

Medicare Part D Opioid Prescribing Mapping Tool

Methodology

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Background

The Medicare Part D Opioid Prescribing Mapping Tool is an online interactive mapping tool that presents geographic comparisons of the opioid prescribing rate at the state, county, and ZIP code levels. This mapping tool allows the user to see both the number and percentage of de-identified Medicare Part D opioid claims at the local level and better understand how this critical issue impacts communities nationwide.

Opioid prescribing rates are derived using data from Medicare Part D claims prescribed by health care providers. The mapping tool presents data for 2018, changes in rates from 2017 to 2018, and changes in rates from 2013 to 2018. The underlying data tables are available for each calendar year, 2013 through 2018. Approximately 70% of Medicare beneficiaries have Medicare prescription drug coverage either from a Part D plan or a Medicare Advantage Plan offering Medicare prescription drug coverage. In 2018, Medicare Part D spending was \$168 billion; U.S. retail prescription drug spending was about \$350 billion. The mapping tool does not contain beneficiary information.

Methods

The measures presented in this mapping tool are aggregated from the Part D Prescriber Summary¹ table, prior to any redactions and suppression reflected in the public version. The Part D Prescriber Summary table contains information at the prescriber-level (i.e. one summary record per NPI) and includes overall as well as sub-group summaries (e.g. opioids) of drug utilization, drug costs, and beneficiary counts.

In order to keep consistent reporting across the levels of geography, we develop a ZIP code reference table to determine the prescriber's state, county, and Rural-Urban Area Commuting (RUCA) codes. The ZIP code associated with the Part D prescriber, as reported in National Plan & Provider Enumeration System (NPES) is used to determine the FIPS state and county and the census-tract based Rural-Urban Area Commuting (RUCA) Codes. For additional information on the methods used in developing the reference table, see Appendix A, "ZIP Code Reference Table Methodology".

A list of the opioids included in the Opioid Prescriber mapping tool are available for download.² This list is generated using the Medicare Part D Overutilization Monitoring System (OMS), which can change from year to year. Opioid claims for each calendar year, 2013 through 2018, are identified using the OMS opioid list updated in 2019.³ Long-acting opioid claims are identified using controlled substances

¹ https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Downloads/Prescriber_Methods.pdf

² <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Downloads/OpioidDrugList.zip>

³ For additional information on Medicare Part D OMS please see <https://www.cms.gov/Medicare/Prescription-Drug-Coverage/PrescriptionDrugCovContra/RxUtilization.html>.

including opioids with oral morphine milligram equivalent (MME) data made public by the Centers for Disease Control and Prevention (CDC).⁴

The county-level Hot Spots and Outliers maps were created using an exploratory spatial data analysis technique known as local indicator of spatial association (LISA). The LISA map identifies significant spatial clustering (sometimes referred to as hot spots) of similar values around a specific location as well as pockets of dissimilar locations or outliers. The LISA analysis was implemented using the Find Outliers tool in www.ArcGIS.com. A hot spot (shown in red on the map) reflects a high rate cluster of counties and is defined as a county with a rate that is near other counties with high rates. Conversely, a low rate cluster (shown in dark blue on the map) of counties is defined as a county with a low rate that is near other counties with low rates. Counties that are high rate outliers (shown in pink on the map) reflect a county with a high rate that is near counties with low rates. Conversely, a county that is a low rate outlier (shown in light blue on the map) reflects a county with a low rate that is near counties with high rates. Counties that are shown in white reflect counties with rates that are not statistically significant from the rates of nearby counties.

Metrics

- **Prescriber Geographic Level (Prscrbr Geo Lvl)**: Identifies the level of geography that the data in the row has been aggregated. A value of “National” indicates the data in the row is aggregated across all states, the District of Columbia, and the US territories. A value of “State” indicates the data in the row is aggregated to the state of the prescriber as determined by the ZIP reference table (see **Appendix A** below). A value of “County” indicates the data in the row is aggregated to the county of the prescriber as determined by the ZIP reference table (see **Appendix A** below). A value of “ZIP” indicates the data in the row is aggregated the ZIP code of the prescriber as reported in NPPES.
- **Prescriber Geographic Code (Prscrbr Geo Cd)**: For the state-level data, the state FIPS code of the prescriber as determined by the ZIP reference table (see **Appendix A** below). For the county-level data, the county FIPS code of the prescriber as determined by the ZIP reference table (see **Appendix A** below). For the ZIP code-level data, the ZIP code of the prescriber as reported in NPPES.
- **Prescriber Geographic Description (Prscrbr Geo Desc)**: For the state-level data, the state name of the prescriber as determined by the ZIP reference table (see **Appendix A** below). For the county-level data, the state name and county name of the prescriber as determined by the ZIP reference table (see **Appendix A** below). For the ZIP code-level data, the state name of the prescriber as determined by the ZIP reference table (see **Appendix A** below) and the ZIP code of the prescriber as reported in NPPES.
- **RUCA Code (RUCA Cd)**: Rural-Urban Commuting Area Codes (RUCAs) are a Census tract-based classification scheme that utilizes the standard Bureau of Census Urbanized Area and Urban Cluster definitions in combination with work commuting information to characterize all of the nation's Census tracts regarding their rural and urban status and relationships. The prescriber's

⁴ This information is available for download on the CDC Opioid Overdose Data Resources web page at: <https://www.cdc.gov/drugoverdose/resources/data.html>

ZIP code was cross-walked to determine the RUCA codes (see **Appendix A** below). RUCA Codes are only reported for data aggregated at the ZIP code-level.

- **Total, Rural, and Urban Delineation (RUCA Desc)**: Specifies whether the area represents a rural or urban area according to the RUCA code or if it is a total for the area. The urban classification was defined using RUCA codes: 1-3 and rural classification was defined using 4-10. Please note that in prior versions of the tool, we used the following logic: *Urban*: 1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1, and 10.1. *Rural*: 4.0, 4.2, 5.0, 5.2, 6.0, 6.1, 7.0, 7.2, 7.3, 7.4, 8.0, 8.2, 8.3, 8.4, 9.0, 9.1, 9.2, 10.0, 10.2, 10.3, 10.4, 10.5, and 10.6.
- **Part D Prescribers (Tot Prscrbrs)**: The number of providers prescribing Medicare Part D drugs.
- **Part D Opioid Prescribers (Tot Opioid Prscrbrs)**: The number of Medicare Part D providers prescribing opioid drugs.
- **Overall Claims (Tot Clms)**: The number of Medicare Part D drug claims, including original prescriptions and refills.
- **Opioid Claims (Tot Opioid Clms)**: The number of Medicare Part D opioid drug claims, including original prescriptions and refills.
- **Long-Acting Opioid Claims (LA Tot Opioid Clms)**: The number of Medicare Part D opioid drug claims that are considered long-acting, including original prescriptions and refills.
- **Opioid Prescribing Rate (Opioid Prscrng Rate)**: The number of Opioid Claims divided by the Overall Claims and multiplied by 100.
- **Long-Acting Opioid Prescribing Rate (LA Opioid Prscrng Rate)**: The number of Long-Acting Opioid Claims divided by the Opioid Claims and multiplied by 100.
- **Change in Opioid Prescribing Rate (Opioid Prscrng Rate Chg)**: The percentage point difference in the opioid prescribing rate. This measure has a five year change measure and a one year change measure. For example, the five year change measure is the percentage point difference in the opioid prescribing rate from 2013 to 2018, which is calculated by subtracting the rate in 2013 from the rate in 2018. The one year change measure is the percentage point difference in the opioid prescribing rate from 2017 to 2018, which is calculated by subtracting the rate in 2017 from the rate in 2018. At each geographic level, the change in the prescribing rate is displayed as an increase, decrease, or no change. At the state level, an increase reflects a percentage point difference of at least 0.10 and a decrease reflects a difference of at least -0.10; at the county and ZIP code-levels, an increase reflects a difference of at least 1.0 and a decrease reflects a difference of at least -1.0.
- **Change in Long-Acting Opioid Prescribing Rate (LA Opioid Prscrng Rate Chg)**: The percentage point difference in the long-acting opioid prescribing rate. This measure has a five year change measure and a one year change measure. For example, the five year change measure is the percentage point difference in the long-acting opioid prescribing rate from 2013 to 2018, which is calculated by subtracting the rate in 2013 from the rate in 2018. The one year change measure is the percentage point difference in the long-acting opioid prescribing rate from 2017 to 2018, which is calculated by subtracting the rate in 2017 from the rate in 2018. At each geographic level, the change in the prescribing rate is displayed as an increase, decrease, or no change. At the state level, an increase reflects a percentage point difference of at least 0.10 and a decrease reflects a difference of at least -0.10; at the county and ZIP code-levels, an increase reflects a difference of at least 1.0 and a decrease reflects a difference of at least -1.0.

Data Limitations

In order to protect the privacy of Medicare beneficiaries, imputation and suppression are applied to the Opioid Prescribing Mapping Tool data. Opioid claim counts between 1 and 10 in the prescriber level source data are first imputed prior to aggregating to the ZIP code, state and national levels. Then at each aggregated geographic level, any derived opioid claim counts between 1 and 10 are primary suppressed (replaced with missing values). Secondary suppression is applied in cases where a single subgroup category is primary suppressed. For example, if the opioid claim count for given *rural* geographic area is primary suppressed but the associated *urban* geographic opioid claim count is not primary suppressed, then the urban geographic area must be secondary suppressed to prevent disclosure of the rural suppressed value. Secondary suppression prevents backing into a primary suppressed value by using the values from the other opioid claim counts such as total opioid claim count. The totals for Part D prescribers, opioid claims and overall claims will vary slightly across the state, county, and ZIP code-level data due to the **restrictions** applied at each geographic summary level (see restrictions noted within the “Metrics” section of this document).

The information presented in this mapping tool does not indicate the quality or appropriateness of care provided by individual physicians or in a given geographic region. For instance, high opioid prescribing for beneficiaries with cancer, palliative care and end of life care may be appropriate. In addition, opioids such as Methadone, may be prescribed for pain management as well as part of drug addiction detoxification and maintenance program. The mapping tool does not distinguish the various reasons for opioid prescribing.

Finally, the number of claims reflect prescriptions that have been filled by the beneficiary. The mapping tool does not measure whether a beneficiary took the medication.

How to Use the Mapping Tool

The Medicare Part D Opioid Prescribing Mapping Tool is designed to allow the user to explore opioid prescribing rates, changes in rates, rates across rural and urban areas, and “hot spots” at the state, county, and ZIP code-levels. The user can navigate around the map by clicking and dragging to a point of interest, as well as zoom in to explore lower levels of geography (counties or ZIP code areas) or zoom out to explore higher levels of geography (states). Zooming in or out can be done by scrolling the mouse wheel, typing the “+” or “-” keys on the keyboard, or by clicking the “+” or “-” buttons on the mapping tool. The user can obtain more information about a particular place by clicking on the map, where a pop-up box displays opioid prescribing rates at the current and higher levels of geography, as well as the number of opioid claims, overall claims, and Part D prescribers in that area. For the maps that display rates across rural/urban areas, the user can click on the pop-up box and then move the slider bar to compare rural opioid prescribing rates to urban opioid prescribing rates. Rural opioid prescribing rates are shown to the left of the slider bar and urban opioid prescribing rates are shown to the right of the slider bar. The web browsers that currently support the mapping tool include: Internet Explorer 9 and higher (limitations of using Internet Explorer 9 can be found here: <https://doc.arcgis.com/en/arcgis-online/reference/browsers.htm>), Edge, Firefox, Chrome, Safari, iOS Safari, Chrome for Android.

The data for the mapping tool can be downloaded here: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Downloads/Medicare_Opioid_Data.zip

CMS is obligated by the federal Privacy Act, 5 U.S.C. Section. 552a and the HIPAA Privacy Rule, 45 C.F.R Parts 160 and 164, to protect the privacy of individual beneficiaries and other persons. All direct identifiers have been removed from this data file.

Appendix A ZIP Code Reference Table Methodology

The ZIP code reference table contains a crosswalk between ZIP codes and FIPS state and county codes, FIPS-based geographic data elements (e.g., Core Based Statistical Areas), census-tract based Rural-Urban Area Commuting (RUCA) codes, and ZIP-code based health care regions (i.e., Dartmouth Atlas Hospital Referral Regions and Hospital Service Areas).

To construct the crosswalk between ZIP and FIPS state and county codes, we use the U.S. Department of Housing and Urban Development (HUD) ZIP-FIPS crosswalks.⁵ The HUD crosswalks report the proportion of a ZIP code's addresses that are contained within a particular FIPS code by quarter. We take these quarterly crosswalks and create an annual file that contains the last-best quarterly record for each ZIP-FIPS code combination within the year. Since ZIP codes can span multiple counties, the annual crosswalk contains multiple ZIP-FIPS value combinations. We use the ZIP-FIPS address proportions to assign a ZIP code to a single FIPS code by selecting the FIPS code that has the highest proportion of all the ZIP code's addresses. We then merge on FIPS-based geographic data elements to the ZIP reference table by FIPS.

We use a similar process to link ZIP codes to RUCA codes. RUCA codes classify U.S. census tracts using measures of population density, urbanization, and daily commuting.⁶ Researchers often use these codes to designate geographic areas as either urban or rural based on their commuting patterns to metropolitan and micropolitan areas. To link RUCAs to ZIP codes, we use the HUD ZIP-census tract crosswalks (ZIP-TRACT). As with the ZIP-FIPS crosswalks, the ZIP-TRACT crosswalks report the proportion of a ZIP code's addresses that exist in a given census tract by quarter. We use a similar process of identifying the census tract with the highest proportion of a ZIP code's addresses to create a unique ZIP-census tract combination for the reference table. We then merge RUCA codes onto the ZIP reference table by census tract.

While the HUD crosswalks are the main data source for the ZIP code reference table, we do perform additional edits to correct and enhance these data. Some records in the HUD ZIP-FIPS crosswalk contain FIPS values that are out of date. We correct these FIPS values using the closest annual ZIP-FIPS crosswalk file with correct FIPS values for the ZIP code. Additionally, some ZIP-TRACT quarterly crosswalks exclude ZIP codes that appear in the ZIP-FIPS crosswalk for the same year. While ZIP codes can change over time, we would not expect the presence of ZIP codes to differ between the two crosswalks within a given year, particularly since census tracts only change with the decennial census. To correct this discrepancy, we impute ZIP-TRACT crosswalk records from the closest annual ZIP-TRACT crosswalk file that contains the missing ZIP codes. Lastly, since we use the ZIP reference table to assign geographic data elements to health care providers based on their ZIP code, we supplement the ZIP crosswalk reference table with business ZIP codes that appear in the U.S Census County Business Patterns (CBP) data.⁷ These ZIP codes represent codes for business campuses that may not appear in databases of general ZIP codes.

⁵ https://www.huduser.gov/portal/datasets/usps_crosswalk.html

⁶ <https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx>

⁷ <https://www.census.gov/programs-surveys/cbp/data.html>