INFLUENCE OF AN INVITATION TO ANSWER BY TELEPHONE ON RESPONSE TO CENSUS QUESTIONNAIRES

Jon Clark and Kirsten West, U.S. Bureau of the Census,*Don Dillman, Washington State University
Jon Clark, Census Bureau, Washington, D.C. 20233

KEY WORDS: mailback response rate, telephone response rate, response mode preference

1. INTRODUCTION

A decline in the mailback response rate from 75 percent in 1980 to 65 percent for the 1990 Decennial U.S. Census has prompted research on ways to improve response in the 2000 Census. Each drop of one percent in the mailback response rate results in an additional cost of as much as $17 million to collect information through personal visits by enumerators. This paper reports results of the Mail and Telephone Mode Test (MTMT), an experiment to determine whether offering households the opportunity to call in answers over the telephone to an interviewer will significantly improve response rates.

2. BACKGROUND

2.1 Related Research

Two recently completed research efforts have found that in a non-census year, five different techniques may be used to improve census questionnaire response rates (Dillman et al., In Press). These factors and their estimated contributions to higher completion rates are as follows: respondent-friendly construction (3.4%), slightly shorter form (4.6%), replacement questionnaire (10.4%), prenotice letter (6.4%) and reminder postcard after the prenotice letter (6.3%). The estimated response rates for using all of these factors was 71.4% vs. 40.3% for sending only the 1990 mailout package with no additional contacts, a difference of 31.1 percentage points (Dillman et al., 1993).

In addition, it was found that respondent friendly construction and the replacement questionnaire were more effective for improving response in 1990 low response areas, i.e., primarily inner city areas with a high proportion of minorities, where 11 percent of the U.S. population resides. In these areas it was estimated that use of all five factors improved response by 123 percent, from 24.7% to 55.1%. At the same time, the prenotice and reminder were more effective for improving response in the 1990 high response areas, where the remaining 89 percent of the U.S. population resides. Here, response was improved 73 percent from 42.4% to 73.5%, through use of the five factors (Dillman et al., 1993).

The present study builds upon results from these previous studies by examining the effect of the telephone invitation and follow-up letter as additions to four of the response inducing factors identified in these studies. Not included in this study is the use of the slightly shorter questionnaire. The questionnaire on which the above findings were based was a "micro" form which included no housing questions and only five of the seven individual person questions utilized on the 1990 Census short form. The current study examines the effect of the telephone on a respondent-friendly census form containing all of the questions from the 1990 short form.

2.2 Rationale for Inviting People to Respond by Telephone

The influence on response rate of providing survey recipients the alternatives of returning a questionnaire by mail or by calling in their answers has not been previously tested. However, there are several reasons for expecting that such an alternative might improve response.

First, previous research has shown that people prefer different methods for responding to surveys, and it has been reasoned that some people who will refuse one mode, may respond to another (Groves and Kahn, 1979; Dillman and Tarnai, 1988). Second, the effectiveness of switching to a second survey mode as a means for improving response, has been demonstrated repeatedly and is a commonly used procedure in the census and other surveys (Mooney et al., 1993; Paxson et al., 1993). At the same time, it is important to recognize the difference between utilizing the telephone to improve response by calling the person who has not responded by another mode, and simply offering the telephone as an alternative way to respond. In a census, people cannot be called inasmuch as the census form is sent to addresses only and the telephone number is not known.

Third, in the 1990 Census, telephone assistance lines were overwhelmed by people who called during the days immediately following delivery of the census form to households. Among the reasons for calling were such concerns as not being sure who to include or exclude from the census form, difficulties reading English, and not understanding how to answer certain questions. It was reasoned that offering the telephone alternative might encourage people with these and other concerns to call in their answers as an alternative to not responding at all.

The recent census questionnaire experiments noted earlier have shown that response inducing procedures are differentially effective in the 1990

high and low response rate areas. However, it was difficult to predict how the areas would be affected in this test. Census Bureau experience suggests that problems in knowing how to answer certain questions and language problems would be greater in low response areas. At the same time, residents of high response areas might have easier access to telephones and more familiarity with their use for unusual purposes, such as calling to provide information to an unknown person. Thus, a prediction could not be made as to how response in high and low response areas would be affected.

Offering the opportunity to respond by telephone can be done in different ways, with varying practical consequences. It is more costly to obtain responses by telephone than by mail. Setting up telephone facilities, hiring interviewers, and paying long distance toll charges, involve substantial costs not needed for mail response. Only improvements in accuracy and item nonresponse, should they occur via the telephone, and eliminating certain mail processing costs, would provide some compensation for the increased costs. Consideration of these cost implications led to the conclusion that it would be undesirable to switch people who would normally respond by mail to the telephone mode. Any improvements in response should therefore be evaluated in the context that telephone response may substitute for mail response.

The likelihood of substitution of telephone for a mail response can be lessened by not offering the telephone invitation until many people have already responded. This could be done by not offering the invitation to respond by telephone with the questionnaire itself, and only including reminders.

There is reason to expect that less substitution might occur with telephone invitations not accompanying the questionnaire than when such a telephone invitation is enclosed with the form. Because there is no name on the envelope containing the census questionnaire, and it is addressed to "the residents at..." some recipients are likely to assess the contents as being unimportant, and as a result discard them. Households who receive a telephone invitation in a reminder, and who do not recall getting a questionnaire have an avenue by which to respond. Thus, it can be hypothesized that any increase in response from the telephone invitation is less likely to substitute for mail response, when the invitation(s) is (are) separate from the questionnaire mailing itself.

2.3 Treatment Groups

The invitation to respond by telephone was offered to households in a variety of ways to form five experimental panels, taking into account the issues outlined above. (Table 1 shows the implementation strategy for the treatment groups).

1. Control. Households received a prenotice, questionnaire mailing, reminder postcard and replacement questionnaire mailing without any invitation to respond by telephone. This treatment replicates procedures used in a previous experiment (Dillman et al., In Press).
2. Telephone invitation in postcard reminder. Households received the same prenotice and questionnaire mailing as the control group. However, the reminder postcard included an invitation to respond by either telephone or mail, in bold print. No replacement questionnaire mailing was used.
3. Telephone invitation in postcard reminder and letter reminder. Households received the same treatment as group two except that an additional reminder letter was sent four days after the postcard, and it also contained an invitation to respond by telephone or mail.
4. Telephone invitation in postcard reminder letter reminder and replacement questionnaire. Households received the same treatment as group three except that a replacement questionnaire mailing was sent and it too included an invitation to respond by mail. The invitation in this mailing was a half page, bright red announcement, with large reverse printing proclaiming, "It's your choice! Your census form can be answered by either telephone or mail." Additional instructions in red printing (not reversed) on how to do it were also provided.
5. Telephone invitation in prenotice, questionnaire mailing, reminder postcard and replacement questionnaire mailing. In this treatment, respondents were invited to respond by mail or telephone when the questionnaire was sent to them. They were also advised in the prenotice that they could respond either way, but told that the number to call would be included with the questionnaire itself. Households received a reminder card with a telephone invitation, but did not receive the follow-up reminder letter with another invitation to respond by telephone.

Design of the experiment with these panels allows several distinct research questions to be answered. They include the extent to which people prefer to answer census questionnaires by mail or over the telephone and whether different ways of offering the invitation to respond by telephone influence overall response and the propensity to use the telephone. In addition, we can determine the extent to which a fourth contact letter (which includes a telephone invitation) can substitute for a replacement questionnaire mailing. Mailing a replacement questionnaire was found in a previous test to improve completion rates by approximately 10 percentage points.

2.4 Survey Implementation

The questionnaire contained all of the content from the 1990 Census short form, i.e., seven individual questions for each household member plus eight housing questions. A respondent-friendly booklet questionnaire for which a response rate of 66.8 percent was obtained in an earlier census test that utilized the control group implementation procedures was used for all treatment groups. Census day was set as the first Saturday in April, April 3, 1993, with the following mailing dates for each of the implementation elements: prenotice, March 26; census form, March 29; reminder postcard, April 2, follow-up letter, April 6, and replacement questionnaire, April 23. All mailings were first class, with all materials being printed similarly to those used in the earlier experiment (Dillman, et al., In Press). The survey implementation is found in Table 1.

Table 1. Telephone Treatment Implementation

Mailing Piece	Panel 1	2	3	4	5
Prenotice Letter 3-26-93	M	M	M	M	M+T
Questionnaire 3-29-93	M	M	M	M	M+T
Reminder Card 4-2-93	M	M+T	M+T	M+T	M+T
Follow-up Letter 4-6-93	-		M+T	M+T	-
Replacement Questionnaire 4-23-93	M	-	-	M+T	M+T
Close-out 5-21-93	-	-	-	-	-

Where, M denotes "mail piece," and M+T denotes "mail piece and telephone" invitation.

2.5 Sample Design

The universe for the MTMT consisted of all housing units situated in the questionnaire mailback areas as identified by the 1990 Census Address Control File. Housing units to which it was unlikely the United States Postal Service (USPS) would deliver were excluded from the test. The 449 district office (DO) areas for the 1990 census were selected as the geographic units for defining the strata for the test. Two strata were selected, Low Response Areas or LRA and High Response Areas or HRA. Due to the high correlation between the minority rate and the 1990 Census mail response rate, the stratification objectives were met by simply ranking the DOs by their percent minority (minority is defined as including all black and Hispanic classifications). DOs with a combination of high minority (black and/or Hispanic origin) population and low 1990 questionnaire mail response rates were defined as LRA.

The first stratum of 67 DOs had a combined minority population of about 64 percent and encompassed about 11 percent of all housing units in the census mailback areas. The second stratum of 382 DOs had a combined minority population of about 15 percent and a cumulative mail response rate approximately 10 percentage points higher than the DOs in the first stratum. This stratum is referred to as the HRA stratum. The LRA stratum represents 10,320,810 of the total mail back sample universe of 88,817,070 housing units. The HRA stratum represents 78,496,269 housing units.

A sample of 22,500 housing units were selected with 11,250 units in each stratum. Each stratum, in turn, was divided into five equally sized panels in order to test the five different treatments. The sample was clustered in order to reduce the sampling variance in the panel-to-panel comparison. A systematic sample of 2,250 housing units was selected from each stratum. For each housing unit selected, four subsequent units were also selected. The resulting households in each of the five-unit clusters were randomly allocated to each panel.

The sample was designed to obtain statistically reliable results on differences within strata between the treatment response rates. The sample size was deemed sufficient for detecting a minimum of a 3.5 percentage point difference at the .10 percent level of significance.

Mailback and telephone response is measured by completion rate estimates for a given panel. They are computed by dividing the weighted total of the number of questionnaires returned by mail or telephone by the weighted total number of forms mailed out less Postmaster Returns (PMRs). For the stratum level, the estimates are obtained without the weights.

Since the impact of each of the treatment groups is dependent on the delivery of each of the implementation components defined for the treatment group, a case was defined as a PMR if any of the mailing pieces were returned as a PMR.

2.6 Statistical Inference

Standard errors for the national estimates were computed using the Stratified Jackknife variance procedures (Wolter, 1985). The estimates were produced by the VPLX statistical software procedure. Standard errors for the within stratum estimates were computed using the formula for the simple random sampling jackknife variance procedures.

The MTMT involves pairwise comparisons of the differences between completion rates for five panels, both overall at the national level and for the

two strata. The analysis has been carried out so that statements about the entire "family" of 10 pairwise comparisons are made while maintaining the 90% confidence level simultaneously for all comparisons. While this procedure requires that larger differences must exist between individual panels to be declared significant, we are able to control the familywise error rate in the decision process. When several differences between any two panels are declared significant, we are at least 90% confident that all such decisions are correct, simultaneously. All 90% confidence intervals were adjusted using Dunnett's C-procedure for comparing pairwise contrasts of the test panels estimates (Hochberg and Tanbane, 1987).

3. FINDINGS

The primary objective of the MTMT is to investigate the influence of the telephone on census response. What is the mode of preference (telephone or mail) of respondents and does the opportunity to use the telephone enhance response? Secondary objectives are to evaluate the use of the follow-up letter and the influence of the replacement questionnaire on response. Although all estimates were made for each stratum and for the national level in the Census Bureau final report (Thompson, 1993), the estimates that are used here are national unless otherwise specified. Most estimates were consistent across strata.

Table 2 shows the completion rates from the five panels for the entire test period. The completion rates ranged from 72.2% in panel 4, with the highest number of mailing pieces (5) and three telephone invitations to 62.7% in panel 2, with the lowest number of mailing pieces (3) and one telephone invitation.

Table 2. Completion Rates and Standard Errors (s.e.) by Panel and Stratum

MTMT Panel	National (s.e.)	LRA (s.e.)	HRA (s.e.)
1.	70.6% (0.880)	54.9% (1.108)	72.7% (0.983)
2.	62.7% (0.937)	44.7% (1.100)	65.1% (1.050)
3.	66.0% (0.924)	48.1% (1.108)	68.4% (1.035)
4	72.2% (0.865)	54.9% (1.113)	74.3% (0.965)
5.	69.3% (0.903)	52.5% (1.113)	71.5% (1.008)

To analyze the test data and to compare the effects that different mailing pieces had on response, it is important to focus on specific time frames associated with these mailing pieces within the test. The test is divided into three mutually exclusive time periods: (1) from the start to April 5, (2) from April 6 (when the follow-up letter was sent out) to April 22, and (3) from April 23 (when the replacement questionnaire was sent out) to close-out, May 21 (see Table 3).

Do people prefer to answer the Census by mail or telephone? This question can be answered by

Table 3. Percent of Overall Results by Time Period

Form Type and Time Period	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5
Start to 4-5					
Mail	20.3	21.6	19.8	18.8	17.0
Telephone	0.0	0.5	0.4	0.3	2.7
Overall	20.3	22.1	20.2	19.2	19.7
4-6 to 4-22					
Mail	37.9	36.1	38.9	38.8	35.7
Telephone	0.0	1.1	3.6	4.0	2.0
Overall	37.9	37.2	42.5	42.8	37.7
4-23 to 5-21					
Mail	12.4	3.3	3.2	9.3	11.0
Telephone	0.0	0.1	0.1	0.9	0.8
Overall	12.4	3.4	3.3	10.1	11.8
Beginning to close-out					
Mail	70.6	61.1	61.9	66.7	63.7
Telephone	0.0	1.7	4.1	5.2	5.6
Total	**70.6**	**62.7**	**66.0**	**72.2**	**69.3**

examining responses to panel 5, where every contact offered a choice of responding by mail or telephone. The overall response was 69.3%, 5.6% of which was by telephone, 63.7% was by mail. Of those who responded in panel 5, 8.0% responded by telephone. One cannot infer that those 8.0% would not have responded had the opportunity to respond by telephone not been available, but that their preferred mode of response was the telephone. It is interesting to note that while the HRA stratum is significantly higher than the LRA stratum in mail response (17.6% higher in panel 1 to 20.8% higher in panel 2), there is no significant difference between strata due to the telephone influence on response (0.0% higher in panel 1 to 1.0% higher in panel 5).

Does a telephone invitation improve response? There are several comparisons that can be used to answer this question. The primary comparison is panel 1 (70.6%) vs. panel 5 (69.3%) for the whole test since both panels were similarly implemented except that panel 5 included a telephone invitation with each of the four mailing pieces. Obviously, panel 5 is not significantly higher. Another comparison to evaluate the influence of the telephone invitation is panel 1 (58.1%) vs. panel 2 (59.3%) from the start of the test to April 22. The only difference in the implementation of these two panels to April 22 is that panel 2 included a telephone invitation with the reminder card. Since the difference in response is within sampling error, one cannot (conclude that the telephone invitation had a significant effect on response. Comparing panel 2 (59.3%) vs. panel 5 (57.7%) from the start of the test to April 22 shows the effects of the additional telephone invitations used in panel 5 for the prenotice letter and the first questionnaire. Since panel 5 is not significantly higher than 2 for this time period, again conclude that the opportunity to respond by telephone does not enhance response.

Does telephone response substitute for mail response? Several comparisons provide information that indicate the telephone responses were primarily substitution, that is, the response that the telephone adds to total response is offset by an approximate equivalent decrease in mail response so that the net response is about the same. The comparison made above, panel 1 vs. panel 5 for the entire test period, indicates that the overall response is not significantly different although panel 1 had more mail response (70.6% to 63.7%) while panel 5 had more telephone response (5.6% to 0.0%). Since these two panels, one making no telephone invitation and the other making four telephone invitations, are not significantly different in response, one can infer that the telephone response only substituted for mail response. Two other comparisons are used to evaluate whether telephone response substitutes for mail response. Panel 5 vs. panels 2, 3, and 4 from the start of the test to April 6 is not significant. Panel 1 vs. panels 4 and 5 from April 23 to closeout is likewise not significant. The lack of statistical significance indicates that the telephone response only substitutes for mail response.

Does the follow-up letter add to response? The follow-up letter has not been used in earlier tests, but was used with panels 3 and 4 of this test. A secondary objective was to evaluate its influence on response. To test the effects of the follow-up letter, we compare panel 2 vs. 3 and 4 for the entire test period. The follow-up letter adds 2.8% to response which is significant. Of the 2.8% response added by the presence of the follow-up letter, 0.2% was by mail and 2.6% was by telephone. Another comparison is panel 2 vs. panel 3, which yields a significant estimate of 3.2%.

Does the replacement questionnaire add to response? It has been demonstrated in previous census tests that the replacement questionnaire adds significantly to mail response (Dillman et al., 1993). To estimate the effect of the replacement questionnaire in this test, we compare panels 3 vs. 4 which yields a significant increase in response of 6.1%. Another comparison is panel 2 vs. 1 which yields a significant estimate of 7.9%.

How well does the follow-up letter substitute for the replacement questionnaire? The comparison of panel 2 vs. panel 4 for the entire test period estimates the effects of both the follow-up letter and the replacement questionnaire. This estimate is 9.4%, which is significant. The comparison of panel 2 vs. 3 shows that the effect of the follow-up letter by itself is 3.2%, but when the replacement questionnaire is added (panel 3 vs. panel 4) the effect of the replacement questionnaire above and beyond the effect of the follow-up letter is 6.1%. This shows that the replacement questionnaire adds significantly more to response than the follow-up letter. Although the replacement questionnaire adds more to response than the follow-up letter, the question of substitution can only be answered in the presence of related costs and operational concerns of implementation in a census environment.

Do the number of telephone invitations and mail contacts influence response? The data from this study indicate that there is a direct correlation between the number of telephone invitations and the telephone response (see Table 4). When 2, 3, or 4 telephone invitations are made, the response is significantly higher than when no or only one telephone invitation is made. Similarly, when 4 or 5 mail contacts are made, the response is significantly higher than when only 3 mail contacts are made. The positive effect on the response rate of multiple contacts was also observed in the

Implementation Test (Dillman et al., 1993). Obviously, which mailing pieces and how they are implemented are also important.

4. DISCUSSION AND CONCLUSION

The main finding of this study is that relatively few people prefer to respond to census questionnaires by telephone, and most of those who do would probably also have responded by mail. Thus, offering the telephone as a response option does not seem justified if the main goal is to improve overall mailback completion rates. Whereas offering only a mailback option elicited a completion rate of 70.6%, offering a telephone response option produced a slightly lower (but not significantly different) completion rate of 69.3%. Of those who responded in the presence of the two options, only 8.0% chose the telephone.

However, the data also suggest that under certain conditions the telephone has a potential role for improving completion rates. The blanket follow-up letter offering both the mailback and telephone options for responding improved response by approximately 2.8 percentage points, 0.2% of the increase being from mail, and 2.6% from telephone. Thus, in response to this mailing, most of the increase in response came over the telephone. This fact is not unexpected inasmuch as the invitation was issued without a replacement questionnaire, and some people who responded may have chosen the telephone because they could not find, or may have already discarded the questionnaire sent to them earlier. This finding raised the possibility that whereas the telephone substitutes for a mail response when the options are provided together, it adds to response, when the option is provided without resending a questionnaire in a fourth contact. A question that remains unanswered is whether a fourth contact without a telephone option would have produced the same 2.8% increase in response, in effect pushing the 2.6% who responded by telephone back to responding by mail.

Table 4. Completion Rates, Number of Telephone Invitations and Mail Contacts by Panel

Panel	# of Phone Invit.	# of Mail Cont	Phone Resp. Rate	Total Resp. Rate
1	0	4	0.0	70.6
2	1	3	1.7	62.8
3	2	4	4.1	66.0
4	3	5	5.2	72.2
5	4	4	5.6	69.3

Previous research has demonstrated repeatedly that when telephone numbers are available and nonrespondents to mail surveys are called, the survey completion rates can be improved. This experiment is the first to our knowledge that tests whether completion rates can be improved when only addresses, and not names and/or telephone numbers are available (i.e., when the respondent is invited to call in the response). Our results suggest that only when the telephone option is provided without the presence of a questionnaire is response improvement likely, and even that remains a possibility that is yet to be definitively tested.

5. REFERENCES

Dillman, D. A., M. Sinclair and J. Clark (In Press, 1993), "Effects of Questionnaire Length, Respondent-Friendly Design, and a Difficult Question on Response Rates for Occupant-Addressed Census Mail Surveys," Public Opinion Quarterly.

Dillman, D.A., J. Clark, and M. Sinclair (1993), "How Prenotice Letters, Stamped Return Envelopes and Reminder Postcards affect Mailback Response Rates for Census Questionnaires," presented at the 1993 Annual Research Conference, Alexandra, Virginia.

Dillman, D.A. and J. Tarnai (1988), "Administrative Issues in Mixed Mode Surveys," in Groves, R.M. et al., Telephone Survey Methodology, New York: John Wiley.

Groves, R.M. and R.L. Kahn (1979), Survey Research by Telephone, New York: Academic Press.

Hochberg, Y. and Tambane, A.C. (1987), Multiple Comparison Procedures, New York: John Wiley and Sons.

Mooney, G. L. Giesbrech, and C. Shettle (1993), "The Influence of Questionnaire Length and Financial Incentives on Response to a Government Survey," Presented at the Annual Meeting of Public Opinion Research, St. Charles, Ill.

Paxson, C.M., D.A. Dillman and J. Tarnai (1993), "Improving Response to Establishment Mail Surveys," Presented at the International Establishment Surveys Conference, Buffalo, New York, June 1993.

Thompson, J.H. (1993), "Final Results of the Mail and Telephone Mode Test," (July 21, 1993), DSSD 2000 Census Memorandum Series, #-47.

Wolter, Kirk (1985), Introduction to Variance Estimation. New York: Springer-Verlag.

*This paper reports the results of research undertaken by Census Bureau staff. The views expressed are attributable to the authors and do not necessarily reflect those of the Census Bureau.