

Using the 2015 Census Test Evaluation Followup to Compare the Nonresponse Followup with Administrative Records

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Abstract

The U.S. Census Bureau conducted the 2015 Census Test as part of its research to develop methodology for using administrative records (ARs) to reduce the cost and improve the quality of the 2020 Census Nonresponse Followup (NRFU) data. The goal of the 2015 Census Test in Maricopa County, AZ was to test methodology and operations designed to reduce the NRFU workload. The 2015 Evaluation Followup (EFU) was part of the 2015 Census Test and collected additional data to allow a comparison of NRFU data with ARs available for the same addresses. The 2015 EFU analyses provide information about different uses of ARs that are topics of current research, such as determining occupancy status, enumerating a housing unit (HU), and providing data for imputation procedures. The 2015 EFU interviewed 5,000 HUs where there was a discrepancy between the NRFU results and the ARs. The evaluation of the quality of the NRFU responses and the AR file includes comparisons of the population count and the demographics of the persons listed in each source with 2015 EFU data. In addition, the study uses 2015 EFU results to assess the quality of the AR and NRFU data regarding HU occupancy status.

Key words: 2020 Census, occupancy status, household member respondents, proxy respondents

1. Introduction

The 2015 Evaluation Followup (EFU) collected data for a comparison of the accuracy of occupancy status and responses for 2015 Census Test Nonresponse Follow (NRFU) housing units (HUs) with the accuracy of the administrative records (AR) available for the housing unit. The EFU selected a sample of 4,098 HUs in NRFU where there was at least one of nine types of discrepancies between the NRFU and AR information for the HU and conducted interviews July 20 to August 14, 2015. Then EFU results were compared to the NRFU and AR data to assess their quality.

¹ This report is released to inform interested parties and encourage discussion of work in progress. The views expressed on statistical, methodological, and operational issues are those of the authors and not necessarily those of the U.S. Census Bureau.

The U.S. Census Bureau conducted the 2015 Census Test in four distinct areas of Maricopa County, AZ. The four areas and their defining characteristics are as follows:

- Central Maricopa: Low 2010 Census response rate, high vacancy rate, about 75% Hispanic population.
- Chandler: High 2010 Census response rate, low mobility, low vacancy rate.
- Mesa: Medium 2010 Census response rate, low mobility.
- Outer Ring: Remote rural area.

The data collection for the 2015 Census Test began with a period of self-response where a member of the household residing in a housing unit (HU) at an address in the test site could respond online or by mail. The Census Bureau sent several pieces of mail to the HUs prior to Census Day for the test, which was April 1, 2015. These included an initial invitation letter with a link to a website where they could fill out the questionnaire, a reminder postcard, a second reminder postcard, and a paper questionnaire they could fill out and return by mail. When the Census Bureau did not receive a self-response for a HU, the address was sent to Nonresponse Followup (NRFU). Following the purpose of the 2015 Census Test, the Census Bureau examined strategies for using a combination of administrative records and personal visits in enumerating the HUs in NRFU. In each of the four sub-areas of the test site, block groups were randomly assigned to the three panels that tested methods for following up at addresses where a self-response was not obtained.

In this paper, Section 2 discusses the Nonresponse Followup methodologies including the test panels, the use of administrative records, and the modeling used in identifying HUs to enumerate using administrative records. Section 3 describes the 2015 EFU methodology with Section 4 containing the results. Section 5 closes with a summary and recommendations.

2. Nonresponse Followup methodology tests

2.1 Test panels

The NRFU in 2015 Census Test had three panels that employed different contact strategies in addition to using administrative record files in different ways, including a panel that used no administrative records. The two experimental panels used the new field reengineering approaches employing the new Re-Organized Census with Integrated Technology (ROCKIT) field management and the new in-field operational control system, known as MOJO. One panel utilized the approach of full removal of NRFU HUs for enumeration using administrative records while the second experimental panel utilized a hybrid removal of HUs for administrative records enumeration. The two experimental panels used an adaptive contact strategy while the control implemented contact approaches similar to those used in the 2010 Census. Information about the control system, adaptive design, and administrative records usage in each panel follows:

- Panel 1 (Control) mimicked the 2010 Census NRFU contact strategy as closely as possible. At the start of the operation, enumerators were assigned a set of cases that they were to work until completion. Enumerators were instructed to make up to three contact attempts with a proxy response permitted only after the final attempt to interview a household member had failed. Addresses where interviewers could not obtain a proxy or the proxy responses were not data-defined were unresolved. The contact strategy was fixed for all households and

did not use administrative records in any way. This panel served as a control for comparing the results of the other panels.

- Panel 2 (Hybrid) used the new field reengineering approach developed by the ROCKIT team. This included the new field management structure with the operation in Maricopa County being run out of the Denver Regional office. This also included using the new MOJO control system. Each day, enumerators were assigned a set of cases to attempt that day. Enumerators were also provided an optimal ordering of the cases to help minimize travel. Another enhancement was the introduction of online training for enumerators. Adaptive design approaches were utilized to determine the maximum number of visits for an address. This panel used the hybrid administrative record removal. Administrative record vacant units were identified before the start of NRFU and removed from the fieldwork. Units identified to have good administrative record occupied information received only one contact attempt during NRFU. For non-administrative record cases, visits were attempted with the household until the maximum number of visits was reached. For occupied units, a proxy enumeration was only allowed to have been attempted on the last visit (Konicki 2016; Keller and Konicki 2016).
- Panel 3 (Full) used the same new field reengineering approach used in Panel 2. This panel utilized the full removal of HUs for enumeration by administrative records before the start of NRFU. Any addresses identified by administrative records as vacant or having administrative records of sufficient quality to use for occupied enumeration were resolved and removed from the NRFU field workload. As with the Hybrid panel, adaptive design approaches were used to determine the maximum number of visits for the remaining fieldwork cases.

2.2 Use of administrative records

The 2015 Census Test utilized predictive models fit using 2010 Census data for the test site to identify units for removal from the NRFU workload with a designation of vacant and to identify occupied units for administrative records enumeration. A paper by Morris, Clark and Keller (2016) describes the predictive models and approaches using 2010 Census data.

For the identification of vacant units, the predictive model was built with data collected in the 2010 Census and from other sources, including: (1) Undeliverable-as-Addressed (UAA) codes from the United States Postal Service (USPS) for the 2015 Census Test mailings; (2) presence of person records on administrative record and third-party files; (3) information about the address from the Census Bureau's Master Address File, and (4) estimates at the block group level American Community Survey(ACS) that pools five years of data for the block group. This model predicted the probability of a unit being occupied, vacant or a delete (HU did not have living quarters). Optimization methodology then used these predicted probabilities to maximize the number of addresses identified as administrative records vacant based on a set of constraints. These constraints included having the average vacant predicted probability greater than 0.8 while having the amount of potential occupied units classified as vacant being less than a 0.5% of the estimate of occupied HUs from the ACS for the block groups in the panel.

The U.S. Census Bureau used two models in the identification of occupied units for enumeration using administrative records. The formation of administrative records households at addresses in NRFU combined information from Internal Revenue Service Tax Year 2014 Individual 1040 Tax Returns (IRS 1040) and Tax Year 2014 Information Returns (IRS 1099), Center for Medicare and Medicaid Services Medicare Enrollment Database, the Indian Health Service Patient Database, and the Targus Federal Consumer file. The IRS 1040 and Medicare database contain information regarding whole households, which was a key reason why the 2015 Census Test used these sources. The U.S. Census Bureau received the 2015 version of the Indian Health Service Patient Database in June so the updated version was available for the 2015 EFU analysis while the 2015 NRFU used the 2014 version.

The first predictive model, called the Person-Place model, was built by Morris (2014) leveraging initial work by Brown (Brown, Childs, and O'Hara 2015) and employing person-matching results. The second predictive model, called the Household Composition model, was developed by Keller (Morris, Keller, and Clark 2016) to assign household (HH) compositions based on the number of adults and the presence of children. This model predicts the probability of observing the same composition of a NRFU household if fieldwork had been done. The methodology used the estimated probabilities from the two models in a linear optimization approach to maximize the number of HUs removed from the NRFU workload for enumeration with administrative record. The linear optimization maximized the number of HUs removed from the workload based on constraints related to predictions from both models and having their average predicted probabilities being above certain thresholds. For this test, both thresholds were set to 0.53 based on research showing that these cutoffs produced the maximum number of HUs where the 2010 NRFU and administrative records agreed on the population count while identifying about 15% of the eligible NRFU cases occupied according to administrative records.

For the 2015 Census Test, the identification of HUs for removal from the NRFU using administrative records was divided into two phases. The analyses for NRFU begin with IRS records submitted in the first 18 weeks of 2015, called Phase 1, which arrived before NRFU began. Analyses with Phase 1 data were available at the beginning of NRFU because 2015 was the first year that the Internal Revenue Service provided monthly data files to the U.S. Census Bureau. The second delivery of the IRS records submitted in weeks 19 to 22, called Phase 2, arrived in June while NRFU was underway. The analysis with the Phase 2 data employed the same threshold cutoffs as Phase 1 leading to the identification of new occupied HUs on June 5, 2015. Details of methodology and implementation may be found in Morris *et al.* (2015).

Table 1 presents the initial occupancy status flags assigned using administrative records to HUs in the 2015 Census Test NRFU universe. There were 72,072 units in the 2015 Census Test that did not self-respond before the start of the administrative records processing on May 9, 2015. Of the 72,072 units in the 2015 Census Test NRFU universe, administrative records could not determine the status of 50,624 units. Using the optimization approach with results from predictive models to identify HUs to remove from the NRFU fieldwork, the processing determined that 13,078 units, or 18.1%, were occupied according to administrative records. This processing also determined that 8,370 units, or 11.6%, were vacant according to administrative records.

Table 1. Administrative Record initial flags by panel in NRFU universe
(Row percentages)

Panel	Phase 1 Counts			Phase 2 Counts	Total
	Not Assigned	AR Occupied	AR Vacant	AR Occupied	
Control	15,144 71.2%	3,443 16.2%	2,672 12.6%	354 1.7%	21,259
Hybrid	15,531 70.8%	4,226 19.3%	2,188 10.0%	405 1.8%	21,945
Full	19,949 69.1%	5,409 18.7%	3,510 12.2%	475 1.6%	28,868
Total	50,624 70.2%	13,078 18.1%	8,370 11.6%	1,234 1.7%	72,072

Note: Row percentages do not add to 100% as some Phase 2 AR Occupied have Not Assigned status in Phase 1.

3. 2015 Evaluation Followup Methodology

The U.S. Census Bureau conducted the 2015 EFU for selected control panel cases in the Central Maricopa county, Chandler and Mesa test areas. Due to potential long travel distances and other operational complications, the 2015 EFU did not include the control panel cases in the outer ring block groups. The 2015 EFU collected data for an investigation that included comparisons of the census fieldwork test results and the administrative record results in the control panel.

The design of the 2015 EFU fieldwork focused on producing data for analyses to inform decisions about potential uses of ARs in the 2020 Census that are topics of current research. These decisions regard whether to use ARs to determine occupancy status and enumerate a HU and whether to use ARs in imputation procedures for HUs where NRFU interviews could not obtain a response from a household member. The possible uses of ARs mirror the information that NRFU interviewers attempt to learn from proxy responses. Interviewers ask proxies for a complete enumeration of the residents of the HU, but when proxies do not provide that information, the interviewers attempt to collect occupancy status, number of people residing at the address, and their characteristics. The 2015 Census NRFU occurred May 14 to June 2015 while the EFU conducted interviews from the end of July 20 through August 14, 2015.

The research questions for the 2015 EFU are relevant to decisions regarding the use of ARs in conducting the 2020 Census NRFU. These research questions addresses by the 2015 EFU are:

- Are proxy and household member responses for the population count at NRFU addresses more or less accurate than the administrative records available for the housing unit?

- Are proxy and household member responses for occupancy status at NRFU addresses more or less accurate than the administrative records available for the housing unit?
- Are proxy and household member responses for occupancy status at NRFU addresses more or less accurate than the “close to high quality” administrative records available for the housing unit?
- Are proxy responses for occupancy status at NRFU addresses more or less accurate than the “close to high quality” administrative records available for the housing unit?
- Are current year administrative records for NRFU addresses more or less accurate than the previous year administrative records?

The 2015 EFU interviewed 4,098 HUs where there is a discrepancy between the NRFU results and the ARs. The restriction to examining only the discrepancies arose because budget limitations forced the focus to be on cases where the probability of finding weaknesses in ARs is higher and the likelihood of identifying characteristics that distinguish high quality NRFU responses and ARs appears higher. Only HUs where all the administrative records had Personal Identification Keys (PIKs), which are essentially encrypted Social Security Numbers or Taxpayer Identification Numbers, were allowed in the sample so that comparisons between household rosters could be made. The implication of this requirement was that the administrative records almost always contained the person’s age and sex although in the end, the amount of missing characteristics in the EFU and NRFU prevented comparisons of individuals on rosters. The EFU workload was lower than the 5,000 the budget for sample size so no subsampling was necessary.

The plan selected cases from the following discrepancy categories for 2015 EFU:

- Administrative Records Occupied and NRFU Household Respondent Occupied but counts differ
- Administrative Records Occupied and NRFU Proxy Respondent Occupied but counts differ
- Administrative Records Occupied versus NRFU Vacant
- Administrative Records Vacant versus NRFU Occupied
- Administrative Records “Close” Units Versus NRFU Proxy Results
- Administrative Records Count Changes From Previous Year
- Administrative Records Vacant versus Census Delete
- Administrative Records Occupied with different counts in Phase 1 and Phase 2
- Administrative Records Occupied and NRFU count agrees but household composition differs

Table 2 shows the distribution of the 4,098 cases across the nine EFU reasons. The table shows the total cases in each category. Because of a case may have multiple reasons for going to interview, the column summations may not add up. In addition, the unique column shows how many times a case was sent for only that reason.

Table 2. EFU workload by category

EFU Category	Total Cases	Unique Cases
Total	4,098	
1. Adrec occupied and NRFU household respondent occupied but counts differ	839	300
2. Adrec occupied and NRFU proxy respondent occupied but counts differ	314	122
3. Adrec occupied versus NRFU vacant	196	81
4. Adrec vacant versus NRFU occupied	388	388
5. Adrec “close” units versus NRFU proxy results	1,181	1,181
6. Adrec count changes from previous year	1,612	595
7. Adrec vacant and census delete	131	131
8. Adrec occupied with different counts in Phase 1 and Phase 2	468	90
9. Adrec and census occupied with count agreement but household composition differs	242	127

Note: Columns do not sum to total due to overlap of some categories.

The 2015 EFU interviews are believed to be of higher quality because the interviewers are selected from the pool of 2015 NRFU interviewers and given additional training with particular focus on reinterviewing techniques. In addition, the questions regarding moves, other residences, and periods of vacancy are more extensive than the NRFU questionnaire. The combination of using interviewers with more experience and more training along with collecting additional data about moves and occupancy status provides the basis for the belief that the EFU interviews are of higher quality than the NRFU interviews.

The evaluation of the quality of the NRFU responses and the AR file includes assessing the AR records and the NRFU enumerations by proxy and household member respondents by the count of persons in the HUs in each source. In addition, the evaluation assesses the quality of the designation of vacant versus occupied by NRFU and AR methodology.

Our analyses that compare household composition in the AR records, the NRFU records and the 2015 EFU records are limited. Additional analyses were planned but not possible because of inadequate age data for many records in the NRFU and/or the EFU.

All tables presented in this document have percentages and standard errors rounded to the nearest tenth. Therefore, if the percentages do not sum to 100.0 percent, this is due to rounding. In addition, all tables, unless otherwise noted, are representing the NRFU universe or a subset thereof. Standard errors were computed using Taylor Series linearization, reflecting the clustering of NRFU units by block groups and the experimental design of assigning the block groups to the three treatment panels.

4. Results

This section presents a comparison of the amount of agreement between the administrative records (ARs) and EFU results and between the NRFU and EFU results for three of the nine studied categories of HUs where the administrative records and NRFU produced discrepant results:

- Administrative Records Occupied and NRFU Household Respondent Occupied but counts differ
- Administrative Records Occupied and NRFU Proxy Respondent Occupied but counts differ
- Administrative Records Vacant versus NRFU Occupied.

The results for the other six discrepant categories not discussed in this paper can be found in Mulry, Mule, and Clark (2016).

3.1 Administrative records occupied and NRFU household member respondent occupied but counts differ

This section analyzes the 2015 EFU results for 1,961 addresses where the nature of the discrepancy was that the administrative records processing and the NRFU household member respondent agreed that that the HU was occupied but the population counts differed. There were 1,961 addresses in the 2015 EFU areas that were enumerated by a household interview in NRFU and were determined to be occupied based on administrative records processing. For about 57% of 1,961 addresses, the administrative record count and the NRFU householder response is the same. However, there were 839 (or 42.8%) where the administrative record count did not agree with the count provided by the interview NRFU household member respondent.

The goal of the analysis of the data collected for the 839 addresses is to examine whether the EFU count tends to agree with NRFU, AR, or neither. Table 3 shows that the EFU results for the 839 addresses. Although all the 839 NRFU respondents were HH members, 131 (15.6%) of the EFU respondents were proxies.

Table 3 Comparison of EFU population count to the Administrative Records population count and the NRFU population count for HUs agrees with an NRFU household member respondent

Comparison	Frequency	Percent	Std Err of
			Percent
EFU matches Administrative Record Count	147	17.5	1.4
EFU matches NRFU count	468	55.8	2.0
EFU count matches neither	182	21.7	1.7
EFU Other*	42	5.0	0.8
Total	839	100.0	

*Other includes EFU vacant, noninterview, and unresolved.

Table 3 shows that the EFU count for 55.8% (S.E. = 2.0%) of the 839 HUs agrees with the NRFU count. In contrast, the EFU count agrees with the AR count for 17.5% (S.E. = 1.7%) of the HUs and disagrees with both the NRFU and the AR counts for 21.7% (S.E. = 1.4%). The remaining 42 HUs are either vacant or have a noninterview or unresolved status. Over half of the 839 HUs have NRFU counts that agree with the EFU count, and the agreement rate of 55.8% is significantly higher than the agreement rate of 17.5% between the EFU and AR count. This indicates that the NRFU counts tend to be more accurate than the AR counts when using the EFU counts as the standard of comparison.

We conducted additional analyses for 468 HUs in Table 3 where the EFU and NRFU counts agree to investigate whether the two sources also agree on household composition. We selected six HH compositions because previous tests indicated their administrative records tended to be more accurate than those for other HH compositions. NRFU and EFU household composition agreement are very high when the EFU and NRFU counts agree and the NRFU respondent is a NRFU HH member. The highest agreement rate is 90.2% for 3 adults with no children and the lowest agreement rate being 73.3% for 3 adults with 1 or more children. The main source of difference between the two sources was when either EFU or NRFU was missing age for at least one person in the HH.

Next, we consider whether AR and EFU HH compositions agree when the EFU and NRFU counts agree, which by design implies the AR and EFU counts disagree. We consider three AR HH compositions where we had enough observations for an analysis:

- For 128 administrative records households with 1 adult, 0 children, the differences with the EFU HH composition were mostly because EFU found 2 adults and 0 children. This happened 56.3% of the time. As for the remaining HUs, EFU found 12% had 1 adult and 1+ children; 11 % had 2 adults and 1+ children, and for 11 %, the EFU age was missing for at least one HH member.
- For 147 administrative records households with 2 adults and 0 children, the biggest difference was that 42% % of them had a composition of 1 adult and 0 children. For the remaining, EFU found 21% had 3 adults and 0 children and 17% had 2 adults with 1+ children.
- For 151 administrative records households with 2 adults and 1+ children, EFU had the same composition 41 % of the time. When we examine whether EFU had more or less HUs with children than administrative records, we see that EFU had 1 adult with 1+ children for 19.2% and 3 adults with 1+ children for 11.3%, resulting in a total of 71.6% with children.

Next, we compared the administrative records HH composition to the EFU household composition for the 147 EFU HUs in Table 3 where the administrative records and EFU counts agreed. Administrative records and EFU tend to agree on the composition of 1 Adult, 0 Children. Although age was missing for 30.0% of the HUs in this category, we assumed the person was an adult since there was only 1 person living in the HU, which implies an agreement rate of 100.0%. When administrative records had the HH composition of 2 adult, 0 children, EFU found the same composition 81% of the time, but 13.5% could not be assigned an EFU HH composition. When administrative records had the household composition of 2 adults, 1+ children, EFU assigned same composition 57.7% of the time, but 23.1% could not be assigned an EFU composition.

In addition, we compared the HH composition from NRFU and EFU for the same 147 EFU HUs in Table 3. By design, the NRFU and EFU counts disagree. When the NRFU HH composition was 1 adult and 0 children, EFU found 48.6% of these HUs had 2 adults and 0 children. Notice that 48.6% of HUs that have 1 adult and no children in administrative records have 2 adults and no children in NRFU approximately offsets the 48.1% of HUs that have 2 adults and no children in administrative records with 1 adult and no children in NRFU.

The major indication from our analysis of the 839 the addresses in EFU areas where the administrative record count did not agree with the count provided by the interviewed NRFU household member is that the 2015 EFU interview results agreed with NRFU

results 56% of the time. In contrast, the agreement rate with administrative records was 17%. In addition, for these 56%, the EFU and NRFU agreement rate in the six household composition categories ranged from 90.2% to 73.3%. Since the EFU had higher agreement with NRFU than administrative records and the household composition agreement rates also were higher, we recommended including an additional mailing for the administrative record units in the future. We also recommended continuing to the additional files like Supplemental Nutrition Assistance Program files that may pursue be able to improve the counts from administrative records.

3.2. Administrative records occupied and NRFU proxy respondent occupied but counts differ

This section summarizes the results for addresses in the 2015 EFU areas where the administrative record count did not agree with the count provided by the NRFU proxy. The 2015 EFU included 765 determined to be occupied based on administrative records processing and a proxy interview in NRFU. Of these 765 addresses, 314 (or 41%) had different population counts from the two sources.

For these 314 HUs, the 2015 EFU found that the ARs and NRFU proxy respondents performed comparably with regards to agreement with the EFU count. Neither achieved an agreement rate with the EFU count that is over 50%. Table 4 shows that the percentage of 314 HUs where the ARs and EFU counts agree is 32.5% (S.E. = 2.8%) while the percentage where the NRFU and EFU counts agree is 33.4% (S.E. = 3.0%). The difference between 32.5% and 33.4% is not significant. In contrast, the EFU count disagrees with both the NRFU and the AR counts for 22.3% (S.E. = 3.0%). EFU found that the remaining 37 HUs are either vacant or have a status of noninterview or unresolved. These data indicate that EFU did not find the NRFU counts to be more accurate or less accurate than the AR counts. Another viewpoint is that EFU had a count disagreement rate of approximately 55% for both NRFU and ARs, leading one to say that both sources were equally inaccurate according to EFU. This result led us to examine whether the two sources differed on the presence of characteristics

Table 4. Comparison of EFU population count to the Administrative Records population count and the NRFU population count for HUs with an NRFU proxy respondent

Comparison	Frequency	Percent	Std Err of Percent
EFU matches Administrative Record Count	102	32.5	2.8
EFU matches NRFU count	105	33.4	3.0
EFU matches neither	70	22.3	3.0
EFU Other	37	11.8	2.3
Total	314	100.0	

*Other includes EFU vacant, noninterview, and unresolved.

In Table 5, we examine whether the people in the NRFU interview or from administrative records have fewer missing characteristics. The first row shows the percent missing characteristics for the 102 cases where EFU agrees with the administrative records. For these 102 housing units, we have both administrative record and NRFU responses. The

results show that the administrative records have no missing age and sex information. This was done deliberately for age by requiring records to have age and by using records that were assigned a Protected Identification Key (PIK), the processing obtained sex for all of the records.

For NRFU, age was missing 25.2% of the time and sex was missing 12.8% of the time. For race and Hispanic origin, we analyzed if either was available from administrative records or reported during the interview for NRFU. The results show that race/Hispanic origin was missing fewer times in the administrative records (13.6%) as compared to the NRFU response (23.1%). The second row shows the results for when the NRFU count agrees with the EFU count. This row shows similar trends in missing characteristics as the previous comparison. For these cases, even though the NRFU count agrees with EFU, there is a larger amount of missing characteristics for these three items.

Table 5. Percent of People Missing Characteristics for Administrative Records and NRFU by EFU Count agreement for NRFU proxy respondents

	Administrative Records				NRFU			
	Number of People	Percentage Missing			Number of People	Percentage Missing		
		Age	Sex	Race/Hispanic Origin		Age	Sex	Race/Hispanic Origin
<u>EFU=AR</u>	221	0.0%	0.0%	13.6%	234	25.2%	12.8%	23.1%
Percentage		0.0%	0.0%	2.4%		5.2%	3.8%	4.0%
Std error of percentage		0.0%	0.0%	2.4%		5.2%	3.8%	4.0%
<u>EFU=NRFU</u>	249	0.0%	0.0%	15.3%	261	37.2%	15.3%	31.0%
Percentage		0.0%	0.0%	2.4%		6.7%	4.5%	5.5%
Std error of percentage	-	0.0%	0.0%	2.4%		6.7%	4.5%	5.5%

Note: Administrative records do not contain detailed Hispanic origin information.

To summarize, our analysis of the 2015 EFU results for the 319 addresses where the administrative record and the NRFU proxy respondent agreed that the HU was occupied, but the count did not agree found a more equal pattern in the agreement rates than observed for the NRFU household member respondents. For these 319 cases, EFU agreed with the administrative record count 33% of the time, agreed with the NRFU count 33% of the time and disagreed with both 22% of the time. While the population count comparisons were very similar, the characteristics were missing fewer times for the administrative records case than the NRFU proxy respondents. This was, in part, due to the administrative records requirement of only using records assigned a protected identification key. These results indicate that administrative records appear to be as good as proxy enumerations for this group and for characteristics may be better.

3.3 Administrative Record Vacant and NRFU Occupied

This section evaluates the EFU status of housing units determined to be occupied during NRFU but predicted vacant by AR. As noted, we assign a vacant status to 2,672 units in the control panel. With the exception of those units located in the Outer Ring, all AR vacant units assigned an occupied or delete status during NRFU received an EFU visit. There were 388 units not in the Outer Ring that AR predicted to be vacant but received

an occupied status during NRFU. Table 6 presents the results of EFU for these 388 units. Of these 388 units, 272 were occupied and 74 units were vacant in EFU. The agreement rate of 70.1% supports the accuracy of NRFU in these types of HUs.

Table 6. EFU status for HUs that were vacant in administrative records but occupied in NRFU

EFU status	Count	Percent	Std Err of Percent
Occupied	272	70.1	4.3
Vacant	74	19.1	2.6
Delete	8	2.1	0.9
Other	34	8.8	4.5
Total	388	100.0	

Table 7 presents the USPS UAA results of those units assigned a vacant status by AR but determined occupied by NRFU and EFU. Of these 272 units, 88.6% received at least one vacant status by the USPS. The results show that 27.2% (S.E. = 6.1%) received a UAA in three mailings and 15% (S.E. = 5.2%) received a UAA vacant status in all four consecutive mailings.

Table 7. Mailings where a UAA assigned the status of vacant to a EFU HU that was vacant in administrative records but occupied in both NRFU and EFU

EFU status	Count	Percent	Std. Error of Percent
<u>Number of mailings where UAA assigned vacant status</u>			
0	31	11.4	3.8
1	54	19.9	7.7
2	72	26.5	7.3
3	74	27.2	6.1
4	41	15.0	5.2
Total	272	100.0	
<u>Reminder card UAA assignment</u>			
Vacant	192	70.6	12.2
Attempted, not known	15	5.5	1.9
Not deliverable as addressed	9	3.3	1.4
Unclaimed	1	0.4	0.4
Delivered	55	20.2	11.2
Total	272	100.0	

The reminder card was the second Census mailing and was timed most closely with Census Day. This was the UAA information that was used in the administrative record processing. When we evaluate the USPS status assigned to the reminder card for the 272 units, 70.6% (S.E. = 12.2%) received a vacant status from the USPS. The reminder card

results did show that 20% (S.E. = 11.2%) were delivered. The administrative record vacant processing did not have a requirement that the mailing had to be vacant. It utilized the predicted probabilities of a case being vacant, delete or occupied. Since the 2015 Census Test results showed that NRFU occupied cases were being identified as administrative record vacant, one lesson learned is that future processing will require a case to have a UAA for the delivery used in the identification. Further analysis of these 55 cases delivered in the reminder card results showed that 22 cases (40%) of the cases were not UAA in any of the four mailings and that 24 cases (43.6%) were only UAA on the last mailing that had an in home delivery date of around April 15th.

A major finding for the 388 addresses where administrative records and NRFU disagreed on occupancy status was that EFU agreed with NRFU that 272 (70%) were occupied while 74 (19%) were vacant as indicated by administrative records. For the 272 that were occupied in EFU, the analysis showed that 20% were not Undeliverable-As-Addressed (UAA) in the second mailing. This result is important in that this mailing was used in the processing since it was closest to Census Day April 1st. Going forward, this result led to the addition of a requirement that the address used in processing must be UAA in the mailing closest to Census Day. In addition, more investigation is needed to interpret the result that 27% of these 272 addresses received a UAA for three mailings and 15% received a UAA for four mailings even though EFU found them to be occupied. Since over 40% were UAA for three or more mailings, we recommended that the research team do more qualitative outreach with the United States Postal Service in the 2016 Census Test. This will allow the team to gain a better understanding of how postal carriers assign UAAs and to use UAAs better in our processing.

4. Summary

This paper reports an analysis of the results from the 2015 EFU interviews at addresses that had one of three types of discrepant results from administrative records and NRFU interviews during the 2015 Census Test in Maricopa County, AZ. Through the analyses of the 2016 EFU results, the research team gained new knowledge of the data and methods for using administrative records in the 2020 Census. The team was able to make recommendations in some areas and identify other areas where additional data sources and additional information about the collection of some of the administrative data would aid in improving the methodology.

One of our recommendations was an additional mailing to addresses without a self-response but with administrative records that appeared of high enough quality for enumeration. The recommended mailing was implemented in the 2016 Census Test. Since the 2016 Census Test does not include an evaluation followup, the response rate from the additional mailing will inform the decision on whether to continue the mailing in additional tests. We also recommended continuing to pursue additional files like Supplemental Nutrition Assistance Program files for research on whether they can improve the count and HH composition from administrative records sources. The work to acquire additional administrative records files is ongoing.

The EFU results indicated that administrative records appear to be of comparable quality to proxy enumerations for the count, and for characteristics, administrative records may be better. The basis for this statement is that the agreement rate between the EFU and NRFU counts was very similar to the agreement rate between the EFU and administrative

records count when the NRFU and administrative records counts disagreed. Additional support came from the observation that the characteristics were missing fewer times for the administrative records where processing was able to assign a protected identification key than for the NRFU proxy respondents. These results support continuing planned research on using administrative records instead of proxy responses for enumerating addresses where high quality administrative records are available.

The 2015 EFU results indicated that the research team needs a better understanding of the USPS data regarding addresses where the 2015 Census Test mailings were returned as Undeliverable-As-Addressed (UAA) to improve the accuracy of the models for identifying vacant HUs. When administrative records indicated a HU was vacant but NRFU found it to be occupied, EFU agreed with NRFU 70% of the time, and 42% of those received UAAs for three or four of the census mailings. The low agreement with administrative records led to the recommendation that the research team do more qualitative outreach with the USPS to learn more about the assignment of UAAs. This recommendation is being implemented in the 2016 Census Test. The qualitative research includes focus groups postal carriers to learn more about the assignment of UAA codes so that the team can improve the processing to identify vacant units.

The research in 2016 Census Test will produce data that will lead to improvements in the methodology for using administrative records in census-taking. The planned 2017 Census Test and 2018 end-to-end test will build on the results of the recommended studies to produce final methodology for the use of administrative records in the 2020 Census.

References

- Brown, J. D., Childs, J. H., and O'Hara, A. (2015). Using Census Records To Evaluate Administrative Records and Vice Versa, Federal Committee on Statistical Methodology Research Conference. Last accessed September 14, 2016 at https://fcsml.sites.usa.gov/files/2016/03/H1_Brown_2015FCSM.pdf.
- Keller, A. and Konicki, S. (2016). 2020 Research and Testing: Final Report on the Imputation in the 2015 Census Test. 2020 Census Program Internal Memorandum Series: 2016.42.i. U.S. Census Bureau. Washington, DC.
- Konicki, S. (2016). 2020 Research and Testing: Final Report on Adaptive Design in the 2015 Census Test. 2020 Census Program Internal Memorandum Series: 2016.48.i. U.S. Census Bureau. Washington, DC.
- Morris, D. (2014). A Comparison of Methodologies for Classification of Administrative Records Quality for Census Enumeration. In *JSM Proceedings Survey Research Methods Section*. Alexandria, VA, American Statistical Association. 1729–1743.
- Morris, D., Keller, A. and Clark, B. (2016). An Approach for Using Administrative Records to Reduce Contacts in the 2020 Census. *Statistical Journal of the IAOS*, 32. 177–188. Last accessed July 20, 2016 at <http://content.iospress.com/download/statistical-journal-of-the-iaos/sji1002?id=statistical-journal-of-the-iaos%2Fsj1002>.
- Mulry, M., Mule, T., and Clark, B. (2016). Final Report on the 2015 Census Test Evaluation Followup. 2020 Census Program Internal Memorandum Series: 2016.51.i. U.S. Census Bureau. Washington, DC.