Total Medical Expenses (TME) Trends Across Massachusetts Communities, 2023

February 2026

Technical Appendix

CHIA.

Total Medical Expenses Trends Across Massachusetts Communities
(February 2026)

TECHNICAL APPENDIX

Contents

American Community Survey (ACS) Data (Calendar Year 2023)

Data Source:

The ACS is an annual survey conducted by the United States Census Bureau to collect information about communities across the nation. The ACS collects information on various social and demographic topics, such as race and ethnicity, occupation, educational attainment, and many other subjects. For more information about the ACS, and to view interactive, customizable tables of publicly available ACS data sets, please visit **data.census.gov/**. To view ACS technical documentation, please visit: **census.gov/programs-surveys/acs/technical- documentation.html**.

Data Year:

CY 2023 5-year estimates, used throughout this report, represent data collected over 60 months (5 years), and aggregate data from January 2019 through December 2023. Multi-year estimates increase the statistical reliability of data for communities that are less populated and for subgroups with smaller populations. For more information on multi-year estimates, please visit **https://www.census.gov/data/developers/data-sets/acs-5year.html**.

Definitions:

- ZIP code Tabulation Area (ZCTA): The list of ZCTAs used for this report was developed by the Census bureau using **2020 Census tabulation blocks**. ZCTAs often have a one-to-one relationship with their associated ZIP codes, but there are some differences between ZIP codes and ZCTAs as geographic measures. ZIP codes were developed by the United States Postal Service (USPS) to define delivery routes, which are composed of street networks and/or locations with high mail volumes. ZCTAs are used to describe ZIP codes as areas of land, allowing Census data to be mapped. For more information on ZCTAs, please visit: **https://www.census.gov/programs-surveys/geography/guidance/geo-areas/zctas.html**.

- Population Estimates: Throughout the interactive dashboard, users are able to select an ACS variable to view the estimated number of people who indicated the relevant demographic description in their survey response at the ZCTA level. The data for ACS demographic variables was collected by the Census Bureau and is publicly available at **data.census.gov/table**.

- Population Proportions: Throughout the interactive dashboard, users are able to select an ACS variable to view related data, presented as percentages of the population at the ZCTA level. The data for ACS demographic variables was collected by the Census Bureau and is publicly available at **data.census.gov/table**. Population proportions and percentages were calculated by CHIA using Census bureau data, as described by the table below.

  The numerator of each population proportion within a given ZCTA is the estimated number of people who indicated the relevant demographic description in their survey response (equivalent to the population estimate described above). The denominator of each proportion, per ZCTA, is the total population estimate for each ZCTA. Denominator values

may vary by demographic variable. For each publicly available data table, the ACS defines a "population universe" which describes the total population estimate per ZCTA. Most variables are percentages of the total population at the ZCTA level. Definitions for each available variable selection, including definitions for the numerator and denominator of each calculated percentage, are provided in the table below.

For more information of ACS terms, visit the Census Bureau's glossary at **https://www.census.gov/glossary/**.

Demographic Variable Proportion Calculations

Variable Name	ACS Table Number (as referenced on data.census.gov/table)	Numerator Definition	Denominator (Universe) Definition
Percentage of ZCTA Total Population Who Are Foreign-Born	B05001	Estimated proportion of a ZCTA population who are born outside of the U.S. The **Census Bureau's glossary of terms** defines the foreign-born population as "*Anyone who is not a U.S. citizen at birth, including those who become U.S. citizens through naturalization.*"	Total population
Percentage of ZCTA Total Population Not a US Citizen	B05001	Estimated proportion of a ZCTA population who are **not** U.S. citizens. The Census Bureau's glossary of terms defines U.S. citizens as "*People who indicate that they were born in the United States, Puerto Rico, a U.S. Island Area, or abroad of at least one U.S. citizen parent are U.S. citizens. People who indicate that they are U.S. citizens through naturalization are also U.S. citizens. Naturalized U.S. citizens are foreign-born people who identify themselves as naturalized. Naturalization is the conferring, by any means, of citizenship upon a person after birth.*"	Total population
Percentage of ZCTA Total Population Hispanic or Latino	B03002	Estimated proportion of a ZCTA population who are of Hispanic or Latino ethnic origin. The Census Bureau's glossary of terms states that "*Hispanic or Latino refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race.*" For a detailed list of	Total population

Variable Name	ACS Table Number (as referenced on data.census.gov/table)	Numerator Definition	Denominator (Universe) Definition
		Hispanic or Latino groups, please see the Census Bureau's glossary of terms.	
Percentage of ZCTA Total Population Asian, Non-Hispanic nor Latino	B03002	Estimated proportion of a ZCTA population who identify as being of Non-Hispanic nor Latino ethnic origin *and* of Asian race and no other race group. The Census Bureau's glossary of terms defines "Asian" as *"A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam."* For a detailed list of Asian groups, please see the Census Bureau's glossary of terms.	Total population
Percentage of the ZCTA Total Population White, Non-Hispanic nor Latino	B03002	Estimated proportion of a ZCTA population who identify as being of Non-Hispanic nor Latino ethnic origin *and* White race and no other race group. The Census Bureau's glossary of terms defines "White" as *"A person having origins in any of the original peoples of Europe, the Middle East, or North Africa. It includes people who indicate their race as 'White' or report entries such as Irish, German, Italian, Lebanese, Arab, Moroccan, or Caucasian."*	Total population
Percentage of ZCTA Total Population All Other Races, Non-Hispanic nor Latino	B03002	Estimated proportion of the sum of the number of people in a ZCTA population who identify as being of Non-Hispanic nor Latino ethnic origin *and* the following races: American Indian & Alaska Native and no other race group; Native Hawaiian & Other Pacific Islander and no other race group; Some other race and no other race group; and Two or more races. See the Census Bureau's glossary of terms for more detailed definitions of each of these four race categories.	Total population

Variable Name	ACS Table Number (as referenced on data.census.gov/table)	Numerator Definition	Denominator (Universe) Definition
Percentage of ZCTA Total Population Age Under 18 Years	B01001	Estimated proportion of a ZCTA population who are aged 0-17 years old (under 18 years of age) as of the interview date.	Total population
Percentage of ZCTA Total Population Age 65+ Years	B01001	Estimated proportion of a ZCTA population aged 65 years or older, as of the interview date.	Total population
Percentage of ZCTA Total Population Age 18 to 64 Years	B01001	Estimated proportion of a ZCTA population who are 18 to 64 years old, as of the interview date.	Total population
Percentage of the ZCTA Occupied Housing Units With Car	S2504	Estimated number of occupied housing units with available vehicles. Vehicles include automobiles, vans, and trucks of one-ton capacity or less, kept at home for use by household members.	Occupied housing units
Percentage of ZCTA Households that Received SNAP Benefits in the Previous 12 Months	B22003	Estimated proportion of households within a ZTCA population who received Food Stamps or Supplemental Nutrition Assistance Program (SNAP) benefits in the past 12 months.	Total Households
Percentage of ZCTA Population (25 years and older) with Less than High School Education	B06009	The ACS provides estimates on the number of people within a ZCTA population who have not completed a high-school level of education, including not obtaining a GED.	Population 25 years and over in the United States
Percentage of ZCTA Population (3 years and older) Currently Enrolled as Undergraduate Students	B14007	Estimated proportion of a ZCTA population who are currently enrolled in college in undergraduate studies.	Population 3 years and older in the United States
Percentage of ZCTA Population (3 years and older) Currently Enrolled as Graduate Students	B14007	Estimated proportion of a ZCTA population who are currently enrolled in graduate or professional school.	Population 3 years and older in the United States
Percentage of the ZCTA Population (3 years and older) Currently Enrolled as Undergraduate or Graduate Students	B14007	Estimated proportion of a ZCTA population who are currently enrolled in college in undergraduate studies, or in graduate or professional school.	Population 3 years and older in the United States
Percentage of ZCTA Population (5 years	B16004	Estimated proportion of a ZCTA population that speak only English, or speak a language	Population 5 years and older

Variable Name	ACS Table Number (as referenced on data.census.gov/table)	Numerator Definition	Denominator (Universe) Definition
and older) Who Speak English Well		other than English at home *and* rate their ability to speak English as "well" or "very well."	
Percentage of ZCTA Population (5 years and older) Who Speak Only English	B16004	Estimated proportion of a ZCTA population that speak only English at home.	Population 5 years and older
Percentage of ZCTA Population (5 years and older) Who Do Not Speak English Well	B16004	Estimated proportion of a ZCTA population that speak a language other than English at home *and* rate their ability to speak English as "not well" or "not at all".	Population 5 years and older
Percentage of the ZCTA Civilian Noninstitutionalized Population (19 to 64 years old) who are Unemployed	B27011	Estimated proportion of the ZCTA population who are in the labor force, but unemployed.	Civilian noninstitutionalized population 19 to 64. The Census Bureau's glossary of terms defines "noninstitutionalized population" as "All U.S. civilians not residing in institutional group quarters facilities such as correctional institutions, juvenile facilities, skilled nursing facilities, and other long-term care living arrangements."
Percentage of the ZCTA Civilian Noninstitutionalized Population with No Health Insurance	B27010	Estimated number of people with no health insurance.	Total civilian noninstitutionalized population (see definition of "noninstitutionalized" above or click here to visit the Census Bureau's glossary of terms.)
Percentage of the ZCTA Population (Civilians 18 years and older) with a Disability	S1810	The ACS estimates the number of people within a ZCTA population with any disability. The Census Bureau's glossary of terms defines "Disability" as *"A long-lasting physical, mental, or*	Total civilian noninstitutionalized population (see definition here)

Variable Name	ACS Table Number (as referenced on data.census.gov/table)	Numerator Definition	Denominator (Universe) Definition
		emotional condition. This condition can make it difficult for a person to do activities such as walking, climbing stairs, dressing, bathing, learning, or remembering. This condition can also impede a person from being able to go outside the home alone or to work at a job or business."	
Percentage of the ZCTA Total Civilian Noninstitutionalized Population with an Independent Living Disability	S1810	Proportion of the population within a ZCTA who have a "go-outside-home disability". This type of disability is defined in the Census Bureau's glossary of terms as having *"difficulty doing errands such as visiting a doctor's office or shopping by oneself."*	Total civilian noninstitutionalized population (see definition here)
Percentage of the ZCTA Population (Civilian Veterans 18 years and older) with a Service-Connected Disability	B21100	Estimated number of civilian veterans with a service-connected disability.	Civilian veterans 18 years and over
Percentage of the ZCTA Occupied Housing Units with Telephone Access	B25043	Estimated proportion of households with telephone access (able to make and receive phone calls).	Occupied housing units
Percentage of the ZCTA Households with Computer Access	B28001	Estimated proportion of households with one or more computing device. Computing devices include desktops, laptops, smartphones, tablets or other portable wireless computers, and other computers.	Households
Percentage of the ZCTA Households with Internet Access	S2802	Estimated proportion of households with internet access.	Households
Median Family Income of ZCTA	B19113	Estimated median family income of a ZCTA. The maximum estimated median family income reported by the ACS is $250,000. ZCTAs with an estimated family median income of greater than $250,000 are reported as having a	Families Please note, a proportion calculation is not applicable for this variable. Median family income per ZCTA is

Variable Name	ACS Table Number (as referenced on data.census.gov/table)	Numerator Definition	Denominator (Universe) Definition
		median family income estimate of "250,000+." The Census Bureau's glossary of terms defines "family income" as "*The sum of the income of all family members 15 years and older living in the household. Families are groups of two or more people (one of whom is the householder) related by birth, marriage, or adoption and residing together; all such people (including related subfamily members) are considered as members of one family*."	expressed as a dollar amount.

Total Medical Expenses (TME) Data (Calendar Year 2023)

Data Source:

Collected annually by CHIA pursuant to M.G.L. c. 12 C, section 8, from both commercial and public payers.

Data Year:

CY 2023

Definitions:

TME is defined as the total medical spending for a member population based on allowed claims (i.e., payer paid amount plus patient cost sharing) for all categories of medical expenses and all non-claims-related payments to providers. TME is expressed on a per member per month (PMPM) basis.

- Member ZIP code TME measures the total health care spending of each Massachusetts ZIP code, based on member residence, rather than where members received services. ZIP codes are self-reported by members, which may lead to certain inaccuracies, particularly in areas with high student or other transient populations.
- Commercial full-claims data includes both self- and fully-insured commercial business for which claims for all medical services were available to the reporting payer. The data captures complete medical spending and is used to calculate commercial TME.
- Commercial partial-claims data was excluded from this report. Commercial partial-claims data includes self- and fully insured commercial business where the employer separately contracts for one or more specialized services, such as pharmacy or behavioral health service management. In these cases, the reporting payer does not have access to the claims for the separately contracted services. As the full range of medical expenses is not available in the data reported by the payers, these partial-claims are not included in the TME analyses contained in this report.

The 2023 TME data is considered final, with, on average, eight months of claims run-out as of the 2024 collection cycle. Some, but not all, payers submitted updated CY 2023 data during the 2024 collection cycle. TME data used for this analysis uses the most recently available CY 2023 data for each payer.

For more information about TME data collection, please refer to the technical appendices published as part of CHIA's annual report: **https://www.chiamass.gov/annual-report/**.

To view the TME dataset, which is published in an aggregate format, please visit **https://www.chiamass.gov/annual-report.**

Physician Density Data (Calendar Year 2023)

Data Source:

American Medical Association (AMA) Workforce Mapper
https://www.ama-assn.org/about/research/health-workforce-mapper-app

Data Year:

CY 2023

Definitions:

Physician Density

Physician density measures the distribution of physicians across a specific area. As such, it may be an indicator of access to medical care by geography since patients with fewer physicians in their area may experience longer wait or travel times to see a doctor. CHIA used the Health Workforce Mapper, an application developed by the American Medical Association (AMA), where users can specify physician density by state, county, age group, types, and specialties. This publication uses estimates for 2023. For more information on data sourcing, see the AMA's Health Workforce Mapper User Manual: **https://www.ama-assn.org/modules/custom/ama_workforce_mapper/images/documents/AMA%20Health%20Workforce%20Mapper%20Manual.pdf.**

For the purposes of this report, physician density values reflect the number of primary care (internal medicine and family/general practice) physicians per 1,000 population with a county.

Primary Care Visit per Member by Community (Calendar Year 2023)

Data Source:

Payer-submitted claims data to the Massachusetts All-Payer Claims Database (MA APCD)

Data Year:

CY 2023

Definition:

Primary Care Visit per Member by Community

Primary care visits per member by community measures the average number of patients' visits with their primary care physicians statewide and by ZCTA. As such, it represents an indicator of primary care utilization and provides context to the potential differences in medical spending between communities.

CHIA estimated the number of primary care visits by identifying distinct medical claims where primary care services were provided in 2023. Primary care visits were defined by the unique combination of primary care providers, patients, and encounter date. These visits reflect members with commercial, MassHealth (Medicaid) ACPP/MCO, and Medicare Advantage coverage. Primary care visits per member by community was calculated by dividing the count of visits by the count of members for each ZCTA. Data for ZCTAs with fewer than 20 members with a primary care claim have been suppressed.

Chronic Conditions by Region (Calendar Year 2023)

Data Source:

Payer-submitted claims data to the Massachusetts All-Payer Claims Database (MA APCD)

Data Year:

CY 2023

Definition:

Chronic Conditions by Region

Chronic conditions, or chronic diseases, are defined by the **U.S. Centers for Disease Control and Prevention (CDC)** as health conditions that "last 1 year or more and require ongoing medical attention or limit activities of daily living or both." This publication includes estimates of Massachusetts members with specific chronic conditions by region as well as the prevalence rate of chronic conditions by 1,000 members. These data provide general context for the health status or burden of disease among Massachusetts regions, which may influence geographic variations in medical spending. Chronic conditions included in this publication are:

- Asthma
- Behavioral Health
- Cancer
- Diabetes
- Hypertension

These conditions were selected in reference to the **Massachusetts Aligned Measure Set**, a selection of high-priority quality measures for use in specific provider contracts to promote aligned accountability across payers and providers. The Aligned Measure Set includes quality measures for voluntary adoption by private and public payers and providers, specifically for use in global budget-based risk contracts; it aims to reduce administrative burden and focus quality improvement efforts on meaningful and high-priority measures and is updated annually by the Quality Measure Alignment Taskforce.

In acquiring an estimate of those with chronic conditions, CHIA referred to claims data from the Massachusetts All-Payer Claims Database (MA APCD). This dataset is restricted to those who have primary medical coverage through commercial, MassHealth (Medicaid) ACPP/MCO, or Medicare Advantage insurance. Each claim has an associated primary diagnosis code, as well as a list of

other diagnoses codes associated with a patient's history or their encounter. The codes are based on the International Classification of Diseases, 10th revision, or ICD-10.

In assessing which diagnoses codes are associated with a specific condition, CHIA referred to the existing 2024 PCBH data specifications for behavioral health conditions, and the ICD-10-CM Guidelines published in October 2024 for asthma, hypertension, cancer, and diabetes.[1,2] For determining which ICD-10 codes were associated with a chronic state, CHIA referred to the Chronic Condition Indicator Refined (CCIR) for ICD-10-CM published by the Healthcare Cost and Utilization Project (HCUP), a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality (AHRQ).[3]

If a claim incurred at any point between January 2020 or December 2023 documented an ICD-10 code associated with a) asthma, hypertension, behavioral health, or diabetes, AND b) a "chronic" state, that individual was included in the estimate. For behavioral health, only primary diagnosis codes were scanned. For all other conditions, the full list associated with a claim was scanned. It's important to note that the chronic conditions are not mutually exclusive categories.

The prevalence of each chronic condition by region was calculated by dividing the count of members with a primary diagnosis of the condition by the count of members in each region.

Methodology for Linking Data Sources

Multiple data sources were used in this report, which were linked to one another to be able to apply a new lens to existing data sets. The methodology for linking these data sets together is described below.

ACS and TME data linking:

Using a crosswalk translating mapping Massachusetts ZIP codes to ZCTAs, ZIP code-level TME data collected annually by CHIA was linked to demographic data from the ACS. This report sourced the most recently available Zip to ZCTA crosswalk (published in 2023) from the **Health Resources and Services Administration Data Warehouse site**. The crosswalk uses ZIP code Points from the ArcGIS and data points from U.S. Census Bureau shapefiles to match ZCTA areas and ZIP code areas.

In most cases, there is a one-to-one relationship between ZCTAs and their corresponding ZIP codes. In some cases, there is a one-to-many relationship between ZCTAs and ZIP codes (i.e., more than one ZIP code may be associated with a ZCTA). In these cases, all associated ZIP codes were linked to a single, corresponding ZCTA. ZIP code-level TME data was then cross-walked to the ZCTA-level data downloaded from **data.census.gov/table**.

Some ZIP codes refer to post office boxes (a type of large volume customer area), and thus, may correspond to ZCTAs that have an estimated total population of zero (0). Throughout this report, ZCTAs that have a total population of zero (0), and their corresponding ZIP codes, are excluded from analysis.

County, municipality, and ZIP code cross-walking:

Using the United States Postal Service (USPS) Database, each ZIP code was matched with the associated USPS community/neighborhood. In larger cities, multiple communities and ZIP codes were rolled up into one city; for example, Boston includes neighborhoods such as Jamaica Plain, Allston, Downtown and others.

Determining Correlation Significance Between TME Spending Categories and ACS Demographic Variables

In the report, CHIA presents data on correlations between certain spending categories and community characteristics.

Correlations refer to the relationship between 2 variables; when both variables increase or decrease in the same direction, this is considered a positive correlation. Conversely, a negative correlation refers to a relationship wherein one variable increases as another decreases. When plotting observed data points on a scatterplot, 2 perfectly correlated variables would be represented with a linear trend line. However, real-world scenarios rarely provide instances of perfect correlation, so a "line of best fit" is utilized instead. A strong correlation means that the data points are closely clustered around the line of best fit while a weak correlation indicates that the data points are more scattered.

To quantify the strength of 2 variables' correlation, this report uses Pearson's correlation coefficient, or r. The r value can range from -1 to 1, with -1 being a perfectly linear negative correlation and 1 being a perfectly linear positive correlation. If the r value is 0, there is no correlation. The focus of this analysis is on the variables with non-negligible correlation values (r value greater than or equal to 0.30 or less than or equal to -0.30). Thresholds for meaningful correlation will vary widely by the field of study.[4,5,6] The social sciences tend to have lower thresholds. This report's correlation results reflect statistically significant findings ($p < 0.05$) but may not necessarily reflect strong correlation values. R values for results displayed in this report and marked as strong correlations range from absolute values of 0.3 to 0.76.

R Value	Correlation Indication
-1	Perfectly linear *negative* correlation
-0.30	Minimum negative correlation for report inclusion
0	No relationship
0.30	Minimum positive correlation for report inclusion
1	Perfectly linear *positive* correlation

[1] Center for Health Information and Analysis, PCBH 2024 Data Specification Manual, **https://www.chiamass.gov/assets/docs/p/pbhc/PCBH-2024-Data-Specification-Manual-.pdf**

[2] U.S. Center for Medicare & Medicaid Services, ICD-10-CM Official Guidelines for Coding and Reporting, **https://www.cms.gov/files/document/fy-2025-icd-10-cm-coding-guidelines.pdf**

[3] Agency for Healthcare Research and Quality, Chronic Condition Indicator Refined (CCIR) for ICD-10-CM, **https://hcup-us.ahrq.gov/toolssoftware/chronic_icd10/chronic_icd10.jsp**

[4] K. K. V. Mate, D. M. Bushnell, M. Anatchkova, J. Martin-Delgado, O.M.Y. Ahmed, V. Williams, and C. Daskalopoulou, "What is with all these different correlation thresholds?" Quality of Life Research 31: S42-S42, **https://www.rti.org/publication/what-all-these-different-correlation-thresholds.**

[5] Kozak, Marcin, "What Is Strong Correlation?" Teaching Statistics 31, no. 3 (2009): 85–86, **https://onlinelibrary.wiley.com/doi/full/10.1111/j.1467-9639.2009.00387.x**.

[6] Center for Improving Value in Health Care, "Health Equity Analysis", accessed February 3, 2026, **https://civhc.org/get-data/public-data/health-equity-analysis/#**.