

1997 NSAF Sample Design

Report No. 2

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Assessing
the New
Federalism

*An Urban Institute
Program to Assess
Changing Social Policies*

NSAF Methodology

Preface

Introduction

1997 NSAF Sample Design Report is the newly-reissued second report in a series describing the methodology of the 1997 National Survey of America's Families (NSAF). It is being reissued to accompany the 1999 NSAF Report the same subject (as No. 2 in that series).

About the National Survey of America's Families (NSAF)

As discussed elsewhere (e.g., see especially Report No. 1 in the 1997 NSAF methodology series), NSAF is part of the Assessing the New Federalism Project at the Urban Institute, being done in partnership with Child Trends. Data collection for the NSAF was conducted by Westat.

In each round of NSAF, carried out so far, over 40,000 households were interviewed, yielding information on over 100,000 people. NSAF has focused on the economic, health, and social characteristics of children, adults under the age of 65, and their families. The sample is representative of the nation as a whole and of 13 states. Because of its large state sample sizes, NSAF has an unprecedented ability to measure differences between the 13 states it targeted.

About the 1997 and 1999 NSAF Methodology Series

The 1997 and 1999 methodology series of reports have been developed to provide readers with a detailed description of the methods employed to conduct the 1997 NSAF. The two series are nearly parallel, except for the documentation of the public use files, where an on-line system is being used for the 1999 survey and we are planning to reissue the 1997 files on a similar basis.

Report No 1 in the 1997 series introduces NSAF. Report Nos. 2 through 4 in both series—plus Report No. 14 in the 1997 series—describe the sample design, how survey results were estimated and how variances were calculated. Report Nos. 5 and 9 in each series describe the interviewing done in for the telephone (RDD) and in-person samples. Report Nos. 6 and 15 in the 1997 series and Report No. 6 in the 1999 series displays and discusses the comparisons we made to surveys that partially overlapped NSAF in content—including the Current Population Survey and the National Health Interview Survey, among others. Report Nos. 7 and 8 in both series cover what we know about nonresponse rates and nonresponse biases. Report No. 10 in both series covers the details of the survey processing, after the fieldwork was completed, including the imputation done for items that were missing. Report No. 11 in both series introduces the public use files made available.

In the 1997 series, there were additional reports on the public use files available in a PDF format as Report No. 13, 17-22. These will all eventually be superseded by the on-line data file codebook system that we are going to employ for the 1999 survey. The 1997 and 1999 NSAF questionnaires are available respectively as Report No. 12 in the 1997 series and Report No. 1 in the 1999 series. Report No. 16 for the 1997 series, the only report not so far mentioned contains

occasional papers of methodological interest given at professional meetings through 1999, regarding the NSAF work as it has progressed over the years since 1996 when the project began.

About this 1997 Report

Report No. 2 provides a detailed description of the 1997 NSAF sample design for both telephone and in-person interviews. Particular emphasis is given to the difficulties that arose because of the dual-frame nature of the survey. In addition, methods used to subsample low-income families are described, as are techniques used to sample children and adults within households. For information about this report, contact by e-mail BrickM1@Westat.com.

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, DC 20037, telephone: (202) 261-5886, fax: (202) 293-1918, Website: <http://newfederalism.urban.org>. For more information about this report, contact VadenkN1@Westat.com.

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CHAPTER 1 OVERVIEW

The purpose of this volume is to describe the sample design for the 1997 National Survey of America's Families (NSAF). This has already been done briefly in the first report in this methodology series. Here, the goal is to go into greater detail – sufficient to provide a full appreciation for the considerations that went into the features of this large and complex survey.

The first chapter gives an overview of the survey and introduces its two major components, the telephone and in-person surveys. Chapter 2 describes the methods used to allocate the sample to these components and how household sub-sampling was used to increase the sample size for low-income people. The next two chapters give detailed accounts of the sampling decisions made in the design of the telephone and in-person survey components, respectively. Chapter 5 presents the methods used to sample children and adults from within the sampled households. It also contains many tables on the number of sampled and interviewed persons from the survey. The final chapter describes how this report relates to other reports on this series.

1.1 The Survey

The NSAF collected information on the economic, health, and social dimensions of the well-being of children, adults under the age of 65, and their families in 13 states, Milwaukee, and the balance of the nation. The Urban Institute selected these study areas (see Figure 1-1) because they represent a broad range of fiscal capacity, child well-being and approaches to government programs. Wisconsin was targeted for particularly intensive study, with separate large samples for Milwaukee and the balance of the state. Data were also collected in the balance of the nation to permit estimates for the United States as a whole.

**Figure 1-1.
Study Areas**

Alabama	Massachusetts	New Jersey	Milwaukee County
California	Michigan	New York	Balance of Wisconsin
Colorado	Minnesota	Texas	Balance of Nation
Florida	Mississippi	Washington	

A primary goal of the survey was to obtain social and economic information about children in low-income households (with incomes below 200 percent of the poverty threshold) since the impact of New Federalism on these children was likely to be greatest. Secondary goals included obtaining similar data on children in higher income households, plus adults under age 65 (with and without children).

With few exceptions, the decision was made to limit the survey to children, adults, and families living in regular housing. Figure 1-2 explains the concept of regular housing through examples

of specific inclusions and exclusions. Although one impact of New Federalism could be the displacement of persons from regular housing, it was felt not to be feasible within the survey context to include the population that live outside of regular housing. The elderly population was also excluded. College students were enumerated at their parents' homes. Most of these inclusions and exclusions are typical of those made in other household surveys. For example, the Current Population Survey (CPS) (U.S. Bureau of the Census, 1977) has essentially the same rules. The major difference is that the CPS includes military personnel living on post with families but excludes those living in noninstitutional group quarters.

Figure 1-2.
Sampling Frame Inclusions and Exclusions

Inclusions

- Houses, apartments, and mobile homes occupied by individuals, families, multiple families, or extended families where at least one occupant is under the age of 65
- Houses, apartments, and mobile homes occupied by multiple unrelated persons, provided that the number of unrelated persons is less than nine and at least one occupant is under the age of 65
- Persons in workers' dormitories and camps
- Military personnel living on post with their families, as well as military personnel living off post with or without their families

Included Persons in Excluded Structures

- Persons living temporarily away from home were enumerated at their usual residences. This includes college students in dormitories, patients in hospitals, vacationers, business travelers, snowbirds, and so on. Structures were excluded that were expected to primarily include only such persons away from their homes

Exclusions

- The institutionalized population. Examples of institutions include prisons, jails, juvenile detention facilities, psychiatric hospitals and residential treatment programs, and nursing homes for the disabled and aged
- Non-institutional group quarters, including communes, monasteries, convents, group homes for the mentally or physically disabled, shelters, halfway houses, dormitories, and dwelling units with nine or more unrelated persons
- The homeless
- Persons in transient hotel/motel rooms, tents, recreational vehicles, trailers, and in other similar temporary arrangements
- Military barracks and ships

Figure 1-3.
Key Concepts Definition

- Household. A household includes all of the persons who normally live in the housing unit served by a residential phone. All households contacted by dialing an eligible telephone number are eligible for the screening questionnaire
- Household member. A household member is defined as a person who uses the household as his or usual place of residence. This includes persons who keep most of their belongings in the household and usually sleep there.
- Persons who are temporarily away on business, vacation or in a medical care facility are considered household members, as are students who are away at school.
- Persons who are living in the household temporarily, but who do have permanent living quarters somewhere else are not considered household members (e.g., a grand mother who is visiting for a month. Conversely, persons who are living in the household temporarily who do not have permanent living quarters elsewhere are considered household members(e.g., a son who returns home to live while searching for another apartment).
- Housing unit. A house, an apartment or other group of rooms, or a room, occupied by the household, constitutes the housing unit. A group of rooms or a single room is regarded as a *housing unit* when it is occupied as separate living quarters; that is, when the occupants do not live and eat with any other person in the structure, and when there is direct access from the outside or through a common hall. The count of households excludes persons living in group quarters, such as rooming houses, military barracks, and institutions. Inmates of institutions (mental hospitals, rest homes, correctional institutions, etc.) are not included in the survey.
- Family. For purpose of this study, “family refers to all people leaving together in a household who are related by blood adoption or marriage. Also, included as “family” is the partner, of the respondent even if they are not married. Therefore, a “family” includes “mom”, “Her daughter, Susie”, and “mom’s live in boyfriend” even if he is not the father of Susie. If the live-in boyfriend has children in the household, they are also considered part of the child’s family. Foster children are also considered family members. Other relatives of the live-in boyfriend (e.g., his sister who also lives there, would be considered members of the child’s family. Some households contain more than one family (e.g., two unrelated roommates who share an apartment) would be considered two “families” in one household).

1.2 Survey Components

There were two separate components to the survey. One was a random digit dialing (RDD) survey of households with telephones. The RDD approach was adopted because it is a cost-effective means to collect the desired data. However, because households without telephones contain a significant proportion of all low-income children, there was a supplementary area sample 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 3 years old or under have no telephone. The area sample provides data for these and other families without current phone service. A large area sample was screened to find such households. No other households were interviewed from the area sample.

This dual-frame approach is very new. Its use in 1997 on NSAF represented one of the first uses of the design on a large national survey. As a result of the newness of the procedure, there were no clear guidelines on how to design each component in order to optimize the dual-frame estimates. While it seems clear that the dual-frame approach does produce more precise estimates than a pure area-sampling approach of the same cost, and that the dual-frame approach also produces less biased estimates than a pure RDD approach of the same cost, it is not yet clear which approach strikes the optimal balance between minimizing bias and maximizing precision. Waksberg, et al. (1997) describe some of the design considerations early in the process of the survey.

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 sub-sampling of households contacted in the RDD component. With this approach, a very short 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 sub-sampled. More detailed and reliable income questions were asked of those sampled on the basis of the short question. The combination of a new dual-frame sampling approach with screener-based sub-sampling further complicated an already challenging design task. As a result, lessons were learned that will make the next dual-frame survey easier to optimize. (These issues will be discussed in the Sample Design Report for the 1999 NSAF, a forthcoming report in this series.)

Two issues are particularly salient in this regard. The first is whether the area component should cover blocks with very high telephone coverage rates as of the prior census. The decision was made for NSAF not to include these blocks in the area sample. This improved the precision per dollar of cost but “opened a window” for bias. The number of households in these blocks that did not have phone service on a particular day seven years later turned out to be higher than anticipated. This topic is discussed further in Waksberg, et al. (1998) and other reports in this series. The second matter concerns the allocation of the total sample between the RDD and area components and the use of sub-sampling based upon a short screener instrument. This is a complex problem requiring the anticipation of many factors. Some ideas on how it could be improved are discussed in this report.

Within both the RDD and the area samples, there was a decision to sub-sample household members so as to reduce the respondent burden. If there were multiple children under age 6, one was randomly selected. The same was done for children 6 to 17 years old. Data were collected about each of these sample children through the most knowledgeable adult (MKA) in the household for that child. During the MKA interview, additional data were also collected about the MKA himself or herself and about his/her spouse/partner if living in the same household. All information about the spouse/partner of the MKA was collected by proxy through the MKA. For the most part, every question that was asked about the MKA was repeated in reference to the

spouse/partner. However, some questions on health insurance and health care utilization were asked in reference to only one of the two. The target of these questions was randomly assigned to either the MKA or his/her spouse/partner in order to reduce the burden on the MKA. There were also some questions that were asked only about the MKA, related to feelings, religious activities, and opinions. These were not repeated in reference to the spouse/partner because proxy response did not seem sufficiently valid or reliable and because self-response on these few questions was operationally impractical.

Other adults in households with children were sub-sampled, as were adults in adult-only households. These rules for the sub-sampling were complex and are described in detail later. An important feature of these rules, however, is that the eligible adults were those who would not have been MKAs for other children in the household if those children had been selected. Self-response was required for sampled adults. During the interview with a sampled adult, additional data were also collected about his/her spouse/partner if living in the same household. As in the MKA interview, these data were always collected by proxy. There was never an attempt to collect data directly from the spouse of a sampled adult. As in the MKA interview, there were also some questions that were asked only about the sampled adult, related to feelings, religious activities, and opinions.

1.3 Summary

The NSAF has a very complex design. The dual-frame nature of the survey presented several nonstandard sampling problems, and these problems were compounded by the lack of accurate data to help resolve them. Despite these limitations, the sample design decisions were made in a way so that the estimates for the survey would be robust and provide a sound basis for making inferences about the population, especially the low-income population.

In the subsequent chapters of this report, the methods used to resolve the sometimes competing design requirements are described. The original plans and the modifications that had to be made during the survey itself are presented. In addition, the number of sampled and interviewed children and adults for the 1997 NSAF are tabulated.

Chapter 2

Sample Allocation and Screener Sub-sampling

One key decision that had to be made early in the sample design stage involved the allocation of the sample to the telephone and nontelephone components. The allocation required information about the number and characteristics of the population in telephone and nontelephone households and expected costs of data collection. The allocation problem was further complicated by the desire to increase the sample size of low-income people in the telephone sample by asking screening questions at the beginning of the interview with the household. The goal was to sub-sample those households that were not low-income so more resources could be devoted to interviewing low-income telephone households.

The technical details of the methods used to allocate the sample to the two components and within the telephone sample are presented in this chapter. However, the allocation was driven by the analytic requirements of the survey. We begin the chapter by discussing these analytic requirements.

2.1 Requirements

The most demanding precision requirement was to have an effective sample size of 800 low-income families with children for each study area, where low income was defined as family income below 200 percent of the poverty threshold. With this large of a sample, it was felt that a variety of statistics about this group could be estimated with adequate precision. For example, if 30 percent of low-income families with children exhibit some behavior of interest at baseline and 34.5 percent exhibit the same behavior at follow-up, and if a simple random sample of 800 is used at both points, then there is an 80 percent chance of noticing the difference and concluding that it is significant with a two-sided test with a maximum type I error of 5 percent. As described in this and later chapters, the effective sample size targets were not achieved for a variety of reasons. The result is that the estimates from the NSAF are less precise than originally planned.

In addition to the study area requirements, enough sample was desired in the balance of the nation to allow national estimates of reasonable precision. It was desired to have better reliability for the nation as a whole than for each of the 13 states. The final criterion was to plan for an effective sample size of about 1,100 families for the balance of the nation, which was projected to result in an effective sample size for the entire nation of about 5,400 families. Consideration was given to making the sample for the balance of the nation smaller, but since about one-half of the nation's children are in the balance, small reductions in this sample would have resulted in large reductions in the national effective sample size.

The sample was designed with the goal of providing the required effective sample size for low-income families with children at the lowest possible cost. There are two other national surveys with the goal of providing highly precise state estimates for a large set of states.

One is the CPS {<http://www.bls.census.gov/cps/cpsmain.htm>}. It relies on area sampling, making it very expensive. The National Immunization Survey (NIS) {<http://www.cdc.gov/nchswww/about/major/slichs/slichs.htm>} is the other survey. It relies on RDD sampling with an indirect adjustment to a less current area sample, the National Health Interview Survey (NHIS) {<http://www.cdc.gov/nchswww/about/major/nhis/nhis.htm>}. As a result, the NIS has lower cost but uncertainty about the magnitude of potential coverage biases from nontelephone households. The NHIS provides estimates of the national bias in the NIS, but there are no state-specific estimates of bias in the NIS. For NSAF, these sampling techniques were blended, trying to attain an optimal mix of cost and bias reduction

Our goal was to create a dual-frame design with area and RDD components that would provide estimates with low bias and high precision per dollar of cost. To further enhance efficiency, it was decided to use screener-based sub-sampling in the RDD component. With this approach, simple questions were asked at first contact to establish whether there were children present and the rough magnitude of the household's income. Based upon these responses, households without children and those with higher income were sub-sampled. During the extended interviews, more detailed family-specific income questions were asked. About 20 to 30 percent of families had a different classification with respect to income when classified on the basis of the extended interview instead of the screener interview (Flores-Cervantes, et al., forthcoming). Reclassifications in both directions were expected and observed. Part of this was due to asking about **household** income at the screener and **family** income at the extended interview, but part of the difference is also due to the more detailed accounting of income in the extended interview. As a result, a low-income family in a household with high screener income had a smaller probability of selection than a low-income family in a household with low screener income.

Low-income families could thus be sampled three ways: through accurate responses in the RDD household screening, through inaccurate RDD household screening responses coupled with sub-sampling, and through the area sample. It is useful to think of these three sampling mechanisms as corresponding to three latent strata as shown in Figure 2-1. The word "latent" is used because the stratum membership of most families is not observable until the extended interview is completed. This is in contrast to the situation on most surveys where the stratum membership of every unit is known prior to sampling and may thus be used in the sampling. To illustrate, note that nontelephone households are not identified until after an interviewer has knocked on the door and spoken with the occupants. Even then, the household might say they do not have a telephone and later this could turn out to be incorrect. As another example, low-income families living with wealthier relatives might be originally classified as being in a high-income household, and this would not be corrected until the extended interviews were conducted.

Figure 2-1.
Latent Strata for Low-income Families with Children

Latent Stratum	Description
1	Families with children in households with telephone service where a simple question on HH income correctly identifies the family as having income below 200 percent of the poverty threshold
2	Families with children in households with telephone service where a simple question on HH income fails to identify the family as having income below 200 percent of the poverty threshold
3	Low-income families with children in households without telephone service

The fact that the strata are latent and of uncertain size made the sample design quite difficult. If the strata could be identified in advance of screening, the formula for optimal allocation (see, e.g., Hansen, Hurwitz, and Madow (1953) p. 220) would apply:

$$n_i \propto N_i \sqrt{\frac{d_i}{c_i}}, \quad (2-1)$$

where d_i is the design effect¹ for the i -th stratum, c_i is the per unit cost of an interview with a member of the i -th stratum, N_i is the size of the stratum, and n_i is the interviewed sample size. This states that ideal sampling rates for the second and third strata are proportional to root design effects and inversely proportional to the root of costs.

However, this simple formula does not apply due to the need for screening to determine stratum membership. Screening is less costly than extended interviews, but a combination of screening and interviewing is more expensive than merely interviewing a sample of the same size. For this survey, we estimated that every screener interview that did not result in an extended interview had a cost on the order of one-fifth the cost of an extended interview. Thus, this simple formula provides poor guidance on how to optimize the design. The approach that was used in the design of the 1997 survey was to break this optimization problem into two pieces, where the allocation of the sample between the telephone and nontelephone households was optimized separately from the optimization of the sub-sampling of households that screen as not having low income.

¹ The “design effect” (Kish, 1965) is the ratio of the variance of the estimate under the actual design used to produce the estimate to the variance of the estimate assuming the same data to have come from a simple random sample. The design effect reflects the estimated variance of the survey data relative to that of a simple random sample. Design effect can vary considerably by the statistic being estimated. Design effect for multi-stage cluster samples will usually exceed 1, sometimes substantially, while for stratified simple random samples and other list samples, design effect will be near or slightly less than 1. Generally, stratification tends to reduce the design effect, and cluster sampling to increase it. Widely, variable sample weights tend to increase design effect.

This approach of optimizing the two aspects of the design separately worked fairly well, but there were some shortcomings.

2.2 Mix of Nontelephone and Telephone Households

The optimal allocation investigation was conducted separately by state. The decision of how much sample to place in stratum 3 (nontelephone households) was based on a number of factors, including optimal interviewer workloads and the need for adequate degrees of freedom for variance estimation within each study area. One factor was the estimated allocation to maximize precision for low-income families at a fixed cost. The approach also assumed that very little of the telephone sample of low-income households would come from stratum 2, so the design effect induced by undersampling in the second stratum was ignored. An alternative² that could have been used is

$$I = \frac{n_T}{n_3} = \frac{N_1 + N_2}{N_3} \sqrt{\frac{d_T c_3}{d_3 c_T}}, \quad (2-2)$$

where d_T is the design effect for the combined telephone sample from the first and second strata, n_T is the combined sample size for the two telephone strata, and c_T is a sample-size-weighted average cost per complete across the two telephone strata.

Despite the problems noted, the allocations were similar for many study areas, although there are some exceptions. The allocations for low-income households with children and for all households with children were quite different. Since there was interest in both types of statistics, there were competing "optimum" designs with no clear method for choosing between them.

2.3 Sub-sampling of Telephone Households that Screen as Not Low-income

Very early design work determined a sample size for each study area that was expected to be adequate to meet precision targets. This sample size was given in terms of interviewed households with telephones and children—without regard to income level. This early work assumed that a flat 25 percent of the households with children that screened as not having low income would be retained for full interviews. As planning progressed, data from another survey, discussed below, were obtained on the rate at which households change their reported income levels between a brief screener instrument and an extended interview. These data led to a re-evaluation of the sub-sampling strategy. As a result, the sub-sampling rate varied by state from a low of 25 percent to a high of 40 percent.

² A review of the early design work on NSAF shows that the formula used to determine this optimum had a programming error. The formula programmed to estimate the allocation for low-income households with children was $I' = \frac{n_T}{n_3} = \frac{N_1 + N_2}{N_3} \sqrt{\frac{(N_3/N)c_3}{c_T'}}$, where c_T' was a cost per complete in a telephone survey that did not employ an income screener. A similar formula was used to estimate the optimum split for all households with children. That formula did not contain the programming error, but it did omit the telephone design effect and invert the area design effect. These errors had little effect on the allocations and did not introduce any bias into the survey.

The sub-sampling rates were derived by trying to simultaneously maximize the effective sample sizes for low-income households with children and for all households with children, subject to the constraint that the total number of interviews in the study area was held equal to the agreed-upon fixed total. Maximizing both of these effective sample sizes requires good information on false negative and false positive error rates in the screening. Let ϕ be the false negative rate in the screening operation and θ be the false positive rate. This means that if there are really 100 low-income households in the screening sample, it is expected that 100ϕ of these will falsely screen as not having low income. Furthermore, if there are 1,000 households that really do not have low income, it is expected that $1,000\theta$ of these will falsely screen as having low income. Based on the Continuing Survey of Food Intake by Individuals (CSFII) {<http://www.barc.usda.gov/bhnrc/foodsurvey/home.htm>} conducted for the U.S. Department of Agriculture (USDA) in 1994 and 1995, the false negative rate was projected to be $\phi=15$ percent, and the false positive rate was projected to be $\theta=3$ percent. There were a number of differences between the CSFII and the NSAF, including a threshold for low income at 130 percent of poverty rather than 200 percent of poverty, but these were the only data available at the time.

If p is the poverty rate as measured using the extended interviews, then the screener poverty rate can be shown to be

$$p' = q(1-p) + (1-j)p. \quad (2-3)$$

Let f_2 be the sampling fraction for households that screen as not having low income. Then the effective sample size for low-income telephone households with children can be shown to be

$$\frac{n_1 + n_2}{d_T} = \frac{n_1 \left(1 + \frac{j}{1-j} f_2 \right)}{[1-j + j f_2][1-j + j / f_2]} \quad (2-4)$$

and the effective total sample size for all telephone households with children can be shown to be

$$\frac{\frac{n_1}{(1-j)p} [p' + (1-p')f_2]}{[p' + (1-p')f_2][p' + (1-p')/f_2]} = \frac{\frac{n_1}{(1-j)p}}{[p' + (1-p')/f_2]}. \quad (2-5)$$

These calculations were carried out for various values of f_2 and n_1 such that the total number of interviews was unchanged. The results were then inspected. Values for f_2 and n_1 were then chosen that gave reasonable values for both effective sample sizes.

Two recent observations indicate that higher values of f_2 combined with lower values of n_1 might give superior precision for the same total cost. The first is that these formulae do not account for the cost of screening. By holding the total number of interviews constant rather than total cost, the allocation favors stratum 1. The second observation is that the false positive and negative rates are both higher than projected (see Flores-Cervantes, et al., forthcoming). As a

result, sub-sampling rates of 50 percent or even higher might have been better in most of the states. As with the allocation between the telephone and nontelephone populations, the allocation of the sample between the first two latent strata does not introduce any biases in the estimates—it just means that confidence intervals may be a little wider than they might have been with a different sample allocation.

2.4 Three-way Allocations

Table 2-1 shows the final allocations and resulting projected effective sample sizes for low-income households with children.³ The effective sample sizes were calculated with the formula

$$n' = \frac{1}{\sum \frac{(N_i / N)^2}{n_i / d_i}}, \quad (2-6)$$

where the design effects for the two telephone strata are equal to one, and the projected population proportions are shown in Table 2-2. The projections in Table 2-2 were constructed by using the 1990 Decennial Census to estimate, for each site, the prevalence of low-income households with children and the proportion of these that do not have telephone service and by using the CFSII to estimate national false positive and negative error rates in the screening.

³ The procedures for setting initial sample sizes in order to achieve these numbers of completed interviews are described in Chapter 3 for the RDD sample and in Chapter 4 for the area sample.

Table 2-1.
Projected Numbers of Completed Interviews with Low-income Households
with Children by State and Stratum

State/Area	Interviews with Low-income Households Containing Children			Total	Resulting Effective Sample Size
	Telephone with Income Screening that is		Non-Telephone		
	Correct	Incorrect			
Alabama	869	61	151	1,081	800
California	884	52	48	984	804
Colorado	933	55	54	1,042	799
Florida	947	56	81	1,084	799
Massachusetts	965	49	39	1,053	793
Michigan	929	55	63	1,047	794
Minnesota	958	48	32	1,038	796
Mississippi	926	66	206	1,197	829
New Jersey	1,023	45	77	1,145	784
New York	915	54	94	1,063	793
Texas	1,044	62	146	1,251	805
Washington	930	55	40	1,025	793
Milwaukee	952	48	40	1,040	790
Bal., Wisconsin	960	48	40	1,048	795
Bal., U.S.	1,333	78	143	1,554	1,130
Total	14,568	832	1,254	16654	N/A

* During the design stage, no effective sample size target was set for the national estimate.

NOTE: All numbers in this table were projected prior to the beginning of interviewing. See tables in Chapter 5 for actual interviewed sample sizes.

Table 2-2.
Projected Distribution of Low-income Households with Children
by State and Stratum

State/Area	Low-income Households Containing Children			
	Telephone with Income Screening that is		Non-Telephone	Total
	Correct	Incorrect		
Alabama	65.9%	11.6%	22.5%	100.0%
California	77.4%	13.7%	8.9%	100.0%
Colorado	75.0%	13.2%	11.7%	100.0%
Florida	71.4%	12.6%	16.0%	100.0%
Massachusetts	77.1%	13.6%	9.3%	100.0%
Michigan	74.0%	13.1%	13.0%	100.0%
Minnesota	78.4%	13.8%	7.7%	100.0%
Mississippi	63.0%	11.1%	25.9%	100.0%
New Jersey	71.9%	12.7%	15.5%	100.0%
New York	70.8%	12.5%	16.7%	100.0%
Texas	65.3%	11.5%	23.2%	100.0%
Washington	76.6%	13.5%	9.9%	100.0%
Milwaukee	77.2%	13.6%	9.2%	100.0%
Bal., Wisconsin	77.2%	13.6%	9.2%	100.0%
Bal., U.S.	69.2%	12.2%	18.5%	100.0%
Total	71.1%	12.6%	16.3%	100.0%

NOTE: All numbers in this table were projected prior to the beginning of interviewing. See tables in Chapter 5 for actual interviewed sample sizes.

It is important to note that actual nominal and effective sample sizes realized in the survey are different than those shown in Table 2-1. The projections in Table 2-1 were subject to many sources of error including prediction error on screener income misclassification rates, prediction error on telephone coverage rates, prediction error on components of variance, prediction error on stratum-specific variances, prediction error on response rates and eligibility rates, and sampling error. Chapter 5 contains actual nominal sample sizes. Actual effective sample sizes for some statistics are given in Variance Estimation Report number 4 in the 19997 NSAF Methodology Series.

Table 2-3 shows the relative sampling fractions by stratum for each state. A relative sampling fraction of 1.0 means that the indicated stratum was associated with the smallest sampling fraction. In every site (other than Washington State where the nontelephone sampling fraction was slightly lower), the plan was to sample children in low-income families at the lowest rate if they lived in a telephone households that did not report low income on the screener. It was generally planned to sample children in low-income families at rates 15 to 40 percent higher if they lived in nontelephone households than in misclassified telephone households. The highest sampling rates were planned for children in low-income families if they lived in telephone

households that reported low income on the screener. The rates for these children were 2.5 to 4 times greater than in misclassified households.

Table 2-3.
Projected Relative Sampling Fractions for Low-income Households with Children by State and Stratum

State/Area	Relative Sampling Rates		
	Telephone Screened Correctly	Telephone Screened Incorrectly	Non-Telephone
Alabama	2.51	1.00	1.28
California	3.00	1.00	1.41
Colorado	2.99	1.00	1.11
Florida	2.98	1.00	1.14
Massachusetts	3.48	1.00	1.17
Michigan	2.98	1.00	1.15
Minnesota	3.52	1.00	1.19
Mississippi	2.51	1.00	1.36
New Jersey	4.01	1.00	1.40
New York	2.99	1.00	1.30
Texas	3.02	1.00	1.19
Washington	3.00	1.01	1.00
Milwaukee	3.50	1.00	1.23
Bal., Wisconsin.	3.53	1.00	1.23
Bal., U.S.	3.02	1.00	1.21
Total	3.10	1.00	1.16

NOTE: All numbers in this table were projected prior to the beginning of interviewing. See tables in Chapter 5 for actual interviewed sample sizes.

As mentioned in Chapter 1, low-income households with children were not the only households of interest, but obtaining adequate numbers of them drove the overall size of the screening samples for the RDD and area surveys. In the RDD survey, other households were sub-sampled provided they contained at least one member under age 65. The details on the sub-sampling are in Chapter 3. In the area survey, all screened households with someone under the age of 65 and without current phone service were retained in the sample for extended interviews, as explained in Chapter 4. For both surveys, the initial sample sizes had to be considerably larger to allow for nonresponse and various forms of ineligibility. Again, the details of determining designated sample sizes are in Chapters 3 and 4.

Chapter 3

Telephone Survey

This chapter discusses the basic RDD sampling methodology, the calculation of the anticipated initial sample sizes required to meet the objectives given in the previous chapter, the use of advance screening, and sub-sampling of households that did not report low income or did not contain children.

3.1 RDD Methodology

A list-assisted RDD sample method was used to select a sample of telephone households that were screened to identify low-income households with children and other households of interest. List-assisted sampling was made possible by recent technological developments (Casady and Lepkowski (1993)). In list-assisted sampling, the set of all telephone numbers in operating telephone exchanges is considered as composed of 100-banks. Each 100-bank contains the 100 telephone numbers with the same first eight digits (i.e., the identical area code, telephone exchange, and first two of the last four digits of the telephone number). All 100-banks with at least one residential number listed in a published telephone directory are identified. The sampling frame is restricted to these 100-banks. A simple random or a systematic sample of telephone numbers is selected from this frame.

This method of RDD sampling is now the standard choice. It results in an unclustered sample that can be released to interviewers all at once. These are both important features not shared by the Mitofsky-Waksberg method that used to be the standard RDD sampling technique (Brick and Waksberg (1991)). Furthermore, the working residential rate among sampled numbers (critically important in determining the cost of an RDD sample) is comparable to the Mitofsky-Waksberg technique. The only disadvantage is a small amount of undercoverage. Studies have been carried out on the potential losses and the undercoverage is estimated to be only about 2 to 4 percent. Furthermore, the households that are excluded do not appear to be very different from those included in the frame (Brick, et al., 1995; Giesbrecht, et al., 1996).

To further improve the working residential rate and thereby reduce costs, two additional operations were conducted prior to turning the sampled numbers over to interviewers for screening. The first was to eliminate all numbers listed only in the yellow pages. The second method was to use a computer system that dials numbers to eliminate many nonworking numbers. This device can detect the tritone signal for a nonworking number very quickly. Usually, there is no audible ring of any phone at a number that is tested. These two methods combined have been observed on other studies to reduce the number of telephone numbers that need to be dialed by about 18 percent, bringing the percentage of sampled numbers that are residential to over 60 percent.

The numbers remaining after the tritone and yellow page purges were called by interviewers to determine working residential numbers. When a residential telephone number was reached, the first step was to determine the age composition and income for the household. Low-income households with children were, of course, retained with certainty. Households containing only

persons 65 years old or over were dropped. Other households were sub-sampled, as is discussed in Section 3.3.

Early in the planning of the sample design, the possibility of reducing the amount of screening by defining and oversampling low-income geographic areas for the RDD component was considered but rejected. An analysis of the 1990 Census distribution of low-income families among block groups (Waksberg, Judkins, and Massey, 1997) indicated that such oversampling in area samples was not useful and would be counterproductive in most surveys. It appeared clear that there is even less reason for such an approach in an RDD survey because the units that can be identified in an RDD sample are more heterogeneous than those in an area sample.

3.2 Projection of Initial Sample Sizes

The decision of how large to make the initial sample of telephone numbers was guided by the precision requirements for low-income households with children. As discussed in Chapter 2, goals were set for the states of how many low-income households with children would be interviewed. These goals were broken down by whether the household screens correctly on the simple screener income question. Nationally, the goal was to interview 15,400 low-income households with children. This was to be accomplished by interviewing 15,700 households with children where low income is reported on the screener and another 12,100 households with children where income above 200 percent of the poverty threshold is reported on the screener. Out of this total of 27,800 interviewed households with children, it was projected on the basis of CSFII data that 14,600 of those that screened as low income would continue to report low income on the extended interview and that about 800 of those that screened as having higher income on the screener would switch their reported income on the extended interview to low, thereby giving the desired total of 15,400 low-income households with children. (See Table 2-1.) Any sample large enough to meet this requirement by state would also meet requirements for other groups such as higher income children and adults. In order to project the required initial sample size by state, it was necessary to make projections of how many of the numbers would not yield interviews with low-income households containing children. There were a number of components in this projection involving:

- Nonworking or nonresidential numbers
- Nonresponse to screening interview
- Presence of children
- Low-income reporting
- Nonresponse to extended interview

Data from the 1996 National Household Education Survey (NHES:1996) {<http://nces.ed.gov/nhes/>} were used to project the working residential rates for sampled numbers and the screener response rates, all by state. Data from the 1990 Decennial Census were used to estimate the number of low-income telephone households with children in each state. Data from the CSFII were used to project the rate at which low-income households would

misclassify themselves on a simple screener question. General experience led to a projection of an 85 percent response rate on the extended interview. The calculations are shown in Table 3-1. These projections led to an initial sample size of about 466,000 phone numbers. Out of these, it was projected that interviewers would speak with household members at about 179,000 households in order to find around 18,000 that have children and have income below 200 percent of the poverty threshold. Allowance was made for finding some of these in the group that reports low income on the simple screener question and for finding more during the extended interview. Finally, it was assumed that extended interviews could be obtained in 85 percent of the low-income households with children, yielding the required total of 15,400 interviewed low-income households with children. That works out to about 30 phone numbers that had to be sampled for every desired extended interview with a low-income household containing children.

It was realized at the time of the projections that there were many sources for possible prediction error. Accordingly, it was decided to create a reserve sample equal to 50 percent of the projected need for phone numbers in each site and to split the entire main and reserve sample into subsamples for a phased release. A "predictor" sample was designated for each site. The predictor sample was given highest priority for interviewing. The initial plan was to use the predictor sample to fine tune the sample size for each state. However, as the interviewing progressed on the predictor and main samples, the decision was made not to release any of the reserve sample even though there was a sample shortfall. This decision was based on an analysis that determined it was more cost effective to increase the area samples than to release any of the RDD reserves. This is discussed further in Chapter 4.

**Table 3-1.
Projected Sample Size Requirements**

State/Area	Total Raw Phone Numbers	Residential Rate*(%)	Working Residential Numbers [†]	Screener Response Rate [‡] (%)	Screened House-Holds	Percentage with Children, Low Income on Extended and Screener Income of:		Retention Rate for Households Above 200% of Poverty	House-holds with Children and Low Income on Extended Interview	Extended Interview Response Rate	Interviewed Households with Children and Low Income on Extended Interview
						Low	Not Low [§]				
Alabama	19,335	53.5	10,344	80.0	8,275	12.35	2.18	1/2.5	1,094	85	930
California	26,398	48.3	12,750	72.0	9,180	11.33	2.00	1/3	1,102	85	936
Colorado	31,673	47.5	15,045	74.0	11,133	9.86	1.74	1/3	1,162	85	988
Florida	32,470	49.8	16,170	75.0	12,128	9.19	1.62	1/3	1,180	85	1,003
Massachusetts	43,498	53.8	23,402	72.0	16,850	6.74	1.19	1/3.5	1,193	85	1,014
Michigan	28,047	50.4	14,135	76.0	10,743	10.18	1.80	1/3	1,158	85	984
Minnesota	30,669	53.6	16,439	80.0	13,151	8.57	1.51	1/3.5	1,184	85	1,006
Mississippi	15,804	52.7	8,329	80.0	6,663	16.36	2.89	1/2.5	1,167	85	992
New Jersey	51,272	52.5	26,918	72.0	19,381	6.21	1.10	1/4	1,256	85	1,068
New York	32,508	51.3	16,676	72.0	12,007	8.96	1.58	1/3	1,140	85	969
Texas	25,630	48.5	12,430	76.0	9,447	13.00	2.29	1/3	1,301	85	1,106
Washington	30,380	49.0	14,886	76.0	11,314	9.67	1.71	1/3	1,158	85	985
Milwaukee	28,844	51.6	14,884	80.0	11,907	9.40	1.66	1/3.5	1,176	85	1,000
Bal., Wisc.	29,508	51.6	15,226	80.0	12,181	9.27	1.64	1/3.5	1,186	85	1,008
Bal., U.S.	39,746	49.6	19,714	76.0	14,982	10.47	1.85	1/3	1,660	85	1,411
Total	465,782	51.0	237,348	75.6	179,342				18,117		15,400

* Based on NHES:1996.

[†] Includes expected no answers and answering machines.

[‡] Based on NHES:1996 with adjustment for screener differences.

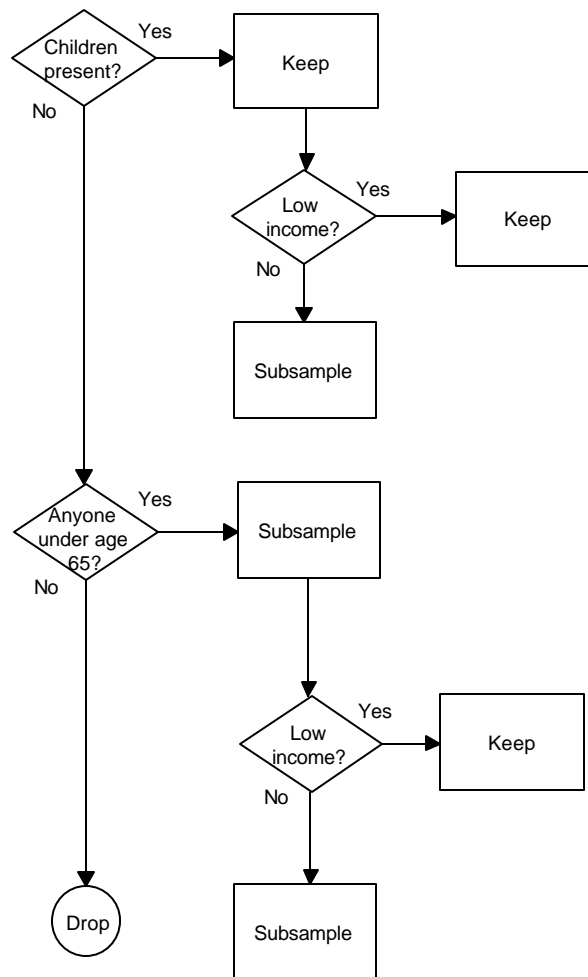
[§] Based on CSFII experience, it was assumed that 15 percent of true low-income households would report income above the threshold on a simple screener question.

[¶] Prior to cancellation of separate samples for Pennsylvania and Ohio and the subsequent increase in sample for the balance of the nation.

3.3 Sub-sampling Households

Households with children under 18 and incomes below 200 percent of poverty were retained with certainty. Households with all members 65 and older were never retained. All other households were sub-sampled. There were two distinct sub-sampling steps. The first was to sub-sample households with no children. The second was to sub-sample households with income above 200 percent of poverty or those not responding to the income screener question—both those with children and those without children. There were thus four household sampling strata with different sub-sampling fractions. This is illustrated in Figure 3-1. The two sub-sampling steps are discussed in more detail below. Also, there was a lag between screening and extended interviews for part of the sample. This is discussed in the third subsection. Finally, some of the sub-sampled households were reinstated due to sample shortfalls. This is discussed in the fourth subsection.

Figure 3-1.
Household Sub-sampling Operations



3.3.1 Sub-sampling Adult-only Households

The sub-sampling of adult-only households was designed in conjunction with rules for sub-sampling persons within households with children to provide estimates for adults under age 65. For reasons related to earlier design discussions, the MKAs and their spouse/partners are called “Option A” adults. Other adults are called “Option B” adults. “Option B” adults who live in households with children are called “Option B stragglers.” Statistics about nonelderly adults are formed using data from the “Option A” interviews about the MKAs and their spouses and using data from the “Option B” interviews about all other adults under age 65.¹ The group of all other adults under age 65 consists of nonelderly adults in adult-only households and some of the nonelderly adults in households with children. In the households with children, a nonelderly adult was eligible for separate sampling if he or she did not have any children under age 18 living in the household and if he or she had not already been identified as the MKA for a focal child or as the spouse/partner of an MKA.²

Precision targets for adults were set for the combined group of “Option B” adults and “Option B” stragglers. Generally speaking, it was desired to have an effective sample of about 500 low-income “Option B” adults and stragglers per state and an effective sample size per state for all “Option B” adults and stragglers of about 800. These targets included the contribution from both the telephone and in-person interviews. Here it is important to note that both targets assumed that adults would be sub-sampled within all sub-sampled households as discussed in Chapter 5. Furthermore, even though data would be collected on spouse/partners of sampled adults who live together, spouses/partners would not count toward the targets of 500 low-income “Option B” adults and 800 total “Option B” adults. It was anticipated that once the data on “Option B” adults were combined with data on their spouses/partners and with data on MKAs for sample children and the spouses/partners of MKAs, the effective sample sizes would be about 1,200 low-income adults under age 65 per state and about 2,500 total adults under age 65 per state.

Given projections of adult yields from the area sample, low-income household yields from the RDD sample, and effects of within-household sub-sampling of “Option B” adults, recommended retention rates for adult-only households in the RDD sample were developed. These are shown in Table 3-2. These state-specific retention rates ranged from 43 percent to 53 percent; the retention rate for the balance of the United States was 60 percent. The sub-sampling was implemented as follows: (1) The retention rate table was loaded into the CATI system; (2) each telephone number was flagged as either a “child only” household or as a “child and adult” household when it was first delivered to an interviewer; and (3) the designation never changed once assigned. Households flagged as “child and adult” became the “adult-only” households if there were not children under age 18 present and at least one person under the age 65.

¹ Option A interviews were administered to the MKA about the focal child(ren). It also obtained income, earnings, health insurance, and other information about the MKA and his/her spouse/partner. The “Option B” interview obtained the same information about the sample adult and his/her spouse/partner as obtained by the “Option A” interview—only questions about children were missing from the “Option B” version of the questionnaire. The questionnaire versions are described in report 12 (forthcoming) of this series.

² The fact that this definition depends on the outcome of child selection is not ideal. It resulted in multiple chances of selection for people who are MKAs for children who are not their own. It also resulted in multiple chances of selection for partners of parents with children under age 18 in the household. However, the alternative of determining the MKA and spouse/partner for every nonsample child was not operationally feasible within the constraints of the survey.

As interviewing progressed, it became apparent that the retention rates for adult-only households were set too low in some of the states. Once this was noticed, some of the retention rates were revised upward. This was done by assigning the "child and adult" label more frequently on subsequent releases of phone numbers. The second column of Table 3-2 shows the sub-sampling rates that were being applied by the end of the survey. Average actual retention rates are shown in Chapter 5 by study area. When interviewing was nearly completed, it was found that, despite the revisions in sub-sampling rates, the number of extended interviews in low-income households without children was significantly less than planned in some states. A supplementary sample to address this problem is discussed in Section 3.3.4.

Table 3-2.
Proportions of original Households without Children Retained for Sample

State/Area	Initial Proportion	Final Proportion
Alabama	.49	.49
California	.53	1.00
Colorado	.57	.70
Florida	.39	.39
Massachusetts	.43	.43
Michigan	.50	.50
Minnesota	.48	1.00
Mississippi	.54	.53
New Jersey	.50	.49
New York	.44	.44
Texas	.47	.47
Washington	.46	1.00
Milwaukee	.49	.48
Wisconsin	.51	.80
Bal., U.S.	.60	.60

3.3.2 Sub-sampling Households with Incomes Above 200 Percent of the Poverty Threshold

In households with children and in sub-sampled adult-only households, a simple question on household income was asked. Households reporting income above 200 percent of poverty were then sub-sampled. The same sub-sampling rates were used whether or not there were children present. The income levels for determining 200 percent of poverty are shown in Table 3-3. Operationally, after the question on the presence of children, the interviewer simply asked whether household income was above or below that figure. Based upon the response to this question, the household was either retained with certainty or sub-sampled.

Table 3-3.
Income Levels for Determining Less Than 200 Percent Poverty Level

Household Size by Person	Without Children	With Children
1	16,000	16,000*
2	21,000	22,000
3	25,000	25,000
4	32,000	32,000
5	39,000	38,000
6	45,000	43,000
7	52,000	49,000
8	58,000	54,000
9+	70,000	65,000

* This type of household can occur only if an emancipated minor is living alone.

As discussed in Chapter 2, based on experience from CFSII, it was expected that about 15 percent of the low-income population would mistakenly classify itself as high income in response to the simple screener question. Sub-sampling these misclassified households introduces an additional design effect on telephone low-income households with children at the same time that it reduces costs for extended interviews. The design effect may be written as

$$d_t = ((1-j) + j f_2) / ((1-j) + j / f_2),$$

where ϕ is the proportion of low-income households with children that are misclassified on the screener question as having higher income, and f_2 is the retention rate for the households that screen as not having low income. Also, reverse misclassifications were expected. Based again upon CSFII, it was expected that about 3 percent of the higher income population would mistakenly classify itself as low income in response to the simple screener question. This type of misclassification does not affect the design effect for low-income statistics, but does reduce the nominal sample size directly. Thus, both types of misclassification reduce the effective sample size for low-income households as discussed in Chapter 2. The value of f_2 was selected for each state by analyzing the impact of several trial values from the set $\{1/4, 1/3.5, 1/3, 1/2.5\}$. Preliminary work had already fixed the total number of interviews with low-income household with children that would be interviewed in each state. The only open question was how many of these interviews should be with households that screen correctly and how many with those that do not screen correctly. Holding the total number of interviews constant while varying f_2 results in changes in the total size of the screened RDD sample, the effective sample size for all households with children and the effective sample size for just low-income households with children. These projections were then reviewed to pick a value of f_2 . As discussed in Chapter 2, this procedure did not consider the costs of the screening. As a result, the selected values of f_2 are probably smaller than the optimal values. The values ranged from 0.25 to 0.4, with most resting at $f_2=1/3$. The selected values of f_2 are shown in Table 3-4.

About 5 percent of households did not indicate in screener interviews whether they are above or below the low-income threshold. These were also sub-sampled but at higher rates than those with reported income above the threshold (see Table 3-4). The resulting expected sample sizes are shown in Table 3-5. Note that Table 3-5 also shows how the incomes are expected to be reclassified after the income questions in the extended interview.

Table 3-4.
Sub-sampling Rates for Higher Income and Unknown Income Households

State/Area	Proportion Retained for Sample*	
	Income > 200% of Poverty	Unknown Income
Alabama	.40	.57
California	.33	.50
Colorado	.33	.50
Florida	.33	.50
Massachusetts	.29	.44
Michigan	.33	.50
Minnesota	.29	.44
Mississippi	.40	.57
New Jersey	.25	.40
New York	.33	.50
Texas	.33	.50
Washington	.33	.50
Milwaukee	.29	.44
Bal., Wisconsin	.29	.44
Bal., U.S.	.33	.50

*This is a proportion of those asked the income question. The same rates were used for households with and without children. However, since the adult-only households had been previously sub-sampled, the overall retention rates for low-income adult-only households are lower than shown here.

These projections were prepared by calculating the switching rates for households that do and do not report low income on the screener. Note that the switching rates are functions of the false negative and false positive error rates but are distinct from them. The switching rate from low income to high income is

$$S_{\ell \rightarrow h} = \frac{q(1-p)}{p'}$$

where θ is the proportion of high-income households with children that are misclassified on the screener question as being low-income. The switching rate from high income to low income is

$$S_{h \rightarrow \ell} = \frac{jp}{1 - p'}$$

where p is the proportion low income according to the extended interview and p' is the proportion classified as low income in the screening. For example, if $p = 38.9$ percent, then the two switching rates become $S_{\ell \rightarrow h} = 5.0\%$ and $S_{h \rightarrow \ell} = 9.0\%$.

Table 3-5.
Projected Nominal Sample Sizes for Households with Children
for the RDD Component by Household Income

State/Area	Sampled As		Whereas Actually		Total
	Low Income	Higher Income	Low Income	Higher Income	
Alabama	917	683	930	670	1,600
California	941	659	936	664	1,600
Colorado	1,002	798	988	812	1,800
Florida	1,006	694	1,003	697	1,700
Massachusetts	1,071	1,029	1,014	1,086	2,100
Michigan	999	801	984	816	1,800
Minnesota	1,045	855	1,006	894	1,900
Mississippi	963	537	992	508	1,500
New Jersey	1,158	1,142	1,068	1,232	2,300
New York	986	814	969	831	1,800
Texas	1,103	697	1,106	694	1,800
Washington	999	801	985	815	1,800
Milwaukee	1,030	770	1,000	800	1,800
Bal., Wisconsin	1,037	763	1,008	792	1,800
Bal., U.S.*	1,425	1,075	1,411	1,089	2,500
Total	15,682	12,118	15,400	12,400	27,800

* Prior to the cancellation of the separate samples for Ohio and Pennsylvania and the subsequent boost in the sample size for the balance of the nation.

3.3.3 Prescreening

Working about 500,000 phone numbers and completing so many interviews with people in those households, the NSAF is one of the largest household surveys conducted by telephone. The plans were to begin detailed interviewing no earlier than February 15, 1997, and to complete all interviewing by June 1997 since this would permit respondents to provide reasonably accurate information about 1996 income. Since this was a very short interval for such a heavy workload, it was decided to begin "prescreening" telephone numbers in January. Thus, prior to mid-February, a telephone prescreening operation was begun to eliminate business numbers,

nonworking numbers, and households without persons under 65³ and also to select a preliminary sample of children and adults. During this prescreening operation (referred to as Version 1 screening), low-income households with children were retained, and the remaining eligible households were sub-sampled according to the procedures described in subsection 3.3.1 and 3.3.2. Roster information was collected in prescreened households and used to select a sample of persons as described in Chapter 5. Beginning in mid-February, the retained telephone numbers were called to verify the screening information and to conduct the detailed, extended interviews. A key component of the verification was to confirm the household roster. If there was any change in the household roster, then the within-household sampling was rerun. This was done to ensure a positive probability of selection for new household members such as newborns, children being passed between separated and divorced parents, and new spouses/live-in friends.

In mid-February, the Version 1 screening was stopped, and Version 2 screening began. During this operation, the remaining telephone numbers were asked both the screening and extended questions within the same contact, when possible. Version 1 screening was helpful in reducing the peak load on the telephone interviewing operation. The only disadvantage of the procedure is that it probably led to some undercoverage of children who live with their grandparents since the elderly household respondents may not have been able to always accurately predict that their grandchildren would be coming to live with them. There are no data on how often this occurred, but it seems reasonable to suppose that it must have happened at least occasionally.

3.3.4 Reinstatement of Sub-sampled Adult-only Households

As discussed in 3.3.1, retention rates for adult-only households were revised during the field period. However, there were still shortfalls in some states, particularly in the category of low-income adults. As a result, it was decided to call back some of the adult-only households that had been previously sub-sampled out. This was done in the four areas with the largest shortfall of low-income adults. A total of 7,295 adult-only households were recontacted⁴ in Massachusetts, Michigan, New Jersey, and the balance of the nation. These callbacks included adult-only households of all income levels since household income had not been determined for these households during screening. Part of the call-back procedure was to screen for low income. Households that were not in the low-income category were sub-sampled using the same rates as discussed in section 3.3.2.

3.4 Achieved Response and Eligibility Rates

Table 3-6 shows the outcomes of the RDD screening process. The total number of released phone numbers was 483,260, about 4 percent higher than projected. This increase was partially due to rounding the sample sizes up to the next whole thousand (or in some cases to the next even thousand) and due to the late cancellation of the Ohio and Pennsylvania state samples. This

³ Respondents in such households were asked if children under 18 or adults under age 65 were expected to move into the household, in which case the household was retained for the final screening operation in February.

⁴ This step was not needed for Colorado Survey, since it started later than the rest.

cancellation resulted in an increase of about 2,200 telephone numbers in the balance of the nation (comparing Table 3-6 and 3-1).

About 48 percent of the sample phone numbers were determined to be nonworking or nonresidential. Another 5 percent were never resolved despite the use of up to 14 attempts to reach someone at the number. Among those numbers that were known to be residential, the unweighted screener response rate was 79 percent. To compute a single overall response rate on the screener, it was assumed that 27 percent of the never-answered phones were residential and that 63 percent of those with answering machines were residential. These rates were based on experiments done in the NHES and NIS for these types of telephone numbers (Brick and Broene, 1997; Shapiro, et al., 1995). These assumptions lead to an overall screener response rate of 76 percent. This approach is consistent with the guidelines presented in CASRO (1982). A full discussion of response rates is given in the Response Rates and Methods Evaluation Report number 8 in the 1997 NSAF Methodology Series. The screening yield of 37 percent (the percentage of sampled numbers that yield a complete screening interview) was slightly lower than the forecast 38 percent, probably due to a lower-than-expected residency rate.

**Table 3-6.
Screening for Residential Status and Presence of Children**

State/Area	Released Sample	Verified Nonworking or Nonresidential*		No Contact (After 14 Calls)	Only Answering Machine Contacts	Known Residential	Known + Imputed Residential [†]	Residential Rate [‡]	Complete Age Screening	Screener Response Rate [§]
		Number	Rate							
Alabama	20,000	8,962	44.8%	702	92	10,244	10,492	52.5	8,828	84.1%
California	27,000	12,965	48.0%	1,784	279	11,972	12,629	46.8	8,983	71.1%
Colorado	33,270	16,458	49.5%	1,712	344	14,756	15,435	46.4	11,724	76.0%
Florida	34,000	16,503	48.5%	1,765	334	15,398	16,085	47.3	12,093	75.2%
Massachusetts	44,000	19,792	45.0%	2,690	454	21,064	22,076	50.2	15,604	70.7%
Michigan	30,000	14,489	48.3%	1,681	241	13,589	14,195	47.3	10,841	76.4%
Minnesota	32,000	15,440	48.3%	1,270	203	15,087	15,558	48.6	12,964	83.3%
Mississippi	16,000	7,274	45.5%	510	46	8,170	8,337	52.1	7,090	85.0%
New Jersey	52,000	23,350	44.9%	4,096	699	23,855	25,401	48.8	16,890	66.5%
New York	34,000	16,098	47.3%	2,102	301	15,499	16,256	47.8	11,550	71.0%
Texas	27,000	13,842	51.3%	1,265	156	11,737	12,177	45.1	9,497	78.0%
Washington	32,000	15,772	49.3%	1,421	307	14,500	15,077	47.1	11,873	78.7%
Milwaukee	30,000	15,730	52.4%	1,219	201	12,850	13,306	44.4	10,792	81.1%
Bal., Wisc.	41,000	14,050	46.8%	1,278	164	14,508	14,956	49.9	12,486	83.5%
Bal., U.S.	41,990	20,542	48.9%	1,849	299	19,300	19,988	47.6	15,576	77.9%
Total	483,260	231,267	47.9%	25,344	4,120	222,529	231,967	48.0	176,791	76.2%

* These include those telephone numbers that were classified as nonresidential on the basis of the automated tritone detection and telematch, as well as those verified by interviewers.

[†] It was assumed for purposes of calculating the response rate that 27 percent of the phones that were never answered were residential and that 63 percent of those where the only contact was with an answering machine were residential.

[‡] The percent of released sample that was either verified or imputed to be working phone numbers for private residences.

[§] The percentage of known or imputed residential phone numbers for which the age screening was completed.

Table 3-7 shows the outcomes of the age-screening. The screening was used to classify households into four broad categories:

- Households with children under 18 and at least one adult knowledgeable about the children;
- Households with only emancipated minors (persons under 18);
- Households with no children but at least one person under the age of 65; and
- Households where everyone was 65 or older.

The first category had the largest overall sampling rates and thus determined the size of the screening sample. All of these were retained for income screening as were the households with only emancipated minors. The percentage of the screened sample that contained children (emancipated or not) was 37 percent. Adult-only households with someone under the age of 65 were sub-sampled prior to income screening as described in Section 3.3.1. As noted there, the sampling rate varied over time and site. Overall, these households constituted 42 percent of the screened sample. The average retention rate for adult-only households was 58 percent in the initial screening. Households with only elderly members were immediately dropped from the sample. These constituted 21 percent of screened households.

Table 3-8 shows the results of the reinstatement of sub-sampled adult-only households in some sites. The attempt to rescreen failed for 25 percent of the refiled sample. Attempts to recontact these households were dropped, and the households were classified as ineligible if children had entered since the initial screening or if all residents under age 65 had departed or aged beyond the limit. These drops eliminated another 9 percent of the reinstated households. Table 3-9 is a revised version of Table 3-7 where the impact of the reinstatement is shown. A total of 47,646 adult-only households were selected (after reinstatement) for income screening.

Table 3-10 shows the results of the income screening for telephone households with children. Of households with children, about 6 percent declined to answer the income screening question. Of those households that did answer, 29 percent reported low income and 71 percent reported income above 200 percent of poverty. All of the low-income households were retained, 30 percent of the others with known income were retained, and 42 percent of those with unknown income were retained.

Table 3-11 shows comparable information for adult-only telephone households. The income question was declined by 7 percent. Among those that answered, the low-income rate was 17 percent. All of the low-income households were retained, 29 percent of the others with known income were retained, and 41 percent of those with unknown income were retained. Combining the subsampling shown in Tables 3-10 and 3-11, it is noted that 30 percent of all households that screened with income above 200 percent of poverty were retained for extended interviews.

Table 3-7.
Outcomes of Age Screening of Telephone Households Before
Reinstatement of Some Adult-only Households

State/Area	Households with Children	Households with Emancipated Minors Under Age 16	Households with Emancipated Minors Aged 16 or 17	Percent of Screened Households With Children	Households with No Children but Some Adults Under 65	Adult-only Households Retained for Income Screening*	Retention Rate of Adult-only Households	Households with Only Adults 65 and Older
Alabama	3,244	0	2	36.7%	3,649	1,735	47.5%	1,935
California	3,534	0	3	39.3%	3,735	2,878	77.1%	1,714
Colorado	4,283	0	1	37.9%	5,314	3,539	66.6%	1,967
Florida	3,750	1	2	31.0%	4,989	1,879	37.7%	3,354
Massachusetts	5,466	1	4	35.0%	6,784	3,189	47.0%	3,354
Michigan	4,127	1	0	38.1%	4,319	2,291	53.0%	2,395
Minnesota	4,701	0	0	36.3%	5,662	4,135	73.0%	2,601
Mississippi	2,685	0	3	37.9%	2,831	1,445	51.0%	1,574
New Jersey	6,626	0	4	39.2%	6,771	3,913	57.8%	3,493
New York	4,079	0	2	35.3%	5,014	2,436	48.6%	2,457
Texas	3,847	1	0	40.5%	3,870	1,719	44.4%	1,780
Washington	4,468	1	2	37.6%	5,262	3,825	72.7%	2,143
Milwaukee	3,573	0	0	33.1%	4,754	2,234	47.0%	2,465
Bal., Wisc.	4,593	0	1	36.8%	5,235	3,480	66.5%	2,658
Bal., U.S.	6,093	0	3	38.1%	6,216	4,143	66.7%	3,427
Total	65,069	5	27	36.8%	74,405	42,841	57.6%	37,317

* Does not include those adult-only households that were later reinstated. See Tables 3-8 and 3-9.

**Table 3-8.
Results of Rescreening on Refielded Adult-only Telephone Households**

State/Area	Result of Rescreening Attempt				Total
	Still Eligible	Child Now in Household	Everyone Now 65+	No Contact or Refusal	
Colorado	40	4	0	8	52
Massachusetts	1,091	64	94	442	1,691
Michigan	517	42	40	207	806
New Jersey	2,037	122	142	762	3,063
Balance, U.S.	1,120	90	61	412	1,683
Total	4,805	322	337	1,831	7,295

NOTE: Still eligible means that there are no resident children and that at least one resident is under age 65. Table 3-2 covers the proportion of original households, without children retained for sample. Table 3.8 covers the results of rescreening on refielded adult-only telephone households.

Table 3-9.
Outcomes of Age Screening of Telephone Households After Reinstatement
of Some Adult-only Households

State/Area	Households with Children	Households with Emancipated Minors Under Age 16	Households with Emancipated Minors Aged 16 or 17	Percent of Screened Households with Children	Households with No Children but Some Adults Under 65	Adult-only Households Retained for Income Screening*	Retention Rate of Adult-only Households	Households with Only Adults 65 and Older
Alabama	3,244	0	2	36.7%	3,649	1,735	47.5%	1,935
California	3,534	0	3	39.3%	3,735	2,878	77.1%	1,714
Colorado	4,443	0	2	37.9%	5,314	3,579	67.4%	1,967
Florida	3,750	1	2	31.0%	4,989	1,879	37.7%	3,354
Massachusetts	5,466	1	4	35.0%	6,784	4,280	63.1%	3,354
Michigan	4,127	1	0	38.1%	4,319	2,808	65.0%	2,395
Minnesota	4,701	0	0	36.3%	5,662	4,135	73.0%	2,601
Mississippi	2,685	0	3	37.9%	2,831	1,445	51.0%	1,574
New Jersey	6,626	0	4	39.2%	6,771	5,950	87.9%	3,493
New York	4,079	0	2	35.3%	5,014	2,436	48.6%	2,457
Texas	3,847	1	0	40.5%	3,870	1,719	44.4%	1,780
Washington	4,468	1	2	37.6%	5,262	3,825	72.7%	2,143
Milwaukee	3,573	0	0	33.1%	4,754	2,234	47.0%	2,465
Bal., Wisc.	4,593	0	1	36.8%	5,235	3,480	66.5%	2,658
Bal., U.S.	5,933	0	2	38.1%	6,216	5,263	84.7%	3,427
Total	65,069	5	27	36.8%	74,405	47,646	64.0%	37,317

* Includes adult-only households that were originally sub-sampled out of the survey and then reinstated. Only such households were kept that could still be reached, had not added children, and had not lost all residents under age 65.

Table 3-10.
Income Screening of Telephone Households with Children

State/Area	Households with Children	Complete Income Screening	Low-income Households*	Not Low-income Households		Households With Unknown Income		Total Sample Households With Children
				Identified	Selected	Identified	Selected	
Alabama	3,244	3,075	1,157	1,918	715	169	93	1,965
California	3,534	3,298	1,242	2,056	661	236	111	2,014
Colorado	4,443	4,234	1,149	3,085	958	209	99	2,206
Florida	3,750	3,515	1,170	2,345	723	235	103	1,996
Massachusetts	5,466	5,154	1,158	3,996	1,102	312	123	2,383
Michigan	4,127	3,886	1,071	2,815	881	241	110	2,062
Minnesota	4,701	4,527	1,130	3,397	897	174	72	2,099
Mississippi	2,685	2,523	1,106	1,417	534	162	80	1,720
New Jersey	6,626	6,178	1,187	4,991	1,206	448	138	2,531
New York	4,079	3,818	1,291	2,527	796	261	119	2,206
Texas	3,847	3,598	1,317	2,281	675	249	108	2,100
Washington	4,468	4,230	1,209	3,021	977	238	107	2,293
Milwaukee	3,573	3,376	997	2,379	649	197	82	1,728
Bal., Wisc.	4,593	4,394	1,103	3,291	933	199	69	2,105
Bal., U.S.	5,933	5,594	1,758	3,836	1,184	339	124	3,066
Total	65,069	61,400	18,045	43,355	12,891	3,669	1,538	32,474

* According to the simple screener question.

Table 3-11.
Income Screening of Telephone Households with Adults Under Age 65 but No Children

State/Area	Retained for Income Screening	Complete Income Screening	Low-income Households*	Not Low-income Households		Households with Unknown Income		Total Sample Adult-only Households
			Identified and Selected	Identified	Selected	Identified	Selected	
Alabama	1,735	1,620	421	1,199	435	115	61	917
California	2,878	2,678	456	2,222	654	200	76	1,186
Colorado	3,579	3,379	555	2,824	893	200	90	1,538
Florida	1,879	1,735	364	1,371	432	144	63	859
Massachusetts	4,280	3,984	532	3,452	979	296	118	1,629
Michigan	2,808	2,598	443	2,155	682	210	86	1,211
Minnesota	4,135	3,897	575	3,322	931	238	87	1,593
Mississippi	1,445	1,331	423	908	377	114	55	855
New Jersey	5,950	5,526	658	4,868	1,128	424	133	1,919
New York	2,436	2,240	428	1,812	531	196	76	1,035
Texas	1,719	1,602	340	1,262	380	117	49	769
Washington	3,825	3,588	635	2,953	922	237	96	1,653
Milwaukee	2,234	2,099	374	1,725	491	135	59	924
Bal., Wisc.	3,480	3,274	532	2,742	762	206	85	1,379
Bal., U.S.	5,263	4,917	978	3,939	1,191	346	158	2,327
Total	47,646	44,468	7,714	36,754	10,788	3,178	1,292	19,794

*According to the simple screener question.

Chapter 4

Area Sample

This chapter describes the design of the in-person or area sample that was designed to yield an efficient sample of households without current telephone service in each targeted state and the balance of the nation. The first section covers the sampling of primary sampling units (PSUs); the second section deals with the sampling of segments; and the third section details the sampling of "chunks," which were compact subsets of segments. The fourth section of the chapter describes how additional samples were selected in some states when it was determined that the sample yield was lower than expected. The final section gives the results of the sampling at all stages.

The sampling procedures are those typically used in area probability samples, with two exceptions. The first special procedure was the elimination from the sampling frame of blocks in Census block groups (BGs) with very high telephone service rates. Based on the 1990 Census data, it was estimated that less than 8 percent of the all nontelephone households would be excluded. However, because of shifts in the population in the seven years between the census and the NSAF, about 30 percent of all nontelephone households were actually eliminated. Since nontelephone households accounted for only about of 20 percent to 30 percent of the total low-income population, the geographic restriction of the sample was still a small percentage of the entire inference population. This was done to lower the cost of data collection even though it was realized that this would leave a certain group of households unrepresented. The second special procedure concerned sampling of dwelling units (DUs) within segments. Traditionally, a constant expected number of DUs is sampled from all sample segments after a preliminary listing operation. In this survey, because of the need to reduce the cost of the screening operation, "chunking" was used instead of a listing and subsampling approach. These two special procedures are highlighted in the sections that follow.

4.1 First-stage Sampling

There were four distinct phases in the work. The first was to define the PSUs. This was done by starting with a standard set of PSU definitions that are used by Westat as the sampling frame for many surveys and then making one modification to adapt the definitions for NSAF. The second phase was to decide how many PSUs to select in each targeted state and in the balance of the nation. This was a difficult decision because of conflicting operations management, variance, and variance estimation considerations. The third phase was to stratify the PSUs so as to reduce between-PSU variance as much as possible for statistics of interest. The fourth phase was to actually draw the sample PSUs from the strata. These are each described here.

4.1.1 PSU Definition

The standard Westat PSUs were formed in 1991. These PSUs were defined to follow several rules. First, each metropolitan statistical area (MSA) defined by the Census Bureau in 1990 was generally defined to be a separate PSU. This procedure has the effect of minimizing between-PSU variance while adding only modestly to within-PSU travel costs. The between-PSU variance is reduced as compared to a plan that established separate PSUs for the central cities

and the suburbs because heterogeneity is maximized within PSUs rather than across them. The within-PSU travel cost is not much higher despite leaving the central cities and suburbs together because of the generally high-quality transportation networks in metropolitan areas.

The very largest metropolitan areas are called consolidated metropolitan statistical areas (CMSAs), each consisting of two or more primary metropolitan statistical areas (PMSAs). The second rule in defining PSUs was to define each PMSA within a CMSA as a separate PSU. This was done because CMSAs are conglomerated areas with distinct central cities and very large populations. Hence, two PMSAs within the same CMSA are not as different from each other as a central city is from its own suburbs. Furthermore, defining whole CMSAs as PSUs would increase within-PSU travel costs and make counts of sample PSUs less meaningful.

The third rule in defining PSUs applied to outside metropolitan areas. There, single counties were generally used as PSUs unless the population counts were too low. Counties with 1990 population counts below 15,000 persons (of all ages) were collapsed with neighboring counties until the minimum size constraint was met.¹ Collapsing was kept to this minimal level because further collapsing would have increased within-PSU travel costs more than it would have reduced between-PSU variances.

The one modification that was made to these PSU definitions to optimize them for NSAF use was to split some multistate PSUs. Multistate PSUs were split into state components if one or more of the states was a focal state. Remaining pieces were collapsed to ensure a minimum population of 8,000. Other multistate PSUs were left intact, but no stratum contained PSUs that crossed Census region boundaries.

4.1.2 Number of Sample PSUs

Several considerations went into the decision of how many PSUs to select in each focal state and the balance of the nation. The first was field management. The second was between-PSU variance. The third was having enough sample PSUs to permit stable variance estimates. Theory exists on how to optimize the design with respect to field management issues and between-PSU variance, but trading these off against the stability of variance estimates is more subjective.

With respect to field management, it is possible to have traveling staff or residential staff, or some mixture of the two. Generally, it is more cost effective to have residential staff, provided that there is adequate work in each sample PSU to keep the staff at near optimum utilization

¹ These rules explain most but not all of the PSU definitions. The 1991 Westat PSUs were themselves the product of modifications from older sets of PSUs definitions, stretching back to a PSU frame created at the U. S. Bureau of the Census in the 1960s to achieve a minimum population count of 7,500. At the time, it was a massive clerical operation, where attention was paid not only to achieving the minimum population count by collapsing adjoining counties but also to collapsing counties with different characteristics to the extent feasible. That step of maximizing within-PSU heterogeneity has the effect of reducing between-PSU variances by maximizing homogeneity of the PSUs. Since the initial creation of the frame, Census (in 1971-72) and Westat (in 1981 and 1991) have updated it to reflect changes in the definitions of MSAs. Fringe counties were added to MSAs, if the fringe county had been part of a collapsed PSU, then it was sometime necessary to collapse the residual counties in the old fringe PSU with other counties. Also, Westat increased the minimum measure of size from 7,500 persons to 15,000 persons. Some of the non-metropolitan counties that were collapsed in past decades due to small populations have since grown in population enough so that there is no longer any strong reason to keep them collapsed with neighboring counties. On the other hand, the only harm in keeping them collapsed is a little extra interviewer travel.

levels. The work assigned to a single interviewer is typically called a workload. For NSAF, it was projected that an optimal workload would consist of 8 segments with an average of 30 DUs each, for a total of 240 DUs.² A much smaller workload would have resulted in the need to recruit and train more interviewers, a substantial fixed expense that is clearly best amortized over a larger workload.

Based on concern for being able to estimate variances accurately, it was desired to select a minimum of 8 PSUs per study area. Any fewer than 8 PSUs per state would result in variance estimates that were too unstable. However, this rule was modified for study areas with very large PSUs. Some PSUs are so large that they essentially need to be selected more than once in order to maintain an equi-probability sample. Thus, the actual rule was to allocate a minimum of 8 workloads to each study area. For each study area, calculations were made of how many low-income non-telephone households with children would be found and interviewed given a screener area sample of $236 \times 8 = 1,888$ households per study area. These calculations were based upon Decennial Census tabulations of the frequency of non-telephone households in the state³ and on 1990 Decennial Census tabulations by state of the proportion of non-telephone households that contain children and have low income. As in Chapter 2, let n_3 denote the total number of sample non-telephone low-income households with children. The resulting value of the area design effect was then calculated using the formula (Cochran, 1977):

$$d_3 = 1 + \mathbf{d}_3 \left(\frac{n_3}{8} - 1 \right),$$

where \mathbf{d}_3 is the intraclass correlation at the PSU level. Based upon experience with other surveys, it was assumed that \mathbf{d}_3 would be on the order of 0.05.

The resulting values for n_3 and d_3 were then factored into equation 2-6 to determine the effective sample size for all low-income households with children. Also, the split of the area sample with the telephone sample that would result from such an allocation was compared to the value that was believed to be optimal. Where the split was deemed to be too far from the optimal or the effective sample size for all low-income households with children could not be achieved with this size area sample, the decision was made to boost the number of workloads for the site.

Table 4-1 shows the number of workloads that was finally adopted for each state along with the number of sample PSUs, projected and actual segment counts, the total expected workload in terms of listed DUs, occupied DUs (i.e., households), screened households, households without phone service, and the non-telephone hit rate (the ratio of screened households to households without phone service). The number of sample PSUs is usually smaller than the number of workloads, which as noted above happens when some PSUs are very large. The vacancy rate was assumed to be 10 percent, the screener response rate to be 97 percent. The non-telephone hit

² As the details of sampling were worked out, this rule was operationalized as 262 listed DUs, of which it was projected that 236 would be occupied, and 230 would be actually screened.

³ This calculation excluded blocks with very high telephone service rates as mentioned briefly earlier and discussed in more detail in Section 4.2.1.

rate varied by state as explained in section 4.2 with a national average of 9.4 screened households to obtain each hit.

Table 4-2 shows projections of how many of the screened non-telephone households would be interviewed and how these interviews would be distributed by presence of children and income. Note that there is wide variation across the study areas in these projections based on the 1990 Census. This variation is due to the variation in the projected non-telephone hit rate shown earlier. The vast majority of households with children but no phone service are projected to have low incomes. However, among adult-only households, the 1990 Census found a sizeable minority does not have low income. Table 4-2 also shows that it was projected that 8.9 percent of non-telephone households would be ineligible because all members are elderly. This reduces the overall ineligibility rate to 9.7 percent and increased the overall hit rate so that 10.3 households had to be screened to find one eligible non-telephone household.

**Table 4-1.
Numbers of Workloads, Sample PSUs, Segments, DUs, and Households**

State/Area	Number of Interviewer Workloads	Number of Sample PSUs	Number of Segments		Projected Yields from Area Screening Sample*				
			Projected [†]	Actual [*]	Listed DUs	Occupied DUs	Screened Households	No Telephone [‡]	Non-Telephone Hit Rate [§]
Alabama	12	10	96	106	3,144	2,830	2,759	406	6.8
California	8	6	64	71	2,096	1,886	1,839	133	13.9
Colorado	8	6	64	72	2,096	1,886	1,839	176	10.5
Florida	10	8	80	86	2,620	2,358	2,299	255	9.0
Massachusetts	8	4	64	60	2,096	1,886	1,839	124	14.8
Michigan	8	6	64	64	2,096	1,886	1,839	178	10.3
Minnesota	8	7	64	69	2,096	1,886	1,839	112	16.5
Mississippi	12	12	96	89	3,144	2,830	2,759	520	5.3
New Jersey	10	6	80	86	2,620	2,358	2,299	213	10.8
New York	10	7	80	88	2,620	2,358	2,299	269	8.6
Texas	10	9	80	79	2,620	2,358	2,299	352	6.5
Washington	8	6	64	66	2,096	1,886	1,839	137	13.4
Milwaukee	8	1	64	50	2,096	1,886	1,839	122	15.1
Bal., Wisconsin	8	8	64	70	2,096	1,886	1,839	122	15.1
Bal., U.S. [¶]	18	18	144	152	4,716	4,244	4,138	457	9.1
Total	146	114	1,168	1,208	38,252	34,427	33,566	3,574	9.4

* Prior to the sample expansion discussed in Section 4.4.

[†] These are projected counts prior to segment sampling. In the budgeting, it was assumed that eight segments would be drawn for every workload.

[‡] This count includes households with all elderly members that are ineligible for the survey.

[§] The number of occupied households that must be screened in order to find one without current phone service.

[¶] Shortly prior to the beginning of interviewing, separate samples were dropped for the states of Ohio and Pennsylvania. To maintain full coverage of the nation, a sample PSU was added to the balance of the nation category in each dropped state, bring the total PSUs in the balance up from 16 to 18 and the total for the nation up from 112 to 114. Other numbers increased proportionately.

**Table 4-2.
Projected Extended Interviews from Area Component**

State/Area	Households with Children		Adult-only Households		Total [†] Eligible	Ineligible Due to Age
	Low Income	Income above 200% of Poverty	Low Income	Income Above 200% of Poverty		
Alabama	151	23	96	42	312	33
California	48	9	29	19	104	8
Colorado	54	9	49	27	138	11
Florida	81	14	66	36	197	20
Massachusetts	39	6	25	22	93	13
Michigan	63	9	47	21	141	11
Minnesota	32	4	33	16	84	11
Mississippi	206	26	120	45	397	46
New Jersey	77	19	34	36	167	14
New York	94	17	62	36	208	20
Texas	146	21	78	37	282	18
Washington	40	6	39	21	106	11
Milwaukee	40	5	32	13	90	13
Balance, Wisc.	40	6	32	16	94	9
Balance, U.S. [‡]	164	29	110	54	357	32
National Total	1,274	202	853	441	2,770	269

* Prior to the sample expansion discussed in Section 4.4.

[†] This total is restricted to households with at least one member under the age of 65.

[‡] Shortly prior to the beginning of interviewing, separate samples were dropped for the states of Ohio and Pennsylvania. To maintain full coverage of the nation, a sample PSU was added to the balance of the nation category in each dropped state, bring the total PSUs in the balance up from 16 to 18 and the total for the nation up from 112 to 114. Other numbers increased proportionately.

4.1.3 Stratification and Selection of PSUs

The general idea of stratification is to group similar PSUs together and then select just one or two sample PSUs per stratum. This reduces between-PSU variance for most statistics, particularly those that are related to the statistics that are used in the grouping. More strata are better than fewer when it comes to the precision of point estimates, but forming the maximum possible number of strata will tend to make estimation of variances more difficult and less satisfactory. Given the small number of PSUs for each state in the NSAF, the decision was made to form the maximum possible number of strata, corresponding to one sample PSU per stratum.

In stratification, it is also useful to form strata that are of nearly equal size in terms of population. This is impossible when some PSUs are larger than the average population per desired stratum. The common solution to this problem is to set such PSUs off in strata of their own and then to select them with certainty. These are then called self-representing (SR), or certainty, PSUs. This was done for NSAF. These very large SR PSUs were assigned multiple workloads. When this occurred, the decision was made to reduce the number of sample PSUs as shown in Table 4-1.

After the SR PSUs had been identified and workloads had been allocated to them, the remaining PSUs were stratified. Slightly different stratification procedures were used in the focal states than in the balance of the nation. Within a focal state, the number of strata to be formed ranged from 3 in Massachusetts to 12 in Mississippi. The first priority was to separate the metropolitan and non-metropolitan PSUs into separate strata, but a few mixed strata were created in order to avoid creating some very small strata or creating strata comprised of PSUs with widely varying poverty rates. The second priority was to try to separate PSUs by the poverty rate for children in the PSU as measured in the 1990 Decennial Census. The third priority was percent minority in 1990, but it was possible to use this variable in only a few states.

PSUs outside of the focal states were stratified by metropolitan status, child poverty level, and region. The heaviest emphasis was placed on creating strata that were purely metropolitan or non-metropolitan. Heavy emphasis was also placed on creating a separate stratum of MSAs with very low poverty rates, a stratum of non-metropolitan PSUs with very low poverty rates, and a stratum of non-metropolitan PSUs with very high poverty rates. All Alaskan and Hawaiian PSUs were included in the low-poverty non-metropolitan stratum to ensure that no more than one PSU was selected from these high-cost states. The remaining PSUs were stratified with a slightly heavier emphasis on region than on child poverty.

Once the strata were formed, one PSU was selected from each stratum with probability proportional to population in 1990 within block groups that were eligible for sampling. In other words, the measure of size for a PSU was its entire population, excluding persons living in BGs that were eliminated from the sampling frame.

4.2 Second-stage Sampling

As mentioned previously, there were two special procedures in the sampling for this survey. The first concerned the exclusion of areas with very high rates of telephone coverage. This exclusion had little effect on segment formation and selection rules. It is discussed in Section 4.2.1. The second special procedure was to screen compact chunks without listing. This feature had a major effect on segment formation and selection rules. In surveys where there will be sub-sampling within each segment to yield a uniform (or nearly uniform) household sample size for all

segments, it is fairly straightforward to decide on a minimum size for each segment and on how many segments to select from each sample PSU. For NSAF, natural variation in block size made it advantageous to allow the minimum segment size and the number of sample segments to vary by PSU while keeping the number of sample households nearly uniform across PSUs. Blocks averaged about 21 DUs per block in 1990, but the variation around that average was large with many blocks having zero or thousands of DUs. Section 4.2.2 focuses on how the segments were defined and on how the number to select in each PSU was derived. The selection procedures are described in 4.2.3.

4.2.1 Exclusion of BGs with High Telephone Coverage Rates

Extending coverage to every non-telephone household was judged to be an expensive undertaking with uncertain benefits. The 1990 Decennial Census showed that there are BGs where virtually every household had a telephone. The prospect of having to screen hundreds or even thousands of households in some areas to find a single non-telephone household seemed to be carrying the concept of coverage for every non-telephone household to an unreasonable extreme. Accordingly, the decision was made to restrict the area sample to BGs where the percentage of households with a phone was below 92 to 98 percent, with the exact limit varying from state to state.

Table 4-3 shows the cutoffs by state. These were arrived at by first tabulating the number of non-telephone and total households by the telephone coverage rate for the BG. For this tabulation, only whole percentage point increments in the local rates were examined. The maximum percentage with telephones that would be sampled for a particular state was then set as low as possible without resulting in the exclusion of more than 10 percent of the non-telephone households in the state. For example, in Alabama, it was found that 7.3 percent of the non-telephone households and 40.9 percent of all households were in BGs in which at least 95 percent of the households had telephones. By excluding these BGs from the sampling frame, a tremendous reduction in the projected required screening was achieved while only incurring a coverage loss of 7.3 percent of non-telephone households. If the cutoff had been reduced to 94 percent in Alabama, it would have resulted in a coverage loss of more than 10 percent of the non-telephone households—a figure that was judged to be too high. The resulting non-telephone hit rates were shown in Table 4-1.

**Table 4-3.
Maximum Telephone Service Rates Allowed in Covered BGs**

State/Area	Maximum Telephone Service Rate Allowed in Covered BGs %	Percent of Non-telephone Households Excluded	Percent of Block Groups Excluded	Percent of all Households Excluded
Alabama	95	7.3	37.4	40.9
California	98	7.3	59.2	59.0
Colorado	97	8.8	56.6	57.9
Florida	97	9.1	48.0	54.6
Massachusetts	98	9.4	70.5	70.4
Michigan	97	9.8	56.1	59.9
Minnesota	98	9.1	57.6	60.7
Mississippi	92	9.7	34.5	35.9
New Jersey	98	5.6	68.2	66.8
New York	97	7.5	58.7	58.7
Texas	95	7.7	42.2	45.3
Washington	98	6.1	53.3	53.7
Milwaukee	98	9.2	56.7	59.5
Bal., Wisconsin	98			
Bal., U.S.	97	8.0	54.9	57.1

In addition to the exclusion of blocks in BGs with high telephone coverage, all blocks with zero year-round housing as of 1990 were excluded. These blocks can occur in urban areas where all the structures are nonresidential or in rural areas such as national forests. While new construction may have occurred in some of these blocks, the high cost of canvassing these areas made it impractical to include these blocks in the sampling frame.

4.2.2 Segment Formation and Determination of Number to Select per PSU

Two different procedures were used to define segments in different PSUs and to decide how many to select. One of these procedures was preferred for reducing design effects due to clustering but tended to result in more sample segments than had been projected (shown in Table 4-1). The other procedure tended to form larger segments and then select fewer of them. This feature was important because the screening operation for non-telephone households was more cost effective with a smaller set of larger segments. The choice of which procedure to use for a particular state was guided by comparing the number of sample segments generated in the state by the preferred method to the budgeted number for the state (Table 4.1). If the first procedure kept the number of sample segments within (or at least close to) budget, then it was used. Otherwise, the second procedure was used. The first procedure was used for California,

Massachusetts, New Jersey, New York, and Milwaukee. The second procedure was used in the rest of the areas.

A prerequisite for both methods was to have a target number of screener interviews for the PSU. For SR PSUs, the target was defined to be proportionate to the frame population of the PSU (the total count of persons excluding persons in BGs eliminated from the frame) compared to the frame population for the entire state.⁵ So if the desired listed DU sample size for the entire state was, for example, 2,620, and if a particular SR PSU contained p percent of the total population for the state, then the target number of screeners for the PSU was set equal to $26.2p$. For nonself-representing (NSR) PSUs, the remaining sample was allocated in proportion to NSR stratum population with a slight adjustment for vacant DUs. This generally resulted in targets close to 262, a number that was assumed would contain 236 occupied DUs, the preferred interviewer workload as discussed earlier in this chapter.

Procedure 1

This was the initial procedure. Let B be the block count for the entire PSU, H be the DU count for the entire PSU, h be the desired number of sample DUs for the entire PSU (i.e., the assigned workload for the PSU as defined earlier), s be the minimum allowed segment size, c be the desired chunk size, N be the number of defined chunks in the entire PSU, and x be the desired number of sample segments for the entire PSU. The variables B and H were input from the Decennial Census; the variable h was a function of the stratum size as discussed earlier; and the variables s , c , N , and x could be set individually for each PSU to ensure that the realized value of h was close to the desired value and that the design effect due to clustering would be kept small. This was more flexibility than needed, so the restriction was added that $s = c/2$. Furthermore, it was decided to allow N to be determined by c .

The procedure was first set

$$c = \frac{H}{B}.$$

Then all blocks with fewer than s DUs were collapsed with nearby blocks until the conglomeration had s or more DUs. Collapsing was done on the basis of the sequential block numeric labels assigned by the Census Bureau. Blocks with consecutive block labels are usually physically abutting. Occasionally, it was necessary to collapse whole BGs with nearby blocks or BGs, but collapsing was never done across tract boundaries. Where an entire tract had fewer than s DUs, it was allowed to remain deficient.

Also, large blocks were assigned chunk counts. Any block with more than $(1.5)c$ DUs was assigned multiple chunks. The number of chunks assigned to a block was always a whole number, equal to the rounded value of the quotient of the DU count for the block divided by the desired chunk size. Every segment was assigned at least one chunk. The resulting chunks in the PSU were then counted to obtain N . The desired number of sample segments for the PSU was then set to

⁵ The frame population excluded the population in BGs with high telephone coverage rates.

$$x = \frac{h}{H}N.$$

An intuitive understanding of this approach follows. Suppose the proportion of housing that was to be drawn into the sample is h/H , then the same proportion of chunks needed to be drawn into the sample. Since just one chunk was sampled per segment, this also determined the number of segments to select. If the value of x determined by this procedure was not between 6 and 20, then the value of c was changed to bring x within those limits. Since $N \approx H/c$, this could usually be accomplished by constraining c to lie between $h/20$ and $h/6$. It was felt that at least 6 sample segments per PSU were required in order to avoid large between-segment contributions to variance and to ensure that the sample state means were based on large enough samples to appeal to the central limit theorem for approximate normality. (This rule was violated in just two sample PSUs, both of them SR PSUs with small desired workloads.) Also, more than 20 segments would have resulted in unwarranted expense.

To illustrate this procedure, consider the example in Table 4-4. In this mock PSU, $B=256$, $H=6600$, and $h=260$. The initial value for the desired chunk size is thus set to $c=H/B=25.8$, and the minimum segment size is set to $s=c/2=12.9$. This would require collapsing the 100 blocks that have only 10 DUs each. Suppose that they were all next to each other so that the collapsing led to 50 segments of 20 DUs each. Also, the blocks with more than $1.5c=38.7$ DUs must be marked for chunking. Thus, the blocks with 50 DUs are marked to each be divided into 2 chunks each, and the blocks with 100 DUs are marked to be divided into 4 chunks each. That gives a total of $N=274$ chunks in 206 segments. Thus, the desired number of sample segments for the PSU under the original procedure would be $x=hN/H=10.8$. Since this value is between the allowed limits of 6 and 20 it would be accepted. Note, however, that the value of x is greater than the 8 that had been budgeted for each PSU. The expected number of DUs to list is correct at 260, but they are spread across more segments than budgeted.

Table 4-4.
Illustration of Original Segment Formation Procedure

DU Count	Blocks	DUs in Blocks	Segments	Chunks per Segment	Cumulative Number of Chunks
10	100	1,000	50	1	50
20	60	1,200	60	1	110
30	60	1,800	60	1	170
50	20	1,000	20	2	210
100	16	1,600	16	4	274
Total	256	6,600	206		274

Procedure 2

The point of Procedure 2 was to form fewer total segments and to chunk large blocks into bigger pieces. The goal was to bring x into alignment with what had been budgeted. Procedure 1 was

developed under the mistaken assumption that it was adequate to control the number of DUs to screen in a PSU and to control the number of blocks containing the DUs, whereas it was really quite important to have these DUs in the planned 8 segments per workload. It was decided that too many small values of s and c were being produced by Procedure 1, leading to too many sample segments.

To remedy this problem, a value for c was assigned to each state through trial and error by iteratively running the segmenting software described above until the number of sample segments for the state was within (or at least close to) the budget for the state. This iterative procedure started out with the guess that

$$c = \max \left\{ 30, \frac{H}{B} \right\},$$

unless such a large value for c would result in fewer than 6 sample segments, in which case, the value for c was adjusted downward. Also, if this initial guess yielded fewer segments for the state as a whole than had been budgeted, then that value of c was retained for all PSUs in that state. Generally, this procedure had the effect of limiting the number of sample segments per workload to 9 as compared with the upper limit of 20 under the original procedure. Note that this was accomplished primarily by increasing the minimum size for segments formed by collapsing small blocks.

Results

Table 4-1 shows the resulting sample size targets for segments by state. Note that a total of 1,208 segments were selected nationally, slightly higher than the figure of 1,168 that had been planned. This was due to the fact that every PSU was forced to have at least 6 segments and no PSU was allowed to have more than 9 per assigned workload under the second procedure.

4.2.3 Segment Stratification and Selection

The segments were stratified by size. Size was defined as the ratio of the number of year-round housing units in the segment to the desired chunk size, c , for the PSU. The two cutpoints in the stratification were 0.75 and 10.0. This means that a low stratum was established for segments with DU counts more than 25 percent below the desired chunk size, a high stratum was established for segments with 10 or more chunks, and a middle stratum was left for all the remaining segments in the PSU.

Within each stratum, the segments were sorted by the segment-level telephone coverage rate. (This was computed as the average telephone rate in 1990 for Census BGs intersecting the segment.) The sort order was reversed in the middle stratum so that small segments with high non-telephone rates were close to medium segments with high non-telephone rates and so that medium segments with low non-telephone rates were close to large segments with low non-telephone rates. A systematic probability proportional to size (PPS) sample was then drawn where the measure of size for a segment was its assigned chunk count. Sampling was independent across PSUs, both NSR and SR.

Note that the stratification on size was important for controlling the sample numbers of very large and small segments to expected levels. Controlling the number of very large segments provides control over the number of very large blocks, a group that is important substantively since characteristics of interest are different for blocks with very high population density. Controlling the number of small segments is useful for controlling the number of sample DUs. Also, note that the reversing sort across strata reduced the variance on the non-telephone household yield. This was done to reduce the probability of selecting a sample of segments with either a very high or a very low non-telephone rate. Since the middle size stratum was very broad, the sort on telephone rate was nearly as effective as a primary sort on telephone rate.

4.3 Chunk Selection

The algorithm for associating a number of chunks with each segment is described in 4.2.2. This algorithm depended only on information from the Decennial Census. The idea was that when a segment with a single assigned chunk was selected, the entire segment would be screened. Similarly, when a segment with N chunks was selected, an interviewer would cruise the segment and spot housing on a map of the segment, which was then faxed to the home office. Home office staff then drew chunk boundaries to include roughly equal number of DUs in each chunk and randomly selected one chunk out of the N with equal probability. The selected chunk was then returned to the interviewer who then screened all the DUs within the sample chunk.

There were a few segments that were marked as single-chunk segments but were discovered, during cruising, to have grown considerably since the Decennial Census due to new construction. Rather than screen many more DUs than planned (most of which would be fairly new and would thus likely have phone service), the decision was made to chunk some of these. Also, there were segments where chunking was planned, but growth made it advisable to form more chunks than originally planned. Lastly, there was one segment where so much housing had been demolished that the planned chunking was not carried out. Table 4.5 provides some information on planned and unplanned chunking in both the main sample and in a sample supplement described in Section 4.4.

**Table 4-5.
Segment Counts by Planned and Unplanned Chunking (Including Sample Supplement)**

State/Area	Chunking Done as Expected	Chunking Expected but not Done	More Chunking Done Than Expected	Chunking not Expected but Done Anyway	Chunking not Expected and not Done	Total Segments
Alabama	27	0	0	2	77	106
California	37	0	2	1	31	71
Colorado	52	0	3	2	63	120
Florida	39	0	3	4	60	106
Massachusetts	39	0	1	0	36	76
Michigan	12	1	1	0	50	64
Minnesota	9	0	0	2	58	69
Mississippi	16	0	0	2	71	89
New Jersey	83	0	1	0	52	136
New York	89	0	1	0	28	118
Texas	24	0	3	1	51	79
Washington	35	0	1	0	46	82
Milwaukee	23	0	0	1	26	50
Bal., Wisconsin	13	0	0	0	57	70
Bal., U.S.	48	0	1	0	103	152
Total, U.S.	546	1	17	15	809	1,388

4.4 Supplement

During the summer of 1997, projections of nominal and effective sample sizes were revised based upon screening outcomes up to that point. The revision focused on estimates of children in families below 200 percent of the poverty level, by site. The revised projections (Table 4-6) showed shortfalls in both the nominal and effective sample sizes for the area component in most sites. The reasons for this and a full discussion of the problem is given in the In-person Survey Methods Report number 5 in the 1997 NSAF Methodology Series, another report in this series. The projected telephone sample sizes for poor children were, on the average, close to the planned sample sizes. There were some sites, however, where the sample size was substantially lower than expected. The effective sample sizes from the telephone sample were affected more than the nominal sample sizes for most sites because of higher-than-expected switching from high income on the screener interview to the low income on the extended interview.

The net result of this was a projected shortfall in the effective sample size for the combined area and telephone samples for all the focal states. The shortfalls were more than 150 in 7 of the 15 sites and particularly severe in Colorado and New Jersey. It was decided to add enough sample to try to bring the effective sample size for low-income households with children up to a minimum of 650 in all areas except the balance of Wisconsin, Colorado, and New Jersey. In

Colorado and New Jersey, it was decided to field as large a supplement as could be afforded. No supplement was selected for the balance of Wisconsin because the sample size for the state as a whole was adequate.

A variety of supplementation plans were studied for allocating the sample between the RDD and area components in 6 states. In each case, the best solution was to expand the area sample while leaving the RDD sample at the planned size. The final sample supplements decided upon are shown in Table 4-7. It is interesting to note that the projected increases in the combined effective sample sizes are much larger than the projected increases in the nominal sample sizes. This is because the small yields in the area samples meant that there were going to be very large design effects caused by attaching very large weights to the few non-telephone low-income households with children that were found.⁶ Thus, even a small increase in the sample of non-telephone households can result in a major improvement in the combined effective sample size. As with other projections of effective sample sizes given in this report, actual effective sample sizes varied from the projections.

All of the supplemental sample was obtained by selecting additional segments rather than selecting additional PSUs or by selecting additional chunks from large segments. The supplemental segments were selected from the same files that the original segments had been selected from. This meant that the issues of defining a minimum segment size and a desired chunk size did not have to be revisited. The procedure was to simply select a subsample of the midpoints between the sample segments in the sampling frames. This increased the number of segments nationally from 1,208 to 1,388. Also note that although Table 4-7 does not show the effect of the supplement on any group except the low-income households with children, all non-telephone households in the supplement were retained regardless of income or presence of children, and the same within-household sampling rules for adults and children were used as in the main sample.

⁶ The large weights would be caused by poststratification to figures from the Census of how many such households exist in each state.

Table 4-6.
Targets and Revised Yield Projections for Low-income Households with Children (July 28, 1997)

State/Area	RDD			Area			Combined			Combined Effective		
	Plan	July Proj.	Bal/Def	Plan	July Proj.	Bal/Def	Plan	July Proj.	Bal/Def	Plan	July Proj.	Bal/Def
Alabama	930	999	69	151	88	-63	1,081	1,087	6	800	727	-73
California	936	883	-53	48	34	-14	984	917	-67	804	723	-81
Colorado	988	995	7	54	11	-43	1,042	1,006	-36	799	433	-366
Florida	1,003	975	-28	81	41	-40	1,084	1,016	-68	799	623	-176
Massachusetts	1,014	1,014	0	39	15	-24	1,053	1,029	-24	793	625	-168
Michigan	984	939	-45	63	43	-20	1,047	982	-65	794	662	-132
Minnesota	1,006	987	-19	32	40	8	1,038	1,027	-11	796	752	-44
Mississippi	992	934	-58	206	135	-71	1,198	1,069	-129	829	703	-126
New Jersey	1,068	987	-81	77	37	-40	1,145	1,024	-121	784	485	-299
New York	969	815	-154	94	30	-64	1,063	845	-218	793	587	-206
Texas	1,106	1,030	-76	146	83	-63	1,252	1,113	-139	805	724	-81
Washington	985	1,156	171	40	17	-23	1,025	1,173	148	793	618	-175
Milwaukee	1,000	1,000	0	40	43	3	1,040	1,043	3	790	712	-78
Bal., Wisc.	1,008	908	-100	40	15	-25	1,048	923	-125	795	516	-279
Bal., U.S.	1,411	1,645	234	142	108	-34	1,553	1,753	200	1,130	1,180	50
Total, U.S.	15,400	15,187	-213	1,252	741	-511	16,652	15,928	-724			

Table 4-7.
Supplemental Area Sample: Projections of Nominal Sizes and Impact on Effective Sizes

State/Area	Additional segments	Project additional screened DUs	Project additional low-income households with children	Projected increase in combined effective sample size for low-income households with children	
				Number	Percent
				Area sample	
Colorado	48	1,414	7	124	28.6
Florida	20	683	10	46	7.4
Massachusetts	16	564	4	38	6.1
New Jersey	50	1,569	21	69	14.2
New York	30	821	10	72	12.3
Washington	16	480	4	44	7.1

4.5 Achieved Response and Eligibility Rates

The results of the area listing and prescreening operation are shown in Table 4.8. The results of the screening operation are shown in Table 4.9. In most DUs, there was no time lapse between prescreening and screening. If the respondent reported that there was no phone and at least one occupant under age 65, then the interviewer immediately segued into the cell phone procedures so that the screener and extended interviews could be conducted by telephone interviewers at the Telephone Research Center (TRC) in Maryland. However, at some DUs, the information on the presence of a telephone may have come from a teenager who was not eligible to make the cell phone call to the TRC. In addition, there were instances where a qualified respondent was too busy to participate in the rostering operation. In such cases, the interviewer returned later for the screener interview.

Response on the prescreener (phone ownership and age only) was very high, at 99 percent. At the screener level, it was 84 percent. About 8 percent of the households that had reported eligibility at the prescreening changed their report. Occupancy rates ran close to the 90 percent projected. The eligibility rate was considerably lower than projected at 5 percent on the prescreener, compared to the projected 20 percent. After revisions from the screener interview, the eligibility rate declined further. The hit rate for eligible households was also considerably higher than projected, at about 21.7 versus the projected 10.3. This means that roughly 22 households had to be contacted to find a single household without phone, instead of the anticipated 10 or 11. The reasons for this are not fully understood but are partially explained in the In-person Survey Methods Report number 5 in the 1997 NSAF Methodology Series.

**Table 4-8.
Outcomes of Area Listing and Prescreening**

State/Area	Listed	Occupied		Prescreening			
		Number	Rate	Complete	Response Rate	Eligible*	Eligibility Rate
Alabama	3,587	3,198	89%	3,188	99.7%	194	6.1%
California	2,151	1,973	92%	1,945	98.6%	89	4.6%
Colorado	2,099	1,801	86%	1,713	95.1%	69	4.0%
Florida	2,770	2,412	87%	2,401	99.5%	85	3.5%
Massachusetts	2,074	1,940	94%	1,922	99.1%	44	2.3%
Michigan	2,263	2,009	89%	2,004	99.8%	95	4.7%
Minnesota	2,268	2,039	90%	2,021	99.1%	86	4.3%
Mississippi	3,232	2,802	87%	2,767	98.8%	297	10.7%
New Jersey	2,341	2,103	90%	2,087	99.2%	98	4.7%
New York	2,710	2,457	91%	2,425	98.7%	80	3.3%
Texas	2,586	2,350	91%	2,341	99.6%	187	8.0%
Washington	2,260	2,051	91%	1,974	96.2%	87	4.4%
Milwaukee, Wisc.	1,877	1,721	92%	1,700	98.8%	112	6.6%
Balance, Wisc.	1,987	1,723	87%	1,701	98.7%	45	2.6%
Balance, U.S.	4,690	4,270	91%	4,261	99.8%	227	5.3%
Total Original	38,895	34,849	90%	34,450	98.9%	1,795	5.2%
Colorado	1,414	1,290	91%	1,266	98.1%	78	6.2%
Florida	683	567	83%	548	96.6%	20	3.6%
Massachusetts	564	529	94%	528	99.8%	13	2.5%
New Jersey	1,569	1,441	92%	1,436	99.7%	72	5.0%
New York	821	736	90%	678	92.1%	7	1.0%
Washington	480	460	96%	442	96.1%	13	2.9%
Total supplement	5,531	5,023	91%	4,898	97.5%	203	4.1%
Grand total	44,426	39,872	90%	39,348	98.7%	1,998	5.1%

*No telephone in household and at least one occupant under age 65.

**Table 4-9.
Outcomes of Area Screening**

State/Area	Completed Screeners	Response Rate on Screener	Households That Now Report Ineligibility*	Switching Rate Among Initially Eligible Households	Revised Eligibility Rate	Projected Eligibility Rate	Households Eligible for Within-household Sub-sampling
Alabama	168	86.6%	6	3.6%	5.9%	13.3%	162
California	69	77.5%	13	18.8%	3.7%	6.7%	56
Colorado	62	89.9%	4	6.5%	3.8%	8.8%	58
Florida	78	91.8%	2	2.6%	3.4%	10.1%	76
Massachusetts	33	75.0%	4	12.1%	2.0%	5.9%	29
Michigan	88	92.6%	16	18.2%	3.9%	9.0%	72
Minnesota	75	87.2%	6	8.0%	3.9%	5.4%	69
Mississippi	268	90.2%	11	4.1%	10.3%	16.9%	257
New Jersey	76	77.6%	8	10.5%	4.2%	8.5%	68
New York	66	82.5%	17	25.8%	2.4%	10.7%	49
Texas	154	82.4%	12	7.8%	7.4%	14.4%	142
Washington	57	65.5%	9	15.8%	3.7%	6.8%	48
Milwaukee, Wisc.	93	83.0%	0	0.0%	6.6%	5.8%	93
Balance, Wisc.	37	82.2%	2	5.4%	2.5%	6.0%	35
Balance, U.S.	199	87.7%	16	8.0%	4.9%	10.1	183
Total Original	1,523	84.8%	126	8.3%	4.8%	9.7	1,397
Colorado	71	91.0%	11	15.5%	5.2%		60
Florida	16	80.0%	2	12.5%	3.2%		14
Massachusetts	8	61.5%	2	25.0%	1.8%		6
New Jersey	55	76.4%	3	5.5%	4.7%		52
New York	3	42.9%	0	0.0%	1.0%		3
Washington	11	84.6%	0	0.0%	2.9%		11
Total Supplement	164	80.8%	18	11.0%	3.7%		146
Grand total	1,687	84.4%	144	8.5%	4.6%		1,543

*These households switched from reporting no telephone and at least one occupant under age 65 to either having a phone or having only elderly residents.

Chapter 5

Within-household Sampling and Achieved Sample Sizes

Within both the RDD and area components of the design, persons were sub-sampled within households. This sub-sampling was done primarily to reduce respondent burden. Different sub-sampling rules were used for children, adults in households with children, and adults in households without children. The first three sections of this chapter describe those rules. The last two sections give tables on the expected and achieved outcomes of the sub-sampling.

5.1 Sample Selection of Children

After selecting the households, children under 18 were sampled from the selected households for the child sample. When a household contained exactly one child, that child was always selected. In households with more than one child under 18, either one or two of the children were selected as follows: Among children 5 and under, one child was randomly selected, and among children 6-17, one child was also randomly selected. Thus, in households containing children under 6 and also children 6 and older, two children were selected. These rules were applied identically in the RDD and area components.

An interview was conducted with the MKA about each sample child. This person was often the mother or father of the child, but persons with other relationships to the child were also interviewed if they were most knowledgeable about a sample child.¹ During the interview about the child, questions were also asked about the MKA and his/her spouse/partner if the spouse/partner also lived within the household. All the questions about the spouse/partner were answered by proxy by the MKA. However, there were some questions that were asked only about the MKA² and there were others that were randomly asked about one of the two when both were present. The subject for the latter questions was randomly chosen between the MKA and his/her spouse/partner.³ This protocol was applied identically in the RDD and area components.

5.2 Sample Selection of Other Adults in Households with Children

A sample of adults under age 65, other than the MKA and his/her spouse/partner, was drawn from households with children, provided the household was sub-sampled for adults as discussed in Section 3.3. Adults in this category include adult siblings, grandparents, aunts, uncles, and other relatives of sample children, boarders, and live-in servants. The purpose of interviewing

¹ If a person under the age of 18 was identified as a focal child, but did not have an MKA or the MKA was the spouse or unmarried partner of this person, then this individual was determined an emancipated minor and regarded as an adult in the interview. In all, there were 33 emancipated minors in the 1997 NSAF.

² These questions concerned feelings, religious activities, and opinions. As a consequence of this rule, these questions were rarely asked of fathers in two-parent families.

³ These questions concerned health insurance and health care utilization. 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/her spouse/partner, the burden was reduced on the MKA.

some of these adults was to ensure their representation in estimates about the entire group of all adults under the age of 65. The sample selection of other adults was performed at the close of the MKA interview so that relationship data were available on all the adults in the household. To be eligible, the adults had to be under age 65 and not the parent of a child under age 18 living in the household. Ideally, the eligibility rule would have included only adults who were not potential MKAs or potential MKA spouse/partners for nonsample children under age 18 living in the household, but this would have involved asking detailed questions for each child in the household about who was the MKA for the child and which adults in the household might be spouse/partners of the potential MKAs. It was felt that such an approach would be too burdensome and that the small biases that were induced by the rule were acceptable. These biases involved multiple chances of selection for nonparent MKAs and no chance of selection for non-MKA parents. To clarify this last point, a parent had zero chance of selection if he/she resided with his/her child but was not viewed by the household respondent as the MKA or as the spouse/partner of the MKA. It was felt that such parents are exceedingly rare so that the omission from the sample was of little consequence.

In order to reduce the undersampling of other adults in households with large numbers of such adults, the sample size for other adults in a particular household depended upon the number of such adults present. If there were only one or two, then one of these adults was randomly selected. If there were three or more present, then two were randomly selected.

Once the random selection of one or two other adults was complete, the sample adults were interviewed. During each such interview, data were collected about both the sample adult and his/her spouse/partner if the spouse/partner also lived in the household.⁴ All this information was collected by proxy through the sample adult. The questions on health care insurance and utilization were asked about both the selected adult and the spouse/partner, but proxy responses from the selected adult were accepted for both of them. As with the MKA interview, some questions on feelings, opinions, and religion were asked only of the sample adult.

⁴ Since the sample selection was done at the close of the MKA interview, it was not possible to accidentally select both an adult and his/her spouse/partner and then ask them both about themselves and each other.

Table 5-1.
Proportion of RDD Adult-only Households with Three Other Adults Under Age 65 in
which Just One of the Adults is Selected

State/Area	Proportion
Alabama	0.54
California	0.65
Colorado	0.49
Florida	0.51
Massachusetts	0.56
Michigan	0.53
Minnesota	0.53
Mississippi	0.68
New Jersey	0.62
New York	0.65
Texas	0.56
Washington	0.53
Milwaukee	0.61
Bal., Wisconsin	0.57
Bal., U.S.	0.53

5.3 Sample Selection of Adults from Adult-only Households

The within-household sub-sampling rules for these adults under age 65 were similar to the rules for other adults in households with children. Either one or two adults were selected depending upon how many adults were present without respect to household income. Unlike other adults in households with children, the within-household sub-sampling rule was different for RDD households with three adults under age 65 than in corresponding area households. A decision was made based on a random number whether to sample one or to sample two in the RDD component. The probabilities for deciding whether to take one or two adults from adult-only RDD households with three adults varied by state and area. These probabilities are shown in Table 5-1. These probabilities were jointly set with the sub-sampling rate for adult-only telephone households in order to achieve targeted sample sizes for adults from adult-only households discussed in Section 3.3. Note that the rates do not vary by household income. In the area component, two adults were always selected when there were three present. The rules for households with other numbers of adults did not vary by component. As with the sample of other adults from households with children, data were collected by proxy (through the sample adult) about the spouse/partner of each sample adult if living in the household—except that some questions on feelings, religion, and opinions were asked only of the sampled adult.

The only slight difference was that no household relationship data were available at the time of sampling. Thus, it was possible to select both an adult and the spouse of that adult. When the

computer program detected that this had happened, the interview with the second spouse was cancelled. One feature of the design that is being considered in Cycle 2 concerns the order of collecting relationship data in these households when the randomly selected adult is not at home at the time of sample selection. It was sometimes the case in Cycle 1 that the spouse of the selected adult would be the person providing the information for sampling. Since most of the interview pertains to both spouses, it might be feasible to accept the spouse who is already on the phone as the respondent rather than trying to call at another time in order to speak to the selected person. The only problem would then be that the questions on feelings, religion, and opinions would not be asked on a random sample of adults but would tend to be biased toward women and types of persons that are more likely to be at home and answer the phone than their spouses/partners. This may be a serious drawback since it is already the case that these questions are never asked of spouses/partners of MKAs for focal children.

5.4 Expected Adult Sample Sizes

Table 5-2 shows the numbers of interviews and the effective sample sizes that were projected to result from the sub-sampling rates in Table 5-1 and the original retention rates for adult-only households. As discussed in Section 3.3, the household retention rates changed over the course of the survey and turned out not to have been large enough to meet the targets in Table 5-2. Accordingly, some of the adult-only households were restored to the sample. When this was done, the same procedures for income screening, sub-sampling of high-income households, and sub-sampling within households were carried out as in the original sample.

The left-hand side of the table counts expected interviews with adults who are neither MKAs for sample children nor spouse/partners of MKAs. It counts adult interviews from both households with children and from adult-only households. The right-hand side counts the number of adults about whom data were projected to be obtained, either through MKA interviews, other adult interviews, or through proxy response by sample spouses/partners. The effective sample sizes were projected in order to project precision levels on statistics pertaining to the complete universe of adults under age 65 in the nation.⁵

⁵ Subject, of course, to the exclusions discussed in Chapter 1 of the population in group quarters, the homeless, and others.

**Table 5-2.
Option B Expected Sample of Adults (Number of Persons)**

State/Area	Sampled Persons Only, Including Other Adults in Households with Children, but Excluding Spouses of Sample Persons and MKAs for Sample Children								Total Adults in Sample, Including MKAs, Spouses, and Other Adults			
	Telephone Expected Sample Size				Nontelephone Sample Size		Effective Sample Size		Total Achieved Sample Size		Effective Sample Size	
	Sampled as		Achieved Sample									
	Poor	Nonpoor	Poor	Nonpoor	Poor	Nonpoor	Poor	Total	Poor	Nonpoor	Poor	Nonpoor
Alabama	506	544	499	551	143	52	514	893	2,379	4,292	1,419	2,464
California	573	727	538	762	57	26	471	929	2,234	4,190	1,316	2,200
Colorado	573	627	548	652	49	76	559	617				
Florida	552	598	529	621	100	44	472	841	2,328	4,259	1,242	2,274
Massachusetts	645	905	578	972	40	26	434	1,085	2,149	5,190	1,164	2,867
Michigan	578	722	544	756	70	25	451	934	2,175	4,455	1,277	2,469
Minnesota	630	670	589	711	43	18	447	888	2,295	4,715	1,288	2,546
Mississippi	529	471	531	469	203	57	531	813	2,603	4,081	1,516	2,161
New Jersey	719	1,131	608	1242	74	50	473	1,264	2,412	5,980	1,298	3,178
New York	565	785	524	826	110	47	463	983	2,237	4,628	1,236	2,499
Texas	564	586	542	608	134	47	497	846	2,775	4,702	1,491	2,360
Washington	573	677	543	707	53	24	444	899	2,215	4,444	1,282	2,510
Milwaukee	639	661	599	701	50	16	486	853	2,108	4,229	1,193	2,254
Bal., Wisconsin	637	663	597	703	44	19	450	876	2,366	4,581	1,343	2,430
Bal., U.S.	1,035	1,165	987	1,213	145	57	809	1,591	3,552	6,823	2,257	4,025

5.5 Achieved Nominal Sample Sizes and Response Rates

Tables 5-3 through 5-17 show the results of the within-household sampling operations for children and adults by survey component (RDD or area) and by household income (low and total). These tables include achieved nominal sample sizes and response rates by site. Effective sample sizes will be smaller due to design effects. Contributions to the design effect are from clustering in the area sample and a variety of sources of variation in the probabilities of selection. Some of the groups that were undersampled include households without phones, households with screener income above 200 percent of the poverty threshold, households outside of the 13 focal states, children in households with multiple children in the same age range, adults in households without children, and other adults in households with children and multiple adults beside the MKA and spouse (e.g., grown children living with parents and young siblings). Effective sample sizes actually realized are given in the Variance Estimation Report number 4, in the NSAF 1997 Methodology Series.

Tables 5-3 through 5-7 are for the RDD component. The next group of five are for the area component, and the last set of five combine the two components. The first two tables in each set of five concern children. The others concern adults.

The response rates reported in the tables are the simple unweighted ratios of the number of interviewed persons to the number of sampled eligible persons. These rates reflect how well the operations of interviewing went for different groups. Response rates that include differential sampling rates and combine the screener and extended rates are discussed in detail in the Response Rates and Methods Evaluation Report number 8, in the NSAF 1997 Methodology Series.

Tables 5-3 and 5-4 show that, in telephone households, children under age 6 were selected at a higher rate than those 6 to 17 years old. This is a direct result of the sub-sampling rules that specified that only one child in the age range was to be sampled per household. Since the mean number of children per household is greater for 6- to 17-year-olds, the sub-sampling rate is lower for this group. The tables also show that the extended interview response rates for low-income children were about the same as for all children.

Tables 5-5 and 5-6 give similar information for the sampling and extended interview response rates for other adults (adults who are not MKAs or their spouse/partner) in telephone households. While almost 80 percent of the other adults listed in households with children were sampled, the rate was nearly 20 percent less in households without children. In addition, the extended response rate was higher in adult-only households. This may have been a consequence of having more difficulty locating and interviewing other adults (many of whom were older siblings still living at home) in households with children. In adult-only households, it is frequently possible to continue the interview since the screener respondent may be the sampled adult, and this tends to increase the response rate in these households.

Table 5-7 shows that well over one-half (61 percent) the adult interviews were conducted with the MKA of the sampled child. Only 36 percent of the adult interviews were conducted with

adults in households without children, and the remaining 5 percent were other adults in households with children.

Tables 5-8 to 5-12 are the corresponding counts for nontelephone households. In general, the results are very similar to those noted above for the telephone sample. The main difference is that the extended response rates are much higher—for children the response rates are about 97 percent, for other adults in households with children the rates are around 90 percent, and for adults in adult-only households the rates are about 90 percent. Again, the likely reason for the lower rates for other adults in households with children has to do with locating the sampled person to conduct the interview.

Tables 5-13 to 5-17 combine the telephone and nontelephone results to provide counts for the entire effort. While these tables do provide the overall counts, they provide less information about the interviewing results than the previous tables because they combine together units that have different attributes. For example, the extended response rates in these tables are very similar to those in the telephone tables because the sample size from the RDD sample was so much larger that it dominates the combined rates. Thus, while these tables are valuable as a summary of the counts of the number of extended interviews, they do not provide much insight into the survey operations.

Table 5-3.
Within-household Sampling and Extended Interviews of Children in
Telephone Low-income Households

State/Area	Children Under Age 6						Children 6 to 17					
	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed	Selected	Average selection rate (%)	Inter-viewed	In-eligible	Response rate (%)
Alabama	738	536	72.6	430	2	80.5	1,596	930	58.3	761	1	81.9
California	1,015	703	69.3	539	1	76.8	1,830	982	53.7	743	1	75.7
Colorado	839	592	70.6	484	0	81.8	1,639	890	54.3	737	1	82.9
Florida	747	561	75.1	450	1	80.4	1,678	926	55.2	750	1	81.1
Massachusetts	759	556	73.3	441	0	79.3	1,695	916	54.0	730	0	79.7
Michigan	732	503	68.7	398	0	79.1	1,604	848	52.9	698	1	82.4
Minnesota	816	549	67.3	472	0	86.0	1,799	898	49.9	795	0	88.5
Mississippi	686	503	73.3	422	0	83.9	1,622	921	56.8	765	0	83.1
New Jersey	803	571	71.1	447	2	78.6	1,729	956	55.3	736	0	77.0
New York	965	650	67.4	497	1	76.6	1,877	1,039	55.4	814	0	78.3
Texas	973	681	70.0	538	1	79.1	1,911	1,046	54.7	844	1	80.8
Washington	875	610	69.7	514	0	84.3	1,829	963	52.7	820	2	85.3
Milwaukee	746	512	68.6	411	2	80.6	1,549	789	50.9	624	1	79.2
Bal., Wisc.	750	514	68.5	457	1	89.1	1,769	901	50.9	814	0	90.3
Bal., U.S.	1,209	864	71.5	746	0	86.3	2,554	1,386	54.3	1,182	0	85.3
Total	12,653	8,905	70.4	7,246	11	81.5	26,681	14,391	53.9	11,813	9	82.1

Table 5-4.
Within-household Sampling and Extended Interviews of Children in
All Sub-sampled Telephone Households

State / Area	Children Under Age 6						Children 6 to 17					
	Listed in Sub-Sampled Households	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	1,097	819	74.7	665	2	81.4	2,576	1,589	61.7	1,314	2	82.8
California	1,458	1,047	71.8	805	2	77.0	2,839	1,578	55.6	1,207	2	76.6
Colorado	1,373	1,005	73.2	811	1	80.8	3,026	1,728	57.1	1,425	3	82.6
Florida	1,173	900	76.7	719	2	80.1	2,652	1,564	59.0	1,270	1	81.3
Massachusetts	1,481	1,095	73.9	894	1	81.7	3,209	1,819	56.7	1,460	1	80.3
Michigan	1,247	892	71.5	729	0	81.7	2,907	1,630	56.1	1,353	1	83.1
Minnesota	1,339	940	70.2	827	0	88.0	3,084	1,666	54.0	1,477	0	88.7
Mississippi	969	731	75.4	613	1	84.0	2,356	1,409	59.8	1,172	1	83.2
New Jersey	1,561	1,156	74.1	914	3	79.3	3,423	1,995	58.3	1,552	0	77.8
New York	1,464	1,036	70.8	809	1	78.2	3,027	1,761	58.2	1,401	0	79.6
Texas	1,350	979	72.5	783	1	80.1	2,983	1,687	56.6	1,353	1	80.2
Washington	1,428	1,042	73.0	883	0	84.7	3,266	1,819	55.7	1,557	2	85.7
Milwaukee	1,106	790	71.4	640	2	81.2	2,483	1,368	55.1	1,103	1	80.7
Bal., Wisc.	1,250	886	70.9	796	1	89.9	3,070	1,688	55.0	1,502	0	89.0
Bal., U.S.	1,873	1,372	73.3	1,179	0	85.9	4,245	2,406	56.7	2,064	0	85.8
Total	20,169	14,690	72.8	12,067	17	82.2	45,146	25,707	56.9	21,210	15	82.6

Table 5-5.
Within-household Sampling and Extended Interviews of Other Adults* in
Sub-sampled Telephone Households with Children

State/Area	Low-income Telephone Households with Children						All Telephone Households with Children					
	Listed Other Adults	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed Other Adults	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	128	104	81.3	77	4	77.0	222	184	82.9	135	4	75.0
California	306	228	74.5	142	7	64.3	482	357	74.1	218	8	62.5
Colorado	179	142	79.3	97	2	69.3	311	249	80.1	177	4	72.2
Florida	155	120	77.4	74	6	64.9	213	166	77.9	106	7	66.7
Massachusetts	117	92	78.6	60	1	65.9	218	179	82.1	117	3	66.5
Michigan	124	101	81.5	59	2	59.6	268	213	79.5	141	3	67.1
Minnesota	157	126	80.3	98	1	78.4	286	236	82.5	179	2	76.5
Mississippi	183	148	80.9	101	4	70.1	253	207	81.8	145	5	71.8
New Jersey	218	168	77.1	99	3	60.0	387	302	78.0	184	7	62.4
New York	187	142	75.9	79	7	58.5	309	235	76.1	149	9	65.9
Texas	188	141	75.0	90	2	64.7	271	212	78.2	139	3	66.5
Washington	223	174	78.0	125	4	73.5	371	292	78.7	203	5	70.7
Milwaukee	113	92	81.4	55	4	62.5	198	160	80.8	102	5	65.8
Bal., Wisc.	143	121	84.6	89	4	76.1	286	239	83.6	187	7	80.6
Bal., U.S.	212	165	77.8	113	2	69.3	395	312	79.0	225	3	72.8
Total	2,633	2,064	78.4	1,358	53	67.5	4,470	3,543	79.3	2,407	75	69.4

*Adults who are neither the MKA about a sample child nor the spouse of such a person, nor the parent of a child under age 18 in the household.

Table 5-6.
Sub-sampling and Extended Interviews of Adults in Sub-sampled
Adult-only Telephone Households

State/Area	Low-income Adult-only Households						All Adult-only Households					
	Listed Adults	Selected	Selection Rate (%)	Inter-viewed	In-eligible	Rate (%)	Listed Adults	Selected	Selection Rate (%)	Inter-viewed	In-eligible	Rate (%)
Alabama	700	455	65.0	364	0	80.0	1,599	991	62.0	801	0	80.5
California	890	521	58.5	384	0	73.7	2,288	1,326	58.0	987	1	74.0
Colorado	1,000	622	62.2	471	1	75.8	2,847	1,700	59.7	1,314	3	77.3
Florida	648	406	62.7	289	1	71.4	1,597	950	59.5	704	2	74.1
Massachusetts	966	596	61.7	426	0	71.5	3,144	1,838	58.5	1,351	3	73.6
Michigan	778	488	62.7	387	0	79.3	2,273	1,350	59.4	1,057	3	78.3
Minnesota	990	628	63.4	515	1	82.1	2,899	1,733	59.8	1,430	1	82.4
Mississippi	732	453	61.9	357	1	79.0	1,570	926	59.0	729	2	78.8
New Jersey	1,271	765	60.2	532	1	69.6	3,936	2,245	57.0	1,562	9	69.7
New York	776	487	62.8	367	2	75.7	1,983	1,178	59.4	864	5	73.6
Texas	656	392	59.8	295	1	75.4	1,507	881	58.5	651	5	74.2
Washington	1,098	689	62.8	538	2	78.3	3,014	1,801	59.8	1,444	5	80.2
Milwaukee	625	409	65.4	330	0	80.7	1,613	1,008	62.5	814	0	80.6
Bal., Wisc.	1,007	604	60.0	482	1	79.9	2,647	1,533	57.9	1,239	7	81.1
Bal., U.S.	1,744	1,085	62.2	839	4	77.6	4,371	2,611	59.7	2,019	8	77.4
Total	13,881	8,600	62.0	6,576	15	76.6	37,288	22,071	59.2	16,966	54	76.9

**Table 5-7.
Sources of Adult Telephone Interviews**

State/Area	MKA for Sample Child	Spouse of MKA	Other Adults in Household with Children		Adults in Household without Children		Total Adult Extended Interviews
			Interviewed	Spouse	Interviewed	Spouse	
Alabama	1,644	1,089	135	8	801	360	2,580
California	1,586	1,059	218	32	987	398	2,791
Colorado	1,838	1,331	177	12	1,314	573	3,329
Florida	1,642	1,075	106	9	704	359	2,452
Massachusetts	1,943	1,346	117	5	1,351	549	3,411
Michigan	1,722	1,231	141	6	1,057	509	2,920
Minnesota	1,873	1,407	179	12	1,430	646	3,482
Mississippi	1,478	928	145	12	729	364	2,352
New Jersey	2,025	1,460	184	7	1,562	649	3,771
New York	1,780	1,142	149	4	864	340	2,793
Texas	1,742	1,209	139	16	651	299	2,532
Washington	1,975	1,457	203	19	1,444	705	3,622
Milwaukee	1,431	810	102	4	814	266	2,347
Bal., Wisc.	1,900	1,476	187	5	1,239	614	3,326
Bal., U.S.	2,669	1,879	225	24	2,019	951	4,913
Total	27,248	18,899	2,407	175	16,966	7,582	46,621

Table 5-8.
Within-household Sampling and Extended Interviews of Children in
Nontelephone Low-income Households

State/Area	Children Under Age 6						Children 6 to 17					
	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	75	50	66.7	49	1	100.0	122	61	50.0	60	0	98.4
California	44	24	54.5	21	0	87.5	66	26	39.4	22	0	84.6
Colorado	29	24	82.8	23	0	95.8	63	33	52.4	31	0	93.9
Florida	60	36	60.0	35	0	97.2	58	32	55.2	31	1	100.0
Massachusetts	18	13	72.2	13	0	100.0	30	12	40.0	12	0	100.0
Michigan	37	25	67.6	25	0	100.0	56	29	51.8	29	0	100.0
Minnesota	46	29	63.0	28	0	96.6	54	25	46.3	25	0	100.0
Mississippi	134	87	64.9	87	0	100.0	195	101	51.8	98	1	98.0
New Jersey	54	41	75.9	39	0	95.1	89	49	55.1	47	0	95.9
New York	19	15	78.9	14	1	100.0	45	24	53.3	24	0	100.0
Texas	96	52	54.2	49	0	94.2	100	48	48.0	48	0	100.0
Washington	23	15	65.2	14	0	93.3	26	14	53.8	13	0	92.9
Milwaukee	50	28	56.0	28	0	100.0	58	30	51.7	30	0	100.0
Bal., Wisc.	10	6	60.0	6	0	100.0	19	12	63.2	11	0	91.7
Bal., U.S.	101	68	67.3	66	0	97.1	148	72	48.6	69	0	95.8
Total	796	513	64.4	497	2	97.3	1,129	568	50.3	550	2	97.2

Table 5-9.
Within-household Sampling and Extended Interviews of Children in
All Nontelephone Households

State/Area	Children Under Age 6						Children 6 to 17					
	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	80	55	68.8	54	1	100.0	128	66	51.6	65	0	98.5
California	51	28	54.9	25	0	89.3	67	27	40.3	23	0	85.2
Colorado	32	27	84.4	26	0	96.3	68	38	55.9	36	0	94.7
Florida	64	39	60.9	38	0	97.4	68	37	54.4	36	1	100.0
Massachusetts	18	13	72.2	13	0	100.0	35	14	40.0	14	0	100.0
Michigan	40	28	70.0	28	0	100.0	63	33	52.4	33	0	100.0
Minnesota	49	31	63.3	30	0	96.8	55	26	47.3	26	0	100.0
Mississippi	146	94	64.4	94	0	100.0	210	108	51.4	105	1	98.1
New Jersey	64	47	73.4	45	0	95.7	99	57	57.6	55	0	96.5
New York	20	16	80.0	15	1	100.0	49	28	57.1	27	0	96.4
Texas	106	59	55.7	55	0	93.2	123	60	48.8	58	0	96.7
Washington	27	17	63.0	16	0	94.1	28	15	53.6	14	0	93.3
Milwaukee	54	31	57.4	31	0	100.0	58	30	51.7	30	0	100.0
Bal., Wisc.	14	10	71.4	9	0	90.0	24	15	62.5	13	0	86.7
Bal., U.S.	107	71	66.4	69	0	97.2	164	83	50.6	80	0	96.4
Total	872	566	64.9	548	2	97.2	1,239	637	51.4	615	2	96.9

Table 5-10.
Within-household Sampling and Extended Interviews of Other Adults* in
Nontelephone Households with Children

State/Area	Low-income Telephone Households with Children						All Telephone Households with Children					
	Listed Other Adults	Selected	Average Selection Rate	Inter-viewed	In-eligible	Response Rate	Listed Other Adults	Selected	Average Selection Rate	Inter-viewed	In-eligible	Response Rate
Alabama	15	12	80.0	9	0	75.0	16	13	81.3	9	0	69.2
California	13	9	69.2	6	1	75.0	14	10	71.4	6	1	66.7
Colorado	12	9	75.0	7	0	77.8	17	13	76.5	10	1	83.3
Florida	7	6	85.7	5	0	83.3	12	9	75.0	7	0	77.8
Massachusetts	4	4	100.0	2	1	66.7	4	4	100.0	2	1	66.7
Michigan	8	8	100.0	7	1	100.0	12	11	91.7	10	1	100.0
Minnesota	11	9	81.8	8	0	88.9	12	10	83.3	9	0	90.0
Mississippi	36	27	75.0	26	0	96.3	39	29	74.4	28	0	96.6
New Jersey	14	11	78.6	9	0	81.8	15	12	80.0	10	0	83.3
New York	5	3	60.0	2	0	66.7	7	5	71.4	4	0	80.0
Texas	8	7	87.5	2	0	28.6	12	10	83.3	5	0	50.0
Washington	2	2	100.0	1	0	50.0	4	3	75.0	2	0	66.7
Milwaukee	7	7	100.0	7	0	100.0	10	9	90.0	9	0	100.0
Bal., Wisc.	2	2	100.0	2	0	100.0	3	3	100.0	3	0	100.0
Bal., U.S.	13	11	84.6	7	0	63.6	14	12	85.7	7	0	58.3
Total	157	127	80.9	100	3	80.6	191	153	80.1	121	4	81.2

*Adults who are neither the MKA about a sample child nor the spouse of such a person, nor parent of a child under age 18 in the household.

Table 5-11.
Sub-sampling and Extended Interviews of Adults in Adult-Only Nontelephone Households

State/Area	Low-income Adult-Only Nontelephone Households						All Adult-Only Nontelephone Households					
	Listed Adults	Selected	Selection Rate (%)	Inter-viewed	In-eligible	Rate (%)	Listed Adults	Selected	Selection Rate (%)	Inter-viewed	In-eligible	Rate (%)
Alabama	78	54	69.2	52	1	98.1	104	72	69.2	69	1	97.2
California	39	22	56.4	15	1	71.4	48	28	58.3	20	1	74.1
Colorado	67	47	70.1	44	0	93.6	95	67	70.5	61	1	92.4
Florida	45	29	64.4	24	0	82.8	59	38	64.4	32	0	84.2
Massachusetts	19	13	68.4	12	0	92.3	29	18	62.1	17	0	94.4
Michigan	33	24	72.7	23	0	95.8	38	28	73.7	27	0	96.4
Minnesota	24	20	83.3	19	0	95.0	35	27	77.1	26	0	96.3
Mississippi	139	97	69.8	91	0	93.8	187	130	69.5	121	0	93.1
New Jersey	42	29	69.0	26	0	89.7	77	51	66.2	46	0	90.2
New York	15	14	93.3	14	0	100.0	23	19	82.6	17	0	89.5
Texas	65	44	67.7	41	0	93.2	88	58	65.9	49	0	84.5
Washington	42	30	71.4	29	0	96.7	59	39	66.1	35	0	89.7
Milwaukee	56	41	73.2	38	0	92.7	73	53	72.6	47	0	88.7
Bal., Wisc.	18	12	66.7	11	0	91.7	23	16	69.6	15	0	93.8
Bal., U.S.	87	55	63.2	51	0	92.7	113	71	62.8	64	0	90.1
Total	769	531	69.1	490	2	92.6	1,051	715	68.0	646	3	90.7

Table 5-12.
Sources of Adult Nontelephone Interviews

State/Area	MKA for Sample Child	Spouse of MKA	Other Adults in Household with Children		Adults in Household without Children		Total Adult Extended Interviews
			Interviewed	Spouse	Interviewed	Spouse	
Alabama	98	44	9	2	69	22	176
California	36	21	6	1	20	1	62
Colorado	55	36	10	0	61	16	126
Florida	57	22	7	1	32	10	96
Massachusetts	21	8	2	0	17	5	40
Michigan	46	12	10	0	27	6	83
Minnesota	46	21	9	1	26	4	81
Mississippi	150	62	28	4	121	29	299
New Jersey	74	24	10	1	46	13	130
New York	34	9	4	0	17	1	55
Texas	89	43	5	0	49	14	143
Washington	24	17	2	1	35	3	61
Milwaukee	47	16	9	2	47	11	103
Bal., Wisc.	18	11	3	0	15	3	36
Bal., U.S.	120	72	7	1	64	25	191
Total	915	418	121	14	646	163	1,682

Table 5-13.
Within-household Sampling and Extended Interviews of Children in Telephone
and Nontelephone Low-income Households

State/Area	Children Under Age 6						Children 6 to 17					
	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	1,813	586	72.1	479	3	81.7	1,718	991	57.7	821	1	82.8
California	1,059	727	68.6	560	1	77.0	1,896	1,008	53.2	765	1	75.9
Colorado	868	616	71.0	507	0	82.3	1,702	923	54.2	768	1	83.3
Florida	807	597	74.0	485	1	81.2	1,736	958	55.2	781	2	81.5
Massachusetts	777	569	73.2	454	0	79.8	1,725	928	53.8	742	0	80.0
Michigan	769	528	68.7	423	0	80.1	1,660	877	52.8	727	1	82.9
Minnesota	862	578	67.1	500	0	86.5	1,853	923	49.8	820	0	88.8
Mississippi	820	590	72.0	509	0	86.3	1,817	1,022	56.2	863	1	84.4
New Jersey	857	612	71.4	486	2	79.4	1,818	1,005	55.3	783	0	77.9
New York	984	665	67.6	511	2	76.8	1,922	1,063	55.3	838	0	78.8
Texas	1,069	733	68.6	587	1	80.1	2,011	1,094	54.4	892	1	81.5
Washington	898	625	69.6	528	0	84.5	1,855	977	52.7	833	2	85.3
Milwaukee	796	540	67.8	439	2	81.3	1,607	819	51.0	654	1	79.9
Bal., Wisc.	760	520	68.4	463	1	89.0	1,788	913	51.1	825	0	90.4
Bal., U.S.	1,310	932	71.1	812	0	87.1	2,702	1,458	54.0	1,251	0	85.8
Total	13,449	9,418	70.0	7,743	13	82.2	27,810	14,959	53.8	12,363	11	82.6

Table 5-14.
Within-household Sampling and Extended Interviews of Children in All
Telephone and Nontelephone Households

State/Area	Children Under Age 6						Children 6 to 17					
	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	1,177	874	74.3	719	3	82.3	2,704	1,655	61.2	1,379	2	83.3
California	1,509	1,075	71.2	830	2	77.2	2,906	1,605	55.2	1,230	2	76.6
Colorado	1,405	1,032	73.5	837	1	81.2	3,094	1,766	57.1	1,461	3	82.8
Florida	1,237	939	75.9	757	2	80.6	2,720	1,601	58.9	1,306	2	81.6
Massachusetts	1,499	1,108	73.9	907	1	81.9	3,244	1,833	56.5	1,474	1	80.4
Michigan	1,287	920	71.5	757	0	82.3	2,970	1,663	56.0	1,386	1	83.3
Minnesota	1,388	971	70.0	857	0	88.3	3,139	1,692	53.9	1,503	0	88.8
Mississippi	1,115	825	74.0	707	1	85.7	2,566	1,517	59.1	1,277	2	84.2
New Jersey	1,625	1,203	74.0	959	3	79.7	3,522	2,052	58.3	1,607	0	78.3
New York	1,484	1,052	70.9	824	2	78.3	3,076	1,789	58.2	1,428	0	79.8
Texas	1,456	1,038	71.3	838	1	80.7	3,106	1,747	56.2	1,411	1	80.8
Washington	1,455	1,059	72.8	899	0	84.9	3,294	1,834	55.7	1,571	2	85.7
Milwaukee	1,160	821	70.8	671	2	81.7	2,541	1,398	55.0	1,133	1	81.0
Bal., Wisc.	1,264	896	70.9	805	1	89.8	3,094	1,703	55.0	1,515	0	89.0
Bal., U.S.	1,980	1,443	72.9	1,248	0	86.5	4,409	2,489	56.5	2,144	0	86.1
Total	21,041	15,256	72.5	12,615	19	82.7	46,385	26,344	56.8	21,825	17	82.8

Table 5-15.
Within-household Sampling and Extended Interviews of Other Adults* in Telephone and
Nontelephone Households with Children

State/Area	Low-income Households with Children						All Households with Children					
	Listed Other Adults	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed Other Adults	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	143	116	81.1	86	4	74.1	238	197	82.8	144	4	73.1
California	319	237	74.3	148	8	62.4	496	367	74.0	224	9	61.0
Colorado	191	151	79.1	104	2	68.8	328	262	79.9	187	5	72.8
Florida	162	126	77.8	79	6	62.7	225	175	77.8	113	7	64.6
Massachusetts	121	96	79.3	62	2	64.6	222	183	82.4	119	4	65.0
Michigan	132	109	82.6	66	3	60.6	280	224	80.0	151	4	67.4
Minnesota	168	135	80.4	106	1	78.5	298	246	82.6	188	2	76.4
Mississippi	219	175	79.9	127	4	72.6	292	236	80.8	173	5	73.3
New Jersey	232	179	77.2	108	3	60.3	402	314	78.1	194	7	61.8
New York	192	145	75.5	81	7	55.9	316	240	75.9	153	9	63.8
Texas	196	148	75.5	92	2	62.2	283	222	78.4	144	3	64.9
Washington	225	176	78.2	126	4	71.6	375	295	78.7	205	5	69.5
Milwaukee	120	99	82.5	62	4	62.6	208	169	81.3	111	5	65.7
Bal., Wisc.	145	123	84.8	91	4	74.0	289	242	83.7	190	7	78.5
Bal., U.S.	225	176	78.2	120	2	69.0	409	324	79.2	232	3	72.3
Total	2,790	2,191	78.5	1,458	56	66.5	4,661	3,696	79.3	2,528	79	68.4

*Adults who are neither the MKA about a sample child nor the spouse of such a person, nor the parent of a child under age 18 in the household.

Table 5-16.
Sub-sampling and Extended Interviews of Adults in Adult-Only
Telephone and Nontelephone Households

State/Area	Low-income Adult-Only Households						All Adult-Only Households					
	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)	Listed	Selected	Average Selection Rate (%)	Inter-viewed	In-eligible	Response Rate (%)
Alabama	778	509	65.4	416	1	81.9	1,707	1,066	62.4	870	1	81.7
California	929	543	58.4	399	1	73.6	2,344	1,361	58.1	1,007	2	74.1
Colorado	1,067	669	62.7	515	1	77.1	2,947	1,770	60.1	1,375	4	77.9
Florida	693	435	62.8	313	1	72.1	1,658	990	59.7	736	2	74.5
Massachusetts	985	609	61.8	438	0	71.9	3,176	1,858	58.5	1,368	3	73.7
Michigan	811	512	63.1	410	0	80.1	2,314	1,380	59.6	1,084	3	78.7
Minnesota	1,014	648	63.9	534	1	82.5	2,939	1,764	60.0	1,456	1	82.6
Mississippi	871	550	63.1	448	1	81.6	1,760	1,058	60.1	850	2	80.5
New Jersey	1,313	794	60.5	558	1	70.4	4,023	2,302	57.2	1,608	9	70.1
New York	791	501	63.3	381	2	76.4	2,007	1,198	59.7	881	5	73.8
Texas	721	436	60.5	336	1	77.2	1,598	941	58.9	700	5	74.8
Washington	1,140	719	63.1	567	2	79.1	3,079	1,844	59.9	1,479	5	80.4
Milwaukee	681	450	66.1	368	0	81.8	1,692	1,064	62.9	861	0	80.9
Bal., Wisc.	1,025	616	60.1	493	1	80.2	2,676	1,552	58.0	1,254	7	81.2
Bal., U.S.	1,831	1,140	62.3	890	4	78.3	4,497	2,691	59.8	2,083	8	77.6
Total	14,650	9,131	62.3	7,066	17	77.5	38,417	22,839	59.5	17,612	57	77.3

Table 5-17.
Sources of Adult Telephone and Nontelephone Interviews

State/Area	MKA for Sample Child	Spouse of MKA	Other Adults in Household with Children		Adults in Household without Children		Total Adult Extended Interviews
			Interviewed	Spouse	Interviewed	Spouse	
Alabama	1,742	1,133	144	10	870	382	2,756
California	1,622	1,080	224	33	1,007	399	2,853
Colorado	1,893	1,367	187	12	1,375	589	3,455
Florida	1,699	1,097	113	10	736	369	2,548
Massachusetts	1,964	1,354	119	5	1,368	554	3,451
Michigan	1,768	1,243	151	6	1,084	515	3,003
Minnesota	1,919	1,428	188	13	1,456	650	3,563
Mississippi	1,628	990	173	16	850	393	2,651
New Jersey	2,099	1,484	194	8	1,608	662	3,901
New York	1,814	1,151	153	4	881	341	2,848
Texas	1,831	1,252	144	16	700	313	2,675
Washington	1,999	1,474	205	20	1,479	708	3,683
Milwaukee	1,478	826	111	6	861	277	2,450
Bal., Wisc.	1,918	1,487	190	5	1,254	617	3,362
Bal., U.S.	2,789	1,951	232	25	2,083	976	5,104
Total	28,163	19,317	2,528	189	17,612	7,745	48,303

Chapter 6

Conclusion

This report has described the most salient features of the sampling procedures used in the 1997 NSAF. Particular emphasis has been given to the difficulties to be overcome because of the dual-frame nature of the survey, with both telephone and area components. Telephone and area samples had to be carefully developed so that they could be combined to provide a sound basis for making inferences to the populations for each of the 13 states and for the nation.

As the report describes, there were several key challenges to be addressed in designing and selecting the 1997 NSAF sample. For example, determining how much of the interviewing effort should be allocated to the telephone and to the nontelephone components had important consequences on the efficiency of the overall sample. This report presents the rationale for the decisions made and how the decisions were actually implemented. Tables are also given that document the sample sizes achieved.

Sample design and selection is just one of many activities undertaken in the 1997 NSAF. Other reports in the present Methodology Series will be released soon and many are closely related to the sample design. One set of these reports is on the statistical methodology used to produce estimates from the survey—weighting, variance estimation, and data preparation methods. Another set of reports describes the telephone and in-person data collection methods in considerably more detail. There is also a report on the response rates for the 1997 NSAF, including an evaluation of the methods used to increase those rates. Later reports provide a basis for assessing the success of the survey—e.g., one report compares estimates from the NSAF to those from other surveys and another examines the potential nonresponse bias using data from a special nonresponse study.

The hope is that these reports, taken as a whole, will give a relatively complete picture of the survey methods employed in mounting the 1997 NSAF. Similar reports in this methodology series are planned for the 1999 NSAF.

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