# Medicaid Enrollment for Individuals Who May Receive a Prescription for Medication to Treat Opioid Use Disorder

## Methodology Appendix (last updated July 2, 2019)

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This document describes the methods and limitations of the Medicaid enrollment count estimates published in "Tracking Medicaid-Covered Prescriptions to Treat Opioid Use Disorder."

## Background and Introduction

No existing data source tracks quarterly and annual Medicaid enrollment for specific demographic groups from 2010 to 2018. To compute the per capita number of prescriptions to treat opioid use disorder among Medicaid enrollees, we developed a novel method of counting Medicaid enrollees. We defined the focus population as Medicaid enrollees ages 12 and older with full-benefit coverage (i.e., including prescription drug coverage). To compute enrollee counts, we used multiple data sources, because, as mentioned, no single data source exists for the study period, 2010–18 calendar years and quarters. Whenever possible, we used person-level analytical data files of administrative records derived from the Medicaid Statistical Information System (MSIS) and the Medicaid Analytic eXtract (MAX) to directly derive enrollment counts, using data from those in the universe of interest.[1] When we lacked the data to directly compute counts of full-benefit enrollees ages 12 and older for a quarter or year, we relied on patterns observed in relevant MSIS/MAX data and/or reports states submitted to the Centers for Medicare & Medicaid Services (CMS) with counts of broader Medicaid populations.

# Methods

## Computing Enrollment Counts for 2010 through 2015

The person-level analytical files were generally available for directly computing enrollment counts for 2010 through 2015. However, gaps in the availability of the person-level analytical files exist, primarily when states stopped producing these files as they transitioned to the Transformed-MSIS,[2] and states transitioned to the Transformed-MSIS at different times during this period. To compute counts for the periods with gaps in the data, we relied on the state's MSIS/MAX data from the surrounding periods, usually together with counts of total enrollment reported by states to CMS.

To directly compute enrollment counts, we first identified enrollees ages 12 and older with full Medicaid benefits in the MSIS/MAX analytical files.[3] For each available quarter of data, we then computed a quarterly count by taking the number of these enrollees ever observed in the quarter. Our quarterly counts are directly from the calendar year quarter. Because our analytical data files are for the fiscal year, we used the following methodology to compute calendar year enrollment. We derived each available calendar year count by taking the average of the four quarterly counts for the calendar year and applying a measure to adjust for the difference between annual and average quarterly counts. Annual counts from the MSIS/MAX are always higher than average quarterly counts because there is churn among enrollees, with people moving in and out of enrollment.[4] The adjustment factor to account for churn was computed as the ratio of the average fiscal year quarterly counts to the annual count observed in the fiscal year and was typically about 1.2 but varied across states. Because the calendar year starts and ends one quarter earlier than the fiscal year,[5] the adjustment factors for churn may be slightly low or high. However, we observe that within states, churn was generally similar over time.

Because we have different data sources for each year and state, we used a different methodology for each calendar year, as follows:

- 2010: We had all the fiscal year 2010 MSIS data, so for the first three calendar year 2010 quarterly counts, we used our direct method of computing counts, as described above. For the last 2010 calendar year quarter, we relied on our 2011 fiscal year MSIS data. We had complete MSIS data for 40 states in fiscal year 2011, so for these states we used our direct method of computing counts for the last quarterly count. We had no data for 11 states[6] in fiscal year 2011, and for these states we imputed the last quarter of calendar year 2010 using the state's 2010 and 2012 MSIS data. We first took the difference between the last quarter of fiscal year 2010 and the first quarter of fiscal year 2012 and then computed a count by assuming simplistically

that the difference was spread evenly across the four missing quarters. We computed the annual calendar year count as described above, using the derived quarterly counts for calendar year 2010 and the adjustment factor for churn computed from fiscal year 2010 annual and average quarterly counts.

- 2011: We computed the counts for the first three quarters of calendar year 2011 using the data and methods we used for the last quarterly count of calendar year 2010, as described above. For the last quarter of calendar year 2011, we relied on the fiscal year 2012 MSIS/MAX data. We had all the fiscal year 2012 MSIS/MAX data, so we used our direct method of computing the counts. For states with complete fiscal year 2011 data, we computed the annual calendar year count as described above. For states missing fiscal year 2011 data, we computed the annual count using the derived quarterly counts for calendar year 2011 and the adjustment factor for churn computed from fiscal year 2010 annual and average quarterly counts.
- 2012: We had all the fiscal year 2012 MSIS/MAX data, so we used our direct method of computing counts for the first three calendar year 2012 quarterly counts. For the last quarter of calendar year 2012, we used our direct method of computing counts and the fiscal year 2013 MSIS data, which we had for 48 states. For the three states missing this quarter of data,[7] we imputed a count using our count from the third calendar year quarter, which we derived for the first quarter of calendar year 2014, and the method described above, where we simplistically assumed the difference between the counts was spread evenly over missing quarters. We derived the count for the first quarter of calendar year 2014 from counts states report to CMS through the Medicaid Budget and Expenditure System (MBES).[8] The MBES counts are of unduplicated individuals enrolled in the state's Medicaid program at any time during each month and were available for January 2014 through September 2017. To account for individuals younger than age 12 and those with partial coverage in the MBES count, we computed the fraction of all enrollees observed in the last observed MSIS/MAX quarter who were older than age 11 and had full-benefit coverage in each state and then applied this fraction to the MBES count. This fraction varied by state and less so by time and was roughly 0.65 in periods after Medicaid expansion in states that adopted the Affordable Care Act (ACA). Before the ACA and in states that did not adopt the ACA, the fraction was roughly 0.5. Because the MBES counts were monthly, we next used a measure of quarterly churn to adjust for individuals being enrolled for only part of the quarter, so the highest monthly count in a quarter is usually an undercount of the number of people ever enrolled in the quarter.[9] We measured quarterly churn the same way we measured annual churn, but we computed quarterly churn as

the ratio of the average of the three monthly counts in the quarter to the count of individuals ever observed in the quarter. To adjust the MBES count, we applied the most recent measure of quarterly churn available from the MSIS/MAX. Since we have complete fiscal year 2012 data, we computed the annual calendar year 2012 count as described above. We adjusted this count to account for duplicates in one quarter of the Nevada MSIS data, lowering the count by applying the percentage of unduplicated person records.

- 2013: We directly computed the counts for the first three quarters of calendar year 2013 using the fiscal year 2013 MSIS data that we had for those quarters in 45 states. For the six states missing MSIS/MAX data for this period, [10] we imputed quarterly counts as described above, where we used our most recent quarterly count from MSIS/MAX, which we derived for the first quarter of calendar year 2014, and assumed the difference in counts was spread evenly over missing quarters. For states with complete fiscal year 2013 data, we computed the annual calendar year count as described above. For states missing any fiscal year 2013 data, we computed the annual count using the derived quarterly counts for calendar year 2013 and the adjustment factor for churn computed from the fiscal year 2012 annual and average quarterly counts.

- 2014: We directly computed the counts for the first three quarters of calendar year 2014 using the fiscal year 2014 MSIS data we had for those quarters in 30 states. For the 17 states where we were completely missing these quarters and the four states where we were missing some of these quarters of MSIS data,[11] we used the method described above where we took the MBES count for the relevant quarter and used our most recent MSIS/MAX data to adjust it to account for enrollees under 12 or with partial coverage. For the last quarter of calendar year 2014, we directly computed the counts using the MSIS data we had for that quarter in 21 states. For the states missing MSIS data, we relied on the MBES counts and the most recent MSIS/MAX data as described above. We then adjusted to account for duplicates in some quarterly MSIS data from Arkansas, Oklahoma, Oregon, and Texas, using the method described above.

- 2015: We directly computed the counts for the first three quarters of calendar year 2015 using the fiscal year 2015 MSIS data we had for those quarters in 16 states.[12] For the 32 states where we were completely missing these quarters and the three states where we were missing some of these quarters of MSIS data,[13] we used the method described above, where we took the MBES count for the relevant quarter and used our most recent MSIS data to adjust it. We had no MSIS data for the last quarter of calendar year 2015, so we derived these counts using our

method of adjusting the MBES count. We then adjusted to account for duplicates in some quarters of the MSIS data from California.

### Computing Enrollment Counts for 2016 through 2018

- 2016: No MSIS or Transformed-MSIS data were available for fiscal year 2016, so we used the MBES counts and the most recent quarterly MSIS/MAX data to adjust the monthly counts to quarterly counts and quarterly counts to annual counts for full-benefit enrollees ages 12 and older, as described above. Because of anomalies observed in California's MBES data from 2016 quarter two to 2017 quarter three, we use the application-and-enrollment data reported on the state's website and adjusted it as described below.[14]
- 2017: We use the approach described above for computing the 2016 counts, but we relied on the application-and-enrollment counts states submit to CMS for the last calendar year quarter of 2017,[15] because the MBES counts were not reported after quarter three of calendar year 2017. States submit these reports to document counts of applications for enrollment and all enrollees with comprehensive benefits. Because the application-and-enrollment counts were monthly, we took the average of each calendar year quarter and applied the last MSIS/MAX observed measure of quarterly churn. Next, because the application-and-enrollment counts included children under age 12, we computed the fraction of full-benefit enrollees ages 12 and older in the last available quarter of MSIS/MAX and applied it to our derived quarterly count to compute an adjusted count for full-benefit enrollees ages 12 and older. We next computed the annual count as described above, averaging the derived quarterly counts and applying the last-observed MSIS/MAX measure of annual churn.
- 2018: We used the 2017 approach, as described above.

## Limitations

In states where adult enrollment increased after the MSIS/MAX data were no longer available because of the ACA or other eligibility rule changes,[16] our measures of the share older than age 12 and our counts after expansion are likely slightly too low. We expect the bias to be smaller in states that had relatively high eligibility thresholds, as many of the expansion states had. Because we relied on multiple data sources that use different definitions of enrollment and have different strengths and weakness, we

expect our trends to be less valid at the quarters and years where we transition from one data source to another. However, for most states, the estimates across transitions look like estimates in the surrounding period. Also, though some transition quarters have discontinuities in enrollment, many have compelling explanations. For example, Massachusetts increased from 1.3 million full-benefit enrollees ages 12 and older using the MSIS in quarter three of 2014 to 1.5 million using the MBES in quarter four of 2014. However, this was an expansion period, and similar increases were observed in the earlier quarters in 2014. Several anomalous changes have no explanation other than differences in the data. In future work, we may work with the states and CMS to clarify source data definitions, which could support further adjustments in our methodology to improve the precision of these enrollment estimates.

# Conclusion

We developed a novel methodology for computing counts of full-benefit Medicaid enrollees ages 12 and older using publicly available data from 2010 through 2018. This methodology could be used to improve research that relies on counts of Medicaid enrollees for populations not directly available in reported data.

# Notes

[1] "Medicaid Statistical Information Statistics (MSIS)," Centers for Medicare & Medicaid Services, updated April 3, 2017, https://www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/MSIS/; "Medicaid Analytic eXtract (MAX) General Information," Centers for Medicare & Medicaid Services, updated March 14, 2019, https://www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/MedicaidDataSourcesGenInfo/MAXGeneralInformation.html. Our MAX data are for Colorado 2012 and have been adjusted to the fiscal year.

[2] "Transformed Medicaid Statistical Information System (T-MSIS)," Medicaig.gov, accessed June 27, 2019, https://www.medicaid.gov/medicaid/data-and-systems/macbis/tmsis/index.html.

[3] Defined as having full-scope benefits, pregnancy-related services, benchmark-equivalent coverage as enacted by the Deficit Reduction Act of 2005, or coverage through a "Money Follows the Person" rebalancing demonstration.

[4] For example, people are enrolled part of the year because they were eligible for being pregnant/postpartum but then did not have income low enough to qualify for Medicaid via another pathway.

[5] For example, fiscal year 2015 is September 2014 to August 2015.

[6] Florida, Kansas, Maine, Maryland, Massachusetts, Montana, New Jersey, New Mexico, Oklahoma, Texas, and Utah.

[7] Colorado, Kansas, and Rhode Island.

[8] The MBES data are Medicaid enrollment counts that states began reporting with their expenditure data on January 1, 2014.

[9] There are several state MSIS quarters where monthly enrollment counts are the same, likely because the state did not update its eligibility flags.

[10] Alaska, Colorado, Florida, Kansas, North Carolina, and Rhode Island.

[11] States missing all MSIS data for calendar year 2014 are Alabama, Alaska, Colorado, Delaware, the District of Columbia, Florida, Illinois, Kansas, Maine, Maryland, Montana, Nebraska, New Mexico, North Carolina, North Dakota, Rhode Island, and Virginia. We were missing some data for Kentucky, South Carolina, Texas, and Virginia.

[12] States with complete MSIS data for the first three quarters of calendar year 2015 are California, Georgia, Idaho, Iowa, Michigan, Minnesota, Mississippi, Missouri, New Jersey, Pennsylvania, South Dakota, Tennessee, Utah, Vermont, West Virginia, and Wyoming.

[13] States with some quarters of calendar year 2015 MSIS data are Alabama, New York, and Oregon.

[14] "CMS PI SOCRATA by Month," California Department of Health Care Services, accessed July 22, 2019, https://www.dhcs.ca.gov/services/medical/eligibility/Pages/SOCRATAbyMonth.aspx.

[15] "March 2019 Medicaid & CHIP Enrollment Data Highlights," Medicaid.gov, accessed June 27, 2019, https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html.

[16] Alaska, Colorado, Delaware, the District of Columbia, Illinois, Louisiana, Maryland, Montana, Nevada, New Hampshire, New Mexico, Rhode Island, and Wisconsin.

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