

Tracking the Medicaid Undercount in the 2021 ACS Coverage Data

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Related SHADAC Resources

SHADAC researchers have monitored the Medicaid undercount for many years and have produced a handful of resources to help data users better understand the undercount when interpreting health insurance coverage estimates.

A few of these additional resources include:

[Medicaid Undercount Doubles, Likely Tied to Enrollee Misreporting of Coverage](#) (Issue Brief)

[Understanding the Undercount of Medicaid Enrollees in the 2020 CPS](#) (SHADAC Blog)

[Medicaid Expansion and the Medicaid Undercount in the ACS](#) (Research Article)

[Medicaid Undercount Project](#) (Collaborative Study)

Introduction

Research has consistently shown that health insurance coverage surveys underestimate the number of people enrolled in Medicaid and the extent of this “Medicaid undercount” varies greatly across surveys and states. Among [surveys that measure health insurance coverage](#), the American Community Survey (ACS) has been known to have a smaller Medicaid undercount¹, which is one of the reasons that SHADAC typically relies on this survey to track state-level health insurance coverage.

The “Medicaid undercount” refers to the discrepancies that exist between survey estimates of enrollment in Medicaid and the number of enrollees that are actually reported in state and national administrative data.

In 2020, the COVID-19 pandemic created disruptions to ACS data collection which resulted in [substantial data quality problems](#) that led the U.S. Census Bureau to re-release the 2020 ACS data on an experimental only basis. Because of these disruptions, SHADAC instead relied on data from the Current Population Survey Annual Social and Economic Supplement (CPS ASEC) to produce 2020 state-level health insurance coverage estimates. The CPS ASEC has its own challenges with the Medicaid undercount, which we covered in a [blog post in April 2022](#).

With the 2021 ACS data being given its normal, official release by the U.S. Census Bureau, SHADAC has returned to using the ACS as our primary data source for monitoring state-level health insurance coverage rates. However, as we and other data users have begun analyzing the 2021 ACS estimates, it has become apparent that the extent of the ACS’ Medicaid undercount was greater in 2021 than in prior years.

Given the evidence of a greater Medicaid undercount in the 2021 ACS, it is important for users to understand the undercount in the ACS when interpreting coverage estimates. In this brief, we review the research regarding the Medicaid undercount in the ACS, provide estimates of how the undercount varies across states in 2021, discuss the impact of assigning single coverage for those with multiple sources (known as an insurance “hierarchy”) on the Medicaid undercount in the ACS, and provide guidance on how to understand health insurance coverage data in the 2021 ACS.

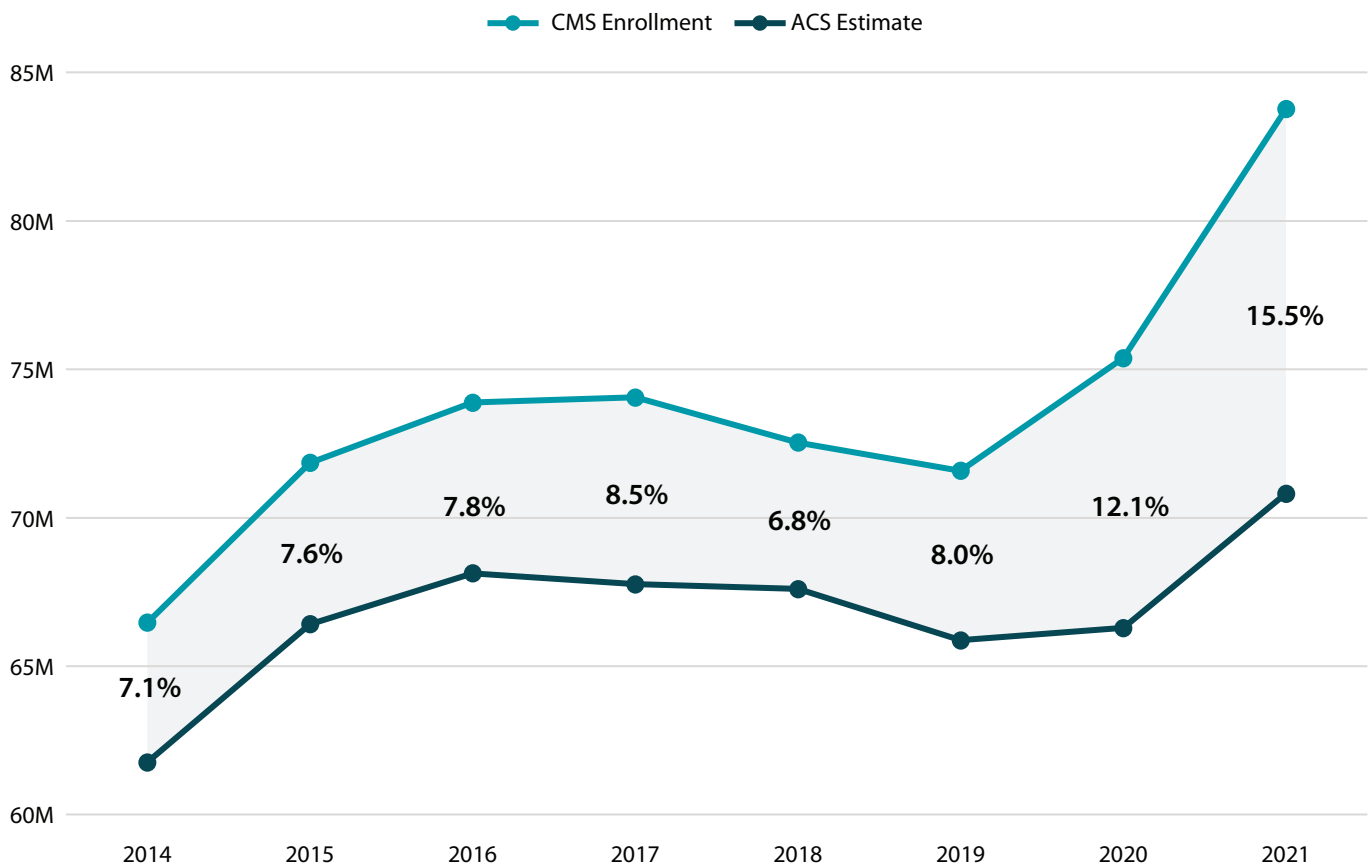
Medicaid Undercount

The “[Medicaid undercount](#)” refers to the differences that exist between survey estimates of Medicaid coverage and the number of enrollees that are reported in administrative data, a relatively reliable pattern in which survey estimates fall below administrative figures.

Previous studies of the undercount in the ACS have estimated that the survey underestimates Medicaid enrollment by approximately eight percent, though this varies by state and over time.² Studies of the Medicaid undercount often link Medicaid administrative records to survey data to observe if respondents who were enrolled in Medicaid according to administrative data reported having Medicaid when surveyed. One such study of the 2009 ACS found that 22 percent of Medicaid enrollees failed to report Medicaid coverage when surveyed, though this again varied significantly by state and subpopulation.¹ These rates of Medicaid undercount and “false-negative” reporting have long been thought to be lower than those in other federal surveys that measure health insurance coverage, such as the CPS ASEC, National Health Interview Survey (NHIS), and Medical Expenditure Panel Survey (MEPS). SHADAC analysis of the Medicaid undercount in recent ACS survey years found that the undercount ranged from 6.8% to 8.5% between 2014 and 2019. However the undercount nearly doubled to 15.5% in 2021, exceeding even the large 12.1% undercount in the 2020 ACS, when the ACS was troubled by serious pandemic-related data collection and resulting [data quality problems](#).

The undercount of Medicaid enrollment in the American Community Survey grew to nearly 16% in 2021

The ACS' percent undercount of Medicaid enrollment with ACS estimates compared to CMS enrollment figures, 2014–2021



Notes: CMS Medicaid enrollment figures represent average monthly enrollment for the calendar year. ACS estimates are an annual average. The percent undercount is the percent difference between the ACS estimate and the CMS figure. 2020 ACS estimates are based on experimental ACS data and should be treated with caution.

Source: SHADAC analysis of 2014–2021 American Community Survey PUMS files and CMS Medicaid enrollment data via KFF.

To understand how the undercount in the 2021 ACS varied by state, Table 1 compares the number of Medicaid enrollees from the Centers for Medicare and Medicaid Services (CMS) to weighted estimates from the 2021 ACS. The undercount varied considerably by state, from a 39.2% **undercount** in the District of Columbia (105,839 persons) to a 2.9% **overcount** in Kansas (13,145 persons). ACS estimates were within five percent of CMS enrollment numbers in just six states: Illinois, Kansas, Mississippi, South Dakota, Texas, and Wyoming.

As described in previous literature, the average state-level undercount was larger in Medicaid expansion states (17.5% average) than in non-expansion states (8.1% average).¹ Within the literature, this difference between expansion and non-expansion states is partly explained by differences in the income composition of enrollees, though there are likely other unknown factors at play.²

Reasons for the Undercount

Across surveys, studies of the undercount have found that it is caused primarily by reporting error, i.e., by Medicaid enrollees misreporting their coverage when surveyed, either misstating that they have a different form of coverage or that they are uninsured.¹ Misreporting and the undercount vary by state, which is likely tied to the characteristics of enrollees, state residents, and state Medicaid programs such as Medicaid expansion status.^{1,2} Children, those outside the labor force, and those with lower incomes tend to have lower levels of misreporting, while adults, those currently employed, non-citizens, and those with higher incomes tend to have higher levels of misreporting.¹

Though there is uncertainty about the specific causes of the increase in the undercount in the 2021 ACS, a [recent SHADAC brief](#) suggests that some part of the increase may be linked to the Medicaid continuous coverage requirement and an associated increase in reporting error. More research is needed to fully understand the roots of this increase in the undercount.

Table 1. Estimates of Medicaid/CHIP Coverage, 2021

State	Medicaid, ACS 2021	Medicaid Enrollment, CMS	Difference ACS vs. CMS	
Alabama	976,359	1,050,933	-74,574	-7.1%
Alaska	185,997	249,696	-63,699	-25.5%
Arizona	1,575,930	2,063,828	-487,898	-23.6%
Arkansas	822,946	931,715	-108,769	-11.7%
California	10,507,608	12,947,026	-2,439,418	-18.8%
Colorado	1,087,737	1,596,991	-509,254	-31.9%
Connecticut	832,871	955,636	-122,765	-12.8%
Delaware	209,155	269,506	-60,351	-22.4%
D.C.	164,265	270,104	-105,839	-39.2%
Florida	3,905,203	4,333,694	-428,491	-9.9%
Georgia	1,947,277	2,206,783	-259,506	-11.8%
Hawaii	290,803	410,142	-119,339	-29.1%
Idaho	392,043	397,292	-5,249	-1.3%
Illinois	2,568,056	3,396,458	-828,402	-24.4%
Indiana	1,381,779	1,770,982	-389,203	-22.0%
Iowa	648,863	783,200	-134,337	-17.2%
Kansas	462,589	449,444	13,145	2.9%
Kentucky	1,318,288	1,543,422	-225,134	-14.6%
Louisiana	1,484,497	1,770,286	-285,789	-16.1%
Maine	273,393	325,180	-51,787	-15.9%
Maryland	1,269,847	1,529,032	-259,185	-17.0%
Massachusetts	1,634,096	1,801,349	-167,253	-9.3%
Michigan	2,398,928	2,769,844	-370,916	-13.4%
Minnesota	1,074,887	1,233,142	-158,255	-12.8%
Mississippi	707,549	708,777	-1,228	-0.2%
Missouri	937,959	1,096,390	-158,431	-14.5%
Montana	225,483	292,121	-66,638	-22.8%
Nebraska	299,465	332,631	-33,166	-10.0%
Nevada	664,266	799,329	-135,063	-16.9%
New Hampshire	195,292	225,020	-29,728	-13.2%
New Jersey	1,745,593	2,001,592	-255,999	-12.8%
New Mexico	730,581	845,122	-114,541	-13.6%
New York	5,566,839	6,898,635	-1,331,796	-19.3%
North Carolina	1,991,966	2,117,808	-125,842	-5.9%
North Dakota	79,927	112,981	-33,054	-29.3%
Ohio	2,601,871	3,077,575	-475,704	-15.5%
Oklahoma	808,753	977,760	-169,007	-17.3%
Oregon	1,025,337	1,214,811	-189,474	-15.6%
Pennsylvania	2,745,241	3,386,052	-640,811	-18.9%
Rhode Island	265,321	337,231	-71,910	-21.3%
South Carolina	1,048,032	1,179,514	-131,482	-11.1%
South Dakota	129,252	129,414	-162	-0.1%
Tennessee	1,389,906	1,638,413	-248,507	-15.2%
Texas	5,045,229	5,064,805	-19,576	-0.4%
Utah	372,657	420,113	-47,456	-11.3%
Vermont	157,005	179,545	-22,540	-12.6%
Virginia	1,358,819	1,745,529	-386,710	-22.2%
Washington	1,643,172	1,988,361	-345,189	-17.4%
West Virginia	506,188	586,750	-80,562	-13.7%
Wisconsin	1,087,659	1,285,712	-198,053	-15.4%
Wyoming	69,168	69,630	-462	-0.7%
United States	70,811,947	83,767,305	-12,955,358	-15.5%

Notes: CMS Medicaid enrollment figures represent average monthly enrollment for the calendar year. ACS estimates are an annual average.
Source: SHADAC analysis of 2021 American Community Survey Public Use Microdata Sample file, and CMS Medicaid Enrollment data via KFF.

¹ State Medicaid expansion status as of Jan. 2, 2021

The Role of Analytic Choices in the Medicaid Undercount

Though misreporting error is usually the underlying driver of difference between survey estimates of Medicaid coverage and counts of Medicaid enrollees in administrative data, analytic choices can also impact the apparent magnitude of the Medicaid undercount.

Analytic decisions around the universe of respondents to use in an analysis can affect the apparent size of the Medicaid undercount. The ACS is a representative sample of the entire U.S. population, but analyses using ACS data often restrict the analysis to certain subsets of the ACS sample. For example, SHADAC often restricts estimates using the ACS to the noninstitutionalized population, which excludes persons living in institutions such as nursing homes and prisons and jails. To be more comparable with estimates from other data sources such as the CPS, other analyses use only respondents in the civilian noninstitutionalized population, which additionally excludes respondents in the active-duty military. Because Medicaid enrollment data are drawn from the entire population (and include a substantial number of individuals in institutions such as nursing homes), restricting survey analyses to exclude institutionalized population can further increase the apparent size of the Medicaid undercount.

Using an insurance hierarchy to assign respondents with multiple sources of coverage to just one type of coverage can also impact the apparent size of the Medicaid undercount. SHADAC regularly imposes our primary source of coverage hierarchy when producing estimates of health insurance coverage.³ The goal of our hierarchy is to determine which source of health insurance coverage is most likely to be a comprehensive health insurance plan that serves as the respondent's primary payer (i.e., the insurance plan that pays first). Because by law Medicaid generally serves as the "payer of last resort," our hierarchy assigns respondents reporting Medicaid coverage plus other comprehensive coverage to that other source of coverage (often Medicare or employer-sponsored coverage).⁴ This is conceptually different from how Medicaid enrollment is observed in administrative data, which counts Medicaid enrollees regardless of whether Medicaid serves as a primary or secondary source of coverage. As a result, SHADAC's hierarchy often has the effect of increasing the apparent size of the Medicaid undercount.

Table 2. SHADAC Primary Source of Coverage Hierarchy

Age 19 or older	
1	Medicare
2	Employer/Military (TRICARE, VA)
3	Medicaid/CHIP
4	Direct purchase
5	Uninsured
Age 0-18	
1	Employer/Military (TRICARE, VA)
2	Medicaid/CHIP
3	Direct purchase
4	Medicare
5	Uninsured

Table 3 on the next page, compares CMS enrollment data to estimates of Medicaid in the ACS with and without the exclusion of institutionalized respondents as well as with and without the application of the SHADAC insurance hierarchy. As expected, estimates excluding the institutionalized population increase the size of the apparent undercount—by more than two percentage points, both nationally and in all states. Applying SHADAC's primary source of coverage hierarchy also has a substantial impact on the apparent undercount, increasing the undercount at the national level a further 21 percentage points. In total, limiting estimates to the noninstitutionalized population and employing a primary source of coverage hierarchy increases the apparent undercount by 23 percentage points at the national level. This increase in the undercount varies by state from nearly 15 percentage points in D.C. to nearly 40 percentage points in Wyoming. This variation is due to differences in the size of the institutionalized population with Medicaid coverage, and in the share of people reporting Medicaid and some other coverage type in the ACS.

We have compared ACS and enrollment data to illustrate the impact of these analytic choices on estimated Medicaid coverage, but it is important to note that the administrative data and coverage estimates with a primary coverage hierarchy employed are by definition not comparable; the administrative data is meant to count anyone with Medicaid coverage, while the hierarchy is designed to reassign those with Medicaid and some other coverage type to another source of coverage. It is also important to note that eliminating the insurance hierarchy and/or expanding the universe of those included in the ACS to include the institutionalized does not eliminate the problem of the Medicaid undercount in the 2021 ACS. Rather, researchers should understand that there is a systemic undercount in the ACS that exists regardless of what analytic choices are made with the data, but some analytic decisions, such as employing a primary source of coverage hierarchy, will make the differences between survey and administrative data appear larger.

Table 3. Impact of the SHADAC Insurance Coverage Hierarchy and Exclusion of Institutionalized Population on the Medicaid Undercount, 2021

State	CMS Enrollment	Total Population			Non-institutionalized Population				Total Change in Undercount			
		ACS	Difference from CMS	%	ACS	Difference from CMS	%	SHADAC Hierarchy			Difference from CMS	%
Alabama	1,050,933	976,359	-74,574	-7.1%	958,541	-92,392	-8.8%	693,147	-357,786	-34.0%	-283,212	-26.9
Alaska	249,696	185,997	-63,699	-25.5%	181,317	-68,379	-27.4%	136,105	-113,591	-45.5%	-49,892	-20.0
Arizona	2,063,828	1,575,930	-487,898	-23.6%	1,540,040	-523,788	-25.4%	1,163,824	-900,004	-43.6%	-412,106	-20.0
Arkansas	931,715	822,946	-108,769	-11.7%	806,867	-124,848	-13.4%	623,331	-308,384	-33.1%	-199,615	-21.4
California	12,947,026	10,507,608	-2,439,418	-18.8%	10,283,119	-2,663,907	-20.6%	7,969,867	-4,977,159	-38.4%	-2,537,741	-19.6
Colorado	1,596,991	1,087,737	-509,254	-31.9%	1,062,570	-534,421	-33.5%	793,765	-803,226	-50.3%	-293,972	-18.4
Connecticut	955,636	832,871	-122,765	-12.8%	804,050	-151,586	-15.9%	597,922	-357,714	-37.4%	-234,949	-24.6
Delaware	269,506	209,155	-60,351	-22.4%	203,960	-65,546	-24.3%	150,869	-118,637	-44.0%	-58,286	-21.6
D.C.	270,104	164,265	-105,839	-39.2%	159,589	-110,515	-40.9%	124,507	-145,597	-53.9%	-39,758	-14.7
Florida	4,333,694	3,905,203	-428,491	-9.9%	3,833,655	-500,039	-11.5%	2,662,540	-1,671,154	-38.6%	-1,242,663	-28.7
Georgia	2,206,783	1,947,277	-259,506	-11.8%	1,916,024	-290,759	-13.2%	1,393,618	-813,165	-36.8%	-553,659	-25.1
Hawaii	410,142	290,803	-119,339	-29.1%	284,509	-125,633	-30.6%	199,016	-211,126	-51.5%	-91,787	-22.4
Idaho	397,292	392,043	-5,249	-1.3%	381,442	-15,850	-4.0%	279,488	-117,804	-29.7%	-112,555	-28.3
Illinois	3,396,458	2,568,056	-828,402	-24.4%	2,474,168	-922,290	-27.2%	1,926,428	-1,470,030	-43.3%	-641,628	-18.9
Indiana	1,770,982	1,381,779	-389,203	-22.0%	1,329,997	-440,985	-24.9%	1,000,058	-770,924	-43.5%	-381,721	-21.6
Iowa	783,200	648,863	-134,337	-17.2%	627,970	-155,230	-19.8%	451,855	-331,345	-42.3%	-197,008	-25.2
Kansas	449,444	462,589	13,145	2.9%	438,952	-10,492	-2.3%	308,996	-140,448	-31.2%	-153,593	-34.2
Kentucky	1,543,422	1,318,288	-225,134	-14.6%	1,279,510	-263,912	-17.1%	980,339	-563,083	-36.5%	-337,949	-21.9
Louisiana	1,770,286	1,484,497	-285,789	-16.1%	1,450,683	-319,603	-18.1%	1,117,919	-652,367	-36.9%	-366,578	-20.7
Maine	325,180	273,393	-51,787	-15.9%	264,913	-60,267	-18.5%	168,115	-157,065	-48.3%	-105,278	-32.4
Maryland	1,529,032	1,269,847	-259,185	-17.0%	1,231,539	-297,493	-19.5%	930,731	-598,301	-39.1%	-339,116	-22.2
Massachusetts	1,801,349	1,634,096	-167,253	-9.3%	1,587,705	-213,644	-11.9%	1,114,320	-687,029	-38.1%	-519,776	-28.9
Michigan	2,769,844	2,398,928	-370,916	-13.4%	2,346,125	-423,719	-15.3%	1,710,054	-1,059,790	-38.3%	-688,874	-24.9
Minnesota	1,233,142	1,074,887	-158,255	-12.8%	1,045,049	-188,093	-15.3%	790,500	-442,642	-35.9%	-284,387	-23.1
Mississippi	708,777	707,549	-1,228	-0.2%	694,057	-14,720	-2.1%	493,100	-215,677	-30.4%	-214,449	-30.3
Missouri	1,096,390	937,959	-158,431	-14.5%	900,866	-195,524	-17.8%	641,662	-454,728	-41.5%	-296,297	-27.0
Montana	292,121	225,483	-66,638	-22.8%	217,587	-74,534	-25.5%	161,429	-130,692	-44.7%	-64,054	-21.9
Nebraska	332,631	299,465	-33,166	-10.0%	289,333	-43,298	-13.0%	203,654	-128,977	-38.8%	-95,811	-28.8
Nevada	799,329	664,266	-135,063	-16.9%	650,934	-148,395	-18.6%	489,370	-309,959	-38.8%	-174,896	-21.9
New Hampshire	225,020	195,292	-29,728	-13.2%	186,277	-38,743	-17.2%	135,525	-89,495	-39.8%	-59,767	-26.6
New Jersey	2,001,592	1,745,593	-255,999	-12.8%	1,690,414	-311,178	-15.5%	1,288,449	-713,143	-35.6%	-457,144	-22.8
New Mexico	845,122	730,581	-114,541	-13.6%	715,273	-129,849	-15.4%	559,638	-285,484	-33.8%	-170,943	-20.2
New York	6,898,635	5,566,839	-1,331,796	-19.3%	5,400,722	-1,497,913	-21.7%	4,105,625	-2,793,010	-40.5%	-1,461,214	-21.2
North Carolina	2,117,808	1,991,966	-125,842	-5.9%	1,947,301	-170,507	-8.1%	1,417,265	-700,543	-33.1%	-574,701	-27.1
North Dakota	112,981	79,927	-33,054	-29.3%	74,431	-38,550	-34.1%	51,889	-61,092	-54.1%	-28,038	-24.8
Ohio	3,077,575	2,601,871	-475,704	-15.5%	2,512,675	-564,900	-18.4%	1,932,394	-1,145,181	-37.2%	-669,477	-21.8
Oklahoma	977,760	808,753	-169,007	-17.3%	786,126	-191,634	-19.6%	592,583	-385,177	-39.4%	-216,170	-22.1
Oregon	1,214,811	1,025,337	-189,474	-15.6%	1,004,984	-209,827	-17.3%	745,838	-468,973	-38.6%	-279,499	-23.0
Pennsylvania	3,386,052	2,745,241	-640,811	-18.9%	2,646,569	-739,483	-21.8%	1,859,678	-1,526,374	-45.1%	-885,563	-26.2
Rhode Island	337,231	265,321	-71,910	-21.3%	256,765	-80,466	-23.9%	186,669	-150,562	-44.6%	-78,652	-23.3
South Carolina	1,179,514	1,048,032	-131,482	-11.1%	1,029,649	-149,865	-12.7%	757,760	-421,754	-35.8%	-290,272	-24.6
South Dakota	129,414	129,252	-162	-0.1%	122,006	-7,408	-5.7%	88,705	-40,709	-31.5%	-40,547	-31.3
Tennessee	1,638,413	1,389,906	-248,507	-15.2%	1,358,371	-280,042	-17.1%	939,735	-698,678	-42.6%	-450,171	-27.5
Texas	5,064,805	5,045,229	-19,576	-0.4%	4,955,753	-109,052	-2.2%	3,786,838	-1,277,967	-25.2%	-1,258,391	-24.8
Utah	420,113	372,657	-47,456	-11.3%	366,820	-53,293	-12.7%	242,148	-177,965	-42.4%	-130,509	-31.1
Vermont	179,545	157,005	-22,540	-12.6%	154,383	-25,162	-14.0%	111,933	-67,612	-37.7%	-45,072	-25.1
Virginia	1,745,529	1,358,819	-386,710	-22.2%	1,309,162	-436,367	-25.0%	963,849	-781,680	-44.8%	-394,970	-22.6
Washington	1,988,361	1,643,172	-345,189	-17.4%	1,607,027	-381,334	-19.2%	1,186,238	-802,123	-40.3%	-456,934	-23.0
West Virginia	586,750	506,188	-80,562	-13.7%	494,516	-92,234	-15.7%	363,342	-223,408	-38.1%	-142,846	-24.3
Wisconsin	1,285,712	1,087,659	-198,053	-15.4%	1,056,052	-229,660	-17.9%	742,702	-543,010	-42.2%	-344,957	-26.8
Wyoming	69,630	69,168	-462	-0.7%	66,499	-3,131	-4.5%	41,630	-28,000	-40.2%	-27,538	-39.5
United States	83,767,305	70,811,947	-12,955,358	-15.5%	68,986,846	-14,780,459	-17.6%	51,376,962	-32,390,343	-38.7%	-19,434,985	-23.2

Notes: CMS Medicaid enrollment figures represent average monthly enrollment for the calendar year. ACS estimates are an annual average.
Source: SHADAC analysis of 2021 American Community Survey Public Use Microdata Sample file, and CMS Medicaid Enrollment data via KFF.

How to Use 2021 ACS Coverage Data in Light of the Medicaid Undercount

Despite the increase in the ACS' Medicaid undercount in 2021, it remains the best source of up-to-date information about the full distribution of health insurance coverage at the state, sub-state, and national levels. Survey data are almost always the only source of representative, population-wide information about health insurance coverage, and the ACS' reliability, large sample size, availability for sub-state geographies, and track record of measuring coverage at least as accurately as other surveys make it a clear choice for analysts looking for information about health insurance coverage. Further, survey data such as the ACS are an important source of detailed information about the characteristics of individuals with Medicaid coverage and allow data users to analyze many factors that are unreliable or completely unavailable in administrative data.

On the other hand, analysts seeking to simply enumerate Medicaid enrollees or to study basic beneficiary characteristics would be better served by using Medicaid administrative data, as these data do a better job of accurately counting the number of people enrolled in Medicaid.

Despite the increase in the undercount and for the reasons cited above, SHADAC will continue to use 2021 ACS data to produce estimates of health insurance coverage and the characteristics of individuals with Medicaid and other forms of health insurance coverage. However, it is important to keep in mind that the 2021 ACS estimates likely *understate* the number of people and percent of the population with Medicaid coverage and likely *overstate* the number of people and percent of the population with no health insurance coverage.

Looking Ahead

The ACS has historically undercounted the Medicaid population for a variety of reasons. This issue of undercount does not mean that the ACS is not useful for understanding coverage, but it is important for users to understand this limitation and its causes. SHADAC is available to provide technical assistance to analysts looking to make decisions about how and whether to use the ACS and how the undercount may affect estimates of Medicaid coverage and uninsurance.

Looking ahead, we will continue to closely monitor the measurement of Medicaid coverage in the ACS and other federal surveys as the continuous coverage requirement ends April 1, 2022 and states begin again reviewing all enrollees' eligibility. This process of "unwinding" will likely have substantial impacts on survey measurement of coverage and the mismatch between Medicaid coverage information gleaned from administrative and survey data sources.

¹ Boudreaux, M. H., Call, K. T., Turner, J., Fried, B., & O'Hara, B. (2015). Measurement error in public health insurance reporting in the American Community Survey: evidence from record linkage. *Health services research*, 50(6), 1973-1995. <https://doi.org/10.1111/1475-6773.12308>

² Boudreaux, M., Noon, J. M., Fried, B., & Pascale, J. (2019). Medicaid expansion and the Medicaid undercount in the American Community Survey. *Health services research*, 54(6), 1263-1272. <https://doi.org/10.1111/1475-6773.13213>

³ Hest, R. (2020) *SHADAC's primary source of coverage hierarchy for American Community Survey (ACS) estimates on State Health Compare*. State Health Access Data Assistance Center. https://www.shadac.org/Insurance_Coverage_Hierarchy_2020

⁴ *Medicaid and CHIP Payment and Access Commission*. (n.d.) Third party liability: Medicaid and other payers. <https://www.macpac.gov/subtopic/third-party-liability/>