

USING CELLULAR TELEPHONES TO INTERVIEW NONTELEPHONE HOUSEHOLDS

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Introduction

The National Survey of America's Families (NSAF) is part of a multiyear study to assess the New Federalism by tracking ongoing social policy reforms and relating policy changes to the status and well-being of children and adults. A key objective of the study is to assess the effects of the devolution of responsibility for major social programs, such as Aid to Families with Dependent Children, from the Federal to the state level. The NSAF will collect information on the economic, health, and social dimensions of the well-being of children, nonelderly adults, and their families in 12 states and in the balance of the nation. The 12 states, which account for a little more than half of the country's population, were selected to vary in terms of their size and geographic location, the dominant political party, and key baseline indicators of well-being and fiscal capacity. A sample of the balance of the nation is included so that national estimates can also be produced. Low-income families will be oversampled because the policy changes of interest are expected to affect them most. The initial round of the NSAF is taking place in 1997 and a followup round is planned for 1999 or 2000. Case studies will occur in parallel with the survey to provide an in-depth understanding of the policy changes occurring in each of the 12 states. The Urban Institute and Child Trends are being funded by a consortium of foundations, led by the Annie E. Casey Foundation, to carry out the Assessing the New Federalism Project. Westat, Inc. is responsible for sample design and selection, data collection, and other related activities.

Summary of Sample Design and Methodology

The survey uses two sampling frames: random digit dialing (RDD) to cover the approximately 95 percent of the U.S. population with telephones and an area sample to represent households without telephones. A major focus of the survey is to provide reliable estimates for persons and families below 200 percent of the poverty threshold. Because it is

estimated that up to 20 percent of families in poverty do not have telephones, using the RDD sample alone would lead to biased estimates.

The RDD portion of the survey uses a list-assisted method for sample selection and computer-assisted telephone interviewing (CATI) for screening and interviewing. The telephone component involves screening approximately 200,000 households and conducting 25- to 45-minute interviews with nearly 50,000 persons under the age of 65. The area sample requires listing nearly 37,000 addresses in 138 primary sampling units (PSUs) in order to conduct fewer than 1,500 interviews in households without telephones. The initial plan called for using CATI for the telephone component and computer-assisted personal interviewing (CAPI) for the in-person component. However, the costs associated with training a large interviewing staff for CAPI, each of whom would average fewer than 10 completed interviews, led to the exploration of alternative methods for collecting the data, including the use of cellular telephones. Cellular telephones offered the advantages of minimizing any mode effect that may have occurred as well as allowing interviews to be conducted by the same telephone interviewers who were conducting the interviews for the RDD component.

However, prior to implementation, we had to extend our knowledge. Specifically, we were unfamiliar with cellular telephone technology, uncertain about the levels of cellular coverage in all parts of the nation (particularly mountain and rural areas), and concerned about respondent reaction. Methodologically, we needed to design procedures that would allow interaction between three people instead of the usual two: the in-person (field) interviewer, the telephone interviewer, and the respondent. In addition, we needed to provide CAPI backup for the field interviewers in case the telephone technology failed. This paper discusses our approach and our experience using cellular telephones on both the pilot and full-scale surveys.

Cellular Telephones and Service

Before committing to the use of a particular type of cellular telephone and service agreement,

extensive discussions were held with providers of cellular service in the Washington D.C. area. Equipment issues focused on the wattage of the cellular telephone, the size of the unit, and battery capability. Although several manufacturers produce cellular telephones, the telephones basically come with two signal strengths or wattage capabilities: 0.6 watts (found in the small handheld telephones) and a maximum of 3 watts.¹ In anticipation that many of the interviews would be conducted in remote areas, we assumed that the more powerful telephones would be necessary.

A cellular telephone referred to as a transportable phone or "bag phone" was our initial selection. It comes in a zippered bag not unlike the cases used for small laptop computers. It has a handset much like a household telephone, with a cord connecting it to the telephone electronics inside the bag. Not only does this telephone have the stronger power (3 watts), it can also be switched to "extended talk," or the lower power level (0.6 watt). Despite these features, we wanted to be sure that the advantages of the bag phone actually outweighed those of smaller handheld telephones, which are lighter, easier to carry, and many of which also have batteries that last longer than that of the bag phone. The anticipated disadvantages of the smaller telephones were their lower signal strength and the possibility that the users would perceive a danger of radiation from having the entire telephone and transmitter so close to their heads. It was also expected that these smaller telephones would become quite warm when used for long calls.

Another critical issue was cost. With an anticipated order of 170 telephones, we had to obtain and compare monthly service fees, daily access charges, air time charges, activation charges, and long distance charges. Surprisingly, there was not much variability in the rates charged by the service providers.

Pilot Study

Though one goal of the pilot study was to test the interviewing protocol, the main objective was to determine if cellular telephones would work and if respondents would be willing to use them.

The initial pilot was conducted in Norfolk, Virginia and San Diego, California in August of 1996. Interviewers were supplied with one of two different

handheld telephones and a "bag phone." Training for the pilot study covered household listing, approaching the household, and introducing the study to the respondent. Emphasis was placed on describing the use of the cellular telephone to the respondent; calling the Telephone Research Center (TRC); and the hand-off between the field interviewer, the TRC, and the respondent. Considerable time was also spent familiarizing interviewers with the use and care of the cellular telephones.

Because nontelephone households are rare, cellular interviews were attempted at both telephone and nontelephone households for the pilot study. After each interviewing session, the field interviewer was asked to record the respondent's reaction to the cellular telephone and to describe any problems that occurred.

During the pilot we completed all interviews that were started. None of the potential respondents refused because of the cellular telephones and none seemed surprised at using a cellular telephone for the interview. One of the questions the survey team sought to answer was whether the respondents would be concerned about radiation or about using a telephone that had been used by someone else. No respondent expressed either of these concerns. The smaller telephones did become warm during the long calls, as anticipated, but no respondent asked to terminate a call because of this factor.

However, equipment problems were encountered, particularly from calls originating in San Diego. There were disconnections and static, and the batteries needed to be replaced more often than expected. We deemed it necessary to further test the equipment before making a decision about implementing the cell phone technology for the main survey. Because the pilot was conducted in urban areas, we chose a mountainous region of northern California and a rural area in Texas for further experimentation. Though problems were encountered in these areas, they were less acute than those from San Diego. We ultimately attributed the problems in San Diego to the increase in the number of cellular telephone calls originating there during the Republican National Convention, which was in progress at the same time as the pilot.

Overall, more problems (disconnections and static) were reported with the handheld phones than with the bag phones. While there were some disconnections and static problems with the bag phones, they were clearly better suited to the variety of remote areas in which the pilot study was

¹ We describe the technology available in August 1996.

conducted. However, one problem with the bag phones was that the batteries seemed to run out more quickly than those of the handheld phones. This was somewhat of a surprise because the interviews, although long by survey standards, were not thought to be of such length that a battery would run out of power during an interview. Interview length, recorded for 15 of the pilot study calls, ranged from 9 to 55 minutes and averaged 27 minutes.

Cell phone disconnections and static did not interfere with respondents' willingness to use the cellular telephone and complete the interviews. Given that respondents were willing to participate, we felt we could overcome some of the technical difficulties by providing all interviewers with the high wattage "bag telephones," extra batteries, and an AC adapter, to be plugged into a respondent's outlet. (As it turned out, we had great difficulty securing the appropriate AC adapters for the particular "bag phones" selected, and most interviewers ended up working without them).

Survey Protocol

One hundred and fifty interviewers were trained in a day and a half session held in February 1997, and work began immediately thereafter. Work on the initial sample ended in July of 1997.² To complete the fieldwork efficiently, interviewers were trained to list a dwelling unit, approach the door, and **prescreen** the household with an adult household member, all as part of one visit to the address. Prescreening consisted of reading a brief statement identifying the interviewer and introducing the study before asking questions to determine eligibility. The first question confirmed that the dwelling unit was a private residence and not a business, a brief series of questions was then asked about the presence in the home of a "working" telephone, and the last question asked if anyone in the household was under the age of 65. The age question was asked only if the respondent affirmed that the household had no working telephone.

To determine if there was a "working" telephone, up to three questions were asked. First, an overall question: "Is there a working telephone in this household?" If not, a followup question asked if the telephone had worked at any time in the past week. If so, we asked why it was not working at the present

time. If it was a temporary problem, e.g., mechanical or weather related, the household was considered to have a working telephone. Otherwise, e.g., bill not paid, the household was considered to be without a telephone and eligible for inclusion in the survey.

Once a household was identified as eligible, the interviewer explained that the interview would be conducted from Maryland using the cellular telephone and that if the household cooperated they would be paid \$20. After securing cooperation, the field interviewer explained to the respondent that the cellular telephone often worked best near a window. If the signal strength indicator on the telephone's keypad screen registered that the strength was inadequate, the interviewer moved to another window or outside.

Using the telephone's memory feature, the field interviewer automatically called Westat's TRC in Maryland. Calls coming into the TRC from field interviewers were answered by a supervisor, who recorded the cellular telephone ID number, the field interviewer's ID number, and the case ID number.³ The call was then transferred to a TRC interviewer. Using the recorded case ID number, the TRC interviewer accessed the appropriate case in the computer-assisted telephone interviewing (CATI) system, entered the address of the dwelling unit, and told the field interviewer that he or she was ready to speak with the respondent. The TRC interviewer first administered a brief **screening interview** to make sure the household did not have a "working" telephone and that someone in the household was age eligible. Additional screening questions, similar to those on the telephone survey, were asked to select an appropriate person(s) for an **extended interview**.

Upon completing the screener, the TRC interviewer again spoke with the field interviewer to let him/her know that the screener was complete and to identify the extended interview respondent for the field interviewer. This was done even if the extended interview respondent and screener respondent were the same person. We felt this step was necessary to keep the field interviewer in the position of responsibility for making sure the correct person was being interviewed. We followed this procedure at every juncture in the interview, e.g., following the completion of the screener and each extended

² Subsequent samples were also released but not included in this paper because the work is still in progress.

³ Each cellular telephone was arbitrarily assigned a three-digit ID number that we linked to the actual telephone number of the cellular telephone. Using this number, the TRC interviewer was able to quickly re-establish a call in the event of a disconnection.

interview; at the end of the telephone call, the TRC interviewer spoke with the field interviewer to confirm the outcome. This communication between interviewers was essential, particularly in the case of ineligible households or respondents, because it helped to ensure that the two interviewers and their respective case management systems were synchronized.

Results

Response Rates. As shown, over 99 percent (32,769) of the 33,081 occupied households that were listed agreed to answer the brief **prescreening** questions. Of these, slightly less than 5 percent (1,626) were determined to be eligible, i.e., they did not have a telephone and someone in the household was under 65. Of the 1,626 identified as eligible at the prescreening, 51 turned out to be ineligible during the TRC screening. Of the 1,575 eligible households, 85 percent (1,340) were successfully **screened** by the TRC. During screening, 1,567 persons were selected for the **extended** interview (there were multiple interviews within households), of which 1,463 (94 percent) completed the interview.

Response Rate by Stage: Prescreening, Screening, Extended Interview⁴

Prescreening		
Listed	36,791	(100%)
Vacant	3,710	(10%)
Occupied	33,081	(100%)
Complete	32,769	(99%)
Ineligible (telephone)	31,143	(94%)
Eligible (no telephone)	1,626	(5%)
Nonresponse	312	(1%)
Screening		
Eligible @ prescreening	1,626	(100%)
Ineligible (telephone)	51	(3%)
Eligible @ Screening	1,575	(100%)
Complete	1,340	(85%)
Nonresponse	235	(15%)
Extended Interviews		
Sample Persons	1,567	(100%)
Ineligible	7	(-----)
Eligible for extended	1,560	(100%)
Complete	1,463	(94%)
Nonresponse	97	(6%)

Cellular Service Problems. Some sort of service problem occurred on 25 percent of all the calls received from the field. Most involved disconnections

and static and were easily resolved by having either the TRC or the field interviewer redial the telephone number. However, in approximately 3 percent of the calls, it was not possible to reconnect the respondent and the TRC, even after repeated attempts, and the interviews had to be attempted later.

Many geographic areas selected for the study were on the fringes of cellular service. However, the resourcefulness of the field staff made it possible to complete interviews anyway. One supervisor noted, "Many interviews were done outside, walking around until a good signal could be found." She continued, "Another thing many interviewers did to complete interviews was to put the cell phone on the top or hood of their car and plug it into the cigarette lighter."

At other times cellular telephones could not be used. In these cases, neighbors were often approached and asked if their telephones could be used for the study. More than once, supervisors reported that an interviewer had found five or six eligible respondents lined up in a neighbor's apartment waiting patiently to do their interviews. These kind neighbors were usually thanked with \$5 per telephone call for their trouble. (All calls were made to a toll-free number.)

In hilly areas, where cellular transmission was poor, many respondents were willing to walk to the top of a hill with the interviewer to complete the interview. Some drove to other locations with the interviewer until the signal was strong enough. Others went to pay telephones near their homes and others to motel telephones.

In a rural area of Mississippi, after many attempts to make connections with the cellular telephones, it was determined that the problem was with the local cellular service provider. The equipment was old and too slow in verifying the interviewers' cellular telephone numbers. Finally, after many calls to the customer service representative and technical personnel, the field supervisor was able to work out an agreement. The cellular service provider set its system to accept calls from any cellular telephone with the study's area code and exchange.

In the end, 93 percent of the 1,463 interviews were completed using cellular telephones. The remaining 7 percent were accomplished by other means, mostly by using a neighbor's telephone or a nearby pay telephone. A few community centers and/or churches were also compensated for allowing the use of their telephones. In one instance we installed a telephone in a community center in a very remote area on an Indian reservation

⁴ The numbers in this table are subject to change as subsequent sample releases are finalized.

Interviewer and Respondent Reaction.

Respondents showed no reluctance to use the new technology. Although the survey has had its share of nonresponse, there is no indication that failure to participate was related to the use of the cellular telephone. We know of only two cases in which the respondents refused because they would not allow *any* telephones in their homes. Some respondents were willing to go quite a bit out of their way to participate when the interviewer could not use the cellular telephone. In one instance, a mother was having so much trouble hearing because of the static on the telephone that she offered to meet the interviewer in town to do the interview.

Field interviewers found this work challenging as they often worked in difficult areas talking with some of the poorest people in America. They also preferred to conduct the interviews themselves rather than turning them over to their TRC counterparts.

For the most part, TRC interviewers found this work easier than regular telephone interviewing since it was the field interviewer's job to gain respondent cooperation. Otherwise, they felt that interviewing respondents using cellular telephones was no different than other telephone interviewing. Static and disconnections did make the interviewing process much longer and questions and answers frequently had to be repeated, but that did not seem to trouble either the interviewer or the respondent. Both maintained a cooperative and patient attitude.

Conclusion

Cellular telephones were an effective means for completing interviews. The cell telephones and the procedures that were developed to support their use were well received by both the respondents and by interviewers. The approach also saved on the expenses associated with training 150 field interviewers to conduct the CAPI extended interview as well as the CAPI programming costs. A CAPI training would have involved an additional 5 to 6 days of field interviewer per diem for the 40 hours of training required to make interviewers proficient. It should also be noted that the TRC interviewers who actually conducted the interview were highly experienced, having interviewed literally hundreds of people on this particular study; whereas, the field interviewers, who were expected to average fewer than 10 interviews each, had no chance of becoming as adept with the instrument as their telephone counterparts. This procedure also offered the

advantage of minimizing any mode effect that might have otherwise occurred.

It should also be noted that this study was conducted in the infancy of cellular telephones. As the technology advances, there should be fewer problems with disconnections and static, battery life will increase, and antennas will become more powerful.