



# Data and Methodology: T-MSIS-Based State Per Capita Expenditures for the 2023 Medicaid and CHIP Scorecard

**This page has been left blank for double-sided copying.**

---

## Contents

I.	Summary of State Medicaid Per Capita Expenditures Analysis .....	1
A.	Data sources .....	1
B.	Overview of methodology .....	2
1.	Preparing and summarizing TAF and CMS-64 data .....	2
2.	Estimating state per capita expenditures for five eligibility groups .....	3
3.	Assessing the usability of the TAF data .....	3
II.	Data and Methods in Detail .....	5
A.	Data sources and analysis .....	5
1.	Constructed Medicaid member years associated with each eligibility group from the TAF DE file for each state .....	5
2.	Calculated expenditures for each beneficiary by using the TAF 2020 and 2021 claims data .....	6
3.	Calculated the percentage of Medicaid spending associated with each eligibility group in the TAF data .....	7
4.	Calculated total Medicaid spending using CMS-64 expenditure data extracted from the MBES .....	7
5.	Used the Medicare Master Beneficiary Summary File to determine the allocation of Medicare premium payments .....	11
B.	Calculation of per capita expenditures .....	12
Appendix A:	Construction of the TAF Files .....	A.1
Appendix B:	TAF and T-MSIS Data Fields Used in Per Capita Expenditures Calculations .....	B.1
Appendix C:	Assignment of Eligibility Groups .....	C.1
Appendix D:	Relationship Between Per Capita Data Quality Assessments, T-MSIS Data Quality Measures, and Outcome Based Assessment Categories .....	D.1

**This page has been left blank for double-sided copying.**

---

## Tables

I.1 Per capita expenditures and DQ Atlas data quality thresholds.....	5
II.1. Categories from CMS-64 quarterly spreadsheets .....	8
II.2. Illustrative example of calculating per capita expenditures (contrived data).....	13
A.1. Relationship of the original claim number and the adjustment claim number under the original ICN approach.....	A-10
A.2. Relationship of the original claim number and the adjustment claim number under the daisy chain approach.....	A-10

**This page has been left blank for double-sided copying.**

---

# I. Summary of State Medicaid Per Capita Expenditures Analysis

This document describes the construction of state-level Medicaid per capita expenditures for the Medicaid and Children’s Health Insurance Program (CHIP) Scorecard. Our approach to this analysis draws on the methodology used by the CMS Office of the Actuary (OACT)<sup>1</sup> to estimate national-level Medicaid per capita spending.<sup>2</sup> The data sources for the analysis are the Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAF) for calendar years 2020 and 2021 and CMS-64 expenditure data. The TAF are the research optimized version of state T-MSIS submissions.

The analysis has three parts: (1) obtaining, preparing, and analyzing TAF and CMS-64 data; (2) estimating state per capita expenditures for five eligibility groups; and (3) assessing the quality of the TAF data.

## A. Data sources

We use four primary data sources for the analysis.

- 1. TAF data.** The TAF are the research-ready versions of state T-MSIS data. They are the only data at the national level that provide information at the beneficiary and service levels, thereby supporting an assessment of per capita expenditures across five key eligibility groups. The analysis was based on the TAF for calendar years 2020 and 2021 that reflects state T-MSIS submissions as of March 2023. The following information from TAF was used in the analysis:
  - Counts of beneficiaries and months of enrollment by eligibility group from the TAF Annual Demographic and Eligibility (DE) file.
  - Expenditures from the TAF claims files, which include inpatient hospital (IP), other services (OT), long-term care (LT), and pharmacy (RX) claims. Claims data in the TAF are organized by service dates on the claims. For example, a claim for a service that took place on December 15, 2020, but was paid in January of 2021 would appear in the December 2020 claims file, and not the January 2021 file. Appendix A contains an explanation of how TAF claims files are constructed from T-MSIS files.
- 2. CMS-64 data.** We used aggregate expenditure information that states report on the Form CMS-64 for calendar years 2020 and 2021 extracted from the [Medicaid Budget and Expenditure System \(MBES\)](#). The MBES is the financial reporting system for the federal Medicaid matching payments to states. We used this

---

<sup>1</sup> See [2018 ACTUARIAL REPORT ON THE FINANCIAL OUTLOOK FOR MEDICAID \(cms.gov\)](#).

<sup>2</sup> We deviated from OACT’s methodology in certain cases where it made sense for purposes of this analysis.

## I. Summary of State Medicaid Per Capita Expenditures Analysis

---

expenditure information to calculate total expenditures at the state level. Expenditures in the MBES are organized by payment date.

3. **Master Beneficiary Summary File.** We used this Medicare file<sup>3</sup> on the Virtual Resource Data Center to determine the percent of Medicare-Medicaid dually-eligible beneficiaries who are aged or disabled and used that percentage to allocate CMS-64 Medicare premiums to the aged and disabled populations.
4. **Medicaid DQ Atlas.** We used the publicly available data quality measures in DQ Atlas ([www.medicaid.gov/dq-atlas](http://www.medicaid.gov/dq-atlas)) to assess state TAF data quality and provide these assessments as contextual information in reporting the per capita expenditure estimates. The five DQ Atlas topics that we used are: Medicaid-Only Enrollment, Eligibility Group Code, CHIP Code, Linking Expenditures to Eligibility Records, and Medicaid Beneficiary Expenditures.

## B. Overview of methodology

This chapter summarizes our three-step methodology, which is described in detail in Chapter II.

### 1. Preparing and summarizing TAF and CMS-64 data

- Using the 2020 and 2021 TAF data, for each state and year, we first identified beneficiaries who were ever enrolled in Medicaid in the year<sup>4</sup>, determined the number of months they were enrolled, and assigned them to an eligibility category. Then we used that information to calculate the total member-months of enrollment across the five key eligibility groups. This step required us to map 76 eligibility categories reported by states in the T-MSIS data to the five eligibility groups<sup>5</sup> listed below:
  - Children<sup>6</sup>
  - Adult non-VIII group (under age 65, not disabled, and not part of a Medicaid expansion for adults)
  - Aged
  - People with disabilities

---

<sup>3</sup> This file is documented here: <https://www.resdac.org/cms-data/files/mbsf-base>

<sup>4</sup> This analysis includes all Medicaid beneficiaries and their expenditures. It includes all Medicaid beneficiaries and their expenditures including beneficiaries with both comprehensive and partial benefits.

<sup>5</sup> In 2020, CMS introduced a new eligibility group for COVID testing (ELIGIBILITY-GROUP-CODE=76). Only about .2% of all Medicaid eligible beneficiaries fall into this group in 2020, and therefore we grouped them by their age into one of these five eligibility classifications.

<sup>6</sup> We excluded all CHIP beneficiaries, including those in S-CHIP and M-CHIP, from all calculations. Although M-CHIP beneficiaries may be considered Medicaid beneficiaries, we excluded them from the per capita spending calculations because we benchmarked TAF spending to state spending reported in the Form CMS-64, whereas all CHIP spending is reported in the Form CMS-21. This approach is consistent with the OACT methodology.



## I. Summary of State Medicaid Per Capita Expenditures Analysis

---

- Adults covered under section 1902(a)(10)(A)(i)(VIII) of the Social Security Act (also known as the VIII group adults or Medicaid expansion adults)
- Enrollment counts for each eligibility group and state were annualized by dividing total member-months of enrollment by 12.
- For each beneficiary assigned to one of the five eligibility groups above, we used the payment information from TAF claims records that could be linked to their eligibility records to estimate their total expenditures for the year. We summed the payments for everyone assigned to the same eligibility group to get a total TAF-based expenditure amount for that group. We then summed across the five eligibility groups to determine total TAF-based expenditures for each state. Finally, we calculated the proportion of the total TAF-based expenditures associated with each of the five eligibility groups.
- To calculate CMS-64 expenditures for each state, we summed total (federal and state share) net Medicaid assistance payments that each state reported to CMS in MBES for all quarters in calendar year 2020 (quarters 2, 3, and 4 of federal fiscal year 2020 and quarter 1 of federal fiscal year 2021), and repeated this step for calendar year 2021. We excluded spending in service categories not linked to individual beneficiaries, such as administrative expenses and disproportionate share hospital (DSH) payments, consistent with OACT's methodology.

### 2. Estimating state per capita expenditures for five eligibility groups

- We used the TAF annualized enrollment counts for each state and eligibility group obtained in step 1 as the denominators for the per capita expenditures estimates.
- We used CMS-64 total expenditures obtained in step 1 as the basis of the numerators for the per capita expenditure estimates. The CMS-64 total expenditures (excluding Medicare premium payments) were allocated across eligibility groups within each state based on the distribution of TAF expenditures across eligibility groups obtained in step 1. CMS-64 expenditures for Medicare premium payments were allocated to the "Aged" and "People with disabilities" groups based on the relative size of each group among the dually-eligible beneficiaries in the Medicare MBES data for the state.
- Finally, we calculated per capita expenditures for each eligibility group within each state by dividing each numerator (CMS-64 allocated expenditures) by the corresponding denominator (TAF member-years of enrollment).

### 3. Assessing the usability of the TAF data

- We used five sets of data quality analyses drawn from DQ Atlas<sup>7</sup> to assess the quality and completeness of each state's 2020 and 2021 TAF data for use in estimating per capita expenditures. More information about the methodology used for each of these data quality analyses is available in the "Background and Methods" section for each topic in DQ Atlas. The relationship between each data quality

---

<sup>7</sup> Link: [www.medicaid.gov/dq-atlas](http://www.medicaid.gov/dq-atlas)

## I. Summary of State Medicaid Per Capita Expenditures Analysis

---

analysis and the data quality checks used by CMS to evaluate state T-MSIS submissions are displayed in Appendix D.<sup>8</sup>

- **Enrollment.** To ensure that we have a reasonably accurate number of beneficiaries, we used the “Medicaid-Only Enrollment” topic, which assesses the difference between TAF enrollment and each state’s Performance Indicator Data (PI) enrollment averaged across all months of 2020 and (separately) 2021.
- **Eligibility group code.** To link expenditures in claims to the appropriate eligibility group, we used information in the “Eligibility Group Code” topic that assesses missing eligibility information in the TAF data.<sup>9</sup>
- **CHIP code.** To ensure that spending estimates and beneficiary counts appropriately exclude CHIP populations, we used the “CHIP Code” topic, which assesses how often the CHIP code variable is missing or inconsistent with the CHIP program type operating in a state.
- **Percentage of expenditures that link to a person.** To ensure expenditures in claims can be appropriately allocated to a beneficiary, we used the “Linking Expenditures to Eligibility Records” topic, which evaluates the proportion of Medicaid and CHIP expenditures that link to an eligibility record in the same month of service.
- **Expenditures: fee-for-service and monthly payments.** To ensure the TAF-based expenditures we use to allocate spending between eligibility groups is complete, we use the “Total Monthly Beneficiary Payments” topic in DQ Atlas. This topic compares the amount of fee-for-service (FFS) and monthly beneficiary payments (MBP)<sup>10</sup> captured in the TAF to the amounts reported by states in the Form CMS-64. In addition, we use the “Total FFS Expenditures” and “Total Monthly Beneficiary Payments” topics to provide states with separate assessments of the completeness of FFS and MBP in their TAF data, to assist states with identifying data quality issues.

Table I.1 below shows each data quality measure and the threshold used to classify states’ TAF data quality for the purposes of calculating per capita expenditures.

---

<sup>8</sup> Each DQ Atlas measure relates to one or more T-MSIS Priority Items (TPI) data quality checks, which are measures of data quality calculated when state submission T-MSIS files undergo operational readiness testing to determine whether they are sufficiently complete and reliable. CMS also conducts an additional assessment of each state and territory’s T-MSIS data quality using the Outcomes Based Assessment (OBA) methodology. The OBA assessment organizes key TPI measures into OBA categories.

<sup>9</sup> The full data quality assessment for the “Eligibility Group Code” topic in DQ Atlas examines both the extent of missing data for this variable as well as the use of individual eligibility group codes representing distinct eligibility pathways. Because our methodology for calculating per capita expenditures combines many eligibility group codes into five high-level eligibility groups, we did not include the aspects of the data quality assessment related to complete use of the more-granular eligibility group codes.

<sup>10</sup> Monthly beneficiary payments include capitated payments to HMOs, HIOs, or PACE plans; capitated payments for primary care case management (PCCM); premium payments for private health insurance; and capitated payments to prepaid health plans (PHPs).

## I. Summary of State Medicaid Per Capita Expenditures Analysis

Table I.1 Per capita expenditures and DQ Atlas data quality thresholds

Data quality assessment for the per capita expenditure analysis	Enrollment Benchmarking	Missing Information on Eligibility	CHIP Code	Expenditure Linkage	Expenditure Benchmarking
Topic name in DQ Atlas*	Medicaid-Only Enrollment	Eligibility Group Code	CHIP Code	Linking Expenditures to Beneficiaries	Medicaid Beneficiary Expenditures
Measure description in DQ Atlas (available in table view)	Avg Mthly % Diff in Medicaid Enrollment in TAF vs PI Data	Percentage of Medicaid and CHIP beneficiaries missing an eligibility group code	1. Alignment: CHIP Program Type vs CHIP Code Distribution in TAF 2. % Beneficiaries with Missing CHIP Code	% Expenditures That Do Not Link to Eligibility Record in Month of Service	% Diff in Medicaid Beneficiary Expenditures in TAF vs CMS-64
<b>Data Quality Assessment Criteria for Per Capita Reporting</b>					
<b>Low concern</b>	$x \leq 10\%$	$x \leq 5\%$	$x \leq 10\%$	$x \leq 10\%$	$x < 5\%$
<b>Medium concern</b>	$10\% < x \leq 20\%$	$5\% < x \leq 10\%$	$10\% < x \leq 20\%$	$10\% < x \leq 20\%$	$5\% \leq x < 20\%$
<b>High concern **</b>	$x > 20\%$	$x > 10\%$	$x > 20\%$	$x > 20\%$	$x \geq 20\%$

Notes:

\*The DQ Atlas is available at [www.medicaid.gov/dq-atlas](http://www.medicaid.gov/dq-atlas). Each of these topics can be found in the “Explore by Topic” area.

\*\*The “High concern” category for per capita expenditures reporting was designed to include both the “high concern” and “unusable” categories from DQ Atlas.

The next chapter provides more detail on the methodology we used to construct per capita expenditures.

## II. Data and Methods in Detail

### A. Data sources and analysis

Three data sources formed the basis of our analysis. The first is the TAF, composed of five files: the Annual Demographic and Eligibility (DE) file, which includes enrollment and eligibility information, as well as the inpatient (IP), long-term care (LT), other services (OT), and prescription drug (RX) claims files, which include records of expenditures for services provided during calendar years 2020 and 2021. The second source is the Medicaid quarterly expenditure data that states report on the Form CMS-64, which we downloaded from the MBES system. The last data source was the Medicare Master Beneficiary file. All files represent calendar year 2020 and 2021 data. All calculations were performed separately for each state and eligibility group within each state. Appendix B shows a list of the TAF data fields and the corresponding T-MSIS data fields used in this analysis.

#### 1. **Constructed Medicaid member years associated with each eligibility group from the TAF DE file for each state**

The first step was to determine the total number of member years across the five eligibility groups in each state. This information was used as the denominator for the per capita metric. Because we used the TAF data for this component of the analysis, we built this information from the beneficiary level up to each eligibility group. Specifically, we:

- Calculated the total number of months in which each Medicaid beneficiary was enrolled at any point in 2020 and (separately) 2021, summing the number of months in Title XIX Medicaid for each beneficiary<sup>11</sup>
- Attributed each beneficiary into one of the five eligibility groups:
  - Children<sup>12</sup>
  - Adult non-VIII group (under age 65, not disabled, and not part of a Medicaid expansion for adults)
  - Aged

---

<sup>11</sup> We removed the separate CHIP (S-CHIP) and Medicaid expansion CHIP (M-CHIP) beneficiaries from the analysis, restricting the estimates to only those Medicaid beneficiaries whose services were financed as Title XIX services. To exclude the S-CHIP and M-CHIP beneficiaries, we used the CHIP code in the TAF enrollment records and excluded all beneficiaries reported to be only in CHIP during the year (CHIP code = 2 or 3 or Eligibility group = 61-68 when the CHIP code was missing).

<sup>12</sup> In 2014, three states--California, North Dakota, and Utah--established an agreement with CMS that allows them to calculate a percentage of spending for their Medicaid Child population as qualifying for the M-CHIP enhanced federal match rate. This agreement was reached because the implementation of MAGI rules under the ACA and the elimination of asset questions moved these beneficiaries from M-CHIP to Title XIX Medicaid. In T-MSIS this Child population is reported as Medicaid Child, not M-CHIP. We have adjusted our calculations for this re-apportionment, which ranges from 6-8%, depending on the state.

## II. Data and Methods in Detail

---

- People with disabilities
- Adults covered under section 1902(a)(10)(A)(i)(VIII) of the Social Security Act (also known as the VIII group adults or Medicaid expansion adults)

We used eligibility code<sup>13</sup> information (the most recent non-missing value for a person in the calendar year) and age in the TAF enrollment records to categorize beneficiaries into the five eligibility groups. For full details on this categorization, please see Appendix C.

- Summed the number of Medicaid months across all beneficiaries attributed to the eligibility group, and then calculated the member-years for the eligibility group as total member months divided by 12.

### 2. Calculated expenditures for each beneficiary by using the TAF 2020 and 2021 claims data

For each beneficiary, we used payment information from the TAF IP, OT, LT, and RX claims files to calculate total payments associated with each individual.<sup>14</sup> For a detailed explanation of how claims are compiled from T-MSIS and organized into TAF monthly files, please see Appendix A. We aggregated the claims payments as follows:

- From the IP, LT, OT, and RX files, we used all FFS claims records, all capitated payment and monthly payment records, and Medicaid supplemental payments that are linked to an individual beneficiary (claim types 1 - Medicaid FFS claims, 2 - Medicaid capitated claims, and 5 - Medicaid Supplemental payments). We did not use Medicaid encounter claims.
- We did not include any claims that represented a lump-sum payment or that could not be assigned to a beneficiary. That is, we excluded claims from the IP file that were Medicaid DSH payments; any service tracking claims from the IP, LT, OT, or RX files; and any claim that had a positive service tracking payment amount.<sup>15</sup>
- We removed any fee-for service claim where at least one claim line had a type of service code indicating electronic health record payments (type of service=135), which is an administrative expenditure. We also removed any OT or RX claims where at least one claim line had a type of service code indicating drug rebates (type of service=131)<sup>16</sup>. In addition, we removed any LT, OT or RX claims where one of

---

<sup>13</sup> If a state had not expanded Medicaid by the end of 2020, but their eligibility data showed beneficiaries in the VIII group, we classified those beneficiaries based on their age group and ignored the eligibility group code field.

<sup>14</sup> We used the total payment amount from the header record, which summarizes the claim.

<sup>15</sup> Service tracking records represent lump-sum payments to a service provider that are not linked to specific individuals. An example is monthly billing from a transportation provider. We did include service tracking claim payments in North Dakota because in this state, all of the service tracking managed care payments were associated with one eligibility group: the VIII group Medicaid Expansion Adults.

<sup>16</sup> Drug rebates are removed from TAF data that are used to allocate expenditures between eligibility groups because most states do not submit this information to T-MSIS and the few states that do submit it appear to be

## II. Data and Methods in Detail

---

the lines had a type of service code indicating disproportionate share hospital payments (type of service=123) and we also removed any IP claims where the only type of service code on the claim was associated with disproportionate share hospital payments.<sup>17</sup>

- We then summed the total Medicaid paid amount from each of the remaining IP, LT, OT, and RX records for each beneficiary.<sup>18</sup> We matched each month's FFS claims to the eligibility file to ensure that the beneficiary was enrolled in Medicaid (and not CHIP) at the time that the service took place. For monthly beneficiary payments such as managed care capitation payments, we checked for Medicaid enrollment at any time during the year, even if the beneficiary was not enrolled in the specific month that the payment was made. At the end of this step, the file consisted of four payment variables (totaled over all 12 months) for each Medicaid beneficiary. The four variables were then summed to produce the total payment for each beneficiary. If a beneficiary did not have any claims in the calendar year, then the total payment amount was \$0 for that beneficiary.

### **3. Calculated the percentage of Medicaid spending associated with each eligibility group in the TAF data**

Using the summarized TAF claims payment information (calculated in the previous step) for each beneficiary with any Medicaid member months in the calendar year, along with the beneficiary's attribution to one of the five eligibility groups, we aggregated the total payments associated with each eligibility group. A total TAF-based spending amount for the state was calculated by summing the total spending amounts across all five eligibility groups. We then calculated the percentage of the total spending associated with each of the five eligibility groups, with the percentages adding to 100%.

### **4. Calculated total Medicaid spending using CMS-64 expenditure data extracted from the MBES**

We used the MBES system to obtain quarterly Medical Assistance payments reported by each state on the Form CMS-64.<sup>19</sup> We extracted and aggregated the CMS-64 expenditure data as follows:

---

doing it incorrectly. We do include Drug Rebates in the numerator of the per capita expenditure calculation because those expenditures (credits back to the state) come from the CMS-64.data.

<sup>17</sup> Before removing any header claims based on the content of the claim lines, we dropped any denied claim lines because TAF includes denied claim lines. Denied claim lines are identified as Claim line status code=542, 585, 654. We remove DSH expenditures because we follow OACT's methodology.

<sup>18</sup> We adjusted expenditures for California, North Dakota, and Utah because these states have an established agreement with CMS that allows them to calculate a percentage of their Medicaid Child population and report them as M-CHIP. See footnote 9.

<sup>19</sup> We used the total payments that consists of both the state and the federal share.



## II. Data and Methods in Detail

- We first downloaded the data for the four calendar quarters of 2020 and 2021.<sup>20</sup> Table II.1 shows all of the medical assistance payment categories in the CMS-64 and how they were used in this analysis.
  - Tab 50 is the total of all MAP categories of service and includes all of the 64.9 series of forms (64.9 Base, 64.9 Waiver, 64.9 VIII, 64.9E, 64.9 PE, and the prior period expenditures adjustment forms which have a P behind them. It includes expenditures from waivers and non-waivers.
  - The 64.10 is ADMIN and 64.21 is M-CHIP. These forms are not included in the FMR Category of Service report and are not included in the expenditures for this analysis.
  - For Uncompensated care waivers: All waiver information entered on a 64.9 series expenditure waiver form in MBES is included. This includes 1115, 1915(b), and 1915(c) waivers.
- Once we downloaded the data for the four calendar quarters of 2020 and 2021, we calculated net expenditures by subtracting DSH payments: (Net expenditures [column G] from the Total expenditures tab [category 50] – Net expenditures from Inpatient DSH [category 1B] – Net expenditures from Mental Health DSH [category 2B]). We then summed the total payments across the four calendar quarters to calculate the total CMS-64 payments for the year for each state.

**Table II.1. Categories from CMS-64 quarterly spreadsheets**

CMS-64 Service Category	CMS-64 Category Code	Expenditure category
Inpatient Hospital - Reg. Payments	1A	INCLUDED
Inpatient Hospital - DSH	1B	EXCLUDED
Inpatient Hospital - Sup. Payments	1C	INCLUDED
Inpatient Hospital - GME Payments	1D	INCLUDED
Mental Health Facility Services - Reg. Payments	2A	INCLUDED
Mental Health Facility - DSH	2B	EXCLUDED
Certified Community Behavior Health Clinic Payments	2C	INCLUDED
Nursing Facility Services - Reg. Payments	3A	INCLUDED
Nursing Facility Services - Sup. Payments	3B	INCLUDED
Intermediate Care Facility - Public	4A	INCLUDED
Intermediate Care - Private	4B	INCLUDED
Intermediate Care Facility - Individuals with Intellectual Disabilities (ICF/IID): Supplemental Payments	4C	INCLUDED
Physician & Surgical Services - Reg. Payments	5A	INCLUDED

<sup>20</sup> Specifically, we obtained data from the CMS-64/Financial Management Reports (FMR) for the Category of Service, Nation, and four quarters for calendar years 2020 and 2021. This included the second through fourth quarters for federal fiscal year 2020 and the first quarter of federal fiscal year 2021, which corresponded to TAF calendar year 2020, and the second through fourth quarters for federal fiscal year 2021 and the first quarter of federal fiscal year 2022, which corresponded to TAF calendar year 2021. We limited the expenditures to the category known as Medical Assistance Payments, Total Computable.

## II. Data and Methods in Detail

CMS-64 Service Category	CMS-64 Category Code	Expenditure category
Physician & Surgical Services - Sup. Payments	5B	INCLUDED
Physician & Surgical Services - Evaluation and Management	5C	INCLUDED
Physician & Surgical Services - Vaccine codes	5D	INCLUDED
Outpatient Hospital Services - Reg. Payments	6A	INCLUDED
Outpatient Hospital Services - Sup. Payments	6B	
Prescribed Drugs	7	INCLUDED
Drug Rebate Offset - National	7A1	INCLUDED
Drug Rebate Offset - State Sidebar Agreement	7A2	INCLUDED
MCO - National Agreement	7A3	INCLUDED
MCO - State Sidebar Agreement	7A4	INCLUDED
Increased ACA OFFSET - Fee for Service	7A5	INCLUDED
Increased ACA OFFSET - MCO	7A6	INCLUDED
Dental Services	8	INCLUDED
Other Practitioners Services - Reg. Payments	9A	INCLUDED
Other Practitioners Services - Sup. Payments	9B	INCLUDED
Clinic Services	10	INCLUDED
Clinic Services - Reg. Payments	10A	INCLUDED
Clinic Services - Sup. Payments	10B	INCLUDED
Laboratory/Radiological	11	INCLUDED
Home Health Services	12	INCLUDED
Sterilizations	13	INCLUDED
Abortions	14	INCLUDED
EPSDT Screening	15	INCLUDED
Rural Health	16	INCLUDED
Medicare - Part A	17A	INCLUDED (MCR PREMIUM)
Medicare - Part B	17B	INCLUDED (MCR PREMIUM)
120% - 134% Of Poverty	17C1	INCLUDED (MCR PREMIUM)
Coinsurance	17D	INCLUDED
Medicaid - MCO	18A	INCLUDED
Medicaid MCO - Evaluation and Management	18A1	INCLUDED
Medicaid MCO - Vaccine codes	18A2	INCLUDED
Medicaid MCO - Community First Choice	18A3	INCLUDED
Medicaid MCO - Preventive Services Grade A OR B, ACIP Vaccines and their Admin	18A4	INCLUDED
Medicaid MCO - Certified Community Behavior Health Clinic Payments	18A5	INCLUDED
Medicaid MCO - Services Subject to Electronic Visit Verification Requirements	18A6	INCLUDED
Prepaid Ambulatory Health Plan	18B1	INCLUDED



## II. Data and Methods in Detail

CMS-64 Service Category	CMS-64 Category Code	Expenditure category
MCO PAHP - Evaluation and Management	18B1a	INCLUDED
MCO PAHP - Vaccine codes	18B1b	INCLUDED
MCO PAHP - Community First Choice	18B1c	INCLUDED
MCO PAHP - Preventive Services Grade A OR B, ACIP Vaccines and their Admin	18B1d	INCLUDED
Medicaid PAHP - Certified Community Behavior Health Clinic Payments	18B1e	INCLUDED
MCO PAHP - Services Subject to Electronic Visit Verification Requirements	18B1f	INCLUDED
Prepaid Inpatient Health Plan	18B2	INCLUDED
MCO PIHP - Evaluation and Management	18B2a	INCLUDED
MCO PIHP - Vaccine codes	18B2b	INCLUDED
MCO PIHP - Community First Choice	18B2c	INCLUDED
MCO PIHP - Preventive Services Grade A OR B, ACIP Vaccines and their Admin	18B2d	INCLUDED
Medicaid PIHP - Certified Community Behavior Health Clinic Payments	18B2e	INCLUDED
MCO PIHP - Services Subject to Electronic Visit Verification Requirements	18B2f	INCLUDED
Medicaid - Group Health	18C	INCLUDED
Medicaid - Coinsurance	18D	INCLUDED
Medicaid - Other	18E	INCLUDED
Home & Community-Based Services - Reg. Pay. (Waiv)	19A	INCLUDED
Home & Community-Based Services - St. Plan 1915(i) Only Pay.	19B	INCLUDED
Home & Community-Based Services - St. Plan 1915(j) Only Pay.	19C	INCLUDED
Home & Community Based Services State Plan 1915(k) Community First Choice	19D	INCLUDED
All-Inclusive Care Elderly	22	INCLUDED
Personal Care Services - Reg. Payments	23A	INCLUDED
Personal Care Services - SDS 1915(j)	23B	INCLUDED
Targeted Case Management Services - Com. Case-Man.	24A	INCLUDED
Case Management - State Wide	24B	INCLUDED
Primary Care Case Management	25	INCLUDED
Hospice Benefits	26	INCLUDED
Emergency Services for Undocumented Aliens	27	INCLUDED
Federally-Qualified Health Center	28	INCLUDED
Non-Emergency Medical Transportation	29	INCLUDED
Physical Therapy	30	INCLUDED
Occupational Therapy	31	INCLUDED
Services for Speech, Hearing & Language	32	INCLUDED
Prosthetic Devices, Dentures, Eyeglasses	33	INCLUDED
Diagnostic Screening & Preventive Services	34	INCLUDED

## II. Data and Methods in Detail

CMS-64 Service Category	CMS-64 Category Code	Expenditure category
Preventive Services Grade A OR B, ACIP Vaccines and their Admin	34A	INCLUDED
Nurse Mid-Wife	35	INCLUDED
Emergency Hospital Services	36	INCLUDED
Critical Access Hospitals	37	INCLUDED
Nurse Practitioner Services	38	INCLUDED
School Based Services	39	INCLUDED
Rehabilitative Services (non-school-based)	40	INCLUDED
Private Duty Nursing	41	INCLUDED
Freestanding Birth Center	42	INCLUDED
Health Home w Chronic Conditions	43	INCLUDED
Tobacco Cessation for Preg Women	44	INCLUDED
Health Home with Substance Abuse Disorder	45	INCLUDED
ODU Medicaid Assisted Treatment – Drugs	46	INCLUDED
ODU MAT DRUG REBATE/National Agreement	46A1	INCLUDED
ODU MAT DRUG REBATE/State Sidebar	46A2	INCLUDED
ODU MAT DRUG REBATE MCO /National Agreement	46A3	INCLUDED
ODU MAT DRUG REBATE MCO /State Sidebar	46A4	INCLUDED
ODU MAT DRUG REBATE/Increased ACA Offset Fee for Service - 100%	46A5	INCLUDED
ODU MAT DRUG REBATE/Increased ACA Offset MCO – 100%	46A6	INCLUDED
ODU Medicaid Assisted Treatment Services	46B	INCLUDED
ARP Section 9811 COVID Vaccine/Vaccine Administration	47	INCLUDED
Other Care Services	49	INCLUDED
Total Net Expenditures	50	INCLUDED

### 5. Used the Medicare Master Beneficiary Summary File to determine the allocation of Medicare premium payments

To account for the fact that most states are not submitting expenditure data for Medicare premiums into T-MSIS, we use the Medicare Master Beneficiary Summary File (MBSF) to determine the proportion of Medicare premiums reported on the CMS-64 that should be allocated to the “Aged” eligibility category and to the “People with disabilities” category. We still included CMS-64 expenditures for Medicare premiums in the numerators of the per capita estimates, but the distribution of these expenditures into eligibility categories was handled as follows:

- Using the Medicare Master Beneficiary Summary file, calculated the number of Medicare-Medicaid dually eligible beneficiaries in each state.
- Using the Medicare Master Beneficiary Summary file, calculated the percent of duals eligible for Medicare on the basis of being disabled and the percent eligible on the basis of being aged.

## II. Data and Methods in Detail

---

### B. Calculation of per capita expenditures

We used the distribution of TAF-based spending across eligibility group to allocate the CMS-64 total expenditures (less Medicare premium payments) to each of the five eligibility groups within each state. We allocated the CMS-64 expenditures associated with Medicare premium payments to the “Aged” and “People with Disability” groups based on the Medicare MBES distribution of dually-eligible enrollment across these two groups. Finally, we divided the CMS-64 expenditures allocated each eligibility group by the number of TAF Medicaid member years in that eligibility group, giving us the final estimate of per capita expenditures for each eligibility group within each state.

This process is illustrated using an example with contrived data in Table II.2 below.

## II. Data and Methods in Detail

**Table II.2. Illustrative example of calculating per capita expenditures (contrived data)**

State x	A	B	C	D	E	F	G	H	I
Eligibility group	Number of member months from TAF	Number of member years from TAF	TAF total expenditures	TAF share of expenditures	Percent of duals that are Disabled or Aged from Medicare data	CMS-64 Medicare Part A&B premiums	CMS-64 medical spending without Medicare premiums and without DSH	CMS-64 medical spending plus Medicare premiums (minus DSH)	Per capita spending per member/year
Children	960,000	80,000	\$125,500,000	19%			\$151,050,000	\$151,050,000	\$1,888
Adults	504,000	42,000	\$98,400,000	15%			\$119,250,000	\$119,250,000	\$2,839
Aged	180,000	15,000	\$125,000,000	19%	60%	\$3,000,000	\$151,050,000	\$154,050,000	\$10,270
Disabled	300,000	25,000	\$232,600,000	35%	40%	\$2,000,000	\$278,250,000	\$280,250,000	\$11,210
VIII Group	264,000	22,000	\$83,000,000	12%			\$95,400,000	\$95,400,000	\$4,336
<b>Total</b>	<b>2,208,000</b>	<b>184,000</b>	<b>\$664,500,000</b>	<b>100%</b>		<b>\$5,000,000</b>	<b>\$795,000,000</b>	<b>\$800,000,000</b>	<b>\$4,348</b>

Note: The total row for CMS-64 spending for each state consists of total Medical Assistance payments (minus DSH payments) and how that total CMS-64 spending amount is distributed across the eligibility groups in column F is determined by the percentage reported in column C.

- **Calculate the proportion of total Medicaid spending associated with each eligibility group using TAF data.** The TAF data for the fictitious state in Table II.2 included 184,000 beneficiary member years enrolled in Title XIX Medicaid in 2021, with an associated \$664.5 million in spending. The percentages in Column D show the distribution of TAF expenditures across each eligibility group, which will be used to allocate the total expenditures the state reported on the CMS-64. For the aged group (Table II.2, Row 3), the value in Column D is equal to \$125,000,000 divided by \$664,500,000 = 19 percent.
- **Allocate CMS-64 dollars (excluding Medicare premiums) among the five eligibility groups.** For the aged group, Column D (19 percent) is multiplied by the total medical spending that the state reported on the CMS-64 excluding Medicare premiums for the four quarters covering calendar year 2021 (Column G, \$795,000,000) to produce \$151,050,000.
- **Allocate CMS-64 dollars associated with Medicare premiums to the “Aged” and “People with Disabilities” groups.** The aged group had \$3,000 (column F) additional added to represent their portion of Medicare premium payments.

## II. Data and Methods in Detail

---

- **Calculate per capita expenditures for each eligibility group.** Per capita spending is calculated by dividing the CMS-64 dollars allocated to each eligibility group by the number of member years. In the example, per capita spending for the aged group would be calculated as the sum of CMS-64 spending (minus Medicare premiums) \$151,050,000 in CMS-64 spending allocated to the aged category (Column G) plus the \$3000 of CMS-64 spending for Medicare premiums allocated to the aged category (Column F) divided by the 15,000 member years for this group drawn from TAF (Column B) to produce a per-capita spending estimate of \$10,270 per member/year.
- **Calculate total per capita expenditures for each state.** The total per capita spending across all eligibility groups is calculated as the unallocated CMS-64 spending divided by the number of TAF member-years across all eligibility groups. In our example, this would be  $\$800,000,000 / 184,000 = \$4,348$  per member/year.

**This page has been left blank for double-sided copying.**

## **Appendix A:**

### **Construction of the TAF Files**

**This page has been left blank for double-sided copying.**



### A. Transformed Medicaid Statistical Information System

Since 1999, states have been required to submit electronic Medicaid claims and eligibility data files through the Medicaid Statistical Information System, or MSIS. These files have been the only national, uniform, and comprehensive data collection system for Medicaid and Children's Health Insurance Program (CHIP), including both Medicaid Expansion CHIP (M-CHIP) and Separate CHIP (S-CHIP), person-level enrollment and service-level claims records. During 2017, the Transformed Medicaid Statistical Information System (T-MSIS) replaced the retired MSIS system.

T-MSIS represents the next generation of national data for Medicaid and CHIP beneficiaries and the services they use. T-MSIS data enhance and expand on MSIS in the following ways:

- Files are monthly rather than quarterly.
- Files contain variable length relational records rather than fixed-length flat records, resulting in more nuanced, granular data.
- T-MSIS data can be accurate to the day based on effective and end dates of record segments within the relational structure.
- T-MSIS contains more than four times as many data elements as MSIS.
- In addition to four claims files (Inpatient, Long-Term Care, Pharmacy, and Other Services) and a person-level eligibility file, T-MSIS contains three new file types: Provider, Managed Care Plan, and Third-Party Liability.

### B. Relational Structure of T-MSIS

Each T-MSIS file submission contains sets of data organized into record segments, which are converted into a series of tables that are collectively referred to as the T-MSIS relational database. The design of T-MSIS is complex. The eligibility files states submit include 19 person-specific record segments. Each segment captures different pieces of information about each individual eligible for Medicaid or CHIP, that when related to one another by shared record keys, represent a full record of information for each eligible. For claims file types, a relational record segment is either a claim header or a claim line. A full claim record may have one claim header and many claim lines.

### C. Need for the TAF

To maximize the ability of end-users to analyze beneficiary health outcomes using T-MSIS, the Division of Business and Data Analytics (DBDA) within the Centers for Medicare & Medicaid Services (CMS) recognized the need to create a series of analytic-optimized data sets, or the T-MSIS Analytic Files (TAF). Data users are eager to take advantage of the benefits of T-MSIS including new variables that were not collected in MSIS or derived for the Medicaid Analytic eXtract (MAX), the predecessor to the TAF. These new TAF data sets exist alongside T-MSIS and serve as an alternate

data source tailored to meet the broad research needs of the Medicaid and CHIP data user community. This community includes not only the Center for Medicaid and CHIP Services (CMCS), but also a wide-range of users across other CMS components, such as the Center for Medicare and Medicaid Innovation (CMMI), and external researchers, such as universities or research hospitals.

Three issues make working with the source T-MSIS data challenging for researchers.

- The first is that the size of the database and the relational structure of T-MSIS does not lend itself to an intuitive approach to data selection and analysis without a relatively sophisticated understanding of its structure and contents. The relational structure means that there are parent and child records that must be linked to perform a review or complete an analysis of the data. The need to link parent and child records is particularly true for the person/entity-level files, i.e., the Eligibility, files. Each of these files has at least eight constituent record segments and multiple keys for linking them. Additionally, the size of the T-MSIS database is so large that the data are stored in a special database environment, requiring specialized knowledge in data extraction and transformation procedures. A simple record selection query, if done improperly, can potentially overload the data processing environment.
- The second issue is similarly a function of the rich data that T-MSIS provides. Because states submit files monthly and each segment comes with effective and end dates to which their data apply, seemingly straightforward questions can be quite complex to answer. For example, whether or not a beneficiary can be identified as enrolled in Medicaid in January 2021 may depend both on which state data submission is being used, as well as the specific day the data were extracted, and whether the research question references a specific point in time or the entire month. The TAF addresses these issues as uniformly as possible across the states to create a well-vetted standard approach for use by the research community. In doing so, it reduces the burden on researchers during the initial data processing phase of a research project.
- The third issue is that errors in state submissions to T-MSIS can occur. This issue manifests itself at both the data-element and structural levels. At the data-element level, states may submit data that do not conform to T-MSIS coding requirements, such as submitting values not on the list of valid codes in the T-MSIS data dictionary. The TAF recodes some invalid values to a standard NULL value. At the structural level, states may submit contradictory data within the same file. For example, a beneficiary may show as both enrolled and not enrolled in an 1115 demonstration in the month.

### **D. Summary of Annual and Monthly TAF**

Each TAF, based on enrollment/eligibility, claims, provider and/or managed care plan data, provides T-MSIS source data as well as constructed variables designed to support

research and analysis such as outcomes measurement, public reporting, quality improvement initiatives, and quality monitoring, among other items. The monthly files are created first and then the annual files are created from the corresponding monthly files. For the per capita expenditure calculations, we use five sets of TAF files:

### 1. Eligibility

The per capita expenditure analysis uses the annual DE file. We provide some background information about the monthly Beneficiary Summary File (BSF) here because the DE file builds on the monthly BSFs.

- **Annual Demographic and Eligibility (DE) TAF.** The annual DE TAF contain demographic, eligibility, and enrollment information for all Medicaid and CHIP beneficiaries who were enrolled for at least one day during each calendar year. The content of the annual DE file is largely based on the monthly Beneficiary Summary File (BSF). The monthly BSF TAF include any beneficiary in the source T-MSIS data who was enrolled in Medicaid or CHIP for at least one day in the month represented in the file being constructed. Specifically, the BSF contain one record for each MSIS ID per state that has an active<sup>21</sup> enrollment time span as defined by the following logic:
  - An active record for that MSIS ID as indicated by the T-MSIS active indicator AND
  - Enrollment effective date occurring before or equal to the last day of the month; AND
  - Enrollment end date occurring on or after the first day of the month OR enrollment end date = NULL.
- Both the enrollment effective date and the enrollment end date variables originate from the ENROLLMENT-TIME-SPAN-SEGMENT (ELG000021) of the file being constructed. Records are excluded if they have a DEATH-DATE (ELG000002) that is before the start of the TAF month.
- In most cases, this selection criteria results in one record per MSIS ID in the ENROLLMENT-TIME-SPAN-SEGMENT (ELG000021). However, there are two special cases. First, there can be records with active enrollment during the month, but are missing an MSIS ID in the source data; those records are excluded from the BSF. Second, there are cases where multiple records are active for the same MSIS ID in a given month; this might be because a beneficiary stopped and then re-started Medicaid enrollment during the month, or it might be a data quality issue in the

---

<sup>21</sup> The term active refers to the most recent record submitted by the state for a particular eligibility or claims transaction. The record segment key, which is a row in a state file submission, makes a record segment distinct in the T-MSIS database. If the state submits two record segments with the same record segment key then the record segment that was submitted in the most recent reporting period's file submission with the highest file submission sequence number (only applicable when the state has submitted a Create file and then either a Replacement or Update file for the same reporting period) is marked as "active". .

state's file submission. When there is more than one enrollment period, the monthly BSF captures the effective and end dates associated with each Medicaid and CHIP enrollment episode in that month.

- For other data elements in the monthly BSF, the most recent active information submitted by the state is selected from the corresponding T-MSIS source record. When there are multiple records that are active in the most recent segment of the month, the source data are sorted according to a predetermined order and then the value on the first T-MSIS record in the sort order is used to populate the variable in the BSF. The BSF uses the following general sort order for most source variables (sort type in parentheses):
  - T-MSIS reporting period of the record segment to which the source variable belongs (descending)
  - Effective date of the record segment to which the source variable belongs (descending)
  - End date of the record segment to which the source variable belongs (descending)
  - Record number (descending)
- When there are no active records in the T-MSIS source data segment during the month for a given beneficiary, the value for that BSF data element is set to NULL.
- The variables in the annual DE files are populated from the monthly BSF. Most of the monthly data elements are taken directly from the monthly BSFs. The TAF also uses the 'last-best' method to select the value in the most recent month in which a non-missing value exists. For example, the per capita expenditures calculations use the 'last-best' value for eligibility (eligibility-group-code) to assign an individual to an eligibility group.

### 2. Claims

The four sets of monthly claims files that are used in the per capita expenditures analysis are described below.

- **Monthly Inpatient Hospital (IP) Claims TAF.** The IP TAF contain inpatient hospital claims. The claims in TAF include FFS claims, managed care encounter claims, service tracking claims, capitated payments and monthly beneficiary payments, and supplemental payments for Medicaid, Medicaid-expansion CHIP, and Separate CHIP. Inclusion in the IP TAF is based on the month/year of the discharge date or, when the discharge date is unavailable, the most recent service end date associated with the claim. Each IP TAF is comprised of two files – a Claim Header file and a Claim Line file. The claims included in these files are active, non-voided, non-denied (at the header level), non-duplicate final action claims. Only claim header records meeting these inclusion criteria, along with their associated claim line records, are incorporated. Both files can be linked together using unique keys that are

constructed based on various claim header and claim line data elements. The two IP TAF are generated for each calendar month for which data are reported.

- **Monthly Long-Term Care (LT) Claims TAF.** The LT TAF contain long-term care institution claims, including nursing facilities, intermediate care facility services for individuals with intellectual disabilities, mental health facility services, and independent (free-standing) psychiatric wings of acute care hospitals. The claims in TAF include FFS claims, managed care encounter claims, service tracking claims, and supplemental payments for Medicaid, Medicaid-expansion CHIP, and Separate CHIP. Inclusion in the LT TAF is based on the month/year of the ending date of service. Each LT TAF is comprised of two files – a Claim-Header file and a Claim-Line file. The claims included in these files are active, non-voided, non-denied (at the header level), non-duplicate final action claims. Only claim header records meeting these inclusion criteria, along with their associated claim line records, are incorporated. Both files can be linked together using unique keys that are constructed based on various claim header and claim line data elements. The two LT TAF are generated for each calendar month in which the data are reported.
- **Monthly Other Services (OT) Claims TAF.** The OT TAF contain claims for services other than those provided by an inpatient hospital, long-term care facility, or pharmacy. Services in the OT TAF include but are not limited to: physician services, outpatient hospital services, dental services, other physician services (i.e. chiropractors, podiatrists, psychologists, optometrists, etc.), clinic services, laboratory services, X-ray services, sterilizations, home health services and personal support services. The claims in TAF include FFS claims, managed care encounter claims, service tracking claims, capitated payments, and supplemental payments for Medicaid, Medicaid-expansion CHIP, and Separate CHIP. Inclusion in the OT TAF is based on the month/year of the ending date of service or, when the ending date of service is unavailable, the service beginning date is used or, when the service beginning and ending date on the claim header are missing, the most recent service ending date on the claim line is used. Each OT TAF is comprised of two files – a Claim-Header file and a Claim-Line file. The claims included in these files are active, non-voided, non-denied (at the header level) and non-duplicate final action claims. Only claim header records meeting these inclusion criteria, along with their associated claim line records, are incorporated. Both files can be linked together using unique keys that are constructed based on various claim header and claim line data elements. The two OT TAF are generated for each calendar month in which the data are reported.
- **Monthly Pharmacy (RX) Claims TAF.** The RX TAF contain claims for drugs or other services provided by a pharmacy. The claims in TAF include FFS claims, managed care encounter claims, service tracking claims, and supplemental payments for Medicaid, Medicaid-expansion CHIP, and Separate CHIP. Inclusion in the RX TAF is based on the month/year of the prescription fill date. The RX TAF are comprised of two files – a Claim Header file and a Claim Line file. The claims included in these files are active, non-voided, non-denied (at the header level), non-

duplicate final action claims. Only claim header records meeting these inclusion criteria, along with their associated claim line records, are incorporated. Both files can be linked together using unique keys that are constructed based on various claim header and claim line data elements. The two RX TAF are generated for each calendar month for which data are reported.

### E. Record inclusion in TAF claims

The per capita expenditures analysis uses the header claims. All TAF header claims must meet the following criteria. The claims must be:

- Active

Active claims have a unique segment key across all reporting periods. The segment key is defined at the claim header level by the following T-MSIS fields: SUBMITTING-STATE, ICN-ORIG, ICN-ADJ, ADJUDICATION-DATE, and ADJUSTMENT-IND. When a state resubmits a claim file to T-MSIS for one reporting period, the claim that was submitted in the previous version of the file becomes inactive, and the newly submitted claim becomes active.

- Non-denied

The claim denied indicator (CLAIM-DENIED-INDICATOR) is equal to 1 (not denied) or the claim type (TYPE-OF-CLAIM) does not have a value of denied (Z) or the claim status category (CLAIM-STATUS-CATEGORY-CODE) does not have a value of 'F2' or the claim status code (CLAIM-STATUS-CODE) is not equal to one of the following values : '026', '087', '542', '585', '654'.

- Non-void

The adjustment indicator (ADJUSTMENT-IND) is not equal to 1.

- Final action

A final action claim is the claim in a claim family that represents the final version of a claim. See the next section for a full description of the final action algorithm.

- Non-duplicate

All header claims with duplicate information on the following fields will be excluded from the TAF: TMSIS-RUN-ID, SUBMITTING-STATE-CODE, ICN-ORIGINAL, ICN-ADJUSTMENT, ADJUDICATION-DATE, ADJUSTMENT-IND.

### F. Description of the Final Action Algorithm

At a high level, the final action algorithm links together the original claim and all related adjustment claims into a “claim family” that is assigned a common claim family ID. Next, the algorithm determines the “final action claim” within the family.

### 1. Identifying Claim Families

A “claim family” is a set of paid, denied, or void claims that have been adjudicated and have a related internal control number (ICN). This grouping of the original claim and all of its subsequent void and adjustment claims shows the progression of changes that have occurred since the claim was first submitted. Claims are first organized by source file type and then by MSIS ID. Then the ICNs on claims from the same source file type with the same MSIS ID are compared to create claim families.

There are two ways to link original claims and their subsequent adjustments into a claim family:

- All the claims in the family have the same original ICN while the adjustments each have a different adjustment ICN. This is known as the “Original ICN approach.”
- Each subsequent adjustment links back to only the prior claim in the family. The original and the first adjustment have either a common original ICN or adjustment ICN. Then if there was a second adjustment it would have an original ICN or adjustment ICN in common with the first adjustment but not with the original claim. Then if there was a third adjustment it would have an original ICN or adjustment ICN in common with the second adjustment but not the first adjustment or original. This is known as the “Daisy Chain ICN approach.”

### 2. Example of the original ICN approach

Under this approach, a state assigns an ICN to the initial adjudicated version of the claim or encounter and records this identifier in the original claim number. If adjustment claims are subsequently created, the ICN assigned to the initial adjudicated version of the claim or the encounter is carried forward on every subsequent adjustment claim. Table A.1 illustrates how the original claim number and the adjustment claim number on the members of a claim family are populated when the original ICN approach is used. Adjudication date is then used to sort claims within a family to determine the sequence in which each adjustment occurred, and which claim is the final action. Medicaid paid date or check effective date are used if adjudication date is missing or the same across claims.



**Table A.1. Relationship of the original claim number and the adjustment claim number under the original ICN approach**

Event	ADJUDICATION-DATE	ICN-ORIG	ICN-ADJ	ADJUSTMENT-IND
On 5/1/2014, the state completes the adjudication process on the initial version of the claim	5/1/2014	1	-	0
On 7/15/2014, the state completes a claim re-adjudication / adjustment	7/15/2014	1	2	4
On 8/12/2014, the state completes a 2nd claim re-adjudication / adjustment	8/12/2014	1	3	4
On 9/5/2014, the state completes a 3rd claim re-adjudication / adjustment	9/5/2014	1	4	4

### 3. Example of the daisy chain ICN Approach

Under this approach, the state records the ICN of the previous final adjudicated version of the claim/encounter in the ICN-ORIG field of the adjustment claim record. If additional adjustment claims are subsequently created, the ICN-ORIG on the new adjustment claim only points back one generation. Table A.2 illustrates how the ICN-ORIG and ICN-ADJ values on the members of a claim family are populated when the DAISY-CHAIN ICN approach is used.

**Table A.2. Relationship of the original claim number and the adjustment claim number under the daisy chain approach**

Event	ADJUDICATION-DATE	ICN-ORIG	ICN-ADJ	ADJUSTMENT-IND
On 6/1/2014, the state completes the adjudication process on the initial version of the claim	6/1/2014	11	-	0
On 8/15/2014, the state completes a claim re-adjudication/adjustment	8/15/2014	11	12	4
On 9/12/2014, the state completes a 2nd claim re-adjudication/adjustment	9/12/2014	12	13	4
On 10/5/2014, the state completes a 3rd claim re-adjudication/adjustment	10/5/2014	13	14	4

### 4. Flagging final action claims

In broad terms, the final action algorithm operates as follows:

- Link all the related claims, including the original and adjustments, into a claim family and assign a claim family ID. Identifying the set of related claims that represent a claim family will use different logic depending on whether the state uses the Original ICN approach or the Daisy Chain approach.
- Sequence the claims within a claim family either based on adjudication date (or Medicaid paid date or check effective date if adjudication date is missing or the same across claims) if the family uses the Original ICN approach or the order implied by the relationship between the original claim number and the adjustment



## Appendix A: Construction of the TAF Files

---

claim number across claims in the family if the family uses the Daisy Chain approach.

- In all states other than those using marginal adjustments (only Illinois as of November 2019), flag the final action claim as the latest-sequenced claim in a claim family. This includes all claims regardless of status, including paid, denied, and voided claims.
- If there is ambiguity in the order of the final two claims in the claim family then the algorithm uses the information available to make a best guess at the most appropriate final action claim. If the information available is not sufficient then the claim family will not be sequenced or assigned a final action status.
- In states using marginal adjustments (only Illinois as of November 2019), flag all claims in a claim family as final action claims if the last claim in the claim family is something other than a void or denied claim.

**This page has been left blank for double-sided copying.**

## **Appendix B:**

### **TAF and T-MSIS Data Fields Used in Per Capita Expenditures Calculations**

**This page has been left blank for double-sided copying.**

## Appendix B: TAF and T-MSIS Data Fields Used in Per Capita Expenditures Calculations

The table below shows the list of both TAF and T-MSIS data fields from the enrollment and eligibility data files that were used to construct per capita expenditures.

TAF Variables from the Annual DE file	CORRESPONDING T-MSIS DATA FIELDS
SUBMTG_STATE_CD	ELG249: SUBMITTING-STATE
MSIS_IDENT_NUM	ELG251: MSIS-IDENTIFICATION-NUM
AGE_NUM	ELG024: DATE-OF-BIRTH
AGE_NUM	ELG025: DATE-OF-DEATH
ELGBLTY_GRP_CD_01-12	ELG087: ELIGIBILITY-GROUP
ELGBLTY_GRP_LTST	ELG087: ELIGIBILITY-GROUP
CHIP_CD_01-12	ELG054: CHIP-CODE
RSTRCTD_BNFTS_CD_LTST	ELG097: RESTRICTED-BENEFITS-CODE

## Appendix B: TAF and T-MSIS Data Fields Used in Per Capita Expenditures Calculations

The table below shows the list of both TAF and T-MSIS data fields from the claims files that were used to construct per capita expenditures.

TAF Variables from the Claims files (IP,LT,OT,RX)	CORRESPONDING T-MSIS DATA FIELDS
SUBMTG_STATE_CD	CIP017: SUBMITTING-STATE
	CLT017: SUBMITTING-STATE
	COT017: SUBMITTING-STATE
	CRX017: SUBMITTING-STATE
MSIS_IDENT_NUM	CIP022: MSIS-IDENTIFICATION-NUM
	CLT022: MSIS-IDENTIFICATION-NUM
	COT022: MSIS-IDENTIFICATION-NUM
	CRX022: MSIS-IDENTIFICATION-NUM
CLM_TYPE_CD	CIP100: TYPE-OF-CLAIM
	CLT052: TYPE-OF-CLAIM
	COT037: TYPE-OF-CLAIM
	CRX029: TYPE-OF-CLAIM
TOT_MDCD_PD_AMT	CIP114: TOT-MEDICAID-PAID-AMT
	CLT065: TOT-MEDICAID-PAID-AMT
	COT050: TOT-MEDICAID-PAID-AMT
	CRX041: TOT-MEDICAID-PAID-AMT
TOS_CD	CIP257: TYPE-OF-SERVICE
	CLT211: TYPE-OF-SERVICE
	COT186: TYPE-OF-SERVICE
	CRX134: TYPE-OF-SERVICE
MDCD_DSH_PD_AMT (IP only)	CIP220: MEDICAID-AMOUNT-PAID-DSH
SRVC_TRKNG_TYPE_CD	CIP123: SERVICE-TRACKING-TYPE
	CLT073: SERVICE-TRACKING-TYPE
	COT059: SERVICE-TRACKING-TYPE
	CRX050: SERVICE-TRACKING-TYPE
SRVC_TRKNG_PYMT_AMT	CIP124: SERVICE-TRACKING-PAYMENT-AMT
	CLT074: SERVICE-TRACKING-PAYMENT-AMT
	COT060: SERVICE-TRACKING-PAYMENT-AMT
	CRX051: SERVICE-TRACKING-PAYMENT-AMT

## **Appendix C:**

### **Assignment of Eligibility Groups**

**This page has been left blank for double-sided copying.**



## Appendix C: Assignment of Eligibility Groups

If the eligibility code variable (ELGBLTY\_GRP\_CD\_LTST) is not null (not missing), we used it, the beneficiary's age (AGE\_NUM), and the restricted benefits code (RSTRCTD\_BNFTS\_CD\_LTST) to assign the eligibility group for the per capita expenditure analysis (ELIG\_MACBIS) as follows:

ELGBLTY_GRP_CD_LTST	AGE_NUM	RSTRCTD_BNFTS_CD_LTST	Group	ELIG_MACBIS
1, 2, 3, 4, 6, 7, 8, 9, 14, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 54, 55, 56, 70, 71	AGE_NUM < 21	RSTRCTD_BNFTS_CD_LTST <> F	Children	1
54	AGE_NUM = NULL	RSTRCTD_BNFTS_CD_LTST <> F	Children	1
1, 2, 3, 4, 9, 14, 27, 32, 33, 34, 35, 36, 56, 70, 71, 76	21 <= AGE_NUM < 65	--	Adults	2
1	AGE_NUM=NULL	--	Adults	2
--	--	RSTRCTD_BNFTS_CD_LTST = F	Adults	2
21, 24, 45, 47, 48, 49, 50, 69	--	RSTRCTD_BNFTS_CD_LTST <> F	Disabled	4
11, 12, 13, 15, 16, 17, 18, 19, 20, 22, 23, 25, 26, 37, 38, 39, 40, 41, 42, 43, 44, 46, 51, 52, 59, 60	AGE_NUM < 65 OR NULL	RSTRCTD_BNFTS_CD_LTST <> F	Disabled	4
1, 2, 3, 4, 5, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 25, 26, 27, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46, 51, 52, 53, 56, 59, 60, 71	AGE_NUM >= 65	RSTRCTD_BNFTS_CD_LTST <> F	Aged	5
72, 73, 74, 75	AGE_NUM ≥18 or NULL	RSTRCTD_BNFTS_CD_LTST <> F	VIII Group	3
61, 62, 63, 64, 65, 66, 67, 68		RSTRCTD_BNFTS_CD_LTST <> F	Children <sup>a</sup>	1

<sup>a</sup> For this analysis, we remove CHIP beneficiaries. However, if a beneficiary is enrolled in both CHIP and Medicaid in the same year, we still want to count their Medicaid months and Medicaid expenditures. Therefore, we classify these beneficiaries as Children so that we can include their Medicaid member months and their Medicaid expenditures.

Among any remaining beneficiaries not yet assigned to a category based on the above logic, we assigned those with AGE\_NUM >= 65 to the Aged group. Any individual with CHIP\_CD\_LTST = 2, 3, or 4 was assigned to the Children group. Finally, any beneficiaries without a group assignment at this stage was assigned an unknown group.

**This page has been left blank for double-sided copying.**

## **Appendix D:**

### **Relationship Between Per Capita Data Quality Assessments, T-MSIS Data Quality Measures, and Outcome Based Assessment Categories**

**This page has been left blank for double-sided copying.**

## Appendix D: Per Capita Data Quality and T-MSIS Data Quality

---

Five DQ Atlas measures are used to assess state TAF data quality and presented as contextual information in reporting the per capita expenditure estimates. Each DQ Atlas measure relates to one or more T-MSIS Priority Items (TPI) data quality checks, which are measures of data quality calculated when state submission T-MSIS files undergo operational readiness testing to determine whether they are sufficiently complete and reliable. CMS also conducts an additional assessment of each state and territory's T-MSIS data quality using the Outcomes Based Assessment (OBA) methodology. The OBA assessment organizes key TPI measures into OBA categories.

States can monitor T-MSIS file processing and check for and address T-MSIS data submission errors identified in the TPI data quality checks using T-MSIS dashboards, and CMS provides states with data quality technical assistance to monitor and address specific data quality issues.

The DQ Atlas measures used to assess TAF data quality for the purposes of per capita analyses relate to the TPI data quality checks and OBA categories as follows:

## Appendix D: Per Capita Data Quality and T-MSIS Data Quality

DQ Atlas measure	DESCRIPTION AND NOTES	TPI DQ CHECK MEASURE ID AND NAME	OBA CATEGORY
Enrollment Benchmarking: Medicaid-Only Population	<ul style="list-style-type: none"> <li>Benchmark monthly enrollment counts in TAF to PI</li> <li>The TPI DQ check compares enrollment counts for all full-benefit enrollees, but CHIP enrollees are excluded from per capita calculations</li> </ul>	<ul style="list-style-type: none"> <li>EL-15-001-1 = % difference between full-benefit T-MSIS enrollment count (EL-6-023-23) and PI enrollment count (Medicaid + CHIP)</li> </ul>	Beneficiary eligibility
Eligibility Group Code	<ul style="list-style-type: none"> <li>Percentage of enrollees with unknown eligibility group in TAF</li> <li>This DQ Atlas measure essentially combines the two related TPI checks because in TAF, MSIS IDs with missing or invalid Eligibility Group code are considered to have an “unknown” Eligibility Group category</li> </ul>	<ul style="list-style-type: none"> <li>RULE-2135 = The percentage of MSIS IDs with an invalid Eligibility Group</li> <li>RULE-7447 = The percentage of MSIS IDs missing Eligibility Group</li> </ul>	File integrity
Expenditure Benchmarking: Total Medicaid Expenditure	<ul style="list-style-type: none"> <li>Compare expenditures in T-MSIS for both FFS claims and MBP to what states report on the CMS-64</li> <li>The TPI checks relate to this DQ Atlas measure because they calculate the percentage of FFS original claim headers with Total Medicaid Paid Amount = \$0 or missing, which would in turn affect the comparison of T-MSIS to CMS-64 reporting</li> </ul>	<ul style="list-style-type: none"> <li>EXP-1-024-2 = % of claim headers with Total Medicaid Paid Amount = \$0 or missing</li> <li>EXP-2-020-2 = % of claim headers with Total Medicaid Paid Amount = \$0 or missing</li> <li>EXP-6-029-1 = % of claim headers with Total Medicaid Paid Amount = \$0 or missing</li> <li>EXP-7-027-2 = % of claim headers with Total Medicaid Paid Amount = \$0 or missing</li> <li>EXP-16-021-3 = % of claim headers with Total Medicaid Paid Amount = \$0 or missing</li> <li>EXP-27-001-1 = % of claim headers with Total Medicaid Paid Amount = \$0 or missing</li> <li>EXP-22-009-9 = OT Medicaid Capitation Payment: Original, Paid Claims</li> <li>EXP-29-001-1 = IP Medicaid Encounter: Original, Non-Crossover, Paid Claims</li> <li>EXP-30-001-1 = IP Medicaid Encounter: Original, Crossover, Paid Claims</li> <li>EXP-33-001-1 = LT Medicaid Encounter: Original, Non-Crossover, Paid Claims</li> <li>EXP-34-001-1 = LT Medicaid Encounter: Original, Crossover, Paid Claims</li> <li>EXP-38-001-1 = OT Medicaid Encounter: Original, Crossover, Paid Claims</li> </ul>	Expenditures

## Appendix D: Per Capita Data Quality and T-MSIS Data Quality

DQ Atlas measure	DESCRIPTION AND NOTES	TPI DQ CHECK MEASURE ID AND NAME	OBA CATEGORY
Beneficiary Information: CHIP Code	<ul style="list-style-type: none"> <li>Percent of eligibility records where CHIP code is missing or inconsistent with the type of CHIP program the state operates (Medicaid expansion, separate, or combination program)</li> </ul>	<ul style="list-style-type: none"> <li>EXP-41-001-1 = RX Medicaid Encounter: Original, Non-Crossover, Paid Claims</li> <li>EL-3-002_2-31 = % of MSIS IDs with CHIP-CODE = 1 (Medicaid) that have ENROLLMENT-TYPE = 2 (Separate Title XXI CHIP)</li> <li>EL-3-002_3-16 = % of MSIS IDs with CHIP-CODE = 2 (M-CHIP) that have ENROLLMENT-TYPE = 2 (Separate Title XXI CHIP)</li> <li>EL-3-002_4-32 = % of MSIS IDs with CHIP-CODE = 3 (S-CHIP) that have ENROLLMENT-TYPE = 1 (Medicaid or M-CHIP)</li> </ul>	Beneficiary eligibility
Linking Expenditures to Beneficiaries	<ul style="list-style-type: none"> <li>Denominator includes all expenditures reported in T-MSIS</li> <li>Numerator includes expenditures that link to an eligibility record that indicated that the person was enrolled during the month in which the service occurred</li> <li>New DQ Atlas measure released in 2022</li> </ul>	<ul style="list-style-type: none"> <li>RULE-1337 = % of claim headers with an MSIS ID not enrolled on Beginning Date of Service</li> <li>RULE-1758 = % of claim headers with an MSIS ID not enrolled on Prescription Fill Date</li> <li>RULE-335 = % of claim headers with an MSIS ID not enrolled on Admission Date</li> <li>RULE-884 = % of claim headers with an MSIS ID not enrolled on Beginning Date of Service</li> </ul>	File integrity

CHIP = Children's Health Insurance Program; DQ = Data quality; FFS = Fee-for-service; ID = identifier; MBP = Monthly beneficiary payments; OBA = Outcomes Based Assessment; PI = Performance Indicators; T-MSIS = Transformed Medicaid Statistical Information System; TAF = T-MSIS Analytic Files; TPI = T-MSIS Priority Items.

**This page has been left blank for double-sided copying.**



Email [Dataconnectsupport@cms.hhs.gov](mailto:Dataconnectsupport@cms.hhs.gov) if you need help or have a question about MACBIS data or tools, or if you would like to submit a data request.