COMPARING TWO APPROACHES TO QUESTIONNAIRE DESIGN: OFFICIAL GOVERNMENT VERSUS PUBLIC INFORMATION DESIGN

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1. BACKGROUND

Thirteen different questionnaires were used in the U.S. 2000 Census Test which included seven short form questionnaires and six long form questionnaires. The U.S. 2000 Census Test short form data allow us to evaluate two different approaches to questionnaire and mailing package design--the Official Government and the Public Information Design approaches. Both approaches incorporate features found to increase response rates to mail surveys administered using self administered questionnaires. Research has shown that the following implementation strategies increase mail response rates for mail surveys:

- Respondent-friendly questionnaire design; that is, a questionnaire judged by researchers to be easy for respondents to complete (Dillman, 1991);
- Mailing advance letters to legitimize the survey request, communicate the importance of the survey, and invoke a norm of reciprocity (Dillman, Clark, and Sinclair, 1995; Dillman, 1991; Yammarino, Skinner, and Childers, 1991; and Heberlein and Baumgartner, 1978);
- Government sponsorship of the survey (DeLeeuw, 1990; Goyder, 1982; Heberlein and Baumgartner, 1978);
- Mailing a reminder postcard (Dillman, Clark, and Sinclair, 1995; Dillman, 1978; Dillman et al., 1974);
- Mailing a replacement questionnaire to nonrespondents (Dillman, 1991; Goyder, 1982); and
- Including a mandatory message such as *U. S. Census Form enclosed: YOUR RESPONSE IS REQUIRED BY* LAW on the outgoing envelope (Dillman, Singer, Treat, and Clark, 1996; Treat, 1993a; Cole, Kusch, Berry and Hoy, 1993; Tulp, and Kusch, 1993; and Tulp, Hoy, Kusch, and Cole, 1991).

The discussion below highlights key ways the two approaches operationalized these research findings.

A. Official Government Approach

Five of the seven short form mailing packages (envelopes and questionnaires) were designed using the Official Government approach. These include Forms 1A, 1B, 1C, 1D, and 1G. The design of these mailing packages focused on past research which shows that some government-sponsored surveys obtain higher response rates than do private sector-sponsored surveys (Heberlein and Baumgartner, 1978; DeLeeuw, 1990). All five forms are green in color and have very similar cover pages. In addition, the Census Bureau built on previous research which showed that including a combined message on the outgoing mail envelope (U.S. Census Form Enclosed; Your response is required by law) on a plain white envelope significantly increased response by 10 percentage points beyond that which we could obtain with any other response inducing factors (Dillman, Singer, Treat and Clark, 1996). Some have hypothesized that this appearance is consistent with the public's expectations of government; that is, not multicolored or expensive, and that the use of this envelope may have been successful in stressing that the government was sponsoring the survey and that respondents had a legal requirement to complete and return the enclosed questionnaire (Dillman, Jenkins, Martin and DeMaio, 1996).

B. Public Information Design Approach

In response to Congress, a contractor was hired to design two prototype mailing packages (Forms 1E and 1F and their envelopes). The contractor used their extensive experience in packaging, forms design and layout, and logical organization of information to develop mailing packages that would be user centered--accessible, easy to use, and appealing to the general public. Their efforts were focused on designing the forms to be as short as possible, using marketing tools to increase a sense of urgency and priority and developing a message that would motivate its users. They attempted to design a questionnaire that would allow the Federal Government to present itself with style--a style that was patriotic, contemporary, and good looking. They wanted the questionnaires and envelopes to match in design (e.g., the color, graphics, and icons were the same on all components of the mailing package). In terms of color, gold was chosen as the primary color since many recent commercial mailings have been printed in red, white and blue.

The contractor used a different graphical design and appeal message for each mailing package. The message on Form 1E and its mailing envelope included *2000 U.S. Census* in large print with the slogan *Count ME In!* appearing in a small blue circle. The back of the envelope included the same image that appeared on the front of the questionnaire. Form 1F and its mailing envelope incorporated a graphical image of the capital in the design along with the words *U.S. Census 2000 and TEST* also included. Unlike the Official Government design, this design approach carried over the graphical design onto the outgoing and return mailing envelopes and gave a lot of attention to the back side of the outgoing mailing envelopes.

Another difference in the design of these forms was that the contractor downplayed the prominence of the mandatory message (part of the message appeared in a small blue circle on the front of the Form 1E envelope and the message appeared on the back of the Form 1F envelope along the zip-off tab.) In sum, the contractor used color, informational icons (symbols to replace words), and graphics to attract the reader's attention. The predominant color chosen for these two forms was gold. Blue was added to the design of Form 1E.

2. EVALUATION METHODOLOGY

A. Sample Design

The universe for the U.S. 2000 Census Test was the 1990 Census Address Control File (ACF) census identification numbers (IDs) for housing units in questionnaire mailback areas only.[1] The sample design divided the universe into two strata based on race, Hispanic origin, and tenure variables at the 1990 Census Tract/Block Numbering Area level. One stratum, denoted as the low coverage area (LCA) stratum, has a high proportion of minority persons and renters; and the second stratum, denoted as the high coverage area (HCA) stratum, contains the residual. The LCA stratum contains 17,359,020 housing units and the HCA stratum contains 71,812,378 housing units after exclusions were made for units selected for previous tests.

Stratified sampling was used to select the sample of 94,500 housing units. Within each form type, the sample was allocated equally to the panels (seven simple form panels and six sample form panels). For each of the seven simple form panels, a sample of 2,400 housing units was selected from the HCA stratum and a sample of 3,600 housing units was selected from the LCA stratum. For each of the six sample form panels, a sample of 3,500 housing units was selected from the HCA stratum and a sample of 5,250 housing units was selected from the LCA stratum. For each housing unit selected within the strata, twelve neighboring units were selected. This resulted in selections of 13 unit clusters. Each unit was randomly allocated to one of the 13 test panels.

B. Implementation Plan

The U.S. Postal Service attempted to deliver the following mailing pieces to housing units falling in the national probability sample: an advance letter (mailed February 23, 1996), an initial questionnaire (mailed February 28, 1996), a reminder postcard (mailed March 4, 1996) and a replacement questionnaire with a letter for nonresponding units (mailed March 25, 1996). While the replacement questionnaires for all panels were scheduled to be mailed on March 25, 1996, the mailing was staggered. Replacement questionnaires for Forms 1A and 1B were mailed on March 20 while replacements for Forms 1C, 1D and 1G were mailed on March 21. The replacements for Forms 1E and 1F were mailed on March 26.

C. Definition of Mail Response Rates

To evaluate the two different methodologies, mail response rates were compared within strata and at the national level (combined strata). Response is defined as the receipt of a questionnaire in the processing facility (see Section 2.E, Limitations, for implications of this definition).

Since a fixed sampling rate was used within a stratum by form type, unweighted estimates were used for analysis when calculating stratum level estimates. Weighting was used to take into account stratification and sample allocation when calculating national panel estimates.

Define $MR_{h,t}$ as the final mail response rate for panel t, where t = 1, . . . , 13 in stratum h, h = 1 or 2 (1=HCA and 2=LCA).

The estimate of $MR_{h,t}$ will be composed of a ratio of two values defined below:

$X_{h,t}$ = Total questionnaire IDs that returned a questionnaire for panel t in stratum h.

$Y_{h,t}$ = Total mailed questionnaire IDs that were not identified by the U.S. Postal Service as "undeliverable as addressed" or UAA. All UAAs were processed and identified after test closeout for panel t, in stratum h. An ID was defined as a UAA if both the initial and replacement questionnaires were checked in as a UAA.

[1] For more details, see DSSD 2000 Census Memorandum Series #F-1.

Hence $MR_{h,t} = X_{h,t} / Y_{h,t}$.

For the weighted mail response rate at the national level, define $MR_{h,t}$ as the final response rate at the national level for panel t where t= 1, . . . , 13. Weights were calculated as $W_{h,t} = \frac{N_h}{n_{h,t}}$

where N_h = sample universe for stratum h, and
$n_{h,t}$= sample selected for panel t in stratum h.

Thus, $MR_t = \frac{\sum W_{h,t} X_{h,t}}{\sum W_{h,t} Y_{h,t}}$

D. Statistical Inference

The mail response rates were calculated for each of the panels within strata and at the national level (strata 1 and strata 2 combined). Standard errors for the estimates were computed using the Stratified Jackknife variance procedure (Wolter, 1985), using the VPLX statistical software.

For this evaluation, three pairwise comparisons of the differences between mail response rates for the short form panels were considered of value in testing specific hypotheses. This analysis was carried out so that we were 90 percent confident in each stratum (LCA and HCA) and at the national level that the confidence intervals for the pairwise comparisons contained their respective true differences (i.e., simultaneously). To provide for a simultaneous confidence level of 90 percent, each confidence interval was computed by adding and subtracting from the estimated difference, the estimated standard error of the difference multiplied by 2.43. The multiplicative factor was based on Hochberg and Tamhane, Section 2.1.1 (1987), and the pairwise comparisons are approximately equicorrelated ($\rho = 0.1$) by virtue of the experimental design.

E. Limitations of this Study

This report provides data on mail response to the U.S. 2000 Census Test. A mail response is defined as a questionnaire checked in the processing system. A small number of blank returns were returned in the mail by respondents.

The conclusions drawn from this analysis apply to the complete set of features used in the two questionnaire design approaches. Inferences about the questionnaires themselves cannot be drawn from comparisons made in this evaluation. The color, design and style of the questionnaire and mailing envelopes as well as the format and number of persons for whom data could be collected varied among the forms. We cannot say whether the questionnaire or any other design feature tested was the cause for the differences in the response rates because each design feature was not tested independently.

There were several problems experienced during the printing and assembly of the questionnaire mailing packages. It is probable that some respondents may have received forms assembled improperly and decided to destroy these forms rather than complete them. We did not supply a toll-free telephone number for respondents to report problems such as this; therefore, we will not have a good account of how often this occurred. Damaged forms were pulled from replacement mailings so all households should have received at least one good form.

3. RESULTS

A. Overall Response Rates for the U. S. 2000 Census Test

The overall national mail response rate for this test was 68.91 percent. The mail response rates and standard errors for each of the seven short form panels at the national and stratum levels are presented in Table 1. As Table 1 shows, the national level response varied from a low of 66.19 percent (Form 1F) to a high of 75.59 percent (Form 1G). The rates in the HCA ranged from a low of 70.96 percent (Form 1F) to a high of 80.47 percent (Form 1G). The rates in the LCA ranged from a low of 46.40 percent (Form 1F) to a high of 55.20 percent (Form 1G).

B. Hypotheses Testing--Comparing Two Approaches to Questionnaire Design: Official Government versus Public Information Design

Two different approaches to questionnaire design were tested during the U.S. 2000 Census Test--the Official Government approach (Forms 1A, 1B, 1C, 1D, and 1G) and the Public Information Design approach (Forms 1E and 1F). To determine which approach produced higher mail response rates, the response rates to Forms 1E and 1F were compared to the response rates tor Form 1G. Form 1G was selected as the control form for these comparisons because it is most comparable to the Public Information Design forms for the following reasons:

- None of these three forms include room to list all persons (a roster) living at the housing unit;
- All three forms request a count of persons living in the housing unit on census day;

Table 1. U.S. 2000 Census Test Final Short Form Panel Mail Response Rates at the National and Stratum Levels

Short Form Panels	Mail response Rate (%) Estimates and Standard Errors (%)		
	National	HCA	LCA
1A	71.18 (0.8)	75.93 (0.9)	51.62 (0.9)
1B	74.79 (0.7)	79.93 (0.9)	53.43 (0.9)
1C	74.69 (0.7)	79.41 (0.9)	55.07 (0.9)
1D	74.06 (0.7)	79.31 (0.9)	52.20 (0.9)
1E	70.73 (0.8)	75.66 (0.9)	50.19 (0.9)
1F	66.19 (0.8)	70.96 (1.0)	46.40 (0.9)
1G	75.59 (0.7)	80.47 (019)	55.20 (0.9)
Avg. Response for all short forms	72.45 (0.7)	77.38 (0.9)	52.02 (0.9)

- All three forms include a partial list of residence rules to use when considering who to include as census day residents;
- All three forms include enough space to collect data for five household members; and
- All three forms are similar in length (they each have four or eight questionnaire pages).

Table 2 shows the comparison of mail response rates for Forms 1E and 1F to Form 1G at the national and stratum level. As Table 2 shows, the response rates for the Public Information Design approach questionnaires in this test (with the specific design features included) were lower than response rates for the Official Government questionnaires tested.

C. Hypothesis Testing--Comparing the two Public Information Design Questionnaires

We tested the null hypothesis that there should be no difference in response between the two Public Information Design mailing packages because they were designed using the same design principles; that is, both forms used color (gold), informational icons (symbols to replace words), and graphics to attract the reader's attention. If length alone is considered, we would hypothesize that response to Form 1F (four pages) would be higher than response to Form 1E (eight pages). As Table 3 shows, the response rates to Form 1F were statistically lower than the response rates to Form 1E nationally and for both strata.

4. DISCUSSION

In this test, five short form questionnaires used the Official Government approach (green respondent-friendly questionnaires mailed in plain white envelopes with a mandatory message included on the front of the outgoing envelope). Response rates for this approach (as measured by Form 1G) were higher than the response rates received for the questionnaires developed using a Public Information Design approach to questionnaire design (gold respondent-friendly questionnaires with a slogan were mailed in matching gold envelopes with the accompanying slogan). Additional testing should be conducted to attempt to isolate the specific design feature(s) responsible for producing this effect. It is possible that the Public Information Design forms would have received comparable response rates if they were mailed in the Official Government envelopes. This test cannot address this issue. One hypothesis for why the Official Government approach produced higher response rates is that the outgoing envelope portrayed more prominently that the contents resulted from official government business and that a response was required by law. Respondents may pay more attention to mail received from the Government if they are packaged in a white envelope with the mandatory message (Dillman, Singer, Clark and Treat, 1996) than mail received in envelopes which used bright colors, slogans and graphics. It is possible that response rates for Forms 1E and 1F would be just as high as Form 1G if they were mailed in the Official Government envelopes. This test cannot separate the individual effects.

Another hypothesis that deserves additional consideration is whether response to Forms 1E and 1F was affected by the message that the questionnaire was due by "March 2, 1996 or as soon afterward as possible." On Form 1E, this message appeared on the mailing envelope and on page 4 of the questionnaire. This same message appeared twice on page 1 of Form 1F and also on the back of page 4 of

this questionnaire. Respondents may have focused on the March 2 deadline, determining that responses received after that date were not wanted. As mentioned, these are conjectures on the part of the author and others who have worked with the forms. This hypothesis was considered when analyzing the effect of the replacement questionnaire on response and appears to warrant merit. The response rates for the replacement questionnaires were much lower for Forms 1E and 1F than the other forms.

The finding that response to Form 1F was significantly lower than response to Form 1E was surprising. One hypothesis for this finding is that the word TEST which clearly appeared on the Form 1F outgoing envelope, in combination with the placement of the mandatory message (printed on the back of the envelope) may have motivated respondents to decide that they did not want to take part in a test. While TEST appeared on all test questionnaires, it was displayed most prominently on the Form 1F outgoing envelope (it replaced the mandatory message on the Official Government forms and was available on the back of the envelope on the pull-off tab).

Where are we today in terms of mailing package design for Census 2000?

Based on the results of the research conducted, a contractor will design the Census 2000 dress rehearsal mailing package. The short form questionnaires will collect data for five household members and they will be one page in length so that they can be imaged. The forms will be golden in color and will be mailed in plain white envelopes that include the mandatory message printed in a box on the outgoing envelopes. Graphical icons will be included on the form to provide respondents with information about the uses of census data. The due date (Census Day) and word TEST will not appear on the questionnaires.

Table 2. Comparison of Mail Response Rates to Forms 1E and 1F and Form 1G at the National and Stratum Levels

Comparison	National		HCA		LCA	
	Diff.	90% C. I.	Diff.	90% C. I.	Diff.	90% C. I.
1G-1E	4.86*	2.47 to 7.25	4.81*	1.92 to 7.70	4.97*	2.09 to 7.73
1G-1F	9.40*	6.95 to 11.85	9.51*	6.55 to 12.47	8.81*	5.99 to 11.63

* Indicates that the difference is statistically significant at fwe $\alpha = 0.10$.

Table 3. Comparison of Mail Response Rates to Forms 1E and 1F at the National and Stratum Levels

Comparison	National		HCA		LCA	
	Diff.	90% C. I.	Diff.	90% C. I.	Diff.	90% C. I.
1F-1E	-4.54*	-7.07 to -2.01	-4.70*	-7.77 to -1.63	-3.89*	-6.72 to -1.06

* Indicates that the difference is statistically significant at fwe $\alpha = 0.10$.

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