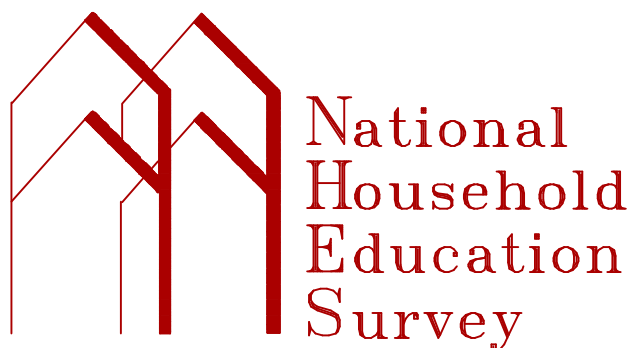# NATIONAL CENTER FOR EDUCATION STATISTICS

Technical Report   **March 1997**

National Household Education Survey

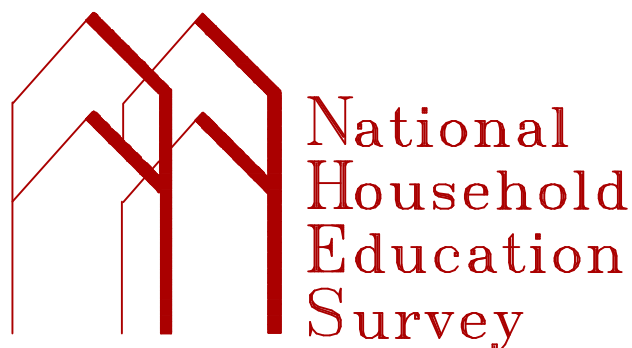# Feasibility of Conducting Followup Surveys in the National Household Education Survey

National Household Education Survey

National Household Education Survey

Feasibility of Conducting Followup Surveys in the National Household Education Survey

J. Michael Brick
Mary Collins
Elizabeth Davies

Westat, Inc.

Kathryn Chandler

National Center for Education Statistics

U.S. Department of Education
Richard W. Riley
Secretary

Office of Educational Research and Improvement
Marshall S. Smith
Assistant Secretary

National Center for Education Statistics
Pascal D. Forgione, Jr.
Commissioner

The National Center for Education Statistics (NCES) is the primary federal entity for collecting, analyzing, and reporting data related to education in the United States and other nations. It fulfills a congressional mandate to collect, collate, analyze, and report full and complete statistics on the condition of education in the United States; conduct and publish reports and specialized analyses of the meaning and significance of such statistics; assist state and local education agencies in improving their statistical systems; and review and report on education activities in foreign countries.

NCES activities are designed to address high priority education data needs; provide consistent, reliable, complete, and accurate indicators of education status and trends; and report timely, useful, and high quality data to the U.S. Department of Education, the Congress, the states, other education policymakers, practitioners, data users, and the general public.

We strive to make our products available in a variety of formats and in language that is appropriate to a variety of audiences. You, as our customer, are the best judge of our success in communicating information effectively. If you have any comments or suggestions about this or any other NCES product or report, we would like to hear from you. Please direct your comments to:

> National Center for Education Statistics
> Office of Educational Research and Improvement
> U.S. Department of Education
> 555 New Jersey Avenue, NW
> Washington, DC 20208-5574

March 1997

Contact:
Kathryn Chandler
(202) 219-1767

Table of Contents

List of Tables

List of Tables (continued)

List of Figures and Exhibits

Background of the NHES

Most large random-digit-dial telephone surveys conducted in the U.S. are cross-sectional studies that examine characteristics of the population at a particular point in time. A longitudinal design is another method for surveying the population that has important advantages over repeated cross-sectional surveys for estimating changes over time. This report examines the feasibility of conducting a longitudinal survey when the base year data are from a random-digit-dial telephone survey. The National Household Education Survey was the vehicle for this research and is described below prior to a more complete discussion of the rationale for the study.

The National Household Education Survey (NHES) is a data collection system of the National Center for Education Statistics (NCES), which has as its legislative mission the collection and publication of data on the condition of education in the Nation. The NHES is specifically designed to support this mission by providing information on those educational issues that are best addressed by contacting households rather than schools or other educational institutions. The NHES provides descriptive data on the educational activities of the U.S. population and offers policymakers, researchers, and educators a variety of statistics on the condition of education in the United States.

The NHES is a telephone survey of the noninstitutionalized civilian population of the U.S. Households are selected for the survey using random-digit-dialing (RDD) methods, and data are collected using computer-assisted telephone interviewing (CATI) procedures. Approximately 60,000 households are screened for each administration, and individuals within households who meet predetermined criteria are sampled for more detailed or extended interviews. The data are weighted to permit estimates of the entire population. The NHES survey for a given year typically consists of a Screener, which collects household composition and demographic data, and extended interviews on two substantive components addressing education-related topics. In order to assess data item reliability and inform future NHES surveys, each administration also includes a subsample of respondents for a reinterview.

The primary purpose of the NHES is to conduct repeated measurements of the same phenomena at different points in time. Throughout its history, the NHES has collected data in ways that permit estimates to be tracked across time. This includes repeating topical components on a rotating basis in order to provide comparative data across survey years. In addition, each administration of the NHES has benefitted from experiences with previous cycles, resulting in enhancements to the survey procedures and content. Thus, while the survey affords the opportunity for tracking phenomena across time, it is also dynamic in addressing new issues and including conceptual and methodological refinements.

A new design feature of the NHES program implemented in the NHES:96 was the collection of demographic and educational information on members of all screened households, rather than just those households potentially eligible for a topical component. In addition, this expanded screening feature included a brief set of questions on an issue of interest to education program administrators or policymakers. The total Screener sample size was sufficient to produce state estimates of household characteristics for the NHES:96.

Full-scale implementations of the NHES have been conducted in 1991, 1993, 1995, and 1996. Topics addressed by the NHES:91 were early childhood education and adult education. The NHES:93 collected information about school readiness and school safety and discipline. The 1991 components were repeated for the NHES:95, addressing early childhood program participation and adult education. Both components underwent substantial redesign to incorporate new issues and develop new measurement approaches. In the NHES:96, the topical components were parent/family involvement in education and civic involvement. The NHES:96 expanded screening feature included a set of questions on public library use.

In addition to its topical components, the NHES system has also included a number of methodological investigations. These have resulted in technical reports and working papers covering diverse topics such as telephone undercoverage bias, proxy reporting, and sampling methods. This series of technical reports and working papers provides valuable information on ways of improving the NHES.

Rationale for a Longitudinal Feasibility Study

The NHES employs a cross-sectional design, which allows for the collection of detailed information on independent samples of households that are different across administrations. In contrast, studies using a longitudinal design collect data from a sample of respondents at more than one point in time. The ability to track a sample across time, addressing the same research questions, can provide precise measurement of the process and outcomes of educational experiences.

Longitudinal studies are often undertaken to study how experiences and activities relate to outcomes that occur later in time. For example, longitudinal studies of students such as High School and Beyond (Zahs et al. 1995), the National Educational Longitudinal Study (Ingels 1994), and the Beginning Postsecondary Students Longitudinal Study (Fitzgerald 1994) have been used to measure relationships between the experiences of students and later educational achievement, enrollment in postsecondary schooling, and career paths. For longitudinal studies of young children, a primary objective is to better understand how early childhood experiences, including participation in educational programs, prepare children for success in school.

Longitudinal data collection programs also provide a unique opportunity to examine the process of change. For example, with a longitudinal approach to early childhood experiences, it is possible to accurately capture the number and types of programs in which a child participates at different points in his or her early years, as well as

to examine how the types of programs change in relation to changing family composition and economic circumstances. Such data may be of great value in assessing how these early experiences are associated with later educational progress.

There are other methodological features associated with using longitudinal designs in educational research (Bailar 1989). For example, cross-sectional surveys have attempted to assess change in children's development over time by collecting retrospective information from parents. However, reliance on respondents' memory can be particularly error-prone. A longitudinal approach reduces the error associated with recall because the data are collected near the time the events occur. The accuracy afforded by this approach may permit the identification of relationships that might be obscured by the response errors inherent in cross-sectional surveys.

Since one of the goals of the NHES is to monitor changes over time, both nationally and for key subgroups, longitudinal approaches have a natural appeal. Duncan and Kalton (1987) describe a variety of measures of change and the design approaches that are most advantageous for these measures. A longitudinal design is the only approach that permits estimates of changes at the individual (micro) level. For example, a longitudinal design is necessary to examine how events and experiences in a child's early life affect performance later in life, assuming retrospective data collection is not deemed reliable. The implementation of a longitudinal design would greatly enhance the analytic potential of the NHES data sets. Assessing the ability of the NHES to be a vehicle to address these types of issues in addition to providing cross-sectional estimates of the population was the motivation for this study.

While much is known about the difficulties and successes associated with longitudinal studies based on institutional samples or in-person base year interviews, little is known about longitudinal studies based on random-digit-dial (RDD) samples. Booth and Johnson (1985) report on a study of just over 2,000 married couples who were

selected by RDD in the base year and were interviewed 3 years later, after interim tracking contacts.

As a part of a methodological investigation, the NHES:91 contained an experiment to test the feasibility of using the NHES as a mechanism to conduct longitudinal studies of young children. The complex design and methodological procedures of the NHES present important challenges to undertaking a longitudinal approach. For example, random-digit-dial surveys typically have lower response rates than personal interview surveys, with much of the loss in response occurring within the first moments of contact with the household (Groves and Lyberg 1988). If tracing RDD samples is also problematic, substantial additional numbers of cases could be lost to the study. The net response rates that can be obtained in a longitudinal study must be evaluated in light of this fact. Booth and Johnson (1985) for example, report a base year response rate of 65 percent and a followup completion rate of 78 percent, for a time 2 response rate of 51 percent. The NHES feasibility study focuses on the issue of response rates but also addresses other challenges associated with a longitudinal design.

The subsequent sections of the report describe the design, procedures, and results of the followup survey. The final section summarizes the research and discusses other methods that may be used to improve the estimates of change over time from the NHES.

Design of the Followup Survey

In the NHES:91, parents of 3- to 8-year-old children were surveyed about the care and education of their children for the Early Childhood Education (ECE) component. All eligible children were sampled within each of the households for which a screening interview was completed. While the child is the unit of analysis, the parent or guardian who was most knowledgeable about the child's care and education was the respondent to the ECE interview. In all, 13,894 interviews were completed in the ECE component. These

completed interviews represented a net response rate of 77 percent, the product of the screening response rate of 81 percent and the extended interview (ECE) response rate of 95 percent. Brick et al. (1992b) presents additional information on the NHES:91 ECE component design, survey procedures, and unit and item response.

As noted earlier, conducting a longitudinal followup survey with the respondents to the NHES has some analytic advantages, but the feasibility of successfully accomplishing this data collection had not been evaluated prior to this experiment. The experiment involved drawing a random subsample of children who were the subjects of completed NHES:91 ECE interviews, asking the parent respondents a series of additional questions that would assist in locating them at a later date, attempting to locate the same respondents about 1 year later, and conducting a brief followup interview with the respondents to determine how willing they would be to complete another interview.

The subsample for the followup survey was selected during the original interview in 1991. When the household was sampled in 1991 for the ECE component, a subsample of children was selected to participate in the followup study; 513 NHES:91 interviews were completed for children selected for the followup study. A sample of about 500 is sufficient to estimate a response rate to the followup with a standard error of less than 2 percent. All 13,894 children whose parents completed initial interviews were eligible for the followup study, with the exception of one constraint; the subsample was restricted so that no more than one child per household could be sampled for the followup. Because telephone interviews can be time-consuming, particularly for busy parents, limiting followup to a single child in each household was used to reduce the time commitment for parents and to contribute to a high followup response rate.

Since the NHES:91 sample was selected using RDD methods, the only identifying information for the sampled persons available at the time of the

initial interviews was their telephone number. Additional data items were asked in the NHES:91 to facilitate locating the sampled persons at a later time. These items included the respondent's full name and address and the name, address, telephone number, and relationship of a contact person outside the respondent's home who could be expected to know how to locate the person in the future. Nearly 90 percent of the respondents provided their own full names and addresses. Booth and Johnson (1985) report similar levels of response to items asking respondent information; 89 percent of their respondents provided their names and addresses. However, only about two-thirds of the NHES respondents were willing to give the requested data about a contact person (Booth and Johnson report 72 percent cooperation in naming contact persons). A series of survey procedures was undertaken to locate and interview the sampled parents 1 year later. These procedures are described below.

Survey Procedures for the Followup

The followup survey began in late April 1992 and ended a month later, about 1 year after the initial NHES:91 data collection period. The survey procedures for a typical RDD survey were not appropriate for the followup survey because specific respondents to the NHES:91 were sought. Because those respondents could have changed telephone numbers and addresses during the year, procedures were developed to attempt to locate and then interview the NHES:91 respondents for the followup survey. In the followup interview, each respondent was asked to answer a limited subset of items about the sampled child.

Figure 1 presents an overview of the locating and interviewing steps for the followup survey. Every sampled respondent was classified as having been located or not, depending on whether or not it was possible to verify that the respondent lived in a household that was called during the followup survey. For all the respondents who were located, an additional status code was recorded indicating whether or not an interview was completed. The two classifications (located and interviewed) are

key for evaluating the potential of conducting meaningful followup surveys for future NHES administrations.

Locating Procedures

The entire subsample of 513 persons was included in the followup survey, regardless of whether the contact information was available from the NHES:91 interview. That is, those persons who provided additional followup information were included, as were persons who did not provide this information. For all 513 respondents to the NHES:91, at least the first name of the parent respondent was known. Most of the respondents (90 percent) gave their last name and address when these questions were asked in the supplemental set of items included in the NHES:91. Because the full name and address were needed for some locating procedures, the results of the locating activities are sometimes given separately for those who provided contact information and for those who did not.

Prior to making any telephone calls to the respondents, postcards were mailed to all those who provided their name and address in the NHES:91 interview. The purposes of the postcard were to remind the respondents that they would be interviewed again shortly and to obtain address updates from the Postal Service for any persons who might have moved during the last year. Exhibit 1 is a copy of the postcard. The information from the postcards was used only when the sampled person no longer lived at the same telephone number and had to be located.

The first attempt to contact all 513 persons for the interview was to call the telephone number used for the NHES:91 interview. Given that only 1 year had passed since the NHES:91 interview, a relatively large proportion of the respondents was expected to be located in a household with the same telephone number. Depending on the outcome of that call and the type of available information on the respondent, one of several possible locating efforts was followed. Telephone

Figure 1.—Process of locating and interviewing respondents in the NHES:91 followup survey

```
                        ┌─────────────────────┐
                        │ Sampled respondents │
                        └─────────────────────┘
                                   │
                                   ▼
           ┌─────────────►┌─────────────────────┐
           │              │ Dial telephone number│
           │              │    for respondent    │
           │              └─────────────────────┘
           │                         │
           │                         ▼
           │                      ╱Locate╲ ──yes──►┌─────────────────────┐
           │                     ◄respondent►       │  Classify as located │
           │                      ╲      ╱          │      respondent      │
           │                         │              └─────────────────────┘
           │                        no                        │
           │                         ▼                        ▼
           │              ╱Find alternative╲            ╱ Conduct ╲──yes──►┌─────────────────────┐
           └──yes──       ◄   telephone    ►            ◄interview►         │Classify as completed│
                          ╲    number     ╱             ╲        ╱         │      interview       │
                                │                            │             └─────────────────────┘
                               no                           no
                                ▼                            ▼
                    ┌─────────────────────┐      ┌─────────────────────┐
                    │    Classify as      │      │  Classify as located,│
                    │    not located      │      │    not interviewed   │
                    └─────────────────────┘      └─────────────────────┘
```
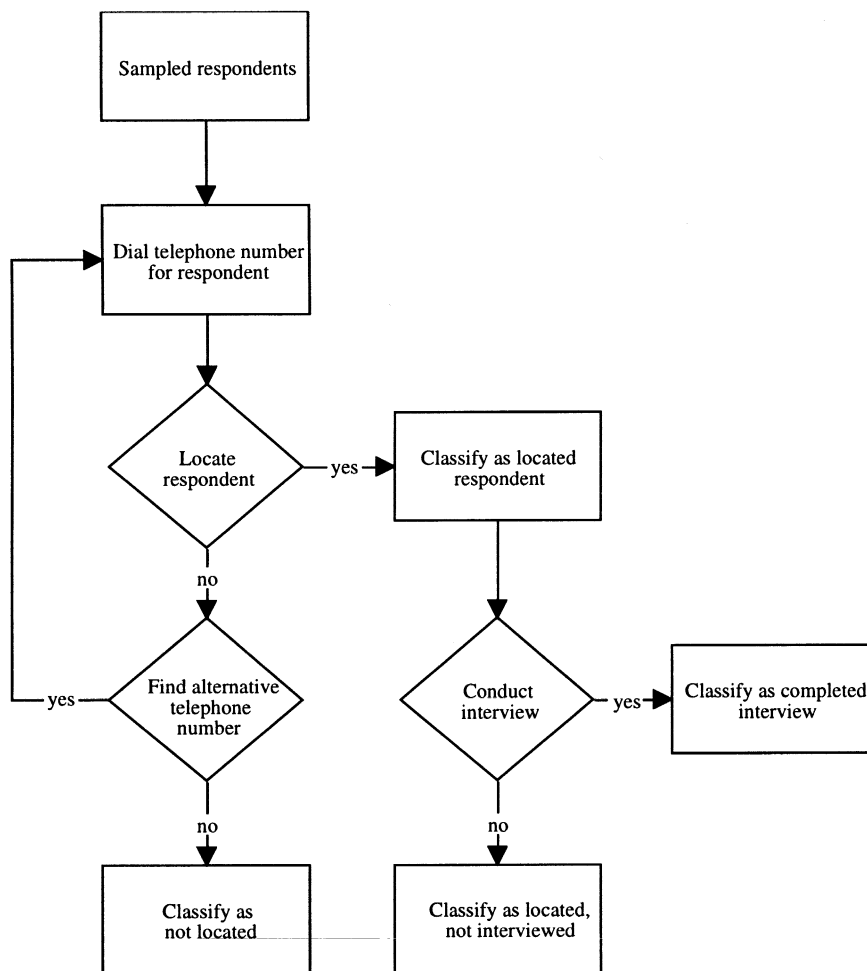
numbers of followup respondents were identified with the aid of five different sources, utilized as necessary in the following sequence: the NHES:91 telephone numbers, recorded messages with new telephone numbers if the 1991 number was no longer in service at followup, directory assistance, the contact people provided in the NHES:91 interview, and a credit reporting service.

New technologies for locating persons using the Internet or CD-ROM files of phone listings may now be available to enhance locating efforts, but these methods were not in use at the time of this study. While these new technologies do offer a great advance, there are limitations associated with how current the data are and the percentage of people covered by the services. Continued improvements in technology promise even more effective and accessible services in the future.

While many of the steps for locating respondents are self-explanatory, others require more detailed discussion. One of these is the use of directory assistance. In general, directory assistance telephone calls were made only for those respondents who gave their full name and address when interviewed in the NHES:91. The address used for the directory assistance calls was either the response from the NHES:91 interview or any update of that address obtained from the postcard mailing. Directory assistance was also attempted in a few cases where no address data existed, provided the last name of the respondent was

uncommon enough that there was some chance of locating the appropriate respondent.

Another locating step that requires further clarification is the use of the contact person from the NHES:91 interview. When a call to directory assistance did not yield a new telephone number for the respondent, the contact person identified in the NHES:91 supplemental items was called to obtain a new number for the respondent. This was done at the same time as the directory assistance telephone call.

The last source for locating respondents was a credit reporting service. The full name and address of the respondent was required by the credit service to do this search, so those who did not give these data were excluded from this step.

Schedule and Interviewing

Interviewers who worked on the NHES:91 were assigned to conduct the followup interviews. Since they were already trained on the NHES procedures, this enabled us to reduce the amount of training needed for the followup. Six experienced interviewers received additional training for this work.

A 4-hour training program included the following activities:

■ A review of the NHES:91 ECE component and the followup feasibility test;

■ Procedures for conducting the followup;

■ Exercises showing each type of followup and the sequence of activities; and

■ An interactive lecture to reacquaint the interviewers with the questions.

The followup survey was done at Westat's Telephone Research Center in Frederick, Maryland. The schedule of activities was as follows:

Exhibit 1.—Postcard mailed to NHES:91 followup sample

NATIONAL HOUSEHOLD EDUCATION SURVEY

About 1 year ago, you or a member of your household participated in a telephone interview for a Department of Education study on the care and education of young children. During that interview, we told you that we wanted to contact you again in about a year to ask a few followup questions about your child. We will be making these telephone calls in the next several weeks. As in the original interview, your participation is voluntary and confidential. This brief followup interview will only take about 5 minutes of your time.

If you have any questions, please contact Kathryn Chandler at the U.S. Department of Education, National Center for Education Statistics, at 202-219-1767. You may also contact Mary Collins of Westat, Inc., who is managing the data collection effort, toll-free at 1-800-937-8281.

Thank you for your continued assistance.

OMB 1850-0640

Date	Activity
April 8, 1992	Postcards mailed to sample
April 22, 1992	Training of interviewers
April 22—May 31, 1992	Interviewing
May 8—May 31, 1992	Tracing through credit service

Some activities were done continuously during the data collection time period. These included updating addresses from postcard returns and making directory assistance calls as needed.

When a telephone number was identified for a respondent, the number was dialed at least seven times over a 10-day period to attempt to locate the sampled person. If no contact with a household member was made during these repeated calls, an attempt was made to identify a new telephone number for the NHES:91 respondent until available numbers from all sources were exhausted. If the NHES:91 respondent was not found, then the case was classified as not located.

If contact was made with a member of a household and he or she verified that the NHES:91 respondent or child was at this number, then the sampled child was classified as located. Multiple attempts were then made to interview the NHES:91 respondent (if the NHES:91 respondent was no longer a household member, but the child was, another responsible parent or guardian was interviewed). If after at least seven attempts an interview was not completed, the case was classified as located but not interviewed.

Findings and Analysis

In this section, we report on the findings from the followup efforts. The findings describe the overall success in locating and interviewing the NHES:91 respondents. The results of specific efforts to locate the persons also are presented. The response experience for this feasibility study is placed in context with a review of longitudinal response rates from two other national household-based surveys. Each of these is an in-person survey, unlike the NHES, which uses a random-digit-dialing approach. Later, we discuss the implications of these results for conducting a longitudinal survey of children with the RDD methodology.

Locating and Response Rates

There were 513 persons eligible for the followup survey -- the total number of persons who completed the ECE interview in the NHES:91 and were sampled for the followup. As a result of all the efforts combined, 88 percent of the sampled NHES:91 cases were located and 80 percent completed followup interviews. Of the 452 NHES:91 parent/guardian respondents who were located in the followup, 90 percent were successfully interviewed (Table 1). These rates are similar to those reported by Booth and Johnson (1985), who located 87 percent of their base year respondents, interviewed 90 percent of those who were located, and interviewed 78 percent of their total panel. Burgess (1989) reports that at least 80 percent of survey respondents can be contacted for most surveys if tracing is used, and asserts that success rates in excess of 90 percent should be expected; the survey method associated with these rates (telephone or in person) is not specified.

Table 1 shows the number and percent of respondents by response status, and for those who were located, the number and percent for whom interviews were completed. About half of the cases where the respondent was located but no interview was conducted were refusals, and almost all of the others were cases for which the maximum allowed number of attempts was reached without completing the interview.

Response Status by Locating Characteristics

Table 1 also shows the distribution of response status by whether or not the sampled persons provided both full name and address information in the NHES:91 interview. Nearly 90 percent (460 of

Table 1.—Number and percent of sampled persons, by response status and address information status

Response status	Total		With address information[1]		Without address information[1]	
	Number	Percent	Number	Percent	Number	Percent
Total	513	100.0	460	100.0	53	100.0
Located	452	88.1	408	88.7	44	83.0
Completed interviews	409	90.5	374	91.7	35	79.5
Not completed interview	43[2]	9.5	34	8.3	9	20.5
Not located	61	11.9	52	11.3	9	17.0

[1]Having address information means the respondent provided both full name and address in the NHES:91 interview.

[2]Of the 43 interviews that were not completed, 21 were refusals, 19 were not reached after multiple attempts, and 3 were not completed for other reasons.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey (NHES), followup survey, 1992.

513) of the sampled persons provided this information. Both the ability to locate the sampled respondents and their willingness to complete the interview once located appear to be greater for those who gave full name and address information in the NHES:91 interview, but the sample size is too small to conclude this from this study.

Another key locating characteristic is whether the sampled person was located at the same telephone number used in the NHES:91 interview. Table 2 shows the response distribution of the sampled persons by whether or not they were located at the same telephone number in 1991 and 1992. Slightly more than three-fourths (77 percent) of the

Table 2.—Number and percent of sampled persons, by response status and telephone location

Response status	Total		At same telephone number		Not at same telephone number	
	Number	Percent	Number	Percent	Number	Percent
Total	513	100.0	394	100.0	119	100.0
Located	452	88.1	394	100.0	58	48.7
Completed interview	409	90.5	357	90.6	52	89.7
Not completed interview	43	9.5	37	9.4	6	10.3
Not located	61	11.9	-	-	61	51.3

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey (NHES), followup survey, 1992.

sampled persons were located by dialing the same telephone number. All of the persons who were never located are categorized as not being at the same telephone number based on the assumption that they would have been located if they still had the same number. Although some of them actually may have been at the same telephone number, it is likely that only a very few persons were in that category because repeated calls were made to the original number if no other telephone numbers were identified for the respondent. Of the sampled persons who were at the same telephone number, 91 percent completed the followup interview. Only 44 percent of those not at the same telephone number completed the interview (52 out of 119). However, 90 percent of those not at the same telephone number who were located completed the interview. Thus, the difference in completion rates at this stage was the inability to locate the persons.

Table 3 shows the distribution of response status by both the persons' willingness to provide name and address in the initial interview and by whether or not they were located at the same telephone number. The numbers are relatively small for these tabulations and show little of substance.

Response Status by Tracing Efforts

Locating the sampled respondent was the first and most important step in completing the followup interview. As shown in Table 3, 119 of the 513 sampled persons were not at the same telephone number and required some type of locating activity. For 113 of these persons, some type of locating effort could be attempted, while for 6 persons nothing could be done because of the lack of information on even the name of the sampled person. Because of their importance, more detailed results of applying the locating procedures are discussed below.

If the person was not located at the original number, the first possible step to locate a respondent involved recorded messages that provided new telephone numbers. Only 18 telephone numbers had recordings with new telephone numbers: 13 of these respondents were located, 11 produced completed interviews, and 5 were not located (not in table).

Table 3.—Number of sampled persons, by response status, telephone location, and address information

Response status	At same telephone number		Not at same telephone number	
	With address information*	Without address information*	With address information*	Without address information*
Total	359	35	101	18
Located	359	35	49	9
Completed interview	322	35	43	9
Not completed interview	37	0	6	0
Not located	0	0	52	9

* Having address information means the respondent provided both full name and address in the NHES:91 interview.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey (NHES), followup survey, 1992.

Before the results from the other locating activities are presented, some factors associated with the results must be considered. First, although the locating activities were done sequentially, the activity associated with ultimately locating the respondent cannot specifically be identified. For example, the Postal Service may have returned a postcard with a new address for a respondent after the credit searches for the person had begun. In this case, directory assistance for the person would have been attempted immediately using the new address. In another example, a source may have identified a telephone number that had been attempted previously. The number might have been temporarily disconnected or the respondent might have been away during the earlier calling period; when the number was dialed again, the respondent was located. It is unclear how to associate a source with locating the respondent in these and many other situations.

Because of the difficulty of linking the source of the telephone number to locating and interviewing the respondent, it is not possible to fully assess the effectiveness of each source of locating information. Instead, the final results of locating and interviewing are presented for all the respondents who were subjected to the various types of locating activities. The discussion begins with the postcards returned by the Postal Service for respondents who were no longer at their 1991 address and ends with the credit bureau search efforts.

All 460 sampled persons who provided a name and address in the NHES:91 were mailed a postcard (Exhibit 1). Postcards were returned by the Postal Service for 59 of these persons (13 percent). Of the postcards that were returned, 44 contained new address information. Other people were successfully interviewed, although 61 percent were located. After dialing the original telephone number and using data from the returned postcard, directory assistance was dialed for those sampled persons who were still not located but had provided their name and address in the NHES:91 interview. As shown in Table 4, directory assistance was used for 97 cases (21 percent). Only 44 percent of those persons were located and 37 percent completed the followup interview.

The results of directory assistance shown in Table 4 also include telephone calls made to contact persons whom respondents identified in the

Table 4.—Number and percent of sampled persons, by response status and tracing activity

Tracing activity	Response status								
	Total	Located		Located, completed interview		Located, not completed interview		Not located	
	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Postcard returns	44	27	61.4	23	52.3	4	9.1	17	38.6
Directory assistance/ contact person	97	43	44.3	36	37.1	7	7.2	54	55.7
Credit searches									
with new locating data	15	4	26.7	3	20.0	1	6.7	11	73.3
without new locating data	33	6	18.2	5	15.2	1	3.0	27	81.8

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey (NHES), followup survey, 1992.

NHES:91 interview. The results of these activities cannot be separated, because the telephone interviewers immediately attempted to reach the contact persons if no new telephone information was obtained from directory assistance for the respondent. Contact persons were named for two-thirds of the 513 sampled persons, but calls were only needed for 44 of these persons. Twenty-eight postcards returned by the Postal Service had notes such as "Address unknown." Table 4 shows the distribution of the response status for the 44 persons for whom the postcard mailing resulted in obtaining a new address. Only 52 percent of these of these calls resulted in a new telephone number to contact the sampled respondent.   Of the remaining 16 contact persons called, 12 said that they would call back on the Westat toll-free number after they spoke to the sampled respondent but ultimately did not call back, and the other 4 refused to provide any new data.

The final locating strategy was the use of a credit bureau search for the sampled persons who had not been located by any of the previous efforts. Forty-eight names were sent to the credit service, and 15 were returned with different information than previous sources had provided. In many of the 33 other cases, the credit searches resulted in address information that had already been obtained from one of our previous tracing efforts.   Only 27 percent of the sampled persons for whom new locating information was obtained from the credit searches were located, and 20 percent completed the interview.

After all the locating activities were completed, final attempts were made to contact all unresolved cases. In most cases, these efforts involved dialing the NHES:91 telephone number again.   If the persons had been located but not interviewed, the telephone number at which they were located was dialed again.   These efforts resulted in some completed interviews. This is also the reason that five completed interviews are shown in Table 4 for the cases in which the credit searches did not result in new locating data. Some persons located and interviewed in this process had telephones that had been temporarily disconnected, and others had

been away from home during the initial field period.

A summary of all the locating efforts attempted is presented as Table 5. This table gives the number and percent of persons by whether or not they were located and interviewed for each of the different types of locating activities attempted. The locating efforts were essential in improving the response rates to the survey. As a result of the locating activities, about 10 percent (53 of 513) of the respondents were located and 8 percent (43 of 513) were interviewed. The postcard returns and the directory assistance calls (including using the contact persons from the NHES:91 interview) were responsible for finding most of these respondents.

These locating activities are relatively low cost efforts and should be included in any followup surveys.

The credit bureau searches are more expensive and did not result in locating many more of the respondents.   The utility of the credit bureau searches needs to be closely considered in future studies. The cost of conducting the searches must be weighed against a possible 1 to 3 percent increase in the response rate. The direct cost of credit bureau searches to locate a person's telephone number varies depending on the nature of the search. Typically, it costs about $3 to $10 per searched name, with other costs associated with handling and recording the data retrieved from the service. For followup surveys where the loss due to nonresponse is a major problem, it may be useful to incur the credit bureau search costs even for a relatively small increase in response rates. As noted earlier, new technologies such as the Internet may provide other methods for locating persons at reasonable cost, but these were not in use in 1992 when this survey was conducted.

Implications for Longitudinal Analysis

The findings discussed above provide a framework for evaluating the feasibility of conducting a followup telephone survey with parents of young children when the sample is selected using RDD

Table 5.—Number and percent of sampled persons, by response status and all types of locating activities

Response status	Type of locating activity			Number of persons	Percent
	Postcard returned	Directory assistance	Credit searches		
Located	none	none	none	399	88.3
	none	called	none	20	4.4
	none	called	new data	3	0.7
	none	called	no new data	4	0.9
	return	none	none	8	1.8
	return	called	none	15	3.3
	return	called	new data	1	0.2
	return	called	no new data	2	0.4
All located	-	-	-	452	100.0
Located and completed	none	none	none	366	89.5
	none	called	none	16	3.9
	none	called	new data	2	0.5
	none	called	no new data	3	0.7
	return	none	none	5	1.2
	return	called	none	14	3.4
	return	called	new data	1	0.2
	return	called	no new data	2	0.5
All located and completed	-	-	-	409	100.0
Located and not completed	none	none	none	33	76.7
	none	called	none	4	9.3
	none	called	new data	1	2.3
	none	called	no new data	1	2.3
	return	none	none	3	7.0
	return	called	none	1	2.3
All located and not completed	-	-	-	43	100.0
Not located	none	none	none	1	1.6
	none	none	no new data	1	1.6
	none	called	none	18	29.5
	none	called	new data	7	11.5
	none	called	no new data	17	27.9
	return	none	none	2	3.3
	return	called	none	2	3.3
	return	called	new data	4	6.6
	return	called	no new data	9	14.8
All not located	-	-	-	61	100.0

NOTE: Percentages may not add to 100 because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey (NHES), followup survey, 1992.

methods. The two major issues that must be addressed in using the NHES for a longitudinal followup survey are coverage bias and unit nonresponse bias.

Coverage bias arises because not all eligible persons live in households with telephones. Previous research on telephone coverage for young children indicated that the coverage bias in the estimates for this population will be relatively small if appropriate weighting adjustments are made during estimation (Brick et al. 1992a). Of course, estimates for domains that contain a disproportionately high fraction of the undercovered population may be subject to more severe biases. Unit nonresponse bias is the more immediate concern of this research. The size of the bias due to nonresponse is related to the percentage of the sample that did not respond to the survey and the differences in the characteristics of the respondents and the nonrespondents. One way of expressing this nonresponse bias as a fraction of the response rate and the difference in characteristics is:

$$Bias\ (\hat{y}_r) = (1 - \frac{r}{n})\ (Y_r - Y_{nr}) \qquad (1)$$

where $\hat{y}_r$ is the estimate based on responses only from respondents, r is the number of respondents, n is the total sample size, Y_r the value of the characteristics for respondents, and Y_{nr} is the value of the characteristics for nonrespondents. This expression shows that as the response rate $(\frac{r}{n})$ decreases and the difference between respondent and nonrespondent characteristics increases, the bias of the estimate can become large. Kalton, Kasprzyk, and McMillen (1989) discuss the potential impact of nonresponse bias for longitudinal surveys. They point out the deleterious effect on the estimates as response rates decrease and differences between respondents and nonrespondents increase.

The role of nonresponse in the bias of the estimates is the reason this experiment was developed to assess the potential rate in a longitudinal study. Differences in characteristics of respondents and nonrespondents are harder to quantify because the difference depends on both the specific items considered and the reasons for the nonresponse.

For example, some characteristics, such as poverty, low maternal education, and high family mobility are educational risk factors for children (Zill et al. 1995; Sattler 1992). To the extent factors such as these are associated with survey response and the ability to locate the subject during longitudinal followup, they may be sources of bias.

Since no data were collected from nonrespondents in the followup, it is not possible to compare their characteristics with those of the respondents based on the followup interview. However, the initial NHES:91 interview was completed by all sampled cases, and these characteristics can be examined to provide some insight into the correlates of nonresponse in the followup. Of course, important characteristics such as moving to a different home and changing family composition are not included when using only the data from the initial interview.

Data from the NHES:91 interviews were used to compute estimates of the differences between those who did and did not respond to the followup. The estimates were derived using the weights from the NHES:91 to account for the probability of selecting the persons for that survey. These estimates differ slightly from unweighted analysis. For example, the estimated response rate for the followup using the weights is 76 percent while the unweighted response rate is 80 percent.

Table 6 presents estimates of the response rates to the followup by the demographic and early childhood characteristics from the NHES:91 interview. Estimated differences between response rates to the followup are subject to very large sampling errors because the sample sizes are small. Thus, even moderately sized differences in response rates cannot be distinguished due to the large sampling errors. A few of the differences bear discussion because they are so large that they

Table 6.—Followup response rates by child and household characteristics

Characteristic	Unweighted number of cases[1]	Weighted response rate
Total	512	76
Race		
White	395	85
Black	72	49
Other	45	80
Hispanic origin		
Hispanic	103	72
Non-Hispanic	409	79
Home Type		
Single family or townhouse	398	84
Apartment	78	56
Other type	36	74
Home ownership		
Own	342	86
Rent	152	66
Some other arrangement	18	--[3]
Income		
$20,000 or less	118	68
$20,001 to $40,000	206	78
More than $40,000	188	88
Parents' highest education[2]		
High school or less	193	72
Some college/vocational/technical	160	79
Bachelor's degree or more	156	85
Mother's first language		
English	437	78
Spanish	62	75
Other	13	--[3]
Family receives daily newspaper		
Yes	301	81
No	210	75
Census region of residence		
Northeast	95	85
Midwest	128	77
South	193	75
West	96	78
Read to child in past week		
Yes	463	78
No	47	80
Child weighed 5.5 pounds or more at birth		
Yes	477	78
No	35	80

[1]One case is excluded from this analysis due to missing values.

[2]Highest education of the child's parent(s) or guardian(s) living in the household.

[3]Estimates based on fewer than 30 cases (unweighted) are not shown and are indicated by --.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Household Education Survey (NHES), followup survey, 1992.

are statistically significant despite the large sampling errors.[1]

The most important difference in followup response rates was between white and black persons. The estimated response rate was 49 percent for blacks and 85 percent for whites. With such a large difference between the response rates of blacks and whites, even small differences in the characteristics of the respondents could result in large biases. Thus, the nonresponse bias for estimates by race could be very substantial.

It is interesting to note that the estimates by Hispanic origin were not large or statistically significant. The estimated response rate for Hispanics was 72 percent as compared to 79 percent for non-Hispanics.

Another characteristic that was statistically significant was whether the person lived in an apartment or single family house. Those who lived in an apartment had an estimated followup response rate of 56 percent, while those who lived in a single family house had an estimated response rate of 84 percent. Similarly, persons who owned their homes had higher response rates than renters (86 percent versus 66 percent). This result is consistent with the hypothesis that those who are most likely to move, such as renters and apartment dwellers, are underestimated in longitudinal surveys due to nonresponse bias. Allen and Petroni (1994) report on research to account for movers explicitly using different nonresponse adjustment methods, although they were notable to identify any adjustments that reduced attrition bias in their study.

Persons in households with incomes over $40,000 annually (88 percent) and those in households with incomes of $20,000 or less (68 percent) are significantly different. Similarly, children whose parents' highest education is a bachelor's degree or more have higher response rates than those whose

parents' highest education is high school or less (85 percent versus 72 percent). Because education and income are associated with home ownership and, hence, with mobility, these differences are not surprising.

Most of the selected variables of substantive importance for early childhood education (e.g., how often the child was read to by a parent, whether the child weighed more than 5.5 pounds at birth, or whether the child was read to in the past week) had relatively small differences in estimated response rates. Of course, if the sample size were larger, many of these smaller differences would be statistically significant if the observed differences remained.

Longitudinal Response Rates

The response rate for a longitudinal survey is the completion rate for the initial survey multiplied by the followup completion rate, assuming that only those who responded to the initial survey are followed. In the NHES application, the followup response rate is the product of the response rate for the NHES:91 ECE interview and the completion rate for the followup survey. The response rate for the NHES:91 ECE interview was 77 percent (the response rate to the ECE was the product of the 81 percent screening completion rate and the 95 percent completion rate for the ECE interview). Thus, the overall response rate for longitudinal analysis using the followup data is 62 percent (77 percent for the original survey times 80 percent for the followup survey).

It might be possible to increase the followup response rate by increasing the percentage of respondents who are located. Often, the greater the time between contacts, the greater the percentage of cases that are lost to the study. Burgess (1989) reviews some approaches to tracing respondents in longitudinal surveys. One strategy to potentially increase the locating rate would be to have semiannual or quarterly postcard mailings. This relatively low-cost approach would increase the likelihood of obtaining change-of-address information from the Postal Service in a

---

[1] The sampling errors for the differences in response rates were calculated by multiplying the simple random sampling error $(\sqrt{pq/n})$ by the square root of the mean design effect for the NHES:91 ECE component.

timely way and would also remind the respondent of the study. By contrast, interim telephone contacts between data collection phases would be considerably more costly, but may be no more effective.

It is interesting to speculate on what the response rate might be if the followup completion rates were somewhat different. For example, if all the persons who were located in the followup survey (88 percent) were successfully interviewed, the followup response rate would be 68 percent (77 percent times 88 percent). This is only 6 percent greater than the observed rate. If the locating rate were raised from 88 percent to, say, 95 percent, and the same 90 percent response from located persons was obtained, the followup response rate would be 65 percent (77 percent times 86 percent), an increase of only 4 percent. Future followup efforts should seek to maximize both the locating rate and the response rate, but the potential for increasing the overall response rate using these methods is limited.

Clearly, the followup response rate is depressed by the 81 percent completion rate for the screening of households in the initial NHES:91. Several attempts have been made to increase this rate in the NHES, for example, by refielding cases that have had the maximum number of attempts in the study protocol, and research in this area continues. For example, in the NHES:96, an advance mailing was sent to all households for which an address could be obtained from a commercial vendor. However, attaining completion rates of 85 percent or higher in this type of general population survey is not yet feasible. Assuming the screening rate is 85 percent and all the other rates are as observed, the longitudinal response rate would be 65 percent (85 percent times 95 percent times 80 percent). Once again, this is higher than the observed rate, but only marginally. Conversely, if design decisions for the study lead to lower screener response rates, the net response rate for a longitudinal study would be decreased.

In essence, this analysis suggests that the longitudinal response rate for a RDD survey like the NHES would probably be between 62 and 65 percent. A 70 percent rate appears to be the upper limit, unless better techniques for gaining participation are discovered and implemented. To understand how these response rates compare with the rates that might be attained using different modes of sampling and data collection, the response rates for longitudinal household and cohort surveys conducted by the Census Bureau and the Ohio State University are described below. Although these comparisons are useful, it is important to recognize that the demands placed on the respondents in these surveys vary significantly and may affect some of the results.

SIPP Response Rates

The Survey of Income and Program Participation (SIPP) is a longitudinal household survey conducted by the Bureau of the Census. Since it is an important household-based panel survey, SIPP provides an appropriate comparison to the NHES experiment on the feasibility of collecting longitudinal data.

Several SIPP surveys have been conducted since data collection started in 1984. The survey consists of an initial interview and followup surveys conducted at 4-month intervals. These data collections are called waves. For example, if the Wave 1 interview takes place in January, then the Wave 2 interview should be conducted in May of the same year. More details on the design of SIPP and the data we used on response rates can be found in Jabine et al. (1990).

The first wave of data collection in SIPP is always done by personal visit to the household. Subsequent data collection is done primarily by phone but may also be done in person. Followup data are not collected for households that do not participate in the Wave 1 data collection. For comparative purposes, we will use the rates reported for the 1988 Panel of SIPP, i.e., the survey that began data collection in February 1988. The overall response rates for the eight waves of this survey are given in Table 7. It should be recognized that the population of interest in SIPP is not restricted to households with young children.

Table 7.—Response rates from the 1988 Panel of the Survey of Income and Program Participation

Response Condition	Response rate
Responded to all 8 interviews	67.0%
Responded to all interviews prior to death	1.5

Responded to all interviews except when:
    in an institution
    in the Armed Forces
    abroad
	
	0.7
	1.4
	0.6

Other panel members	0.2
Total	71.4

SOURCE: Lepkowski, Kalton, and Kasprzyk (1989)

The response rates reported for this survey are much higher than those that could be expected using an RDD screening sample. The main difference is the completion rate for the initial survey. The Wave 1 rate for SIPP was 93 percent, while the NHES:91 ECE rate was 77 percent. While the difference in the rates is largely the result of the different modes of sampling and data collection, the Census Bureau's response rates are generally higher than those achieved by other data collection organizations.

With personal interviews there are more opportunities to obtain participation, including activities such as speaking with neighbors, and it is easier to demonstrate the importance of the sampled person's cooperation. The Bureau's early experiments with RDD samples had response rates that are more consistent with the NHES response rates (Biemer, Chapman, and Alexander 1985; Fitti 1979).

The completion rates for followup surveys are also greater in SIPP than in the NHES experiment. For example, 94 percent of the Wave 1 respondents completed the Wave 2 interview in SIPP, while only 80 percent of the initial NHES:91 sample completed the followup interview. This is largely a function of being able to locate the respondents. In the followup to the NHES:91, 90 percent of those located were interviewed. The lack of information (including full name and address) to locate the sample persons in a RDD survey is a major impediment to improving the completion rates for

the followup. The fact that the SIPP followup was conducted only 4 months after the initial interview while the NHES followup was a year later also affects this comparison. Since the NHES followup was conducted 1 year after the initial interview, it is not possible to evaluate the impact of the time between interviews on the rates. Alternative procedures, such as interim postcard mailings and telephone contacts discussed earlier could reduce the numbers of cases lost to the study, but also add costs for a large-scale effort.

NLSY Response Rates

The National Longitudinal Survey of Youth (NLSY) is a longitudinal survey sponsored by the U.S. Bureau of Labor Statistics, U.S. Department of Labor that is conducted by the U.S. Bureau of the Census and the National Opinion Research Center. The survey is directed by the Ohio State University. In the NLSY, interviews are conducted with a sample of persons born January 1, 1957 through December 31, 1964. The base year for the survey was 1979. Annual followup surveys are conducted with this cohort.

Table 8, below, gives the response rates for the NLSY civilian sample[2] for the years 1979 through

---

[2] The NLSY included a civilian sample, a supplemental civilian sample, and a military sample. Also, in 1986, a child sample was selected from among the children of women in the civilian samples. For ease of presentation, the civilian sample figures are presented here. Retention rates were similar for the supplemental civilian sample.

Table 8.—Response and sample retention rates for the civilian sample of the National Longitudinal Survey of Youth: 1979 to 1991

Survey year	Interviews completed	Percent of sample retained	Response rate
1979 (Base year)	6111	--	81.8
1980	5873	96.1	78.6
1981	5892	96.4	78.8
1982	5876	96.2	78.6
1983	5902	96.6	79.0
1984	5814	95.1	77.7
1985	5751	94.1	76.9
1986	5633	92.2	75.4
1987	5538	90.6	74.1
1988	5513	90.2	73.7
1989	5571	91.2	74.6
1990	5498	90.0	73.6
1991	5556	90.9	74.3

NOTE: The base year response rate is the product of the 91.2 percent screener completion rate and the 89.7 base year interview completion rate for the civilian sample. Retention rates reflect the percent of completed base year respondents who were interviewed the subsequent years, excluding ineligibles. Yearly response rates reflect the sample retention rate multiplied by the base year response rate.

SOURCE: Center for Human Resources Research, Ohio State University. NLS User's Guide: 1993. Tables 1.1.1 and 1.1.3.

1991. The retention rate for each followup phase multiplied by the base year response rate gives the response rate. The initial interviews were conducted in person, as were annual followup interviews through 1986. At that time, a change was made to a shorter interview administered by telephone. By the time the shift to telephone interviewing began, eight annual cycles of interviews had been conducted in person. At each followup point, efforts were made to interview all persons who completed the base year interview, whether or not the person had responded to the previous year's followup interview.

The NLSY started with a base year response rate of 82 percent in 1979. Over the 12 years from 1979 through 1991, the response rate declined slightly, and the 1991 response rate was 74 percent.

The NLSY response rates are higher than the NHES rate because of the higher base year response rate and the higher locating rate. One notable difference between the NHES and the NLSY is in the screening rate; the NLSY screener completion rate was 10 percent higher than the NHES:91 screening response rate. It is not uncommon for personal interview surveys to have higher initial response rates (Drew, Choudry, and Hunter 1988). The higher base year rate is essential to obtaining the higher response rates in the followup surveys. In addition, the NLSY has a higher completion rate at the followup stage than the NHES. Like the screening rate, this is probably related to the fact that the base year interview was a personal interview, so that address information was available for all cases at the base year data collection. In addition, in-person interviews tend to establish greater rapport and may have led to greater willingness to continue to participate in the study. The NLSY, unlike the SIPP and NHES, uses a small incentive ($10) upon completion of the interview.

Conclusions and Implications

The results of the efforts to locate and interview the respondents for the NHES:91 longitudinal experiment indicate that there are significant questions about the feasibility of conducting a longitudinal survey using an RDD sample for the baseline. The main problem is nonresponse bias. The response rate for the base year of the ECE interview for the NHES:91 was 77 percent, and compounded with the locating and interviewing completion rates for the followup survey, the overall response rate was about 62 percent. Biases in surveys with rates this low are of great concern.

Booth and Johnson (1985), who started with a lower base year response rate but obtained similar locating and interviewing rates, conclude that "panel studies based on random-digit-dialing samples can yield samples comparable to those gathered by more traditional methods." The authors of this report take a more cautious view. Although some longitudinal surveys with response rates even lower than the NHES feasibility study are conducted, alternative modes of data collection should be fully studied before using the NHES for this type of data collection.

Although the nonresponse rate is due to both the initial nonresponse and the nonresponse at the followup, bias for the followup may be a more serious concern. The nonrespondents for the

followup were largely persons who have moved (or at least changed telephone numbers) in the last year. This group of more mobile households may be very different from the responding households, which are less mobile. This could result in larger biases, especially because residential mobility is a risk factor for young children. Furthermore, the response rates for the followup were different for some important groups. In particular, the response rate for blacks was very low and could result in large biases by race.

Some changes in the technology of telephone surveys may influence decisions about future surveys. Methods for locating persons based only on their telephone numbers may become available and would help to increase the rate at which persons can be located, although this change alone may not be sufficient for making the longitudinal approach viable in the NHES. If the initial

screening response rates can also be significantly improved, then followup surveys using the NHES as the first wave should be reconsidered.

Cost Considerations

When evaluating the desirability of implementing a longitudinal study, cost factors must also be considered. The feasibility study was not designed to provide cost estimates for a full-scale study. A very brief and simple interview was used, which required a limited investment in the development of the CATI system and used only experienced interviewers. The costs associated with a longer and more complex instrument would be greater, particularly if skip patterns or edits based on responses from previous interviews were included. While this followup study used a fairly standard protocol for data collection, full-scale NHES collections typically include more elaborate refusal conversion methods and the refielding of cases that have reached the maximum number of attempts called for in the study protocol.

In comparison with a base year random-digit-dial survey, a followup survey does not incur the substantial costs associated with screening large numbers of telephone numbers to identify household numbers and eligible household members. A longitudinal study would, however, incur substantial costs associated with conducting tracing activities to maximize the percentage of the sample that is located. Some of these activities, as noted previously, are relatively inexpensive. For example, mailing a postcard with "address correction requested" was found to be useful and inexpensive. Making directory assistance calls when the original telephone number is no longer valid is also a low cost method, as is making calls to contact persons named by the respondent in the original interview. More costly tracing efforts, such as credit bureau checks, can be productive. However, it is most cost effective to schedule the followup field period such that other, less costly methods are exhausted before the cost of credit bureau checks is incurred. As mentioned, new technologies for locating persons may be useful in this regard.

Burgess (1989) suggests that several rounds of tracing efforts conducted periodically between survey cycles may ultimately be more cost-effective than extensive (and perhaps less successful) tracing efforts at the followup survey point. While Burgess' example is for a multi-year time frame, this may also be germane to a 1-year followup as in the NHES feasibility study. The locating rate might be increased by relatively low-cost interim tracing activities, such as mailing a postcard with "address correction requested" about half-way between the initial survey and the followup point.

The potential cost of longitudinal studies developed from the NHES could vary widely. These costs are dependent on the specific design elements of the study and the strategies required to implement those design elements. While it is very likely that the costs would be much smaller than surveys that are conducted in person, it is difficult to quantify the cost savings associated with this approach.

Alternative Assessment of Change Over Time

This research into a longitudinal analysis does not imply that the NHES cannot be used to precisely measure change over time in the population. Rather, it addresses longitudinal approaches that require contacting the same sampled persons repeatedly. Other ways of measuring change in the population are feasible. For example, changes in the characteristics of the population can be measured with independent cross-sectional surveys. With such a sample design, the variance of the estimated measure of change is the sum of the variances for the estimates at the two points in time. The variances of estimates of change are thus almost always larger than would be the case if the same persons were followed and interviewed.

Alternative methods for reducing the variance of estimates of change can be employed without using the same sample of persons over time. The precision of estimates of change can be improved if the samples from the two points overlap. Since the overlapping sampled units tend to have large positive correlations for most characteristics of

20

interest, the precision of estimates of change can be improved by this design.

One way of inducing this correlation is to reuse the sampled clusters from the first stage of the RDD sample. These are the banks of 100 consecutive telephone numbers from which additional telephone numbers are generated using the standard or modified Waksberg methods of RDD sampling (see Brick and Waksberg (1991) for more details on these RDD designs). An open question is the size of the correlations that would be obtained using this method. If the correlations were relatively small, then the precision of the estimates would not be significantly improved. While the size of these correlations currently is unknown, it is likely to be small for the NHES population of young children because this group is relatively rare within a cluster. In addition, this method is not consistent with the move to list-assisted methods of RDD sampling (Casady and Lepkowski 1993; Brick et al. 1995) in the NHES, although the list-assisted method could be modified to achieve many of the same benefits.

Another approach that might provide higher correlations and improved precision for estimates of change is to reuse the sampled telephone numbers. In this design, sampled respondents are not followed from year to year, but many of the people (about three-fourths based on the followup results) will be at the same telephone number. The number of persons who are sampled in both surveys will be less than this because of changes in household composition.

This approach has two sample components: a sample of the telephone numbers dialed in the original survey, and a new sample of telephone numbers. The new sample is needed to eliminate the bias associated with persons currently in households that were not valid telephone numbers when the original sample was selected. The number of households sampled from the two components is allocated based on the desired precision of the estimates. If estimates of change are more important than the cross-sectional estimates, more of the sample will be allocated to the numbers dialed in the original survey. Some additional information would also have to be obtained from the households to make national estimates.

This approach improves the precision for estimates of change, but it is not a pure longitudinal sample design in which the sampled persons are repeatedly interviewed. It does avoid the major nonresponse problem of being unable to locate the sampled persons 1 year later. The other reasons for nonresponse will still affect respondents in this design. In particular, concerns about respondents becoming reluctant to respond to the survey after they are repeatedly interviewed still need to be evaluated. Given the two NHES goals of having high response rates and improving estimates of change, the reuse of the sampled telephone numbers is an approach that could be tested empirically. A subset of the sampled telephone numbers could be included in a future NHES survey, and the response rates for the newly sampled and repeatedly sampled numbers could be computed. This experiment would also provide data on the size of the expected correlations and the differences in the expected costs of data collection for the two treatments. This method of using the NHES to monitor changes over time appears more promising than retaining the same sampled persons over time.

References

Allen, T., and Petroni, R. (1994). Mover nonresponse adjustment research for the Survey of Income and Program Participation. *Proceedings of the American Statistical Association Section on Survey Research Methods*. Arlington, VA: American Statistical Association, 662-667.

Bailar, B. (1989). Information needs, surveys, and measurement errors. In D. Kasprzyk, G. Duncan, G. Kalton, and M.P. Singh (Eds.), *Panel Surveys*, 1-24. New York: John Wiley and Sons.

Biemer, P., Chapman, D., and Alexander, C. (1985). Some research issues in random-digit-dialing and estimation. *Proceedings of the First Annual Research Conference of the U.S. Census Bureau*. Washington, DC: U.S. Bureau of the Census, 71-86.

Booth, A., and Johnson, D.R. (1985). Tracking respondents in a telephone interview panel selected by random digit dialing. *Sociological Methods and Research*, 14:53-64.

Brick, J.M., Burke, J., and West, J. (1992a). *Telephone Undercoverage Bias of 14- to 21-year-olds and 3- to 5-year-olds.* Technical report. NCES Publication No. 92-101. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Brick, J.M., Chandler, K., Collins, M.A., Celebuski, C.A., Ha, P.C., Hausken, E.G., Nolin, M.J., Owings, J., Squadere, T.A., and Wernimont, J. (1992b). *National Household Education Survey of 1991: Preprimary and Primary Data Files User's Manual*. NCES Publication No. 92-057. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Brick, J.M., and Waksberg, J. (1991). Avoiding sequential sampling with random digit dialing. *Survey Methodology*, 17(1), 27-41.

Brick, J.M., Waksberg, J., Kulp, D., and Starer, A. (1995). Bias in list-assisted telephone samples. *Public Opinion Quarterly*, 59(2), 196-217.

Burgess, R. (1989). Major issues and implications of tracing survey respondents. In D. Kasprzyk, G. Duncan, G. Kalton, and M.P. Singh (Eds.), *Panel Surveys*, 52–74. New York: John Wiley and Sons.

Casady, R.J., and Lepkowski, J.M. (1993). Stratified survey designs. *Survey Methodology*, 19(1), 103-113.

Center for Human Resources Research. (1993). *NSL User's Guide: 1993*. Columbus, OH: Center for Human Resources Research, Ohio State University.

Drew, J.D., Choudry, G.H., and Hunter, L. (1988). Nonresponse issues in government telephone surveys. In R.M. Groves, D.P. Biemer, L.E. Lyberg, J.P. Massey, W.L. Nicholls, and J. Waksberg (Eds.), *Telephone Survey Methodology*, 233-246. New York: John Wiley and Sons.

Duncan, G., and Kalton, G. (1987). Issues of design and analysis of surveys. *International Statistical Review*, 55(1), 97-117.

Fitti, J. (1979). Some results from the Telephone Health Interview System. *Proceedings of the American Statistical Association Section on Survey Research Methods*. Arlington, VA: American Statistical Association, 244-249.

Fitzgerald, R. (1994). *Descriptive Summary of 1989-90 Beginning Postsecondary Students: Two Years Later*. NCES Publication No. 94-386. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Groves, R.M., and Lyberg, L.E. (1988). An overview of nonresponse issues in telephone surveys. In R.M. Groves, D. P. Biemer, L.E. Lyberg, J.P. Massey, W.L. Nicholls, and J. Waksberg (eds.), *Telephone Survey Methodology*, 191-211. New York: John Wiley and Sons.

Ingels, S.J., Dowd, K.L., Baldridge, J.D., Stipe, J.L., Bartot, V.H., Frankel, M.R., Owings, J., and Quinn, P. (1994). *National Education Longitudinal Study of 1988 Second Followup: Student Component Data File User's Manual*. NCES Publication No. 94-374. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Jabine, T., Petroni, R., and King, K. (1990). *SIPP Quality Profile*. Washington, DC: U.S. Department of Commerce, Bureau of the Census.

Kalton, G., Kasprzyk, D., and McMillen, D. (1989). Nonsampling errors in panel surveys. In D. Kasprzyk, G. Duncan, G. Kalton, and M.P. Singh (Eds.), *Panel Surveys*, 249-270. New York: John Wiley and Sons.

Lepkowski, J., Kalton, G., and Kasprzyk, D. (1989). Weighting adjustment for partial nonresponse in the 1984 SIPP Panel. *Proceedings of the American Statistical Association Section of Survey Research Methods*. Arlington, VA: American Statistical Association, 296-301.

Sattler, J.M. (1992). *Assessment of Children*. 3rd ed. San Diego: Author.

Zahs, D., Pedlow, S., Morrissey, M., Marnell, P., and Nichols, B. (1995). *High School and Beyond Fourth Followup Methodology Report*. NCES Publication No. 94-426. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Zill, N., Collins, M., West, J., and Hausken, E.G. (1995). *Approaching Kindergarten: A Look at Preschoolers in the United States*. NCES Publication No. 95-280. Washington, DC: U.S. Department of Education, National Center for Education Statistics.