Effect of New and Additional Contact Strategies on Cooperation Rates and Data Quality

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1. BACKGROUND

1.1 Purpose of Study

In early 2003, the Census Bureau implemented the 2003 National Census Test (NCT) to study the impact of offering various self-response options, new or additional contact strategies, and alternative race and Hispanic origin questions on cooperation rates and data quality. The overall goals of the 2003 NCT were to identify the best strategy for increasing self response to the census, thus reducing the nonrespondent workload, and to provide information for the wording of the race and Hispanic origin questions. Successful accomplishment of these goals would improve the data quality of the 2010 Census while reducing the cost of data collection. This paper presents the methodology and analysis for the contact strategy portion of the 2003 NCT.

1.2 Previous Research

1.2.1 Tests Conducted During the 1990's

During the 1990's, the Census Bureau conducted a series of four national sample tests to determine the best contact strategies to use in Census 2000. From these tests, the contact strategies found to consistently improve self response include: an advanced letter (5-7 percentage points), a reminder postcard (4-8 percentage points), a replacement questionnaire (6-11 percentage points), and a mandatory message (9-11 percentage points). Furthermore, there was evidence that the effects of many of these factors tended to be largely additive (U. S. Bureau of the Census, 1994).

1.2.2 1998 Dress Rehearsal

In preparation for Census 2000, a dress rehearsal was conducted in 1998, which consisted of three sites. The sites included: Sacramento, CA, 11 counties in South Carolina and Menominee, Wisconsin. In general for this test, addresses received an advance letter, an initial questionnaire, a reminder postcard, and a replacement questionnaire, in that order. The replacement questionnaire was sent to all housing units regardless of whether they had responded to the initial questionnaire (i.e., a blanket replacement questionnaire). This implementation of the replacement questionnaire was different from the implementations used in the previous tests during the 1990's, (i.e. targeted replacement questionnaire). All mailing pieces were mailed using first-class postage. Housing units were asked to return their questionnaire in the first-class, postage-paid return envelope provided (U.S. Bureau of the Census, 1999).

1.2.3 Census 2000

The mailing strategy used in Census 2000 consisted of multiple contacts for Census 2000 mailout addresses. These contacts were:

- an advance letter to every mailout address alerting households the census form would be sent to them soon,
- a questionnaire to every mailout address, and
- a postcard to every mailout address serving as a thank you for respondents who had mailed back their questionnaire or as a reminder to those who had not.

The Census 2000 mailing strategy did not include a replacement questionnaire as one of the contacts due to the difficulty in trying to operationalize the process. For example, for Census 2000, over 42 million replacement questionnaires would have needed to be labeled for the nonrespondent universe, in about a week's time. This multiple mailing strategy used first-class postage for all mailing pieces. The volume of mail was approximately 100 million pieces for each mailing (U.S. Bureau of the Census, 2003a).

2. METHODOLOGY

2.1 Panel Design

The methodology for the 2003 NCT consisted of a data collection strategy involving sixteen different panels. One panel represented a control group which was used for all three components of the 2003 NCT. Three of the sixteen panels comprised the contact strategy portion of the test and will be discussed in this paper. These three panels tested the impact of a replacement questionnaire, a telephone reminder call and a due date on the initial questionnaire's mailing envelope.

¹ This paper reports the results of research and analysis undertaken by Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress.

- **Control Panel:** Included an advance letter, an initial questionnaire, a reminder postcard, and a replacement questionnaire to nonrespondents.
- Census 2000 Design Panel (CS1): Included an advance letter, an initial questionnaire, and a reminder postcard. It mimicked the Census 2000 mailing strategy (no replacement questionnaire package). This panel was included in the test to confirm the results from the 1990's and show that a replacement questionnaire, does in fact, still substantially increase self response. This panel tested the impact of no replacement questionnaire and will be referred to as CS1 or the Census 2000 Panel.
- Telephone Reminder Call Panel (CS2): Included an advance letter, an initial questionnaire, a reminder telephone call, and a replacement questionnaire to nonrespondents. This panel was included because it tested the existing reminder postcard methodology but using current automated technology. It will be referred to as CS2 or the telephone reminder panel.
- Due Date on Initial Questionnaire's Envelope Panel (CS3): Included an advance letter, an initial questionnaire with a due date on the mailing package envelope, a reminder postcard, and a replacement questionnaire to nonrespondents. This panel was tested because there was speculation that a due date might invoke in respondents a sense of urgency or importance, thus leading to an increase in self response. This panel tested the impact of a due date on the initial questionnaire package and will be referred to as CS3 or the due date panel.

2.2 Mailing Strategy

The mailing strategy for both the contact strategy panels and the Control panel used a multiple contact approach. The content of each contact was dependent upon the panel assignment. Every panel received the same advance letter for the first contact. The advance letter informed the respondent that they had been selected to participate in the 2003 NCT and that they would soon be receiving a request to complete a brief questionnaire as part of the test.

The second mailing was the initial questionnaire. The questionnaire allowed respondents to list names for up to 12 household members. For up to six members the questionnaire provided space for the respondent to include the following information: relationship to person 1, age and date of birth, sex, Hispanic origin and race. Space was also provided to report the household count, home ownership, and telephone number for the housing unit. The initial questionnaires for all of the contact strategy panels and the Control panel were the same with the exception of the CS3 panel. This panel had a due date of February 10 on the envelope of the second mailing piece (the initial

questionnaire). Regardless of panel, the mailing package included a letter from the Census Bureau Director urging households to complete their census form and informing them their answers were protected by law. Both the mailing package envelope and the letter contained statements explaining that participation in the survey was required by law. All second mailings were provided with first-class postage paid envelopes for returning the questionnaire.

The third mailing was the reminder postcard. For the Control, CS1, and CS3 panels, the reminder postcard included a statement reminding households to answer the census if they had not already done so and thanked those who had already returned their questionnaire. For the CS2 panel, the housing units for which we were able to obtain a telephone number received an automated reminder call in place of a postcard. The system that placed the reminder calls used IVR technology to automatically call these housing units and play the reminder message. The phone call was similar in nature to the postcard in that it reminded households to return the questionnaire if they had not already done so and thanked those who had already returned their questionnaire. The telephone reminder calls were scheduled for up to three days.

The telephone reminder call was designed such that if contact was made with a household, the call was considered a success. A contact was defined as a call where enough of the reminder message played when either someone answered the telephone or an answering machine picked up. If there was no answer, a busy signal, or not enough of the message was played (indicating a hang-up), then the call was considered a failure and a second attempt was made, approximately two hours after the first attempt. In general, a maximum of two attempts were made per household. Thus, it was possible that even though we had a telephone number, the household may never have received the reminder message. In addition, those households who were in the CS2 panel for which we were unable to get a telephone number did not receive any reminder (postcard or call).

The fourth and final mailing was the replacement questionnaire. The replacement questionnaire was sent to all housing units that had not returned a questionnaire prior to February 12. The previous mailings did not inform the respondents that they would receive a replacement questionnaire if they did not return the initial questionnaire. For the Control and CS2 panels, the questionnaire was the same as the initial questionnaire mailing package, including the cover letter. Since the CS1 panel mimicked the Census 2000 design, the panel did not include a replacement questionnaire. For the CS3 panel, the replacement questionnaire contained the following statement: "It is still not too late to return this questionnaire". The cover letter sent with the replacement questionnaire in the CS3 panel also contained a statement that it was still not too late to return the questionnaire. All panels that received the fourth

mailing were provided with first-class postage paid envelopes for returning the questionnaire.

2.2.1 Key Dates

Event	Date
Advance letter delivered	1/21-1/22
Mailout of Initial Questionnaire	1/30–1/31
Census Day	2/6
Delivery of Reminder Postcards	2/7-2/8
Cut for Replacement Questionnaire	2/12
Mailout of Replacement Questionnaire	2/18-2/19
Closeout	3/31

2.3 Sample Design

We selected seven panels of 10,000 housing units each and nine panels of 20,000 housing units each, for a total of 250,000 housing units to form sixteen panels. Some of the panels required the larger sample size of 20,000 housing units due to the proposed item level analysis. For the purpose of this paper, only the contact strategy panels and the Control panel will be discussed. The contact strategy portion of the test consisted of 60,000 housing units. The Control panel and one of the contact strategy panels (CS2) contained 20,000 housing units. The CS2 panel consisted of 20,000 housing units in order to compensate for the housing units in the panel for which a telephone number would not be obtained. The remaining two contact strategy panels contained 10,000 housing units each.

Prior to sample selection, census tracts were stratified into two groups that reflect differences in Census 2000 mail return rates, as well as anticipated differences in the race/Hispanic origin and home ownership composition (owner vs. renter-occupied housing units) of the population. The average Census 2000 mail return rate in the Low Response Area (LRA) stratum was 62.2 percent. For the High Response Area (HRA) stratum, the average mail return rate was 81.4 percent.

The LRA stratum was expected to contain a very high proportion of the Black and Hispanic populations and renteroccupied housing units. The addresses in the LRA stratum were sampled at a higher rate than those in the HRA stratum to ensure sufficient representation of the low response areas. Estimates presented in this paper were weighted to account for the oversampling of the LRA stratum.

Table 1 gives the sample sizes for each of the contact strategy panels and the Control panel.

Table 1. Sample Sizes by Panel and Strata

	Total	High Response Stratum	Low Response Stratum
Control Panel	20,000	10,000	10,000
Census 2000 Design Panel (CS1)	10,000	5,000	5,000
Telephone Reminder Panel (CS2)	20,000	10,000	10,000
Due Date on IQ Envelope Panel (CS3)	10,000	5,000	5,000

2.4 Calculation of Cooperation Rates

A cooperation rate² is a measure of respondent behavior with regard to returning a questionnaire. It is defined as the number of primary returns divided by the number of sample cases in the panel, less the number of ineligible cases, which are cases returned by the United States Postal Service (USPS) as "undeliverable as addressed" (UAA) for that panel.

 $Cooperation Rate = \frac{\#of \ primary \ returns}{Panel \ sample \ size-ineligible units \ for \ the \ panel}$

2.4.1 Cooperation Rate Denominator

The denominator for the cooperation rate was all cases in sample for the panel after removing those cases that were determined to be UAA. UAAs were defined on a housing unit basis as any unit having any mailing piece (initial questionnaire, reminder postcard, replacement or questionnaire) returned by the USPS. Any housing unit that was determined to be UAA was considered an ineligible unit. Approximately 10 percent of the housing units in sample were UAA for each panel. However, the CS2 panel (telephone reminder panel) had a lower percent of UAAs, possibly due to UAAs being associated with the ability to obtain a telephone number. That is, obtaining a telephone number validates that the unit is not vacant, which is one of the major reasons for why a housing unit is classified as UAA (U.S. Bureau of the Census, 2003c).

Housing units classified as UAA were removed from the denominator. Therefore, any returns received for UAA housing units were excluded from the numerator. Due to our definition of UAA, a return could be received for a housing unit that was classified as UAA. For example, the initial questionnaire was successfully delivered and a household member completed and returned the questionnaire. However, the reminder postcard was returned by the USPS

² Our definition of cooperation rate is in line with the definition established by the American Association of Public Opinion Research. (However, there is a slight difference in how we determine eligible units. See Section 2.4.1.)

as UAA, which resulted in the housing unit being classified as UAA. There were 301 returns for the contact strategy panels and the Control panel removed from the numerator because the corresponding housing unit was UAA.

2.4.2 Cooperation Rate Numerator

The numerator for the cooperation rate was defined as all returns for the panel after removing those cases that were determined to be blank or duplicate returns.

2.4.2.1 Blank Returns

We accounted for blank returns when determining primary returns. We defined a blank return as an eligible return with fewer than two "completed" census items. Items verified for completeness included: home ownership, household count, name, relationship, sex, age or date of birth, Hispanic origin, and race. Approximately 0.9 to 1.5 percent of returns received across panels were considered blank.

2.4.2.2 Duplicate Returns

Due to the multiple contact mailing strategy that was implemented for the 2003 NCT, there was the possibility that a respondent could return more than one questionnaire. In calculating the cooperation rates, only one response per housing unit in the panel was included. Therefore, the primary return for the housing unit was determined, and only this return was included in the numerator. When multiple returns were received for a given housing unit, the primary return was the first nonblank form returned.

2.5 Calculation of Item Nonresponse Rates

Item nonresponse rates are a measure of the 2003 NCT data quality. It refers to the proportion of records with missing data for a particular item. This analysis was restricted to nonblank, primary returns for a housing unit. Item nonresponse rates were calculated according to the following definition:

Item Nonresponse Rate = $\frac{\# of \ records \ with \ missing \ data \ for \ a \ particular \ item}{total \ number \ of \ records}$

Item nonresponse rates were calculated for both housing unit level items and person level items. So, for housing unit level items, the term 'records' in the item nonresponse definition refers to housing units. The total number of housing units was defined as the number of housing units that returned a nonblank primary return. For person level items, the term 'records' refers to persons. The total number of persons was defined as the number of persons listed on all nonblank primary returns.

For this analysis, we calculated item nonresponse rates for five person level data items (relationship, sex, age/year of birth, Hispanic origin, and race) and two housing unit level data items (home ownership and household count). In order to determine missing values for data items, we looked at the presence or absence of a value for a particular item. We did not account for inconsistent responses.

2.6 Variance Estimation

In order to take into account the stratified clustered sample design, WesVar PC version 4.1 was used to compute standard errors for all estimates. A jackknife replication methodology using random groups was used to estimate standard errors. The housing units were sorted in the same order that they were selected and the clusters of housing units (or housing units selected at each hit) were assigned sequentially to one of the 250 random groups.

3. LIMITATIONS

3.1 Reduction of the Telephone Reminder Panel Sample Size

The telephone reminder panel (CS2) used IVR technology to place a telephone call to housing units in the panel for which a telephone number was available. The telephone call was to remind households to return the questionnaire if they had not already done so. In order to acquire the telephone number for the housing units, a telephone lookup operation was conducted. Of the 20,000 housing units in the CS2 panel, we were only able to obtain telephone numbers for 6,208 (31 percent of the sample). Thus, only these 6,208 housing units are in scope for this analysis, reducing the panel size considerably. It is important to keep this in mind when examining the results for the CS2 panel. In addition, note that the population that we obtained telephone numbers for may differ from the control panel in that they may be more likely to respond regardless of whether they received a reminder call. That is, since telephone numbers were actually listed for this population, they may be generally more cooperative. The remaining 13,792 housing units for which we were unable to obtain a telephone number are not included in the results for the CS2 panel.

3.2 Causal Assumptions About Treatment Effects

In assessing the impact of the various contact strategy treatments tested in the 2003 NCT, two causal assumptions were made: 1) the respondent was exposed to the treatment; and 2) the respondent's behavior was then motivated by the treatment. However, these assumptions may not have always held and is a limitation of the analysis. For example, there were housing units in the telephone reminder panel that never received the telephone reminder call because of the way the reminder call was implemented. If, after two attempts to reach a household member, we were still unsuccessful in reaching them (line was busy, there was no answer either by a person or an answering machine, or a combination of the two) then the household never received the telephone reminder call, resulting in the household never being exposed to the treatment.

4. **RESULTS**

4.1 What were the cooperation rates?

Table 2 presents the estimates and standard errors of the cooperation rates for the Control panel and each of the contact strategy panels at the national level.

A		
	Estimate	S. E.
Control Panel	67.1%	0.39%
Census 2000 Design		
Panel (CS1)	56.8%	0.69%
Telephone Reminder Panel (CS2) [*]	73.0%	0.59%
Due Date on IQ Envelope Panel (CS3)	67.6%	0.62%

*CS2 was based on a sample size of 6,208, and excludes housing units for which we were not able to get a telephone number. See Section 3.1 for limitations in analyzing these results

The national cooperation rates for the contact strategy panels ranged from 56.8 percent for the Census 2000 design panel (CS1) to 73.0 percent for the telephone reminder panel (CS2). However, the cooperation rates for the CS2 panel are only for those housing units for which we were able to obtain a telephone number. So, caution should be used when analyzing the CS2 panel. The national cooperation rate for the Control panel was 67.1 percent.

Cooperation rates were also calculated for the high and low response strata. The differences in cooperation rates across strata were significant for all of the panels; the high response stratum cooperation rates were significantly higher than the low response stratum rates. These differences were expected based on our sample design.

4.2 How did the contact strategy panels compare with the Control panel?

Cooperation rate differences between the contact strategy panels and the Control panel were calculated in order to determine the effect of the different mailing strategies on the cooperation rate. Table 3 contains these differences and confidence intervals at the national level.

Table 3. Comparisons of the Contact Strategy Panel with the Control Panel at the National Level				
	Difference	90 % C.I.		
CS1 – Control	-10.3*	-11.85 to -8.75		
CS2 – Control	5.9^{*}	4.47 to 7.33		
CS3 – Control	0.5	-1.01 to 2.01		

*Significant at α =0.10 and critical value=2.10

As seen in Table 3, the difference in cooperation rates between CS1 and the Control are statistically significant. Therefore, at the national level, the addition of a replacement questionnaire to the mailing strategy increased the cooperation rate 10.3 percentage points over the Census 2000 design. These results are consistent with the previous research conducted prior to Census 2000 (U.S. Bureau of the Census, 1994).

In addition, the difference in cooperation rates between the CS2 panel and the Control panel was statistically significant. Thus, illustrating that at the national level, a telephone reminder call, in lieu of a reminder postcard, increased the cooperation rate by 5.9 percentage points. However, it is important to note that the results for the CS2 panel are limited to those housing units for which we were able to obtain a telephone number and those housing units may have a higher propensity to respond regardless of whether they received a reminder call. Therefore, the difference observed between the CS2 panel and the Control panel may be due more to our design than using a telephone reminder call.

The cooperation rates for the CS3 panel were not found to be statistically different from the Control panel. Therefore, at the national level, the inclusion of a due date on the envelope of the mailing package for the initial questionnaire does not affect the overall cooperation rates.

Finally, these results for the three treatment panels were consistent across high and low response strata.

4.3 What were the cooperation rates over time?

In order to get an understanding of how the cooperation rates evolved over the duration of the 2003 NCT, we calculated cooperation rates and daily increases in cooperation rates for each day of the operation. Since forms were not checked in on weekends or holidays, rates were not calculated for those corresponding days. This resulted in large jumps in the rates at these time periods. The calculation of these cooperation rates was the same as for the overall cooperation rate except we limited the primary returns to those that had been received on or before a specific date. For example the cooperation rate for February 25 only included those primary returns that were received on or before February 25 in the cooperation rate numerator.

4.3.1 Daily Cooperation Rates

Figure 1 displays the cooperation rates over time. Day 1 in the figure corresponds to January 30, the start of the initial questionnaire delivery.



Figure 1 illustrates a similar trend in cooperation rates for each panel, in that increases in the rate occurred at the same points in time, although to varying degrees. In addition, we can see that the cooperation rate for the CS3 panel was consistently higher than the rate for the Control panel, (although not necessarily significantly higher) until after the mailout of the replacement questionnaire (around Day 24). For instance on Day 15, the difference between the panels was about four percentage points. Thus, although the due date does not significantly affect the overall cooperation rate, it may result in forms coming in at a faster rate.

4.3.2 Daily Increases in Cooperation Rates

Daily increases in each panel's cooperation rate were also calculated for each day of the 2003 NCT. Figure 2 displays the daily increase in the cooperation rate, where Day 1 in the figure corresponds to January 30, the start of the initial questionnaire delivery.



Like Figure 1, Figure 2 illustrates a similar trend in cooperation rates for each panel. Figure 2 illustrates that spikes in the daily increase in cooperation rates correspond to key dates in the mailing strategy, specifically the delivery of the reminder postcard or reminder telephone call in combination with Census Day and the delivery of the replacement questionnaire. We can also see that Day 26 was

where the cooperation rate for the CS1 panel separated from the remaining panels, in that the daily increase in the cooperation rate was lower for the CS1 panel for that day. This trend continued until Day 35. In addition, from looking at the daily increases we can see that a peak in cooperation rates occurred soon after the cut for the replacement questionnaire, but before the actual delivery of the questionnaire. Thus, a later cut date for the replacement questionnaires would have resulted in reducing the number of replacement questionnaires mailed out, and perhaps decreasing the chance of duplicate responses. Furthermore, it also appears that our cut for the replacement questionnaire was too close to the reminder postcard, as there was an increase of about 10 percentage points as seen in Figure 1.

4.4 What were the item nonresponse rates?

Item nonresponse rates were calculated for five person items (relationship, sex, age/year of birth, Hispanic origin, and race) and two housing unit items (home ownership and household count) for each panel. Item nonresponse rates for sex, age/year of birth, Hispanic origin, and race were based on all persons in responding households. The relationship item nonresponse rates excluded Person 1 because they were not asked the relationship question.

The national item nonresponse rates for the contact strategy panels were not statistically different from the Control panel. The only item that was statistically significant was the household count item for the CS3 panel as compared to the Control panel. However, there was no practical significance. Therefore, the contact strategy implemented did not affect item nonresponse rates.

We also examined the item nonresponse rates for each of the person level and housing unit level data items by strata. The results were as expected, with the low response stratum having higher item nonresponse rates than the high response stratum for all data items.

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the 2003 NCT contact strategy portion is as follows:

Census 2000 Design Panel (CS1)

We saw that the addition of a targeted replacement questionnaire had a significant effect on the cooperation rates, a 10.3 percentage point increase at the national level. This finding was consistent with previous research conducted prior to Census 2000 (U.S. Bureau of the Census, 1994). However, the largest obstacle for this contact strategy is how to operationalize the process. For example, for Census 2000, over 42 million replacement questionnaires would have needed to be labeled for the nonrespondent universe, in about a week's time. Consequently, further research needs to be conducted to determine how a targeted replacement questionnaire can be operationalized for the 2010 Census. In addition, research needs to be conducted to determine when the cut for the replacement questionnaire should take place. From examining the daily increases in cooperation rates, it was apparent that there was an increase in the cooperation rates between the cut for the replacement questionnaires and their delivery. This resulted in more questionnaires being delivered than needed. It is also clear that the cooperation rates were steadily increasing between the delivery of the replacement questionnaire. Therefore, we may want to consider researching the optimal time period between the reminder postcard and the replacement questionnaire.

Telephone Reminder Call Panel (CS2)

A telephone reminder call in lieu of a reminder postcard significantly increased the cooperation rate, 5.9 percentage points at the national level. However, the cooperation rates for the telephone reminder panel (CS2) were based on the 6,208 housing units for which we were able to get a telephone number. These households may have a greater propensity to respond regardless of whether they received a telephone reminder call. That is, the results for this panel may be due more to how we designed the panel rather than the actual treatment. Consequently, we recommend that further controlled testing be done on a telephone reminder call.

There are two possible controlled experiments that could be done to further test the telephone reminder call. One experiment would involve oversampling a large number of housing units and conducting a telephone lookup operation for those housing units. Those housing units for which we are able to obtain a telephone number would be our sample. We would then divide that sample into two panels, those who would get a telephone reminder call and those who would get a reminder postcard. Another experiment would be similar to the 2003 NCT except we would also do a telephone lookup operation for the Control panel. Those housing units for which we were able to obtain a telephone number would become the control for the experiment. Either of these experiments would allow for better comparisons of similar samples to determine if a telephone reminder call affects cooperation rates when compared to a reminder postcard.

Due Date Panel (CS3)

The cooperation rates for the due date panel (CS3) were not statistically different than the Control panel. That is, the inclusion of a due date on the envelope of the mailing package for the initial questionnaire did not affect the cooperation rates. However, from looking at cooperation rates over time, we saw that the cooperation rate for the due date panel was consistently higher than the cooperation rate for the Control panel from the beginning of the operation until after the delivery of the replacement questionnaire.

Although these differences may not be statistically significant, they give some evidence that a due date on the initial questionnaire's mailing package does result in forms being returned earlier. This would be beneficial in that fewer replacement questionnaires would need to be sent. Furthermore, the costs associated with including a due date are minimal. We recommend doing further research on including a due date on the mailing package and possibly looking into including the due date in more than one place. For example, including the due date on the reminder postcard as well as the envelope of the initial questionnaire's In addition, including due dates on mailing package. different materials within mailing pieces should be researched. For example, including a due date on the return envelope of the initial questionnaire's mailing package and possibly the initial questionnaire itself.

Recommendations Across Panels

Across the different contact strategy panels, further research should be done on when each of the mailing pieces should be delivered, and when the cut for the target replacement questionnaire should occur. In looking at the daily increases in cooperation rates, the largest daily increase occurred shortly after Census Day and the reminder postcard/call. There was a weekend in that timeframe, so some of the increase was due to the fact that forms were not checked in on the weekends, but some of the increase was due to the timing of the reminder postcard/call and it's proximity to Census Day. Further research should be done to see if this is a consistent finding. It also appears that our cut for the replacement questionnaire was too close to the reminder postcard, as there was an increase of about 10 percentage points between the cut for the replacement questionnaires and the actual delivery of them. Additional research should be done to determine the optimal timing for the replacement questionnaire.

Item Nonresponse Rates

The analysis conducted on item nonresponse rates indicated that item nonresponse rates were not significantly impacted, either positively or negatively, based on the contact strategies implemented. Therefore, implementing any of these contact strategies in further 2010 research or the 2010 Census should not affect the quality of the data, in terms of item nonresponse.

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REFERENCES

Malakhoff, Lawrence and Sanders, Denise, 2000, *Program Master Plan for the Response Mode and Incentive Experiment*, May 2, 2000.

U.S. Bureau of the Census, 1994, *The 1994 Annual Research Conference Paper*, Decennial Statistical Studies Division 2000 Census Memorandum Series #E-85, May 4, 1994.

U.S. Bureau of the Census, 1999, *Mail Implementation Strategy*, Census 2000 Dress Rehearsal Evaluation Memorandum #A1a, June 1999.

U.S. Bureau of the Census, 2002a, *Program Master Plan for the 2003 National Census Test*, 2003 National Census Test (NCT) #02-05, July 2002.

U.S. Bureau of the Census, 2002b, *Sampling Specifications for the 2003 National Census Test*, Planning, Research and Evaluation Division TXE/2010 Memo Series #TX-RASE-S-3, September 16, 2002.

U.S. Bureau of the Census, 2003a, *Census 2000 Mail Response Rates*, Census 2000 Evaluation Memorandum A.7.a, January 30, 2003.

U.S. Bureau of the Census, 2003b, 2003 National Census Test Analysis Plan, March 4, 2003.

U.S. Bureau of the Census, 2003c, *Study of the U.S. Postal Service Reasons for Undeliverability of Census 2000 Mailout Questionnaires*, Decennial Statistical Studies Division Census 2000 Evaluation Memorandum A.6.b, September 30, 2003.