

A LINKED FOLLOW-UP STUDY OF OLDER PEOPLE

Mary Grace Kovar and Joseph E. Fitti
National Center for Health Statistics

I. Introduction

The National Center for Health Statistics has proposed an "Integrated Survey Design" in which the National Health Interview Survey (NHIS) would be used as the sampling frame for a number of surveys including other national surveys such as the National Survey of Family Growth, telephone surveys when information is needed quickly, and longitudinal surveys (1).

There are several research studies on linking the NHIS to other surveys underway. The results reported here are from the first of those linkage studies to be completed.

This research was designed to determine the feasibility of linking a longitudinal telephone survey to the Supplement on Aging (SOA), a special supplement to the NHIS in 1984. The longitudinal study was planned for telephone because of the high cost of conducting household interviews, especially in a national survey. However, several studies have shown that interviewing elderly people by telephone is more difficult than interviewing younger people and that the potential for bias is greater (2-7).

Therefore, this study was conducted in September 1984 to:

1. Investigate the feasibility of interviewing by telephone elderly people who had been interviewed in person approximately a year earlier.
2. Investigate the feasibility of obtaining information by mail for people without telephones.
3. Test telephone and mail versions of the questions and questionnaires.

A linked telephone survey differs from a Random Digit Dialing (RDD) survey. The people to be interviewed in a linked survey are selected in advance from the respondents to the previous survey. The telephone numbers are known if the interviewer was able to obtain them. If the interviewer did not obtain a telephone number, the first assumption is that there is no telephone. This is unlike an RDD survey where there is no advance knowledge. A linked telephone survey offers opportunities to estimate and perhaps overcome biases inherent in RDD because information about people without telephones is available from the earlier survey, but it has potential disadvantages if there is no attempt to contact people who are assumed to be without telephones. There is no potential for reaching those people by telephone as there is in random dialing.

The Linkage Study differed from what is proposed for the full-scale Longitudinal Study of Aging in several important respects:

1. The SOA was designed to be the basis for a prospective study, the Longitudinal Study on Aging, and information needed for follow-up was incorporated in the questionnaire. We did not want to contaminate the full study based on the 1984 SOA by using those respondents in this study. Therefore, we used a sample of respondents from the 1983 NHIS. As a result, we did not have all the information that is available on the SOA for this study.
2. Paper questionnaires were used although the Longitudinal Study is planned for CATI.
3. Procedures that would be used in the full study to increase response rates, such as personal contacts with non-respondents, were not used.
4. The study was time limited. Only 2 weeks were

allowed for completing all telephone interviews.

It was similar in other respects:

1. There was extensive training prior to telephone interviewing including self-study exercises, four hours of classroom training, and a minimum of three observed practice interviews.
2. The interviewers were all experienced telephone interviewers with from 12 to 18 months experience.
3. Detailed procedures were specified for conducting the interviews in households with more than one sample person because about 30 percent of the sample was in such households.
4. Follow-up procedures for refusals were specified also. There were three (3) initial refusals. Recontacts with these three cases yielded a partial interview in each case.
5. Quality control was maintained through standard procedures of supervisor observation (monitoring), review of completed questionnaires, and feed-back to interviewers. Where necessary, return calls were placed to the sample person to clarify responses or obtain missing data.
6. Unlimited callbacks were made to interview sample persons who were not present at the time of the initial contact.
7. Questionnaires were mailed with first class postage to people for whom we did not have telephone numbers. An address correction notification request message went to the postmaster at the same time.
8. The U.S. Bureau of the Census, which acts as the data collection agent for the regular NHIS, was also the agent for this study. As usual, the study and questionnaire were designed in conjunction with the NCHS.
9. It is customary for NHIS personnel to observe training and some interviews in the regular NHIS. The authors observed and monitored field activity during the telephone interviewing.

Study Design

Three hypotheses were investigated:

1. Biases can be reduced, or at least compensated for, by using mail questionnaires to interview elderly people who do not have telephones.
2. Part of the difficulty in interviewing elderly people by telephone is that they cannot hear well. Foreknowledge of their disability and careful interviewing techniques can overcome this.
3. Elderly people will respond to telephone interviews if they are informed beforehand that the interviewer will be calling.

The hypotheses were investigated by examining response rates, proxy response rates, levels of item non-response, internal consistency, and by comparison with responses to the NHIS and with other reported research.

To assure adequate sample numbers to examine the first two hypotheses older people who had no telephone numbers reported to the Census interviewer in the NHIS, and people who had been reported in the NHIS to have hearing impairments were over-sampled for the study. The number of eligible people in the April-through-June Quarter of the 1983 NHIS and the number selected for the study are shown in Table 1.

To examine the third hypothesis, letters with the envelopes addressed by name, were sent to all potential

respondents. An alternative design would have had a split sample, one-half receiving letters and one-half either receiving no advance letter or receiving one that was not addressed by name. That would have increased costs beyond our budget.

To test significance, the study sample was treated as if it were a simple random sample from a large finite population. The 0.05 level of significance was used. All tabulations are based on unweighted data using SAS (8).

II. Sample Selection and Universe

Sample selection was done by households and yielded multiple eligible respondents in some households. This was intentional in order to test whether or not attempting to interview multiple persons in the same household had an effect on response rates.

The sample was drawn from households with persons 55 years of age or older in the April-June Quarter of the 1983 National Health Interview Survey (NHIS).

Households were selected by whether there was at least one person age 55 or older. These were sorted by whether there was a telephone and, if there was, by whether at least one person age 55 or older had a hearing impairment. All persons in 200 households without telephones were selected and 200 with a hearing impairment and 200 without were selected from the households with telephones.

III. Data Collection

There were two phases of data collection for each method. In the first phase a letter explaining the survey and giving the authority was mailed and in the second, there was either a telephone call or a follow-up letter.

If the telephone number was known, a letter, in an envelope addressed to the person selected for the sample, was sent to all potential respondents. Approximately one week later, an interviewer telephoned.

If the telephone number was not known, a letter was sent with a questionnaire to be mailed back. If there was no response within three weeks, a follow-up letter with another questionnaire was sent.

Telephone Sample

Although there were 400 cases in the telephone portion of the study, only 350 were used. A sub-sample of 250 cases was assigned first. Work was completed so rapidly that the next 100 cases were assigned on the third day of the field work. Because the telephone interviewing was obviously feasible, and time was limited, the final 50 cases were never assigned.

The intent was to have all people respond for themselves. If a selected sample person was reported to be unable to respond personally due to a language or to physical or mental problems, the questions were asked of a proxy respondent.

The study design included plans for personal contact of those sample persons who refused to respond to the telephone interview. Since there were no refusals, this procedure was not needed.

Mail Sample

Each of the mailings to the mail sample included a questionnaire for self-administration with a letter on the cover explaining the survey, and a franked return envelope addressed to the Census Bureau. The second letter contained the same information as the initial letter but reminded the sample person of the previous mailing.

All forms were mailed first class mail, with the questionnaire in a window envelope and addressed to the sample person by name.

As part of the field work in the mail segment, contacts were made with Telephone Directory

Assistance Offices for all non-respondents to determine whether or not a listed telephone number existed. This was not part of the original plan. The procedures were implemented because half of the people who returned self-administered forms provided telephone numbers.

Procedures that were developed for locating people included:

- o contacts with Telephone Directory Assistance;
- o contacts with local libraries who referenced Cross-list Directories, provided new telephone numbers, or former neighbor telephone numbers with which neighbor contacts were made; and
- o contacts with Post Offices for address changes followed by Directory Assistance contacts for new telephone numbers.

IV. Response Rates

Telephone Sample

The total telephone sample as it was implemented consisted of 350 sample persons. The response rate was 92.5 percent excluding the 3 partial interviews (Table 2).

The response for the telephone sample would have been higher if full field procedures had been used. Some people were absent for more than two weeks and others were never contacted. We would have at least 8 more potential respondents and a 95 percent response rate if we had used the procedures we would use in a full-scale survey.

There were no significant differences in response rates to the telephone phase by whether there was only one or more than one sample person in the household (Table 3). The interview was extremely short which may have contributed to the ease with which we obtained multiple interviews in the same household.

Further, there were no significant differences in response rates by characteristics of the sample persons that were known from the NHIS (Table 4). We succeeded in obtaining high response rates for all groups of the older population.

Somewhat to our surprise, having a hearing impairment did not significantly influence response rates.

We were not so successful in obtaining high rates of self-response (Table 5). Despite all efforts, 16 percent of the responses were proxy. (The information about who was the the respondent was not recorded in the check box for 13 respondents.)

Levels of proxy reporting have been cited as adversely affecting the quality of telephone-elicited data on older people. Therefore, we investigated the factors associated with having a proxy respondent.

The only significant difference in proxy response rates for the NHIS variables was by sex with a tendency towards more use of proxy respondents at older ages. The later could be expected; the former was unlikely to be due to extreme physical or mental disability. We investigated using the usual NHIS information and information from the telephone responses. The statistically significant results are shown in Table 6. Men were more likely than women to be under age 70 (66 vs 57 percent); they were more likely to have proxy responses regardless of age. Men were more likely than women to have difficulty hearing on the telephone (19 vs 9 percent); they were more likely to have proxies only if there was no difficulty reported. Men were more likely to be living with another person than women (85 vs 63 percent); they were more likely to have proxies regardless of living arrangements.

It appeared that proxy responses had less to do with health status or data quality than with differential inclinations of men and women to talk on the telephone.

If that is true, it is likely that the quality from a proxy respondent for an older person was better than would be elicited from a self response.

The telephone survey yielded other important information about older people.

The primary purpose of the proposed Longitudinal Study is to investigate changes in health status and functional disability. Traditionally, the simple measure of perceived health status - rated excellent, very good, good, fair, or poor - had been used in the NHIS. The SOA added limitation in the activities of daily living (ADL's). It was that measure and the association with perceived health status that interested us.

The perceived health status was a very good predictor of whether an ADL was reported 15 months later. Only 5 percent of those in excellent health in contrast with 19 percent in very good health and 64 percent of those in poor health had trouble with an ADL reported in the telephone interview.

A final comment on the telephone interviewing is that the interviewers' recording on the paper questionnaires was excellent with the exception of marking check boxes. The level of error detected in the edit was 0.9 percent, based on 155 actual errors out of a possible 17,850 specific items for possible recording among the 350 cases. Of the 155 errors detected in editing completed questionnaires, 152 were omissions of marking questionnaire check boxes. This excellent performance using a paper questionnaire is in accord with other research results (9).

Mail Sample

Response rates were not as high for the mail sample. Only 53 percent of the questionnaires were returned after two mailings. Again, the response rates were not affected by whether there was one or more than one sample person in the household.

Nor were there any significant differences among the population subgroups that we could define from the NHIS data (Table 7).

There was an interesting difference between the two mailings in the proportion of respondents who had proxies. The proportion of responses to the first mailing that were proxies was 14 percent; in response to the second it was 73 percent. The proxy returns from the second mailing perhaps helped overcome some of the non-response to the first mailing.

It is also interesting to note that the proxy response rate was twice as high among the mail as among the telephone respondents. However, the demographic variable with a significant association with proxy status was age on the mail sample rather than sex.

Within two weeks of the mailing, 90 percent of the returns from each mailing had been received. The second mailing could have gone sooner.

Two unanticipated results are shown in Table 8. First, 46 percent of the people who returned mail questionnaires gave a telephone number even though none had been recorded by the NHIS interviewer. It is possible of course that they had acquired telephones in the intervening 15 months; we don't know. That led to instituting the procedures listed earlier for locating telephone numbers. Seven percent of the people in the mail sample had unpublished numbers and 31 percent of the non-respondents had numbers listed in a directory. We could have tried to reach the later by telephone.

Second, 5 of the 122 responses to the mail sample were reports of deaths. None of the 324 responses to the telephone survey were reports of deaths. We had already known from the NHIS that people without telephones were more likely to report poor health status, but we had not anticipated that 4 percent of the

responses would be reports of deaths. We have no way of knowing about the non-respondents.

V. Bias

Did the use of the mail sample reduce bias? People in the mail sample were younger, were more likely to be in fair or poor health, less likely to have graduated from high school, and more likely to be black. In as much as such characteristics are associated with the one that the Longitudinal Study is designed to measure, the prevalence of and change in ADL's, the potential for bias exists.

All of the characteristics were associated with having an ADL among the respondents to this study. Unfortunately, we do not have the information from the 1984 SOA to model the bias properly. We have only the characteristics from the 1983 NHIS from which we selected the sample. If we assume that the respondents to the study were like the non-respondents, and we did not have differential response for any of the characteristics that we investigated, we obtain the data shown in Table 9.

In this case, using only the very limited information we had at hand and assuming that non-respondents were like respondents, having a mail sample made little difference in the estimated prevalence of ADL's. We would have to use more of the highly-correlated characteristics and know more about the non-respondents, especially to the mail survey, to make definitive statements about bias. We would also have to take the deaths into account which we would do in a full study by matching records with the National Death Index.

VI. Recommendations

Have separate sound-proofed booths for interviewing the hearing impaired.

Paper versions of a questionnaire work very well.

Avoid check boxes on a paper version of a telephone questionnaire.

Try to obtain telephone numbers for the mail sample BEFORE mailing questionnaires.

Use locating and tracking procedures for telephone sample persons not at their old telephone numbers. Local town libraries and local post offices are knowledgeable and helpful in small communities.

Bias can be reduced by:

Increasing response rates through

Using experienced interviewers, and

Addressing envelopes to potential respondents by name;

Obtaining information about people without telephones who are generally

In poorer health,

In families with less income,

Have less education, and

Are more likely to be black.

Match with the National Death Index.

VII. Conclusions

A linked telephone survey of the elderly is eminently feasible. This supposedly hard-to-interview population is responsive to telephone interviewing if informed in advance. The quality of the data is good as judged by internal consistency.

The addition of a mail questionnaire is important to reduce bias. The elderly without telephones are more likely to be poor and poorly educated. Since there is a correlation between health status and socio-demographic status, it is important to include these people.

Matching with the National Death Index is essential. Deaths were reported by respondents to the mail

survey. Since we did not have the match, we do not know how many of the non-respondents may have died.

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Table 1. Universe and Sample Size

	NHIS (April-June, 1983)	Study	
		Designed	Implemented
TOTAL age 55 and older	35,528	600	579
With telephone number	31,619	400	350
Hearing impaired	507	200	173
Not hearing impaired	31,112	200	177
Without telephone number	3,909	200	229

Table 2. Telephone Sample Disposition

	n	Percent
Total	350	100.0
Complete	324	92.5
Partial	3	0.9
Absent more than 2 weeks	3	0.9
In hospital indefinitely	1	0.3
Moved, no telephone number	5	1.4
Telephone not answered during 2 weeks	5	1.4
Non-working number, no telephone number	2	0.6
Other non-interview	7	2.0

Table 3. Telephone sample: Response rates by number of sample people in household

	Total		One		Two	
	n	Percent	n	Percent	n	Percent
Total	350	100.0	246	100.0	104	100.0
Interviewed	324	92.5	228	92.7	96	92.3
Not interviewed	26	7.5	18	7.3	8	7.7

Table 4. Telephone sample: Percent Interviewed by Hearing/Non-Hearing Impaired Status and Selected Characteristics

	Total		Hearing Impaired		Not Hearing Impaired	
	n	Percent Interviewed	n	Percent Interviewed	n	Percent Interviewed
Total	350	93.4	173	94.2	177	92.7
55-64	145	96.6	81	95.1	64	98.4
65-69	61	91.8	34	91.2	27	92.6
70-75	56	91.1	31	90.3	25	92.0
75 and older	88	90.9	27	100.0	61	86.9
Male	145	93.1	68	94.1	77	92.2
Female	205	93.7	105	94.3	100	93.0
Black	21	90.5	12	91.7	9	88.9
White	325	93.9	160	94.4	165	93.3
Less than HS	183	90.7	91	93.4	92	88.0
HS Graduate	103	97.1	55	96.4	48	97.9
More than HS	62	95.2	26	92.3	36	97.2
Less than \$20,000	111	96.4	62	95.2	49	98.0
\$20,000 or more	212	91.0	98	92.9	114	89.5
Unknown	27	100.0	13	100.0	14	100.0
Excellent-Good	230	94.9	121	96.7	109	92.7
Fair-Poor	116	90.6	48	87.5	68	92.7

NOTES: 3 partial interviews are included as responses

3 "Other" racial status, 2 "Unknown" educational status, and 4 "Unknown" health status are not shown separately.

Table 5. Telephone Sample: Percent Proxy

	n	Percent Proxy
Total	311	16.4
55-64	134	13.4
65-69	55	10.9
70-75	48	16.7
75 and older	74	25.7
Male	122	22.1
Female	189	12.7
Black	19	15.8
White	289	16.3
Less than HS	157	21.0
HS Graduate	95	10.5
More than HS	57	14.0
Less than \$20,000	100	19.0
\$20,000 or more	184	15.2
Excellent-Good	215	16.7
Fair-Poor	96	15.6
Hearing impaired	156	14.7
Not impaired	155	18.1

Table 6. Telephone Sample: Percent Proxy

	n	Percent Proxy
Total	311	16.4
Age and Sex		
Under 70	81	19.8
Male		
Female	108	7.4
70 and older	41	26.8
Male		
Female	81	19.8
Hearing and Sex		
Difficulty	23	52.2
Male		
Female	17	58.8
No difficulty	99	15.2
Male		
Female	172	8.1
Living arrangement and sex		
Alone	18	11.1
Male		
Female	70	8.6
With others	104	24.0
Male		
Female	119	15.1

Table 7. Mail Sample: Percent Response by Selected Characteristics

	n	Percent Response
Total	229	53.2
55-64	119	48.7
65-69	31	64.5
70-75	36	52.8
75 and older	43	55.8
Male	109	51.4
Female	120	54.2
Black	44	43.2
White	172	55.2
Less than HS	135	51.9
HS Graduate	55	65.5
More than HS	24	41.7
Less than \$20,000	26	53.9
\$20,000 or more	167	55.1
Unknown	28	42.9
Excellent-Good	117	57.5
Fair-Poor	107	47.7

NOTE: 7 "Other" and 6 "Missing" race, 5 "Unknown" education, 8 "Missing" income, and 5 "Unknown" health status are not shown separately.

Table 8. Mail Sample Disposition

	Total		Return		2nd Mail		No return	
	n	Percent	n	Percent	n	Percent	n	Percent
Total	121	100.0	76	100.0	45	100.0	108	100.0
Tel. Number	56	46.3	31	40.8	25	55.6	33	30.6
No Tel. Number	38	31.4	24	31.6	14	31.1	62	57.4
Unpublished/Unknown	22	18.2	19	25.0	3	6.7	13	12.0
Deceased	5	4.1	2	2.6	3	6.7	-	-

Table 9. Estimated percent of population with limitation in Activities of Daily Living: total and derived from telephone and mail sample.

	1983 Population Estimate (thousand)	Study Percent with ADL	Estimated Percent of Population with ADL
Total age 55 and over	47,897		28.3
With telephone number	44,531		27.4
Hearing impaired			
55-69 years			
Male	764	12.5	
Female	528	14.7	
70 years and older			
Male	555	12.5	
Female	679	35.5	
Not hearing impaired			
55-69 years			
Male	12,312	14.9	
Female	15,117	31.7	
70 years and older			
Male	5,613	29.2	
Female	8,962	40.4	
Without telephone number	3,366		39.6
55-69 years			
Male	1,139	32.4	
Female	1,175	43.6	
70 years and older			
Male	451	50.0	
Female	601	37.5	

NOTES: Civilian noninstitutionalized population of United States estimated from NHIS April-June 1983. Known deaths were excluded from mail sample.