USING ADVANCE RESPONDENT LETTERS IN RANDOM-DIGIT-DIALING TELEPHONE SURVEYS

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KEY WORDS: RDD, telephone, letter

Introduction

The rationale for the use of an advance respondent letter is based on the experience of survey researchers that contact before an actual interview attempt "warms-up" respondents, hopefully making them more positively disposed toward participation than if they were only to receive a "cold call." The logic is that using advance respondent letters will increase response rates, thereby reducing the potential size of nonresponse-related total survey error. For example, Traugott, Groves, and Lepkowski (1987) reported an experiment in which advance contact in a telephone survey of the public increased response rates by 10 percentage points. To the extent that advance letters reduce nonresponse, they also are likely to be highly cost effective by decreasing the need for far more expensive refusal conversion attempts (Frey, 1989; Lavrakas, 1993).

For the typical RDD telephone survey, the first attempt made to contact a household is always a "cold call." Since numbers are randomly generated, the person who answers the telephone does not expect the call, and may have never heard of the government agency sponsoring the survey or the survey organization collecting the dam. This lack of familiarity is one reason that RDD surveys typically achieve lower response rates than face-to-face household surveys. Another problem in RDD surveys is the proportion of individuals who simply hang up during the introduction without saying anything (HUDIs), often as soon as the interviewer begins to speak.

Wulfsberg and Battaglia (1992), and Traugott, Groves, and Lepkowski (1987) discuss the potential for increasing response to surveys by using an advance respondent letter combined with RDD sampling methodology. To obtain addresses that correspond to the RDD-generated telephone numbers, a file containing the RDD-generated telephone numbers is cross-referenced against a computerized database containing directory-listed residential telephone numbers, names, and addresses.

It is possible that an advance letter may unintentionally increase both total survey error and survey costs. If potential survey respondents learn from advance contact what makes one ineligible or eligible to be interviewed, some may answer the survey's screening sequence inaccurately so as to avoid being interviewed. If this occurs, the potential respondent is actually refusing to participate and will be incorrectly coded as ineligible.

Conversely, if potentially eligible survey respondents are not sufficiently persuaded as to the benefits that will accrue through survey participation, or if they do not see the relevance of the survey topic to their own circumstances, they may refuse to participate. An appeal to potential respondents to screening surveys that is too weak could possibly result in lower than predicted eligibility rates, since eligible respondents may participate at lower rates than ineligible households, especially since it is much easier to screen out ineligible households than enlist eligible households to participate.

Data

The data on which the current report is based come from a large, on-going data collection effort being mounted by the National Immunization Program and the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention. The Childhood Immunization Initiative established a goal for increasing vaccination levels for 2-year-old children in the United States. The National Immunization Program works throughout the 50 states, the District of Columbia and the U.S. Territories and Commonwealths in ongoing efforts to raise early childhood vaccination coverage levels. In order to provide current baseline estimates of vaccination levels for children 19 through 35 months of age and to monitor change in these levels, the National Immunization Survey (NIS) is being conducted in 78 of these Immunization Action Plan(IAP) areas, consisting of the 50 states, the District of Columbia and 27 metropolitan areas. Beginning with the second quarter of 1994 and continuing through the fourth quarter of 1997, data collection is scheduled to conduct independent quarterly surveys in each of the 78 IAP areas. This will make it possible to combine four consecutive quarters of survey data to provide annualized estimates of the coverage rates for five antigens (DTP, Polio, MMR, Hib, and Hep B) within each of the 78 IAP areas. For 1994, the first year of data collection, the estimates will be based on data collected over three calendar quarters, since the initial

data collection activities did not begin until April of 1994.

The data collection methodology and sample design use list-assisted random-digit-dialing (RDD) methods to sample households and conduct computer-assisted telephone interviews (CATI). Screening for households with children 19 through 35 months of age is conducted through brief interviews. When an eligible household is identified, data on five types of vaccinations, including dates and/or numbers of vaccination events, are obtained for each child in the target age range living in the household.

The need to collect vaccination data independently for each of the 78 IAP areas on a quarterly basis, combined with the small proportion of households in the United States that contain a child 19 through 35 months of age, require a large initial sample of telephone numbers. For the survey year 1994, the total sample size was 1,177,140 randomly generated telephone numbers.

Sample households with directory-listed residential telephone numbers are mailed an advance respondent letter. The RDD telephone numbers are matched against electronic telephone directories that contain address information for directory-listed residential telephone numbers. After the RDD sample file is matched against computerized telephone directory lists, all matched addresses determined to be undeliverable due to incomplete information are deleted from the file. A mailing contractor addresses the envelopes, inserts the letter, and mails the advance respondent letter. In a typical survey quarter, more than 150,000 advance respondent letters are mailed to matched addresses. Advance respondent letters have been used since the beginning of data collection in April of 1994.

The databases used in the telephone-number-to-address-matching process contain over 65 million residential telephone numbers, over 10 million business telephone numbers, and a new-mover file of over 2 million not-yet-published residential telephone numbers. The database of residential and business listings does not include unpublished or unlisted telephone numbers. In some instances, due to consumer preference, a listing may not contain a street address.

The NIS advance respondent letters are printed on (NCHS) letterhead, under the signature of the director of NCHS. The body of the letter explains that the household may receive a telephone call as part of an important national health study. The original advance respondent letter includes a boxed statement at the bottom mentioning questions asked about children under four years of age and "each child's shot record."

Methods

As the 1994 data collection progressed, it became apparent that eligibility rates were below anticipated levels, thereby reducing survey response rates and increasing survey production time and costs. One concern was that respondents in eligible households receiving the advance letter did not perceive a reason for participating because the letter did not heavily emphasize the purpose of the study (i.e., children and vaccinations). Another possibility considered was that respondents were falsely answering that they had no children under four years of age, thereby eliminating themselves from further interviewing contact attempts.

Because of the lower-than-expected eligibility rates and response rates, an experimental manipulation of the advance respondent letter was undertaken during the third quarter of data collection to test for the possibility of negative, albeit unintentional, consequences of using an advance respondent letter. This test was designed to address two questions: (1) is using an advance respondent letter more beneficial than no letter because the letter increases response rates, lowers refusal rates, and decreases the number of call attempts required?; and, (2) if using an advance respondent letter is found to be of benefit, can the content of the letter be manipulated to decrease total survey error by increasing survey participation and the use of vaccination records?

Theory suggests that use of a letter will increase cooperation and participation in the survey, as well as increase the use of vaccination records at first contact with eligible households, thereby reducing total survey error and costs. If the letter does not generate these benefits, however, or leads to lower eligibility rates, it may be preferable to shift resources away from the advance respondent letter and allocate them to making the additional callbacks required to ensure an equally high proportion of respondents have vaccination records available at the time of the interview.

An experimental design was used to test the effects of the advance respondent letter. Five third quarter, 1994 sample replicates were used to implement the multi-cell experimental design for the advance letter experiment. Given that time and cost estimates for the NIS were predicated on an eligibility rate of 5% of known households, the experimental design had to be sensitive to statistically significant differences between conditions of 1 percentage point or greater. A sample size of at least 6,900 per cell can detect a 1.0 percentage point difference for a 2-tailed test at the .05 significance level with .80 power. An effective subsample size of 6,900 was targeted for each experimental condition to provide this level of statistical power. To achieve this goal, 63,691 RDD generated

telephone numbers that had been determined to be from households with directory-listed telephone numbers were <u>assigned randomly</u> to one of four conditions:

Group 1. No advance respondent letter mailed
- n = 19,229.

Group 2. Low level mention of study purpose
- n = 9,430.
- Advance respondent letter mailed.
- Single mention of immunization and no mention of children.

Group 3. Medium level mentions of study purpose
- n = 25,571.
- Advance respondent letter marled.
- Mentions children under 4 years old and immunization. Requests that vaccination records be available during interview.

Group 4. High level mentions of study purpose
- n = 9,451
- Advance respondent letter marled.
- Several mentions of children and immunizations.
- Mentions need for respondent to retrieve vaccination records prior to the interview for children under four.

Results

The overall response rates, survey participation rates, and household eligibility rates for the four experimental groups are shown in Table 1, based on the distribution of final case status. Since the cases in the four experimental conditions are equivalent (i.e., all are directory-listed and randomly distributed nationally), the outcomes across the groups should be similar. This means that if the cases in each group have been subjected to relatively equal levels of calling effort, the resolution rates and household working number rates achieved should be approximately equal. From Table 1 it can be seen that this is the case, with the proportion of residential outcomes obtained ranging from 84.4% to 85.8% across the four experimental conditions.

Known households receiving the advance respondent letter have higher eligibility rates than those households not receiving an advance letter mailing -- 3.5% for directory-listed households not sent an advance respondent letter versus 3.7% to 3.9% for the three letter groups (Table 1). Note that this observed eligibility rate is lower than the estimated eligibility rate of 5.1% and the overall eligibility rate observed in the **NIS sample** for 1994 of 4.2% because the 60% of households with directory-listed telephone numbers have substantially lower eligibility rates than the 40% of households that do not have a directory-listed telephone number (and are not included in the current analysis).

In order to assess the effectiveness of the advance respondent letter in greater detail, several outcome measures were constructed that were used to estimate a series of General Linear Model (GLM) analysis of variance (ANOVA) equations. Sample telephone numbers identified as nonworking and nonsample, including numbers identified as nonresidential, are excluded from all subsequent analyses.

Since me effect of the letter may manifest itself at any one of several different stages of the interview process, these dependent measures varied according to the stage being assessed. The outcome measures were used to investigate the effect of the advance respondent letter at four stages of the data collection process:

a. outcome of **the *first call attempt*** (Table 2);
b. outcome of **the *first*** household contact, excluding answering machines and non-residential contacts (Table 3);
c. **the *final case disposition*** (Table 4);
d. use *of vaccination records* during interviews in households with an eligible child(ren) (Table 5).

First call attempt. The results of an analysis of first call outcomes are shown in Table 2. First call outcomes that resulted in a non-residential, non-working, out-of-scope call event, or reached an answering machine have been excluded from Table 2. While not all differences were statistically significant, the letter prominently describing the purpose of the study as being immunization and children (HIGH) had the highest cooperation rates of all groups. The **HIGH** group had the lowest percentage of HUDIs and refusals during the introduction than either of the other two letter groups.

First household contact. Table 3 shows the results of a parallel analysis where the dependent measures are all measures of outcomes of first household contacts. For this analysis first household contacts are defined as including call events when a human is reached, including both known household contacts and possible household contacts. Outcomes that identify a telephone number as being nonresidential are excluded from the first household contact analysis, as well as answering machine/service outcomes.

Table 3 shows that the **HIGH experimental** condition is associated with lower refusal rates for first contacts, a relationship observed for the three measures of refusals. The levels of refusals are significantly lower in the **HIGH** condition, in contrast to the other three conditions, for refusals during the introduction. This is a particularly sensitive point for refusals to occur, since respondents terminating at this point are likely to have received sufficient information from the

interviewer to make a connection to any letter. This is in contrast to HUDIs, when the interviewer has not had a chance to provide any information that would identify the study or relate the telephone call to a letter.

No significant differences are observed across the four experimental conditions for the proportion of all possible households identified as containing an eligible child. Among the three letter conditions (**LOW, MEDIUM, and HIGH), the HIGH** group shows the highest proportion of cases reaching a final disposition at the first household contact (58.9%).

Overall, households receiving an advance respondent letter were significantly less likely to refuse at the introduction than households not receiving an advance mailing (results not shown). Additionally, first contacts with households receiving an advance respondent letter were significantly less likely to result in an outcome that was a final refusal. In contrast, households not receiving an advance respondent letter were less likely to hang-up during the introduction and were more likely to reach a final disposition case status as a result of the first household contact (again, results not shown).

Final case disposition. Table 4 shows the results of an analysis of experimental condition by the final case disposition. Among the letter conditions, eligibility rates are highest for the **MEDIUM** letter group, although none of the observed differences between this group and the other letter groups are statistically significant. In aggregate, significantly higher eligibility levels were observed among households receiving an advance mailing (results not shown). This finding is consistent both for the proportion of possible households with a child less than four years of age and among possible households with a child 19 through 35 months of age.

The percent of cases with a final disposition of refusal is significantly lower for the MEDIUM letter group, while the HIGH group was associated with the lowest percent in the other refusal categories (HUDI and ever refused during the introduction). While the **MEDIUM group was** associated with fewer final refusals, this outcome depends on the refusal conversion efforts made in each group, which could, in turn, depend on whether the replicates were released early or late in the quarter, since this will effect the amount of time available to attempt refusal conversions. The MEDIUM group replicates were among the first released. The other three measures of refusal are more indicative of the initial reaction of households to contact attempts and are less dependent on the amount of time a case is available to be worked.

Use **of vaccination records. The use of au advance respondent letter may contribute to an overall** reduction in response error in surveys such as the NIS if the advance respondent letter can be used to motivate respondents to retrieve records to use during the interview. Thus, analysis was conducted among eligible households that looked at the availability and usage of vaccination records during the interview.

The rates of having vaccination records available and using them during the interview are higher among all three groups receiving an advance respondent letter than for the NO LETTER SENT group (Table 5, top panel). Among the three letter groups, the vaccination records usage levels are highest for the MEDIUM group, although none of these differences are statistically significant.

Since response error in reports of vaccinations is known to be lowest among reports taken from vaccination records, the NIS interview protocols were designed to encourage follow-up telephone calls to households in order to conduct an immunization interview that is based on vaccination records. As with any callback situation, however, the ability to avoid having to make multiple household contacts should contribute to overall survey response.

Conclusions

The results of the experimental manipulation of the advance letter experiment can best be summarized by considering the two research questions posed earlier. First, using an advance respondent letter in a list-assisted random-digit-dialing sample design (such as the NIS) can reduce nonresponse from refusals rates. Thus, in answer to the first question this research was designed to address, the answer is "yes", an advance respondent letter can increase response rates and lower refusal rates. In addition, the use of vaccination records is highest when an advance contact letter is sent requesting that the respondent retrieve the records prior to the interview.

Second, the advance respondent letter that prominently mentions immunization and children (HIGH) has advantages over the other two letters. While there were no differences observed between the three letters in terms of eligibility rates, use of a letter that contains more frequent and obvious mentions of the purpose of the study the immunization and children letter resulted in lower refusal rates on first calls (Table 2), first contacts (Table 3), and at final case disposition (Table 4).

Based on the preliminary results of this experiment, the advance respondent letter used for the NIS was changed during the fourth quarter data collection. The version implemented was a version of the HIGH letter.

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Table 1. Experimental Condition by Final Case Disposition

Final Status	Experimental Condition							
	No Letter		Low		Medium		High	
	n	**%**	**n**	**%**	**n**	**%**	n	**%**
Non-residential	3,006	15.6	1,356	14.4	3,976	15.5	1,345	14.2
Residential	16,223	84.4	8,074	85.6	21,595	84.5	8,106	85.8
All Outcomes	19,229	100.0	9,430	100.0	25,571	100.0	9,451	100.0
Overall Eligibility Rate	3.5%		3.9%		3.8%		3.7%	
Screener Response Rate	61%		69%		71%		68%	
Cooperation Rate	96%		95%		98%		97%	
Overall Response Rate	59%		66%		70%		66%	

Table 2. Outcome of First Call Attempt (Excluding Nonworking and Nonsample Numbers)

Condition	% Eligible	Final Refusal	HUDI	Refused at Introduction	Reached a Final Disposition
1. NO LETTER SENT	1.2%	14.0%	1.1%	2.3%	40.1%
2. LOW	1.3%	12.0%	0.9%	1.9%	35.6%
3. MEDIUM	1.2%	10.9%	1.7%	1.9%	35.8%
4. HIGH	1.2%	10.7%	0.6%	1.2%	37.5%
Significant Between Group Differences [1]	None	2,1; 3.1; 4.1	1,3; 2.3; 4,1; 4,3	4,1; 4,2; 4,3	1,2; 1.3; 1,4
F-ratio / D.F. / Prob(f)	.44 / 3 I .72	36.8 / 3 I <.001	25.8 / 3 / <.001	13.1 / 3 / <.001	30.6 / 3 / <.001

[1] Significant @ Alpha < .01 and 95% C.I.

Table 3. Outcome of First Household Contact (Excluding Nonworking and Nonsample Numbers)

Condition	% Eligible	Final Refusal	HUDI	Refused at Introduction	Reached Final Disposition
1. NO LETTER SENT	1.7%	21.4%	1.6%	3.7%	61.0%
2. LOW	1.8%	19.9%	1.5%	3.1%	57.4%
3. MEDIUM	1.8%	17.1%	2.6%	3.2%	54.8%
4. HIGH	1.7%	17.1%	1.0%	2.1%	58.9%
Significant Between Group Differences'	None	3,1; 3,2; 4,1; 4,2	1,3; 2,3; 4,3	4,1; 4,2; 4,3	1,2; 1,3; 2.3: 4.3
F-ratio / D.F. / Prob(f)	.06 / 3 / .98	47.7 / 3 / <.001	36.6 / 3 / <.001	16.34 / 3 / <.001	52.2 / 3 / <.001

Table 4. Final Case Disposition (Excluding Nonworking and Nonsample Numbers)

Condition	% Possible Households with Child<4	% Possible Households with Eligible Child	Final Refusal	Ever a HUDI	Ever Refused during Introduction
1. NO LETTER SENT	7.1%	2.9%	28.0%	3.0%	5.8%
2. LOW	7.6%	3.3%	28.1%	3.2%	5.6%
3. MEDIUM	8.2%	3.4%	17.5%	3.7%	4.7%
4. HIGH	7.6%	3.3%	24.1%	2.4%	3.5%
Significant Between Group Differences [1]	3,1	None	3,1; 3.2; 3,4; 4,1; 4,2	1.3; 4,3	3,1; 3,2; 4,1; 4.2; 4,3
F-ratio I D.F. I Prob(f)	5.7 / 3 / <.001	3.5 / 3 / .02	255.2 / 3 / <.001	12.9 / 3 I <.001	26.6 / 3 I <.001

Table 5. Usage of Vaccination Records (Households with Eligible Children)

Condition	Have Vaccination Records For At Least One Child	Vaccination Records Are Available	Agreed to Get Vaccination Records	Vaccinations Records Used during Interview	Callback for Vaccination Records
1. NO LETTER SENT	49.2%	42.9%	40.3%	40.3%	3.8%
2. LOW	52.5%	45.3%	43.8%	43.5%	3.3%
3. MEDIUM	58.1%	52.8%	49.2%	49.2%	4.1%
4. HIGH	52.5%	49.3%	46.4%	46.4%	2.5%
Significant Between Group Differences [1]	None	3,1	None	None	None
F-ratio / D.F. / Prob(f)	3.5 / 3 / .02	4.4 / 3 / .004	3.4 / 3 I .02	3.4131.02	.54 I3 / .66

[1] Significant at Alpha <.01 and 95% C.I.