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Investigating the 2010 Undercount of Young Children – Geographic Distribution of Coverage Followup Results

FINAL REPORT

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1. INTRODUCTION

Demographers have documented the high undercount of children under the age of 5 in decennial censuses (e.g., West and Robinson 1999, O'Hare 2015). Evaluations show that U.S. Census Bureau surveys, such as the American Community Survey, the Current Population Survey, and the Survey of Income and Program Participation, also undercount young children, which can result in biased survey estimates (O'Hare and Jensen 2014).

In this report, we define “young children” as children age 0 to 4. In 2010, the Census Bureau used two different methods to evaluate census coverage. A post-enumeration survey, the Census Coverage Measurement (CCM) program, used dual system estimation to measure net coverage error. In addition, Demographic Analysis (DA) provided independent estimates of net coverage error. In 2010, DA estimated a net undercount of about 4.6 percent for young children (Hogan et al. 2013). This translates into a net undercount of almost 1 million young children. O'Hare (2015) shows that the net undercount rate for young children in the decennial census increased from 1.4 percent in 1980 to 4.6 percent in 2010, while the net undercount rate for the adult population (age 18+) went from an undercount of 1.4 percent in 1980 to an overcount of 0.7 percent in 2010. This growth in the net undercount of young children is the motivation for this research.

The 2010 Census included a coverage improvement program to review the list of household members and identify suspected coverage errors for followup. Two recent reports summarized data from this Coverage Followup (CFU) operation. The first report (U.S. Census Bureau 2017a) looked at households that responded positively to one of the probes on the 2010 Census questionnaires about potentially omitted children. The report summarized the characteristics of households where the respondent was uncertain about including a child. The second report (U.S. Census Bureau 2017b) analyzed the characteristics of the young children added as a result of CFU and the characteristics of the households where they lived. Data from these two evaluations identified instances of potential coverage error involving young children.

In this report, we look at the geographic distribution of the CFU results, identifying areas with the greatest numbers and highest rates of positive responses to the child undercount probes and areas with the greatest numbers and proportions of their young children added as a result of the CFU operation. As we plan for the 2020 Census, it is useful to identify the geographic areas that experienced 2010 Census enumeration challenges involving young children. These areas could be targeted for special outreach and education efforts in 2020. Understanding common characteristics of these areas may help us better understand the reasons for the errors.

2. BACKGROUND

2.1 Coverage of Young Children in the 2010 Census

DA refers to a specific set of techniques for developing national population estimates by age, sex, and race from independent aggregate statistics. The DA population estimates are constructed using vital statistics (birth and death records), estimates of net international migration, and, for the

population age 65 and over, data from Medicare (U.S. Census Bureau 2012a). The Census Bureau uses these population estimates to assess the quality of the decennial census. DA is widely believed to provide the best estimates of young children because of the accuracy and completeness of birth registration in the United States and the small level of immigration and mortality for these ages (O'Hare et al. 2016).

Figure 1 graphs the percent difference between the 2010 Census count and the 2010 DA estimate by age for children under the age of 18. Note that age is “completed age,” implying that a value of 1, for example, represents children who were 12 months old as well as children who were up to 23 months old—just short of 2 years old. Children age 1 and 2 had the greatest percent difference at 5.5 percent. After age 12, the 2010 Census counts exceeded the DA estimates. Differences between the 2010 DA estimates and the 2010 Census counts may be explained by census coverage error. However, error exists in the DA estimates so we should not assume that all differences equate to coverage shortcomings. These results highlight the reason for focusing on the youngest children and the need to explore possible causes for the 2010 Census undercounting young children.

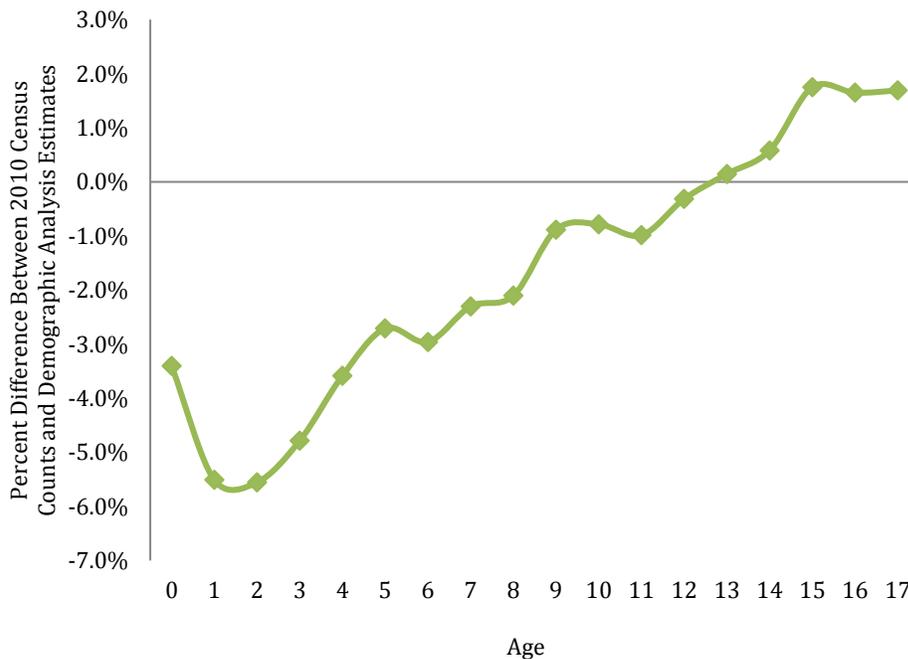


Figure 1. Comparison of 2010 Census Counts and Demographic Analysis Estimates for Children by Single Year of Age
Source: Revised 2010 Demographic Analysis Estimates (released May 2012)

Using data from the 2010 CCM and the 2010 DA, U.S. Census Bureau (2017c) estimated that the 2010 Census omitted nearly 2.2 million young children. This equates to more than 10 percent of the DA estimate of children under age 5 and was higher than the estimated omission rate for any other age group.

2.2 Basic Data Collection Methodology – 2010 Census

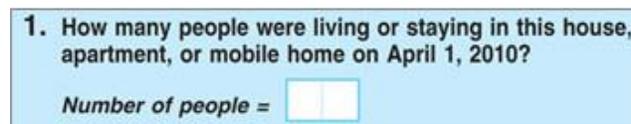
The 2010 Census relied largely on self-response to enumerate the country. The U.S. Postal Service and census enumerators (in Update Leave areas) delivered census questionnaires asking households to complete and return paper forms by mail. The Census Bureau mailed or delivered bilingual (English/Spanish) questionnaires in some parts of the country with forms and guides in additional languages available upon request. The Census Bureau conducted personal visit Nonresponse Followup (NRFU) interviews to enumerate the households that failed to respond by mail. In some more rural and remote areas, self-response was not an option. Enumerators visited all households in these areas to collect the required information in an operation called Update Enumerate (UE).

The 2010 Census data collection instruments used for self-response and by census enumerators were largely paper-based. In the 2010 Census, a “household” included all people who occupied a housing unit. One person was designated as the householder (a person who owns or rents the housing unit). The householder is frequently, but not always, the person who either completes the questionnaire or is interviewed during NRFU. The 2010 Census asked for the sex, age, date of birth, race, and Hispanic origin of each person and their relationship to the householder. Self-response and NRFU questionnaires included coverage questions to identify households that might have omitted or included someone in error. The following sections provide details about these coverage questions.

2.3 Coverage Followup Operation – 2010 Census

2.3.1 Undercount Probes

The 2010 Coverage Followup (CFU) operation identified potential coverage errors on mail-returned and enumerator-completed questionnaires primarily based on responses to undercount probes. The 2010 Census self-response questionnaire asked households to determine the total number of people living at an address. Figure 2 is a facsimile of the population count question.



1. How many people were living or staying in this house, apartment, or mobile home on April 1, 2010?

Number of people =

Figure 2. Facsimile of Population Count Question on Self-Response Questionnaires – 2010 Census

Immediately following this question was an undercount detection question in a “mark-all-that-apply” format. The question was designed to identify possible census omissions. The undercount question asked about people staying at the housing unit that the respondent did not include in the population count (Figure 3). Note that the first response category explicitly asks about “children, such as newborn babies or foster children.”

2. Were there any additional people staying here April 1, 2010 that you did not include in Question 1?
Mark *X* all that apply.

- Children, such as newborn babies or foster children
- Relatives, such as adult children, cousins, or in-laws
- Nonrelatives, such as roommates or live-in baby sitters
- People staying here temporarily
- No additional people

Figure 3. Facsimile of Self-Response Questionnaire's Undercount Question – 2010 Census

Self-response questionnaires with a positive response to this question (i.e., questionnaires with any of the first four response boxes marked) were eligible for CFU. A positive response was an indication that the person completing the form may have failed to include someone on their questionnaire who stayed with the household on April 1, 2010. We are interested in the households marking the “children, such as newborn babies or foster children” response because we believe that these households may have been uncertain about including a young child on their questionnaire. The 2010 self-response questionnaire also included a series of overcount probes, but, given our interest in omissions, those results are outside the scope of this report.

The questionnaire used in NRFU and in UE included a similar undercount question in a forced-choice question format that was asked after the roster had been completed (Figure 4). The slight difference in presentation was needed to make the question easy to read to a respondent. In this report, we use “NRFU” to refer to households enumerated in both NRFU and UE. The first two response categories involve babies and foster children. The NRFU questionnaire allowed the collection of the names of two people when the response to one or more of the undercount categories was “Yes.” CFU included cases with a positive response to any of the NRFU undercount questions. For the NRFU universe, we are interested in the households responding “Yes” to the “babies” or “foster children” probes. Any listed names from this question were added to the census roster before sending the case to CFU, but these people were not included in the 2010 Census unless CFU was able to recontact the household and validate that they were household members according to the census residence rules. Like self-response questionnaires, NRFU questionnaires also probed for possible overcount errors, but those probes are not in scope for this analysis.

H1. We do not want to miss any people who might have been staying here on April 1. Were there any additional people that you didn't mention, for example:

Babies? Yes No

Foster children? Yes No

Any other relatives? Yes No

Roommates? Yes No

Any other nonrelatives? Yes No

How about anyone else staying here on April 1 who had no permanent place to live? Yes No

If yes to any category, ask: What is that person's name?

First Name Last Name

Anyone else?

First Name Last Name

Do not list any people recorded for this question on the inside pages or on a continuation form.

Figure 4. Facsimile of the Enumerator Questionnaire's Undercount Question – 2010 Census

2.3.2 Coverage Followup Interview

The 2010 CFU operation included self-response and NRFU census questionnaires with suspected coverage errors. Some questionnaires were eligible for CFU based on their responses to the undercount probes previously described. Additional questionnaires entered CFU based on responses to the overcount probes, because of discrepancies on the questionnaires that indicated possible response errors (e.g., differences between the total count of household members and the number of listed people), or if the household was large. All form types (including forms in languages other than English) were eligible for CFU. See U.S. Census Bureau (2012b) and U.S. Census Bureau (2017a) for more detail about the full set of reasons that questionnaires became eligible for CFU.

CFU relied on a centralized telephone followup to recontact households with suspected coverage errors to review the roster and determine the need for changes (additions or deletions). The 2010 CFU interview methodology had several shortcomings. It required a successful recontact with the census household to resolve the potential coverage issue. CFU was only able to recontact 56 percent of the cases eligible for CFU (U.S. Census Bureau 2012b). Households that CFU could not recontact may not have responded to a phone call or may have lacked a phone number on the census questionnaire to facilitate recontact. The households that were unresolved may have included young children that remained unlisted on self-response or NRFU forms. In addition, the CFU interview was an independent review of the household roster. This design standardized the CFU interview and simplified CFU data collection. However, households responding positively to one of the child-specific probes were not asked directly about potentially omitted children. It is possible that a successful CFU contact may not have addressed the initial child-related coverage concern.

The 2010 CFU operation identified more than 8 million households as eligible for follow-up (U.S. Census Bureau 2012b). About 4.5 million households completed a CFU interview resulting in 69,383 added or validated young children (U.S. Census Bureau 2012b, U.S. Census Bureau 2017a). Without the CFU operation, the estimate of omissions would have exceeded 2.2 million. CFU reduced the number of missed young children by about 3 percent.

3. RESEARCH QUESTIONS

This report answers the following research questions.

1. Which states and counties had the greatest number of positive responses to one of the child-specific undercount probes?
2. Which states and counties had the highest proportion of households with a positive response to one of the child-specific undercount probes?
3. Which states and counties had the greatest number of CFU-added young children?
4. Which states and counties had the highest proportion of their young children added in the CFU operation?

4. METHODOLOGY

4.1 Sources of Data

This report uses response data from the Census Unedited File to identify housing units with specific responses to the undercount questions. We chose to focus on the 611,606 households with a positive response to one of the child-specific undercount probes. This includes households marking the “*children, such as newborn babies or foster children*” probe on self-response forms and households responding “Yes” to either the “*babies*” or “*foster children*” probes of NRFU forms. To calculate the proportion of households that responded positively to one of the undercount probes, we used final edited 2010 Census data on occupied housing units (households) as denominators. We excluded any questionnaires that did not include the coverage question, leaving us with 115.6 million households as our national denominator¹.

We identified added young children from the CFU operation using data assembled in the CFU analysis file. This file was the basis for the 2010 CFU evaluations. We also identified young children that CFU validated after an enumerator listed their names in response to the NRFU undercount question. Combining these two universes provided us with a total of 69,383 young children added to the 2010 Census by CFU or added in NRFU and validated in CFU. These are children who were included in the 2010 Census because of this CFU operation. We believe these children may have similar characteristics to those children who were omitted from the 2010 Census. We used the final 2010 Census count of young children as denominators. The 2010 Census included 20,163,046 children under the age of 5 living in housing units in the 50 states and the District of Columbia.

¹ Questionnaires that did not include the coverage question were experimental versions of the questionnaire and households where the census count was imputed.

4.2 Definitions

4.2.1 Positive-Response Metrics

We calculated two measures related to positive responses to the undercount probes. Recall that a positive response to one of these undercount probes reflects a level of respondent uncertainty about including some children on their 2010 Census roster. We identified all households that marked the box for the “*children, such as newborn babies or foster children*” probe in the undercount question on self-response questionnaires or responded “Yes” to either the “*babies*” or “*foster children*” probes in the undercount question on NRFU questionnaires. While other undercount probes resulted in the identification of young children that respondents initially omitted and CFU added, we chose to focus on the probes specifically designed to identify rostering errors involving children.

The first metric was the total number of positive responses to one of the child-specific undercount probes. Nationally, 611,606 households responded positively to one of these probes.

The second metric was the positive-response rate. We defined the positive-response rate as the ratio of the number of households with a positive response to one of the child undercount probes to the total number of households in the 2010 Census² (nationally, 115.6 million total households). Multiplying those results by 1,000 converted the ratios to an estimate of positive responses per 1,000 households. The positive-response rate takes the size of each state and county into account and describes the proportion of households with some possible confusion about rostering children. U.S. Census Bureau (2017a) found that about five out of every 1,000 households responded positively to one of the undercount probes about children.

4.2.2 CFU Add Metrics

We calculated two measures of young children added during CFU. The first metric was the total number of CFU-added young children. A total of 69,383 young children were added to the 2010 Census because of CFU. In addition to the young children identified and added during the CFU interview, this count includes young children added to the NRFU questionnaire as possible omissions and validated in CFU.

The second metric was the CFU add rate, used to assess the proportion of young children added as a result of the CFU operation. We defined the CFU add rate as the ratio of the number of young children added or validated during CFU to the total number of young children in the 2010 Census (nationally, 20.1 million total young children). Multiplying those results by 1,000 converted the ratios to a statistic of CFU-added young children per 1,000 enumerated young children. U.S. Census Bureau (2017b) found that CFU accounted for about three out of every 1,000 young children in the 2010 Census.

² We defined total households as the subset of households where the questionnaire included the coverage question.

4.3 Limitations

The number of CFU adds and the CFU add rates accurately reflect the households where we successfully added young children in the 2010 CFU operation. Those CFU-added young children may not, however, depict the true distribution of omissions of young children because the CFU operation had a fairly low completion rate of 56 percent (U.S. Census Bureau 2012b). We expect that areas with lower levels of cooperation would have been less likely to respond to a census phone call. This would result in lower contact rates and potentially fewer CFU adds. U.S. Census Bureau (2012b) found that CFU completed interviews with about 60 percent of self-response households and only about 34 percent of NRFU households.

We interpret the positive responses as a measure of uncertainty among respondents, but the number of positive responses and the positive-response rates can also include response errors on the part of the respondent. Some households may have marked one of the child undercount probe boxes in error, having included all household members correctly. We believe that these response errors are minimal. Responses on enumerator-completed forms may understate confusion about young children because of guidance from the enumerator.

4.4 Estimation and Analysis

We produced counts of households with positive responses, counts of CFU-added young children, and positive-response rates for the 50 states, the District of Columbia, and for all 3,143 counties. We restricted the CFU add rates to the 50 states, the District of Columbia, and 2,011 of the 3,143 counties (those with at least 1,000 young children). To study the relationship between the positive response rates and CFU add rates and size of county, we created six strata based on the total number of households in each county. We pooled all responses across all households within each of these strata to produce positive-response and CFU add rates.

5. RESULTS

5.1 Positive Responses to Child-Specific Undercount Probes

Which states and counties had the greatest number of positive responses to one of the child-specific undercount probes?

A total of 611,606 households responded positively to one of the child-specific undercount probes. This includes responses on both self-response and NRFU questionnaires.

5.1.1 State-Level Results

Table 1 summarizes the number of positive responses to the child-specific undercount probes and the positive-response rate for each state and the District of Columbia, sorted from the highest to lowest number of positive responses. Table 1 also includes the ranking of each state with respect to the total number of young children. As expected, the states with the largest populations of young children had the greatest number of positive responses to one of the undercount probes involving children. Four states (California, Texas, New York, and Florida) had 40,000 or more positive-

response households. These four states account for more than 37 percent of all positive-response households. The states of Illinois, Georgia, North Carolina, and Pennsylvania each had more than 20,000 positive-response households. Three states (Wyoming, Vermont, and North Dakota) had fewer than 1,000 positive-response households.

Table 1. Number of Positive-Response Households and Positive-Response Rates – State-Level

State	Number of Positive-Response Households	Positive-Response Rate	Total Young Children	Ranking – Total Young Children
California	84,162	6.8	2,526,451	1
Texas	59,788	6.8	1,926,502	2
New York	44,879	6.2	1,149,259	3
Florida	40,044	5.5	1,071,160	4
Illinois	24,223	5.0	834,458	5
Georgia	22,770	6.5	686,173	8
North Carolina	21,050	5.7	631,223	9
Pennsylvania	20,576	4.1	727,977	6
Ohio	18,070	3.9	719,985	7
New Jersey	17,572	5.5	539,996	11
Virginia	15,441	5.1	509,038	12
Michigan	15,182	3.9	595,247	10
Maryland	13,270	6.2	363,828	19
Tennessee	12,707	5.1	407,428	16
Massachusetts	11,962	4.7	365,746	18
Louisiana	11,908	7.0	313,923	23
Washington	11,545	4.5	438,744	14
Arizona	11,507	4.9	455,017	13
Indiana	11,071	4.4	433,483	15
South Carolina	10,957	6.2	301,981	25
Alabama	9,650	5.2	304,765	24
Missouri	9,603	4.1	389,535	17
Colorado	8,565	4.4	343,605	22
Wisconsin	8,199	3.6	358,117	20
Kentucky	8,143	4.8	282,073	26
Minnesota	7,737	3.7	354,519	21
Mississippi	6,911	6.3	210,748	30
Oklahoma	6,557	4.5	263,761	27
Oregon	6,082	4.1	236,995	29
Nevada	6,025	6.1	187,368	35
Connecticut	6,006	4.4	201,740	33
Arkansas	5,957	5.2	197,504	34
Kansas	5,028	4.5	205,309	31
Iowa	4,254	3.5	201,794	32
Utah	4,157	4.8	263,693	28
New Mexico	4,109	5.3	144,735	36
Nebraska	3,127	4.4	131,610	37
West Virginia	2,875	3.8	103,974	39
Hawaii	2,747	6.1	86,657	40
Idaho	2,389	4.2	121,655	38
Rhode Island	1,947	4.7	57,333	45
Maine	1,822	3.3	69,360	42
Delaware	1,744	5.2	55,791	46
New Hampshire	1,678	3.3	69,619	41
District of Columbia	1,670	6.4	32,271	50
Montana	1,247	3.1	61,892	43
Alaska	1,083	4.3	53,718	47
South Dakota	1,048	3.3	58,799	44
Wyoming	861	3.8	40,150	49
Vermont	855	3.4	31,847	51
North Dakota	846	3.0	44,490	48

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.1.2 County-Level Results

Table 2 summarizes the number of positive-response households at the county-level. We included all 3,143 counties in this distribution. Most counties (54 percent) had fewer than 50 positive-response households. A total of 122 counties had 1,000 or more positive responses to a child-specific undercount probe. These 122 counties account for 325,659 of the 611,606 positive response households (53 percent). The three largest counties (Los Angeles County, California; Harris County, Texas; and Cook County, Illinois) included about 8 percent of all the positive-response households.

Table 2. Distribution of Number of Positive-Response Households – County-Level

Number of Positive-Response Households	Number of Counties	Percent of Counties
0	37	1.2
1 to 49	1,652	52.6
50 to 99	592	18.8
100 to 249	453	14.4
250 to 999	287	9.1
1,000 or more	122	3.9
TOTAL	3,143	100.0

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

Table 3 identifies the 20 counties with the greatest number of positive-response households. The table also displays the county ranking of total number of young children. Generally, the counties with the largest population of young children had the greatest number of households responding positively to one of the child-specific undercount probes. More than 23 percent of all positive-response households live in these 20 counties.

Table 3. Counties with the Greatest Number of Positive-Response Households

State	County	Number of Positive-Response Households	Ranking – Number of Young Children
CA	Los Angeles County	25,049	1
TX	Harris County	12,681	3
IL	Cook County	12,509	2
NY	Kings County	8,595	8
TX	Dallas County	7,631	6
NY	Queens County	7,493	14
AZ	Maricopa County	7,312	4
FL	Miami-Dade County	6,985	11
NY	Bronx County	6,213	20
CA	Orange County	6,170	7
CA	San Diego County	5,742	5
PA	Philadelphia County	5,084	22
CA	Riverside County	4,807	9
FL	Broward County	4,666	19
NV	Clark County	4,650	13
CA	San Bernardino County	4,531	10
TX	Tarrant County	4,313	12
TX	Bexar County	4,125	15
MI	Wayne County	4,113	18
NY	New York County	4,077	32

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.2 Positive-Response Rates

Which states and counties had the highest proportion of households with a positive response to one of the child-specific undercount probes?

Nationally, about 5.3 out of every 1,000 households responded positively to one of the child undercount probes. Table 4 shows the distribution of the state-level and county-level positive-response rates. We include the District of Columbia in both state and county distributions.

Table 4. Distribution of Positive-Response Rates – State and County Levels

Positive-Response Rate	Number of States	Percent of States	Number of Counties	Percent of Counties
Less than 3.0	0	0.0	701	22.3
3.0 to 3.9	13	25.5	837	26.6
4.0 to 4.9	17	33.3	624	19.9
5.0 to 5.9	10	19.6	417	13.3
6.0 or greater	11	21.6	564	17.9
TOTAL	51	100.0	3,143	100.0

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.2.1 State-Level Results

In Table 4, we see that, the positive-response rates are not equally distributed across states. Of the 51 states (including DC), 14 have positive-response rates higher than the mean of 5.3 per 1,000. More than 25 percent of all states had a positive-response rate below four per 1,000. Ten states and the District of Columbia had rates of six per 1,000 or greater. State-level rates ranged from a low of three per 1,000 in North Dakota and a high of seven per 1,000 in Louisiana. The median state-level positive-response rate was 4.7 per 1,000. Table 5 displays the state-level rates sorted from highest to lowest. Louisiana, Texas, California, and Georgia had some of the highest rates. North Dakota, South Dakota, Montana, New Hampshire, Maine, and Vermont had some of the lowest rates. Comparing these results with the results in Table 1, we identify Texas, California, Georgia, and New York as states with the highest positive-response rates and the greatest number of positive-response households. We also find that the states with the lowest positive-response rates generally had the lowest numbers of positive-response households (North Dakota, Montana, New Hampshire, Maine, South Dakota, and Vermont).

Table 5. State-Level Positive-Response Rates

State	Positive-Response Rates	State	Positive-Response Rates
Louisiana	7.0	Kansas	4.5
Texas	6.8	Oklahoma	4.5
California	6.8	Washington	4.5
Georgia	6.5	Indiana	4.4
District of Columbia	6.4	Connecticut	4.4
Mississippi	6.3	Colorado	4.4
Maryland	6.2	Nebraska	4.4
New York	6.2	Alaska	4.3
South Carolina	6.2	Idaho	4.2
Hawaii	6.1	Pennsylvania	4.1
Nevada	6.1	Missouri	4.1
North Carolina	5.7	Oregon	4.1
New Jersey	5.5	Ohio	3.9
Florida	5.5	Michigan	3.9
New Mexico	5.3	Wyoming	3.8
Arkansas	5.2	West Virginia	3.8
Alabama	5.2	Minnesota	3.7
Delaware	5.2	Wisconsin	3.6
Tennessee	5.1	Iowa	3.5
Virginia	5.1	Vermont	3.4
Illinois	5.0	South Dakota	3.3
Arizona	4.9	Maine	3.3
Kentucky	4.8	New Hampshire	3.3
Utah	4.8	Montana	3.1
Rhode Island	4.7	North Dakota	3.0
Massachusetts	4.7		

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.2.2 County-Level Results

We see wide variation in the positive-response rates at the county-level. The positive-response rates ranged from a low of zero to a high of more than 13 per 1,000. The median county-level positive-response rate was 4.0 per 1,000. Table 4 indicates that about 22 percent of the counties had rates below three per 1,000. About 18 percent of the counties had rates of six per 1,000 or greater. Figure 5 is a map displaying the county-level positive-response rates. We observe geographic clustering of counties with high positive-response rates in the Carolinas and Georgia, along the Gulf Coast (notably in Louisiana and Mississippi), throughout Texas, and in Southern California. The northern half of the nation generally shows moderate to low positive-response rates. Because of the small geographic size of several counties in New York and Maryland, this map does not highlight the high positive-response rates observed in New York City (Queens, Bronx, and Kings counties) or Prince George's County (Maryland suburb of District of Columbia).

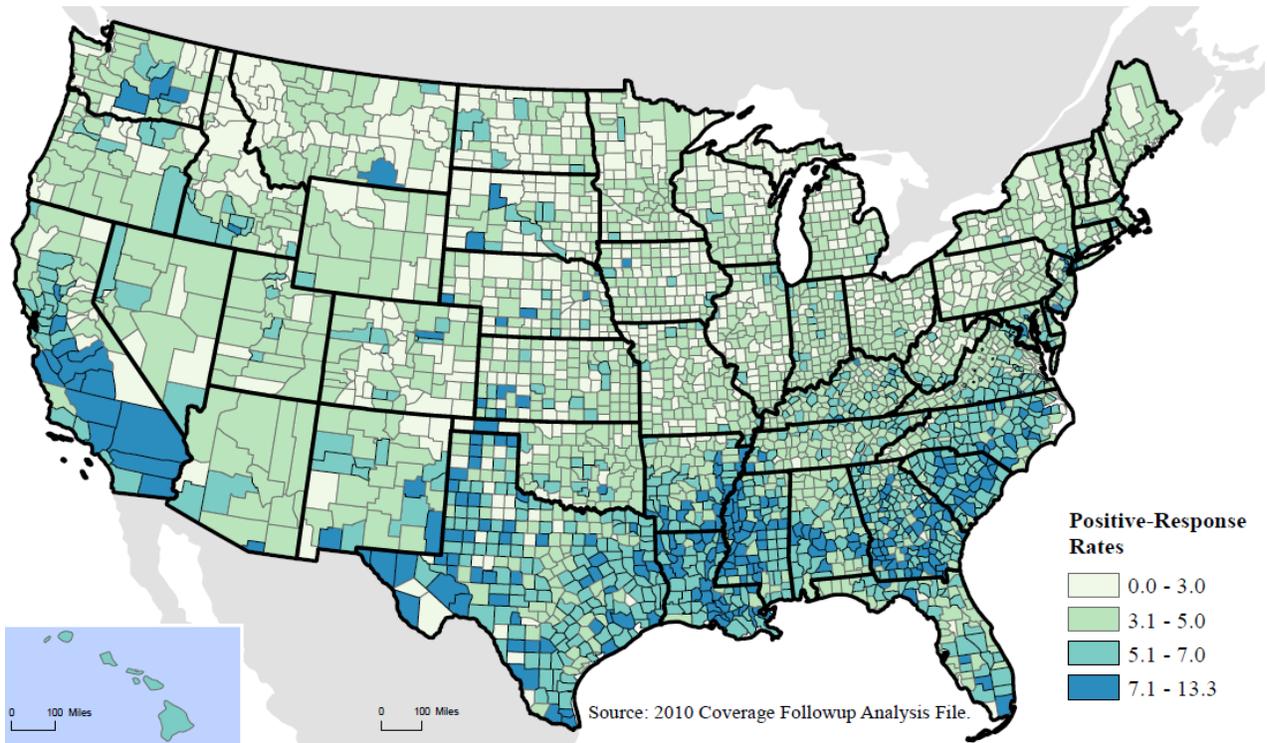
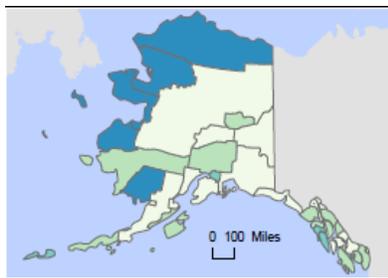


Figure 5. County-Level Positive-Response Rates
Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

Table 6 identifies some of the large counties (i.e., those with at least 100,000 households) with high positive-response rates.

Table 6. Large Counties with High Positive-Response Rates

State	County	Positive-Response Rates
NY	Bronx County	13.1
CA	Monterey County	10.0
NY	Queens County	9.7
NY	Kings County	9.6
CA	Tulare County	9.5
MD	Prince George's County	9.3
TX	Dallas County	9.0
MD	Baltimore City	9.0
TX	Harris County	8.9
CA	Fresno County	8.8
CA	Kern County	8.7
PA	Philadelphia County	8.6
TX	Cameron County	8.4
LA	Caddo Parish	8.3
NJ	Essex County	8.3
CA	San Joaquin County	8.3
FL	Miami-Dade County	8.1

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

Figure 6 displays the relationship between the county-level positive-response rates and the county level counts of total positive-response households. To improve the scale of the graph, we excluded the five largest counties (those with more than 1 million households). We observe a weak relationship (correlation coefficient of 0.04) suggesting that a high positive response rate does not imply a large number of positive-response households.

A graphic such as this could, however, be used to identify the counties where outreach and promotion might be most effective. We added two lines at five positive-responses per 1,000 (vertical line, the national positive-response rate) and 4,000 total positive-response households (horizontal line). The counties with at least five per 1,000 positive-response rates and at least 4,000 total positive-response households are in the upper right quadrant. These counties include three in New York—Queens, Kings, and Bronx. The quadrant also includes Miami-Dade, Florida; Dallas, Texas; and Philadelphia, Pennsylvania. Excluded from Figure 6 are the three largest counties (Los Angeles, California; Cook, Illinois; and Harris, Texas), all with positive-response rates exceeding five per 1,000 and counts of positive-response households exceeding 4,000.

The lower right quadrant of Figure 6 identifies counties with high positive-response rates but relatively low counts of positive-response households. In general, these are small counties. The high positive-response rates in these counties suggest a greater concentration of households with problems completing their census rosters. Studying these counties may help us to better understand the reasons for respondent confusion.

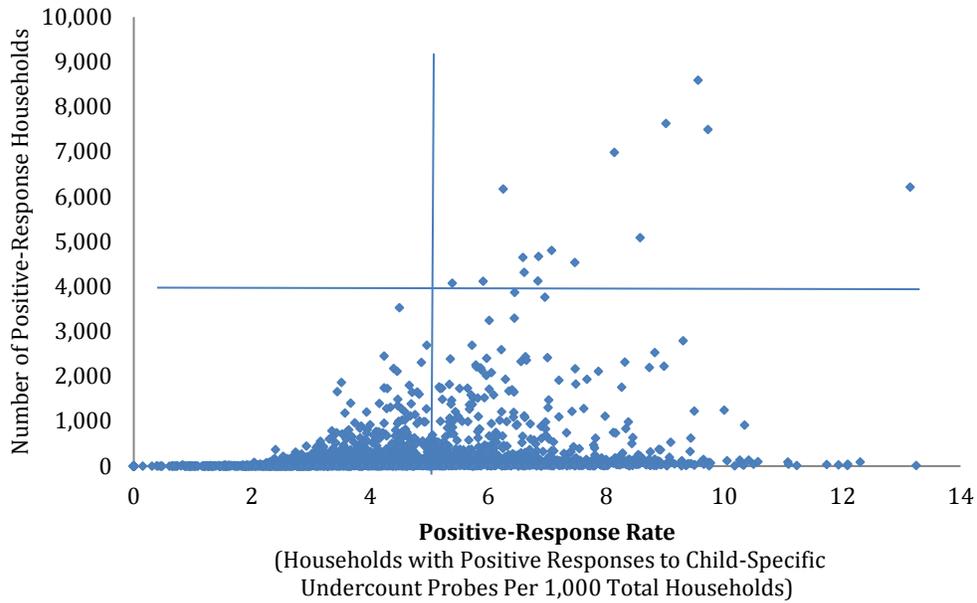


Figure 6. Positive-Response Rates by Number of Positive-Response Households – County-Level
 Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

We divided the 3,143 counties into six groups based on size (total number of households). Figure 7 displays the positive-response rates for each of these size groups. We see that the positive-response rates generally increase as the county size increases. Counties with at least 500,000 households shared a positive-response rate of nearly seven per 1,000. Small counties had positive-response rates between four and five per 1,000. While the largest counties had the highest positive-response rates, respondent confusion about listing children is not uniquely a “big city” problem.

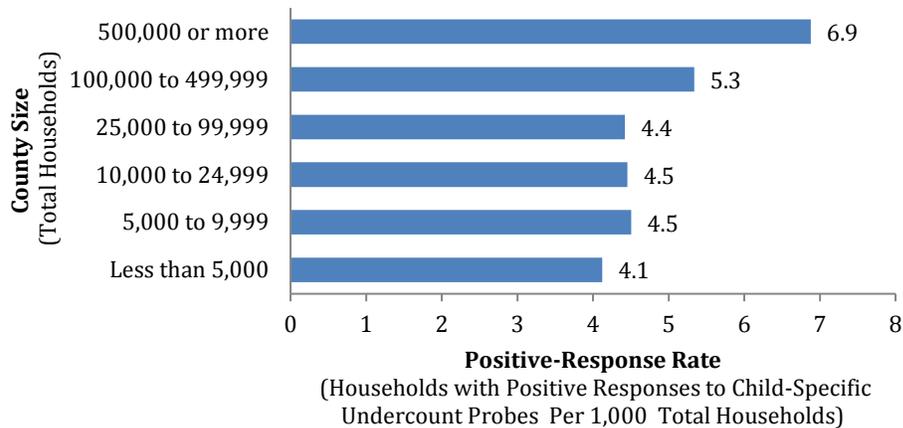


Figure 7. Summary of Positive-Response Rates by County Size
 Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.3 Coverage Followup Adds

Which states and counties had the greatest number of CFU-added young children?

We analyzed data for the 69,383 young children added to self-response and NRFU questionnaires in CFU. Only a subset of these added children were added to a questionnaire that responded positively to one of the child-specific undercount probes. Responses to other undercount probes, including overcount probes, resulted in the addition of young children during CFU. Refer to U.S. Census Bureau (2017a) for more information about the other sources of added young children.

5.3.1 State-Level Results

Table 7 displays the counts of CFU-added young children in each state, sorted from highest to lowest. The states with the largest populations of young children accounted for the greatest number of CFU-added young children. The CFU operation added 28,201 young children in California, Texas, New York, Florida, and Illinois (more than 40 percent of all CFU-added young children). These five states include more than 37 percent of all young children. The CFU operation added few young children in Vermont, North Dakota, Wyoming, and New Hampshire (states with small numbers of young children).

Table 7. Number of Coverage Followup-Added Young Children and Add Rates – State-Level

State	Number of CFU-Added Young Children	Coverage Followup Add Rate for Young Children	Total Young Children	Ranking - Total Young Children
California	11,018	4.4	2,526,451	1
Texas	6,417	3.3	1,926,502	2
New York	4,350	3.8	1,149,259	3
Florida	3,771	3.5	1,071,160	4
Illinois	2,645	3.2	834,458	5
Georgia	2,511	3.7	686,173	8
North Carolina	2,130	3.4	631,223	9
Pennsylvania	2,108	2.9	727,977	6
Ohio	1,902	2.6	719,985	7
Michigan	1,739	2.9	595,247	10
Virginia	1,727	3.4	509,038	12
New Jersey	1,698	3.1	539,996	11
Arizona	1,672	3.7	455,017	13
Washington	1,574	3.6	438,744	14
Tennessee	1,487	3.6	407,428	16
Maryland	1,358	3.7	363,828	19
Indiana	1,255	2.9	433,483	15
Missouri	1,252	3.2	389,535	17
Louisiana	1,120	3.6	313,923	23
South Carolina	1,081	3.6	301,981	25
Alabama	1,030	3.4	304,765	24
Colorado	1,024	3.0	343,605	22
Wisconsin	1,000	2.8	358,117	20
Massachusetts	967	2.6	365,746	18
Oregon	903	3.8	236,995	29
Oklahoma	898	3.4	263,761	27
Kentucky	885	3.1	282,073	26
Minnesota	882	2.5	354,519	21
Mississippi	868	4.1	210,748	30
Utah	865	3.3	263,693	28
Nevada	684	3.7	187,368	35
Hawaii	662	7.6	86,657	40
Kansas	645	3.1	205,309	31
Connecticut	613	3.0	201,740	33
Arkansas	587	3.0	197,504	34
Iowa	548	2.7	201,794	32
New Mexico	539	3.7	144,735	36
Nebraska	445	3.4	131,610	37
Idaho	370	3.0	121,655	38
West Virginia	275	2.6	103,974	39
Montana	226	3.7	61,892	43
Alaska	211	3.9	53,718	47
District of Columbia	207	6.4	32,271	50
Maine	195	3.3	58,799	42
South Dakota	195	2.8	69,360	44
Delaware	184	3.3	55,791	46
Rhode Island	178	3.1	57,333	45
New Hampshire	169	2.4	69,619	41
Wyoming	119	3.0	40,150	49
North Dakota	109	2.4	44,490	48
Vermont	85	2.7	31,847	51

CFU: Coverage Followup

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.3.2 County-Level Results

Most counties had fewer than 10 young children added in CFU (Table 8). Less than 9 percent of all counties had 50 or more CFU-added young children, and only 14 counties had 500 or more CFU-added young children.

Table 8. Distribution of Number of Coverage Followup-Added Young Children – County-Level

Number of CFU-Added Young Children	Number of Counties	Percent of Counties
0	420	13.4
1 to 9	1,664	52.9
10 to 49	788	25.1
50 to 99	130	4.1
100 to 499	127	4.0
500 or more	14	0.4
TOTAL	3,143	100.0

CFU: Coverage Followup

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

Table 9 lists the counties with the greatest number of CFU-added young children. These are essentially the counties with the greatest number of young children as shown by the ranking. Three counties—Los Angeles, California; Cook, Illinois; and Harris, Texas—included 8 percent of all CFU-added young children. These counties also include about 7 percent of all young children in the nation. From Table 9 we see that the 10 counties with the greatest number of CFU-added young children are the top 10 counties with respect to total young children. These 10 counties account for 16 percent of all CFU-added young children and 13 percent of all young children.

Table 9. Counties with the Greatest Number of Coverage Followup-Added Young Children

State	County	Number of CFU-Added Young Children	Ranking – Number of Young Children	State	County	Number of CFU-Added Young Children	Ranking – Number of Young Children
CA	Los Angeles County	3,140	1	FL	Miami-Dade County	541	11
IL	Cook County	1,351	2	NY	Bronx County	504	20
TX	Harris County	1,067	3	NV	Clark County	502	13
AZ	Maricopa County	915	4	HI	Honolulu County	497	53
NY	Kings County	883	8	PA	Philadelphia County	489	22
CA	San Diego County	841	5	TX	Bexar County	485	15
CA	Orange County	808	7	TX	Tarrant County	468	12
CA	Riverside County	766	9	CA	Santa Clara County	464	16
TX	Dallas County	719	6	MI	Wayne County	449	18
CA	San Bernardino County	706	10	CA	Sacramento County	443	21
NY	Queens County	644	14	FL	Broward County	393	19

CFU: Coverage Followup

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.4 Coverage Followup Add Rates

Which states and counties had the highest proportion of their young children added in the CFU operation?

The 2010 Census included 20,163,046 children under age 5 living in housing units in the 50 states and the District of Columbia. This results in a rate of 3.4 CFU-added young children for every 1,000 young children in the 2010 Census. Table 10 summarizes the state-level and county-level

distributions of these CFU add rates. The county-level results exclude counties with fewer than 1,000 young children.

Table 10. Distribution of Coverage Followup Add Rates for Young Children – State-Level

Coverage Followup Add Rate for Young Children	Number of States	Percent of States	Number of Counties*	Percent of Counties*
Less than 3.0	13	25.5	400	19.9
3.0 to 3.9	34	66.7	594	29.5
4.0 to 4.9	2	3.9	536	26.7
5.0 to 5.9	0	0.0	271	13.5
6.0 or greater	2	3.9	210	10.4
TOTAL	51	100.0	2,011	100.0

*Excludes counties with fewer than 1,000 young children

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

5.4.1 State-Level Results

State-level CFU add rates ranged from 2.4 per 1,000 (New Hampshire) to 7.6 per 1,000 (Hawaii). The median CFU state-level add rate was 3.3. Most states had a CFU add rate between three per 1,000 and four per 1,000. Four states (Hawaii, the District of Columbia, California, and Mississippi) had rates of four per 1,000 or greater. Table 11 displays the state-level rates sorted from highest to lowest. New Hampshire, North Dakota, and Minnesota had the lowest rates.

Table 11. State-Level Coverage Followup Add Rates for Young Children

State	Coverage Followup Add Rate for Young Children	State	Coverage Followup Add Rate for Young Children
Hawaii	7.6	Utah	3.3
District of Columbia	6.4	Missouri	3.2
California	4.4	Illinois	3.2
Mississippi	4.1	New Jersey	3.1
Alaska	3.9	Kansas	3.1
Oregon	3.8	Kentucky	3.1
New York	3.8	Rhode Island	3.1
Maryland	3.7	Idaho	3.0
New Mexico	3.7	Connecticut	3.0
Arizona	3.7	Colorado	3.0
Georgia	3.7	Arkansas	3.0
Montana	3.7	Wyoming	3.0
Nevada	3.7	Michigan	2.9
Tennessee	3.6	Pennsylvania	2.9
Washington	3.6	Indiana	2.9
South Carolina	3.6	Maine	2.8
Louisiana	3.6	Wisconsin	2.8
Florida	3.5	Iowa	2.7
Oklahoma	3.4	Vermont	2.7
Virginia	3.4	West Virginia	2.6
Nebraska	3.4	Massachusetts	2.6
Alabama	3.4	Ohio	2.6
North Carolina	3.4	Minnesota	2.5
Texas	3.3	North Dakota	2.4
South Dakota	3.3	New Hampshire	2.4
Delaware	3.3		

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

We see many of the same states identified with high CFU-add rates in this table and high positive-response rates in Table 5, (e.g., Hawaii, California, the District of Columbia, Mississippi, Maryland, and New York). We also see some states with moderate CFU add rates despite having high positive-

response rates (e.g., Louisiana, Texas, and South Carolina) and high CFU add rates despite having moderate or low positive-response rates (e.g., Alaska, Oregon, New Mexico, Arizona, and Montana). These differences may result from variability across states in the rate of successful CFU interviewing, CFU adding multiple children per household, or CFU cases resulting in added young children coming from undercount probes other than the child-specific probes.

The states with the greatest number of CFU-added young children (California, Texas, New York, Florida, and Illinois) are among the states with moderate to high CFU-add rates but many smaller states (e.g., Hawaii, the District of Columbia, Mississippi, Alaska, and Oregon) have higher CFU-add rates.

5.4.2 County-Level Results

Table 10 shows that about 24 percent of the 2,011 counties in our analysis had CFU add rates of five per 1,000 or greater. About 20 percent had rates less than three per 1,000.

Figure 9 maps the county-level CFU-add rates (CFU-added young children per 1,000 total young children). Note that the counties with fewer than 1,000 young children are shaded white. We did not calculate a CFU add rate for these counties. The highest add rates are scattered throughout the South and Hawaii.

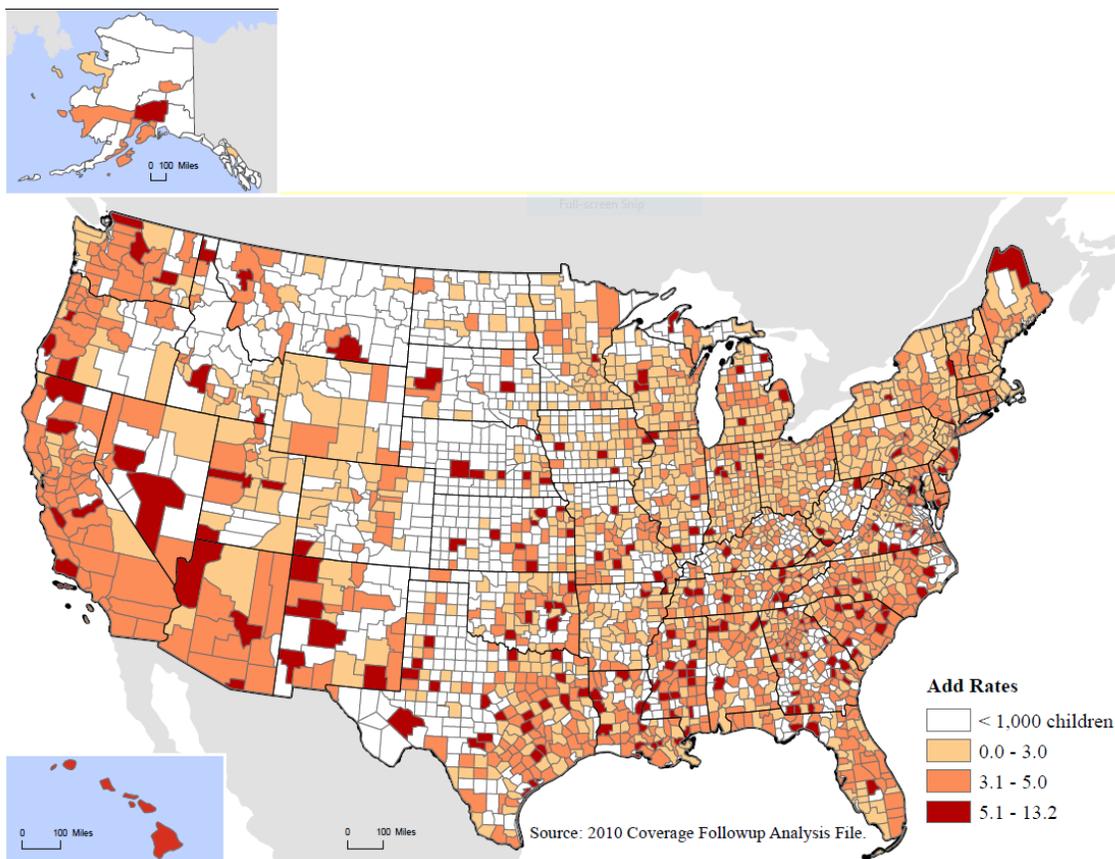


Figure 8. County-Level Coverage Followup Add Rates for Young Children
Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

Table 12 identifies large counties (those with at least 100,000 households) with high CFU add rates. Mohave County, Arizona, had a CFU add rate of 12 per 1,000, the highest CFU county-level add rate. Three counties in Hawaii had CFU add rates of 6.4 or greater. The District of Columbia also had a high CFU add rate. The only county appearing in Table 12 and also in Table 9 (greatest number of CFU-added young children) is Honolulu County, Hawaii. It is worth looking more closely at these counties to understand what they may have in common. They may be counties with a high proportion of racial minorities or complex households³. This might offer us insights into why such a high proportion of households made rostering errors that CFU was able to identify and correct.

Table 12. Large Counties with High Coverage Followup Add Rates for Young Children

State	County	Coverage Followup Add Rate for Young Children
AZ	Mohave County	12.0
HI	Honolulu County	8.2
HI	Maui County	6.7
DC	District of Columbia	6.4
HI	Hawaii County	6.4
CA	Santa Barbara County	5.8
CA	Madera County	5.8
NM	San Juan County	5.7
MD	Baltimore City	5.6
UT	Washington County	5.6

Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

We do not see any overlap between the counties listed as having high positive-response rates (Table 6) and those with high CFU add rates (Table 12). While it makes sense that counties with a high proportion of their households entering CFU because of a positive-response should also be counties with CFU-added children, we found that the positive-response rate for a county is not a strong predictor of the CFU add rate for that county. Figure 9 shows that relationship to be moderate with a correlation coefficient of 0.31. For this analysis, we chose to exclude four outlier counties with high CFU add rates and five counties with more than 1 million total households. We did not calculate CFU add rates for counties with fewer than 1,000 young children.

The moderate relationship may be explained by differential success across counties in recontacting households to complete CFU interviews. It may also result from questions other than the child-specific ones we studied being the reason that a questionnaire went to CFU.

³ We defined complex households as all households other than 1) a single-parent householder with biological or adopted children or 2) a married-couple household with biological or adopted children.

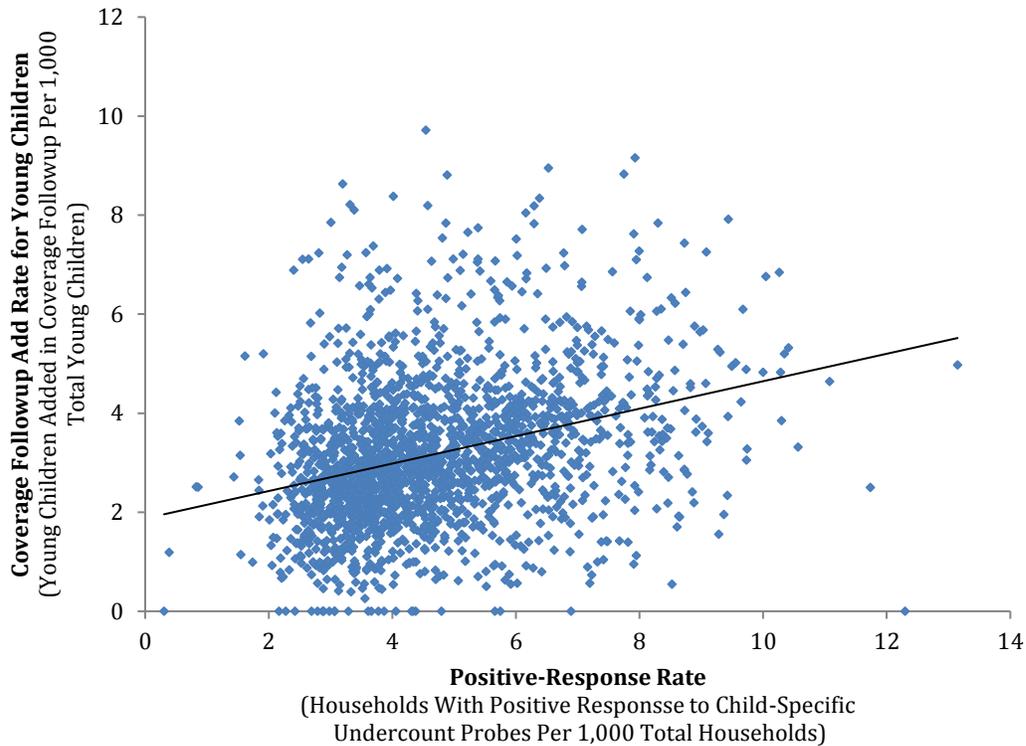


Figure 9. Comparison of Coverage Followup Add Rates for Young Children and Positive-Response Rates – County-Level Excludes counties with fewer than 1,000 young children, counties with add rates of 12 per 1,000 or greater, and counties with more than 1 million households
 Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

Figure 10 displays the CFU add rates by size of county. We see higher CFU adds per 1,000 young children for the largest counties, but the differences between these CFU add rates by county size are not large. Counties of all sizes included about the same rate of CFU-added young children. As noted earlier, one limitation of the CFU add rates is that children were only added in CFU if a second contact was successful. The add rates by size of county may reflect where CFU was most successful in making these contacts.

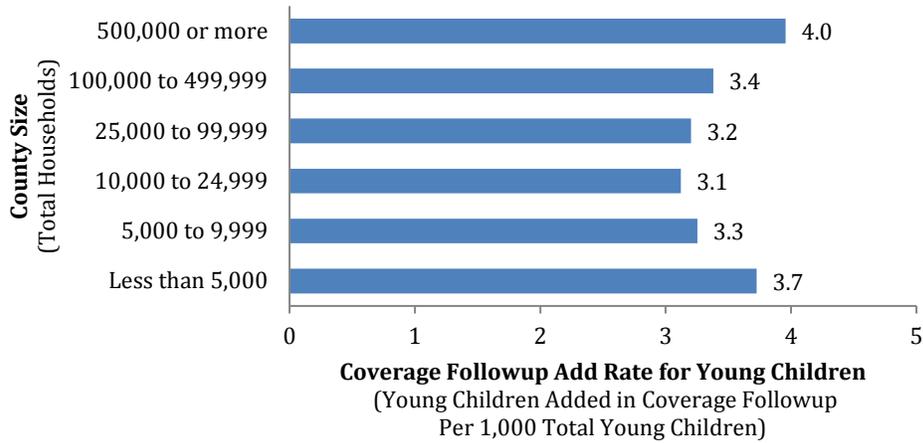


Figure 10. Summary of Coverage Followup Add Rates for Young Children by County Size
 Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

Figure 11 is a scatter plot of the county-level CFU add rates by county size. Because this metric uses total young children in the denominator, we used total young children as the measure of county size. This analysis excludes counties with fewer than 1,000 young children and counties with more than 1 million households. We observe a weak relationship (correlation coefficient of 0.07) between the CFU add rate and the county size (total number of young children) suggesting that the size of a county is not a good predictor of the CFU add rate.

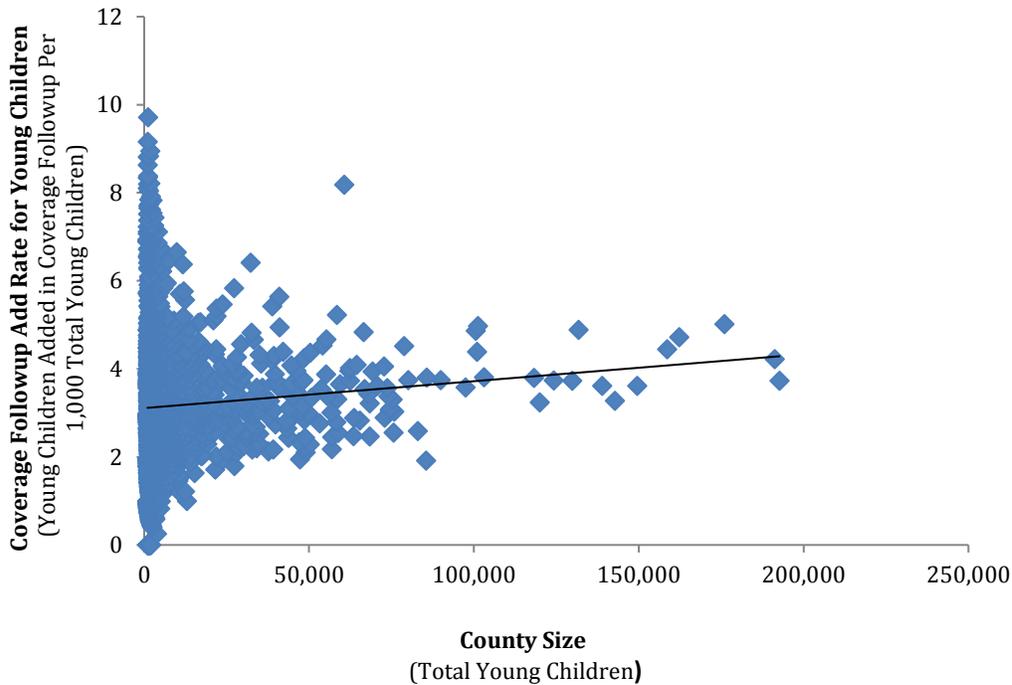


Figure 11. Coverage Followup Add Rates for Young Children by County Size
 Source: Special Tabulation of Census Edited File and Coverage Followup Analysis File

6. DISCUSSION

Our review of the geographic distribution of positive-responses to the child undercount probes identified variation across states and counties. State-level positive-response rates ranged from about three per 1,000 in states such as North Dakota, Montana, and New Hampshire to about seven per 1,000 in states such as Louisiana, Texas, California, and Georgia. If we think of the positive-response rate as an indicator of confusion about whether to include young children when respondents are completing their census questionnaires, these states contain more people with greater challenges in completing forms accurately than the average state. This might be because of language barriers, lower levels of education or literacy, or a greater proportion of complex household structures⁴. Recent research finds that complex households present enumeration challenges that may result in coverage error of young children (U.S. Census Bureau 2017a, U.S. Census Bureau 2017d).

Large counties in New York (Bronx, Queens, and Kings), Texas (Dallas and Harris) and California (Monterey, Tulare, and Kings) had high positive-response rates indicating that a greater proportion of respondents in these counties had potential problems involving children when they completed their questionnaires. Many of these large counties also had the greatest absolute number of households responding positively to one of the child-specific undercount probes. Targeted education and promotion in these largest counties would yield the greatest benefits. While the largest counties generally had some of the highest positive-response rates, we found evidence that respondents across all county sizes had some level of confusion about including young children on their questionnaire.

The CFU add rates also varied across states and counties with states such as Hawaii, California, and Mississippi having some of the highest rates and states such as North Dakota, New Hampshire, and Minnesota having some of the lowest rates. We can interpret these results as indicating where the CFU was most successful in identifying and resolving coverage errors involving children. States with low rates may be states with few coverage errors or may be states with limited CFU success. The states with low CFU add rates are in many instances the same states with low positive-response rates. This suggests that they may have had fewer self-reported coverage errors involving children. Many of the states with high CFU add rates also had high positive-response rates (e.g., California, Hawaii, Georgia) but some states with high positive-response rates (Louisiana and Texas) had only moderate CFU add rates. This may be because CFU may not have had as much success in recontacting respondents and correcting the potential coverage errors in those states. Three counties in Hawaii (Honolulu, Hawaii, and Maui) had high CFU add rates.

7. CONCLUSIONS

Respondents across the country self-reported potential rostering errors involving children. States such as Louisiana, Texas, and California had a relatively high proportion of their occupied households responding positively to one of the child-specific undercount probes. It is critical that

⁴ We defined complex households as all households other than 1) a single-parent householder with biological or adopted children or 2) a married-couple household with biological or adopted children.

we improve the outreach and education about including children on census forms. Improving enumerator training is another way to try to address the confusion that respondents appear to have when they complete their questionnaires. We could use the county-level data on positive responses to identify areas warranting special outreach or education. Counties with high numbers of households and proportions of total households responding positively to one of the child-specific probes are areas where such efforts seem to be most needed.

The CFU operation added young children in each state. In some counties and some states, the add rate was relatively high, suggesting that the 2010 Census initially omitted a greater proportion of children in those counties and states that CFU later added. However, the state and county-level variability in CFU add rates may speak to differences in CFU success. Building a coverage followup operation that does not require a recontact would reduce coverage error of young children.

8. NEXT STEPS

Analysis of the results by data collection mode may allow us to determine where errors occurred or confusion existed when respondents attempted to complete their census questionnaires. We could also learn where rostering issues arose during NRFU.

We can use the county-level data to identify geographic areas with both high numbers of positive response and high positive-response rates. These specific areas had more uncertainty about counting young children and should be a priority for targeted efforts to educate people about how to count children in different living situations. Similarly, we can identify geographic areas with both low numbers and low rates of positive responses and potentially conclude that these areas do not need additional educational efforts. This could help to focus our communication strategies in the areas with the greatest potential payoff.

Additional analysis of the county-level positive-response rates with Planning Database (and other segmentation group) results will allow us to assess if the areas with the highest positive-response rates are classified as “hard-to-count” areas or if they share other important characteristics. We could assess if these areas are also areas with high levels of mobility and language needs or areas with low levels of participation and cooperation.

9. REFERENCES

Hogan, H., Cantwell, P., Devine, J., Mule, V., and Velkoff, V. (2013). “Quality and the 2010 Census,” Population Research and Policy Review, DOI 10.1007/s11113-013-9278-5.

O’Hare, W. P., and Jensen, E. B. (2014). The Representation of Young Children in the American Community Survey, presentation at the ACS Users Group Conference, Washington, DC. May 29-30. Available on line at:

http://acsdatacommunity.leveragesoftware.com/wiki_entry_view.aspx?topicid=1347f3da2bd24cf18d1034ff306d1f06

O'Hare, W. (2015). *The Undercount of Young Children in the U.S. Decennial Census*. Springer Briefs in Population Studies.

O'Hare, W., Robinson, J., West, K. and Mule, V. (2016). "Comparing the US Decennial Census Coverage Estimates for Children from Demographic Analysis and Coverage Measurement Surveys." *Population Research and Policy Review*: 1-20.

U.S. Census Bureau (2012a). Revised 2010 Demographic Analysis Estimates (released May 2012) – Total Resident Population by Age and Race – April 1, 2010.

http://www.census.gov/popest/research/da-estimates/Table_3.pdf

U.S. Census Bureau. (2012b). 2010 Census Coverage Followup Assessment Report. 2010 Census Planning Memoranda Series No. 197.

U.S. Census Bureau (2017a). Investigating the 2010 Undercount of Young Children – Examining Data Collected during Coverage Followup. 2020 Census Program Memorandum Series.

U.S. Census Bureau (2017b). Investigating the 2010 Undercount of Young Children – Child Undercount Probes. 2020 Census Program Memorandum Series.

U.S. Census Bureau (2017c). Investigating the 2010 Undercount of Young Children – A New Look at 2010 Census Omissions by Age. 2020 Census Program Memorandum Series.

U.S. Census Bureau (2017d). Investigating the 2010 Undercount of Young Children – Analysis of Coverage Measurement Results. 2020 Census Program Memorandum series.

West, K. and Robinson, J.G. (1999). "What Do We Know about the Undercount of Children?" U.S. Census Bureau, Population Division working paper.