from other sources and further discussion.

Sampling variability. Standard errors indicate the magnitude of the sampling error. They also partially measure the effect of some nonsampling errors in response and enumeration, but do not measure any systematic biases in the data. The standard errors for the most part measure the variations that occurred by chance because a sample rather than the entire population was surveyed.

USES AND COMPUTATION OF STANDARD ERRORS

Confidence intervals. The sample estimate and its standard error enable one to construct confidence intervals, ranges that would include the average result of all possible samples with a known probability. For example, if all possible samples were selected, each of these being surveyed under essentially the same conditions and using the same sample design, and if an estimate and its standard error were calculated from each sample, then—

1. Approximately 68 percent of the intervals from one standard error below the estimate to one standard error above the estimate would include the average result of all possible samples.
2. Approximately 90 percent of the intervals from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate would include the average result of all possible samples.
3. Approximately 95 percent of the intervals from two standard errors below the estimate to two standard errors above the estimate would include the average result of all possible samples.

The average estimate derived from all possible samples is or is not contained in any particular computed interval. However, for a particular sample, one can say with a specified confidence that the average estimate derived from all possible samples is included in the confidence interval.

Hypothesis testing. Standard errors may also be used for hypothesis testing, a procedure for distinguishing between population characteristics using sample estimates. The most common types of hypotheses tested are (1) the population characteristics are identical versus (2) they are different. Tests may be performed at various levels of significance, where a level of significance is the probability of concluding that the characteristics are different when, in fact, they are identical.

All statements of comparison in the report have passed a hypothesis test at the 0.10 level of significance or better. This means that, for differences cited in the report, the estimated absolute difference between parameters is greater than 1.6 times the standard error of the difference.

To perform the most common test, compute the difference $X_A - X_B$, where X_A and X_B are sample estimates of the characteristics of interest. A later section explains how to derive an estimate of the standard error of the difference $X_A - X_B$. Let that standard error be s_{DIFF}. If $X_A - X_B$ is between -1.6 times s_{DIFF} and +1.6 times s_{DIFF}, no conclusion about the characteristics is justified at the 10 percent significance level. If, on the other hand, $X_A - X_B$ is smaller than -1.6 times s_{DIFF} or larger than +1.6 times s_{DIFF}, the observed difference is significant at the 10 percent level. In this event, it is commonly accepted practice to say that the characteristics are different. Of course, sometimes this conclusion will be wrong. When the characteristics are, in fact, the same, there is a 10 percent chance of concluding that they are different.

Note that as more tests are performed, more erroneous significant differences will occur. For example, at the 10 percent significance level, if 100 independent hypothesis tests are performed in which there are no real differences, it is likely that about 10 erroneous differences will occur. Therefore, the significance of any single test should be interpreted cautiously.

Note concerning small estimates and small differences. Summary measures are shown in the report only when the base is 400,000 or greater. Because of the large standard errors involved, there is little chance that estimates will reveal useful information when computed on a base smaller than 400,000. Also, nonsampling error in one or more of the small number of cases providing the estimate can cause large relative error in that particular estimate. Estimated numbers are shown, however, even though the relative standard errors of these numbers are larger than those for the corresponding percentages. These smaller estimates are provided primarily to permit such combinations of the categories as serve each user's needs. Therefore, care must be taken in the interpretation of small differences since even a small amount of nonsampling error can cause a borderline difference to appear significant or not, thus distorting a seemingly valid hypothesis test.

Standard error parameters and tables and their use. Most SIPP estimates have greater standard errors than those obtained through a simple random sample because clusters of living quarters are sampled for the SIPP. To derive standard errors that would be applicable to a wide variety of estimates and could be prepared at a moderate cost, a number of approximations were required. Estimates with similar standard error behavior were grouped together and two parameters (denoted "a" and "b") were developed to approximate the standard error behavior of each group of estimates. Because the actual standard error behavior was not identical for all estimates within a group, the standard errors computed from these parameters provide an indication of the order of magnitude of the standard error for any specific estimate. These "a" and "b" parameters vary by characteristic and by demographic subgroup to which the estimate applies. Table 2 provides base "a" and "b" parameters to be used for wave 6 1987 panel estimates.

For those users who wish further simplification, we have also provided general standard errors in tables 3 and 4. Note that these standard errors must be adjusted by a factor from table 2. The standard errors resulting from this simplified approach are less accurate. Methods for using these parameters and tables for computation of standard errors are given in the following sections.

Table C-2. **SIPP Generalized Variance Parameters**

Characteristic	a	b	f factor
Persons (1987 Panel)			
Total or White	-0.0001478	34,073	1.00
Black	-0.0004569	12,606	0.61
Child Support			
1987 Wave 6	-0.0001240	11,579	0.58
1985 Wave 6	-0.0001434	12,699	0.61
Support for Nonhousehold Members			
1987 Wave 6	-0.0001273	11,579	0.58
1985 Wave 6	-0.0001434	12,699	0.61

Standard errors of estimated numbers. There are two ways to compute the approximate standard error, s_x, of an estimated number shown in this report. The first uses the formula

$$s_x = f_x \qquad (1)$$

where f is a factor from table 2, and s is the standard error of the estimate obtained by interpolation from table 3. Alternatively, s_x may be approximated by the formula,

$$s_x = \sqrt{ax^2 + bx} \qquad (2)$$

from which the standard errors in table 3 were calculated. Here x is the size of the estimate and a and b are the parameters in table 2 associated with the particular type of characteristic. Use of formula 2 will provide more accurate results than the use of formula 1. When calculating standard errors for numbers from cross-tabulations involving different characteristics, use the factor or set of parameters for the characteristic which will give the largest standard error.

Illustration. SIPP estimates from text table B of this report show that in 1988 3,602,000 people provided support for adults only. The appropriate "a" and "b" parameters and "f" factor from table 2 and the appropriate general standard error from table 3 are

$$a = -.0001273,\ b = 11{,}579,\ f = .58,\ s = 339{,}000$$

Using formula 1, the approximate standard error is

$$.58 \times 339{,}000 = 197{,}000$$

and using formula 2, the approximate standard error is

$$\sqrt{(-.0001273)\ (3{,}602{,}000)^2 + (11{,}579)\ (3{,}602{,}000)} = 200{,}000$$

Table C-3. **Standard Errors of Estimated Numbers of Persons**
(Numbers in thousands)

Size of estimate	Standard error	Size of estimate	Standard error
200	83	50,000	1155
300	101	80,000	1334
600	143	100,000	1389
1,000	184	130,000	1390
2,000	260	135,000	1381
5,000	408	150,000	1336
8,000	513	200,000	950
11,000	597	220,000	586
13,000	647	230,000	136
15,000	691		
17,000	733		
22,000	823		
26,000	887		
30,000	943		

The 90 percent confidence interval as shown by the data is from 3,282,000 to 3,922,000. Therefore, a conclusion that the average estimate derived from all possible samples lies within a range computed in this way would be correct for roughly 90 percent of all samples.

Standard errors of estimated percentages. The reliability of an estimated percentage, computed using sample data for both numerator and denominator, depends on the size of the percentage and its base. When the numerator and denominator of the percentage have different parameters, use the parameter (or appropriate factor) from table 2 indicated by the numerator.

The approximate standard error, $s_{(x,p)}$, of an estimated percentage p can be obtained by use of the formula

$$s_{x,p} = fs \qquad (3)$$

where p is the percentage of persons/families/households with a particular characteristic such as the percent of persons owning their own homes.

In this formula, f is the appropriate "f" factor from table 2, and s is the standard error of the estimate obtained by interpolation from table 4.

Alternatively, it may be approximated by the formula

$$s_{(x,p)} = \sqrt{\frac{b}{x}(p)(100\text{-}p)} \qquad (4)$$

from which the standard errors in table 4 were calculated. Here x is the total number of persons, families, households, or unrelated individuals in the base of the percentage, p is the percentage ($0 \leq p \leq 100$), and b is the "b" parameter in table 2 associated with the characteristic in the numerator of the percentage. Use of this formula will give more accurate results than use of formula (3) above.

Illustration. The text table A shows that an estimated 43.8 percent of persons who receive support are adults. Using formula 3 with the "f" factor from table 2 and the appropriate standard error from table 4, the appropriate standard error is

$$s_{(x,p)} = (.58)(2.54) = 1.5\%$$

Alternately, using formula 4 with the "b" parameter from table 2, the appropriate standard error is

$$s_{(x,p)} = \sqrt{\frac{11{,}579}{12{,}400{,}000} 43.8\%(100\% - 43.8\%)} = 1.5\%$$

Consequently, the 90 percent confidence interval as shown by this data is from 41.3 to 46.3 percent.

Standard error of a difference. The standard error of a difference between two sample estimates, x and y, is approximately equal to

$$s_{(x-y)} = \sqrt{s_x^2 + s_y^2 - 2rs_xs_y} \quad (5)$$

where s_x and s_y are the standard errors of the estimates x and y and r is the correlation coefficient between the characteristics estimated by x and y. The estimates can be numbers, averages, percents, ratios, etc. Underestimates or overestimates of standard error of differences result if the estimated correlation coefficient is overestimated or underestimated, respectively. In this report, r is assumed to be 0.

Illustration. Using text table A, 13.4 percent of persons who receive support are the parents of the provider and 4.3 percent of persons who receive support are the ex-spouses of the provider. The standard errors for these percentages are computed using formula (4), to be 1.0 and 0.6 percent. Assuming that these two estimates are not correlated, the standard error of the estimated difference of 9.1 percentage points is

$$s_{(x-y)} = \sqrt{(1.0\%)^2 + (0.6\%)^2} = 1.2\%$$

The 90 percent confidence interval is from 7.2 to 11.0 percentage points. Since this interval does not contain zero, we conclude that the difference is significant at the 10 percent level.

Standard error of a ratio. The standard error for the average quantity of persons, families, or households per family or household or for a ratio of means or medians is approximated by formula (6):

$$s_{\frac{x}{y}} = \frac{x}{y}\sqrt{\left(\frac{s_x}{x}\right)^2 + \left(\frac{s_y}{y}\right)^2 - 2r\frac{s_xs_y}{xy}} \quad (6)$$

Where x and y are the numerator and denominator for the average or the means or medians which form the ratio, r is the correlation coefficient between the characteristics estimated by x and y. Their associated standard errors are s_x and s_y. Underestimates or overestimates of standard error of ratios result if the estimated correlation coefficient is overestimated or underestimated, respectively. In this report, r is assumed to be 0.

Illustration. Using text table 1, the SIPP estimate of Black-to-White mean support payments in 1988 is .67. Also, the mean support payment and its corresponding standard error are $2,118 and $277, respectively for the Blacks; and $3,138 and $160, respectively for the Whites.

Using formula (6), the standard error for this ratio is approximated by

$$s_{\frac{x}{y}} = \frac{2{,}118}{3{,}138}\sqrt{\left(\frac{277}{2{,}118}\right)^2 + \left(\frac{160}{3{,}138}\right)^2} = .049$$

Table C-4. **Standard Errors of Estimated Percentages of Persons**

Base of estimated percentage (thousands)	Estimated percentages					
	≤1 or ≥99	2 or 98	5 or 95	10 or 90	25 or 75	50
200	4.11	5.78	9.00	12.38	17.87	20.64
300	3.35	4.72	7.35	10.11	14.59	16.85
600	2.37	3.34	5.19	7.15	10.32	11.92
1,000	1.84	2.58	4.02	5.54	7.99	9.23
2,000	1.30	1.83	2.84	3.92	6.65	6.53
5,000	0.82	1.16	1.80	2.48	3.57	4.13
8,000	0.65	0.91	1.42	1.96	2.83	3.26
11,000	0.55	0.78	1.21	1.67	2.41	2.78
13,000	0.51	0.72	1.12	1.54	2.22	2.56
17,000	0.45	0.63	0.98	1.34	1.94	2.24
22,000	0.39	0.55	0.86	1.18	1.70	1.97
26,000	0.36	0.51	0.79	1.09	1.57	1.81
30,000	0.34	0.47	0.73	1.01	1.46	1.69
50,000	0.26	0.37	0.57	0.78	1.13	1.31
80,000	0.21	0.29	0.45	0.62	0.89	1.03
100,000	0.18	0.26	0.40	0.55	0.80	0.92
130,000	0.16	0.23	0.35	0.49	0.70	0.81
180,000	0.14	0.19	0.30	0.41	0.60	0.69
200,000	0.13	0.18	0.28	0.39	0.57	0.65
230,000	0.12	0.17	0.27	0.37	0.53	0.61
250,000	0.12	0.16	0.25	0.35	0.51	0.58