

NSAF Public Use File User's Guide

Report No. 11

Prepared by:

Natalie Abi-Habib

Adam Safir

Timothy Triplett

The Urban Institute



Assessing
the New
Federalism

An Urban Institute
Program to Assess
Changing Social Policies

Methodology Reports

Preface

Report No. 11: NSAF Public Use File User's Guide is the eleventh report in a series describing the methodology of the National Survey of America's Families (NSAF). One component of the *Assessing the New Federalism Project* at the Urban Institute, conducted in partnership with Child Trends, NSAF is a major household survey focusing on the economic, health, and social characteristics of children, adults under the age of 65, and their families.

During the third round of the survey in 2002, interviews were conducted with over 40,000 families, yielding information on over 100,000 people. The survey sample is representative of the nation as a whole and of 13 focal states, and therefore allows for both national as well as state-level analysis. Westat conducted data collection for the survey.

About the Methodology Series

This series of reports has been developed to provide readers with a detailed description of the methods employed to conduct the 2002 NSAF. The 2002 series includes the following reports:

- No. 1 An overview of the NSAF sample design, data collection techniques, and estimation methods
- No. 2 A detailed description of the NSAF sample design for both telephone and in-person interviews
- No. 3 Methods employed to produce estimation weights and the procedures used to make state and national estimates for *Snapshots of America's Families*
- No. 4 Methods used to compute and results of computing sampling errors
- No. 5 Processes used to complete the in-person component of the NSAF
- No. 6 Collection of NSAF papers
- No. 7 Studies conducted to understand the reasons for nonresponse and the impact of missing data
- No. 8 Response rates obtained (taking the estimation weights into account) and methods used to compute these rates
- No. 9 Methods employed to complete the telephone component of the NSAF
- No. 10 Data editing procedures and imputation techniques for missing variables
- No. 11 User's guide for public use microdata
- No. 12 NSAF questionnaire

About this Report

Report No. 11 provides documentation for the 1997–2002 NSAF Public Use Files, each set of which includes data on approximately 42,000 households, yielding information on over 100,000 people. This report gives an overview of the survey, describes the sample design and methodology used, and discusses the limitations on use of the survey data.

After providing an overview of the NSAF data, it also describes how to use the data files, and offers instructions and examples on how to use the NSAF survey weights.

For More Information

For more information about the National Survey of America's Families, contact:

Assessing the New Federalism
Urban Institute
2100 M Street, NW,
Washington, D.C. 20037

E-mail: nsaf@ui.urban.org

Website: <http://newfederalism.urban.org/nsaf>

*Adam Safir
and
Tim Triplett*

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Chapter 1: Overview of the National Survey of America's Families

1.1 Introduction

The User's Guide presents basic information on the National Survey of America's Families (NSAF) public use data. The goal of this report is to provide users with enough information on the survey itself and data files to be able to use the data, although other reports in the Methodology series should be consulted for more detailed information. The NSAF is part of *Assessing the New Federalism* (ANF),¹ a multiyear Urban Institute research project to analyze the devolution of responsibility for social programs from the federal government to the states, focusing primarily on health care, income security, job training, and social services. In collaboration with Child Trends, researchers from the Urban Institute monitor program changes and fiscal developments, along with changes in the well-being of children and families. Data collection for the NSAF was carried out in 1997, 1999, and 2002 by Westat.

This introductory chapter gives an overview of the survey, including descriptions of the sample design and data collection procedures. Chapter 2 provides information on the content and structure of NSAF public use files. Chapter 3 gives instructions and examples on how to use NSAF weights to obtain survey estimates. Chapter 4 describes procedures for calculating variances and standard errors of survey estimates.

1.2 About the Survey

The Urban Institute began the ANF project during the 1996 period of devolution of fiscal responsibility for social programs from the federal government to the states. The project goals are to provide policymakers, state administrators, and advocates the information they need to make better decisions and to help the nation determine the consequences of devolution.

The project is premised on the notion that better information yields better policies. With increased state-level authority, state data become increasingly more important; yet such data are currently very limited. Of course, devolution should not be "evaluated" with a pronouncement of success or failure at the end, but should be monitored, with continuous input into the policy and implementation process. This implies that a new relationship between research and practice is necessary and a long-term effort needed.

The NSAF provides the ANF project data needed for a comprehensive look at the well-being of adults and children and reveals striking differences among the 13 focal states. The survey provides quantitative measures of the quality of life in America. One of the survey's defining features is the breadth of topics it covers:

- Household composition and demographics
- Health status, insurance, access, utilization, and confidence in getting care

¹ *Assessing the New Federalism* is funded by a consortium of private foundations including the Annie E. Casey Foundation, the Robert Wood Johnson Foundation, the W.K. Kellogg Foundation, the Ford Foundation, the David and Lucile Packard Foundation, the John D. and Catherine T. MacArthur Foundation, the Henry J. Kaiser Family Foundation, the Charles Stewart Mott Foundation, and others.

- Employment, earnings, income, poverty status, economic hardship, and child support receipt and payments
- Welfare, Food Stamps, and other program participation
- Child care arrangements and social service needs
- Child and family well-being measures

While the focus of the survey is at the state level, the scope is national—with a primary emphasis on low-income families with children. The focus of ANF analysis is extensive and varied, with wide dissemination a major component. The project has employed four major data sources:

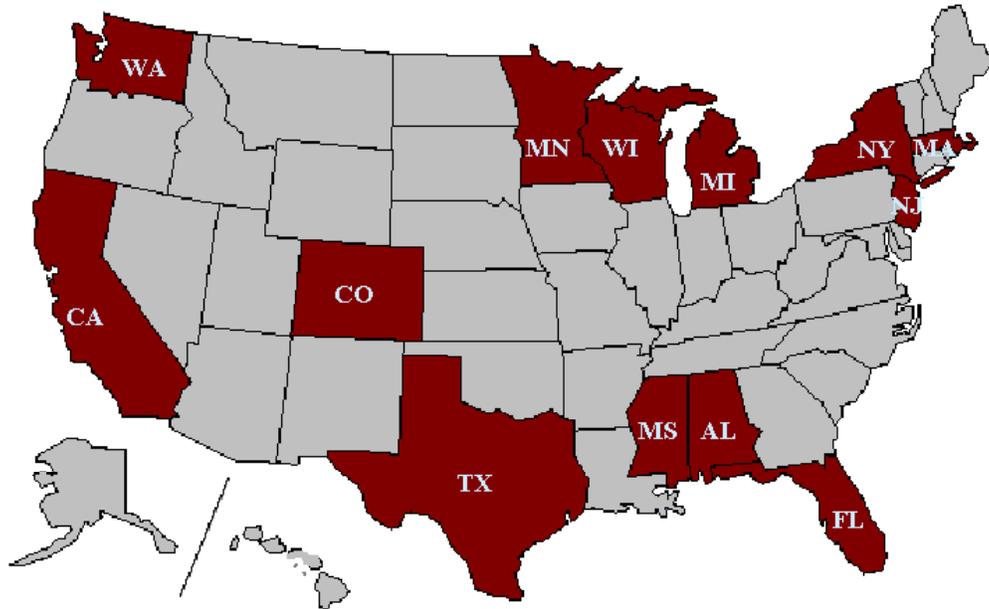
- 1) the compilation and integration of existing state databases;
- 2) in-depth, state-specific baseline case studies with follow-up monitoring;
- 3) special surveys of states; and
- 4) our topic here, the National Survey of America's Families.

The unfolding New Federalism can be viewed as 51 “natural experiments.” Ideally, the effects of devolution should be examined by conducting intensive case studies and tracking changes in well-being in *all* states, as well as by controlling for substate variation in program implementation. However, this would be prohibitively expensive. Instead, the Urban Institute decided to focus on just 13 states, shown in figure 1. These study areas were selected to vary in terms of their size, geographic location, fiscal capacity, citizens' needs, and traditions of providing government services.

While the NSAF survey was conducted, intensive case studies were also conducted in the 13 states to obtain an in-depth understanding of each state's responses to the New Federalism. Monitoring continues as state circumstances change.

NSAF data from all rounds are used to explore linkages between state policy and child and family well-being. The data were collected with the purpose of allowing analysts at the Urban Institute and Child Trends to look at changes over time, and make comparisons across states at a point in time, within a state over time, and across states over time.

Figure 1: 13 Targeted NSAF States



Given these objectives for the ANF project, we identified four key requirements for the design of the survey. These requirements were

- large, representative samples of families with children in the intensively studied states and the nation;
- large, representative samples of low-income families with children in the intensively studied states and the nation;
- observations at multiple points in time; and
- a broad range of well-being indicators that are uniformly measured across states.

Because of the survey's breadth, which encompasses the economic, health, and social dimensions of well-being, the NSAF permits comprehensive assessments of child and family well-being and program participation, while controlling for important socioeconomic characteristics.

1.3 Limitations of Existing Surveys

ANF saw a need for NSAF after reviewing existing surveys and finding them lacking in several aspects for meeting project objectives:

In 1997, many major national household samples—such as the Survey of Income and Program Participation (SIPP)—were not state representative, which meant that reliable state-specific estimates could not be produced from them. At that time, exceptions were the Current Population Survey (CPS) and the National Health Interview Survey (NHIS). However, as will be described shortly, neither the CPS nor the NHIS met the project’s needs because of limitations in content and sample size.

State-representative surveys either focused on narrow aspects of well-being or did not include variables that relate to the anticipated policy changes. For example, the CPS focuses mainly on employment, and at the time of the 1997 NSAF it did not include information on health services use or access to care. The NHIS has the needed health questions, but lacks both information on receipt of AFDC and food stamps, and detailed income information. In addition, neither the CPS nor the NHIS contains information on the need for and use of social services or childcare.

Finally, even with state-representative sample frames, the existing surveys’ sample sizes in most states were too small (particularly for the low-income population). Without some supplementation, the assessment of changes over time in individual states would be very imprecise.

In summary, with the data sources available in 1997, it was simply not possible (without the NSAF) to make reliable state-specific estimates on a wide range of well-being indicators, either because the samples were not state representative or because the survey content was too narrow. In addition, even if one were willing to narrow the scope of well-being measures to just a few dimensions, the sample sizes available for examining low-income households would make comparisons over time very imprecise for most states.

There have now been three rounds of NSAF, fielded during 1997, 1999, and 2002. Westat carried out the data collection in all three rounds for the Urban Institute and Child Trends. Each round of the survey collects information on the economic, health, and social dimensions of the well-being of children, adults under the age of 65, and their families. While the survey is national, 13 states are targeted for special study. In 1997 and 1999, Wisconsin was targeted for particularly intensive study, with separate large samples for Milwaukee² and the balance of the state. Data are also collected in the balance of the nation to permit national estimates.

1.4 NSAF Sample Design

The NSAF is designed to produce estimates that are representative of the civilian, noninstitutionalized population under age 65. As with virtually all household surveys, some segments of the population (e.g., the homeless) could not be sampled because of their living arrangements and are not included in the survey results.

The NSAF draws households from two separate sampling frames. The first frame consists of telephone households from a random-digit dial (RDD) sample of households with telephones. The RDD approach was adopted because it is a cost-effective way to collect the data. However, because low-income children are disproportionately represented in households without telephone

² Milwaukee County was not oversampled in the 2002 design.

service, a supplementary area sample was conducted in person for those households without telephones. Nationally, Giesbrecht et al. (1996) estimate that about 20 percent of families in poverty have no telephone and that about 10 percent of families with one child age 3 or under have no telephone. Thus, the second sampling frame is an area sample that provides data for these and other families without current phone service. A sizable area sample³ was screened to find such households. No other households were interviewed from the area sample.

In addition to the use of RDD sampling to reduce costs (compared to pure area sampling), costs were further reduced through the use of screener-based subsampling of households contacted in the RDD component. With this approach, a single income question was asked during the RDD screening interview. Those households that reported an absence of children or reported incomes above 200 percent of the poverty threshold were subsampled. More detailed and reliable income questions were asked during the extended interview for those not “subsampled out.” In Round 1, there was less consistency between the screener and extended versions of the income question than anticipated. This led to a serious review of how to re-optimize the subsampling rates for the households that initially report high income for Round 2 (see section 3.3 in the 1999 NSAF methodology report no. 2).

For the 1997 NSAF, the RDD telephone sample started out with 483,260 randomly generated phone numbers in 100-banks⁴ with at least one listed residential phone number. Out of these, 48 percent were found or imputed to be working residential phone numbers. Screening data were obtained from 76 percent of the working residential numbers, yielding a total screened sample of 176,791 households. Given the sampling rules described above, 32,474 households with children were selected for extended interviews, as well as 19,800 adult-only households. From these, 40,400 children, 3,500 other adults in households with children, and 22,100 adults in adult-only households were selected. The nontelephone sample for 1997 was significantly smaller than the telephone sample. It consisted of 1,682 interviews from about 1,500 eligible nontelephone households. These households were found by screening an initial sample of 44,400 dwelling units across 1,388 segments in 114 primary sampling units (PSUs). Note that one MKA interview can provide data on up to two sample children and that there were a few MKA interviews with parents under the age of 18.

The second round (1999) of the NSAF built in part on the RDD sample selected in the initial round and augmented it with an additional sample of newly selected telephone numbers. This overlap was quite large and led to both cost savings and some reduction in the variance of change measures from round to round (See report no. 2 and report no. 4 in the 1999 methodology series). For the 1999 sample, a total of 383,653 telephone numbers were used. Of these numbers, about 217,421 were drawn from the Round 1 sample of telephone numbers. These numbers were subsampled from Round 1 numbers at different rates based on the Round 1 screener result code. Overall, for Round 2, 147,623 households were screened, and detailed extended telephone interviews were conducted in 40,874 households.

³ The size of the area sample was reduced for Round 3 and therefore only nationally representative of nontelephone households. The area sample in Rounds 1 and 2 was selected to be representative both nationally and within each focal state.

⁴ A 100-bank is a block of 100 consecutive phone numbers with the same first eight digits. Thus, the telephone numbers between 212-555-5500 and 212-555-5599 would make up one 100-bank.

The nontelephone sample for 1999 also built on the earlier 1997 selections, in that for 1999, we returned to most of the same sample segments used in 1997. There was, however, some supplementation in the balance of the U.S. to reduce the large variances that were found to exist across PSUs. In the 1999 NSAF in-person component, 1,676 extended interviews were conducted in 1,486 households

The third round (2002) sample design in many ways was more like the 1997 design, in that there was no RDD overlap sample. For the 2002 NSAF, the RDD telephone sample consisted of 514,240 randomly generated phone numbers in 100-banks with at least one listed residential phone number. Out of these, 41 percent were found or imputed to be working residential phone numbers. Overall, 133,503 households were screened, and detailed extended telephone interviews were conducted in 39,798 households for Round 3.

The size of the nontelephone sample for 2002 was reduced by more than half and was no longer representative of the NSAF focal states. In Round 3, there were a total of 649 area sample interviews completed from a total of 578 nontelephone households. The nontelephone sample for 2002 used a subset of the PSUs used in the previous rounds of NSAF.

A summary of the results of data collection by round is shown in table 1-1. For a complete description of the NSAF telephone survey methods, see report no. 9 in the 1997, 1999, and 2002 NSAF methodology series.

Overall, the samples for the three rounds of data collection were roughly equal in size. Appendix A provides a state-by-state summary of the achieved sample sizes for 1997, 1999, and 2002, for children and adults separately—both in total and for low-income individuals.

Table 1-1. Data Collection Results by Round

	Round 1 (1997)	Round 2 (1999)	Round 3 (2002)
Screener completes (RDD)	179,280	147,623	133,503
Extended completes (RDD)	46,798	45,040	43,157
Extended completes (area sample)	1,701	1,665	649
Extended completes (total)	48,499	46,705	43,806
Total households	44,461	42,360	39,798
Total families	44,781	44,303	40,084
MKA interviews	28,331	29,917	28,502
Option B (adult interviews)	20,168	16,788	15,304
Sampled adults	75,525	74,719	70,577
Random adults	56,278	52,587	49,507
Sampled children	34,439	35,938	34,332
Focal child 1 (0–5)	12,615	12,515	12,268
Focal child 2 (6–17)	21,824	23,423	22,064

Table 1-2. Response Rates by Round

	Round 1 (1997)	Round 2 (1999)	Round 3 (2002)
Screener response rate	77.4%	76.7%	66.0%
Extended response rate (children)	84.1%	81.4%	83.5%
Overall response rate (children)	65.1%	62.4%	55.1%
Extended response rate (adult)	79.9%	77.5%	78.7%
Overall response rate (adult)	61.8%	59.4%	51.9%
Area sample response rate	85.4%	86.1%	79.4%

Table 1-3. Data Collection Length by Round

	Round 1 (1997)	Round 2 (1999)	Round 3 (2002)
Length of data collection	42 weeks	35 weeks	38 weeks

1.5 NSAF Interviewing Process

In the RDD portion of the NSAF, interviewing consisted of a short screener to determine if the household was to be selected for an extended interview. There were two types of extended interviews. The longer extended interview (45–50 minutes), referred to as an Option A interview, was administered in households with children under 18. The shorter interview (27–30 minutes), called Option B, was given to adults under 65 without children under 18. Option A interviews asked questions about both children and their families, while Option B interviews contained only the questions from Option A that were relevant to adults. The questionnaire was divided into several sections, including the following topics: education, health care coverage and access, child care, employment and earnings, family income, welfare participation, housing and economic hardship, social services, problems, and race, ethnicity, and nativity.

The interviews and screener were programmed into Westat’s computer-assisted telephone interviewing (CATI) system to facilitate administration and data editing. Data collection started on February 15 in 1999 and on February 11 in 2002, while the 1997 survey began January 6, 1997. The start of data collection for the 1999 and 2002 survey was moved back a month to allow respondents a chance to receive all their tax information documents (W-2s, Forms 1099, etc.) before the interview and thus be able to answer questions about their prior year’s income in a more informed manner. The survey was completed in early November for the 1997 NSAF, in early October for the 1999 NSAF, and in mid- to late October for the 2002 NSAF. For more information about the interview process, see report No. 5 on the in-person interviews, and report No. 9 on telephone interviews, in the 1997, 1999, and 2002 methodology series.

Households without telephones were administered an altered version of the screening instrument. Since all nontelephone households with at least one age-eligible person (under 65) were interviewed, this version of the screener did not screen out any households because of income. The screener merely verified that there was not a working telephone (excluding cell phones) in

the household and continued with the same series of sample person selection questions described above for telephone households.

1.6 Within-Household Sampling

For the entire NSAF sample of households, there was a decision to subsample household members to reduce the respondent burden. If there were multiple children under age 6, one was randomly selected. The same was done for children ages 6 to 17. No more than two children were sampled from each household. For example, if a household had three children all under the age of 5, then only one child was sampled and there was not a second focal child. Furthermore, if there were two families in the household and each had two children (one between 0 and 5 years old and one between 6 and 17 years old), only one child age 0 to 5 and one child age 6 to 17 were sampled. Both children could be from the same family or one child could be from each family.

Data were collected about each of these sample children through the most knowledgeable adult in the household for that child. In choosing the MKA, interviewers asked to speak to the person in the household who knew the most about the sampled child's education and health care. Therefore, selection of MKAs was not a random process; rather, the interviewer sought to obtain the highest quality information possible for each child. In families with two sampled children, the MKA was not necessarily the same person for both children. Consequently, there were cases in which one family had two MKAs.

For households without children, up to two childless adults between the ages of 18 and 64 were selected for interviewing. If two childless adults were selected for interviewing, they could not be spouses or partners of each other. For households with children, up to two adults between the ages of 18 and 64 who were not identified as having children under the age of 18 in the household could also have been selected for interviewing. As in households without children, these additional adults selected for interviewing could not be spouses or partners of each other.

1.7 NSAF Questions

A summary table of survey content is shown in table 1-4. All items for the 1997 study can be found in 1997 methodology report no. 12; for 1999 and 2002, the questionnaires are provided in methodology report no. 1. For interviews with MKAs, most items about adults were asked about both the MKA and his or her spouse or partner if the spouse/partner also lived within the household. Items on current health insurance status, employment, education and training were asked about both the MKA and the spouse or partner. However, some questions were asked only about the MKA. These questions concern feelings, religious and volunteer participation, and attitudes and opinions. Other questions concerning past year's health insurance coverage and health care utilization were randomly asked about one of the two when both were present. When there was both an MKA and a spouse or partner, the subject for the latter questions was randomly selected by the survey instrument. The concern was that collecting information about the child, the MKA, and the spouse of the MKA all by proxy through the MKA would tire the MKA excessively. By asking these questions about only the MKA or his or her spouse or partner, the burden on the MKA was reduced. This protocol was applied identically in the RDD and area components.

For interviews with childless adults, as with MKA interviews, many items were asked of both the childless adult respondent and his or her spouse or partner. Items on religious and volunteer participation and attitudes toward welfare and raising children were asked only of the respondent. However, unlike in MKA interviews, in childless adult interviews, both the respondent and the spouse or partner were subjects of questions on health insurance and health care utilization.

It is important to note that most NSAF items are not asked of all persons in families or households. This means that for many measures of adult or child well-being, it will not be possible to construct aggregate measures of well-being based on individual information for families or households that will be valid for all families or households. For example, current employment status is only ascertained for respondents and their spouses or partners. There may be other adults in the household for whom current employment status is not determined. Therefore, trying to build a measure of the number of adults in the family or household who are currently employed will yield an invalid measure, unless one were to restrict the population to families or households with only two adults where the adults are spouse or partners of each other. Similarly, most items on child well-being are only determined for focal children and not all children in the household or family.

Table 1-4. Summary of Well-Being Measures in the NSAF

Well-Being Construct/ Items Measured	Person/Unit for Whom Measured:		
	Child	Parent/ Adult	Family/ Household
<i>Economic Security</i>			
Poverty/family income			X
Parent/Adult employment/earnings/work stability		X	
Health insurance coverage (includes Medicaid)	X	X	
Parent/Adult use of education and training		X	X
Child support	X	X	X
Use of public assistance (includes AFDC, SSI)	X	X	X
Use of food assistance (includes Food Stamps, WIC, school lunch and school breakfast)	X	X	X
Economic hardship			X
Food security		X	X
Use of housing assistance			X
Housing adequacy/stability/crowding	X	X	X
<i>Health and Health Care</i>			
Health status/limitations	X	X	
Hospitals stays and physician visits	X	X	
Health care access, use, and satisfaction	X	X	
Health care monitoring (includes dental visits, well-care/preventive care)	X	X	
Ability to afford medical/dental care, medicine	X	X	
<i>Child's Education/Cognitive Development</i>			
Grade for age	X		
Problem doing well in school, with school work	X		
Whether parents read or tell stories to child	X		
Whether parents take child on outings	X		
Child care use (including amount, type, quality, stability)	X		X
<i>Child's Social Development and Positive Development</i>			
Employment and participation in training programs	X		
Participation in recreational activities: teams, clubs, scouts, religious groups	X		
<i>Child's Behavior Problems</i>			
Behavior Problems Index	X		
Cut classes/suspended/expelled from school	X		
<i>Family Environment</i>			
(A) <i>Family Structure</i>			
Whether two-parent family, whether biological parents present	X	X	
Visitation with noncustodial parent (if relevant)	X		
Stability/turbulence (includes changes in family composition, housing, child care)	X	X	X
(B) <i>Parent/Adult Psychological Well-Being</i>			
Depression		X	
Attitudes toward parenting		X	
Participation in volunteer/religious activities		X	
(C) <i>Family Stress</i>			
Problems in family (includes mental health, family conflict)	X	X	X
(D) <i>Immigration Status</i>	X	X	X
(E) <i>Child-Rearing Practices</i>			
Monitoring; well-child care; dental visits	X		
<i>Community Environment</i>			
Knowledge of community services availability		X	

Chapter 2: NSAF Data Overview

2.1 General Design

NSAF data are organized into hierarchical, flat files; household, family, person, adult, and child level files are available for each round. The hierarchical structure was adopted for two reasons. First and foremost, the structure is consistent with the manner in which the data are collected in the survey. Second, the file structure best accommodates the different weights that are applied to the various data elements—organizing the variables into multilevel data sets with the appropriate weights attached facilitates logical analysis of the data.

Each data set contains five types of variables:

- 1) **Survey variables** store information obtained directly from questions asked on the survey. Each variable begins with the letter corresponding to the section of the survey from which it was obtained.
- 2) **Constructed variables** summarize information from survey variables. Some constructed variables are straightforward recodes of individual survey items. Others involve aggregating information from several or many survey variables to create more complex measures, such as family income as a percentage of the poverty threshold (e.g., UINCRPOV, U_SOCPOV). Data users should check whether a constructed variable has been created that meets their analysis needs before going directly to the use of survey variables, especially if they believe that the measure of interest involves a large number of survey items. All constructed variables begin with the letter U.
- 3) **Administrative variables** provide information that was not obtained directly from a respondent, such as the geographic location of the household or information about the interviewing process itself. Administrative variables include identifier variables, such as person or household ID.
- 4) **Imputation flags** indicate which observations had data imputed for a given variable. An imputation flag is created for all variables that have imputed values. All imputation variables begin with the letter X, where the X replaces the first letter of the variable for which data was imputed.
- 5) **Weights**, as mentioned above, are included on the appropriate files. Weight variables begin with the letter W. For more information on weights, see chapter 3 of this report.

Table 2-1. Data Set Descriptions

Name	Unit	Contents	Weights
FOCALCHD	One record for each focal child.	Person-level data items from extended interviews.	WGFCNA0–60 WGFCST0–60
ADULT_PR	One record for each sampled adult.	Information from sections I (Employment and Earnings) and L (Education and Training).	WGPRNA0–60 WGPRST0–60
ADULT_RN	One record for each randomly sampled adult with child; one record for each sampled childless adult.	Person-level data items from sections E (Health Insurance Coverage) and F (Health Care Access and Utilization).	WGRNNA0–60 WGRNST0–60
ADULT_RB	One record for each childless adult respondent.	Person-level data items from sections N (Issues, Problems and Social Services) and P (Closing section).	WGRBNA0–60 WGRBST0–60
FAMRESP	One record for each respondent.	Family-/respondent-level data items from all sections.	(None)
HOUSEHLD	One record for each household.	Household-level data items.	(None)
PERSON	One record for each household resident.	Person-level data items from sections E (Health Insurance Coverage), J (Income), and O (Demographic).	(None)
SOCFAM	One record for each social family.	Family-level data items (all survey sections and created variables).	WGSOCNA0–60 WGSOCST0–60
CPSFAM	One record for each CPS family.	Family-level data items (created variables).	WCPSNA0 – 60 WCPSST0 – 60

2.2 Data Sets

The NSAF public use files include five person-level data sets: FOCALCHD, ADULT_PR, ADULT_RN, ADULT_RB, and PERSON. The PERSON data set has one observation for each

person living in the household, and the remaining four contain information collected about sampled people during the extended interview. That is, these data sets contain information about focal children, respondents (Option A and Option B), and spouses/partners of respondents.⁵ In addition, one respondent-level data set, FAMRESP, is included, as well as one household-level data set, HOUSEHLD. Finally, there are two family-level data sets, SOCFAM and CPSFAM; each aggregates family information based on a different family definition.

FOCALCHD. This data set contains data elements from the extended interview that are specific to either the FC1 or the FC2. Select data items asked only of MKAs are also included in this data set because the unit of analysis with respect to these questions will usually be children. These items are primarily from sections N and P. The PERSTYPE variable indicates whether the observation is an FC1 or an FC2 observation. The value when PERSTYPE equals 1 means the observation is for a younger focal child (FC1) and the value when PERSTYPE equals 2 means the observation is for an older focal child (FC2). A PERSTYPE value of 23 indicates the observation is for an FC2 who is also the spouse or partner of an MKA. Similarly, a PERSTYPE value of 24 indicates that the observation is for an FC2 who is also an MKA (of the FC1). There are several linking variables on the FOCALCHD data set; these include the person ID of the child (PERSID), the respondent ID of the MKA who provided information about the child (RESPID), the CPS family ID (UCPSID), the social family ID (UFAMID), and the household ID (HHID).

SAMPLED ADULT FILES

The structure of the ADULT_PR, ADULT_RN, and ADULT_RB data sets was driven by the NSAF questionnaire design and sampling. In the survey, some questions are asked about both the respondent and his or her spouse or partner (if one exists), others are asked about either the respondent or his or her spouse or partner (randomly chosen), and still others are asked about only the respondent. Thus, three different person-level adult weights are needed for the three different types of data elements. To make it less confusing for users to match data elements to the appropriate weight, these three data sets have been created so that weights and data items in the files are consistent.

ADULT_PR. The ADULT_PR data set contains data elements from the extended interview that are collected about both the respondent (Option A and Option B) and his or her spouse or partner. There is one observation per respondent and one per spouse or partner (if one exists) in this data set. This data set contains information primarily from sections I (Employment and Earnings), and L (Education and Training). The PERSTYPE variable indicates whether the observation belongs to a respondent or to the respondent's spouse/partner. A value of 4 (MKA) or 6 (Option B respondent) means the observation is for a respondent, while a value of 3 (spouse/partner of MKA) or 5 (spouse/partner of Option B respondent) means the observation is for the respondent's spouse or partner. The linking variables on the ADULT_PR data set include PERSID, RESPID, UCPSID, UFAMID, and HHID.

⁵ Emancipated minors appear on the FOCALCHD data set as well as on the ADULT_PR, ADULT_RN, and ADULT_RB data sets along with their data items from the Option B interviews.

ADULT_RN. The ADULT_RN data set contains data elements from the extended interview that are specific to a randomly selected adult (either the respondent or the spouse/partner). This situation occurs only in sections E (Health Insurance Coverage) and F (Health Care Access and Utilization) for Option A interviews. In Option B, questions are asked from sections E and F about both the respondent *and* the spouse or partner. However, rather than splitting observations for variables across two data sets, information from sections E and F for Option B adults is included in this data set. Thus, for Option A interviews, there is one observation per interview, whereas for Option B interviews, there may be one or two records, one for the respondent and one for the spouse or partner (if one exists). Here again, the PERSTYPE variable indicates whether the observation belongs to a respondent or to the respondent's spouse/partner. The linking variables on the ADULT_RN data set include PERSID, RESPID, UCPSID, UFAMID, and HHID.

ADULT_RB. The ADULT_RB data set contains data elements from the extended interview that are asked only of the respondent in Option B interviews. These are items from sections N (Issues, Problems, and Social Services) and P (Closing section). There is one record per Option B interview in this data set. As described above, similar data elements collected only about the respondent in Option A interviews are included in the FOCALCHD data set, because the unit of analysis for these data items will be the focal child. Thus, some "respondent only" variables are contained in both the FOCALCHD and the ADULT_RB data sets. The linking variables on the ADULT_RB data set include PERSID, RESPID, UCPSID, UFAMID, and HHID.

FAMRESP. There is one family/respondent-level data set called FAMRESP. The term "family-level" is accurate in that information collected about the respondent's family is contained in this data set. However, observations are actually at the respondent level. Because there may be two respondents within a family and some family-level questions are asked of each respondent, it is possible to have two different answers for the same family-level variable. Often, the answers from both respondents will be the same, but this is not true all the time. The FAMRESP data set contains two linking variables, HHID and RESPID.

HOUSEHLD. There is one household-level data set called HOUSEHLD. This data set contains household and administrative variables. The HOUSEHLD data set has one linking variable, HHID, which should be used to merge between HOUSEHLD and any other data set.

PERSON. This data set contains one observation for each person living in the household. Records for nonresident household members have been removed from this data set because very little information, if any, was collected about these individuals. This data set contains demographic information (age, sex, marital status of adults, race/ethnicity, etc.) as well as information on current health insurance status and income. The primary linking variable on this file is PERSID.

SOCFAM. The SOCFAM data set contains items that were asked about the social family as well as variables that were aggregated at the social family level using the UFAMID variable (social family ID). Among the survey items included in the SOCFAM data set are those variables indicating whether anyone in the social family had a particular type of income (e.g., JAFDC) or a particular type of health insurance (e.g., EEMP1COV). The SOCFAM data set also contains created variables that summarize information across all social family members, such as

UNFAMILY (indicating the number of family members). The SOCFAM file includes the linking variable UFAMID, which is the social family ID. The social family definition includes not only married partners and their children, but also unmarried partners, all their children, and members of the extended family (anyone related by blood, marriage, or adoption to the MKA, the spouse/partner, or their children).

CPSFAM. Because the social family definition was used in fielding the NSAF, the CPSFAM data set includes only variables created using the UCPSID. The CPS family ID variable UCPSID is also the linking variable for this data set. The definition of CPS family comes directly from the concept used by the U.S. Census Bureau in the CPS. The CPS defines a family as householder, spouse of householder, their children, and other relatives (by blood, marriage, or adoption) of the family householder.

2.3 Using the Public Use Files

Each public use file is made available as a compressed ASCII file contained in a self-extracting program that must be downloaded and uncompressed. To download the file and save it to a local hard drive, click on the file name. A window will appear asking for the location where the file will be saved. Enter the location and choose “Save.” To unzip the file, go to the File Manager or Windows Explorer and double-click the downloaded file. The extraction program will unzip the ASCII file into the same directory and create a new subdirectory. The new subdirectory will contain six files: (1) *filename.pdf*, the data dictionary for the file, in Adobe PDF format; (2) *filename.txt*, the record description, including variable names, types (i.e., character or numeric), positions (i.e., the columns the variable occupies), and labels; (3) an ASCII copy of the Public Use Data File the researcher has selected; (4) a SAS sample read-in statement for use with the data; (5) an SPSS input statement for use with the data; and (6) *readfilename.txt*, a read-me file that describes the content of the files.

To convert the ASCII file to an SAS data set, use the SAS sample read-in data step and change the infile statement to refer to the location of the downloaded, uncompressed file. To convert the ASCII file to an SPSS data set, use the SPSS sample read-in data step and change the file statement to refer to the location of the downloaded, uncompressed file.

Additionally, many public use data files are available for online statistical analysis using the Survey Documentation & Analysis (SDA) interface developed at the University of California, Berkeley. With SDA, users can obtain weighted estimates for a variety of statistical analyses including means, proportions, cross tabulations, correlations, and regression coefficients (including logit/probit regression). Users can also recode individual variables on any of the analysis forms. For example, a continuous measure, such as age, can easily be recoded into discrete, mutually exclusive and exhaustive categories. Last, the SDA system allows users to create new variables derived from existing variables in each data set. The new variables are temporarily stored in a public work area, which is available to all users.

2.4 Missing Values

There are four types of missing values in NSAF data: *Inapplicables*, *Refusals*, *Don't Knows*, and *Not Ascertaineds*. *Inapplicables* occur when a sampled person is not eligible to receive a certain

question. *Refusals* take place when a respondent refuses to answer a question. *Don't Knows* occur when a respondent does not know or cannot answer a question. Finally, *Not Ascertaineds* occur when a respondent is eligible for a certain question but for some reason the question was not asked (e.g., a CATI or other computer-related problem). Missing values are assigned a negative number. *Inapplicables* are represented by -1, *Refusals* by -7, *Don't Knows* by -8, and *Not Ascertaineds* by -9 (see table 2-2). For SAS users, the SAS read in statement contains an array that converts all missing values to character format. Inapplicables are denoted by (.I), refusals by (.R), don't knows by (.D), and not ascertaineds by (.N).

Table 2-2. Missing Values

Missing Value	ASCII File	SAS	SPSS
Inapplicable	-1	.I	-1
Refused	-7	.R	-7
Don't Know	-8	.D	-8
Not Ascertained	-9	.N	-9

2.5 Using the Data Dictionary

The data dictionary, or codebook, provides information on the variables released on the public use files. Each entry in this data dictionary has eight fields: variable name, label, type, length, question number, question text, description, and frequencies/means. The frequencies display the missing values using the character format (see section 2.4 above).

Each data dictionary field is described in more detail below:

Variable Name. For each entry, a mnemonic string of characters is provided as the variable name. The first letter of the variable name indicates the section of the questionnaire from which the variable was obtained, while the remaining characters (up to seven more) are a short description of the variable. For example, the variable CCHGSC comes from section C of the questionnaire, which deals with the child's education. The remaining characters are a mnemonic reference to the variable description "Changed (shortened to CHG) school (shortened to SC) past 12 months."

Notable exceptions to this naming convention include created variables and demographic variables. Variables beginning with a U have been created by Urban Institute analysts and do not come directly from a survey question. To avoid confusion, demographic variables, most of which were obtained during the initial household screening, consist of one relevant word. For example, the variable indicating gender is simply SEX. Flags for imputed variables begin with letter X, replacing the section identifier that normally occupies the first letter of a variable name. Finally, weights begin with the letter W.

Label. The label is a short description of the variable. In some cases, the label contains slight abbreviations. For example, the variable BDISBL has the label “Has hlth condition that limits activity,” in which the word “health” has been shortened to “hlth.”

Type. Variables can either be character variables, designated by C, or numeric, designated by N. Researchers should note that values for character variables are case-sensitive, so that while “AL” is an allowable value for the character variable STATE, “al” is not.

Length. This field indicates the length of the variable.

Question Number. The question number is provided if the variable was obtained directly from the survey. This field is left blank for all imputation flags, weight variables, and analysis variables created using other variables from the survey.

Question Text. Text from the questionnaire is provided if the variable was obtained directly from the survey. This field is left blank for all imputation flags, weight variables, and constructed variables.

Description. The description field lists any special instructions given to the interviewer for the question. In addition, the description field clarifies some of the terms used in the question and variable label, and, when possible, relates these terms to those that are used by the U.S. Census Bureau in the CPS. Comments on the appropriateness of the variable for analysis and changes across rounds are located in the description field.

Frequencies/Mean. Unweighted variable counts, along with value labels, are provided here for categorical variables. Means are provided here for continuous variables, along with the range of values.

Chapter 3: Using Weights with NSAF Data

3.1 Overview of NSAF Weights

Responses to NSAF items should be weighted to provide approximately unbiased aggregate estimates for each study area and for the country as a whole. The weights should be applied to all survey items in an effort to

- compensate for differential probabilities of selection for households and persons;
- reduce biases occurring where nonrespondents have different characteristics than respondents;
- adjust, to the extent possible, for undercoverage in the sampling frames and in the conduct of the survey; and
- reduce the variance of the estimates by using auxiliary information.

The weighting can be described as involving three stages for both the random-digit dial and in-person components of the NSAF to produce person and family weights:

- The first stage was the computation of the base weight. The base weight is the inverse of the probability of selection, which accounts for the unequal screening rates. This weight also includes an adjustment for the planned exclusion of nontelephone households from the area sampling frame and for the subsampling of persons in selected households.
- The second stage was an adjustment for unit nonresponse (entire households and persons who did not respond to the survey). This was done by adjusting the weights of respondents in particular groups to account for the nonrespondents in those groups.
- In the third stage, the nonresponse-adjusted weights were post-stratified so that the NSAF sample estimates agreed with independent population totals derived from U.S. Census Bureau sources on the number of persons by age, education, ethnicity, gender, race, and housing tenure. This was done for each study area and for the nation as a whole.

These three stages incorporate screener data to create household weights and extended interview data to create the person and family weights. The weights account for the unequal probability of sampling (at both the household and person levels) and include adjustments for nonresponse and undercoverage. The final result is a series of estimates consistent with Census Bureau population totals that reduce biases due to undercoverage and nonresponse. In some cases, the adjustment to Census Bureau population controls may also reduce the sampling error of the estimates.

Weights are assigned to each responding case to facilitate the calculation of approximately unbiased estimates for each study area and the entire nation. Because, as we have seen,

households and persons were sampled with differential probabilities, the use of weights is essential to produce state and national estimates that are representative of the population.

Approximately unbiased estimates of characteristics of persons and families in the 13 study areas and the nation can be produced by appropriately weighting the survey responses. The estimates are of the noninstitutionalized⁶ population of adults under age 65 in the study areas and in the nation. For families, the estimates are limited to those families with at least one person who is under 65 years old. Different sets of weights should be used to produce state- and national-level estimates. The creation of state- and national-level weights is a deviation from earlier NSAF data releases and is discussed in detail in the next section.

3.2 Changes in NSAF Weights

The Round 1 and 2 data are being re-released in parallel with Round 3 data. The primary difference in the re-released data files is the addition of newly created state- and national-level weights that conform to the methods used in constructing the Round 3 weights, most notably in the use of updated control totals.

The final NSAF weights, for all rounds, are adjusted so that sample estimates agree with independent population totals derived from U.S. Census Bureau sources on the number of persons by age, education, ethnicity, gender, race, and housing tenure. The state and national weights, for all rounds, have been poststratified and raked to population projections from the 2000 Census numbers (the earlier undercount-adjusted weights in the Round 1 and Round 2 files were adjusted to totals from the 1990 Census).

In Round 3, the size of the area sample was reduced; while it is still a nationally representative sample of nontelephone households, it is no longer representative at the state level. A model-based adjustment was employed to increase the weight of households similar to nontelephone households. The impact of this design is that state-level weights are necessary for state-level estimation, and national-level weights are necessary for national-level estimation. See the remainder of this chapter, and report no. 3, *Weighting Procedures for the 2002 NSAF* (available on the NSAF web site), for more information about the use of weights.

3.3 Description of NSAF Weights

Five categories of weights are currently available with the NSAF data, each appropriate for a different set of respondents or group of questions from the survey. The five categories of weights are the focal child weights, the adult pair weights, the random adult weights, the childless adult weights, and the family weights. Within each category are separate weights for producing state- and national-level estimates. The weight naming convention denotes state-level weights by **ST** (such as *WGFCST0*) and national-level weights by **NA** (such as *WGFCNA0*). The naming convention furthermore specifies full sample and replicate weights by a number 0 through 60 at the end of each weight name. For example, full sample weights always end in zero (0), such as *WGRNST0*, while replicate weights end in any number from 1 to 60, such as *WGPRNA1* or

⁶ Most persons living in group quarters (housing with many unrelated persons, such as boarding houses) were also excluded.

WGFCST54. Replicate weights are used in variance estimation, as described in report no. 4 of the 1997, 1999, and 2002 NSAF methodology series.

Focal Child (FOCALCHD). These weights enable users to produce estimates of the number and characteristics of children less than 18 years old. These weights should be used to produce virtually all estimates of children. *WGFCNA0-60* should be used to produce national-level estimates of children and *WGFCST0-60* should be used to produce state-level estimates of children.

The child weights include factors that adjust for the probability of selecting the child (including differential factors by reported poverty level on the screener and the number of children per household), and nonresponse at the household and person level. Furthermore, the weights are adjusted to be consistent with known totals of the number of children by race, Hispanic ethnicity, age, sex, and tenure (renting or owning a home) for each study area and the nation.

While the full sample state and national weights can be used for most child-based estimates, users interested in child-based estimates for many of the child care items in the Round 1 and Round 2 data should use an alternative set of weights. In all three rounds of the NSAF, some interviews were conducted during the summer months, when care arrangements could differ from those during the school year. In Rounds 1 and 2, questions about child care asked about child care arrangements in the previous month, while in Round 3 respondents were asked about their school and child care arrangements for the month of May. Analysts should use the focal child school year weights for Rounds 1 and 2 to get estimates on child care arrangements during the school year. For Round 3, analysts should use the regular state- and national-level focal child weights discussed above.

The Round 1 and Round 2 focal child school year weights are available at both the state and national levels. To obtain estimates or conduct variance estimation of child care arrangements during the school year in Rounds 1 and 2 at the national level use *WSFCNA0-60*, at the state level use *WSFCST0-60*.

Adult Pair (ADULT_PR). These weights enable users to produce estimates of all adults 18 to 64 years old, for most of the questions relevant to adults in the NSAF. Most questions about adults were asked about both the sampled adult and his or her spouse or partner, if the spouse/partner lived in the household. Because the adult and the spouse or partner were effectively sampled as a pair for these questions, these weights are called the adult pair weights. For each study area and the nation, these weights adjust for the probability of selection (of the pair of adults), nonresponse, and adjustments to known totals of the number of adults by race, Hispanic ethnicity, age, sex, tenure, and educational attainment. Different weights should be used to generate state- and national-level estimates. *WGPRNA0-60* should be used to produce national-level estimates of adults and *WGPRST0-60* should be used to produce state-level estimates of adults.

In the same way that child care estimation in Rounds 1 and 2 require separate weights for analysis of children, analysis at the adult level (ex., child care expenses) in those rounds also requires a unique set of weights. To obtain national-level estimates and conduct variance estimation of child care measures at the adult level, analysts should use *WSMKNA0-60*.

Estimation at the state level should use *WSMKST0-60*. For Round 3, there is no school year weight, since summer respondents were asked about school and child care arrangements retrospectively instead of asking about school and child care arrangements last month.

Random Adult (ADULT_RN). These weights enable users to produce estimates of adults 18 to 64 years old, for questions in sections E (past-year health insurance coverage) and F (health care use and access). In households with children, these items were asked only of either the respondent or his or her spouse/partner, but not both. In households without children, these questions were asked about both members of the pair. The probability of selection of an adult for the ADULT_RN variables is the same as for the ADULT_PR, except for MKAs with a spouse or partner in the household. In this latter case, the probability of selection for the randomly selected adult is generally half the pair selection probability. Thus, the ADULT_RN weight is generally twice the ADULT_PR weight. The weighting procedures and control totals for the ADULT_RN weights are identical to the ADULT_PR weights. Different weights should be used to generate state- and national-level estimates. *WGRNNA0-60* should be used to produce national-level estimates of adults and *WGRNST0-60* should be used to produce state-level estimates of adults.

Childless Adult (ADULT_RB). These weights are used to produce estimates of adults without children living in the household for a few questions. These questions were asked only of respondents and never of the respondent's spouse or partner. Adults without dependent children were randomly selected from among all childless adults, so they (and their spouse/partners) all had a chance of being asked the questions. The childless adult weights are appropriate for these adults, for the questions asked only of respondents. The childless adult weights were produced by modifying the adult pair weights for the probability of selecting the particular member of the pair, without further adjustment to control totals. Different weights should be used to generate state- and national-level estimates. *WGRBNA0-60* should be used to produce national-level estimates of adults and *WGRBST0-60* should be used to produce state-level estimates of adults.

Note that there is no weight that can be used to generalize to all adults with children for items asked only of respondents. Since MKA respondents were not randomly selected, the spouse or partner of the MKA (often the male spouse/partner) had no chance of being sampled and thus no estimates for adults with children are possible for these questions.

Family (SOCFAM, CPSFAM). These weights are appropriate for making estimates of the number and characteristics of families that have at least one member who is under 65 years old. Families in which all members are over 64 are not included in the NSAF. Families studied by the NSAF were defined using two alternate sets of rules. A social family includes not only married partners and their children, but also unmarried partners, all their children, and members of the extended family (anyone related by blood to the MKA, his or her spouse/partner, or their children). The CPS family definition is limited to the householder, spouse of the family householder, children in the family, and other relatives (related by blood, marriage, or adoption) of the family household respondent.

The family weights are derived from the ADULT_PR weights, with adjustments for the probability of sampling the family. No family-level control totals are applied, but the weights using the control totals from the ADULT_PR weights are the basis for these weights. In most cases, the ADULT_PR weights for the MKA and the family weight are identical. However, in

some families more than one person is an MKA and in these cases the family weight may not be equal to the ADULT_PR weights for either of the sampled MKAs. Even in common situations, such as a family with one parent and a child who is over 17 years old, the ADULT_PR weights and the family weight will not be identical. The family weight should only be used for estimates of the number and characteristics of families. Different weights should be used to generate national- versus state-level estimates. To obtain national-level CPS family estimates, analysts should use *WCPSNA0-60*, and to obtain state-level estimates, analysts should use *WCPSST0-60*. To obtain national-level social family estimates, analysts should use *WSOCNA0-60*, and to obtain state-level estimates, analysts should use *WSOCST0-60*.

3.4 Selecting the Unit of Analysis and the Appropriate Weight

One of the first tasks facing the researcher is to determine the appropriate unit of analysis or the population of interest for their research. Once the unit of analysis is determined, the choice of the appropriate weight is relatively simple. If the child is the unit of analysis, the child weight is appropriate; if the family is the unit of analysis, the family weight is used; and, if the adult (or MKA) is the unit of analysis, then the adult pair, the random adult, or the childless adult weight is used.

Once the unit of analysis is determined, researchers must choose between the state- or national-level weights. This decision is generally straightforward when analyses are focused on *either* state- or national-level estimates. State-level estimates should be derived using the state-level weights while national-level estimation should use national-level weights. However, when comparing state estimates to national estimates, a complication arises. Slight differences between national estimates derived using the national weight and national estimates derived using the state weight are the result of different weighting procedures used to produce the weights (for more information about the construction of the weights, please refer to report no. 3, *Weighting Procedures for the 2002 NSAF*). When comparing state estimates to national estimates, we recommend using the state weight to derive both the state and national estimates. By using the same weight, the estimates will be derived using the same weighting procedure and reduce differences in the respective biases of the weights.

3.5 Combined Child and Adult Estimates

Many NSAF questions are asked of both adults and focal children. For these items, it is possible to obtain estimates for all persons age 0 to 64. To estimate the number of persons under 65 (children as well as adults) with a given characteristic, concatenate the child and appropriate adult file (either adult pair or random adult), rename the weights so they are the same, and carry out the analysis. For example, to estimate the number of persons under 65 who live in a family with income below 200 percent of the poverty level, concatenate the FOCALCHD and ADULT_PR files and rename FOCALCHD and ADULT_PR national weights to a new name, for example, TOTALWT. The analysis can then proceed with *TOTALWT*.

To perform variance estimation calculations (as described in the next chapter and in report no. 4 of the 1997, 1999 and 2002 NSAF methodology series) when using variables across different data files, the same renaming procedure should be applied to the replicate weights of the data sets being used. Using the previous example, rename the FOCALCHD replicate weights

(*WGFCNAI-60*) and the ADULT_PR replicate weights (*WGPRNAI-60*) to a common name, such as *TOTALWT1-60*.

3.6 Estimating Change Over Time

The NSAF data collected in 1997, 1999, and 2002 are a valuable source for estimating change. Estimates of change, such as the difference in the percentage of children under age 6 who live in families below the poverty level, can be produced using the data from Rounds 1, 2, and 3. These are called estimates of net change. Estimates of net change can be produced by calculating separate estimates for each round of the NSAF and then the differences between rounds. Estimating the standard error of estimates of net change is covered in the next chapter.

Chapter 4: Calculating Standard Errors

The sample of households and persons obtained for the NSAF is just one of many possible samples that could have been obtained. Sampling error refers to error in survey estimates that arise from the fact that estimates are based on a sample of observations rather than the population of observations. This form of error is usually expressed in terms of the standard error of an estimate, or the square of the standard error, the sampling variance. Standard errors are also required to conduct hypothesis tests or tests of statistical significance. A clear presentation of estimates from a survey or hypothesis testing should include measures of uncertainty associated with using a sample for inference as opposed to the entire population.

In this chapter, we explain the process of obtaining standard errors for estimates using NSAF data. The NSAF sample design features stratification, clustering, and oversampling. Specialized software or procedures must be used to obtain standard errors that reflect these aspects of the sample design. While survey estimates obtained from the default options in most statistical packages will be correct, standard error estimates may understate the true standard error. For researchers without the technical ability to calculate standard errors appropriately, we provide instructions on how to use design effects to obtain approximate standard errors for some survey estimates. Finally, we briefly describe how standard errors can be calculated correctly using several statistical packages, including WesVar, SAS, SPSS, and STATA.

4.1 Using Statistical Packages

Note that most statistical packages such as SAS or SPSS can still be used to obtain approximately unbiased estimates from NSAF data. The weighting syntax in SAS uses the WEIGHT option in any number of SAS PROC steps to obtain correct estimates. In SPSS, users can use the Weight Cases option under the Data menu to obtain weighted estimates.

While both SAS and SPSS allow users to obtain weighted estimates, the default formulas used by these statistical packages (and others, e.g., Stata) calculate standard errors assuming that the data are from a simple random sample. More formally, observations are assumed to be independent of one another and identically distributed. However, NSAF relies upon a complex sample design that includes oversampling by study area, household type, and household income; clustering in the area sample of nontelephone households; subsampling within households; multiple observations (sample persons) within the same household; and, in Round 2, differential sampling by Round 1 screener result codes. The discussion that follows presents ways that researchers can obtain corrected variance estimates using the replicate weights and other ways to obtain standard errors, including a review of design effects and other statistical software packages.

4.2 Using Design Effects for Approximate Standard Errors

Researchers without the technical ability to calculate variances on their own can consider employing design effects, an alternate method of describing the variability of an estimate from a complex sample survey. The term design effect (DEFF) is used to describe the variance of sample estimates for a particular sample design, relative to the corresponding variance of a

simple random sample with the same sample size. DEFFs are used to evaluate the efficiency of the sampling design and estimation procedure used to develop the estimates.

The concept of the design effect was popularized by Kish (see, for example, Kish 1965) to deal with complex sample designs involving stratification and clustering, designs like that of the NSAF. Stratification generally leads to a gain in efficiency over simple random sampling. On the other hand, clustering usually leads to deterioration in efficiency. This latter effect arises because of the positive intracluster correlation among the subunits in the clusters. For example, the DEFF is larger for children because we sometimes sampled more than one child from the same household. This clustering effect increases the variance over what would pertain in a simple random sampling of children. There is also a stratification effect to consider in the NSAF. By oversampling Mississippi, for instance, we obtain excellent results for that state—roughly as good as those for the much larger California. However, this oversampling means that our estimates of the nation as a whole are not as good as if we had drawn a simple random sample of the country as a whole.

To determine the total effect of any complex design on the sampling variance in comparison with the alternative simple random sampling, one calculates a ratio of variances associated with an estimate, namely

$$\text{DEFF} = \frac{\text{sampling variance of a complex sample}}{\text{sampling variance of a simple random sample}}$$

This ratio is called the design effect of the sampling design for the estimate. This ratio measures the overall efficiency of the sampling design and the estimation procedure used to develop the estimate. At the analysis stage, the DEFF is useful because most output from statistical analysis software (such as SAS and SPSS) assumes the data are from a simple random sample when computing sampling errors of estimates. The DEFF can, in some circumstances, indicate how appropriate this is and can be used to adjust these simple estimates to produce ones that are closer to the actual sampling errors of the estimates (Skinner, Holt, and Smith 1989).

For example, the design effect for a proportion can be expressed as

$$\text{DEFF} = \frac{\text{Var}_{des}(p)}{\text{Var}_{srs}(p)}$$

where

p denotes the weighted estimate of the population proportion P ,

$\text{Var}_{srs}(p)$ is the estimated simple random variance $v(p)_{srs} = \frac{p(1-p)}{n}$, and

$\text{Var}_{des}(p)$ is the variance of the complex sample calculated appropriately

In the NSAF and in most other large-scale surveys, a large number of data items or variables are collected from respondents. Each variable has its own design effect. One way to represent all of these is to compute design effects for a number of similar variables and then try to generalize about the impact of the complex sample design. The tables in appendix B enable us to do this by showing for each round of data collection the average, maximum, and minimum design effects based on more than 25 estimates of children and adults in each round. The design effects in appendix B are computed separately for estimates derived using the state- and national-level weights. Additional average design effect tables can be found in the 2002 NSAF methodology report no. 4.

In most cases, design effects for complex samples are larger than one. This is true of the NSAF, with some design effects considerably greater than one, especially those for the nation as a whole, where the average DEFF in 2002 for all children was 3.17 and 4.62 for all adults. Overall, the average DEFFs for Round 3 are similar to the corresponding DEFFs for Round 2 and are lower than those from Round 1. The most important factors that result in design effects larger than one in the NSAF include the following:

- 1) **Oversampling by study area.** The need for both study area and national estimates required oversampling to produce stable separate estimates for the 13 specified study areas. This oversampling increased the design effect for national estimates.
- 2) **Household screening.** Additional variability comes from the subsampling of households without children and those above 200 percent of the federal poverty level (FPL). The misclassification of households as above 200 percent of FPL when they actually fell below 200 percent of FPL also increases the variance of estimates restricted to persons at or below 200 percent of FPL. See Flores-Cervantes et al. (1998) for a discussion of this topic.
- 3) **Within-household subsampling.** Differential sampling rates at the person level also contribute to increases in design effects. Children and adults were subsampled within households for both the RDD and area sample components.⁷
- 4) **Differential sampling rates of Round 1 telephone numbers.** Telephone numbers from Round 1 were subsampled at different rates in Round 2, depending on result codes. This increases the design effects for Round 2 estimates somewhat but improves precision for estimates of change and reduces overall data collection costs. Telephone numbers for Round 3 were selected independent of the telephone numbers chosen in the two prior rounds of data collection.
- 5) **Clustering of households in the area sample.** For the area sample component of the survey, households were clustered within segments and segments were clustered within

⁷ Households without children and households above 200 percent of FPL were not subsampled in the area component of the study, so design effects associated with such subsampling were not incurred in the area sample but were for the RDD sample.

PSUs. Design effects increase to the extent that respondents in the same cluster are similar in their responses to survey items. Larger design effects resulting from the area sample clustering are more likely to affect low-income households because a larger percentage of low-income persons are in nontelephone households.

A final point about the DEFF tables is that in Round 1 and 2, estimates for Milwaukee and the balance of Wisconsin are shown separately. Using the variable SITE, researchers can treat Milwaukee and the balance of Wisconsin as separate study areas. Alternately, researchers can simply use the larger of the two sets of design effects shown, or employ the replicate structure of the NSAF files to calculate variances directly. In Round 3, Milwaukee cannot be treated as a separate study area since the county was not sampled.

For some files in this public use release, the average DEFTs can be used directly by calculating from the file an unbiased estimate of the simple random sampling error. Below, we have carried out an extended example in detail.

We begin by modifying a conventional 95 percent confidence interval for the population proportion P . This modification is of the form

$$p \pm 1.96(DEFT)\sqrt{(VAR_{SRS}(p))} ,$$

where p is the estimate from NSAF of the true population value P obtained by calculation of the weighted total. Because we are using a conventional 95 percent confidence interval under the assumption of normality, the confidence coefficient is 1.96. The DEFT will depend on the particular P we try to estimate.

$\sqrt{(VAR_{SRS}(p))}$ is an estimate of the standard error of p under simple random sampling (SRS). It can be useful to think of the SRS standard error as

$$\text{SRS standard error} = (\text{population standard deviation}) / (\sqrt{\text{unweighted sample size}}).$$

For a proportion, this is the familiar $v(p)_{SRS} = \frac{p(1-p)}{n}$ that was used above. Notice that for proportions, all that is needed is to properly calculate the weighted estimate p , then the SRS standard error is immediate and the adjusted confidence intervals follow readily.

Consider the following example, worked out here in detail. In particular, consider estimating the number of times children saw the doctor in the previous year, FDOCT. We first use the SAS PROC MEANS statement

```
PROC MEANS DATA=focalchd2002 VARDEF=WDF N SUMWGT MEAN VAR STD;
VAR fdoct;
WEIGHT wgfca0;
TITLE 'Doctor Visits Last Year Using (Sum of Weights) to Calculate the Variance';
```

RUN;

The result would be:

N	Sum Wgt	Mean	Variance	Std Dev
34,332	72,645,014	2.439	7.723	2.779

The simple random sampling standard error is then:

$$(\text{population standard deviation}) / (\sqrt{\text{unweighted sample size}}) = (2.779) / \sqrt{(34,332)} .$$

This calculation yields .015. Since FDOCT average = 2.439 and from appendix table B-10, DEFT = 1.73, the final confidence interval is:

$$2.439 \pm 1.96 * 1.73 * (.015)$$

or

$$2.439 \pm .051$$

It might be worth noting that our basic approach here is similar to that taken in Census Bureau publications for estimating confidence intervals for the CPS estimates.

4.3 Methods for Obtaining Correct Standard Errors

The design effect approach can be used to obtain approximate standard errors for percentages, proportions, and means. However, they cannot be used for estimates such as ratios, regression coefficients, and totals. In addition, design effects have only been provided for some specific subgroups. Finally, the average design effects shown in appendix B are based on a relatively small number of estimated variances from the survey, and these variances are also sample estimates. The particular estimates used to generate the tables in appendix B also affect the averages. The estimates used were specifically selected, and many of them are related to lower income status. Other choices of estimates would give different averages. It is recommended that researchers use the methods described in this section to obtain optimal estimates of standard errors.

The two basic methods for obtaining standard errors for NSAF estimates are replication and linearization. In replication, researchers can use the full sample weight along with the corresponding 60 replicate weights (i.e. WGFCNA0, WGFCNA1, ... WGFCNA60, for national child estimates) to obtain corrected standard errors. Alternatively, researchers can use the full sample weight along with variables that describe the structure of the replicate weights (VARUNIT and VARSTRAT) to obtain corrected standard errors using a Taylor series approximation (or other related linearization method). Users interested in using a linearization method can choose to use SUDAAN, the “SVY” commands in STATA, the “PROC SURVEYMEANS” and “PROC SURVEYREG” commands in SAS, or the “CSELECT” complex samples procedures in the SPSS complex samples module. A discussion of using these

methods to calculate standard errors is covered in chapter 4 of report no. 4 in the 2002 NSAF methodology series.⁸

4.4 Using Replicate Weights to Calculate Standard Errors

The basic idea behind replication is to draw subsamples from the sample, compute the estimate from each of the subsamples, and estimate the variance from the variability of the subsample estimates. Specifically, subsamples of the original *full* sample are selected to calculate subsample estimates of a parameter for which a *full-sample* estimate of interest has been generated. The variability of these subsample estimates around the estimate for the full sample provides an estimate of the standard error of the estimate. The subsamples are called replicates and the estimates from the subsamples are called replicate estimates. Balanced repeated replication (BRR) and jackknife replication (JRR) are two approaches to forming subsamples. Rust and Rao (1996) discuss these and other replication methods, show how the units included in the subsample can be defined using variance strata and units, and describe how these methods can be implemented using weights.

Replicate weights are created to derive the corresponding set of replicate estimates. Each replicate weight is derived using the same estimation steps as the full sample weight but using only the subsample of cases comprising each replicate. Once the replicate weights are developed, it is a straightforward matter to compute estimates of variance for sample estimates of interest. Estimates of variance take the following form:

$$v(\hat{\theta}) = c \sum_{k=1}^G (\hat{\theta}_{(k)} - \hat{\theta})^2,$$

where

- $\hat{\theta}$ is the estimate of θ based on the full sample.
- $\hat{\theta}_{(k)}$ is the k -th estimate of θ based on the observations included in the k -th replicate.
- G is the total number of replicates formed.
- c is a constant that depends on the replication method.
- $v(\hat{\theta})$ is the estimated variance of $\hat{\theta}$.

Thus, imagine using each of the 60 replicate weights, one replicate weight at a time, to obtain 60 separate weighted estimates of the same statistic, such as a mean. Take these 60 estimated means and calculate the sum of the squared deviations from the mean estimated using the full sample weight. This sum of the squared deviations from these 60 means is the estimated variance. In turn, the standard error is the square root of the estimated variance.

⁸ SUDAAN version 8 also has an option that allows the user to calculate variances using jackknife replicate weights supplied by the user. We have not tested this version of SUDAAN and cannot provide advice or guidance on using NSAF replicate weights with this package.

This logic applies to any statistic for which you wish to estimate the standard error. For example, if you wish to obtain standard errors of a regression coefficient, you would essentially estimate the same regression model 60 times, once using each of the 60 replicate weights. You would then calculate the sum of the squared deviations of the regression coefficient from the full sample estimate (and then take the square root) to get the estimated standard error of that regression coefficient. Similarly, if you are interested in calculating the standard error of the difference between two means, you would calculate the difference between those means 60 times, once using each replicate weight. You would then calculate the sum of the squared deviations from these 60 differences and take the square root of that to get the standard error of the difference.

NSAF replicate weights were created using a paired jackknife approach. Full details of creating these replicate weights are provided in report no. 4 of the 1997, 1999 and 2002 NSAF methodology series.

4.5 WesVar

WesVar⁹ is a software package developed by Westat for the personal computer (PC). WesVar uses replication methods such as the jackknife and BRR to compute variance estimates. Through the use of replicates, adjustments made during weighting (e.g., nonresponse or raking) can be taken into account by making the same adjustments to each replicate separately. Replication is computer intensive, but more powerful PCs have largely eliminated this as an issue. However, it is still possible that for very large data sets the computations will exceed the capacity of the machine or take a long time. Although replication can be used for most estimates, replication techniques are not necessarily appropriate for all sample statistics of interest. Special care is needed when trying to estimate standard errors of medians, quartiles, or other quantiles. Direct estimates of quantiles using the jackknife method are not supported, but an alternative method is supported.

WesVar is an interactive program centered on sessions called *workbooks*. A workbook is a file linked to a specific WesVar data set. In a workbook, the user can request descriptive statistics and regression models, as well as analyze and create new statistics. The information about the design is incorporated into the replicate weights when the data file is created. Regression requests support both linear and logistic regression (both dichotomous and multinomial). Outputs include statistics of interest, such as the sum of weights, means, totals, percentages, ratios, regression coefficients, and log odds-ratios, along with their corresponding standard errors, CV, and confidence intervals. Chi-square tests of independence are performed on two-way tables, and goodness of fit statistics are produced for regression models. WesVar can also estimate linear combinations of parameter estimates (e.g., differences and sums of regression coefficients) and perform hypothesis tests. Design effects can be output for all the above statistics except compiled statistics such as ratios.

When importing NSAF data into WesVar, researchers not need to create replicate weights since they have already been created. The '0' weight (e.g. WGFCNA0 on the focal child file) is the

⁹ The latest version of WesVar is version 4. An older version of WesVar that can be used to produce many estimates and standard errors (including regression and logistic regression) is freely available for download at <http://www.westat.com/wesvar/demo/index.html>.

full sample weight and the weights with names ending in 1–60 (e.g. WGFCNA1–WGFCNA60) are the replicate weights. Specify JK2 as the method of replication.

4.6 SAS and STATA Macros

The SAS macros are programs written by Urban Institute staff to enable researchers to generate accurate variance estimates from the NSAF without using additional software. By default, lower versions of SAS and other statistical packages cannot make ready use of certain complex survey designs for statistical analysis. More specifically, SAS does not have the built-in capability to properly analyze NSAF and its use of replicate weights.

Appendix D of report no. 11 in the 1999 NSAF methodology series describes the macros, their capabilities, and the syntax required to invoke the macros correctly. In the second section of appendix D, we present examples of sample programs to run the macros, and follow these examples with the output resulting from the submitted statements. The third section contains the actual macro programs. The macro programs in section 3 can be used as is, or can be modified to run other statistical tests (e.g., logistic regression). For basic questions about the macros and their use, please contact nsaf@ui.urban.org. However, please note that while these macros are being made available to external researchers as a convenience, we cannot provide support beyond general technical assistance.

Appendix E of report No. 11 in the 1999 NSAF methodology series describes macros for use in STATA. This section also reviews the commands that are currently developed and their syntax, discusses their limitations, and illustrates their structure using OLS with JRR standard errors as an example. With this example, users of the NSAF with experience programming in STATA should be able to readily extend the method to other regression commands or customize the routines described here.

4.7 Estimating Variances for Estimates of Change

Estimates of change between 1997 and 2002 and between 1999 and 2002 are important statistics that can be calculated from three rounds of the NSAF. Estimates of change, like point estimates in time, are subject to sampling error. The sampling error for estimates of change depends on the variances of the estimates for each round and on the correlation between the samples. The Round 1 and Round 2 samples were correlated because part of the Round 1 sample was retained for Round 2. However, the Round 3 telephone sample was independent of the two earlier rounds. Thus, estimates of change between 1997 and 2002 and between 1999 and 2002 are not correlated.

For point estimates, the design effect is useful for summarizing the precision of estimates of proportions and means. This representation is not as useful for estimates of change. To understand why, consider estimating a proportion in Round 3, say $\hat{\theta}_3$, and let $v(\hat{\theta}_3)$ be its estimated variance. The estimated change in the proportion between Round 1 (or 2) and Round 3 can be written as $\Delta = \hat{\theta}_1 - \hat{\theta}_3$. Since the Round 3 sample is independent of the earlier rounds, the estimated variance of the difference is

$$v(\Delta) = v(\hat{\theta}_1) + v(\hat{\theta}_3) = D_1 \frac{\hat{\theta}_1(1-\hat{\theta}_1)}{n_1} + D_3 \frac{\hat{\theta}_3(1-\hat{\theta}_3)}{n_3},$$

where the subscripts indicate the round of data collection, D is the average design effect, and n is sample size. Unless the design effects and sample sizes are constant across the rounds, the expression for the design effect for an estimated change is a function of several factors. Since the sample sizes and design effects are not constant across the three rounds of NSAF, the design effect for estimates of change is not very useful.

Despite this, estimating the variance of estimates of change between 1997 and 2002 and between 1999 and 2002 is relatively simple, because the sample for 2002 is nearly independent of the sample from the previous rounds. The sample of telephone numbers for Round 3 is completely independent of the sample of telephone numbers in the earlier rounds. For the national sample, about half of the area sample PSUs from earlier rounds were retained. Within the retained PSUs, this does not necessarily mean the same households or sampled persons within households were retained. Even though the 1997 and 1999 samples were intentionally overlapped and not independent, *1999 NSAF Variance Estimation* (report no. 4) shows the average national correlation for low-income children was 0.07. With the independent telephone sample in Round 3 and at most half the overlap in the area sample, the correlation will be much less. Given this small overlap, the effect of this dependence on the estimates of totals is so small that it can safely be ignored for variance estimation. At worst, this will slightly overestimate the variance for estimates of change, which is a conservative approach. Even estimates for small subgroups are likely to have low correlations. The state estimates for Round 3 use only the telephone sample and thus can be considered independent of the estimates from earlier rounds.

To understand the simplicity of estimating change over time from the NSAF assuming independence of the samples, consider estimating a characteristic or total at time t , say $\hat{\theta}_t$. Let $v(\hat{\theta}_t)$ be its estimated variance (the square of the standard error). The estimated change between times t_1 and t_2 for this characteristic or total is $\Delta = \hat{\theta}_{t_1} - \hat{\theta}_{t_2}$. Assuming the NSAF sample for Round 3 is independent of the samples for Rounds 1 and 2, the variance of the difference is the sum of the variances for the two time periods,

$$v(\Delta) = v(\hat{\theta}_{t_1}) + v(\hat{\theta}_{t_2}). \quad (E1)$$

The two variances on the right side of the equation can be computed separately. For example, consider estimating the change between 1997 (t_1) and 2002 (t_2). The first variance in equation (2.2) can be estimated using the variance estimation procedures described in *1997 NSAF Variance Estimation*, report no. 4 for Round 1, while the second variance can be computed using the procedures described in the 2002 NSAF variance estimation report. The estimated variance of the change can then be summed as indicated in the equation above (E1). If the change is between 1999 and 2002, the same procedures can be used, but t_1 now refers to the Round 2 estimate and its variance is computed using the variance estimation procedures described in *1999 NSAF Variance Estimation*, report no. 4 for Round 2.

This approach is not appropriate for estimating changes between 1997 and 1999 because the samples in those two rounds are not independent. In fact, the sample design for Round 2 was established deliberately to have dependent samples. With dependent samples, the variance of the estimated change has an additional component to account for the correlation in the samples. The estimated variance is

$$v(\Delta) = v(\hat{\theta}_{t_1}) + v(\hat{\theta}_{t_2}) - 2 \cdot \rho \cdot \sqrt{v(\hat{\theta}_{t_1})v(\hat{\theta}_{t_2})}, \quad (\text{E2})$$

where the last term accounts for the dependence of the two estimates. When the correlation, ρ , is large and positive, then the variance of the estimated change may be much smaller than obtained from independent samples. With independent samples, the correlation is zero, and the above equation (E2) reduces to the earlier equation (E1). Report no. 4 in the 1999 methodology series discusses this estimation problem, including the estimation of the correlation. However, as noted earlier, the 2002 sample is considered independent of the samples from the earlier rounds and equation (E2) is not necessary for estimating changes between 2002 and the earlier rounds.

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Appendix A: Sample Sizes

Table A-1. Round 1 Extended Interview Sample Sizes

State	Children		MKAs and Spouses/Partners		Childless Adults	
	All	Low-Income	All	Low-Income	All	Low-Income
Alabama	2,098	1,160	2,875	1,386	1,406	563
California	2,060	1,242	2,698	1,471	1,663	593
Florida	2,063	1,176	2,792	1,383	1,238	452
Massachusetts	2,381	1,016	3,314	1,148	2,046	492
Michigan	2,143	960	3,009	1,143	1,756	510
Minnesota	2,360	1,033	3,347	1,250	2,306	634
New Jersey	2,566	1,029	3,577	1,192	2,472	628
New York	2,252	1,230	2,959	1,395	1,379	473
Texas	2,249	1,367	3,079	1,704	1,173	417
Washington	2,469	1,174	3,465	1,443	2,412	775
Mississippi	1,984	1,219	2,612	1,392	1,431	638
Wisconsin	4,124	1,979	5,689	2,270	3,321	981
Bal. of U.S.	3,392	1,808	4,736	2,210	3,315	1,090
Colorado	2,298	1,078	3,258	1,332	2,162	675
Total	34,439	17,471	47,410	20,719	28,070	8,921

Table A-2. Round 2 Extended Interview Sample Sizes

State	Children		MKAs and Spouses/Partners		Childless Adults	
	All	Low-Income	All	Low-Income	All	Low-Income
Alabama	1,827	891	2,584	1,077	1,368	563
California	1,917	823	2,701	1,019	1,221	429
Florida	1,989	860	2,874	1,051	1,104	498
Massachusetts	2,564	773	3,784	899	1,574	400
Michigan	2,177	735	3,180	883	1,547	467
Minnesota	2,510	738	3,825	906	2,234	526
New Jersey	2,931	812	4,311	949	1,458	305
New York	2,197	966	3,038	1,121	1,124	375
Texas	2,163	1,055	3,068	1,325	664	268
Washington	2,381	822	3,439	988	1,363	364
Mississippi	1,734	927	2,328	1,049	1,186	498
Wisconsin	4,534	1,522	6,580	1,750	2,968	860
Bal. of U.S.	4,557	1,861	6,673	2,349	3,635	1,278
Colorado	2,457	830	3,643	1,041	1,214	351
Total	35,938	13,615	52,028	16,407	22,660	7,082

Table A-3. Round 3 Extended Interview Sample Sizes

State	Children		MKAs and Spouses/Partners		Childless Adults	
	All	Low-Income	All	Low-Income	All	Low-Income
Alabama	1,651	807	2,286	935	1,115	448
California	2,438	1,199	3,411	1,499	1,606	603
Florida	1,735	765	2,514	993	983	369
Massachusetts	2,041	676	2,956	788	1,313	322
Michigan	2,655	853	3,838	1,034	1,692	452
Minnesota	2,584	653	3,885	823	2,285	500
New Jersey	2,623	829	3,796	972	1,167	224
New York	1,949	778	2,742	900	1,007	351
Texas	2,054	1,022	2,909	1,278	903	354
Washington	2,262	826	3,284	1,012	1,160	340
Mississippi	1,516	816	2,083	974	962	417
Wisconsin	2,560	734	3,849	862	1,680	428
Bal. of U.S.	5,731	2,288	8,223	2,800	3,891	1,374
Colorado	2,533	784	3,775	958	1,227	368
Total	34,332	13,030	49,551	15,828	20,991	6,550

Appendix B: Design Effect Tables

The tables below present the average, minimum, and maximum design effects (DEFF) and the square root of the design effects (DEFT) for children and adults using both the national- and state-level weights across all three rounds of the survey. The DEFT is the square root of the DEFF, so it is similar to the DEFF but on the scale of the standard deviation of the estimate rather than the variance. The figures labeled DEFT shown in the tables are the average of the DEFTs across a number of estimates.

The DEFFs given in the tables are calculated as averages over a specific number of statistics. For children, 28 statistics are used to compute the average DEFFs and for adults, 20 statistics are used (see table B-13 for a list of these variables). For the appendix B series of tables, low-income is defined as less than or equal to 200 percent of FPL.

Tables B-1, B-5, and B-12 give the average DEFTs and DEFFs for children, adults, and adults in households with children by site for the three rounds at the national level. The average DEFT for children and adults living in households with children has steadily decreased since 1997 while the average DEFT for adults has fluctuated over successive rounds. Average DEFT is larger for children and adults in households with children because we sometimes sampled more than one child from the same household. This clustering effect increases the variance over what would pertain in a simple random sampling of children.

Table B-2 gives the average DEFTs for all children and for low-income children by study area in Round 1. The average DEFTs for all the study areas is generally in the range of 1.22 to 1.36, or about 22 to 36 percent above what would be found in a simple random sample of the same size. The average DEFT for the national estimate of all children is just over 2.0. For children in low-income families, the average DEFT has a larger range across the 13 study areas than for all children, at 1.32 to 1.50, or 32 to 50 percent above what would be found in a simple random sample of the same size. Additionally, the national estimate is slightly higher for low-income children at 2.24. Tables B-4 and B-10 display the average DEFTs for estimates of children in each study area for Rounds 2 and 3, respectively. The ranges of average DEFTs between all children and low-income children is much smaller in Rounds 2 and 3 than it was in Round 1. In Round 2, the average DEFT ranges from 1.25 to 1.43 for all children and 1.25 to 1.45 for low-income children. The national estimate of all children in Round 2 is 2.02, compared with 1.98 for low-income children. In Round 3, the range of average DEFTs is larger than it was for Round 2, at 1.13 to 1.33 for all children and 1.21 to 1.36 for low-income children. The national estimates, however, for children versus low-income children are almost identical, at 1.73 versus 1.70, respectively.

Tables B-3, B-7, and B-11 show the average DEFTs for estimates of all adults and low-income adults in each study area for Rounds 1, 2, and 3, respectively. The ranges of average DEFTs across all three rounds are larger than those reported for children and adults in households with children in the tables below. This is most likely because of the subsampling of households without children, which increases the variance of the estimates used to calculate DEFT. The Round 1 range of average DEFTs is 1.29 to 1.55 for all adults and 1.40 to 1.71 for low-income adults, in Round 2 the range is 1.35 to 1.80 for all adults and 1.14 to 1.79 for low-income adults, and in Round 3 the range is 1.37 to 1.70 for all adults and 1.35 to 1.65 for low-income adults.

Across the three rounds, Round 3 shows the least difference in average DEFT between all adults and low-income adults. Furthermore, the national estimate for Round 3 is similar for all adults and low-income adults at 2.06 and 2.02, respectively. The national estimates for Rounds 1 and 2 are also close, with 2.20 for all adults versus 2.26 for low-income adults in Round 1 and 2.10 for all adults versus 2.04 for low-income adults in Round 2.

Tables B-4, B-8, and B-12 show the average DEFTs for adults in households with children and low-income adults in households with children across the three rounds. The ranges of DEFTs across study areas for all three rounds are generally more similar to the ranges of DEFTs seen in the tables reporting average DEFTs for children.

The Round 1 range of average DEFTs is 1.36 to 1.57 for all adults living with children and 1.40 to 1.79 for low-income adults living with children. In Round 2, the range is 1.36 to 1.66 for all adults living with children and 1.31 to 1.57 for low-income adults living with children, and in Round 3, the range is 1.26 to 1.46 for all adults living with children and 1.26 to 1.54 for low-income adults living with children. Across the three rounds, the ranges of average DEFTs are close for both all adults living with children and low-income adults living with children.

Table B-1. Average DEFF and DEFT for Estimates from the Round 1 (1997) NSAF for All Persons and Low-Income Persons by Estimate Type, Using the National Weight

Type of Estimate	All				Low-Income			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
All Children	4.99	8.44	3.11	2.21	6.03	10.59	3.08	2.42
All Adults	5.01	7.10	2.69	2.23	5.65	9.12	3.51	2.36
Adults in HHs with Children	5.48	8.64	2.83	2.32	6.13	11.27	3.59	2.44

Table B-2. Average DEFF and DEFT for Estimates from the Round 1 (1997) NSAF Child File for All Children and Low-Income Children by State, Using the State Weight

Study Area	All Children				Low-Income Children			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	1.63	2.73	0.92	1.27	1.77	3.04	1.00	1.32
California	1.62	2.91	0.78	1.26	1.90	3.12	1.11	1.36
Colorado	1.60	2.56	0.85	1.26	1.82	2.60	0.99	1.34
Florida	1.59	2.57	0.90	1.25	1.90	3.10	0.71	1.36
Massachusetts	1.51	2.28	0.88	1.22	1.98	3.50	0.96	1.39
Michigan	1.75	2.99	1.10	1.31	1.82	3.30	0.65	1.33
Minnesota	1.55	2.30	0.85	1.24	1.91	2.82	1.06	1.37
Mississippi	1.71	2.83	0.70	1.29	1.79	2.68	0.85	1.33
New Jersey	1.61	2.52	1.02	1.26	2.25	3.54	1.03	1.49
New York	1.52	2.71	0.78	1.22	1.80	3.00	0.77	1.33
Texas	1.57	2.24	1.00	1.24	1.66	2.43	1.07	1.28
Washington	1.62	2.61	0.76	1.26	2.15	3.65	1.31	1.46
Wisconsin	1.91	3.49	0.89	1.36	2.27	3.67	1.18	1.50
Balance of nation	1.57	2.20	1.00	1.25	1.86	2.65	1.25	1.36
National	4.56	8.10	2.92	2.12	5.13	9.27	3.16	2.24

Table B-3. Average DEFF and DEFT for Estimates from the Round 1 (1997) NSAF Adult Pair File for All Adults and Low-Income Adults by State, Using the State Weight

Study Area	All Adults				Low-Income Adults			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	2.16	3.43	1.36	1.46	2.45	5.62	1.45	1.54
California	1.81	2.74	1.14	1.34	2.26	3.47	1.47	1.49
Colorado	1.88	2.80	1.05	1.36	2.14	3.20	1.45	1.45
Florida	2.44	3.66	1.64	1.55	2.99	4.81	1.67	1.71
Massachusetts	2.03	3.25	0.98	1.41	2.31	3.90	1.42	1.51
Michigan	2.13	5.51	0.97	1.43	2.51	3.96	1.23	1.57
Minnesota	1.93	3.52	1.21	1.37	2.38	3.51	1.73	1.53
Mississippi	2.22	3.25	1.45	1.48	2.39	3.99	1.24	1.53
New Jersey	2.05	4.50	1.15	1.42	2.78	3.80	1.78	1.66
New York	2.10	3.07	1.35	1.44	2.72	3.86	1.59	1.64
Texas	2.25	3.11	0.94	1.48	2.53	3.79	0.82	1.57
Washington	1.94	3.50	0.99	1.38	2.34	3.35	1.10	1.51
Wisconsin	2.06	3.38	1.20	1.42	2.45	3.96	1.32	1.55
Balance of nation	1.69	2.54	0.91	1.29	1.99	3.55	1.26	1.40
National	4.87	6.06	2.59	2.20	5.14	6.20	3.63	2.26

Table B-4. Average DEFF and DEFT for Estimates from the Round 1 (1997) NSAF Adult Pair File for All Adults and Low-Income Adults in Households with Children by State, Using the Site Weight

Study Area	All Adults				Low-Income Adults			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	1.91	2.82	0.93	1.37	2.17	3.10	1.18	1.46
California	1.97	4.11	1.21	1.39	2.24	4.39	1.33	1.48
Colorado	1.93	3.29	0.85	1.38	2.15	3.71	1.08	1.45
Florida	2.43	3.77	1.61	1.54	3.01	4.88	1.64	1.72
Massachusetts	2.01	2.89	1.11	1.41	2.44	3.67	1.35	1.55
Michigan	2.41	4.96	0.48	1.52	2.43	4.80	0.70	1.53
Minnesota	1.88	3.27	1.26	1.36	2.21	3.84	1.14	1.47
Mississippi	2.15	3.98	1.24	1.45	2.14	4.18	1.03	1.44
New Jersey	1.99	3.30	1.10	1.39	2.30	3.76	1.22	1.50
New York	2.55	4.47	1.42	1.57	2.96	5.18	1.29	1.69
Texas	1.95	3.17	0.84	1.38	2.22	3.27	0.84	1.46
Washington	2.09	3.01	0.88	1.43	2.23	3.40	1.17	1.47
Wisconsin	2.07	3.53	1.01	1.41	2.23	3.51	1.24	1.47
Balance of nation	1.69	2.53	1.10	1.29	2.00	2.97	1.14	1.40
National	4.97	7.63	2.77	2.21	5.22	8.05	3.35	2.27

Table B-5. Average DEFF and DEFT for Estimates from the Round 2 (1999) NSAF for All Persons and Low-Income Persons by Estimate Type, Using the National Weight

Type of Estimate	All				Low-Income			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
All Children	3.99	7.20	2.65	1.99	4.15	7.00	2.59	2.03
All Adults	4.39	7.35	2.39	2.06	4.25	6.24	2.63	2.05
Adults in HHs with Children	4.66	8.08	2.29	2.13	4.08	7.70	1.78	1.99

Table B-6. Average DEFF and DEFT for Estimates from the Round 2 (1999) NSAF Child File for All Children and Low Income Children by State, Using the Site Weight

Study Area	All Children				Low-Income Children			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	1.84	2.94	1.02	1.34	1.88	2.90	0.84	1.36
California	1.82	3.64	0.96	1.34	2.05	3.58	0.84	1.42
Colorado	1.72	2.56	0.84	1.30	1.82	2.77	0.88	1.34
Florida	1.83	2.96	0.88	1.34	1.93	2.86	0.82	1.38
Massachusetts	1.68	2.85	1.13	1.29	1.83	2.94	1.18	1.34
Michigan	1.96	2.96	1.15	1.39	1.79	2.41	1.12	1.33
Minnesota	1.72	2.95	1.01	1.30	1.93	3.43	1.12	1.37
Mississippi	1.59	2.91	0.74	1.25	1.60	2.67	0.92	1.25
New Jersey	1.84	2.65	1.23	1.35	1.84	2.86	0.86	1.35
New York	1.78	2.81	0.92	1.32	1.83	2.94	1.05	1.34
Texas	1.73	2.82	0.93	1.30	1.77	2.77	1.11	1.32
Washington	1.75	2.83	0.82	1.31	1.74	2.40	1.00	1.31
Wisconsin	2.07	3.42	1.15	1.43	2.15	4.46	1.06	1.45
Balance of nation	1.65	2.93	0.99	1.27	1.66	2.87	1.10	1.28
National	4.13	6.98	2.48	2.02	3.97	6.14	2.97	1.98

Table B-7. Average DEFF and DEFT for Estimates from the Round 2 (1999) NSAF Adult Pair File for All Adults and Low-Income Adults by State, Using the Site Weight

Study Area	All Adults				Low-Income Adults			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	2.26	4.34	1.13	1.48	2.56	5.62	1.31	1.58
California	1.87	3.42	1.34	1.35	1.95	2.85	1.30	1.39
Colorado	3.16	9.21	0.66	1.73	2.24	3.92	1.16	1.47
Florida	2.63	4.21	1.30	1.61	2.47	3.56	0.95	1.56
Massachusetts	2.45	4.34	1.68	1.55	2.56	3.99	1.48	1.58
Michigan	2.40	3.84	1.37	1.53	2.56	3.87	1.33	1.58
Minnesota	1.94	2.96	1.19	1.38	2.03	3.55	1.30	1.14
Mississippi	1.90	2.97	0.84	1.36	1.85	3.34	1.00	1.34
New Jersey	2.81	5.02	1.86	1.66	2.65	4.30	1.36	1.61
New York	2.40	3.70	1.50	1.54	2.37	3.64	0.73	1.52
Texas	3.34	5.86	1.51	1.80	3.35	7.15	1.41	1.79
Washington	2.36	4.00	1.34	1.52	2.18	3.19	1.15	1.46
Wisconsin	2.99	6.44	1.36	1.70	2.81	4.90	1.68	1.66
Balance of nation	1.88	3.78	1.06	1.35	1.96	2.88	1.33	1.39
National	4.57	7.94	2.45	2.10	4.19	5.83	2.65	2.04

Table B-8. Average DEFF and DEFT for Estimates from the Round 2 (1999) NSAF Adult Pair File for All Adults and Low-Income Adults in Households with Children by State, Using the State Weight

Study Area	All Adults				Low-Income Adults			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	2.05	2.86	0.97	1.42	2.05	3.22	1.31	1.42
California	1.91	3.04	0.81	1.36	1.96	3.19	0.89	1.38
Colorado	2.41	4.84	1.55	1.53	2.16	4.13	1.22	1.45
Florida	2.83	5.71	1.41	1.66	2.53	4.38	1.14	1.57
Massachusetts	1.97	4.78	0.95	1.38	2.19	5.41	0.80	1.44
Michigan	2.31	4.10	1.12	1.50	2.30	3.88	1.42	1.50
Minnesota	2.15	4.21	1.33	1.45	2.05	4.19	0.98	1.41
Mississippi	1.91	3.88	1.10	1.36	1.74	3.00	1.12	1.31
New Jersey	2.67	4.91	1.56	1.61	2.06	3.58	0.85	1.41
New York	2.70	4.63	1.99	1.63	2.33	4.86	0.92	1.50
Texas	2.51	4.28	1.01	1.56	2.42	4.12	1.36	1.53
Washington	2.15	4.18	1.20	1.45	2.06	3.07	0.85	1.42
Wisconsin	2.41	3.55	1.40	1.54	2.42	3.69	1.07	1.54
Balance of nation	2.00	3.14	1.23	1.40	1.81	2.61	0.95	1.33
National	4.82	8.10	2.50	2.17	4.02	5.48	1.92	1.98

Table B-9. Average DEFF and DEFT for Estimates from the Round 3 (2002) NSAF for All Persons and Low-Income Persons by Estimate Type, Using the National Weight

Type of Estimate	All				Low-Income			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
All Children	3.17	5.89	1.54	1.77	3.23	5.86	1.58	1.78
All Adults	4.62	7.74	2.71	2.13	4.64	7.70	2.84	2.14
Adults in HHs with Children	4.12	9.42	1.32	1.99	4.00	8.68	1.33	1.96

Table B-10. Average DEFF and DEFT for Estimates from the Round 3 (2002) NSAF Child File for All Children and Low-Income Children by State, Using the State Weight

Study Area	All Children				Low-Income Children			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	1.43	2.49	0.69	1.18	1.54	2.49	0.66	1.23
California	1.71	2.37	0.86	1.30	1.88	2.53	0.91	1.36
Colorado	1.59	2.57	1.04	1.25	1.71	2.66	0.99	1.30
Florida	1.39	2.15	0.80	1.17	1.47	2.06	0.83	1.21
Massachusetts	1.30	2.33	0.81	1.13	1.61	2.27	1.08	1.27
Michigan	1.60	2.65	1.02	1.25	1.80	2.93	1.04	1.33
Minnesota	1.45	2.29	0.89	1.19	1.82	3.37	0.95	1.33
Mississippi	1.55	2.15	0.67	1.23	1.69	2.40	0.70	1.29
New Jersey	1.55	2.21	0.85	1.24	1.70	2.56	0.74	1.30
New York	1.49	2.42	0.87	1.21	1.70	2.87	0.99	1.29
Texas	1.63	2.99	0.93	1.27	1.69	2.90	0.99	1.29
Washington	1.81	3.21	1.01	1.33	1.74	2.91	1.14	1.31
Wisconsin	1.66	2.82	0.81	1.27	1.60	2.76	0.57	1.26
Balance of nation	1.48	2.04	0.91	1.21	1.60	2.44	0.70	1.25
National	2.99	5.71	1.40	1.73	2.90	4.12	1.58	1.70

**Table B-11. Average DEFF and DEFT for Estimates from the Round 3 (2002) NSAF Adult
Pair File for All Adults and Low-Income Adults by State,
Using the State Weight**

Study Area	All Adults				Low-Income Adults			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	2.66	4.38	1.28	1.61	2.49	4.11	1.52	1.56
California	2.21	3.93	1.29	1.47	2.58	4.67	1.45	1.59
Colorado	2.95	4.51	1.54	1.70	2.73	4.39	1.31	1.63
Florida	2.51	4.09	1.34	1.57	2.73	3.92	1.87	1.64
Massachusetts	2.37	3.80	1.14	1.53	2.48	3.68	0.84	1.55
Michigan	2.04	3.57	1.46	1.42	2.15	3.30	1.28	1.45
Minnesota	1.93	3.38	0.93	1.37	1.84	2.85	1.02	1.35
Mississippi	2.02	2.73	1.37	1.41	2.20	3.09	1.47	1.48
New Jersey	2.92	4.83	1.42	1.70	2.76	3.92	1.65	1.65
New York	2.34	4.42	1.45	1.51	2.57	3.84	1.32	1.59
Texas	2.61	4.47	1.93	1.60	2.66	3.90	1.54	1.62
Washington	2.53	3.94	1.17	1.57	2.29	3.23	1.29	1.50
Wisconsin	2.15	3.62	1.20	1.45	2.09	3.43	1.27	1.43
Balance of nation	2.04	2.88	1.06	1.42	2.25	3.20	0.69	1.48
National	4.25	7.66	2.13	2.06	4.09	6.49	2.12	2.02

Table B-12. Average DEFF and DEFT for Estimates from the Round 3 (2002) NSAF Adult Pair File for All Adults and Low-Income Adults in Households with Children by State, Using the State Weight

Study Area	All Adults				Low-Income Adults			
	Average	Maximum	Minimum	DEFT	Average	Maximum	Minimum	DEFT
Alabama	1.90	4.02	1.19	1.36	1.91	3.32	1.02	1.37
California	1.74	2.53	1.07	1.31	1.78	2.64	1.22	1.33
Colorado	2.14	3.74	0.75	1.44	1.87	2.93	1.08	1.36
Florida	2.09	3.18	1.15	1.43	20.6	2.90	1.33	1.43
Massachusetts	1.62	2.70	0.91	1.26	1.89	2.64	1.04	1.37
Michigan	1.96	2.58	1.06	1.39	1.83	2.50	0.96	1.35
Minnesota	1.94	3.67	0.90	1.37	1.90	3.22	0.97	1.36
Mississippi	2.19	4.85	0.93	1.46	2.47	5.17	1.07	1.54
New Jersey	2.03	3.64	1.23	1.41	1.83	2.97	1.09	1.34
New York	1.98	3.14	1.18	1.40	1.88	3.42	1.17	1.35
Texas	2.17	3.44	1.09	1.46	2.24	3.52	1.15	1.48
Washington	2.02	3.83	1.19	1.41	2.06	3.03	1.16	1.42
Wisconsin	1.92	3.03	1.10	1.38	1.63	2.78	0.94	1.26
Balance of nation	1.95	2.97	1.10	1.38	1.97	3.11	1.22	1.39
National	3.61	5.38	1.73	1.90	3.07	4.67	1.06	1.75

Table B-13. Statistics Used to Compute Estimates of Average Design Effects

Child	Adult
JAFDCF=1 JFSTAMPF=1 KBREAK=1 KLUNCH=1 MCUTMEAL=1 MLESSRNT=1 MPAYRENT=1 MPUBHOUS=1 MTELTRAN=1 UCNGHL=1 UCURMCD=1 UCURNINS=1 UENGNeg=1 UNOCON=1 UOUTNEG=1 UREADNEG=1 USRC_NO=1 FWHDEN=1 FWHMED=1 NVOLUNT_R=1 NRELIG_R=1 UFAMSTR=2 UFAMSTR=3 UFAMSTR=4 UACTNEG=1 UAGGNeg=1 UMH2NEG=1 U_USBORN=1	JOWNCAR=1 UMARSTAT_R=1 IEMPNOW=1 U_FTPT=1 UHINS4_R=1 JFSTAMPF=1 MPAYRENT=1 MTELTRAN=1 MCUTMEAL=1 UCURMCD=1 MFDWORRY=1 UNOCON=1 U_LFSR=1 MFDLACK=1 LWHCRDT=1 MPUBHOUS=1 MLESSRNT=1 LWHTRN=1 U_USBORN=2 ITEMP=1