

## Operational Assessment of the 2004 Coverage Research Followup

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### Abstract

Improving the accuracy of census coverage is one of the major goals of the 2010 Census. From the Census 2000 Testing, Evaluation, and Experimentation Program and the Coverage Measurement Program, we have learned about specific areas of coverage that require improvement. Two of these areas include person and housing unit coverage. In 2004, the Census Bureau conducted a test to evaluate procedural improvements within these areas. To address these, a Coverage Research Followup (CRFU) Operation was designed and implemented. Two objectives of the CRFU were to determine the correct household roster when the census form indicated that someone might have incorrectly been included or excluded, and to test respondent understanding and completeness of the census form. To accurately evaluate these objectives, a successful CRFU operation needed to be conducted. Census Bureau staff contacted sampled households by either telephone or personal visit using a paper and pencil instrument. Interviews were conducted in two waves based on the date of the census response. The first wave primarily included households who mailed back the census form; the second wave primarily included households who responded during nonresponse followup. This paper will document the workloads, response rates, and other operational data by site, mode, and wave. It will include an analysis on lessons learned from the field and telephone center staff, and serve as an indicator for planning and managing future census coverage.

This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress. The views expressed on operational issues are those of the authors and not necessarily those of the U.S. Census Bureau.

### Keywords

2004 Census Test, coverage improvement, coverage questions, unduplication

### Background

A Coverage Edit Followup (CEFU) operation was conducted as part of the 1990 Census. The CEFU focused on addressing inconsistent or incomplete count information from the census enumeration and on

completing the enumeration for large households, since the short form only had space for 6 persons. Respondents who completed and returned their form were contacted, in person, by an enumerator. Those who completed their census return during the Nonresponse Followup (NRFU)<sup>1</sup> operation were more likely to have been correctly enumerated during the NRFU interview. Due to budget constraints, the Census Bureau did not conduct a formal evaluation on the effectiveness of this operation following the 1990 Census.

During Census 2000, a telephone only Coverage Edit Followup (CEFU) operation was conducted to increase within household coverage and improve data quality in two ways. First, it was used to collect person data for large households. Second, it resolved count discrepancies between the reported household population count and the actual number of household members recorded on the census form. An evaluation was conducted to document the aspects of the CEFU operation. The evaluation recommended that we continue to conduct a coverage followup operation and that it be conducted at the types of housing units as was done during Census 2000. That is, housing units where we had count discrepancy and those with large households. It was also recommended that we identify other possible coverage problems with the original census data and include more cases in the followup.

Another recommendation from Census 2000 was that we develop ways to increase the completion rate for followup interviews. First, we should look to improve our ability to obtain correct telephone numbers so that more cases could be completed by telephone. Second, we should consider including a field followup component for cases that could not be resolved by telephone. Results from Census 2000 show that 53.5 percent of the eligible workload was completed. The main reason for the incomplete cases was our inability to obtain valid telephone numbers (Sheppard, 2003). To obtain more accurate telephone numbers, cases were sent to an outside telephone appending service. This was done in an attempt to obtain telephone numbers in which

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<sup>1</sup> The Nonresponse Followup (NRFU) operation was an enumerator-administered interview conducted with households who did not return their Census questionnaire.

a respondent provided telephone number was incorrect or had not been provided on the mailback form. The CEFU was unable to complete cases for which we did not obtain a valid telephone number. See Sheppard (July, 2003) for more details.

**Introduction**

The 2004 Census Test was conducted in portions of northwestern Queens County in New York, and Colquitt, Thomas and Tift Counties in Georgia. During the 2004 Census Test, a Coverage Research Followup (CRFU) operation was conducted. The CRFU was conducted to gather information for improving within household coverage, to identify possible housing unit and person duplication, and to efficiently identify the appropriate cases for followup so that we could maximize coverage improvement where it is needed.

Based on a list of instructions to determine whom to include and exclude from the household roster, two coverage questions were included on both the mailout form and the non-response followup instrument. These questions were used to identify households that may have potential problems with the household roster. An undercount coverage question was used to determine if someone had potentially been omitted from the household roster. An overcount coverage question was used to determine if someone has been included on the roster when they should not have been. Households were eligible for interviews based on responses to the coverage questions. Census responses that had both a valid telephone number and basic street address were initially included in the telephone phase of CRFU. All other households were contacted by personal visit.

In addition, a computer matching operation (unduplication) was implemented to identify potentially duplicated persons or housing units. This operation matched census person records against themselves to identify potential duplication. Duplicates identified by the computer matching operation were divided into three types of duplicates: whole-to-whole, whole-to-partial, and partial-to-partial household. Whole-to-whole household duplication occurred when *all* persons in Household A matched to *all* persons in Household B. Whole-to-partial household duplication occurred when *all* persons in Household A matched to *at least one* person in Household B. Partial-to-partial household duplication occurred when *at least one* person in Household A matched to *at least one* person in Household B, but not all persons matched.

**Whole-to Whole Duplicates**

<u>Household A</u>		<u>Household B</u>
Person 1	→	Person 1
Person 2	→	Person 2
Person 3	→	Person 3
Person 4	→	Person 4

**Whole-to-Partial Duplicates**

<u>Household A</u>		<u>Household B</u>
Person 1	→	Person 1
Person 2	→	Person 2
Person 3	→	Person 3
		Person 4
		Person 5
		Person 6

**Partial-to-Partial Duplicates**

<u>Household A</u>		<u>Household B</u>
Person 1	→	Person 1
Person 2	→	Person 2
Person 3		Person 5
Person 4		Person 6

An interview was conducted at each housing unit to determine whether a potentially duplicated person should have been counted at that address. Following interviewing, a clerical review was conducted in which analysts determined if the linked or potentially duplicated persons were actually duplicates and the cause of duplication. Housing units that were within the same geographic block and identified as Whole-to-Whole and Whole-to-Partial were contacted by personal visit since this type of duplication was likely a result of form misdelivery or housing unit duplication. Partial-to-Partial household duplicates that were within the same census block and had valid telephone numbers were initially contacted by telephone.

**Design of the Coverage Research Followup**

The Coverage Research Followup was conducted in two waves via telephone and personal visit interviewing. Wave 1 interviewing began in June 2004 and continued to the end of August 2004. Wave 2 interviewing began in September 2004 and ended in November 2004.

Telephone numbers were essential in contacting a portion of CRFU cases. Both the paper mailout form and NRFU instrument included a question that asked for the respondent’s telephone number. CRFU telephone interviewing was conducted at two of the Census Bureau’s Telephone Centers located in Jeffersonville,

Indiana and Tuscon, Arizona.

Telephone interviewers began contacting households for CRFU during Wave 1 on June 18, 2004. A successful contact attempt occurred when the interviewer spoke with someone in the household, or received a message from an answering machine confirming that the correct telephone number and household had been reached. If contact was attempted using the respondent provided telephone number and the interviewer determined that they did not contact the correct household, the case was sent to telephone research within the telephone center. Telephone research was only used in an attempt to locate a telephone number for a specific address when contact using the respondent provided telephone number was unsuccessful.

Unresolved telephone interviews were sent to the field for a personal visit using the same paper questionnaire. Personal visit interviews were conducted out of the local census offices by census enumerators. Below is a list of the types of cases that were included in the personal visit field workload:

- Unresolved cases initially sent to the telephone center
- Cases linked as possible duplicate housing units based on information received from the 2004 Census questionnaire
- Cases in which the household did not provide a telephone number on the 2004 Census questionnaire
- Housing units containing a physical location description address rather than a basic street address

The sample of housing units identified for CRFU based on responses to the coverage questions was selected independent of the housing units identified through the unduplication computer matching. Pre-processing activities included a remove-overlap operation so that CRFU housing units selected for both the coverage question and computer-matching universes were only interviewed once. In an effort to minimize respondent burden and help field staff resolve potential duplicate housing units, questionnaires for households that were identified through the computer matching operation and within the same geographic block were manually clipped together. By clipping these cases together, we eliminated a second visit to the same address in the event that two questionnaires represented the same housing unit.

Following the remove-overlap operation, a file of the selected CRFU cases was created. This file was sent to the Census Bureau's National Processing Center so that

demographic data from the census questionnaire could be preprinted on the CRFU questionnaire for interviewing. During the CRFU interview, questions were asked to identify whether respondents correctly included and excluded people from the household roster during the short form enumeration. Interviewers reviewed the household roster that was provided during the enumeration, asked about other persons who may have been potentially left off of the roster and then asked a series of questions to determine whether all persons identified should have been enumerated in the household. The CRFU interview contained the following sections:

- Establishing the correct household
- Identifying a new respondent if the original respondent moved out of census address
- Identifying potential housing unit duplicates to determine reasons for duplication
- Reviewing the census roster with the respondent, which provided the respondent an opportunity to make corrections
- Adding potentially missed people to establish the correct household roster
- Collecting demographic information for any added persons
- Collecting information about other places household members live or stay to identify potentially erroneous enumerations
- Obtaining respondent name and telephone number for quality control purposes

Information for the CRFU interview was collected from respondents who completed the census questionnaire or the most knowledgeable household member if the original respondent was unavailable. We did not accept proxy interviews from anyone who was not a member of the household that had been enumerated on the short-form.

## Results

There were 15,835 cases in the CRFU workload: 4,470 (28 percent) in the Georgia site and 11,365 (72 percent) in the New York site. Of the 15,835 cases, 7,571 (48 percent) were sent to the telephone operation. A higher percentage of coverage question cases were sent to the telephone operation first while a higher percentage of the unduplication cases went directly to the field. This distribution of field to telephone cases was expected given the specific criteria for telephone versus personal visit. Table 1 contains a distribution of the workload for the Georgia site. The assignment to telephone and field in the New York site were similar to the Georgia site.

**Table 1: CRFU Workload, Georgia**

	Coverage	Undup	Both	Total
Telephone	1656	403	52	2111
Field	358	1906	95	2359
Total	2014	2309	147	

**Telephone Results**

The telephone centers achieved an overall 63.6 percent completion rate by completing 4,815 interviews out of 7,571. In Georgia, we completed 1,441 or 68.3 percent of the cases, and in New York, we completed 3,374 or 61.8 percent of cases.

Table 2 contains a distribution of the 7,571 telephone cases by the interview outcome. The table is divided by site into two categories: Complete and Non-interview. Complete Resolved cases include outcomes in which the interview was either completed, or sufficient information was obtained for a complete interview. Cases were considered Sufficient Partial when the housing unit section of the questionnaire had been completed.

**Table 2: Telephone Interview Outcomes**

	Number of Interviews		
	GA	NY	Total
Complete	1441	3374	4815
Non-interview	670	2086	2756

During the telephone phase, CRFU allowed for 16 call attempts to make initial contact with the household. Approximately 25 percent of the cases were completed during the first attempt, and approximately 50 percent were complete within the first or second attempt. Table 3 shows the distribution of telephone call attempts to complete an interview.

**Table 3: Telephone Contact Attempts**

Contact Attempt	Number Complete Interviews	Percent Complete Interviews	Cumulative Percent
1	1,224	25.4	25.4
2	1,185	24.6	50.0
3	819	17.0	67.0
4	500	10.4	77.4
5	338	7.0	84.4
6	217	4.5	88.9
7	158	3.3	92.2
8	134	2.8	95.0
9	74	1.5	96.5
10	44	0.9	97.4
11	41	0.9	98.3
12	26	0.5	98.8
13	16	0.3	99.1
14	20	0.4	99.5
15	8	0.2	99.7
16+	10	0.2	99.9

Total cumulative percentage < 100% due to rounding.

Telephone calls were conducted, local time, Monday through Friday, 9am to 9pm, Saturday, 9am to 7pm, and Sunday, 11am to 9pm, excluding holidays. Once contact was made with a household, the vast majority of the time the interview did not require a callback for completion. When telephone contact was unsuccessful, the case was sent to telephone research to obtain a valid telephone number for the housing unit. There were 1,035 cases out of a total of 7,571 where the case was sent to telephone research. A total of 169, or 16.3 percent of these cases, resulted in a complete interview over the telephone. If contact was still unsuccessful following telephone research, or the case could not be completed over the telephone, the case was coded as a non-interview.

Non-interviews resulted in 36.4 percent of the telephone workload. The largest outcome category of non-interviews was “Other.” This category represented nearly 20 percent of the telephone center workload and included reasons such as “ring no answer,” “constant busy signal,” “fast busy signal,” and “call can’t be completed as dialed.” The “Refusal” category was the next highest representing more than 5 percent of the workload, followed by the “Unpublished Telephone Number” category with 3.6 percent of the workload. Table 4 displays the non-interview rates for the two sites combined. Table 5 shows the distribution of non-interview cases by site.

If we look at the non-interviews, we see that both sites had around a 14-15 percent refusal rate. New York had a high rate of language barrier problems on the telephone.

**Table 4: Telephone Non-interviews**

Category	Percent	Cumulative Percent
HH moved, did not keep telephone number	0.08	0.08
Privacy detector	0.08	0.16
Part of "Do Not Call Registry"	0.03	0.19
Refusal	5.14	5.33
HH institutionalized	0.17	5.5
Mobile, pay phone, fax, pager	1.24	6.74
Language barrier	2.52	9.26
Unpublished telephone number	3.60	12.86
Incorrect telephone number	2.36	15.22
Insufficient partial	2.31	17.53
Other non-interview	18.87	36.4
Cumulative Percentage		36.4

**Table 5: Telephone Non-interviews, by site**

Category	GA	NY
HH moved, did not keep telephone number	0	0.3
Privacy detector	0.1	0.2
Part of "Do Not Call Registry"	0.1	0.05
Refusal	14.8	13.9
HH institutionalized	0.4	0.5
Mobile, pay phone, fax, pager	4.6	3.0
Language barrier	0.1	9.1
Unpublished telephone number	12.5	9.0
Incorrect telephone number	9.0	5.7
Insufficient partial	9.6	5.32
Other	48.7	52.9

**Personal Visit**

Non-interview telephone cases were assigned to the field for a personal visit and subsequently added to the field visit workload. These cases were considered "recycles." The total field visit workload consisted of 11,021 cases, or 69.6 percent of the total CRFU workload. The overall field workload was 3,029 in the Georgia site and 7,992 in the New York site. About a quarter of the field cases in both sites (22.1 percent in GA and 26.1 percent in NY) were recycled from the telephone operation. Table 6 displays the field workload distribution for each site.

**Table 6: CRFU Field Visit Workload**

	GA	NY
Recycles	670	2087
Straight to Field	2359	5905
Total	3029	7992

Table 7 displays the distribution of the recycled workload by site and reason for inclusion in the CRFU. For the recycled cases in Georgia, 78 percent were in the CRFU as a result of responses to the coverage questions and 19 percent were there as a result of their potential need for unduplication. Just under 88 percent of New York's recycled field cases were from the coverage questions and 11 percent from unduplication.

**Table 7: Recycle Workload**

	Undup	Coverage	Both	Total
GA	128	523	19	670
NY	232	1834	21	2087
Total	360	2357	40	2757

Among the cases that recycled from the telephone operation, 86.1 percent of these cases were completed during the field visit operation. This was considered a great success considering that during Census 2000, there was no field operation during the coverage followup operation, so all telephone non-interviews went unresolved.

Table 8 illustrates the straight to field workload distribution by site and reason for inclusion in the CRFU. For these cases, almost 81 percent in the Georgia site were in the CRFU because of their potential need for unduplication. Fifteen percent of the cases were selected in response to the coverage questions, and 4 percent were in the operation for both reasons. In New York, 74 percent of cases were in the CRFU because of the need for potential unduplication. Twenty-three percent of the cases were selected in response to the coverage questions, and 3 percent were included for both reasons.

**Table 8: Straight to field Workload**

	Undup	Coverage	Both	Total
GA	1906	358	95	2359
NY	4366	1338	201	5905
Total	6272	1696	296	8264

Among Georgia's field workload of 3,029 housing units, 87 percent were completed interviews. We were able to complete almost 86 percent of the 7,992 housing units in the New York site.

The field non-interviews were separated into two categories, occupied and non-occupied. In Georgia, 39 percent of the non-interviews were occupied with 61 percent not occupied. Occupied non-interviews were either refusals or cases in which the respondent was never home when contacted. In New York, just under 34 percent of non-interviews were occupied with 66 percent not occupied. Table 9 contains a distribution of the field non-interviews.

**Table 9: Field Non-interviews**

Non-interview Category	GA	NY
Occupied	155	385
Non-occupied	238	757
Total	393	1142

The unoccupied housing units are a concern since these households were presumably occupied at the time of the initial enumeration, otherwise they would not have been included in the Coverage Research Followup operation. As a result of the non-occupied housing unit, we were unable to determine if the persons enumerated were an accurate reflection of who should have been counted there at the time of the Census. No matter what the reason for the non-interview, occupied or non-occupied, our ability to improve coverage in these households is limited.

Field enumerators contacted CRFU households seven days a week from 9am to 9pm local time. There were a maximum of eight contact attempts made to a household before the case was classified as a non-interview. The majority of interviews were completed between 12pm and 7pm. If a case was not completed during the initial contact, the household was contacted again until the maximum number of attempts was reached. Approximately 34 percent of interviews for field visit interviews, and 25.4 percent for the telephone center interviews were completed during the first contact attempt. Of note, over 75 percent of all cases were completed within four contact attempts. Table 10 shows the distribution of field visit attempts per case to complete an interview.

**Table 10: Field contact attempts**

Contact Attempts	Number Complete Interviews	Percent Complete Interviews	Cumulative Percent
1	3,249	34.3	34.3
2	1,692	17.8	52.1
3	1,377	14.5	66.6
4	1,046	11.0	77.6
5	626	6.6	84.2
6	479	5.1	89.3
7	315	3.3	92.6
8	702	7.4	100.0
Total	9,486		

The distribution of contact attempts was fairly consistent across the telephone and personal visit interviews. Field visit attempts yielded a higher number of completed interviews, thus improving our ability to correct coverage problems.

**Quality Control**

Quality control activities were conducted as part of the 2004 Coverage Research Followup operation. Telephone center interviewers were monitored during interviews by their supervisor/coach. The supervisor/coach listened and assessed the interaction between the interviewer and the respondent to ensure that proper survey procedures were followed, and that proper telephone etiquette and technique were implemented. The supervisor/coach conducted monitoring sessions for a minimum of 2.5 percent of each interviewer’s scheduled work week. Each monitoring session lasted a minimum of 20 minutes and included the interviewer making outgoing calls and/or receiving incoming calls.

A quality control (QC) program was also conducted as part of the field component of the CRFU operation. The QC activities included an initial observation of field enumerators, a questionnaire and office review, and a reinterview. Reinterview served as a QC activity to deter and detect enumerator falsification. For CRFU, there were two types of reinterview: random reinterview and supplemental reinterview. Random reinterview cases were pre-selected by Census Bureau Headquarters staff. Supplemental reinterview cases were the result of an enumerator being suspected of possible falsification. During reinterview, a reinterview enumerator (separate staff from the production enumerators), attempted to complete the case. If the respondent indicated they had been contacted, the reinterview enumerator thanked the

respondent and ended the interview. However, if the respondent indicated they were not contacted by a production enumerator or were not sure whether they were contacted, the reinterview enumerator conducted a full replacement interview.

Of the 11,021 field cases, 1,336 were preselected for random reinterview, of which 972 (about 9 percent of the production workload) were actually completed. In 897 (92 percent) of the completed cases, the respondent reported being contacted. In the remaining 75 (about 8 percent) cases, the respondent either was not contacted or did not recall whether he/she was contacted. The majority of incomplete reinterview cases were due to the case being rendered ineligible for reinterview. For example, when a housing unit was found to be outside the block to which the enumerator was assigned. (Marquette, 2005).

### Conclusions

The questions in the CRFU interview were asked in an attempt to identify whether respondents correctly included people on the household roster. This research was conducted to give us insight into the number of people that could be added through the undercount coverage questions in the future and the proportion of these people who would correctly be added to the household. In addition, we may be able to reduce overcoverage by following up with potential duplicates found through computer matching. Furthermore, we may discover improvements in the content and the way we present the residence rules instructions and coverage questions on the census questionnaire.

The 2004 CRFU operation was successful at contacting and completing interviews, especially using field visits. Overall, CRFU enumerators and telephone interviewers completed 14,301 interviews out of a workload of 15,835 resulting in an overall completion rate of 90 percent. Field visit interviews accounted for 66 percent of the completed cases, which effectively increased our ability to resolve person duplicates caused by housing unit problems such as form misdelivery or housing unit duplication.

The average workload for field interviewers was 25.45 cases in Georgia and 11.18 cases in New York at an average cost per case of \$89.37 in Georgia and \$78.69 in New York. We attribute the difference in average workload to high turnover rates in the New York site. Traditionally, telephone interviews are less expensive than field visits. However, field visit interviews give us the ability to complete more interviews in order to improve census coverage.

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