

**COMMONWEALTH OF MASSACHUSETTS
HEALTH POLICY COMMISSION**



**TECHNICAL APPENDIX 2
UNDERSTANDING PATTERNS OF HEALTH CARE
SPENDING, UTILIZATION, AFFORDABILITY, & ACCESS
FOR COMMERCIALY-INSURED MASSACHUSETTS
RESIDENTS WITH LOWER INCOMES**

ADDENDUM TO 2021 COST TRENDS REPORT

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1 Summary

This section describes the Health Policy Commission's (HPC) approach to the analyses contained in **Chapter 3: "Understanding Patterns of Health Care Spending, Utilization, Affordability, & Access for lower-income commercially insured Massachusetts residents"** of the 2021 Cost Trends Report.

2 Data sources

2.1 Data sources

The HPC used the 2018 Massachusetts All-Payer Claims Database v8.0 (APCD) for the exploration of spending patterns by zip-level income. The HPC's APCD analytic files contain five of the largest commercial payers in the state: Blue Cross Blue Shield, Tufts Health Plan, and Harvard Pilgrim Health Care, Anthem (including Unicare, a Group Insurance Commission product offering), and AllWays (formerly known as Neighborhood Health Plan).

The Center for Health Information and Analysis' 2019 Massachusetts Health Insurance Survey (MHIS) and 2019 MHIS Recontact Survey were used to investigate the possible drivers of utilization patterns by individual-level income. The MHIS is a biennial survey that provides information on health insurance coverage, health care access and use, and perceived affordability for the non-institutionalized population in Massachusetts.

3 Exclusions

3.1 APCD-based analysis

For the APCD-based analysis, the HPC defined the population as commercially-insured adults aged 18-64 with full insurance coverage (12 months, including pharmacy coverage) in 2018 and any observed medical spending (with the exception of **Exhibit 3.1**) within the year. Adults without zip code information (n=5,370; 0.39%) were excluded because zip-linked community income level is the source of the quintiles/deciles used throughout the analyses.

Prescription drug spending was excluded from the analysis for **Exhibit 3.1**.

3.2 MHIS-based analysis

For the MHIS-based analysis, the HPC defined the population as commercially-insured adults aged 18-64, with 12-months of continuous health insurance coverage as of the survey timeframe in 2019.

3 Analysis

3.1 APCD-based analysis

3.1.1 Defining community income level groups

Income level groups, defined as quintiles or deciles, were constructed using a population-weighted ACS file including population and median family income from the 5-year estimates of the 2018 American Community Survey for Massachusetts. Adults were categorized into income quintiles and deciles using their zip code tabulation area (ZCTA)-linked median income (ACS 2018). Community income levels were categorized by total state-weighted population to construct community income deciles and quintiles for use in analyses.

Community Income Quintile	Median Family Income (ACS 2018)
1	\$48,404
2	\$74,017
3	\$90,335
4	\$107,865
5	\$151,784

Community Income Decile	Median Family Income (ACS 2018)
1	\$39,522
2	\$57,024
3	\$66,745
4	\$78,645
5	\$86,609
6	\$93,996
7	\$102,680
8	\$113,757
9	\$130,033
10	\$168,373

3.1.2 Categories of spending

Categories of spending were informed by the Health Care Cost Institute's schema for categorizing medical claims spending. Results are adjusted for differences in age, sex, and risk score by income quintile. The risk score information herein contained has been

processed by software called The Johns Hopkins ACG® System © 1990, 2017, Johns Hopkins University. All Rights Reserved. Professional spending is defined as all spending paid to physicians or other professionals regardless of setting and as indicated in the exhibit.

3.1.3 Emergency department utilization rates

Emergency department (ED) visits were identified in the 2018 commercial medical claims using procedure codes (CPT) that indicate a professional service was delivered in the emergency department (99281-99285), and any facility claims lines originating from an emergency department.

An ED encounter was established as an ED visit for the same member on the same date of service. Claims with a populated admitting diagnosis, indicating that an ED visit turned into a hospital admission, were excluded from subsequent analyses.

A predominant diagnosis across all relevant claim lines for each ED encounter was established by using the diagnosis code that was most commonly populated for each ED encounter. If there was a tie, a diagnosis that matched the patched Billings algorithm to identify potentially avoidable emergency department visits was prioritized to ensure classification of the visit. If all or no diagnosis codes had a match with this algorithm, then a random selection was done to identify a single diagnosis code to represent all claim lines of the encounter.

Overall Emergency Department Utilization

The rate of overall ED utilization is reported as an adjusted rate of ED visits per 1,000 commercially insured adults. The adjusted rate is established through a multivariable regression analysis controlling for differences in age, sex, and risk score by income quintile.

Potentially Avoidable Emergency Department Utilization

Potentially avoidable emergency department utilization reporting relies on the Billings algorithm based on work by the NYU Center for Health and Public Service Research. In Billings et al. (1993),¹ the researchers, along with a panel of ED and primary care physicians, develop the following classification for ED visits:

- Non-emergent—The patient's initial complaint, presenting symptoms, vital signs, medical history, and age indicated that immediate medical care was not required within 12 hours;
- Emergent/Primary Care Treatable—Based on information in the record, treatment was required within 12 hours, but care could have been provided effectively and safely in a primary care setting. The complaint did not require continuous

observation, and no procedures were performed or resources used that are not available in a primary care setting (e.g., CAT scan or certain lab tests);

- Emergent - ED Care Needed - Preventable/Avoidable—Emergency department care was required based on the complaint or procedures performed/resources used, but the emergent nature of the condition was potentially preventable/avoidable if timely and effective ambulatory care had been received during the episode of illness (e.g., the flare-ups of asthma, diabetes, congestive heart failure, etc.); and
- Emergent - ED Care Needed - Not Preventable/Avoidable—Emergency department care was required and ambulatory care treatment could not have prevented the condition (e.g., trauma, appendicitis, myocardial infarction, etc.).

The Billings algorithm was updated in 2017 (Johnston 2017) to reflect coding changes and the introduction of ICD-10. More information on the “patched” Billings algorithm which was used in this analysis can be found at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5517669/>.

For the purposes of reporting, the rate of potentially avoidable emergency department utilization is a weighted sum of the non-emergent and emergent/primary care treatable category events reported as a rate per 1,000 attributed adults, adjusted for potential differences in age, sex, and risk score by income quintile.

Mental Health-Related Emergency Department Utilization

Mental health-related ED utilization is defined as the sum of all mental health-related ED visits for all adults by income quintile. Mental health-related ED utilization is reported as an adjusted rate of ED visits per 1,000 adults. The adjusted rate is established through a multivariable regression analysis controlling for age, sex, and risk score differences by income quintile.

Mental health-related ED visits are identified using Clinical Classifications Software (CCS) diagnostic classifications for mental health based on the most frequently used primary diagnosis for an ED encounter.

3.2 MHIS-based analysis

3.2.1 Income group differences

Two income groups were defined in the survey population using survey respondents’ self-reported income relative to 400 percent of the Federal Poverty Level (FPL), or imputed value if income information was missing (N=242). For analyses using the 2019 MHIS, the higher income group (self-reported income \geq 400 percent FPL) included 1,676 survey respondents and the lower income group (self-reported income <400 percent FPL)

included 512 survey respondents. For analyses using the 2019 MHIS Recontact Survey, the higher income group included 393 survey respondents and the lower income group included 109 survey respondents.

Differences between the income groups were weighted to produce state-level estimates using survey weights that adjust for the complex survey design, undercoverage, and survey nonresponse.ⁱ Statistical significance was tested using logistic regressions incorporating survey weights, with an independent variable of interest and dependent variable of income group indicator. Statistical significance was determined using a cut-off of $P < 0.05$.

For more information on the MHIS, including the survey questionnaire, please see: <https://www.chiamass.gov/massachusetts-health-insurance-survey>

ⁱ Billings et al (1993). "Impact of Socioeconomic Status on Hospital Use in New York City, Health Affairs (Spring 1993).

ⁱ Findings from the 2019 Massachusetts Health Insurance Survey Methodology Report, Center for Health Information and Analysis, April 2020, <https://www.chiamass.gov/assets/docs/r/survey/mhis-2019/2019-MHIS-Methodology.pdf>.