

The United States Postal Service Undeliverable Rates for Census 2000 MailOut Questionnaires

FINAL REPORT

This evaluation reports the results of research and analysis undertaken by the U.S. Census Bureau. It is part of a broad program, the Census 2000 Testing, Experimentation, and Evaluation (TXE) Program, designed to assess Census 2000 and to inform 2010 Census planning. Findings from the Census 2000 TXE Program reports are integrated into topic reports that provide context and background for broader interpretation of results.

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EXECUTIVE SUMMARY

In Census 2000, the questionnaire mailout/mailback enumeration method was the primary means of census-taking. Cities, towns, and suburban areas with city-style addresses (house number and street name) as well as rural areas where city-style addresses are used for mail delivery comprised the mailout/mailback areas.

The United States Postal Service was the primary vehicle for delivering census questionnaires. Based on the Decennial Master Address File, the Census Bureau mailed questionnaires on March 13-15, 2000 to about 96 million housing units in areas designated as being mailout/mailback. Questionnaires that were undeliverable were called undeliverable as addressed. Since this study of questionnaires concerns undeliverability by the United States Postal Service, only mailout/mailback housing units are included.

The Undeliverable as Addressed questionnaires were routed back through the United States Postal Service and returned for check-in at the Local Census Office until March 18, 2000. The Census 2000 Local Census Office re-delivery operation for Undeliverable as Addressed questionnaires took place in pre-selected ZIP codes and was conducted by specially trained enumerators. By re-delivering questionnaires identified as “Undeliverable as Addressed” in areas where they were clustered, the Census Bureau sought to efficiently boost response by getting questionnaires back into the hands of the households early in the mail response period. Another purpose of the re-delivery operation was to address geographic clustering of undeliverable as addressed questionnaires.

Addresses remaining Undeliverable as Addressed after the United States Postal Service delivery and census re-delivery were included in the nonresponse followup workload. During nonresponse followup many Undeliverable as Addressed housing units were enumerated as occupied households. Housing units delivered a questionnaire either by the United States Postal Service or the Census re-delivery could have been returned by mail. Those not returned by mail were also included in nonresponse followup and many of these were thus also enumerated as occupied housing units.

The major objectives of this study are to examine the decrease in undeliverable housing units as a result of the re-delivery operation and to study relationships between Undeliverable as Addressed status and demographic data.

Limitations of the Study

- The study was limited to 96 million mailout/mailback housing units out of 126 million addresses in the Decennial Master Address File. These are in the Mailout/Mailback and Military in Update/Leave Type of Enumeration areas as indicated on census files after the census.

- Addresses that were in Mailout/Mailback and Military areas which were converted to other enumeration areas after mailout are not included in this analysis. Therefore, the number of addresses reported in this document as undeliverable by the United States Postal Service and involved in the Local Census Office delivery operation is lower than the actual workloads.
- The demographic study is limited to housing units enumerated as occupied as well as those that were imputed occupied or had imputed characteristics. Imputed data were included since the logistic regression modeling requires demographic data from all target housing units some of which will have some of their demographic data imputed.

Key findings of the Study

- Nationwide, the Census Bureau delivered to nearly 600,000 occupied housing units in the re-delivery operation.
- Age of the householder, tenure, and the size of the household are the best predictors of United States Postal Service delivery.
- Minority households were more likely to be in Local Census Offices selected for the re-delivery operation than non-minority households.
- For United States Postal Service Undeliverable as Addressed units for which re-delivery was attempted, non-minority households were more likely to have a successful re-delivery than minority households.

1. BACKGROUND

In the 1990 Census, the United States Postal Service (USPS) was the primary vehicle for delivering census questionnaires. Based on a master address list, the Census Bureau mailed questionnaires to about 86.2 million housing units in areas designated as being mailout/mailback. Questionnaires that were undeliverable were called postmaster returns (PMR) in the 1990 Census. The PMR questionnaires were routed back through the USPS and returned for check-in. The PMR cases were treated in the same manner as regular nonresponse followup (NRFU) cases. The field in the Census data files which was intended to indicate addresses checked in as a PMR proved to be an unreliable source of information. Hence, there was no 1990 census study similar to this one.

In Census 2000, the questionnaire mailout/mailback enumeration method was the primary means of census-taking. Cities, towns, and suburban areas with city-style addresses (house number and street name) as well as rural areas where city-style addresses are used for mail delivery comprised the mailout/mail back areas.

The United States Postal Service was the primary vehicle for delivering census questionnaires. Based on the Decennial Master Address File (DMAF), the Census Bureau mailed questionnaires on March 13-15, 2000 to about 96 million housing units in areas designated as being mailout/mailback. Questionnaires that were undeliverable were called undeliverable as addressed (UAA). Since this study of undeliverable as addressed questionnaires concerns undeliverability by the USPS, only mailout/mailback housing units are included.

The Census Bureau used a mail strategy consisting of multiple contacts for Census 2000 in mailout/mailback areas. These contacts were:

- ▶ An advance notice letter to every mailout address that informed householders that the census form would be sent to them soon.
- ▶ A questionnaire to every mailout address.
- ▶ A postcard to every mailout address that served as a thank you for respondents who had mailed back their questionnaire or as a reminder to those who had not.

Between March 13 and March 15, 2000 the USPS letter carriers delivered census questionnaires to residential addresses (Gloster, 2000). If the USPS was unable to deliver a questionnaire, that address was designated a UAA. The possible reasons for USPS UAA status were incorrect Zone Improvement Program (ZIP) code, vacant, demolished or non-existent units, lack of residential delivery in the area, and a refusal of mail package. An in-depth study of these reasons is described in an evaluation discussed in Chesnut (2001).

During November 1999, the Field Division (FLD) with assistance of the Decennial

Statistical Studies Division (DSSD), selected ZIP codes serviced by the various USPS Sectional Center Facilities (SCFs) that were likely to have high numbers of UAAs. This was done by using a USPS computer program that matched the DMAF with the USPS address file to identify DMAF addresses that were deemed unrecognizable by the USPS. The counts of these potential UAA addresses were then tabulated by ZIP code and SCF. In addition, DSSD files containing 1) 1990 county vacancy rates and 2) housing unit counts that have only PO Box delivery were used to forecast UAA status by ZIP code. The FLD and DSSD staff set a threshold of 52,000 potential UAA addresses contained by a ZIP code for the ZIP code to be included in the Local Census Office (LCO) Re-delivery operation. After this analysis, the USPS was given a list of 7,563 ZIP codes covered by 72 USPS SCFs that were to be included in the LCO Re-delivery operation.

From March 13 - 18, UAA questionnaires brought back by letter carriers were gathered by USPS personnel at the nearest USPS SCF where the questionnaires were sorted by ZIP code and held in postal trays. On March 18, LCO personnel, from the 317 LCOs in the Re-delivery operation, retrieved the UAAs from the closest SCF. Only questionnaires from pre-selected ZIP codes were retrieved. These questionnaires were brought into the LCO for "Check-In" as LCO UAA Re-delivery questionnaires. The remainder of the UAA questionnaires at the SCFs (those not in the pre-selected ZIP codes) were returned by the USPS directly to the National Processing Center (NPC) for "NPC Only Check-In".

From March 23, 2000 to April 7, 2000, trained LCO enumerators used commercial street maps to attempt delivery of a plastic bag containing the UAA questionnaire to the doorknob of the housing unit to which the questionnaire was addressed. If a re-delivery was unsuccessful the UAA packet was returned to the LCO where it was "Checked-Out" of the LCO and shipped to the NPC for "NPC Check-In". Therefore, UAA packets that were successfully re-delivered by LCO enumerators did not receive a LCO Check-Out nor did they receive a NPC Check-In.

Any questionnaire delivered by the USPS or in the Census re-delivery operation may or may not have been returned by mail. Those not returned by mail were included in nonresponse followup. Any questionnaires that were sent to the NPC as a final UAA were also included in nonresponse followup. Thus any of these housing units could end up enumerated as occupied either by mail (if delivered) or nonresponse followup (if final UAA).

It is not the focus of this report to evaluate the effectiveness of the process of designating Local Census Offices for the re-delivery operation in terms of including a large percentage of Postal Undeliverable as Addressed units. As mentioned above some units are excluded from the numbers in this report and in addition there were logistical problems with the operation performed by the United States Postal Service. These problems resulted in the exclusion from the re-delivery operation of undeliverable as addressed units that were legitimately in targeted Local Census Offices. In addition there were budget restrictions on the workload that would be supported for the re-delivery operation.

The re-delivery operation instructions called for just looking for a doorknob to leave the questionnaire and did not include delivery to vacant units. This is much different than the nonresponse followup operation for which enumerators knock on doors making every attempt to obtain a respondent to provide a successful interview. It is important to note this when looking at the proportion of attempted re-deliveries that were successful. Some of the unsuccessful attempts are due to difficulty in identifying vacants.

Purposes of this evaluation:

- Determine how much (if any) the UAA rates from the United States Postal Service were decreased by the Census LCO Re-delivery operations.
- Examine differences in UAA rates by state and form type.
- Examine the final occupied/vacant/delete/kill distribution for UAA cases.
- Examine tenure and, if occupied, demographic data for the head of household (race, sex, age, Hispanic Origin) and household size for UAA units.

UAA Rates

- Postal UAA rate - The number of census forms deemed UAA by the USPS divided by the total number of Census forms in the USPS mail delivery.
- Census UAA rate - The number of census forms deemed UAA by the USPS minus the number of forms successfully re-delivered by LCO enumerators divided by the total number of Census forms in the USPS mail delivery.

Note that the re-delivery operation was not attempted in all LCOs. For these LCOs the Postal UAA rate and the Census UAA rate are equal. Some states had no LCOs with a re-delivery operation.

2. METHODOLOGY

The Decennial Master Address File (DMAF) (see Attachment 1) was used to calculate UAA rates. For occupied housing units including imputes, the householder demographic characteristics were obtained from the Hundred percent Census Edited File (HCEF) by linking with the DMAF using the housing unit identifier (see Attachment II). A combination of fields were used to determine if a given housing unit was in the mailout/mailback universe and therefore assigned to be mailed a questionnaire. Housing units added to the DMAF in operations following the mailout were excluded from this universe and the UAA rate calculations since no attempt was made to deliver questionnaires to them until after the mailout period. Specifically, to be considered in this study, a DMAF housing unit (excluding group quarters) address must have been in the

mailout/mailback areas and have a complete address. (Stackhouse, 2001). This yielded exactly 96,184,164 addresses (see Tables 1 and 3).

The denominator of both rates (Postal UAA and Census UAA) includes all housing units (excluding group quarters) in the Mailout/Mailback and Military in Update Leave Type of Enumeration Areas (TEA) except those housing units excluded from mail delivery due to incomplete address information.

A housing unit qualifies for the numerator of the postal UAA rate if it is a member of the denominator and also has been classified as a USPS UAA housing unit.

For the Census UAA rate, a housing unit qualifies for the numerator if it is a member of the denominator and it remains a UAA after the re-delivery operation.

$$\textit{Postal UAA Rate} = \frac{A}{B}$$

where

A = number of housing units classified as a UAA housing unit by the USPS and
B = number of housing units for which the USPS attempted delivery.

$$\textit{Census UAA Rate} = \frac{C}{B}$$

where

C = number of housing units initially classified UAA by the USPS minus those successfully delivered by LCO personnel in the re-delivery operation and
B = number of housing units for which the USPS attempted delivery.

The Census Bureau UAA re-delivery operation was not implemented in all the LCOs. The Census Bureau produced the expected work load of UAAs by Zip Code (as noted above). If a LCO had one or more Zip Codes with a high workload, it was designated a lead LCO and the UAA re-delivery operation was implemented. If a Zip Code was overlapping in two or more LCOs and at least one of them was a lead LCO, then the entire Zip Code was part of the UAA operation in one of these lead LCOs. In all, 317 out of 520 LCOs comprising 7,563 Zip Codes were in the re-delivery operation.

Finally, we examine demographic data for the 84,955,317 (see Table 3 UAA Study Total) occupied housing units eligible for the UAA study with three logistic regression models described below (sex, age, Hispanic Origin, and minority (non-White) race are based on the householder).

The minority and non-minority counts were obtained with the aid of the variable Race Edit/Allocation Group (QRACEX) from the Hundred Percent Census Edited File (HCEF). This variable, allocates each person to one (and only one) of six major race groups. If the respondent has more than one race response, an algorithm randomly allocates the respondent to one of these six groups.

Model I: For all occupied housing units; n=84,955,317

$$PostalUAA = \beta_0 + \beta_1 30hh + \beta_2 tenure + \beta_3 sex + \beta_4 hisp + \beta_5 min + \beta_6 oneper + \varepsilon$$

Where:

$$PostalUAA = \begin{cases} 1 & \text{if } hu \text{ is a USPS successful delivery} \\ 0 & \text{if } hu \text{ is a USPS UAA} \end{cases}$$

$$30hh = \begin{cases} 1 & \text{if } hh \text{ is under 30 years} \\ 0 & \text{otherwise} \end{cases}$$

$$tenure = \begin{cases} 1 & \text{if owner} \\ 0 & \text{otherwise} \end{cases}$$

$$sex = \begin{cases} 1 & \text{if male} \\ 0 & \text{if female} \end{cases}$$

$$hisp = \begin{cases} 1 & \text{if hispanic} \\ 0 & \text{if non - hispanic} \end{cases}$$

$$min = \begin{cases} 1 & \text{if minority} \\ 0 & \text{otherwise} \end{cases}$$

$$oneper = \begin{cases} 1 & \text{if one person household} \\ 0 & \text{otherwise} \end{cases}$$

Model II: For USPS UAA occupied units only; n=2,472,735

$$ZipUAA = \beta_0 + \beta_1 30hh + \beta_2 tenure + \beta_3 sex + \beta_4 hisp + \beta_5 min + \beta_6 oneper + \varepsilon$$

Where

$$ZipUAA = \begin{cases} 1 & \text{if LCO attempted delivery} \\ 0 & \text{if LCO did not attempt delivery} \end{cases}$$

Model III: For USPS UAA occupied units that were in Zip Codes selected for LCO re-delivery operation only; n=906,021

$$CenUAA = \beta_0 + \beta_1 30hh + \beta_2 tenure + \beta_3 sex + \beta_4 hisp + \beta_5 min + \beta_6 oneper + \varepsilon$$

Where

$$CenUAA = \begin{cases} 1 & \text{if LCO delivered} \\ 0 & \text{if LCO attempted but did not deliver} \end{cases}$$

Odds Ratios

When a logistic regression model is fit to data, the estimated coefficient for each independent variable can be used to obtain the odds ratio. Consider for example the variable tenure. The estimated coefficient for tenure is the natural logarithm of the odds ratio for tenure. Exponentiating the regression coefficient yields an estimate of the odds ratio. The closer the odds ratio is to 1, the less important the independent variable is in predicting successful delivery by the USPS (for Model 1). This means that owners and renters are equally likely to have their questionnaire delivered by the USPS. Thus, in this case, tenure would not be a useful predictor for USPS delivery.

Consider the reciprocal odds ratios of 2 and 1/2. These odds have the same magnitude but differ in their interpretations. An odds ratio of 2 for tenure means that the odds of USPS delivery are 2 times higher for owners than renters. In contrast, an odds ratio of 1/2 means that the odds of USPS delivery are 50 percent lower for owners than renters. Both odds ratios indicate that the odds of USPS delivery are twice as large for a housing unit with one value of the variable when compared to a housing unit with the opposite value. However, the conclusions for reciprocal odds ratios go in opposite directions.

Files

A cross tabulation of the Decennial Master Address File (DMAF) with the HCEF (Attachment 2) was used to determine these rates. A list of the variables used in this tabulation is listed below:

- Type of the Enumeration Area (TEA)
- UAA
- Form Type (ASAM)
- Group Quarter Flag (gqflg; group quarter persons excluded)
- Non-Response Universe (nru; to exclude units added to DMAF after mailout)
- Duplicates (DUP)
- Age (QAGE)
- Race (QRACEX)
- Sex (QSEX)
- Hispanic (QSPANX)
- State (ST)
- Tenure (STENURE)

A detailed definition of these variables can be found in the attachments to this document.

3. LIMITATIONS

- The study was limited to 96 million mailout/mailback housing units out of 126 million addresses in the Decennial Master Address File.
- Addresses that were in Mailout/Mailback and Military areas which were converted to other enumeration areas after mailout are not included in this analysis. Therefore, the number of addresses reported in this document as undeliverable by the United States Postal Service and involved in the Local Census Office delivery operation is lower than the actual workloads.
- The demographic study is limited to housing units enumerated as occupied as well as those that were imputed occupied or had imputed characteristics. Imputed data were included since the logistic regression modeling requires demographic data from all target housing units some of which will have some of their demographic data imputed

4. RESULTS

Table 1 shows a summary of the UAA Re-Delivery operation at the national level.

Table 2 shows the overall (short and long forms together), short form, and long form Postal UAA rates at the state level and also shows the same three rates for Census UAAs.

Tables 3 and 4 described below have four components as follows:

1. USPS Delivered
2. USPS UAA; LCO successfully Re-Delivered
3. USPS UAA; LCO Undeliverable
4. USPS UAA; LCO Did Not Attempt Delivery

Table 3 shows the housing unit inventory by final occupancy status at the national level for these four components.

Tables 4A through 4F , show demographic characteristics of occupied housing units for these four components.

- Table 4A: Tenure
- Table 4B: Race of Householder
- Table 4C: Sex of Householder
- Table 4D: Age of Householder
- Table 4E: Hispanic Origin of Householder
- Table 4F: Household Size

Tables 5A through 5C, show the results of the logistic regression for models I, II and III.

Table 1. Summary of UAA re-delivery operation: national level¹

Status	Number	Percent	
a. UAA Study Total*	96,184,164	100.0%	
b. USPS Delivered	87,428,262	90.9%	
c. USPS UAAs	8,755,902	9.1%	←Postal UAA Rate
d. USPS UAA; LCO Successfully Re-delivered	1,420,760	1.5%	
e. USPS UAA; LCO Undeliverable	1,947,781	2.0%	
f. USPS UAA: LCO did not Attempt Delivery	5,387,361	5.6%	
g. Census UAAs (c. minus d.) or (e. plus f.)	7,335,142	7.6%	←Census UAA Rate

* Mailout/Mailback Universe excluding incomplete addresses

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts. This effects c. thru g.

Table 2. Overall, short and long form postal and census UAA percentages¹

State	Overall Postal	Short Form Postal	Long Form Postal	Overall Census	Short Form Census	Long Form Census
AL	13.5%	13.4%	14.0%	10.5%	10.4%	11.1%
AK*	19.4%	19.3%	20.0%	19.4%	19.3%	20.0%
AZ	10.3%	10.3%	10.1%	6.7%	6.7%	6.5%
AR	12.3%	12.2%	12.7%	11.9%	11.8%	12.2%
CA	6.3%	6.2%	6.5%	5.4%	5.4%	5.7%
CO	6.5%	6.6%	6.4%	5.6%	5.6%	5.7%
CT	8.7%	8.8%	8.4%	8.7%	8.8%	8.4%
DE	11.5%	11.2%	13.1%	6.6%	6.4%	7.3%
DC*	10.8%	10.8%	10.4%	10.8%	10.8%	10.4%
FL	10.2%	10.2%	10.4%	6.5%	6.4%	6.8%
GA	10.3%	10.2%	11.0%	8.9%	8.8%	9.4%
HI	8.9%	8.7%	10.0%	6.8%	6.6%	7.9%
ID	13.7%	13.0%	17.1%	12.6%	11.9%	16.1%
IL	8.0%	7.9%	8.8%	7.7%	7.6%	8.4%
IN	10.9%	10.9%	10.9%	10.4%	10.4%	10.6%
IA*	9.0%	8.8%	10.2%	9.0%	8.8%	10.2%
KS	9.9%	9.7%	11.0%	9.9%	9.7%	11.0%
KY	10.4%	10.5%	10.3%	10.0%	10.0%	9.8%
LA	11.5%	11.5%	11.6%	11.0%	10.9%	11.1%
ME	14.0%	14.1%	13.5%	14.0%	14.1%	13.5%
MD	9.0%	8.9%	9.3%	9.0%	8.9%	9.3%
MA	8.0%	8.0%	8.0%	6.4%	6.4%	6.3%
MI	9.1%	8.9%	9.8%	6.9%	6.8%	7.4%
MN	6.6%	6.4%	7.8%	6.6%	6.4%	7.8%
MS	12.7%	12.7%	12.8%	12.5%	12.4%	12.6%
MO	9.9%	9.8%	10.3%	8.8%	8.7%	9.3%
MT*	8.0%	7.8%	9.3%	8.0%	7.8%	9.3%
NE*	7.6%	7.5%	7.9%	7.6%	7.5%	7.9%
NV	7.9%	7.9%	8.1%	5.3%	5.3%	5.6%
NH	10.7%	10.7%	11.0%	7.4%	7.4%	7.8%
NJ	8.8%	8.6%	9.7%	5.6%	5.5%	6.2%
NM	10.7%	10.6%	11.1%	9.8%	9.7%	10.3%
NY	7.0%	7.0%	7.2%	6.3%	6.2%	6.4%
NC	10.2%	10.1%	10.8%	9.6%	9.5%	10.3%
ND	9.9%	10.0%	9.1%	9.9%	10.0%	9.1%
OH	9.2%	9.1%	9.7%	7.5%	7.4%	8.0%
OK	11.8%	11.7%	12.4%	9.2%	9.1%	9.7%
OR	12.5%	12.2%	14.5%	11.4%	11.0%	13.5%
PA	10.2%	10.1%	10.8%	9.1%	9.0%	9.6%
RI	8.2%	8.2%	7.6%	4.1%	4.1%	4.0%
SC	15.8%	15.7%	16.3%	12.3%	12.2%	13.1%
SD	9.4%	9.2%	10.2%	9.4%	9.2%	10.2%
TN	10.0%	10.0%	10.6%	7.6%	7.5%	8.3%
TX	8.7%	8.6%	9.1%	6.8%	6.7%	7.3%
UT	8.2%	8.2%	8.3%	6.6%	6.6%	6.8%
VT*	12.6%	12.7%	11.6%	12.6%	12.7%	11.6%
VA	6.1%	6.1%	6.4%	5.3%	5.3%	5.7%
WA	11.7%	11.4%	13.0%	10.1%	9.9%	11.5%
WV	12.8%	12.9%	12.1%	12.8%	12.9%	12.1%
WI	10.7%	9.6%	14.4%	8.2%	7.2%	11.6%
WY*	14.9%	14.8%	15.5%	14.9%	14.8%	15.5%
US	9.1%	9.0%	9.7%	7.6%	7.5%	8.2%

* Indicates a state which had no postal UAAs in the re-delivery operation.**

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

Table 3. Distribution of housing units by final occupancy status¹

	Status	Count	Percent
USPS Delivered	Occupied	82,482,582	94.3%
	Vacant	2,678,665	3.1%
	Delete	739,593	0.9%
	Kill	1,527,422	1.7%
	Total	87,428,262	100.0%
USPS UAA; LCO Successfully Re-Delivered	Occupied	581,019	40.9%
	Vacant	721,081	50.8%
	Delete	26,223	1.8%
	Kill	92,437	6.5%
	Total	1,420,760	100.0%
LCO Undeliverable	Occupied USPS UAA;	325,002	16.7%
	Vacant	641,546	32.9%
	Delete	24,510	1.3%
	Kill	956,723	49.1%
	Total	1,947,781	100.0%
USPS UAA; LCO Did not Attempt Delivery	Occupied	1,566,714	29.1%
	Vacant	2,129,467	39.5%
	Delete	76,663	1.4%
	Kill	1,614,517	30.0%
	Total	5,387,361	100.0%
UAA Study Total	Occupied	84,955,317	88.3%
	Vacant	6,170,759	6.4%
	Delete	866,989	0.9%
	Kill	4,191,099	4.4%
	Total	96,184,164	100.0%

*

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

Table 4A. Occupied housing units classified by tenure¹

	Tenure	Count	Percent
USPS Delivered	Renter	29,936,227	36.2%
	Owner	52,546,355	63.8%
USPS UAA; LCO Successfully Re-Delivered	Renter	281,226	48.4%
	Owner	299,793	51.6%
USPS UAA; LCO Undeliverable	Renter	176,444	54.2%
	Owner	148,558	45.8%
USPS UAA; LCO did not Attempt Delivery	Renter	736,683	47.0%
	Owner	830,031	53.0%
UAA Study Total	Renter	31,130,580	36.6%
	Owner	53,824,737	63.6%

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

Table 4B. Occupied housing units by race of householder¹

AIAN: American Indian Alaska Native; NHPI: Native Hawaiian Pacific Islander

	Race	Count	Percent
USPS Delivered	White	64,434,357	78.1%
	Black	10,474,986	12.7%
	AIAN	624,365	0.7%
	Asian	3,098,682	3.8%
	NHPI	133,745	0.2%
	Other	3,716,447	4.5%
USPS UAA; LCO successfully Re-Delivered	White	456,408	78.5%
	Black	75,526	13.0%
	AIAN	5,133	0.9%
	Asian	14,356	2.5%
	NHPI	1,233	0.2%
	Other	28,363	4.9%
USPS UAA; LCO Undeliverable	White	227,825	70.1%
	Black	62,142	19.1%
	AIAN	2,442	0.7%
	Asian	12,322	3.8%
	NHPI	1,179	0.4%
	Other	19,092	5.9%
USPS UAA; LCO did not attempt delivery	White	1,261,637	80.5%
	Black	177,922	11.4%
	AIAN	17,293	1.1%
	Asian	34,796	2.2%
	NHPI	1,846	0.1%
	Other	73,220	4.7%

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

Table 4B (continued) UAA Study Total	White	66,380,227	78.1%
	Black	10,790,576	12.7%
	AIAN	649,233	0.8%
	Asian	3,160,156	3.7%
	NHPI	138,003	0.2%
	Other	3,837,122	4.5%

Table 4C. Occupied housing units by sex of householder¹

	Sex	Count	Percent
USPS Delivered	Male	51,558,333	62.5%
	Female	30,924,249	37.5%
USPS UAA; LCO Successfully Re-Delivered	Male	362,671	62.4%
	Female	218,348	37.6%
USPS UAA; LCO Undeliverable	Male	194,190	59.8%
	Female	130,812	40.2%
USPS UAA; LCO did not attempt Delivery	Male	976,966	62.4%
	Female	589,748	37.6%
UAA Study Total	Male	53,092,160	62.5%
	Female	31,863,157	37.5%

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

Table 4D. Occupied housing units by age of householder¹

	Age	Count	Percent
USPS Delivered	0-17	32,829	0.0%
	18-29	11,077,312	13.4%
	30-49	35,782,614	43.4%
	50+	35,589,827	43.2%
USPS UAA; LCO Successfully Re-Delivered	0-17	790	0.1%
	18-29	117,394	20.2%
	30-49	209,118	36.0%
	50+	253,717	43.7%
USPS UAA; LCO Undeliverable	0-17	420	0.1%
	18-29	65,432	20.2%
	30-49	129,473	39.8%
	50+	129,677	39.9%
USPS UAA; LCO did not attempt delivery	0-17	2,321	0.1%
	18-29	299,569	19.1%
	30-49	574,159	36.7%
	50+	690,665	44.1%
UAA Study Total	0-17	36,360	0.1%
	18-29	11,559,707	13.6%
	30-49	36,695,364	43.2%
	50+	36,663,886	43.1%

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

Table 4E. Occupied housing units by Hispanic origin of householder¹

	Origin	Count	Percent
USPS Delivered	Non-Hisp	74,474,151	90.3%
	Hisp	8,008,431	9.7%
USPS UAA; LCO Successfully Re-Delivered	Non-Hisp	523,873	90.2%
	Hisp	57,146	9.8%
USPS UAA; LCO Undeliverable	Non-Hisp	289,240	89.0%
	Hisp	35,762	11.0%
USPS UAA; LCO did not attempt Delivery	Non-Hisp	1,438,828	91.8%
	Hisp	127,886	9.1%
UAA Study Total	Non-Hisp	76,726,092	90.3%
	Hisp	8,229,225	9.7%

¹ The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

Table 4F. Occupied housing units by household size¹

	HH Size	Count	Percent
USPS Delivered	1	21,682,863	26.3%
	2	26,295,621	32.0%
	3	13,614,894	16.5%
	4	11,736,489	14.2%
	5	5,488,738	6.7%
	6	2,127,977	2.6%
	7	770,058	0.9%
	8	363,880	0.4%
	9	178,595	0.2%
	10	100,420	0.1%
	11+	123,047	0.1%
USPS UAA; LCO successfully Re-Delivered	1	205,947	35.4%
	2	207,263	35.6%
	3	74,456	12.8%
	4	52,667	9.1%
	5	24,722	4.3%
	6	9,334	1.6%
	7	3,448	0.6%
	8	1,580	0.3%
	9	693	0.1%
	10	401	0.1%
	11+	508	0.1%
USPS UAA; LCO Undeliverable	1	116,277	35.8%
	2	105,723	32.5%
	3	44,283	13.6%
	4	32,166	9.9%
	5	15,881	4.9%

Continue Table 4F on next page

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

	6	6,192	1.9%
	7	2,251	0.7%
	8	1,160	0.4%
	9	483	0.1%
	10	284	0.1%
	11+	302	0.1%
<hr/>			
	1	536,546	34.2%
	2	557,223	35.5%
	3	207,974	13.3%
	4	151,919	9.7%
	5	70,797	4.5%
	6	24,783	1.6%
USPS UAA; LCO did not attempt Delivery	7	9,440	0.6%
	8	4,021	0.3%
	9	1,929	0.1%
	10	1,028	0.1%
	11+	1,054	0.1%
<hr/>			
	1	22,541,633	26.5%
	2	27,165,830	32.2%
	3	13,941,607	16.4%
	4	11,972,241	14.1%
	5	5,600,138	6.6%
UAA Study Total	6	2,168,286	2.5%
	7	785,197	0.9%
	8	370,641	0.4%
	9	181,700	0.2%
	10	102,133	0.1%
	11+	124,911	0.1%
<hr/>			

Table 5A. Model I: Success of USPS delivery of census forms¹

Effect	Definition of Odds Ratio	Estimated Odds Ratio
Under 30 years	over 30 / under 30	1.36
Tenure	renter / owner	0.66
Sex	male / female	0.88
Hispanic	Non-Hisp. / Hisp.	0.87
Minority	Non-Min. / Min.	0.90
One person Household	More than 1 / 1	1.41

Table 5B. Model II: Attempted LCO re-delivery operation for USPS UAA forms¹

Effect	Definition of Odds Ratio	Estimated Odds Ratio
Under 30 years	over 30 / under 30	1.00
Tenure	renter / owner	1.07
Sex	male / female	0.99
Hispanic	Non-Hisp. / Hisp.	0.85
Minority	Non-Min / Min.	0.77
One person Household	More than 1 / 1	0.93

Table 5C. Model III: Successful LCO re-delivery of USPS UAA forms¹

Effect	Definition of Odds Ratio	Estimated Odds Ratio
Under 30 years	over 30 / under 30	0.87
Tenure	renter / owner	0.83
Sex	male / female	1.06
Hispanic	Non-Hisp. / Hisp.	0.99
Minority	Non-Min / Min.	1.48
One person Household	More than 1 / 1	0.98

¹The actual number of units in the re-delivery operation was higher due to changes in TEA after mailout. About 1.8 million UAAs that were included in the delivery operation were converted to other TEAs and excluded from these counts.

5. ANALYSIS AND RECOMMENDATIONS

Table 1 shows that at the national level the Postal UAA rate was 9.1 percent and the Census UAA rate was 7.6 percent. Of about 8.8 million USPS UAAs the Census re-delivery was attempted on about 3.4 million. This does not, however, indicate the degree of success in the targeting of LCO's for the re-delivery operation. As detailed in the limitations section of the Executive Summary, there are several reasons why UAAs in LCO's targeted for re-delivery were excluded from re-delivery. About 1.8 million UAAs are excluded from this analysis due to a change in TEA due to geo-coding error. This report only tabulates UAAs in mailout/mailback and Military in Update Leave TEAs based on the final census files.

The re-delivery operation selected ZIP codes based on the 1990 Census county vacancy rates. If targeting of areas for a re-delivery is used in the future, use of administrative records should be explored as a possible source to help predict areas with a high concentration of UAAs.

A detailed analysis of the re-delivery operation can be found in the report "Analysis of the Local Census Office Delivery Operation of Questionnaires determined Undeliverable As Addressed by the United States Postal Service" that the Decennial Statistical Studies Division is preparing.

Table 2 shows that there is little difference between Short and Long form postal UAA rates for most states, i.e., the percent of housing units that receive short forms that were UAAs is almost the same as its counterpart of housing units that received long forms in most of the states (exceptions are Idaho where the difference was 4.1 percentage points and Wisconsin where the difference was 4.8 percentage points). In the Census UAA rates there is also very little difference between the short and long form rates (exceptions are again Idaho where the difference was 4.2 percentage points and Wisconsin where the difference was 4.4 percentage points). Note that for both states (Idaho and Wisconsin) that are exceptions the difference in UAA rate between short and long forms are about the same for postal UAA and Census UAA rates.

However, comparing the two types of UAA rates, we can see that in some instances the census re-delivery operation after the USPS UAA designation was highly successful. For example (see Table 2), the overall rate in Florida went from 10.2 percent to 6.5 percent, that is, a 36.3 percent conversion from UAA to deliverables. In California the UAA rate went from 6.3 percent to 5.4 percent a 14.3 percent decrease in the rate after the Census re-delivery operations took place and in Rhode Island the census personnel converted 50 percent of the USPS UAAs. Since some LCOs did not attempt re-delivery, the Census re-delivery in the LCOs that did re-deliver was probably more successful than these rates indicate.

In other cases however, there were no changes at all between the two rates. For example in the state of Connecticut the USPS rate was 8.7 percent and the census rate was exactly the same. In the District of Columbia the rate also remained unchanged. In fact, in 15 states the USPS rate and the Census rate are the same. Based on the UAA code on the DMAF, seven of these states (indicated by a * in Table 2) had no UAAs in the re-delivery operation and for the other eight the percentage of UAAs in the re-delivery operation ranges from 0.002 percent to 0.13 percent.

Most occupied housing units were delivered by the USPS (82.5 million out of about 85.0 million in the applicable universe; see Table 3). Of the almost 2.5 million occupied postal UAAs, about 1.6 million were not in the re-delivery operation. Of the 0.9 million that were in the re-delivery operation, re-delivery was successful for 0.6 million.

The ratio of owner to renters for USPS delivered units was about 1.76 to one (52,546,355 / 29,936,227). For all Postal UAAs the ratio of owners to renters was about 1.07 to 1 ((299,793 + 148,558 + 830,031) / (281,226 + 176,444 + 736,683)). For all occupied housing units included in this study, the ratio of owners to renters was about 1.73 to 1 (53,824,737 / 31,130,580). (See Table 4A).

The race of householder (see Table 4B) distributions show some differences over the four components of delivery. The component USPS UAA; LCO Undeliverable has a lower percent white (70.1 percent compared with close to 80 percent) and a higher percent black (19.1 percent compared with about 11 percent to 13 percent) than the other three components.

Sex, Age and Hispanic Origin (of householder, see Tables 4C, 4D and 4E) distributions do not show any notable differences by UAA classification.

The percentage of USPS delivered housing units that were single person households (about 26 percent) was smaller than for housing units not delivered by the USPS (about 35 percent). (See Table 4F).

Note that for all these tables (4A-4F), the percentage distribution for the USPS Delivered component is very similar to the UAA Study total distribution. This is due to the fact that about 82.5 million of the nearly 85 million occupied housing units in the UAA study were USPS delivered.

Examining the odds ratio analysis for model I (table 5A), age of the householder, tenure, and the size of the household show higher odds that the USPS successfully delivered than the other characteristics. First, if the householder was older than 30 years, the odds of the USPS delivering a questionnaire are 36 percent higher than for the USPS to deliver questionnaires to householders under 30. Second, if the householder owned the housing unit, the odds of the USPS delivering a questionnaire are 50 percent (1/.66)

higher than the USPS delivering to renter-occupied units. Finally, if the housing unit had more than one person, the odds of the USPS delivering a questionnaire are 41 percent higher than for the USPS to deliver to units with only one person. The odds ratios for Hispanic and Minority are not far from one; however it is worth noting that these ratios indicate that Non-Hispanics and Non-Minorities have slightly LOWER odds of successful USPS delivery than Hispanics and Minorities, respectively. Perhaps, if a re-delivery operation is done in the future, areas likely to have higher concentrations of younger householders, renters and one person households should be targeted for a re-delivery operation.

In model II (table 5B) we examine the odds ratios for those units that the LCOs attempted delivery. If a householder was a minority, the odds of the housing unit being included in the LCO re-delivery are 30 percent (1/.77) higher than if the householder was a non-minority.

In model III (table 5C) we examine the differences between the householders where the LCO re-delivery operation was a success. If a householder was a non-minority, the odds that the LCO re-delivery was successful are 48 percent higher than if the householder was a minority.

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U.S. Census Bureau 1990 CPH-E-3, Programs to Improve Coverage in the 1990 Census

7. Attachments

Attachment I: DMAF Variables and Values

From the DMAF Operational Files

TEA	Type of Enumeration Area 1=Mailout Mailback 5=Update Enumerate 2=Update Leave 6=Military in Update Leave Area 3=List Enumerate 7=Urban Update Leave 4=Remote List Enumerate 9=Update Leave (converted from TEA 1)
LCO	Local Census Office Code
ST	Collection FIPS State Code
COU	Collection FIPS County Code
TRACT	Nonresponse Followup Tract
MAFID	MAF and DMAF ID
ASAM	A Priori Sample 0=No A Priori Sample (Be Counted or late Field Add) 1=Short Form 6=Long Form
UAA	Undeliverable as Addressed 0=Delivered by USPS (not a Postal UAA) 1= Postal UAA in a zip code not in the re-delivery operation 2, 4, and 7=LCO attempted to re-deliver and failed 5=LCO re-delivered successfully 8=Not enough information–Excluded from Mail
CST	Current Status of Unit Relevant Values: 8 or 9=kill
DUP	Duplicate Status 0=unit never set as duplicate 1=unit set to duplicate or reinstated 2=unit is a duplicate (or other delete)

9=kill

GQFLAG GQ Flag
0=Hu
1=Special place
2=GQ
3= GQ embedded HU

NRU Nonresponse Follow-up Universe
0=universe not set
1 and 2 =not in NRFU
3=in NRFU; nonresponse
4=in NRFU; to late for mailout

Attachment II: HCEF_D' Variables and Values

MAFID	MAF and DMAF ID (Excluding the 2 Character Check Digit) Master Address File Identifier (unique identifier for housing unit address from the DMAF file) Characters 1-2=state code when the MAF ID was assigned Characters 3-5=county code when the MAF ID was assigned Characters 6-12= Control ID
STENURE	“Is this house, apartment, or mobile home” 0= Not in universe 1= Owned by you or someone in the household 2= Owned (without mortgage or loan) 3=Rented for cash rent 4= Occupied without payment of cash rent
NPHU	Number of persons at this housing unit 00= None 01-97= Persons at this housing unit
QREL	Relationship (applicable value for this study only) 01= Householder
QSPAN	Hispanic Origin Code
QRACEX	Race Edit/Allocation Group 1= White 2= Black, African Am., or Negro 3= American Indian or Alaskan Native 4= Asian 5= Native Hawaiian or Other Pacific Islander 6= Some Other Race
QAGE	000-115= Age

Attachment III



UNITED STATES DEPARTMENT OF COMMERCE
Bureau of the Census
Washington, DC 20233-0001

June 20, 2001

DSSD CENSUS 2000 PROCEDURES AND OPERATIONS MEMORANDUM SERIES
#MM-7

MEMORANDUM FOR Ruth Ann Killion
Chief, Planning, Research, and Evaluation Division

From: Howard Hogan (*signed June 20, 2001*)
Chief, Decennial Statistical Studies Division

Subject: Study Plan for A6.a: The United States Postal Service
Undeliverability Rates for Census 2000 Mailout Questionnaires

Attached is the study plan for A6.a: The United States Postal Service Undeliverability Rates for Census 2000 Mailout Questionnaires. The Census 2000 Evaluation Program quality assurance process was applied to the methodology development and the study plan review process. The study plan is sound and appropriate for completeness and accuracy, and it answers its intended category questions as appropriate.

If you have questions about this study plan, please contact Hebert F. Stackhouse on 301-457- 8026.

Attachment (A6.a: The United States Postal Service Undeliverability Rates for Census 2000 Mailout Questionnaires)

cc:
DSSD Census 2000 Procedures and Operation Memorandum Series Distribution List
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**CENSUS 2000 OPERATIONAL SUMMARY
STUDY PLAN A.6.a**

I. NAME OF OPERATION

Study of the United States Postal Service (USPS) Undeliverability Rates for Census 2000 Mailout Questionnaires

II. PROJECT MANAGER

Herbert F. Stackhouse (DSSD)
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III. OPERATIONAL BACKGROUND

A. Past Censuses and Tests

1. 1990 Census

In the 1990 Census, the United States Postal Service (USPS) was the primary vehicle for delivering census questionnaires. Based on a master address list, the Census Bureau mailed questionnaires to about 86.2 million housing units in areas designated as being mailout/mailback. Since a study of undeliverable as addressed (UAA) questionnaires concerns undeliverability by the USPS, only the mailout/mailback housing units are of interest. Both a questionnaire and a mail reminder card were delivered to all housing units in the mailout/mailback universe. The reminder card was delivered on March 30, approximately seven days after the questionnaire mailout. Census Day was officially April 1.

Questionnaires that were undeliverable were called postmaster returns (PMR) in the 1990 Census. The PMR questionnaires were routed back through the USPS and returned for check-in. The PMR cases were treated in the same manner as regular nonresponse followup (NRFU) cases.

In certain areas, the Postmaster Return Questionnaire Delivery was attempted. This was an effort by the district offices to deliver census questionnaires identified as undeliverable by the USPS. Low mail response rate and a high PMR questionnaire rate prompted the Census Bureau's decision to conduct this operation. The district offices attempted to collect all of the PMR questionnaires and were instructed to identify

them by geographic area and obtain the address listing pages for these areas. The PMR questionnaires were grouped by ZIP code or address register area. District offices furnished the enumerators with PMR questionnaires and the corresponding address listing pages. They were instructed to check off each address to which they delivered a PMR questionnaire and to mark the status of all of the housing units on the address listing pages. Questionnaires for housing units which could not be redelivered were then sent to a check-in location. Hence, some PMR questionnaires that were checked in were actually a product of undeliverability by not only the USPS but also by Census Bureau personnel.

The field in Census data files which was intended to indicate what was checked in as a PMR proved to be an unreliable source of information. Hence, there was no 1990 Census study similar to the one in this study plan, which examines Census 2000 UAA totals.

However, a sampling scheme was developed for a study of the reasons for undeliverability. Further details of that background operation can be found in the study plan which addresses the UAA sample selection planned for Census 2000.

2. **Census 2000 Dress Rehearsal**

The Census 2000 Dress Rehearsal was conducted in three areas: Columbia, South Carolina, and 11 surrounding counties, Menominee County, Wisconsin, including the Menominee American Indian Reservation, and Sacramento, California. Each site was selected because of its demographic and geographic characteristics to provide experience with some of the expected Census 2000 environments. The South Carolina site was a mixture of mailout/mailback and update/leave addresses, the Menominee site was entirely update/leave, and the Sacramento site was entirely mailout/mailback.

There were four components of mailout/mailback delivery: an advance letter, an initial questionnaire, a reminder card, and a "blanket" replacement questionnaire (mailed to all addresses). These items used first-class postage and were distributed by the USPS as part of their regular routes. The advance letter was mailed to each address between March 24 and 27, 1998. The initial questionnaire was mailed between March 28 and 31. The reminder card was sent to housing units between April 3 and 6. Replacement questionnaires were mailed between April 15 and 17. Census Day was officially April 18.

The USPS identified those questionnaires that were UAA, whether undeliverability was due to vacancy of the housing unit or some other reason. The UAA universe was classified by the Census Bureau according to the reason for undeliverability. That reason classified the housing unit as “vacant” or “other” - the latter category possibly referring to housing units designated by the USPS as duplicate, demolished/new construction, nonresidential, no such address, no such apartment, no post office box, no mail receptacle, other, or no reason written. The Census 2000 Dress Rehearsal did not keep the type of UAA-Other within a data file.

In the dress rehearsal, the official UAA status of both the initial questionnaire and the replacement questionnaire was used in determining UAA status for Census followup. A USPS status indicating UAA-Vacant on either or both of the questionnaire mailing packages placed the housing unit in the UAA-Vacant universe. Those housing units classified as UAA-Other on either or both of the mailings entered the nonresponse followup (NRFU) universe along with the other nonrespondents.

For the Sacramento site, the UAA cases were subject to a sampling rate. That rate was dependent upon whether the case was in the vacant followup universe or the NRFU universe. The South Carolina site, on the other hand, completed followup for all UAA cases, whether those were in the vacant universe or in the NRFU universe.

Since there were two questionnaires mailed to each housing unit, UAA rates for the dress rehearsal could be defined in a few ways. The UAA rate could be based on the initial mailing only, both mailings, or either mailing. In order to best relate the dress rehearsal results to the mail implementation strategy used in Census 2000, we include only the UAA rates for the initial mailing here. For this case, a housing unit was counted as a UAA if the initial questionnaire was returned by the USPS and the housing unit had not responded by the time of the late cut for NRFU using the replacement questionnaire.

The total UAA rate in Sacramento was approximately 8.7 percent, and the total UAA rate for the mailout/mailback portion of South Carolina was approximately 11.7 percent. In Sacramento approximately 27.1 percent of all UAA housing units had a final census status of occupied, 34.8 percent had a final status of vacant, and approximately 38.1 percent had a final status of delete. In the mailout/mailback portion of South Carolina, approximately 25.7 percent of all UAA housing units had a final status of occupied, 31.4 percent had a final status of vacant, and 42.9 percent had a final status of delete. Studies of the UAA housing units in the dress rehearsal are still ongoing.

No redelivery of UAA questionnaires was attempted by the Local Census Offices (LCO) during the dress rehearsal. Also, there was no sampling operation performed to discover a more detailed breakdown of reasons for undeliverability.

B. Census 2000

In Census 2000, the questionnaire mailout/mailback system was the primary means of census-taking. Cities, towns, and suburban areas with city-style addresses (house number and street name) as well as rural areas where city-style addresses are used for mail delivery comprised the mailout/mailback areas.

1. Multiple Mailing Strategy

The Census Bureau used a mail strategy consisting of multiple contacts for Census 2000 in mailout/mailback areas. These contacts were:

- An advance notice letter to every mailout address that alerted households that the census form would be sent to them soon and gave the opportunity to request a foreign language questionnaire
- A questionnaire to every mailout address
- A postcard to every mailout address that served as a thank you for respondents who had mailed back their questionnaire or as a reminder to those who had not

This multiple mailing strategy used first-class postage for all mailing pieces.

2. Key Dates in Mailback Schedule

Mailout/Mailback Enumeration Areas:

<u>Event</u>	<u>Date</u>
Advance notice letter delivered	3/06 - 3/08
Mailout of Questionnaire	3/13 - 3/15
Delivery of Reminder Cards	3/20 - 3/22
Census Day	4/01
Cut for NRFU	4/11; could vary by site
Late Cut for NRFU	4/18; could vary by site

3. Treatment of UAA Questionnaires

In Census 2000 there was a redelivery operation at the LCO level. (For a more detailed description of this operation, see Census 2000 Operational Summary H.5, "Local Census Office Delivery of Census 2000 Mailout Questionnaires Returned by USPS with UAA Designation"). This implies that questionnaires that are checked in at the National Processing Center (NPC) with a UAA classification not only were undeliverable by the USPS but also might have been undeliverable by Census personnel.

The UAA questionnaires were checked in at the LCOs up until a certain date. If the LCO in question was not one of those selected to attempt a second delivery, then the UAA questionnaires were checked out at the LCO and simply forwarded to the NPC, where they were checked in. If a second delivery was successful, then another check-in or check-out was not recorded. If the second delivery failed, the questionnaire was returned to the LCO, checked out at the LCO, and forwarded to the NPC, where it was checked in.

The fact that housing units had corresponding questionnaires classified as UAA has been maintained in the Decennial Master Address File (DMAF). A flag on the DMAF distinguishes whether or not the questionnaire was checked in at the NPC, whether or not it was checked in at the LCO, and whether or not it was checked out at the LCO. The UAA status of foreign language questionnaires was not maintained. The reason for undeliverability has also not been maintained.

Again, a separate operational plan addresses the issue of the LCO delivery operation. This study synthesizes that operation, but its only aim is to examine issues related to total UAA rates.

IV. QUESTIONS TO BE ANSWERED AND METHODOLOGY

1. What were the UAA rates according to...
 - ...type of enumeration area (TEA)?
 - ...tract? (Rather than reporting a UAA rate for every single tract, distributions of UAA rates or averages according to larger levels of geography will be included. Tract level rates will be maintained in a database separate from the evaluation report.)
 - ...state?
 - ...county?
 - ...certain combinations of these characteristics?
 - ...form type?
- a. Methodology

The UAA rate refers to the number of housing units in the mailback universe that had a mailout questionnaire which the USPS was unable to deliver over the number of housing units in the mailback universe, expressed as a percentage rounded to the nearest tenth percentage point.

The primary source of data for this study is the DMAF. Each housing unit that is in the mailout/mailback universe has a corresponding record on that file with a distinct DMAF twelve digit identification (ID). This variable is known as **MAFID** (see Attachment 1). Also available on that file are fields for each housing unit detailing the form type to be delivered, the type of enumeration area, the LCO, the tract, the state, and the county. There will also be a flag describing the UAA status of the housing unit.

For more information on the calculation and definition of UAA rates, see DSSD Census 2000 Procedures and Operations Memorandum #L-7 (Hogan 2000). Questionnaires designated undeliverable by the USPS were checked in at the LCOs up until a certain date and all that were not successfully redelivered by LCO staff were checked in at the NPC. In certain areas there will be another delivery attempt of UAA questionnaires by LCO personnel. Thus, a questionnaire that was checked in at the LCO only was a UAA according to the USPS but was deliverable according to the LCO personnel attempting delivery. A questionnaire checked in at the NPC was found to be undeliverable by the USPS and by LCO personnel, if the housing unit was in the LCO delivery universe. Consequently, DSSD will calculate a “postal” undeliverable rate that takes into account what the USPS deemed undeliverable and does not consider housing units which LCO personnel classified as deliverable. A second undeliverable rate that takes into account deliverability according to both the USPS and the LCO personnel will also be calculated. This will be the “census” undeliverable rate.

An additional confounding factor in calculating undeliverability rates is the fact that housing units are given the opportunity to request a foreign language questionnaire via the advance notice letter in addition to the English questionnaire that all housing units receive. These questionnaires will not be taken into consideration when calculating the UAA rates. Only the English questionnaires will enter the formula.

We will use the DMAF to calculate UAA rates. A combination of fields will be used to determine if a given housing unit was in the mailout/mailback universe and therefore assigned to be delivered a mail return questionnaire. Some housing units on the DMAF from mailout/mailback areas will be added after the mailback universe is set, and these will be excluded from UAA rate consideration. The mail return

check-in month and day variable will indicate if a given housing unit had a corresponding mail return check-in by the time of the late cut for NRFU.

Regardless of the issues still pending, a UAA rate denominator will basically be devised in the following manner.

The denominator for a given UAA rate is determined using a multiple step process.

First, we generate a base universe consisting of distinct housing units according to the variables on the DMAF that correspond to the elements posed in the question above (form type and state). The variable names that will be used for these delineations are: **ASAM** and **ST**. See Attachment 1 for a detailed list of these variables and their values.

A given housing unit must satisfy

TEA = 1 *or* 6

in order to qualify for a UAA rate denominator, and it can of course be restricted to certain values of these when studying UAA rates for certain TEAs.

For example, suppose that we wish to obtain the UAA rate for all mailout/mailback housing units in the state of Texas that received the long form. The base for our denominator would be those housing units that satisfy: **ST** = 48, **TEA** = 1, and **ASAM** = 6.

Given the base for the denominator, certain housing units must be excluded. These are the housing units that initially were added to the DMAF in operations following the mailout. By definition, these housing units cannot be included in the UAA rates since no attempt was made to deliver questionnaires to them until after the mailout period.

We wish to exclude a housing unit from the UAA rate denominator unless the record for the address was added, corrected, moved to a new block, verified, or edited in one of the following operations that occurred prior to Nonresponse Followup:

- Address Listing
- Block Canvassing
- Local Update of Census Addresses (LUCA) 98
- LUCA 98 Field Verification
- LUCA 99 Relisting

- LUCA 98 Appeals
- LUCA 99 Appeals
- Update/Leave Questionnaire Delivery
- Urban Update/Leave Questionnaire Delivery
- 1990 Address Control File
- Dress Rehearsal-specific operations
- 11/97 (or earlier) Delivery Sequence File (DSF)
- 09/98 DSF
- 11/99 DSF

We also wish to exclude those housing units in mailout areas for which the address information was pre-identified as incomplete, as these housing units did not receive a mailout/mailback questionnaire. These housing units are described by variables **TEA** and **UAA**. (**UAA** is described in further detail in Attachment 1.)

We wish to exclude a housing unit from the **UAA** rate denominator if

TEA = 1 *or* 6
AND
UAA = 8.

Once the denominator is set, the **UAA** rate numerator can be determined. At this time, a housing unit qualifies for consideration of being in the numerator if it is a member of the denominator and it satisfies

UAA = 1, 2, 3, 4, 5, 6, *or* 7.

Again, multiple **UAA** rates (the “postal” and “census” rates roughly described above) will be calculated based on these values. The postal **UAA** universe is the number of IDs in the **MAILOUT UNIVERSE** for which an English census questionnaire for that ID was checked in or checked out as being **UAA** at either the **LCO**, the **NPC**, or both (i.e. **UAA** = 1, 2, 3, 4, 5, 6, or 7). This universe includes all housing units that the **USPS** deemed undeliverable.

The numerator for the census **UAA** rate includes the number of IDs in the **MAILOUT UNIVERSE** for which an English census questionnaire for that ID was checked in as a **UAA** at the **NPC** or checked out as a **UAA** at the **LCO** (i.e. **UAA** = 1, 2, 3, 4, 6, or 7). This universe includes all housing units deemed undeliverable as a result of both the **USPS** delivery attempt and the **LCO** delivery operation. Not all housing units are eligible for delivery by the **LCO**; those that were not but were classified **UAA** by the **USPS** are included in this universe. This universe excludes housing

units for which questionnaires were successfully delivered by the LCO after the USPS failed in its delivery, while the POSTAL UAA UNIVERSE does not. Hence, the housing units counted toward the CENSUS UAA UNIVERSE are a subset of the housing units counted toward the POSTAL UAA UNIVERSE.

The UAA rates will be calculated by dividing the numerator by the denominator, multiplying by 100, and rounding to the nearest tenth percentage point.

Sorting housing units according to some of the aforementioned variables available on the DMAF, we can generate UAA rates by form type, TEA, various levels of geography, and combinations of these characteristics. The results will most likely be presented in table format.

b. Processing Requirements

(1) Clerical

No extra work is required for this study plan. Questionnaires were checked in via automated systems at the NPC. Questionnaires at the LCOs were checked in manually.

(2) Keying

The DSCMO will provide a layout of the DMAF. No extra work is required for this study plan.

(3) Programming and Computer

The DSCMO will produce the DMAF and make it available to the DSSD. The DSSD will be responsible for creating appropriate extracts and tallying the UAA check-in data.

2. What was the breakdown of housing units classified as UAA according to the final occupancy status (occupied, vacant, delete, kill) designated by the Census Bureau?

a. Methodology

This aspect of the study requires data from the Hundred percent Census Edited File with the reinstated housing units (HCEF_D'). Kill status is available from the DMAF using variable **CST** = 8 or 9.

The DSSD will link the housing units classified as UAA according to the DMAF with the housing units found on the HCEF_D'. This is done using the twelve digit census ID (MAFID). The HCEF_D' includes a variable (NPHU) for the number of residents in each housing unit. Housing units with at least one person are classified as occupied and those with zero persons are vacant. This variable is described in Attachment 2. Housing units which were part of the UAA rate universe but do not appear on the HCEF_D' and are not already identified as a kill are considered deletes, since only occupied and vacant housing units are found on the HCEF_D'.

Frequency rates for the different possible final occupancy statuses will be produced in table format for the undeliverable housing units. These results represent subdivisions of the results from question one. This will be done according to the aforementioned geographic variables found on the DMAF.

b. Processing Requirements

(1) Clerical

No extra work is required for this study plan. Questionnaires were checked in via automated systems at the NPC. Questionnaires at the LCOs were checked in manually.

(2) Keying

The DSCMO has provided layouts of the DMAF and HCEF. No extra work is required for this study plan.

(3) Programming and Computer

The DSCMO produced the DMAF and HCEF and has made them available to the DSSD. The DSSD will be responsible for creating appropriate extracts and classifying the undeliverable housing units according to final occupancy status.

3. For those housing units designated UAA that had a final status of occupied, what were the characteristics of these housing units with regard to tenure (owned vs. rented), number of household members, Hispanic origin of the householder, age of the householder, household composition, and race of the householder?

a. Methodology

Those undeliverable housing units from question two which had an occupied final status are the focus of this question. Included on the HCEF_D' are fields containing the tenure, the number of household members, the Hispanic origin of the householder, the race of the householder, and the age of the householder.

The variables of interest are **STENURE**, **NPHU**, **QSPAN**, **QAGE**, and the multiple **QRACE** flags. Additionally, **QREL** must be used to identify the householder so that the proper person-level information is used for each housing unit. These variables are explained in more detail in Attachment 2, which lists their possible values.

In table format, the DSSD will produce frequencies for these four variables for both the occupied housing units from the mailback universe that were classified undeliverable and the occupied housing units from the mailback universe that were not classified undeliverable. (Those housing units not classified undeliverable will be linked to the HCEF by ID in the same manner in which the undeliverable housing units were linked.) Chi square tests will be conducted to determine if the distributions of the two universes are significantly different.

b. Processing Requirements

(1) Clerical

No extra work is required for this study plan. Questionnaires were checked in via automated systems at the NPC. Questionnaires at the LCOs were checked in manually

(2) Keying

The DSCMO will provide layouts of the DMAF and HCEF. No extra work is required for this study plan. (3)
Programming and Computer

The DSCMO will produce the DMAF and HCEF and make them available to the DSSD. The DSSD will be responsible for creating appropriate extracts and producing frequency counts of the occupied undeliverable housing units and the occupied deliverable housing units according to the specific characteristics.

V. LIMITATIONS

Obviously the number of undeliverable rates and the scope of the answers to the questions in this study plan could potentially generate far more than we wish to document. The level of detail will be limited in some respect.

VI. MILESTONE SCHEDULE

Activity	Start Date	End Date
1. Develop Study Plans	06/16/99	05/30/01
2. Conduct Mailout/Mailback Operation	03/06/00	03/22/00
Conduct Questionnaire Check-In at the DCCs	03/06/00	05/15/00
Conduct UAA Questionnaire Check-In at the NPC	03/20/00	05/27/00
3. Daily Delivery of UAA Check-In Data from the NPC	03/20/00	05/27/00
Delivery of the DMAF with Complete Mail Return Check-In Information		08/25/00
Delivery of the HCEF with Demographic Data		11/29/00
Delivery of Response Rates for Comparison with UAA Rates (from A.7.a)		05/29/01
4. Start Analysis	05/16/01	
5. Start/End First Draft of Report	05/16/01	10/25/01
6. Start/End Second Draft of Report	11/08/01	12/19/01
7. Prepare Final Report for Signature	12/19/01	01/03/02
9. Report is Issued		02/20/02

VII. RELATED STUDIES/OPERATIONS

A.6.b “Detailed Reasons for Undeliverability of Census 2000 Mailout Questionnaires by USPS.”

A.7.a “Census 2000 Mail Response Rates.”

H.5 “Local Census Office Delivery of Census 2000 Mailout Questionnaires Returned by USPS with UAA Designation.”

VIII. REFERENCES

Hogan, Howard. “Documentation of Undeliverable Rates for Census 2000 ”, DSSD Census 2000 Procedures and Operations Memorandum Series #L-7, October 10, 2000.

DMAF Variables and Values

From the DMAF Operational Files

TEA	Type of Enumeration Area 1 = Mailout Mailback 2 = Update Leave 3 = List Enumerate 4 = Remote List Enumerate 5 = Update Enumerate 6 = Military in Update Leave Area 7 = Urban Update Leave 9 = Update Leave (converted from TEA 1)
LCO	Local Census Office Code
ST	Collection FIPS State Code
COU	Collection FIPS County Code
TRACT	Nonresponse Followup Tract
MAFID	MAF and DMAF ID
ASAM	A Priori Sample 0 = No A Priori Sample (Be Counted or late Field Add) 1 = Short Form 6 = Long Form
UAA	Undeliverable as Addressed 0 = No UAA Checkin 1 = UAA checkin in NPC only 2 = UAA checkin in NPC; in LCO checkin; no LCO checkout 3 = UAA checkin in NPC; no LCO checkin; in LCO checkout 4 = UAA checkin in NPC; in LCO checkin; in LCO checkout 5 = No UAA checkin in NPC; in LCO checkin; no LCO checkout 6 = No UAA checkin in NPC; no LCO checkin; in LCO checkout 7 = No UAA checkin in NPC; in LCO checkin; in LCO checkout 8 = Not enough address information -- Excluded from Mail
CST	Current Status of Unit Relevant values: 8 or 9 = Kill

From the DMAF MAF Status Files

MAC(17) MAF Action Codes

A = Add
C = Correction
D = Delete
M = Block Move
N = Nonresidential
U = Uninhabitable
V = Verify
E = Edit

The 17 Operations are -

- | | |
|--|--------------------------------|
| (1) Address Listing | (10) Postal Validation Check |
| (2) Block Canvassing | (11) Nonresponse Followup |
| (3) LUCA 98 | (12) BeCounted Verification |
| (4) LUCA 98 Field Verification | (13) TQA Verification |
| (5) LUCA 99 Relisting | (14) Coverage Improvement |
| (6) LUCA 98 Appeals | (15) New Construction |
| (7) LUCA 99 Appeals | (16) 1990 ACF (A or blank) |
| (8) Special Place/GQ | (17) DR-Specific(PALS,TC,TMUC) |
| (9) Questionnaire Delivery (UL, UE, UUL, LE, or remote AK) | |

MSDF MAF DSF Flags

0 = Not indicated in the DSF
1 = Flagged as Residential in the Indicated DSF
2 = Flagged as Nonresidential in the Indicated DSF

The 6 DSFs are -

- | | |
|----------------------|------------|
| (1) 11/97 or earlier | (4) 2/00 |
| (2) 9/98 | (5) 4/00 |
| (3) 11/99 | (6) unused |

Attachment 2

HCEF_D' Variables and Values

MAFID	MAF and DMAF ID (Excluding the 2 Character Check Digit) Characters 1 - 2 = state code when the MAF ID was assigned Characters 3 - 5 = county code when the MAF ID was assigned Characters 6 - 12 = control ID
STENURE	“Is this house, apartment, or mobile home—“ (This is the edited value of the RTENURE variable from the HCUF.) 0 = Not in universe (vacant) 1 = Owned by you or someone in this household with a mortgage or loan 2 = Owned by you or someone in this household free and clear (without a mortgage or loan) 3 = Rented for cash rent 4 = Occupied without payment of cash rent
NPHU	Number of persons at this housing unit 00 = None 01 - 97 = Persons at this housing unit
QREL	Relationship (applicable value for this study only) 01 = Householder
QSPAN	Hispanic Origin Code
QRACE1 - QRACE8	First through eighth race codes
QRACEX	Race Edit/Allocation Group This is the race group that was used for allocating in the 100% edit/allocation process. This same variable will be used by the sample edit/allocation process. 1 = White 2 = Black, African Am., or Negro 3 = American Indian or Alaska Native 4 = Asian 5 = Native Hawaiian or Other Pacific Islander 6 = Some Other Race
QAGE	000-115 = Age