

Using Results from Census 2000 for Planning the 2010 Census*

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This paper discusses the goals and objectives of the tests that are part of the 2010 Census planning cycle. Note that the Census 2000 results presented in this paper are only a very small part of what we learned from Census 2000.

1. Introduction and Background

The beginning of a new decade marks the start of a dedicated effort to begin planning the decennial census of population and housing in the U.S. We start the planning process with the lessons learned and results from the most recently conducted census.

In order to improve the relevancy and timeliness of census long form data and to develop and implement more cost-effective operations, a re-engineering strategy will be implemented for the 2010 Census, composed of:

- a modernized and enhanced address file and geographic database;
- the implementation of the American Community Survey (ACS) to collect census long-form data on an ongoing basis; and
- systematically developing, testing, and implementing a short form only 2010 Census.

In preparation for the 2010 Census, we are conducting several national mailout tests, two census site tests, and a dress rehearsal. We conduct national mailout tests to evaluate new methods, procedures, and systems as an efficient way to examine individual changes to the census. Site tests are conducted for the purpose of selecting the most promising methods for conducting the 2010 Census.

2. The 2003 National Census Test

The first national mailout test was conducted in 2003. The first part examined the impact of offering various self-response options and the second part examined revisions to the race and Hispanic origin questions.

2.1 Self-Response Options

2.1.1 Self-Response Options Test Objectives

The 2003 National Census Test was designed to address the impact of offering various self-response options on overall response rates and data quality. The self-response options offered in the test included mail, Internet, Interactive Voice Response (IVR), and a combination of Internet and IVR (Response Options Strategy Working Group 2002).

To study the impact of offering various self-response options in the 2003 National Census Test, the Census Bureau tested two alternative data collection modes, IVR and Internet. The response options panels were designed to answer three broad research questions:

- What is the effect of offering alternative data collection modes on response?
- What is the effect of new or additional contact strategies on overall response?
- Do any of the alternative panels offer an increased response over the Census 2000 approach?

2.1.2 Input from Census 2000 for Defining Self-Response Options Objectives

The Self-Response Options objectives were identified based on a review of Census 2000 evaluation results on mail response and return rates, telephone questionnaire assistance, and Internet data collection.

*This report is released to inform interested parties of research and to encourage discussion of work in progress.

The mail response rate provides a measure of the NRFU workload. It is calculated as the number of mail returns received prior to the cut-off date for the NRFU universe (April 18, 2000) divided by the total number of housing units in mailback areas that were eligible for NRFU. The mail response rate for all questionnaires (long and short form) as of April 18, 2000 was 64.3 percent (Stackhouse and Brady 2003a).

The mail return rate is a measure of cooperation in the Census. It is calculated as the number of mail returns received prior to the cut-off date for the NRFU universe divided by the total number of occupied housing units in mailback areas that were on the Decennial Master Address File prior to NRFU. The mail return rate for all questionnaires (long and short form) as of April 18, 2000 was 74.1 percent (Stackhouse and Brady 2003b).

Of all occupied housing units enumerated in Census 2000, about 74 percent were enumerated on paper (mail-back) questionnaires while only about 0.12 percent were enumerated using the Internet and TQA (Treat 2003). Due to the expected higher level of data quality and the lower cost associated with self-enumerated responses relative to enumerator-collected responses, it is important for self-response rates to be as high as possible.

The TQA program received 6 million calls, with approximately 51 percent serviced by an agent. Of the main services provided by an agent, the most frequently requested service was the request for a census form (Chesnut 2003). Only about 61,000 households were enumerated as a result of TQA. One of the recommendations from this evaluation was to conduct future research in assessing the expanded use of IVR technologies (Chesnut 2003).

Census 2000 was the first U.S. census to include an Internet on-line reporting capability for short-form, English language questionnaires. Respondents could access the Internet form only if they found the link on the Census 2000 home page. The Internet data collection was an operational success, however, it did not fully reach its potential. This is probably because of a conscious decision by the Census Bureau not to advertise this response mode because of concerns related to public perception of confidentiality and security. Less than 64,000 households were enumerated using just the Internet census form. Recommendations for future research included how to promote the Internet as a major response option and how to use Internet response as a tool to increase data quality by implementing real-time

data feedback and analysis (Whitworth 2002).

During Census 2000, the Response Mode and Incentive Experiment (RMIE) investigated the effect of using Computer-Assisted Telephone Interviewing (CATI), Internet, and IVR. The specific goals of the RMIE were to assess the public's willingness to provide census data using computer-mediated data collection methods, to evaluate the quality of the data collected using these methods, and to study the ability of incentives to promote the use of computer-mediated methods (Caspar 2003).

Results from the RMIE (Caspar 2003) showed:

- CATI brought about a small but statistically significant improvement in the overall response rate. It also had a low item nonresponse rate.
- The implications are complex for the use of the IVR technology. Data quality was the lowest for this mode. Respondents appeared to dislike lengthy surveys with this method and some respondent sub-groups were more likely to report confusion with the task.
- The Internet mode yielded relatively high data quality.
- The calling card was very effective in promoting the use of the alternative response mode. However, rather than encouraging more households to participate, the incentive tended to redirect households that would have otherwise responded by mail.

Results from the RMIE (Caspar 2003) also suggested several areas worthy of future research:

- Research is needed to determine the best ways to present the response mode alternatives.
- Research is needed to determine if advances in speech recognition software can improve the voice user interface to increase data quality and eliminate some of the dissatisfaction voiced by respondents.

2.1.3 Self-Response Options Results

Alternative data collection modes research in the 2003 National Census Test led to the following recommendations (Brady et al 2004):

- Conduct a cost analysis of the strategies.
- Develop content suitable for each mode to optimize the advantages of each, while collecting the same data across modes.

- Research improvements to the IVR system to decrease item nonresponse rates and decrease agent workloads, while minimizing mode effects and maximizing data quality.
- Continue research on timing of offering alternative modes.
- Use a box design above the within household population count question as this emphasized the first question on the form, drew attention to the question, and resulted in an increase in response to the question.

2.1.4 Mail Contact Strategy

During the decade leading up to Census 2000, research and testing focused on ways to increase the willingness and ability of respondents to respond by mail to the census by using multiple notifications for alerting respondents to complete the forms (Gore 1999). We learned that repeated contacts and reminders pay big dividends in response rates. For Census 2000, we implemented a multiple mail contact strategy, consisting of an advance notice letter, a census questionnaire, and a reminder postcard (U.S. Department of Commerce 2000). For the 2003 National Census Test, we tested three contact strategies.

The contact strategy analysis from the 2003 National Census Test provided the following recommendations (Bouffard et al 2004):

- Use a targeted replacement questionnaire as it significantly increased the national cooperation rate in the 2003 National Census Test by 10.3 percentage points over no replacement questionnaire.
- Continue testing a telephone reminder call, in lieu of a reminder postcard.
- Continue research on including a due date on the initial questionnaire’s mailing package.
- Conduct further research on when each mailing piece should be delivered, including research on the optimal timing for the replacement questionnaire.

2.2 Revised Race and Hispanic Origin Questions

2.2.1 Race and Hispanic Origin Questions Test Objectives

The 2003 National Census Test tested the effects of improvements in the Hispanic origin questions, the effects of dropping the “Some Other Race” response,

and whether instructional changes, such as including examples, can overcome an anticipated increase in race item nonresponse. Additional objectives focused on what affect this will have on the overall quality of race and Hispanic origin reporting. The effectiveness of the revised instructions for the Hispanic origin and race questions was also measured (Response Options Strategy Working Group 2002).

The goals of the test were based on objectives from the Race and Ethnicity Research and Development (R&D) Planning Group. The specific issues that required testing in the 2003 National Census Test (Response Options Strategy Working Group 2002) included:

- What is the effect of minimal wording revision of the Hispanic origin question?
- What is the effect of adding Hispanic and race examples?
- What is the effect of dropping the “Some Other Race” response category from the race question?
- What is the effect of adding instructions to clarify that the race and Hispanic origin questions should have different responses?
- What is the *combined* effect of dropping the “Some Other Race” response category and adding instructions to clarify that the race and Hispanic origin questions should have different responses?
- Will adding instructions to clarify that the race and Hispanic origin questions should have different responses obtain a better effect on response rates while maintaining or dropping the “Some Other Race” response category?
- What is the effect of adding instructions to clarify that the race and Hispanic origin questions should have different responses while maintaining the “Some Other Race” response category?

2.2.2 Input from Census 2000 for Defining Race and Hispanic Origin Questions Objectives

The Census 2000 results that preceded this test were included in the Alternative Questionnaire Experiment (AQE). The race and Hispanic origin part of the AQE compared the 1990-style race and Hispanic origin questions with the questions in the Census 2000 short form. It examined the effects of changes mandated by the Office of Management and Budget to allow the reporting of more than one race and reversed the sequence of the race and Hispanic origin items. Although the main limitation of the AQE was that it only informs us about mail responses, the findings are significant for understanding the total effect of the

changes in the census mail questionnaire from 1990 to 2000 (del Pinal 2003).

Overall, the questionnaire revisions substantially improved the completeness of race and Hispanic origin reporting in mail short form questionnaires. Although there were no apparent questionnaire effects on the fraction reported as Hispanic, there were effects on the reporting of detailed Hispanic origin groups. The 1990-style questionnaire obtained more detailed reports of Hispanic origin than the 2000-style questionnaire, probably due to the effects of question wording differences as well as examples. The experiment demonstrated that some questionnaire design changes made in Census 2000 resulted in substantial improvements in data quality, but that other changes had unintended consequences. The recommendation was to carefully pretest and field test all changes to the questionnaire (Martin et al 2003).

2.2.3 Race and Hispanic Origin Questions Results

The Census Bureau's broad goal for the 2003 National Census Test was to reduce the number of race and Hispanic origin responses that were missing or did not fall into one or more of the five major race categories. A secondary goal was improving the reporting of detailed Hispanic origin in the Hispanic origin question. Results from the 2003 National Census Test showed there were trade-offs in choosing one set of experimental treatments over another and that further research was needed (Sheppard et al 2003).

Based on the results and recommendation from this test, the 2004 Census Test and the content part of the 2005 National Census Test were designed to gain insight on respondent reaction to the new race and Hispanic origin questions (Gore 2003).

3. The 2004 Census Test

The 2004 Census Test was the first census site test leading up to the 2010 Census. It focused on applying improved methods for data collection and coverage and gathering performance metrics. The goal was to obtain information needed to inform decisions about adopting, refining, or rejecting potential new methods for the 2010 Census. The test objectives and goals included (Gore 2003):

- Hand-held computers for Field Work - Develop methods for implementing a hand-held computer

system (including Global Positioning Systems technology) during the NRFU operation, with Spanish and English language capabilities.

- Coverage Improvement - Develop new methods for improving coverage, including procedures to address overall coverage of the population and housing and procedures to address unduplication.
- Questionnaire Content - Gain insight on respondent reaction to the new race and Hispanic origin questions, including the removal of the "Some Other Race" option and the inclusion of examples.
- Group Quarters (GQs) - Develop improved definitions and methods for distinguishing between GQs and housing units during census operations and for updating the address file in a comprehensive, integrated manner.

To meet these objectives, the test was conducted in one urban site (a portion of northwestern Queens County, New York) and a rural site (Colquitt, Thomas, and Tift Counties, Georgia). Several R&D Planning Groups contributed to the test's goals and objectives.

3.1 Hand-held Computers for Field Activities

3.1.1 Hand-held Computers Test Objectives

The Field Activities R&D Planning Group identified objectives relating to the optimal and most cost effective field infrastructure required to support automated data collection (Field Activities 2010 R&D Planning Group 2003). The introduction of hand-held computers in the 2010 Census will enable enumerators to transmit data directly to headquarters for processing and receive daily-updated assignments. This could improve the control and tracking of the NRFU universe and thereby reduce multiple enumerations (Hough and Borsa 2003). Results from the evaluation of the Census 2000 NRFU supported this plan and led to the following recommendations (Moul 2002):

- Monitor the followup workload in real-time to reduce the number of cases with unknown population counts and the number of lost enumerator returns.
- Periodically identify and remove late mail returns from the workload to reduce the workload and the number of multiple data captures.
- Implement a sufficient quality assurance program to ensure the accuracy of the NRFU production files and the proper use of enumeration techniques.

For the 2004 Census Test, four evaluations were

identified to answer key research questions associated with the use of hand-held computers for field activities (Gore 2003). The four evaluations involve:

- Did the design support successful implementation of NRFU using hand-held computers?
- Were the enumerators able to use hand-held computers to complete their work and what effect did the use of hand-held computers have on productivity?
- What was the impact on field and office staffing levels, position requirements, management ratios, space configuration, and training in using a hand-held computer system during NRFU?
- What was the effect on data quality of using a hand-held computer system to collect NRFU data?

3.1.2 Input for Defining Hand-held Computer Objectives

In a post-Census 2000 study conducted under contract by Synectics for Management Decisions, Inc., Synectics suggested that electronic tools for enumerators be evaluated on the basis of enumerator functions (Synectics 2001).

3.2 Coverage Improvement

3.2.1 Coverage Improvement Test Objectives

For the 2004 Census Test, five evaluations were identified to answer key research questions associated with developing new methods for improving coverage (Gore 2003). The five evaluations involved:

- Can we minimize the amount of count imputation resulting from data collection activities using automated hand-held computer systems?
- How do coverage probes and edits affect within-household coverage?
- Where do people with multiple residences prefer to be counted and what type of attachment do they have to each residence? Are people with multiple residences duplicated?
- Can we reduce duplication by using improved record linkage methods?
- Can we minimize duplication of housing units and persons in the census by adding a computer-assisted person unduplication operation?

3.2.2 Input from Census 2000 for Defining Coverage Improvement Objectives

Census 2000 results related to these studies come from the AQE and coverage improvement evaluations.

The residence instructions part of the AQE aimed to improve within-household coverage by rewording the roster instructions. The results suggested that the revisions were effective, however, we do not know which of the design and wording changes were responsible for the improvements. Additional research should build on these findings in further cognitive and field tests (Martin et al 2003).

The Coverage Edit Followup operation was designed to improve the within-household coverage of a select universe of cases to ensure that the household roster was correct. In 81.4 percent of all completed cases, no changes were made to the roster. However, by reviewing the roster with the respondent and asking nine probe questions, we increased our confidence in the accuracy of forms where no changes were made. Cases that involved roster changes included some combination of adding or removing names. The net coverage gain was determined by taking the number of persons added and subtracting the number of persons removed. The Coverage Edit Followup operation resulted in a net loss of about 100,000 persons. However, while the net change was a decrease in the population, the Coverage Edit Followup operation did improve the accuracy of Census 2000. Given the results and limitations of the data, the recommendation was to continue to conduct a coverage edit followup operation in future censuses, with suggested improvements (Sheppard 2003).

The Housing Unit Unduplication Operation was developed late in the Census 2000 process. Phase 1 consisted of identifying potential duplicates by performing both address-level and person-level matching. Phase 2 identified which of the 2.4 million IDs flagged for potential deletion would be reinstated and thus included in the final census counts. Although there was room for error in the final determination to reinstate or delete a potential duplicate, overall the Unduplication Operation improved enumeration accuracy (Clark and Moul 2003).

The Census Bureau's ability to match names in Census 2000 had a dramatic effect in identifying and eliminating duplicate housing units and persons. The capability to improve on this ability to unduplicate persons creates the potential to make substantial

reductions in erroneous enumerations in future censuses. The recommendation was to continue research to improve the unduplication process that was employed in the Census 2000 production. This research should focus on improving the process of identifying and removing duplicates, learning more about the causes of the duplication, and developing techniques to estimate gross erroneous enumerations (Clark and Moul 2003).

3.3 Questionnaire Content

3.3.1 Questionnaire Content Test Objectives

For the 2004 Census Test, one evaluation was identified to answer a key research question associated with gaining insight on respondent reaction to the new race and Hispanic origin questions (Gore 2003). The specific question asks: What is the effect of the new race and Hispanic origin questions, including the removal of the "Some Other Race" option?

3.3.2 Input from Census 2000 for Defining Questionnaire Content Objectives

In addition to the Census 2000 research results cited in Section 2, the results specifically related to these objectives are from the evaluation of item nonresponse rates, the AQE, a comparison of results from the Census 2000 Supplementary Survey (C2SS) and Census 2000, and a demonstration of the operational feasibility of the American Community Survey.

The goal of the analysis of item nonresponse for hundred percent items was to determine the extent of item nonresponse for the Census 2000 hundred percent items which are collected for every resident and housing unit in the U.S. Item nonresponse occurs when no answer is provided to an item on the questionnaire. Inconsistent responses were not considered nonresponse. For the Hispanic origin item, nonresponse was higher for self-responses than for enumerator returns. For race, nonresponse was higher for enumerator returns than for self-responses. Results from this evaluation led to recommendations for future research, including the need to continue to test question wording and placement and to investigate ways to reduce item nonresponse (Norris 2003).

In addition to the AQE results in Section 2, the following discussion relates to the research planned for the 2004 Census Test. According to Martin, Gerber, and Redline (2003):

Our results provide a caution that seemingly minor questionnaire variations in the design of a questionnaire can have substantial effects on the data. We recommend against introducing any questionnaire changes without fully pretesting and field testing them, since they may have complex and unexpected consequences. We also note that cognitive testing alone is not sufficient to understand the effects of questionnaire design changes on the data. Cognitive testing alone may prove misleading, and must be supplemented by field experiments.

The primary purpose of the C2SS was to demonstrate the operational feasibility of collecting long form data at the same time as, but in a separate process from, Census 2000. The C2SS results showed no discernible differences in the proportion of Hispanic origin responses, although there were significant differences in the detailed Hispanic origin responses (Bennett and Griffin 2002). Both Census 2000 and the C2SS allowed respondents to report one or more races.

The successful implementation of the C2SS during Census 2000 demonstrated that full implementation of the ACS is operationally feasible. Operational feasibility means that planned tasks were executed on time, within budget, and that the data collected met certain basic quality standards. Based on the C2SS findings, the recommendation was for the Census Bureau to fully implement the ACS (Griffin and Obenski 2002).

3.4 Group Quarters

3.4.1 Group Quarters Test Objectives

For the 2004 Census Test, one evaluation was identified to answer a key research question associated with GQ frame development (Gore 2003). The specific question asks: Can we implement a set of census operations that will distinguish housing units from GQs, assign the correct GQ classifications, improve the assignment of GQs to the correct geography, and reduce duplication between GQs and housing units?

3.4.2 Input from Census 2000 for Defining Group Quarters Objectives

There were some aspects of the GQ inventory development process where there were noteworthy lessons learned and recommendations. Although the

GQ definitions and classifications were researched and tested over the decade, there were inherent weaknesses in the overall identification and classification of some facilities, which ultimately impacted the final enumeration (Abramson 2003). Specific recommendations from evaluations, quality assurance profiles, and operational assessments that were used to plan the 2004 Census Test include:

- Revise the GQ definitions so that they are current, agree with terminology used by facility service providers, advocates, government officials, and the general public, and can be easily understood and implemented by field staff.
- Clarify the distinctions between GQs and housing units.
- Re-evaluate and design a method to integrate the GQ inventory development into the overall address file development process.

4. The 2005 National Census Test

There are two parts to the 2005 National Census Test. One part is designed to test options for the short form questions for both the 2010 Census and the ACS. The second part is designed to test alternative questionnaire delivery strategies to identify a strategy for increasing response to the census.

Both parts build upon the 2003 National Census Test results. Several 2010 R&D Planning Groups were involved in defining test objectives, based on results from Census 2000 and the 2003 National Census Test.

4.1 Short Form Content

Plans for this part of the test include testing and evaluating coverage questions and residence rules; the design, layout, wording, and presentation of the race, ethnicity, and ancestry questions, focusing especially on use of instructions, use of examples, and use of shortened questions; revised wording, sequencing, layout, and response categories for other short form items; advancements in navigational instructions; and questionnaires by language, other than English.

4.2 Questionnaire Delivery Strategy

Plans for this part of the test include testing and evaluating at least two targeted replacement questionnaire printing methods that show promise as viable alternatives with respect to 2010 Census volume,

scale, and timing constraints; the potential for advances in data capture and printing technologies to increase both census response and data quality; and the use of the Internet to increase census response.

5. The 2006 Census Test

The 2006 Census Test, the second site test, will be both a methodological and functional test. The test will be conducted in two sites, the Cheyenne River Indian Reservation and Trust Lands in South Dakota and Central Travis County, Texas. The proposed objectives for the 2006 Census Test are currently being refined by the Census Bureau and are subject to changes based on research, operational, and budget constraints.

6. 2010 Census Test Information and Census 2000 Results

More detailed plans for, as well as results from, the 2010 Census tests and the 2008 dress rehearsal will be released as they become available later in the decade.

For additional information on the Census 2000 Testing, Experimentation, and Evaluation Program, refer to the Census Bureau's web site at <http://www.census.gov/pred/www/>.

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