Counties Where Coverage for Young Children Deteriorated Between 2010 and 2020 [1]
By
Dr. William P. O'Hare[2]
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<u>Introduction</u>

The undercount of young children is one of the most vexing problems faced by the U.S. Census Bureau. The undercount rate for young children (ages 0 to 4) was not only high (5.4 percent) in the 2020 Census, but it has been increasing in every Census since 1980 when it was 1.4 percent.

The official young child net undercount rate in the U.S. Census increased from 4.6 percent in 2010 to 5.4 percent in 2020. But the change in the national rate masks a lot of changes among individual counties. Until now it has not been clear if the national increase in the young child net undercount rate between 2010 and 2020 was a product of a few large counties worsening, a large number of smaller counties worsening, or something else. This study addresses that question.

Given this situation regarding trends in census coverage of young children it would be useful to have a better understanding of recent changes in subnational coverage rates for young children. This study focuses on that issue.

Counties are the smallest unit of census geography for which young child net undercount rates can be systematically derived. However, it is important to recognize that for many counties, particularly large counties, the county-wide young child overage

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rate may mask important differences for communities or neighborhoods within the county.

Knowing where counties with worsening young child net undercount rates are located is critical for planning for the 2030 Census. In this study, locational characteristics of counties with deteriorating coverage of young children are examined by county population size, urbanicity, regions, and states.

Although high net undercount rates for young children are well documented, information on how the national undercount is distributed among the counties and how that distribution is changing is limited. This paper addresses that issue by comparing county-level young child coverage rates from the 2020 Census to young child coverage rates from the 2010 Census to construct measures of change in the coverage of young children between the 2010 and 2020 Census for all counties.[3]

A better understanding of the geographic distribution of changes in undercount rates for young children may help us pinpoint why young children have such a high net undercount rate, determine which young children are most vulnerable to being undercounted, identify changes in factors affecting coverage, and will better prepare us to reduce this problem in the 2030 Census by focusing outreach efforts more effectively.

It is important to clarify that this study does not focus on the counties with higher undercount rates for young children. That information is available in another study

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[3] The terms deterioration and worsening are used interchangeably in this paper.

(O'Hare 2023b). This study focuses on changes between 2010 and 2020. Just because a county has deteriorated between 2010 and 2020 does not mean they have a high net undercount of young children.

Methodology

The development of county level coverage rates for young children is described in detail by O'Hare (2017). In short, coverage rates are calculated as the difference between the Decennial Census count and Vintage Population Estimates. This method for developing subnational net undercount rates for young children has been used by several demographers (Jensen, et al. 2018; King et al. 2019; Johnson and Jensen 2022; O'Hare 2014: O'Hare 2017; O'Hare 2023a; O'Hare 2023b; Mayol-Garcia and Robinson 2011).

There are four main reasons why the population estimates are thought to be more accurate than the Census counts for the population ages 0 to 4.

1. There is clearly a high net undercount of young children in the 2010 and 2020 Censuses (U.S. Census Bureau 2022).

2. The population estimates for ages 0 to 4 are largely based on birth certificate data which are widely thought to be very reliable. Ninety-nine percent of the population ages 0 to 4 in the 2020 population estimates are based on birth certificates (U.S. Census Bureau 2020).

3. The data sources and methodology for producing PEP estimates is nearly identical to the Census Bureau's Demographic Analysis method which is the preferred method for estimating young child undercounts at the national level (U.S. Census Bureau 2021).

4. The results of the Vintage Population Estimates for young children are nearly identical to the Census Bureau's Demographic Analysis estimate at the national level which underscores the suitability of using the Vintage Population Estimates to examine the subnational geographic distribution of the net undercount rates of young children (O'Hare 2023c).

The basic unit of analysis in this study are counties or county equivalents. County equivalents include geographic units such as Independent Cities in Virginia or Parishes in Louisiana. This study used all the geographic units categorized as counties on the Census Bureau's website before eliminating a few as described below.

Only counties where data for the population ages 0 to 4 were available from all sources (2010 Census, Vintage 2010 Population Estimates, 2020 Census, and Vintage 2020 population Estimates) were used in the analysis. A few counties had no young children. In total, about ten counties were not included in the analysis. There are 3,132 counties used in the analysis. The elimination of ten counties from the analysis should not impact the key results.

There are no standard errors or other measures of uncertainty associated with these coverage rates. However, it is very likely that for many counties, particularly small counties, the estimates contain some non-trivial level of error. Therefore, I do not use the estimates for any specific county (except for a few large counties) but rather bundle counties together into groups and examine group rates. By grouping counties together, random overcounts are often balanced with random undercounts thus reducing aggregate errors for the group.

Also, I round the coverage estimates to whole numbers before analysis. Given the likely errors in the county-level estimates, particularly for small counties, using coverage estimates with fractions of a percentage would be false precision.

Results

There are three types of county-level changes that reflect deterioration in coverage, and they are shown below.

1) Those that had a net overcount of young children in 2010 but a net undercount in 2020.

2) Those that had a higher young child net undercount rate in 2020 than in 2010.

3) Those that had a lower young child net overcount rates in 2020 than in 2010.

In other words, deterioration of young child coverage occurred all along the coverage spectrum. For the remainder of this paper, counties with these three kinds of changes are grouped together and labeled worsening or deteriorating. On the other hand, there were 1,161 counties where the coverage of young children improved between 2010 and 2020.

Table 1 provides a few summary statistics on county-level coverage rates for young children in the 2010 and 2020 Censuses which document the worsening of coverage for young children. In the 2010 Census, the average county-level coverage rate for ages 0 to 4 was a net <u>overcount</u> of 1.1 percent but that changed to a 3.1

percent young child net <u>undercount rate</u> in the 2020 Census.[4] There was an average

county overcount of young children in counties in 2010 despite a high national

undercount of young children, because there were a lot of small counties with young

child overcounts. The national undercount of young children is driven by a relatively

small number of large counties that have a lot of young children and high net young

child undercount rates. This is a big swing in the distribution of county-level coverage

rates for young children over a ten-year period.

The widespread nature of the increased net undercount of young children

between 2010 and 2020 is also documented in Table 1 which shows that the share of

counties with a net undercount for young children increased from 52 percent in 2010 to

69 percent in the 2020 Census.

Table 1. Selected Summary Statistics for County Distribution of Changes in Net Young Child Coverage Rates Beween 2010 and 2020 Censuses		
	2010 Census	2020 Census
National Net Young Child Coverage Rate	-4.6	-5.4
Average County Net Young Child Coverage Rate	1.1	-3.1
Percent of Counties with Net Young Child Undercount Rate	52	69
Percent of National Net Young Child Undercount Accounted for by Ten Counties with Highest Net Undercount of Young Children	31	26

In addition, Table 1 shows the aggregate share of the young child undercount in

the ten counties with the highest undercounts decreased from 31 percent in 2010 to 26

percent in 2020. In other words, the net undercount of young children was more

geographically dispersed in 2020 than in 2010.

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[4] The median coverage rate for 2010 was -0.3 and it was -3.1 in 2020. This suggests extreme values had only a very minor impact on the changing mean. The direction of change is clearly the same whether one uses means of medians. .

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Table 2 shows the distribution of counties by degree and direction of change in young child coverage rates between 2010 and 2020. There were 1,971 counties (1,242 plus 730) where the net coverage of young children deteriorated between 2010 and 2020 meaning the coverage of young children deteriorated in the majority (63 percent) of counties between 2010 and 2020. On the other hand, the coverage rate improved for 1,161 (743 plus 418) counties which is 37 percent of counties[5]. In other words, there were roughly twice as many counties worsening as there was counties improving.

Many changes were relatively large, particularly among counties worsening. Only 418 counties had an improvement of 5 percentages points or more in the coverage rates of young children between 2010 and 2020 compared to 1,242 counties which worsened by 5 percentage points or more between 2010 and 2020. In other words, the number of counties where the young child coverage rate deteriorated by five percentages points or more (1,242) is about three times the number of counties where it improved by this amount (416) between 2010 and 2020.

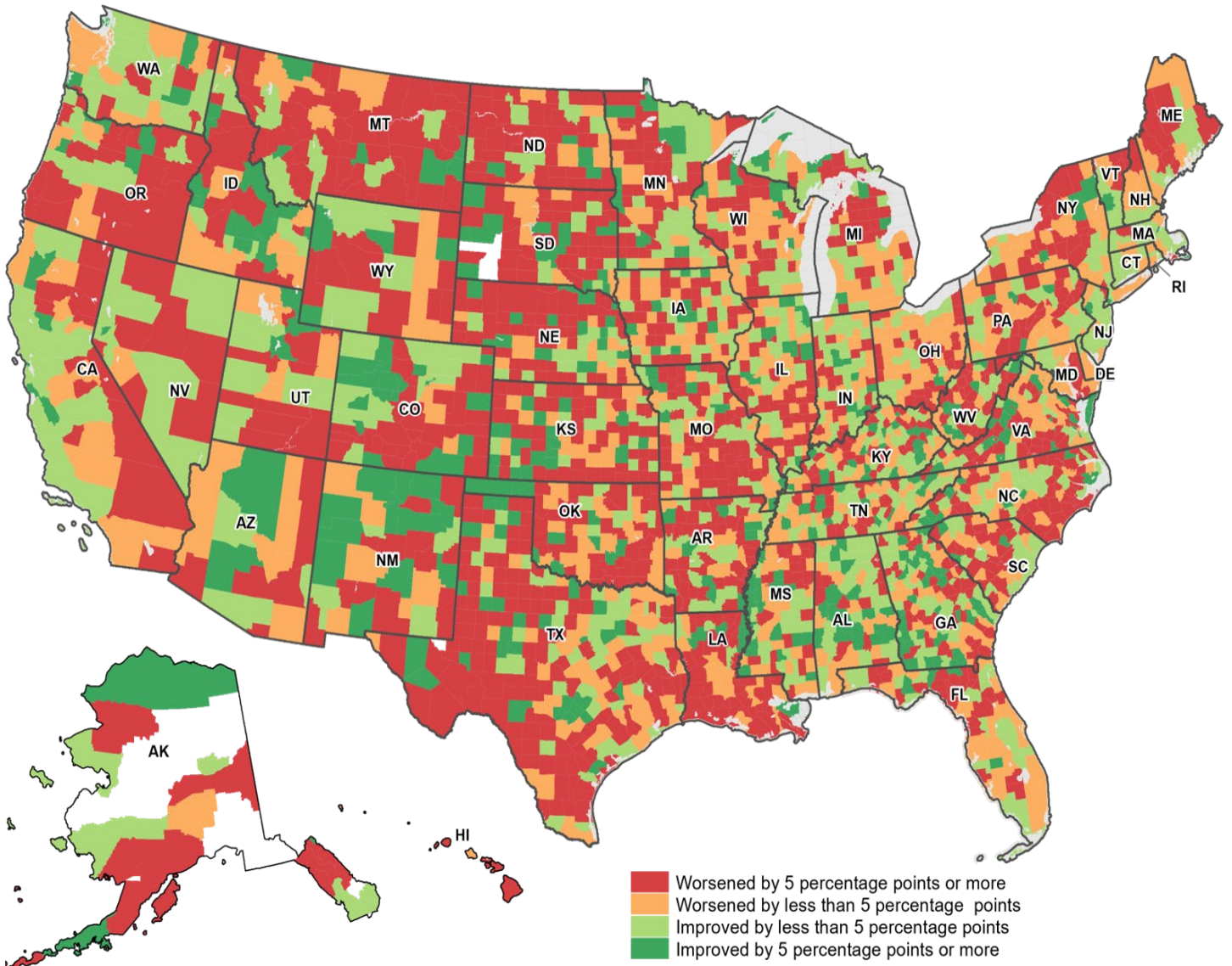| Table 2. Distribution of Counties by Changes in Coverage of Young Children Between 2010 and 2020		
	Number of Counties	Percent of All Counties
Worsened by 5 percentage points or more	1,241	40
Worsened by less than 5 percentage points	730	23
Improved by less than 5 percentage points *	743	24
Improved by 5 percentage points or more	418	13
* counties with no change are included in this category	3,132	100

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[5] Note that 191 counties that had zero change between 2010 and 2020 are included in the improving category in this report.

For ease of analysis and clarity of presentation, for the remainder of this paper, counties will be put into one of two categories (the number of counties in this category is provided in parenthesis).

1) Counties where young child coverage worsened between 2010 and 2020 (1,971)

2) Counties where young child coverage improved between 2010 and 2020 (1,161).

Map 1 shows counties color-coded by changes in young child net coverage between 2010 and 2020. The counties colored red, or orange are those where the coverage of young child worsened between 2010 and 2020 and readers can see the worsening is widespread..

Map 1 Counties Color-Coded in Terms of Changes in Young Child Net Coverage Rates Between 2010 and 20202

Legend:
- Worsened by 5 percentage points or more
- Worsened by less than 5 percentage points
- Improved by less than 5 percentage points
- Improved by 5 percentage points or more

There are two key points from O'Hare's (2023b) examination of aggregate changes in the coverage of young children by county population size between 2010 and 2020.. First, it is clear the largest counties have the highest net young child net undercount rates in both 2010 and 2020. The aggregate undercount rate of young children in 2010 for counties over one million population was 9.2 percent, and the rate was 8.5 percent in 2020 for this group of counties. The second point in O'Hare's analysis focuses on changes between 2010 and 2020. The changes were more pronounced at the other end of the size spectrum. Counties under 20,000 in 2010 total population had an aggregate young child net <u>overcount</u> rate of 0.9 percent in 2010, but a young child net <u>undercount</u> rate of 4.1 percent in 2020. For the second largest population size counties (20,000 to 99,999) , the group went from a young children net undercount rate of 1.3 percent in 2010 to 3.3. percent net undercount rate in 2020. This suggests a lot of changes in the smaller counties between 2010 and 2020.

Table 3 shows the distribution of counties by change in young child coverage rates between 2010 and 2020 and county population size. In smaller counties (those below 20,000 people) 68 percent of the counties experienced a deterioration in young child coverage rates between 2010 and 2020 compared only 33 percent of counties with a population of 1 million or more in 2010 and only 34 percent of counties in the second largest size category (500,000 to 999,999) experienced a deterioration between 2010 and 2020. The smallest counties were about twice as likely to experience worsening compared to the largest counties (68 percent compared to 33 percent).

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Table 3. Percent Distribution of Counties Worsening in Young Child Coverage Between 2010 and 2020 by 2010 County Population Size			
	Percent Distribution with Size Category of Changes in Young Child Coverage Rates 2010		
County Population Size in 2010 Census	Worsening	Improving*	Number of Counties
0 to 19,999	68	32	1,295
20,000 to 99,999	65	35	1,260
100,000 to 499,999	50	50	449
500,000 to 999,999	34	66	89
1,000,000+	33	67	39
Total	63	37	3,132
* Counties with no changes are included in this category			

Data in Table 3 suggest there is a big difference between counties under 100,000 and those over 500,000. The rates at which young child net coverage rates worsening in counties over 1 million and 500,000 to 999,999 are very similar (33 percent and 34 percent) and percent of counties in the two population size categories under 100,000 are very similar and much higher (68 percent and 65 percent).

Since most of the largest counties (those with one million or more people in 2010) improved between 2010 and 2020, the increase in the national net undercount rate of young children between 2010 and 2020 must be due largely to changes in smaller counties.

Focus on the Largest Counties

As stated earlier in this paper, O'Hare (2023b) found counties over one million in total population had much higher young child net undercount rates than other counties in both 2010 and 2020. The average county young child net undercount rates for these large counties fell from 8.3 in 2010 to 7.3 in 2020.

Table 4 shows changes in 39 large (total population of 1 million or more in 2010) counties. Of the 39 large counties, the coverage of young children improved in 23 and deteriorated in 13. Three counties showed no change.

Among the 26 counties that improved the average change was +3.1 percentage points. Among the 13 counties that worsened the average change was -2.3 percentage points.

Among large counties, the majority improved rather than worsened between 2010 and 2020, and the counties that improved changed more than the ones that deteriorated or worsened.

Table 4. Counties with One Million of More People in the 2010 Census Ranked by Change in Young Child Coverage Rates Between 2010 and 2020				
County Name	State Name	2010 Census Net Undercount Rate Ages 0 to 4	2020 Census Net Undercount Rate Ages 0 to 4	Change 2010 to 2020 (2020 rate -2010 rate) a negative number means worsening
New York County	New York	-16	-8	8
Travis County	Texas	-11	-5	7
Kings County	New York	-11	-6	5
Maricopa County	Arizona	-12	-7	5
Cook County	Illinois	-11	-6	5
Salt Lake County	Utah	-8	-3	4
Queens County	New York	-13	-9	4
Alameda County	California	-8	-4	4
Cuyahoga County	Ohio	-7	-3	3
Orange County	Florida	-10	-7	3
Allegheny County	Pennsylvania	-4	-1	3
Philadelphia County	Pennsylvania	-14	-11	3
Hennepin County	Minnesota	-7	-5	2
King County	New York	-5	-3	2
Franklin County	Ohio	-8	-5	2
Wayne County	Michigan	-6	-4	2
Dallas County	Texas	-14	-12	2
Contra Costa County	California	-4	-2	1
Santa Clara County	California	-8	-6	1
Tarrant County	Texas	-7	-6	1
Middlesex County	Massachusetts	-4	-3	1
Sacramento County	California	-5	-4	1
Bronx County	New York	-10	-9	1
Clark County	Nevada	-8	-7	0
Oakland County	California	-2	-1	0
Los Angeles County	California	-10	-10	0
Harris County	Texas	-8	-9	-1
Suffolk County	New York	-7	-8	-1
Nassau County	New York	-5	-6	-1
Fairfax County	Virginia	-6	-8	-1
Broward County	Florida	-11	-12	-2
San Diego County	California	-10	-12	-2
Palm Beach County	Florida	-8	-10	-2
Hillsborough County	Florida	-7	-10	-2
Bexar County	Texas	-6	-9	-2
Orange County	California	-11	-14	-3
Riverside County	California	-5	-9	-4
Miami-Dade County	Florida	-12	-16	-4
San Bernardino County	California	-5	-10	-5

<u>Urbanicity – Use of the USDA Urban-Rural Continuum</u>

County total population size is a crude way to measure how urban or how rural a county is. A more refined way of looking at urban and rural status of counties is offered by the U.S. Department of Agriculture (2023) which developed a nine-point urban-rural scale. The categories are shown in Table 5 along with data.

Table 5. Distribution of Counties by Changes in Young Child Net Coverages Rates and Urbanicity			
	Percent Distribution		
Description of County Type	Worsening	Improving	Number of Counties in Category
Metro - Counties in metro areas of 1 million population or more	50	50	432
Metro - Counties in metro areas of 250,000 to 1 million population	63	37	378
Metro - Counties in metro areas of fewer than 250,000 population	53	47	354
Nonmetro - Urban population of 20,000 or more, adjacent to a metro area	65	35	214
Nonmetro - Urban population of 20,000 or more, not adjacent to a metro area	59	41	92
Nonmetro - Urban population of 2,500 to 19,999, adjacent to a metro area	67	33	592
Nonmetro - Urban population of 2,500 to 19,999, not adjacent to a metro area	66	34	433
Nonmetro - Completely rural or less than 2,500 urban population, adjacent to a metro area	72	28	229
Nonmetro - Completely rural or less than 2,500 urban population, not adjacent to a metro area	71	29	418

Table 5 shows a lot of differentiation along the rural-urban continuum. A much higher share of the most rural counties (71 percent) than the most urban counties (50 percent) worsened between 2010 and 2020.

The first three categories in the USDA code are metro counties; the others are nonmetro. Table 6 shows that within the 1,164 metro counties 55 percent of counties worsened between 2010 and 2020 in terms of young child net coverage. In the 1,968 non-metro counties 63 percent of counties deteriorated.

Table 6. Distribution of Counties by Change in Young Child Net Coverage Rates Between 2010 and 2020 and Metro Status			
	Percent Distributon		
Location	Worsening	Improving	Number of Counties
Metro	55	45	1,164
NonMetro	68	32	1,968
Grand Total	63	37	3,132

Analysis by Census Regions

.   Table 7 shows the distribution of counties by change in the young child coverage rate between 2010 and 2020 and Census Region. In every Census Region the majority of counties worsened in terms of young child coverage between 2010 and 2020.   The percent of counties in a Region that worsened ranges from a low of 58 percent in the West to a high of 67 percent in the Midwest. Analysis by Census Region indicates the worsening of young child coverage is widespread and not confined to any one Region. Moreover, the percentage of counties worsening among the regions seem relatively similar.

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Table 7. Regional Distribution of Counties by Change in the Young Child Net Coverage Rate from 2010 to 2020			
	Percent Distribution		
Region	Worsening	Improving	Number of Counties in Region
Northeast	62	38	217
Midwest	67	33	1,053
South	62	38	1,421
West	58	42	441
U.S. Total	63	37	3,132

Analysis for States

Table 8 shows the states ranked by the percent of counties in the state where the net coverage of young children worsened between 2010 and 2020.   Of the 50 states and DC, 41 had the majority of the counties worsen between 2010 and 2020, indicating the deterioration of young child census coverages was widespread. The states where coverage of young children worsened are geographically dispersed as are those improving.

Rank*	Row Labels	Number of counties in state that worsened	Percent of counties in state that worsened
	Table 8 States Ranked by Percent of Counties in the State Where Young Child Undercount Worsened Between 2010 and 2020		
1	Hawaii	4	100
2	Louisiana	53	83
3	North Dakota	42	79
4	Ohio	69	78
5	Oklahoma	60	78
6	Montana	43	77
7	Maine	12	75
8	New York	46	74
9	Wisconsin	52	72
10	Maryland	17	71
11	South Dakota	45	70
12	New Hampshire	7	70
13	Texas	177	70
14	South Carolina	32	70
15	Kansas	72	69
16	Illinois	69	68
17	Florida	45	67
18	Pennsylvania	45	67
19	Missouri	77	67
20	Arizona	10	67
21	Delaware	2	67
22	Michigan	55	66
23	Nebraska	61	66
24	Alaska	15	65
25	North Carolina	64	64
26	Oregon	23	64
27	Iowa	63	64
28	Virginia	84	63
29	Minnesota	54	62
30	Utah	18	62
31	Wyoming	14	61
32	Arkansas	45	60
33	West Virginia	33	60
34	Colorado	37	58
35	Vermont	8	57
36	Tennessee	53	56
37	Mississippi	45	55
38	Kentucky	65	54
39	Nevada	9	53
40	Idaho	23	52
41	Indiana	47	51
42	New Mexico	16	48
43	Georgia	75	47
44	California	27	47
45	Washington	17	44
46	Rhode Island	2	40
47	Connecticut	3	38
48	Alabama	25	37
49	Massachusetts	5	36
50	New Jersey	6	29
51	District of Columbia	0	0

* Ranking is based on unrounded data.

Summary

      Analysis of young child net coverage rates in the 2010 and 2020 Censuses, covered in this paper and other studies, provides a mixed message. In both Censuses, large counties in terms of population size had the highest net undercount rates of young children, but in terms of changes between 2010 and 2020 in young child net undercount rates, smaller counties deteriorated the most.

      The deterioration of young child coverage rates between 2010 and 2020 was geographically widespread. The majority of counties deteriorated between 2010 and 2020, the majority of counties in the majority of states also deteriorated between 2010 and 2020, and the majority of counties in every Census Region worsened. Smaller counties were likely to worsen more than large counties. And rural counties were more likely to worsen compared to urban counties.

      The data presented in this paper provides important clues about where we are likely to see differences in the undercount rates of young children in the 2030 Census. However, it is important to understand that knowing where the undercount of young children is likely to be the worst, is not the same as knowing how to prevent the high net undercount of young children. Over the past 40 years, the Census Bureau has repeatedly tried to get a complete count of young children, but the accuracy has gotten steadily worse. What needs to be coupled with this information about where the undercount rate of young children is likely to be the highest is information about how to prevent or reduce the undercount rate of young children in the 2030 Census.

      The national net coverage of young children has been deteriorating steadily since 1980. This analysis shows that this trend continued in 2020 in counties large and small

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in every part of the country. Unless something quite different is done in the 2030 Census, there is no reason to expect the deleterious trend from 1980 to 2020 to be reversed in 2030.

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