The Net Coverage of Children Ages 5 to 9 in the U.S. Census

By

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Introduction

After noting the record high net undercount of children ages 0 to 4 in the 2020 Census, the National Academy of Sciences (NAS) panel on the quality of the 2020 Census (2023, page 92) concluded, "It could be worthwhile, to develop subnational estimates for children ages 5-9 as well. The need for subnational estimates is clear from the 2020 PES results, which estimate higher net overcount and undercounts than in 2010 for various population groups, which are not distributed equally across the nation."

Subnational census data are critical for applications such as political redistricting , distribution of federal and state funds, and local planning. Other groups have also called for more subnational measures of quality for the 2020 Census (American Statistical Association 2021; U.S. Census Bureau National Advisory Committee 2022; National Association of Latino Elected and Appointed Officials 2022).

This paper responds to the request from the NAS panel. The analysis includes a background section comparing census coverage measures for the population ages 5 to 9 to the population ages 0 to 4 over time, examination of 2020 Census coverage by single year of ages for the population under age 18, and a comparison of results from the two

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main methods the Census Bureau uses to assess the accuracy of the Decennial Census (Demographic Analysis and the Post-enumeration Survey). In terms of subnational data, the study examines state and county level coverage rates in the 2020 Census for the two age groups of interest (ages 0 to 4 and ages 5 to 9). This study parallels and draws from previous studies on state and county-level coverage of children ages 0 to 4 (O'Hare 2023, a and b).

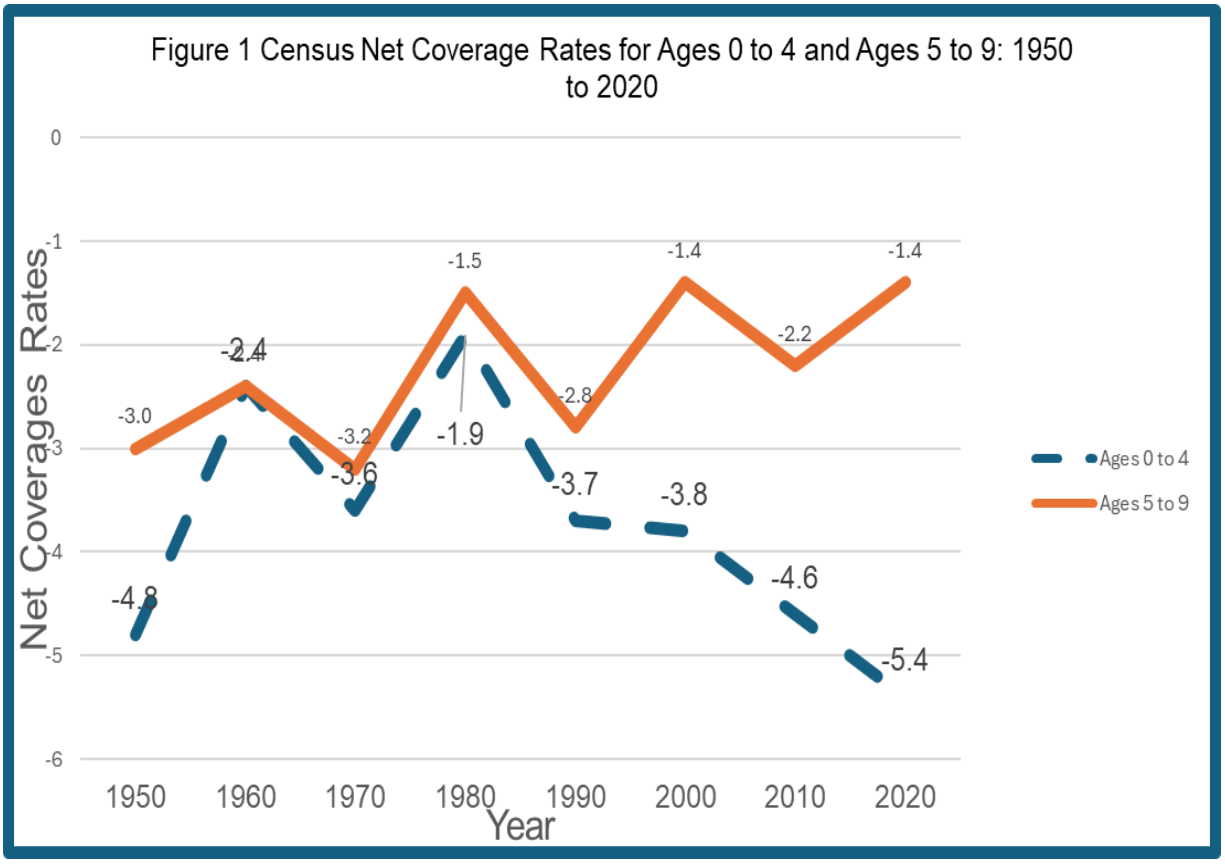
The Discussion section contains information that would lead one to expect a much higher net undercount rate for children ages 0 to 4 than ages 5 to 9 based on surveys of parents. In the Discussion section there is also an outline for a stream of research the Census Bureau should undertake to reduce the high net undercount of young children in the 2030 Census.

Background

Figure 1 shows the Census Bureau's estimated census coverage rates for ages 0 to 4 and ages 5 to 9, for each U.S. census since 1950 based on Demographic Analysis. The net undercount rate for the youngest children (ages 0 to 4) is higher than the net undercount for ages 5 to 9 in every census except 1960, when the two groups had the same net undercount rate (2.4 percent).

Since 1980, the gap between the two age groups has grown steadily. Why the coverage rate for ages 0 to 4 has deteriorated from 1980 to 2020, while that of ages 5 to 9, has not, is an interesting question, but not one that will be addressed in this paper. I have not seen any analysis that purports to explain this growing gap. Perhaps this is a

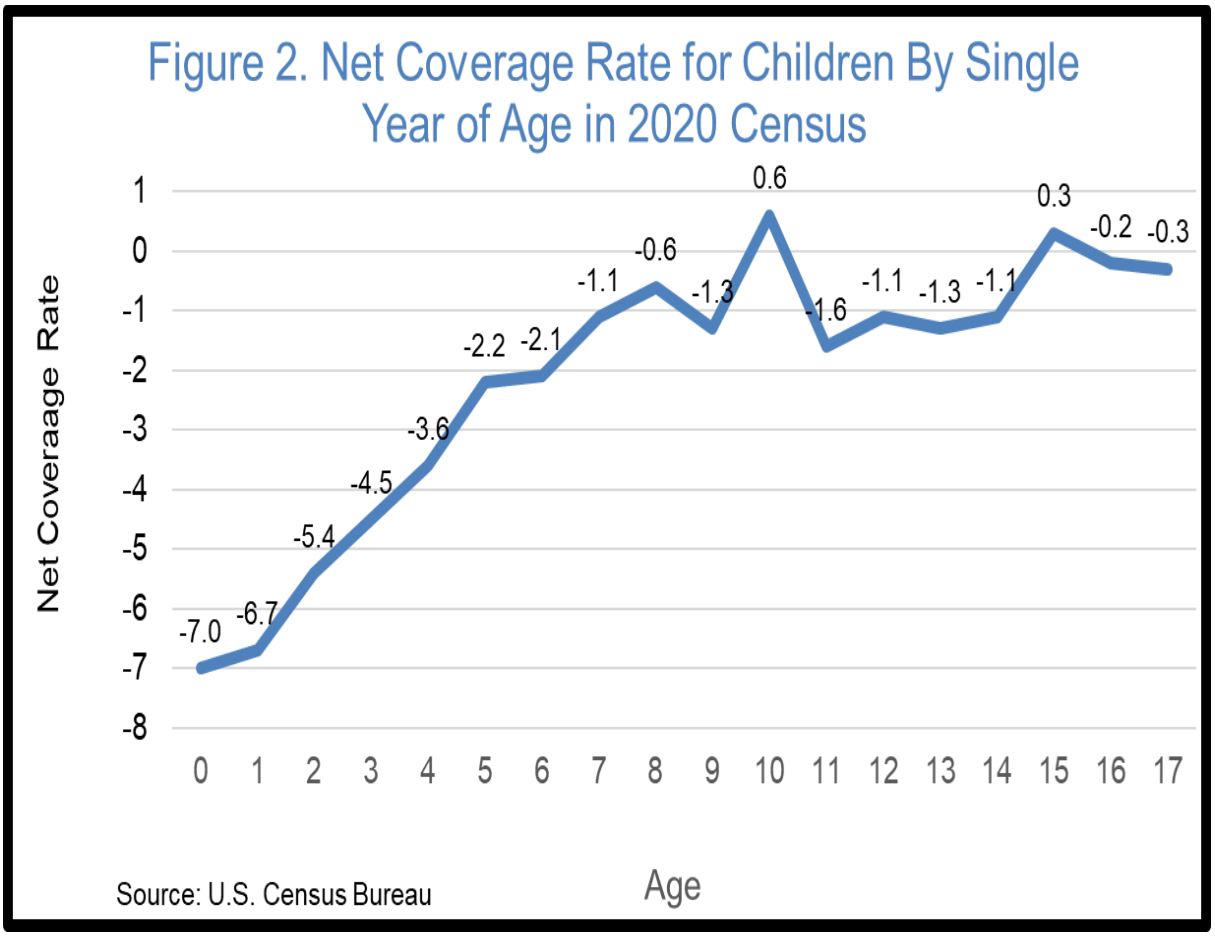
question the newly formed Census Bureau cross-directorate team on the undercount of young children could address.



In short, Figure 1 shows the pattern between coverage of ages 0 to 4 and coverage of ages 5 to 9, is longstanding and the gap between the coverage of ages 0 to 4 and ages 5 to 9, has been growing since 1980.

Figure 2 shows 2020 Census net coverage rates by single year of age for the population under age 18. It shows a steep decrease in net undercount rates from age 0

to age 9, then relative stability from age 10 to 17. Clearly most of the children missed in the 2020 Census are below age 10.[3]



There are two major methods the Census Bureau uses to assess the accuracy of the Census counts. One is called Demographic Analysis (DA), and the other is called Post-Enumeration Survey (PES). DA compares the results from the Census to an

[33] Readers may note a relatively high net overcount for the population age 10. This is due to age heaping in the 2020 Census (U.S. Census Bureau 2023b). Some of the children who were really nine or eleven years old were reported as ten years old. This is a minor problem for the analysis in this study.

independent estimate based on births, deaths, and net immigration. The PES method compares the Census counts to a sample survey taken after the Census is completed.

For evaluating the count of the youngest children (ages 0 to 4) demographers generally use DA rather than PES because the PES data for young children are tainted by correlational bias (O'Hare et al. 2016). Correlation bias refers to the problem of the same kinds of people who are missed in the census also being missed in the PES, which results in an underestimate of the net undercount. Thus, DA is believed to be a better method for assessing the coverage of young children in the census (U.S. Census Bureau 2003; Zeller 2006).

The national net coverage rates for children ages 0 to 4 and ages 5 to 9, from DA and PES for the 2010 and 2020 Censuses, are shown in Table 1. There are two main points from Table 1. First, in both 2010 and 2020, for both the PES and DA estimates, the net undercount estimates for ages 5 to 9 are much lower than the net undercount estimates for ages 0 to 4. In other words, the pattern of ages 0 to 4 having a higher net undercount rates than the population ages 5 to 9 is evident in both of the major methods the Census Bureau uses to measure accuracy in the census.

Second, the PES coverage rates for ages 5 to 9 are substantially lower than the DA estimates in both 2010 and 2020, which suggests that the correlation bias that undermines coverage estimates for the population ages 0 to 4, may be impacting the accuracy of PES estimates for this age group as well. This indicates that one should rely on the data from DA rather than the data from the PES for these age groups.

Table 1. Net 2020 Census Coverage Rates for Ages 0 to 4 and Ages 5 to 9 in 2010 and 2020 Based on Demographic Analysis and Post-Enumeration Survey				
	Ages 0 to 4		Ages 5 to 9	
	2010	2020	2010	2020
Demographic Analysis	-4.6	-5.4	-2.2	-1.4
Post-Enumeration Survey	-0.7	-2.8	0.3	-0.1

Subnational Estimates of Coverage of Population Ages 5 to 9

This section responds to the NAS request for more subnational data by developing 2020 Census net coverage rates for the populations ages 0 to 4 and the population ages 5 to 9, for states and counties. Coverage rates are developed here based on a commonly used method for assessing census accuracy. The method is explained in detail in O'Hare (2014).

In this study, state and county-level census coverage rates for children ages 0 to 4 and ages 5 to 9 are derived by comparing the U.S. Census Bureau's Vintage 2020 Population Estimates for the population ages 0 to 4 and ages 5 to 9 to the 2020 U.S. Decennial Census counts for each age group. This methodology for developing coverage rates at the state and county levels has been used by several analysts in the past including several demographers at the Census Bureau (O'Hare 2014; Siegel et al. 1977; Robinson et al. 1993; Adlakha et al. 2003; Mayol-Garcia and Robinson 2011; U.S. Census Bureau 2014; Cohn 2011; Jensen and Johnson 2021; King et al. 2019; Hartley et. al. 2021). In this study, the method is extended to the population ages 5 to 9.

. For young children, the Population Estimates are widely believed to be more accurate than the census counts. So, if a positive value results from subtracting census

count from the Vintage 2020 Population results it is considered a net overcount and when the subtraction results in a negative value it is considered a net undercount.

This paper used the Vintage Population Estimates for April 1, 2020, for ages 5 to 9 and data from Table P12 from the 2020 Census DHC file to develop coverages estimates. Data for ages 0 to 4 was taken from O'Hare (2023,a and b).

State-Level Data [4]

Table 2 provides summary statistics for the distribution of state-level coverage rates for ages 0 to 4 and ages 5 to 9 in the 2020 Census. The average state-level coverage rate for ages 0 to 4 was an undercount of 3.8 percent while the average for ages 5 to 9 was a slight (0.4 percent) overcount. For ages 0 to 4, 49 states had a net undercount rate, but there were only 17 states with a net undercount rate for ages 5 to 9.

The state average is lower than the national rate for both age groups. In fact, as noted above, the average for ages 5 to 9 is a slight net overcount rate. The fact that the state average coverage rate (+0.4 percent) is quite different than the national coverage rate (-1.4 percent) suggests that many states with a large number of young children have relatively high net undercount rates.

[4] The District of Columbia (DC) is not included as a state in this analysis because it is an outlier in both distributions. In the 2020 Census, the net undercount rate in DC for ages 0 to 4 was 16.7 percent and for ages 5 to 9 it was 14.9 percent.. DC is included in the county analysis.

In terms of the dispersion of state coverage rates for ages 5 to 9, the range and standard deviation for distributions for ages 5 to 9 are large and very similar to those for ages 0 to 4. This addresses the thrust of the question raised by the NAS panel.

The standard deviation (an often-used measure of dispersion) of state coverage rates is 2.1 percentage points for ages 0 to 4 and 2.3 percentage points for ages 5 to 9. The range of state coverage rates for ages 0 to 4 is 9.8 percentage points and the range for ages 5 to 9 is 9.4 percentage points. In other words, the spread of coverage rates across the states for ages 5 to 9 is large and very similar to the spread for ages 0 to 4.

Table 2. Summary Statistics for State Level Coverage Rates for Ages 0 to 4 and Ages 5 to 9 in the 2020 Census

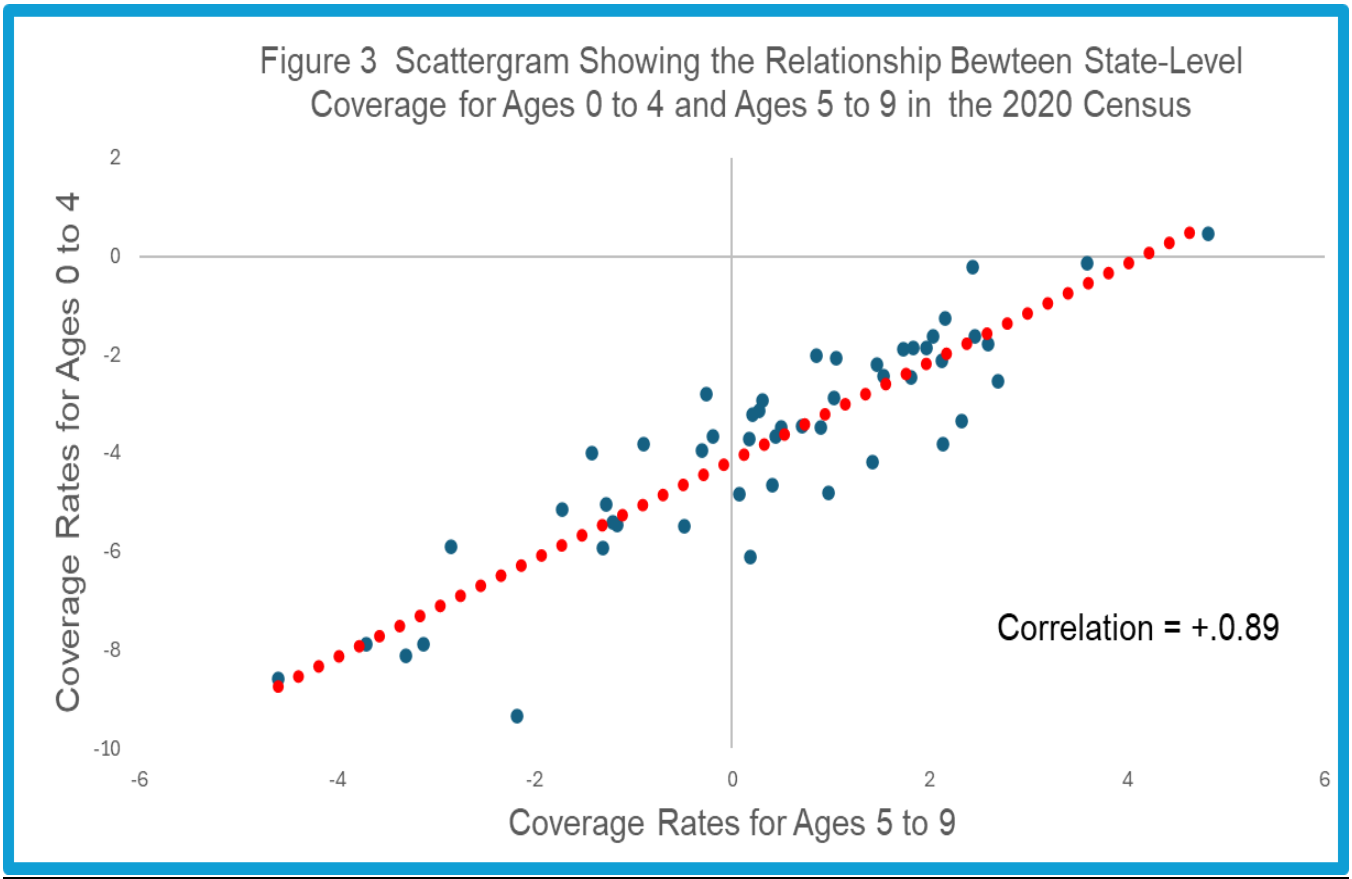
	Age 0 to 4	Age 5 to 9
National Coverage Rate based DA	-5.4	-1.4
Average	-3.8	0.4
Maximum (Percent)	0.5	4.8
Minimum (Percent)	-9.3	-4.6
Range (Percentage Points)	9.8	9.4
Standard Deviation	2.1	2.3
Number of States with Net Undercount	49	17
DC is not included as a state		

Individual state-level coverage rates for ages 0 to 4 and ages 5 to 9 are shown in Table 3. The pattern is geographically pervasive. The net undercount for ages 0 to 4 was worse than the net undercount for ages 5 to 9 in every state.

Table 3. State Level Coverage Rates for the Population Ages 0 to 4 and Ages 5 to 9 in the 2020 Census		
Label	Coverage Rates for Age 0 to 4 in 2020 Census*	Coverage Rate for Age 5 to 9 in 2020 Census
Alabama	-2.1	1.1
Alaska	-4	-1.4
Arizona	-7.9	-3.1
Arkansas	-4	-0.3
California	-8.1	-3.3
Colorado	-3.5	0.5
Connecticut	-1.9	1.7
Delaware	-6.1	0.2
Florida	-9.3	-2.2
Georgia	-5.4	-1.2
Hawaii	-8.6	-4.6
Idaho	-0.1	3.6
Illinois	-3.7	-0.2
Indiana	-1.9	1.8
Iowa	-1.8	2.6
Kansas	-2.4	1.5
Kentucky	-2.5	1.8
Louisiana	-5.5	-0.5
Maine	-3.3	2.3
Maryland	-4.2	1.4
Massachusetts	-3.7	0.2
Michigan	-2.2	1.5
Minnesota	-2	0.9
Mississippi	-5.9	-2.8
Missouri	-3.7	0.4
Montana	-1.6	2.5
Nebraska	-2.1	2.1
Nevada	-5.9	-1.3
New Hampshire	-2.9	1.0
New Jersey	-2.5	2.7
New Mexico	-3.8	-0.9
New York	-4.8	1.0
North Carolina	-5.5	-1.2
North Dakota	-1.9	2.0
Ohio	-2.9	0.3
Oklahoma	-5.2	-1.7
Oregon	-3.2	0.2
Pennsylvania	-3.5	0.7
Rhode Island	-3.8	2.1
South Carolina	-5.1	-1.3
South Dakota	-4.8	0.1
Tennessee	-3.5	0.9
Texas	-7.9	-3.7
Utah	-1.3	2.2
Vermont	0.5	4.8
Virginia	-4.7	0.4
Washington	-3.1	0.3
West Virginia	-2.8	-0.3
Wisconsin	-1.8	2.0
Wyoming	-0.2	2.4
Average	2.1	0.4

* Source: Table 2 in O'Hare, W.P. (2023) "State Undercount Rates for Young Children in the 2020 Census" AUGUST 2023 https://countallkids.org/resources/state-undercount-rates-for-young-children-in-the-2020-census/

Figure 3 shows the relationship between the state-level coverage rates of the population ages 0 to 4 and the coverage rates of the population ages 5 to 9 across the states. There is a very high correlation between the state net coverage rates for ages 0 to 4 and the net state coverages rates for ages 5 to 9 (the correlation coefficient is +0.89). This strongly suggests that state-level forces that lead to relatively high net undercount rates for the youngest children (ages 0 to 4) have a similar impact for the coverage for ages 5 to.9 even though the net undercount rates for ages 5 to 9 are systematically lower.



County Level Analysis

This county-level analysis of census accuracy for the population ages 5 to 9 in the 2020 Census parallels the analysis just presented for states. It should be noted that the number of young children in many counties is small, and the small numbers can lead to unrealistically high (or low) coverage rates.

Table 4 shows summary statistics for the county-level distribution of net coverage rates for ages 0 to 4 and ages 5 to 9 in the 2020 Census. The range and standard deviation show there was a lot of dispersion in the net coverage rates for counties for both

age groups. The standard deviation for ages 0 to 4 was 9.4 and for ages 5 to 9 it was 13.7 percentage points.

Table 4. Summary Statistics for County Level Coverage Rates for Ages 0 to 4 and Ages 5 to 9 in the 2020 Census

	Age 0 to 4	Age 5 to 9
National Net Coverage Rate from DA	-5.4	0.1
County Average Percent	-3.1	0.6
Maximum (Percent)	226	536
Minimum (Percent)	-56	-74
Range (Percentage Points)	282	610
Standard Deviation	9.4	13.7
Percent of Counties with Net Undercount	69.5	45.5

More than two-thirds (69.5 percent) of the counties had a net undercount for the population ages 0 to 4 compared to less than half (45.5 percent) for the population ages 5 to 9.

In 91 percent of the counties examined here, the coverage rates for ages 0 to 4 were worse than the rates for ages 5 to 9. That is, among counties with net undercount rates for both age groups, ages 5 to 9 have lower net undercount rates than ages 0 to 4; among counties with net overcount rates, ages 5 to 9 have higher net overcount rates than ages 0 to 4 net overcount rates; or counties have net overcount rates for ages 5 to 9 compared to net undercount rates for ages 0 to 4.

Table 4 includes some counties that are statistical outliers, meaning they have unrealistically high or low converge rates. This is likely due to the fact that they are small

counties where small numbers can turn into high rates. Table 5 shows summary statistics for those counties with at least 1,000 children in the age group.

The biggest difference between the distribution of all counties and the distribution of counites with at least 1,000 children in each age group is the level of dispersion. The range for counties where age groups are at least 1,000 people is 65 for ages 0 to 4 and 46 for ages 5 to 9. Also, the standard deviations for both age groups were very similar to each other and much lower in Table 5 than in Table 4. The standard deviation for ages 0 to 4 was 5 percentage points compared to 4.7 percentage points for ages 5 to 9.

Table 5. Summary Statistics for County-Level Coverage Rates for Ages 0 to 4 and Ages 5 to 9 in the 2020 Census for Counties with at Least 1,000 in the Age Group.

	Age 0 to 4	Age 5 to 9
National Coverage Rate based DA	5.4	0.1
Average	-3.2	0.2
Maximum (Percent)	35	26
Minimum (Percent)	-30	-20
Range (Percentage Points)	65	46
Standard Deviation (Percentage Points)	5	4.7
Percent of Counties with a Net Undercount	78	44.7

The main point is that there is substantial variation in the coverage rates for both age groups across the counties. This geographic variation raises questions about equity in the Census data. In the words of Sullivan (2023, page 1), “The underlying concept of data equity is fairness, which we might define as the government treating similar-situated

entitles in a similar way". The wide variation in the accuracy of county-level 2020 Census data for young children challenges the degree of equity in the 2020 Census results.

Discussion

National data show the 5.4 percent net undercount rate for the youngest children (ages 0 to 4) is more than three times that of children ages 5 to 9 (1.4 percent). Moreover, the pattern is pervasive. Children ages 0 to 4 have higher net undercount rates than children ages 5 to 9, in every state in the 2020 Census, and census coverage is worse for ages 0 to 4 than ages 5 to 9 in over 90 percent of the counties. The pattern is seen in every census since 1950, and the pattern is seen in both major evaluation methods used by the Census Bureau to assess census accuracy (Demographic Analysis and Post-Enumeration Survey). This large, long-standing, and geographic pervasive difference between the census accuracy for ages 0 to 4 compared to ages 5 to 9 underscores the need to examine the census results for young children (age 0 to 4) separately from older children.

The persistent difference between coverage of children ages 0 to 4 and those ages 5 to 9 raises an important question. Why do the youngest children have a much higher net undercount rate than slightly older children? The answer may lie in recently developed survey evidence.

In a pioneering survey in 2019, the Count All Kids Campaign (Griffin and O'Hare 2020) asked parents of young children if they intended to include their young child in the 2020 Census. Results showed ten percent of parents were not planning to include their young child in the census, and another eight percent said they were not sure if they would

include their young child in the census.[5] More questioning indicated that many parents did not see why the government needed to know about their child until the child was in school (usually about age 5). Other studies found similar results (Vargas 2018: Article 1 2019; Nichols et al. 2014, a, b, c).

Subsequently, the Census Bureau (2023a) included a similar question in a tracking survey they conducted around the time of the 2020 Census. The question was administered for three separate weeks over the course of the survey and was administered in both phone mode and web mode.[6]

There is no summary table provided for their results, but it appears their results were similar to the Count All Kids study. The Census Bureau reports (2023a, page 37), "Notably, for each of these three weeks we also observed a sizable percentage of respondents who said they were unsure about whether to include a child on their census questionnaire—between 13 and 19 percent across all three times period for both modes."

The study separated out responses from people who actually had a young child in the household. The Census Bureau report (2023a, page 38) concluded, "…even among respondents who reported having a young child on the tracking survey, about 8 percent to 16 percent said they were unsure about whether to include them on a census questionnaire."

[5] This survey focused on families with a young child in the household and yearly incomes of $50,000 or less.
[6] The questions were asked from January 6-12, 2020, from March 30 to April 5, 2020, and from June 3 to 9, 2020.

A large share of respondents said they would not include a young child or were not sure if they would include a young child in the census. This puts a lot of young children in jeopardy of being missed in the census and helps explain why the net undercount of the youngest children (under age 5) is so much higher than children just a few years older.

There is strong evidence that a large share of respondents do not follow the census instructions to include everyone in the household. This provides a clear point of emphasis for the 2030 Census communication, outreach, and promotion work. If many respondents continue to think young children are not supposed to be included in the census roster in 2030, we should not expect the undercount of young children to decrease compared to the 2020 Census.

A stream of research can start immediately by conducting further analysis of the Census Bureau's tracking survey results. In the reported results of the tracking survey (U.S. Census Bureau 2023a,Tables 4 and 5) results were examined by whether or not a respondent had a young child in the household and whether the respondent was a homeowner or a renter. The Census Bureau can easily extend that type of analysis by looking at respondents' race/Hispanic Origin, sex, marital status, location (region and/or central city/suburbs/rural areas) and other demographic characteristics collected in the survey. It would also be worth examining the results to see if the distribution of responses by telephone differ from the distribution when the question is asked on the web. If the responses differ by mode of asking the question (phone versus web) it would be useful to know why.

In addition to the closed-ended responses to the survey there were about 800 respondents who offered open-ended responses. These responses should be analyzed by the Census Bureau.

In addition to analyzing the data already collected, the Census Bureau should field additional surveys to gain more insight into the characteristics of respondents who are likely to leave their young child off the Census Bureau roster and the reasons they give for doing so.

In addition to the quantitative research outlined above the Census Bureau should use focus groups and other qualitative methods to gain more insight into why some respondents leave young children off the census roster. The Census Bureau has conducted this kind of qualitative work in the past (Schwede et al. 2014; Valentine and Valentine 1971).

In terms of developing a message for the 2030 Census, the Census Bureau should utilize the database it recently assembled to identify which Census Bureau data are linked for federal funding formulas (U.S. Census Bureau 2023c). The Bureau can identify which programs use data (in whole or in part) for ages 0 to 4 in funding which programs. Making respondents aware of how the data for age 0 to 4 are used to fund important programs could help convince them to report their young child. Showing how not including a young child in the census could impact funding for local schools, child care centers, Head Start programs, and other programs might motivate respondents to include their young child.

Overcoming the reluctance of respondents to include a young child on the census roster should be a key element in 2030 Census planning, communication campaign, and

outreach efforts but the Census Bureau needs to do more work to better understand why parents of young children are reluctant to include them in the census. Do they misunderstand the Census guidelines? (Do they read the census guidelines?). Do they understand the census guidelines but still feel they do not want to reveal their child to the government? It would be useful to know about variations among different groups (by race, sex, age, location, marital status, etc.). How much of the reluctance is based on mistrust of the federal government? What message(s) would convince respondents to include a young child on the Census roster? What type of messenger might help persuade parents to include a young child on the census roster? This work needs to be developed and tested soon so that it can be incorporated into the 2030 Census planning.

If changes in instructions, outreach, and messaging are insufficient to convince respondents to include all young children in the 2030 Census, alternative data collections modes might be warranted including use of administrative records data to supplement the census count.

Summary

This study examines subnational coverage for the population ages 5 to 9 and compares census coverage of children ages 0 to 4 to those ages 5 to 9. Young children (ages 0 to 4) have higher net undercount rates than children ages 5 to 9, and the pattern is pervasive and long standing. The pattern is seen across all the states and the vast majority of counties. Nearly all of the states (49 out of 50) have a net undercount for ages 0 to 4, but the minority (17 of 50) of states have a net undercount for ages 5 to 9. In every census since 1950 the net undercount for ages 0 to 4 was higher than the net undercount

for ages 5 to 9 (except 1960 when they were tied). Based on DA and PES, the national net undercount rate for ages 5 to 9 is much lower than that for ages 0 to 4 in both the 2010 and 2020 Censuses.

There is a high positive correlation between the net coverage rates of children ages 0 to 4 and those ages 5 to 9 across the states. This suggests the factors and forces that lead to state level variation for the youngest children are also impacting the variation in accuracy of the enumeration of children ages 5 to 9, even though the level of coverage is different.

The patterns found here are consistent with survey evidence which shows many respondents are unlikely to list a young child (ages 0 to 4) on a census roster. One key determinant of whether or not a child is included in the census appears to be when a child enters school (usually around age 5). Overcoming the reluctance of respondents to include a young child on the census roster will be a key to improving the count of young children in the 2030 Census.

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