

Analysis of the Effect Undeliverable Questionnaires have on Mail Response Rates

James B. Treat\*

United States Department of Commerce, Bureau of the Census  
Decennial Statistical Studies Division, Room 2120-2, Washington DC 20233

**Abstract**

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In Census 2000, the United States Postal Service was the primary vehicle for delivering census questionnaires with Census Bureau field staff delivering the remaining questionnaires. During the delivery operation the United States Postal Service was unable to deliver some of the census questionnaires. Historically, data on whether a questionnaire was delivered was not captured. For the calculation of the mail response rate, the universe included the undelivered questionnaires. For Census 2000, the Census Bureau captured the United States Postal Service deliverable status. This paper reports on the amount of questionnaires the United States Postal Service and/or Census Bureau field staff were unable to deliver and the impact these undeliverable questionnaires have on the calculation of mail response rates.

**Background**

For Census 2000, the Bureau of the Census partitioned the geographic land mass of the United States into approximately 7.2 million blocks. Each block was assigned to one of three Enumeration Areas. The enumeration areas were designed depending on the address types in the block, the need for special enumeration procedures and/or the method for delivering the Census questionnaire. The three enumeration areas are Mailout/Mailback, Update/Leave, and Personal Visit.

In Mailout/Mailback areas, the majority of addresses are city style, e.g., 801 Main Street. In addition, the address list is primarily developed prior to Census Day, April 1, 2000. The Census Bureau mailed the questionnaires to each address using the United States Postal Service. Respondents performed a self administered enumeration. They provided their data on the paper questionnaire. If they did not return their questionnaire on or before April 18, 2000, the address was visited by an interviewer during Nonresponse Followup. An interviewer administered enumeration was performed. Of the 7.2 million blocks, 52.7 percent are Mailout/Mailback areas containing approximately 80.0 percent of the housing units.

In Update/Leave areas, addresses consist of both city and non-city style. An example of a non-city style address is Rural Route 7, Box 4. While the

address list was developed prior to Census Day, it was also updated during the delivery of the Census questionnaire. During March of 2000, Census Bureau field staff canvassed the Update/Leave blocks, updating both the address list and the maps, and delivering questionnaires. Like Mailout/Mailback areas, respondents performed a self administered enumeration. They provided their data on the paper questionnaire. If they did not return their questionnaire on or before April 18, 2000, the address was visited by an interviewer during Nonresponse Followup. An interviewer administered enumeration was performed. Of the 7.2 million blocks, 41.9 percent are Update/Leave areas containing approximately 18.8 percent of the housing units.

Personal Visit areas contain mostly non-city style addresses. These areas of the country are geographically remote with a low housing unit density and include some selected American Indian Reservations and the colonias, which are irregular housing settlements along the Mexican border. In addition, resort areas with high concentrations of seasonally vacant housing units are also included. From February to May of 2000, Census Bureau field staff canvassed the ground enumerating the housing units. In some sections the address list was already created. In those areas Census Bureau field staff update both the address list and maps, similar to Update/Leave areas. In other sections Census Bureau field staff created the address list at the time of enumeration. An interviewer administered enumeration was performed. Of the 7.2 million blocks, 5.4 percent are Personal Visit areas containing approximately 1.2 percent of the housing units.

In the 1990 Census, the United States Postal Service was the primary vehicle for delivering census questionnaires. The Bureau of the Census mailed questionnaires to approximately 88.1 million housing units (U.S. Bureau of the Census, 1991) using third class postage. The Bureau designated these areas as Mailout/Mailback since we mailed out the questionnaire using the United States Postal Service, and the respondent mailed back the completed questionnaire. Questionnaires were mailed on March 23, 1990 with Census Day being April 1, 1990 (U.S. Bureau of the Census, 1991).

In certain situations the United States Postal Service was unable to deliver the census questionnaire. In the 1990 Census, data on whether a questionnaire was delivered by the United States Postal Service was not captured at the individual housing unit level. Therefore

the Bureau of the Census conducted an evaluation to estimate the number of questionnaires the United States Postal Service was unable to deliver. From the evaluation, we estimated between 5.4 and 7.6 million questionnaires were undeliverable by the United States Postal Service (U.S. Bureau of the Census, 1993). This represented between 6.1 and 8.6 percent of the 88.1 million housing units mailed a questionnaire.

For Update/Leave areas in 1990, data on the number of questionnaires that Census Bureau field staff could not deliver was not available for this paper.

In general, a mail response rate is defined as the ratio of two numbers expressed as a percentage. For the 1990 Census mail response rate, the denominator is the number of addresses which were delivered a questionnaire by either the United States Postal Service or Census Bureau field staff. This denominator includes housing units where an attempt to deliver a questionnaire was made. Therefore the denominator includes housing units that were vacant on census day, nonexistent or were not delivered a questionnaire by either the United States Postal Service or Census Bureau field staff.

The numerator is the number of these addresses for which the Census Bureau received a questionnaire back through the mail. A questionnaire received through the mail counts toward the mail response rate if it was received between the point in time that the questionnaires were delivered and the point in time that the nonresponse followup universe was determined. Therefore, mail response rate represents a measure of the workload completed in the areas which were delivered a census questionnaire. In 1990, the nonresponse followup universe was determined on April 23, 1990.

The 1990 national mail response rate was 65 percent (U.S. Bureau of the Census, 1991). For Mailout/Mailback areas, the mail response rate for these areas slightly increased to 65.1 percent. Removing the housing units where the United States Postal Service was unable to deliver the questionnaire would result in the mail response rate to range from 69.3 to 71.2 percent. This is an increase of between 4.2 and 6.1 percentage points.

For Update/Leave areas, the 1990 mail response rate was 64.1 percent. Since the number of undelivered questionnaires was unavailable I could not determine their impact on the mail response rate.

In Census 2000, the United States Postal Service was also the primary vehicle for delivering census questionnaires. Of the 128.7 million housing units in the address inventory, 103.0 million (80.0 percent) were in Mailout/Mailback areas and 24.2 million (18.8 percent) were in Update/Leave areas (U.S. Bureau of the Census, 2001). In Mailout/Mailback areas, questionnaires were delivered between March 13

and March 15 of 2000 with Census Day being April 1, 2000. In Update/Leave areas, questionnaires were delivered during March of 2000. Data on whether a questionnaire was delivered by the United States Postal Service or Census Bureau field staff was captured at the individual housing unit level. For comparison purposes to the 1990 Census, the 2000 mail response rate will be calculated using a formula similar to the 1990 Census calculation. Therefore questionnaires that the United States Postal Service or Census Bureau field staff were unable to deliver will be included in the denominator of the mail response rate.

This paper reports on the amount of questionnaires the United States Postal Service or Census Bureau field staff were unable to deliver and impact these undeliverable questionnaires have on the calculation of mail response rates. Analysis will be performed at the national, census region, state, county and census tract.

## **Methodology**

For a given housing unit, a respondent could have provided their data by one of the following methods of enumeration: paper questionnaire, computer assisted telephone interview, over the Internet or during a personal visit. For the paper questionnaire there were two options. First, respondents could have completed the questionnaire they were mailed or delivered and returned it by mail. The second option was to complete a "Be Counted" questionnaire and return it by mail. The Be Counted Campaign provided an auxiliary method for people to be included in Census 2000 who may not have received a census questionnaire or believe they were not included on one. Therefore, the Be Counted Campaign had the potential to enumerate housing units that already existed on the address inventory as well as enumerating new housing units. The Be Counted questionnaire contained several questions which allowed the Bureau of the Census to match the respondent provided address against the address inventory. The Be Counted Campaign could only effect the mail response rate provided the questionnaire was completed for a housing unit that was already in the address inventory at the time of the mailout (March 13 through 15 of 2000).

The computer assisted telephone interview was a component of the Telephone Questionnaire Assistance program of Census 2000. The Bureau of the Census contracted with Electronic Data Systems (EDS) to provide an extensive telephone assistance program for respondents. In addition to answering respondent questions about the census and the census questionnaire, the Telephone Questionnaire Assistance program provided respondents with the opportunity to complete their questionnaire over the telephone.

Respondents receiving the census short form

questionnaire were able to respond on the Internet. In order for the respondent to provide their data over the Internet, the respondent had to supply their 22-digit census identification number which was printed on the questionnaire. The questionnaire website could be reached from the Census 2000 home page.

Finally, during the personal visit interview operation, census enumerators contacted housing units to determine the occupancy status of the unit on Census Day. Based on that status, enumerators complete the applicable items on the interviewer administered census questionnaire thus enumerating the housing unit.

The Census 2000 mail response rate describes how many housing units returned their census questionnaire before the start of the nonresponse followup operation. The determination of the nonresponse followup universe occurred on April 18, 2000 with the official start of the operation on April 27, 2000.

For the mail response rate, the denominator includes all housing units in the questionnaire mailing or delivery operations. These addresses were added to the address inventory by one of the following address list building operations: the 1990 Census Address List, Block Canvassing, Local Updating of Census Addresses in urban areas, the 2000 Census Dress Rehearsal Test Site Address Development operations and updates from the United States Postal Service Address File.

For the mail response rate, the numerator is restricted to addresses included in the denominator. In addition, the numerator includes returns received on or before April 18, 2000 from a mail return (either the questionnaire we mailed them or a Be Counted questionnaire), a computer assisted telephone interview return or an Internet return. Housing units providing more than one return are only counted once in the calculation of the rate.

Questionnaires that either the United States Postal Service or Census Bureau field staff were unable to deliver are called Undeliverable as Addressed (UAAs). For the UAA rate the denominator is the same as the denominator of the mail response rate. The numerator is restricted to addresses included in denominator and either the United States Postal Service or Census Bureau field staff was unable to deliver the questionnaire.

In order to examine the effect the UAA questionnaires have on the mail response rate a revised mail response rate needs to be calculated. The revised mail response rate denominator is the mail response rate denominator minus the UAAs. The revised mail response rate numerator includes returns received on or before April 18, 2000 from a mail return (either the questionnaire we mailed them or a Be Counted questionnaire), a computer assisted telephone interview return or an Internet return. Note that the numerator is

restricted to addresses included in the revised mail response rate denominator. In addition, housing units providing more than one return are only counted once in the calculation of the revised rate.

## Results

Table 1 presents the impact that undelivered questionnaires have on the mail response rate. The analysis is performed at the national level. In addition, the impact of the undelivered questionnaires is examined at the enumeration area level, that is for Mailout/Mailback and Update/Leave areas. Note that since there is no mailback component in the Personal Visit areas, it does not make sense to calculate a mail response rate for this area. The rate of undelivered questionnaires for the nation was 7.2 percent. Mailout/Mailback areas had a larger rate than Update/Leave areas, 7.6 percent to 5.4 percent, respectively. At the national level, the impact of the undelivered questionnaires on the mail response rate was an increase of 5.0 percentage points. For Mailout/Mailback areas, the impact of questionnaires the United States Postal Service could not deliver was an increase in the mail response rate from 65.5 percent to 70.9 percent, 5.4 percentage points. The increase in the mail response rate for Update/Leave areas was not as substantial as what was observed in Mailout/Mailback areas, 3.4 percentage points.

Table 1: Effect of the UAAs on Mail Response Rates by Enumeration Areas

Geography	UAA	MRR	RMRR	DIFF
National	7.2	64.4	69.4	5.0
MO/MB	7.6	65.5	70.9	5.4
U/L	5.4	59.3	62.7	3.4

UAA - indicates Undeliverable as Addressed (UAA) rate - UAAs are questionnaires that the United States Postal Service was unable to deliver or Census Bureau Field Staff were unable to deliver

MRR - indicates Mail Response Rate

RMRR - indicates Revised Mail Response Rate

DIFF - indicates the difference between the Revised Mail Response Rate (RMRR) and the Mail Response Rate (MRR)

MO/MB - indicates Mailout/Mailback areas

U/L - indicates Update/Leave areas

Table 2 presents the impact that undelivered questionnaires have on the mail response rate for the four census regions. The undeliverable rate was fairly

consistent across the four regions, with the South having the largest rate. Therefore, the impact the undelivered questionnaires have on the mail response rate was also consistent, ranging from 4.6 percentage points in the Northeast to 5.5 percentage points in the Midwest.

Table 2: Effect of the UAAs on Mail Response Rates at the Census Region

Geography	UAA	MRR	RMRR	DIFF
National	7.2	64.4	69.4	5.0
Northwest	6.7	64.1	68.7	4.6
South	7.6	61.4	66.5	5.1
Midwest	7.4	68.5	74.0	5.5
West	6.8	65.0	69.7	4.7

At the state level, which includes the District of Columbia, the mail response rate ranged from 53.4 to 72.6 percent, a 19.2 percentage point span. The majority of the states with the highest mail response rates are in the Midwest region. The undeliverable rate ranged from 4.2 to 15.3 percent, with the majority of the states (43 of 51) having a rate of less than 10 percent. Removing the undeliverable questionnaires from the denominator resulted in the revised mail response rate ranging from 60.7 to 78.3 percent. In addition, the span decreased to 17.6 percentage points. Therefore, the difference between the mail response rate and the revised mail response rate ranged from 2.8 to 9.6 percentage points.

Figure 1 presents the impact the undelivered questionnaires had on the mail response rate at the county level. There were 3,094 counties which contained Mailout/Mailback and/or Update/Leave areas. The county level mail response rates ranged from about 15.7 to 82.4 percent, with a mean 61.2 percent. Only 19 counties, less than 1 percent, had a mail response rate below 34 percent. About 70.0 percent of the counties had a mail response rate between 34 and 67 percent. Finally, 29.4 percent of the counties had a mail response rate over 67 percent. The county level undeliverable rate ranged from 0 to 58.7 percent, with a mean of 8.3 percent. Note that while there were some counties with substantially high undeliverable rates, only 2.3 percent of the counties had a undeliverable rate greater than 20 percent. The county level revised mail response rates ranged from about 16.9 to 86.1 percent, with a mean 66.9 percent. There was a substantial shift in the number of counties whose rate moved from the middle range (34 to 67 percent) to the upper range (68 to 100 percent). The difference between the mail response rate and the revised mail response rate ranged from 0 to 32.5 percent. On average, the increase in the county level mail response rate as a result of removing the

undelivered questionnaires from the mail response rate denominator was 5.6 percentage points.

Figure 1: Effect of the UAAs on Mail Response Rates at the County Level

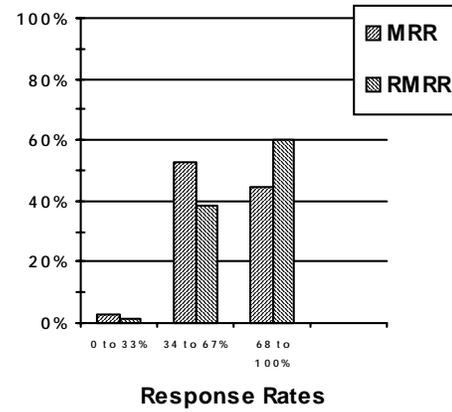
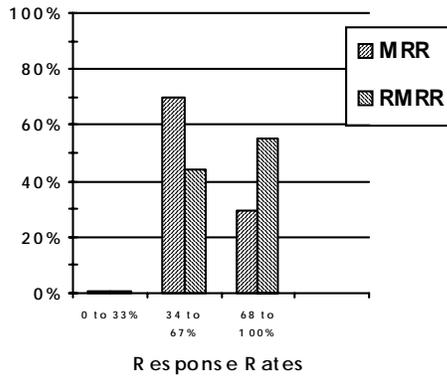


Figure 2 presents the impact the undelivered questionnaires had on the mail response rate at the Census tract level. There were 59,246 Census tracts which contained Mailout/Mailback and/or Update/Leave areas. The tract level mail response rates ranged from 0 to 100 percent, with a mean 63.1 percent. There were 1,468 tracts, less than 2.5 percent, had a mail response rate below 34 percent. About 52.9 percent of the tracts had a mail response rate between 34 and 67 percent. Finally, 44.6 percent of the tracts had a mail response rate over 67 percent. The tract level undeliverable rate ranged from 0 to 100 percent, with a mean of 7.7 percent. Note that while there were some tracts with substantially high undeliverable rates, only 5.4 percent of the tracts had a undeliverable rate greater than 20 percent. The tract level revised mail response rates ranged from 0 to 100 percent, with a mean 68.1 percent.

There was a substantial shift in the number of tracts (over 15 percentage points) whose rate moved from the middle range (34 to 67 percent) to the upper range (68 to 100 percent). The difference between the mail response rate and the revised mail response rate ranged from 0 to 99.9 percent. On average, the increase in the tract level mail response rate as a result of removing the undelivered questionnaires from the mail response rate denominator was 5.0 percentage points.

Figure 2: Effect of the UAAs on Mail Response Rates at the Census Tract Level



### Conclusions

The undeliverable questionnaires substantially impact the mail response rate. In addition, the effect on the mail response rate increases at smaller levels of geography. One of the factors that could be influencing the undeliverable rate is the enumeration delineation. In 1990, 5.6 percent of the addresses were in Personal Visit areas. A large portion of the 1990 Personal Visit areas were converted to Update/Leave areas in 2000. An examination of the mail response rate and undeliverable rate is required for the converted areas. This may show there is a lower mail response rate and/or higher undeliverability rate in comparison to the remaining portion of the Update/Leave areas. In addition, it is

important to establish the purpose of a rate and then define the calculation of the rate which best fits the purpose. Finally, there may not be one best rate but rather several rates that provide a complete picture as demonstrated in this paper.

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