

THE EFFECTS OF ADVANCED LETTERS ON RESPONSE RATES IN LINKED TELEPHONE SURVEYS

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Introduction

A "linked telephone survey" (LTS) is defined as a data collection effort on persons, families, or households related to those measured in an earlier personal interview data collection from a sample. In this paper "linked telephone survey" will be used to describe a reinterview of persons measured previously in the National Health Interview Survey (NHIS). This paper describes the motivation, design, and findings of a methodological investigation into the use of advance letters for linked telephone surveys for the NHIS.

1. Alternative Designs for Collecting Information from the U.S. Household Population

The choice of method to collect information on the U.S. household population must consider both errors and costs of the alternatives. Decisions must be made regarding sampling frames (the materials used to identify the population) and data collection modes. The sampling frame options are typically Census address frames methods (as used in the Current Population Survey and NHIS prior to 1985), area probability methods (as used in the 1985 NHIS), telephone number frames, and other address methods. The data collection methods of chief interest are the personal visit interview and the telephone interview.

The relative coverage errors (failure to include some of the household population) of address frame and area frame methods are not well documented in the survey literature. The use of the telephone frame to study the household population appears to miss between 6 and 7 percent of the persons covered by the Census address frame methods. Thornberry and Massey (1983) have documented that those without telephones tend to have lower family incomes, to have smaller households, and to live in rural areas. The proportion of the elderly who have telephones is relatively larger than the proportions in other groups.

Data collection modes also differ in their nonresponse and measurement error characteristics. Groves and Kahn (1979), DeMaio (1984), O'Neil *et al.* (1980), Fitti *et al.* (1979), and Sykes and Hoinville (1985) have all discussed problems of response rates in first time telephone surveys. In telephone surveys that had no prior contact with the sample household (sometimes called "cold" telephone surveys), across various organizations, over several years of research, cooperation tends to be lower than that obtained in comparable personal visit interviews. Cannell *et al.* (1987) have shown that nonresponse is especially high among the elderly in cold telephone surveys.

In terms of measurement error, however, differences among modes are difficult to find in the survey methodological literature. Hochstim (1967) found fewer reports of intake of alcoholic beverages among women in personal visit surveys than in the other modes, but few other differences. Groves and Kahn (1979) similarly found few differences between personal and telephone interviews. There were, however, some tendencies for respondents to give shorter answers to open questions in the telephone mode. Cannell *et al.* (1987), in a adaptation of the NHIS in a cold telephone format, found more reporting of health events in the telephone mode than obtained by Census Bureau interviewers in the NHIS. The inference from this study is clouded by potential organizational differences that are confounded with mode differences. Groves and Magilavy (1986) present some evidence that argues that response variance associated with interviewer differences may be reduced through the centralization of interviewers that occurs in most telephone surveys. On the whole, however, there are few documented and interpretable differences in statistics obtained in cold telephone surveys and those in personal visit surveys.

Of all the errors in telephone surveys, nonresponse error seems most intractable. Efforts to increase response rates on the telephone in health surveys have been largely unsuccessful (e.g., O'Neil *et al.*, 1979). Lower telephone survey response rates among the elderly are particularly disturbing for a health survey because the elderly have distinctive health characteristics. This concern led to efforts in the use of advanced letters with a linked telephone survey to decrease nonresponse error over cold telephone surveys.

2. Advance Letters and Response Rates

The hypothesized causes of improved cooperation with advance letters focus either on changes in the interviewer behavior or changes in respondent attitudes. Letters might improve response rates by increasing the self-confidence of interviewers, allowing them to refer to an attempt to notify the sample household about their call (whether or not the letter was actually received or read). Calling attention to the letter relieves the interviewer from single-handedly legitimizing her requests for the respondents' time. The interviewer is more fully an agent sent by an organization that used its resources to forewarn the respondent of the call.

If this hypothesis is true a portion of the effect of the advance letter corresponds to changes in interviewer behavior given knowledge of the advance letter. This hypothesis could be tested empirically. For half of the sample receiving letters interviewers could be alerted that a letter had been sent, and directed to refer to the letter in introductory comments with the respondent. For the other half of the sample receiving letters no such knowledge would be given to the interviewers. Correspondingly, for the cases not receiving letters, half would make reference to a letter and half would not. The treatment of having interviewers refer to a letter when none had been sent involves a small deception of both interviewers and respondents and needs to be discussed. It would, however, allow us to measure a pure effect of interviewer behavior, given knowledge of an advance letter.

The operational complication with this plan is that some respondents who received the letter will refer to the letter even without the interviewer's knowledge of the letter. The deception inherent in the experiment will thus be revealed to some interviewers during the study. Some assessment of the damage of this possibility must be made.

The most striking result in the literature on advance letters is that of Cannell and Fowler (1965) that 44 percent of the respondents in an NHIS-like interview reported that they had not received the letter and brochure describing the survey. A total of 33 percent reported reading the letter carefully, and 16 percent quickly. Thus, over 50 percent said they had read neither the letter nor the brochure. A question raised about these results concerns the actual receipt of the letter; the authors estimate that about 73 percent of the letters were actually received. Among those addresses where there was strong evidence of the letter being delivered, 58 percent of the respondents reported reading the letter. There is some evidence that women read the materials more frequently than men, and that lower income groups read more frequently than higher groups.

These results suggest that three features of the experiment must be implemented. First, there should be an experimental check to inquire of respondents whether or not they received a letter, and if so, whether they read it. Second, attention must be given to what aspects of the letter or envelope will increase the level of reading of the letter. With the low levels of reading reported in the above study, it is unlikely that the contents of the letter could have any effect. Third, increased personalization of the letter can be attempted in an LTS design. In a first-time interview situation, the normal

addressee of the letter is the "head of household" or "householder", or some other phrase equally popular among junk mail users. Addressing letters to individuals would probably strengthen the effect. Thus, one treatment should involve sending a letter to each adult in the household individually.

Dillman *et al.* (1976) in a one-time telephone survey used three types of letters, 1) merely mentioning the study and alerting the respondent to an upcoming call, 2) provided additional information about the survey, described its sampling procedures, and invited people to call with questions, and 3) all the information of the first two but emphasize the study's social utility, promised anonymity, briefly described the kinds of questions to be asked, and offered a copy of results. Names were typed on all letters, and a hand written signature was used. There was a negative effect of receiving no letter (85 percent response rate versus above 90 percent response with letters, generally). The best form was the middle alternative, although the effects are not large. The authors note that the third option might have created too long of a letter to be read carefully.

In a series of studies Slocum, Empey, and Swanson (1956) included information in letters that 1) described the study, emphasizing its "social utility", 2) explained how the respondent was selected into the sample, and 3) explained why his cooperation was important. One personal interview study did this experimentally, but found no effect of the letter on response rates, but fewer number of calls in the letter group. They then sent a special delivery letter to a sample of nonrespondents emphasizing their role in the success of the study, and obtained large effects of the letter.

Instead of emphasizing the importance of each respondent to the success of the survey in the letter Erdos(1957) argues that the letter should describe how the respondent will benefit personally from the survey. In a mailed questionnaire of school administrators, Furst and Blitchington (1979) experimentally tested a letter that described how the study was designed, what the researchers hoped to learn, and benefits that could ensue from the results of the research. A five percentage point increase in response rates (statistically insignificant) was obtained with the letter.

In a study of older women (aged 66 - 76 years), Koo *et al.* (1981) required initial screening of households to locate eligible persons, followed somewhat later by a personal interview. An advance letter was experimentally tested on a half-sample. The contents of the letter described the sponsorship of the study (not stated in the article), reviewed purposes of the study, and alerted the respondent of the interviewer's forthcoming visit. Results varied across high and medium socioeconomic status (SES) areas (no effect of letter) and low SES areas (12 percentage point negative effect of letter on response rate). Overall response rates are very low (between 35 and 65 percent).

Cartwright and Tucker (1969) describe a letter experiment on a sample of fathers and mothers of recently born children. The letter described affiliation (Medical Care Research Unit of Institute of Community Studies), gave little information about the study, sought cooperation of reader, pledged confidentiality, described how sample was selected, described the Institute. Fathers were approached by male interviewers; mothers by females. One-fifth of the sample were fathers. No effect of letter for mothers, but 11 percentage point effect (23 to 12 percent refusals) for fathers. The overall response rates for mothers were higher (by 3 to 15 points) than those for fathers. The letter did have a positive effect on mothers where the head of household was a professional, and a negative effect on those where the head was unskilled.

In short, the dimensions on which letter content seem to vary include the following:

- a) how detailed a description of the study is given (from none at all, to a paragraph)
- b) whether the social utility of the respondent's cooperation is emphasized or whether individual rewards on the respondent's part are emphasized.
- c) whether sampling techniques are described
- d) whether confidentiality of the data is promised

In the case of a linked telephone survey another question concerns how reference to the first interview should be made.

3. The Advance Letter Experiment

There were three forms of an advance letter used in this study, experimentally assigned to different sample cases. The simplest form was that in Figure 1.

Figure 1. Short form of advanced letter

Dear Friend:

Last year your family was interviewed in your home as part of the National Health Interview Survey sponsored by the U.S. National Center for Health Statistics.

As part of a followup study, an interviewer from The University of Michigan will be telephoning your home to ask a short series of questions. This study is authorized by Section 306 of the Public Health Service Act (42 U.S.C. 242k). The information you supply will be used for statistical research on health problems, and the answers you give will be held confidential. Participation in the survey is voluntary; however, your help is extremely important to the study.

I thank you in advance for your cooperation with this research.

Manning Feinleib, M.D., Dr.P.H.

Director
National Center for Health Statistics

The second form added a paragraph after the first above, describing the purpose of the linked telephone survey. The third form personalized the salutation (Dear Mrs. Smith:), mentioned the date of the NHIS interview, and cited the number of persons found in the family at that time ("Since your answers will serve to represent other with three family members living together. . .").

In addition to the form of the letter there were two other manipulations in the experiment, a) whether letters were sent only to one person in the sample family or to all persons, and b) whether the interviewer mentioned the letter as part of her introduction on the first telephone contact. For the group of sample families who were not sent an advanced letter the latter manipulation was performed on part of the sample. That is, for some of the cases for which no letter was sent, the interviewer mentioned a letter, "Did you receive a letter we sent to tell you that I'd be calling?" It is important to note that interviewers were not informed that some cases were not sent an advance letter. This fact, it was hypothesized would reduce the overall effect of the advance letter. The characteristics of the survey experience that are treated as dependent variables in the experiment are: a) the cooperation rate among those sample persons contacted, b) reports on whether they received the letter, and c) reports on whether they read the letter.

4. Sample design

The cross section population is defined as all members in NHIS sample families, assigned to sample weeks between January 1, 1985 through June 30, 1985. There were 13,321 families with telephone numbers recorded on the NHIS questionnaire, after removal of some special purpose cases (a population studied in a separate simultaneous survey). A sample of 2,220 of families was drawn with a systematic sampling in 17 independent replicates of equal expected size. The internal replication was desirable because of uncertainties regarding the number of eligible families that would eventually be located and respond to the interview request. The cross section sample was also supplemented by 100 families from the special purpose cases, in order to maintain coverage of the full telephone household population. The final sample size was approximately 1,865. That is, 6.1 percent of the sample cases were lost to data collection efforts because of incomplete NHIS information. These are omitted from later tables describing the outcome of the research.

5. Nonresponse Experience

One of the important criteria on which linked telephone surveys can be judged is their achieved response rates. The response rate definition we will use in this discussion is c/n , where c = the number of cases on which completed data were obtained, and n = the total number of cases sampled. The term "case" is used to signify either sample families or sampled persons, with both numerator and denominator defined on the same units.

Note also that c/n above is a ratio of simple unweighted totals, without adjustment for unequal probabilities of selections. This definition is useful for evaluating the success of the interviewing efforts but may be misleading as an estimate of how complete a measurement of the target population was obtained. For that reason, we also will use c/n , altered by selection weights appropriate to the LTS.

5.1 Overall response rates for the studies

There are two separate features of a linked telephone survey that affect response rates: a) the knowledge of the current telephone number for the sample family and b) the level of cooperation encountered upon contact with the sample family. Table 1 presents weighted and unweighted percentages of persons interviewed among the cross section sample. It shows that about 88 percent of the sample cases were contacted and interviewed for some part of the questionnaire. About 85 percent completed the entire interview. The weights make very little difference in the results. The largest single source of noninterviews are refusal cases, amounting to about 5. The next largest category is that corresponding to cases for which a current telephone number could not be obtained (about 4.5 percent of the cases).

The respondent rule involved the request to speak to someone knowledgeable about the dental care of the family. One person provided information about all the persons in the family. Table 2 presents estimates of the percentage of families providing the interview. To the extent that large or small families were disproportionately cooperative, the figures in table 2 will differ from those in table 1. The percentage of families with at least a partial interview is about 87 percent (versus 88 percent of the persons). Those providing complete interviews is about 83 percent. The small discrepancy reflects the slight tendency for smaller households to have lower response rates.

It is important for the reader to note these response rates apply to the sample cases drawn from the NHIS interviews. The NHIS response rates average about 96 percent of all sample persons. This implies that the percentage of the cross section persons who might have been measured, had a 100 percent sample been drawn, would be $(88 \text{ percent}) * (96 \text{ percent}) = 84.5 \text{ percent}$. This ignores the fact that some cases had no telephone numbers listed on the NHIS form (about 10.1 percent of all NHIS respondent families), and some sampled

had unusable NHIS data (6.1 percent of the sample). Combining telephone noncoverage and total nonresponse rate, the LTS represents 72.1 percent of the persons (this ignores coverage errors of NHIS).

It is also useful to compare these response rates to ones typically obtained in RDD telephone surveys without prior contact with the sample unit. Cannell et al. (1987) achieved response rates of about 81 percent on a first-time RDD survey, using a 30 minute version of the NHIS questionnaire and a knowledgeable respondent selection rule. This is to be compared to the 88 percent rate obtained in the LTS. However, it should be noted that the RDD sample offered somewhat better coverage of the household sample, because the obtaining of a telephone number was not dependent on the voluntary provision of the respondent, but rather was derived from the randomization procedure directly. As noted above, the 88 percent rate really corresponds to 76.0 percent coverage. The 81 percent RDD rate corresponds to $(81 \text{ percent}) * (93 \text{ percent}) = 74.4 \text{ percent coverage}$.

An analysis of variation in response rates by socio-demographic subgroups of the population was performed. The subgroups were chosen to test various notions about noncompliance to the survey request and to document any response rate differences for major socio-demographic subgroups. An example of the first type of classification is the timing of the NHIS interview, whether interview information was obtained for the respondent in the sample week assigned to the case or later. Later interviews reflect either some difficulty in contacting the family or some difficulty in persuading them to respond. The lowest LTS response rate was obtained for those interviewed one week later than the sample week, but those interviewed even later have a higher response rate. It seems unlikely that this indicator of the difficulty to complete the NHIS is useful in indicating the difficulty for a later LTS. The largest correlates of nonresponse to the LTS appear to be age, where adults 17-24 and 75 or more show disproportionately low response rates; education, showing a monotonic increase in response rates with increasing years of education (from 85 to 93 percent). Those living in poverty or with lower incomes also tend to be nonrespondents. Those living alone or in very large families also exhibit lower response rates. One of the chief fears of the LTS test was that the response rate would be a function of how great a time had passed since the NHIS interview. This did not occur for the LTS when contacting those interviewed 8 to 14 months earlier. We suspect that the use of contact persons greatly diminishes the effect of residential mobility on nonresponse for the LTS.

5.2 Effects of the Advance Letter

From one perspective the only important outcome of the advance letter experiment is whether the response rate increases when advance letters are sent. This is the result we examine first. Table 3 presents the percent of sample persons for whom interview data were obtained, among those families where contact was made. The control group of the experiment is the group that was sent no letter and no letter was mentioned by the interviewer at the introduction to the survey. There is an overall negligible 0.4 percentage point increase in the cooperation rate among those sent any type of letter (from 92.6 to 93.0 percent cooperating). This is a substantively trivial and statistically insignificant increase. There appears to be a backfire effect if an advanced letter is mentioned when none was sent. For this group the cooperation rate is about 86.9 percent (versus the 92.6 percent when the letter is not mentioned; standard error of the 5.7 point difference is 2.4 points).

Various experimental treatments involving the letter, however, indicate that larger gains are possible. Among those families sent a letter, for example, there seems to be a clear advantage (4 percentage point rise, standard error about 1.5 percentage points) of sending a letter to everyone in the

family, not just one person. The advantage of sending a letter to everyone seems to be consistent in almost all treatment combinations tried. When mailing to all versus mailing to none is compared, there is a 4.4 percentage point advantage over the control group (standard error approximately 2.0).

There seem to be no consistent differences in reactions to the three different types of letters sent. The most expensive letter to prepare is the one involving personalization of the content. Since it offers no advantage over other forms, substantial cost savings can be realized, while still taking advantage of the letter effect.

There appears to be an unexpected interaction effect between mentioning the letter and the number of persons in the family being sent the letter. When only one person in the family is sent the letter, there is an advantage in mentioning the letter. (93.6 percent cooperation versus 88.5 percent when not mentioning it). There is no such effect when letters are sent to all persons. Only *post hoc* hypotheses can be offered for this result. One begins with the premise that receiving the letter is remembered event for all persons sent the letter. Given that premise, if letters are sent to all persons, then mentioning the letter is not necessary to gain the positive effects of the letter. If, however, a letter is sent only to one person, the odds of the person answering the telephone being the one to whom a letter was addressed are a function of family size. The effect of mentioning the letter to ones not sent the letter is positive.¹ The second hypothesis argues for some backfire effects that are introduced when the letter is mentioned for the group with letters sent to all. Here the mentioning heightens the saliency of an event which is viewed by some as an annoyance, a disproportionate attempt to heighten compliance. (This effect might also be most evident among persons living in large families).

Although the advance letter may be unsuccessful in general, it may find greater success among parts of the population. We examined the effect of the advanced letter for different subgroups of the population. The letter appears to be more effective for households with older persons (over 65 years of age). There were no greater effects of the letter among those interviewed by NHIS far in the past than among those interviewed more recently. This result implies no greater need to use advanced letters when contacting early NHIS samples.

In addition to the possible effects of advanced letters as a tool to increase response rates, it was hoped that they might reduce the costs of data collection by reducing the need for calling back numbers after the first contact. Tables 4 presents the mean and median number of dialings corresponding to a sample telephone number through the call on which the final disposition was made. Neither the sending of an advanced letter, nor any of the related experimental treatments have any important effects on the amount of calling effort required to complete a sample case.

We also examined reports of receiving the advance letter, among those sent the letter. Failure to report the receipt of a letter can arise because: a) no letter was received; b) failure to remember that a letter was received, and c) failure to remember the contents of the letter and the desire to have the interviewer review the contents of the letter orally. Overall, about 75 percent of the respondents recalled receiving a letter, when asked explicitly, "Did you receive a letter we sent to tell you that I'd be calling?" There are few correlates of reporting receipt of the letter. It does appear that Blacks disproportionately fail to report receipt of the letter both in the cross section and the target sample (there is over a 15 percentage point deficit for Blacks' reporting receipt), but there were no interpretable effects of education. It is important to note that the correlation of any individual level traits with receipt of the letter is dampened in the cross section sample because the report of the receipt of the letter was made by only one person in the family. For example, younger people may not recall receiving the letter themselves, but because

they live with older people tend to remember such things, the letter effect can affect the younger people.

6. Summary and Conclusions

The effects of advance letters on response rates to a telephone survey linked to NHIS respondents appear to be small for the traditional letter treatment. Useful increases in survey participation are obtained when letters are sent to all persons in the sample family. It is speculated that these positive effects arise through heightened communication within the household about the impending call of the interviewer. In contrast, the sending of one letter suffers diminished effects because its impact is often limited to the addressee.

Sending the advance letter did seem most successful among a population group which exhibits low response rates in telephone surveys — the elderly. This is a promising result that needs further exploration, including the tailoring of the letter content to known concerns of the elderly sample person.

Unfortunately, no reduction of survey interviewing costs appear to result from the use of the letter. This implies net increases in costs from the printing and mailing of the letter, and the decision about the overall cost efficiency the letter must be made through an evaluation of reduced nonresponse bias in those groups benefiting from the letter.

Finally, inference from this experiment must be limited by the essential survey conditions affecting the letter treatment. The overall response rate in this linked telephone survey is relatively high relative to other telephone reinterview studies. It is likely that the effect of the letter is itself a function of the attractiveness of the survey to the sample population. In cases where the combination of topic and survey organization are not as attractive as that present in this study, larger letter effects might be expected. The difficulty of demonstrating large net gains from advanced letters increases as the response rate without letters itself approaches 100 percent.

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Footnotes

¹ Note that this hypothesis would probably also suggest that mentioning the letter when it was not actually sent would have similar effects. This does not seem to be the case.

Table 1. Overall person-level response rates, cross section sample

Disposition category	n	Percent	
		Unweighted	Weighted by selection weights only
Completed interview	3,684	85.4%	86.6%
Partial interview	98	2.3	1.9
Refusals	227	5.3	4.9
Other noninterviews	96	2.2	2.0
Changed number unsuccessful tracking	200	4.6	4.4
Other noncontacts	8	0.2	0.2
Total	4,313	100.0%	100.0%

Table 2. Overall family-level response rates, cross section sample

Disposition category	n	Percent	
		Unweighted	Weighted by selection weights only
Completed interview	1,530	83.2%	83.4%
Partial interview	75	4.1	4.1
Refusals	95	5.2	5.3
Other noninterviews	46	2.5	2.5
Changed number unsuccessful tracking	86	4.6	4.4
Other noncontacts	7	0.4	0.4
Total	1,839	100.0%	100.0%

Table 3. Percentage of interviews among sample persons contacted by letter treatment, cross section sample

	Letter mentioned		Letter not mentioned			
	Mailed to one	Mailed to all	Mailed to one	Mailed to all		
No letter		86.9% (569)		92.6% (854)	90.3% (1423)	
Short letter	93.3% (627)		99.1% (125)	87.8% (124)	96.5% (60)	
Descriptive letter	94.5 (552)		92.1 (114)	89.8 (139)	100.0 (53)	93.0 (2670)
Descriptive, personalized letter	93.1 (581)		95.2 (109)	87.7 (126)	99.3 (60)	
			Mention		No mention	
Total			92.0% (2677)		92.2% (1416)	
			Mailed to one		Mailed to all	
Total			92.1% (2149)		97.0% (521)	

Table 4. Median and mean number of calls to final disposition by letter treatment, cross section sample

	Letter mentioned				Letter not mentioned				Total	
	Mailed to one		Mailed to all		Mailed to one		Mailed to all		Median	Mean
	Median	Mean	Median	Mean	Median	Mean	Median	Mean		
No letter	2.46	4.79			1.92	3.94			2.15	4.29
Short letter	1.85	3.84	2.33	3.93	2.64	4.68	1.61	2.65	2.11	4.29
Descriptive letter	1.98	4.50	2.58	5.27	1.59	3.45	2.45	4.48		
Descriptive, personalized letter	2.32	4.45	2.15	4.94	2.82	5.28	2.17	3.08		
	Letter mentioned				Letter not mentioned					
	Median		Mean		Median		Mean			
Total	2.19		4.43		2.00		4.02			
	Mailed to one				Mailed to all					
	Median		Mean		Median		Mean			
Total	2.07		4.29		2.27		4.26			