CHIA Data User Workgroup

Donald Kirkwood, Manager of Data Release and Procurement

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Sylvia Hobbs, Associate Director of Artificial Intelligence and Data Innovations

January 27, 2026

Agenda

- **Announcements:**
  - Case Mix FY2025 Targeted Release Availability
  - Reminder of Application Submission Process and to Read Documentation before Applying for Data
  - Alert: New Publication on Machine learning approaches for predicting 30-day hospital readmissions: Evidence from Massachusetts healthcare data
  - Alert: New Publication on Collision Course: A Decade of Traumatic Brain Injury Trends and the Impact of Urban Safety Initiatives in Eastern Massachusetts
  - Alert: New publication on residential proximity to nuclear power plants and cancer incidence in Massachusetts (2000-2018)
  - Alert: A high-resolution multipollutant assessment of health damages due to the on-road sector in Boston, Massachusetts
  - Reminder: American Public Health Association 2026 Abstract Deadline

- **Data User Support Questions**
  - Social Isolation, Neglect and Abandonment
  - National Emergency Medical Services Information System (NEMSIS) Case Definitions
  - Capitated Claims
  - Reminder Concerning Denied Claims
  - Inpatient Medications

- **Q&A**

Announcements

CHIA Annual Data Release Status

Targeted Release Availability

All CY2024 and FY2024 Data Products are Available

All CHIA CY2024 MA APCD data products and FY2024 case mix data products are now authorized for release and are available for application.

MA APCD Calendar Year 2024 Documentation

- MA APCD CY 2024 Documentation Guide
- MA APCD CY 2024 Release Notes
- MA APCD CY 2024 Standardized Extract Data Specifications
- MA APCD Updated Master Patient Index and Data Exclusion
- MA APCD CY 2024 De-Identification Summary

Case Mix Documentation

Hospital Inpatient Discharge Database (HIDD)

- FY24 Documentation Manual (PDF)
- FY24 Release Notes (PDF) (Updated 10/24/2025)

Emergency Department Database (EDD)

- FY24 Documentation Manual (PDF)
- FY24 Release Notes (PDF)

Outpatient Observation Database (OOD)

- FY24 Documentation Manual (PDF)
- FY24 Release Notes (PDF)

FY2025 Case Mix Data Products in Progress

Case mix FY2025 (October 1, 2024, through September 30, 2025) hospital inpatient discharge data is targeted for release in June 2026, outpatient emergency department visit data in August 2026, and outpatient observation stay I September 2026.

Case Mix Releases

Product	Target	Actual	Status
Case Mix FY 2025 (October 1, 2024 - September 30, 2025)			
Hospital Inpatient Discharge Data (HIDD)	June 2026	-	In Progress
Emergency Department Data (EDD)	August 2026	-	In Progress
Outpatient Observation Stay Data (OOD)	September 2026	-	In Progress

Reminder of Application Submission Process and to Read Documentation before Applying for Data

The following webpage links provide the step-by-step instructions for non-government entities and government entities on how to apply for the case mix and MA APCD data.

Non-Government Application Documents

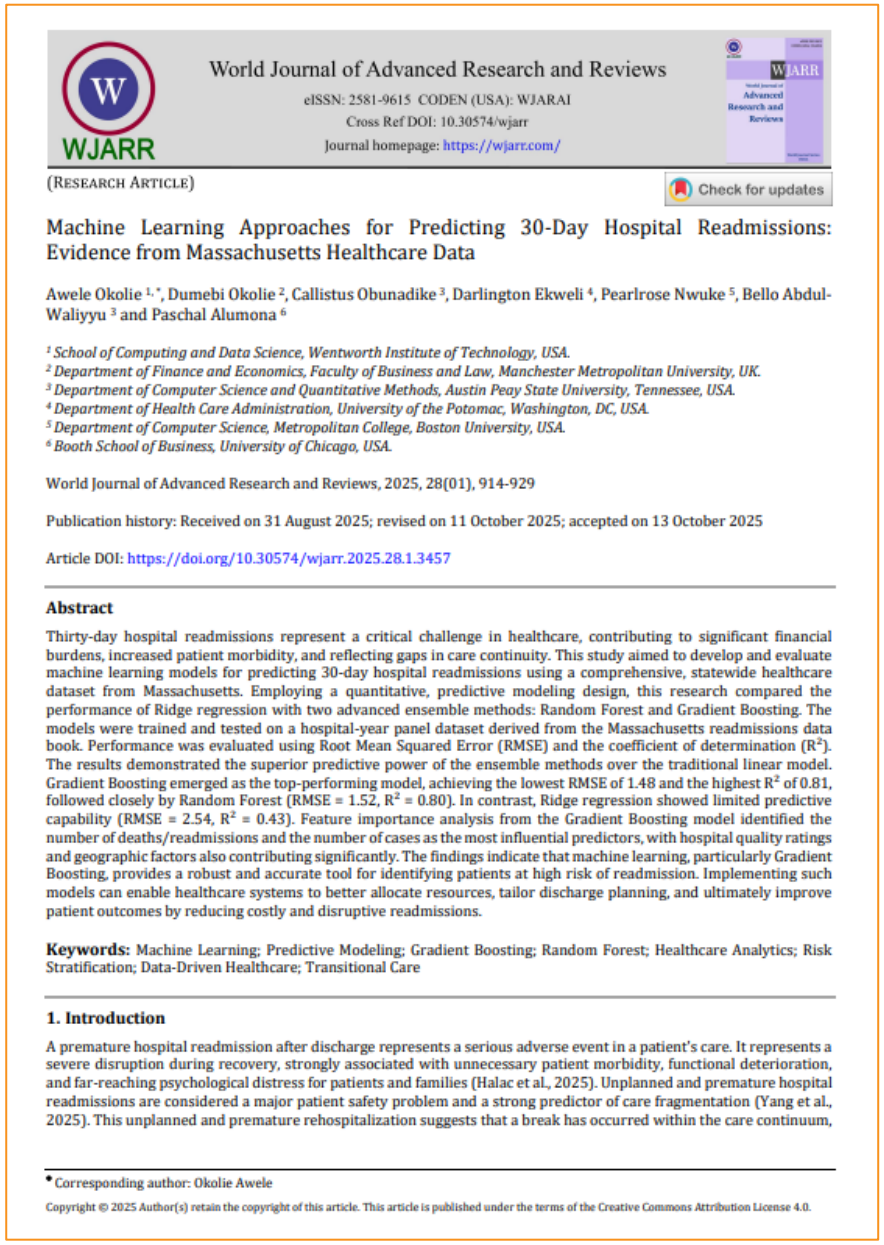
https://www.chiamass.gov/non-government-agency-apcd-requests
https://www.chiamass.gov/non-government-agency-case-mix-requests

Government Application Documents

https://www.chiamass.gov/government-agency-apcd-requests
https://www.chiamass.gov/government-agency-case-mix-requests

Application documents are no longer submitted to or managed through IRBNet.org. All application materials must now be emailed directly to CHIA. Even if you have previous application documents submitted to IRBNet which you are updating, those updates should also be emailed directly to CHIA.

- ❑ **Massachusetts Case Mix Data** application documents must be emailed to casemix.data@chiamass.gov.
- ❑ **Massachusetts All Payer Claims Data** application documents must be emailed to apcd.data@chiamass.gov.



World Journal of Advanced Research and Reviews

eISSN: 2581-9615 CODEN (USA): WJARAI

Cross Ref DOI: 10.30574/wjarr

Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Machine Learning Approaches for Predicting 30-Day Hospital Readmissions: Evidence from Massachusetts Healthcare Data

Awele Okolie [1,*], Dumebi Okolie [2], Callistus Obunadike [3], Darlington Ekweli [4], Pearlrose Nwuke [5], Bello Abdul-Waliyyu [3] and Paschal Alumona [6]

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[4] Department of Health Care Administration, University of the Potomac, Washington, DC, USA.
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[6] Booth School of Business, University of Chicago, USA.

World Journal of Advanced Research and Reviews, 2025, 28(01), 914-929

Publication history: Received on 31 August 2025; revised on 11 October 2025; accepted on 13 October 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.28.1.3457

Abstract

Thirty-day hospital readmissions represent a critical challenge in healthcare, contributing to significant financial burdens, increased patient morbidity, and reflecting gaps in care continuity. This study aimed to develop and evaluate machine learning models for predicting 30-day hospital readmissions using a comprehensive, statewide healthcare dataset from Massachusetts. Employing a quantitative, predictive modeling design, this research compared the performance of Ridge regression with two advanced ensemble methods: Random Forest and Gradient Boosting. The models were trained and tested on a hospital-year panel dataset derived from the Massachusetts readmissions data book. Performance was evaluated using Root Mean Squared Error (RMSE) and the coefficient of determination (R^2). The results demonstrated the superior predictive power of the ensemble methods over the traditional linear model. Gradient Boosting emerged as the top-performing model, achieving the lowest RMSE of 1.48 and the highest R^2 of 0.81, followed closely by Random Forest (RMSE = 1.52, R^2 = 0.80). In contrast, Ridge regression showed limited predictive capability (RMSE = 2.54, R^2 = 0.43). Feature importance analysis from the Gradient Boosting model identified the number of deaths/readmissions and the number of cases as the most influential predictors, with hospital quality ratings and geographic factors also contributing significantly. The findings indicate that machine learning, particularly Gradient Boosting, provides a robust and accurate tool for identifying patients at high risk of readmission. Implementing such models can enable healthcare systems to better allocate resources, tailor discharge planning, and ultimately improve patient outcomes by reducing costly and disruptive readmissions.

Keywords: Machine Learning; Predictive Modeling; Gradient Boosting; Random Forest; Healthcare Analytics; Risk Stratification; Data-Driven Healthcare; Transitional Care

1. Introduction

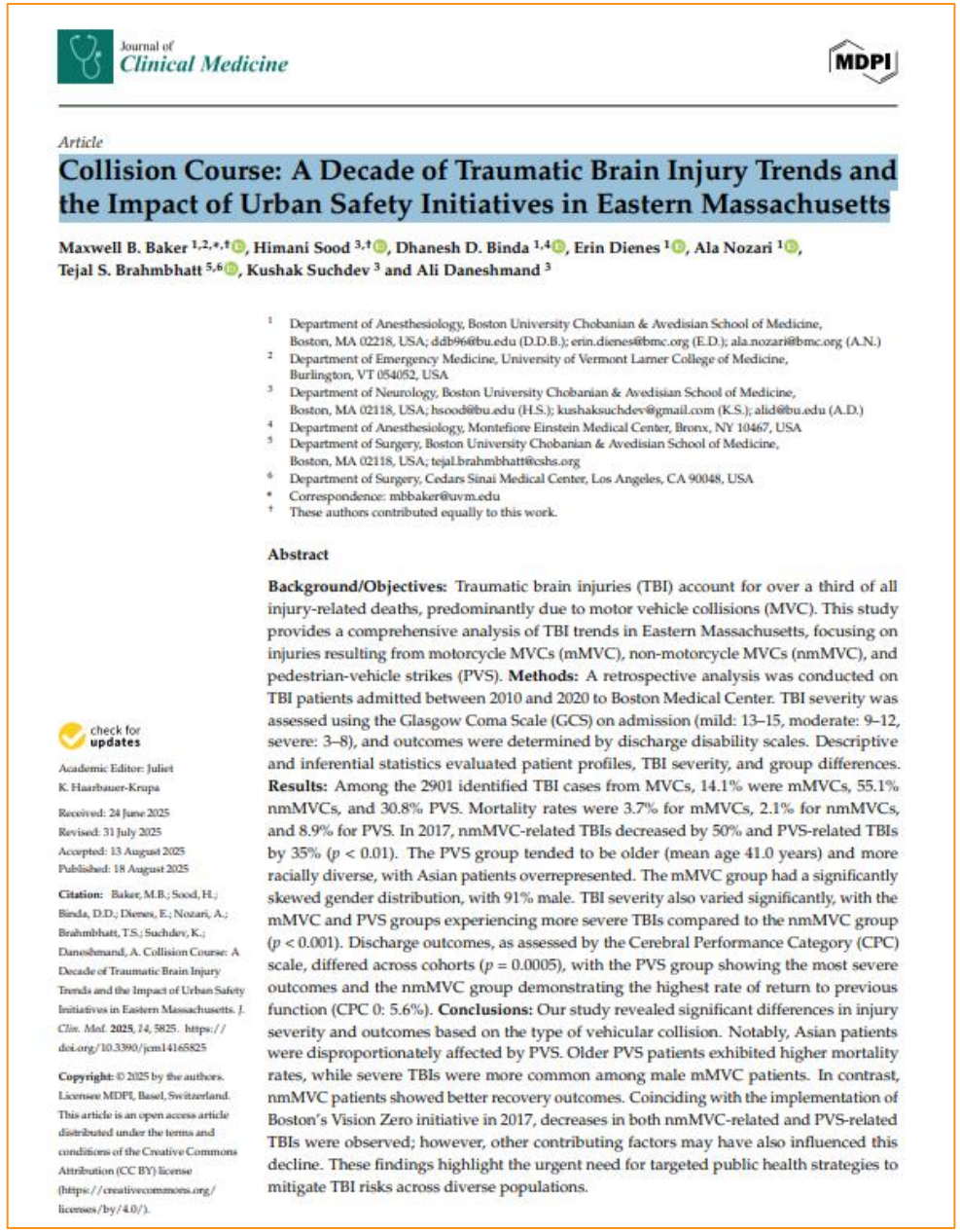
A premature hospital readmission after discharge represents a serious adverse event in a patient's care. It represents a severe disruption during recovery, strongly associated with unnecessary patient morbidity, functional deterioration, and far-reaching psychological distress for patients and families (Halac et al., 2025). Unplanned and premature hospital readmissions are considered a major patient safety problem and a strong predictor of care fragmentation (Yang et al., 2025). This unplanned and premature rehospitalization suggests that a break has occurred within the care continuum,

* Corresponding author: Okolie Awele

Alert: New Publication on Machine learning approaches for predicting 30-day hospital readmissions: Evidence from Massachusetts healthcare data

Okolie A, Bello A, Ikhifa MO, Ibiyeye AO, Agbeso DO, Alumona P. Machine learning approaches for predicting 30-day hospital readmissions: Evidence from Massachusetts healthcare data. World Journal of Advanced Research and Reviews. 2025;28(1):1-2. https://www.researchgate.net/profile/Awele-Okolie-2/publication/396510048_Machine_Learning_Approaches_for_Predicting_30-Day_Hospital_Readmissions_Evidence_from_Massachusetts_Healthcare_Data/links/68efa2c9f3032e2b4be910be/Machine-Learning-Approaches-for-Predicting-30-Day-Hospital-Readmissions-Evidence-from-Massachusetts-Healthcare-Data.pdf

New study uses thirteen years of hospital-level data from CHIA's Readmissions Data Book (2011–2023) to develop and compare machine-learning models, specifically Ridge regression, Random Forest, and Gradient Boosting. The authors analyze model performance and demonstrate that Gradient Boosting substantially outperforms linear approaches in capturing non-linear patterns in healthcare utilization. The findings highlight the potential of machine learning in enhancing risk stratification for targeted interventions within hospital systems.



Journal of Clinical Medicine

MDPI

Article

Collision Course: A Decade of Traumatic Brain Injury Trends and the Impact of Urban Safety Initiatives in Eastern Massachusetts

Maxwell B. Baker [1,2,*,†], Himani Sood [3,†], Dhanesh D. Binda [1,4], Erin Dienes [1], Ala Nozari [1], Tejal S. Brahmbhatt [5,6], Kushak Suchdev [3] and Ali Daneshmand [3]

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† These authors contributed equally to this work.

Abstract

Background/Objectives: Traumatic brain injuries (TBI) account for over a third of all injury-related deaths, predominantly due to motor vehicle collisions (MVC). This study provides a comprehensive analysis of TBI trends in Eastern Massachusetts, focusing on injuries resulting from motorcycle MVCs (mMVC), non-motorcycle MVCs (nmMVC), and pedestrian-vehicle strikes (PVS). **Methods:** A retrospective analysis was conducted on TBI patients admitted between 2010 and 2020 to Boston Medical Center. TBI severity was assessed using the Glasgow Coma Scale (GCS) on admission (mild: 13–15, moderate: 9–12, severe: 3–8), and outcomes were determined by discharge disability scales. Descriptive and inferential statistics evaluated patient profiles, TBI severity, and group differences. **Results:** Among the 2901 identified TBI cases from MVCs, 14.1% were mMVCs, 55.1% nmMVCs, and 30.8% PVS. Mortality rates were 3.7% for mMVCs, 2.1% for nmMVCs, and 8.9% for PVS. In 2017, nmMVC-related TBIs decreased by 50% and PVS-related TBIs by 35% ($p < 0.01$). The PVS group tended to be older (mean age 41.0 years) and more racially diverse, with Asian patients overrepresented. The mMVC group had a significantly skewed gender distribution, with 91% male. TBI severity also varied significantly, with the mMVC and PVS groups experiencing more severe TBIs compared to the nmMVC group ($p < 0.001$). Discharge outcomes, as assessed by the Cerebral Performance Category (CPC) scale, differed across cohorts ($p = 0.0005$), with the PVS group showing the most severe outcomes and the nmMVC group demonstrating the highest rate of return to previous function (CPC 0: 5.6%). **Conclusions:** Our study revealed significant differences in injury severity and outcomes based on the type of vehicular collision. Notably, Asian patients were disproportionately affected by PVS. Older PVS patients exhibited higher mortality rates, while severe TBIs were more common among male mMVC patients. In contrast, nmMVC patients showed better recovery outcomes. Coinciding with the implementation of Boston's Vision Zero initiative in 2017, decreases in both nmMVC-related and PVS-related TBIs were observed; however, other contributing factors may have also influenced this decline. These findings highlight the urgent need for targeted public health strategies to mitigate TBI risks across diverse populations.

check for updates

Academic Editor: Juliet K. Haarbauer-Krupa

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Published: 18 August 2025

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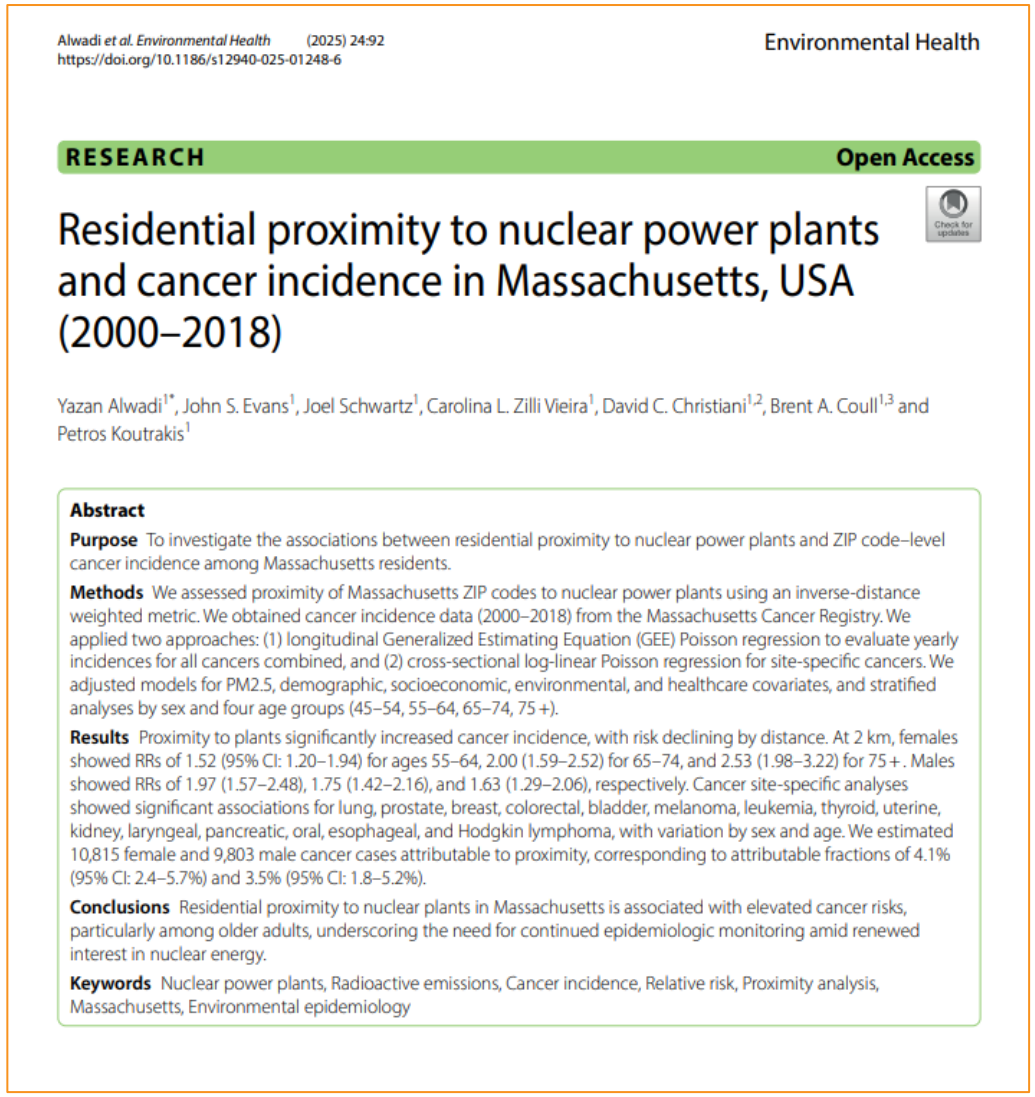
Alert: New Publication on Collision Course: A Decade of Traumatic Brain Injury Trends and the Impact of Urban Safety Initiatives in Eastern Massachusetts

Baker MB, Sood H, Binda DD, Dienes E, Nozari A, Brahmbhatt TS, Suchdev K, Daneshmand A. Collision Course: A Decade of Traumatic Brain Injury Trends and the Impact of Urban Safety Initiatives in Eastern Massachusetts. **Journal of Clinical Medicine**. 2025 Aug 18;14(16):5825. https://www.mdpi.com/2077-0383/14/16/5825

New study using eleven years of data from Boston Medical Center (a Level One ACS Verified and State Designated Trauma Center) to examine traumatic brain injury trends across Eastern Massachusetts from 2010–2020, finds that Asian patients are disproportionately affected by pedestrian-vehicle strikes, making them 2.4 times more likely to be injured as pedestrians than in non-motorcycle motor-vehicle collisions. These pedestrian accidents also correlate with higher injury severity and elevated mortality rates among Asian patients compared with other racial groups.



Alwadi *et al. Environmental Health* (2025) 24:92
https://doi.org/10.1186/s12940-025-01248-6

Environmental Health

RESEARCH Open Access

Residential proximity to nuclear power plants and cancer incidence in Massachusetts, USA (2000–2018)

Yazan Alwadi[1*], John S. Evans[1], Joel Schwartz[1], Carolina L. Zilli Vieira[1], David C. Christiani[1,2], Brent A. Coull[1,3] and Petros Koutrakis[1]

Abstract

Purpose To investigate the associations between residential proximity to nuclear power plants and ZIP code–level cancer incidence among Massachusetts residents.

Methods We assessed proximity of Massachusetts ZIP codes to nuclear power plants using an inverse-distance weighted metric. We obtained cancer incidence data (2000–2018) from the Massachusetts Cancer Registry. We applied two approaches: (1) longitudinal Generalized Estimating Equation (GEE) Poisson regression to evaluate yearly incidences for all cancers combined, and (2) cross-sectional log-linear Poisson regression for site-specific cancers. We adjusted models for PM2.5, demographic, socioeconomic, environmental, and healthcare covariates, and stratified analyses by sex and four age groups (45–54, 55–64, 65–74, 75 +).

Results Proximity to plants significantly increased cancer incidence, with risk declining by distance. At 2 km, females showed RRs of 1.52 (95% CI: 1.20–1.94) for ages 55–64, 2.00 (1.59–2.52) for 65–74, and 2.53 (1.98–3.22) for 75 +. Males showed RRs of 1.97 (1.57–2.48), 1.75 (1.42–2.16), and 1.63 (1.29–2.06), respectively. Cancer site-specific analyses showed significant associations for lung, prostate, breast, colorectal, bladder, melanoma, leukemia, thyroid, uterine, kidney, laryngeal, pancreatic, oral, esophageal, and Hodgkin lymphoma, with variation by sex and age. We estimated 10,815 female and 9,803 male cancer cases attributable to proximity, corresponding to attributable fractions of 4.1% (95% CI: 2.4–5.7%) and 3.5% (95% CI: 1.8–5.2%).

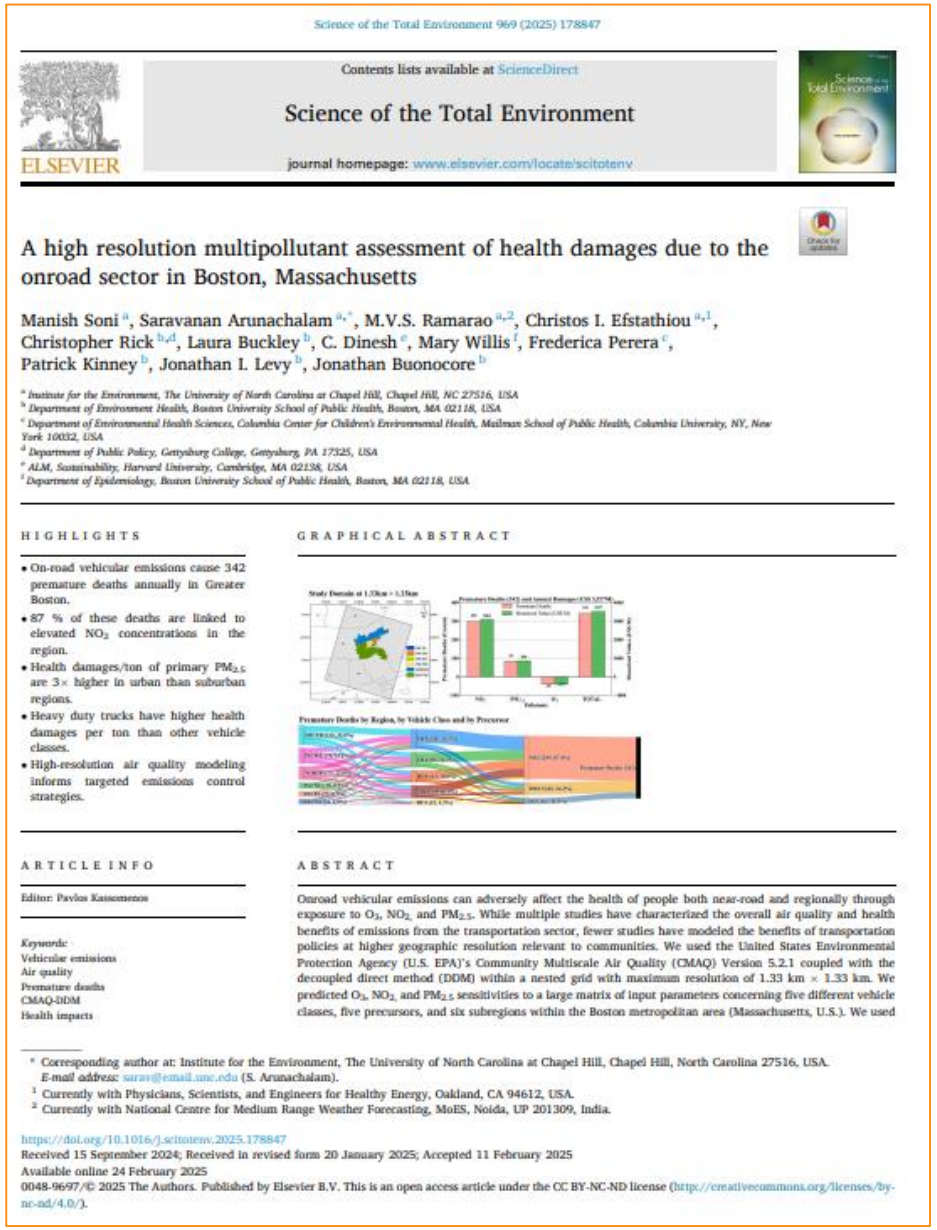
Conclusions Residential proximity to nuclear plants in Massachusetts is associated with elevated cancer risks, particularly among older adults, underscoring the need for continued epidemiologic monitoring amid renewed interest in nuclear energy.

Keywords Nuclear power plants, Radioactive emissions, Cancer incidence, Relative risk, Proximity analysis, Massachusetts, Environmental epidemiology

Alert: New publication on residential proximity to nuclear power plants and cancer incidence in Massachusetts (2000-2018)

Alwadi Y, Evans JS, Schwartz J, Vieira CL, Christiani DC, Coull BA, Koutrakis P. Residential proximity to nuclear power plants and cancer incidence in Massachusetts, USA (2000–2018). Environmental Health. 2025 Dec 18;24(1):92. https://link.springer.com/article/10.1186/s12940-025-01248-6

New study using MDPH's Cancer Registry data to analyze the association between residential proximity to seven nuclear power plants near Massachusetts and ZIP-code–level cancer incidence from 2000–2018. The findings reveal that closer proximity is consistently linked to elevated risks for overall and multiple site-specific cancers, particularly among older adults, with relative risks declining sharply with increasing distance.



Science of the Total Environment 969 (2025) 178847

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

A high resolution multipollutant assessment of health damages due to the onroad sector in Boston, Massachusetts

Manish Soni [a], Saravanan Arunachalam [a,*], M.V.S. Ramarao [a,2], Christos I. Efstathiou [a,1], Christopher Rick [b,d], Laura Buckley [b], C. Dinesh [e], Mary Willis [f], Frederica Perera [c], Patrick Kinney [b], Jonathan I. Levy [b], Jonathan Buonocore [b]

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[b] Department of Environment Health, Boston University School of Public Health, Boston, MA 02118, USA
[c] Department of Environmental Health Sciences, Columbia Center for Children's Environmental Health, Mailman School of Public Health, Columbia University, NY, New York 10032, USA
[d] Department of Public Policy, Gettysburg College, Gettysburg, PA 17325, USA
[e] ALM, Sustainability, Harvard University, Cambridge, MA 02138, USA
[f] Department of Epidemiology, Boston University School of Public Health, Boston, MA 02118, USA

HIGHLIGHTS

- On-road vehicular emissions cause 342 premature deaths annually in Greater Boston.
- 87 % of these deaths are linked to elevated NO_2 concentrations in the region.
- Health damages/ton of primary $PM_{2.5}$ are 3× higher in urban than suburban regions.
- Heavy duty trucks have higher health damages per ton than other vehicle classes.
- High-resolution air quality modeling informs targeted emissions control strategies.

GRAPHICAL ABSTRACT

ARTICLE INFO

Editor: Pavlos Kassomenos

Keywords:
Vehicular emissions
Air quality
Premature deaths
CMAQ-DDM
Health impacts

ABSTRACT

Onroad vehicular emissions can adversely affect the health of people both near-road and regionally through exposure to O_3, NO_2, and $PM_{2.5}$. While multiple studies have characterized the overall air quality and health benefits of emissions from the transportation sector, fewer studies have modeled the benefits of transportation policies at higher geographic resolution relevant to communities. We used the United States Environmental Protection Agency (U.S. EPA)'s Community Multiscale Air Quality (CMAQ) Version 5.2.1 coupled with the decoupled direct method (DDM) within a nested grid with maximum resolution of 1.33 km × 1.33 km. We predicted O_3, NO_2, and $PM_{2.5}$ sensitivities to a large matrix of input parameters concerning five different vehicle classes, five precursors, and six subregions within the Boston metropolitan area (Massachusetts, U.S.). We used

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[2] Currently with National Centre for Medium Range Weather Forecasting, MoES, Noida, UP 201309, India.

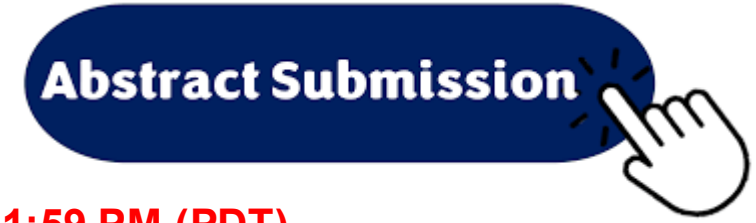
https://doi.org/10.1016/j.scitotenv.2025.178847
Received 15 September 2024; Received in revised form 20 January 2025; Accepted 11 February 2025
Available online 24 February 2025

Alert: A high-resolution multipollutant assessment of health damages due to the on-road sector in Boston, Massachusetts

Soni M, Arunachalam S, Ramarao MV, Efstathiou CI, Rick C, Buckley L, Dinesh C, Willis M, Perera F, Kinney P, Levy JI. A high-resolution multipollutant assessment of health damages due to the on-road sector in Boston, Massachusetts. Science of the Total Environment. 2025 Mar 15;969:178847. https://www.sciencedirect.com/science/article/pii/S0048969725004826

The study analyzes the health burden of on-road transportation emissions in Greater Boston using high-resolution modeling from the Community Multiscale Air Quality model to estimate pollutant-specific mortality and morbidity impacts. The study draws population and baseline mortality measures from CDC WONDER, childhood asthma data from the National Environmental Public Health Tracking Network, and census-tract demographics from the American Community Survey, linking these datasets to modeled concentrations of nitrogen dioxide, fine particulate matter, and ozone to resolve spatially explicit exposure–response relationships. The resulting multipollutant assessment demonstrates that vehicular emissions, particularly nitrogen oxides and primary fine particulate matter, drive substantial and spatially heterogeneous health damages, and emphasizes the need for geographically targeted emission-control strategies.

REMINDER: American Public Health 2026 Annual Meeting Abstract Deadline is Approaching



Abstract Submission Deadline — Tuesday, March 31, 2026, 11:59 PM (PDT)

For submission rules see: https://apha.confex.com/apha/2026/cfp.cgi

APHA 2026
ANNUAL MEETING & EXPO

Together We Thrive: Health Across the Lifespan

San Antonio | November 1-4, 2026

As the largest public health gathering of the year, APHA's Annual Meeting and Expo convenes approximately 11,000 public health professionals and partners from around the world. Join us for this can't miss opportunity to make lasting connections and learn from exhibitors, peers and today's leaders. Together, let's ensure health for all across the lifespan.

APHA 2026 CALL FOR ABSTRACTS

The American Public Health Association is now accepting abstract submissions for oral and poster presentations for the **Annual Meeting and Expo** in San Antonio, TX, November 1 - 4, 2026. Authors are encouraged to submit abstracts on the meeting theme — **Together We Thrive: Health Across the Lifespan** — and current and emerging public health issues.

Log in with your current APHA account (members and non-members) or create a new account if you have no previous account with APHA.

APHA 2026 will be an **in-person** meeting and selected presenters will be required to become a member of APHA, pay for registration, attend the meeting in-person and abide by any COVID-19 vaccination requirements. For general presenter questions, please email annualmeetingprogram@apha.org.

- **Abstract Submission Deadline** — **Tuesday, March 31, 2026, 11:59 PM (PDT).** **There will be no extensions.**
- **Abstract Notification** — Presenters will be notified of abstract status via email on **Tuesday, June 2, 2026**.

Data User Support Questions

Question: I'm interested in applying for data to study social isolation, neglect and abandonment among adults and wanted to know the magnitude of data resources for doing so before applying.

SOCIAL ISOLATION

Answer: Case mix and MA APCD medical claims data can be used to analyze specific areas of medical care to the extent that the area of interest are represented by specific diagnosis codes. **Although no ICD-10-CM code exists for social isolation as a clinical entity**, **the ICD-10-CM classification system does include codes pertaining to the suspected abandonment or neglect of adults, such as T76.01XA, T76.01XD, and T76.01XS** (*See Table 1 below*) . It is important to note that while social isolation itself is not captured in claims data nor case mix data as a diagnosis code, it has been measured through the Behavioral Risk Factor Surveillance System (BRFSS), a sample survey: telephone interview (cell and land line) that uses state-level random-digit-dialed probability samples of adults ages 18+ and relies on self-reported psychosocial indicators rather than diagnosis codes.

Table 1. Definitions of ICD-10-CM Adult neglect or abandonment

ICD-10-CM Code	Definition
T76.01XA	Adult neglect or abandonment, suspected, initial encounter
T76.01XD	Adult neglect or abandonment, suspected, subsequent encounter
T76.01XS	Adult neglect or abandonment, suspected, sequela

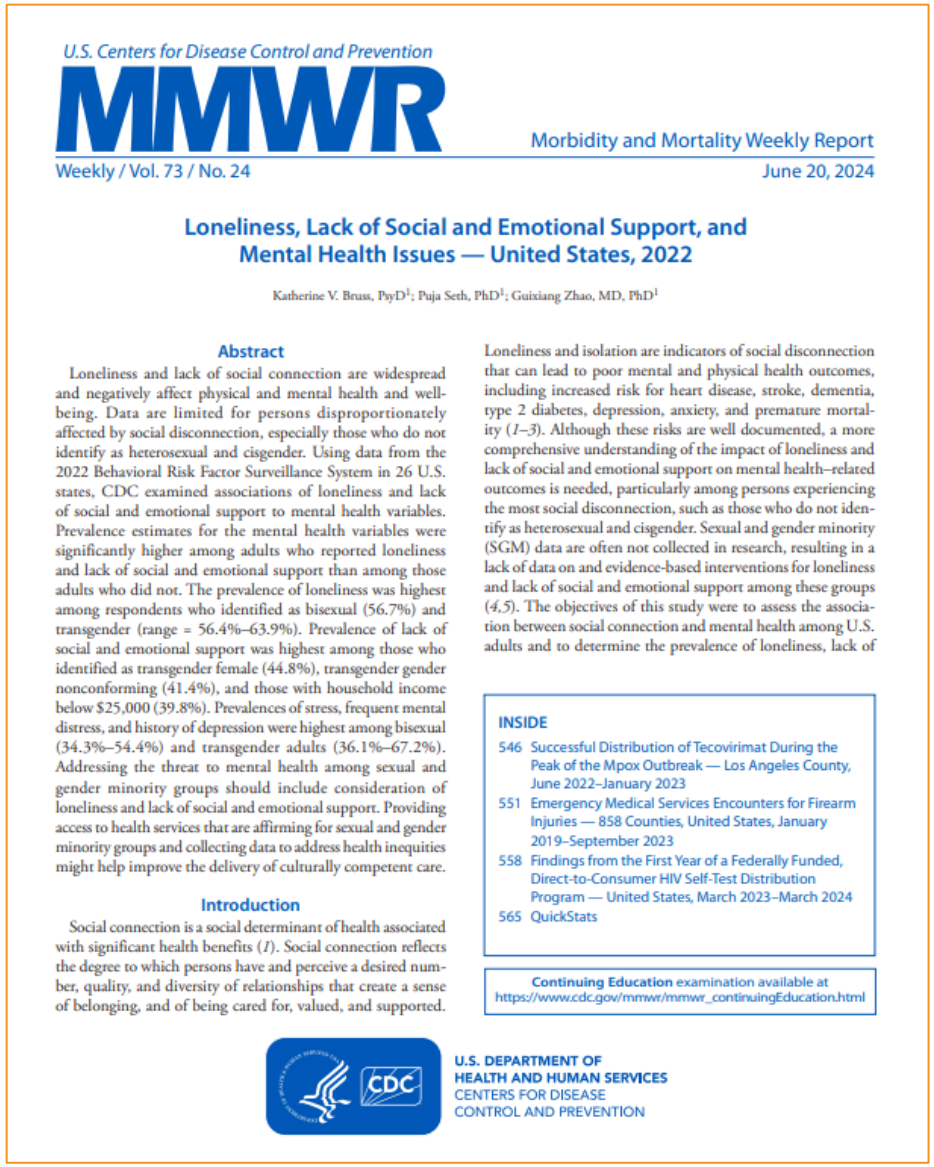
answer continued →

Social Isolation and Loneliness: A Socioeconomic Gradient

The CDC's June 24, 2024, MMWR report using the 2022 Behavioral Risk Factor Surveillance System (BRFSS) data shows that loneliness and lack of social and emotional support have a higher prevalence among people with lower household income and lower educational attainment, indicating that social isolation and loneliness disproportionately affect those facing economic and educational disadvantage. with prevalence highest among adults with less than a high school education (41.1% lonely; 36.3% lacking support) and household income below $25,000 (47.9% lonely; 39.8% lacking support).

Social Connection Demographic Characteristics - CDC BRFSS, United States, 2022

Characteristic	Social connection measure % (95% CI)	
	Loneliness	Lack of social and emotional support
Education		
Less than high school diploma	**41.1 (39.1–43.1)**	**36.3 (34.4–38.3)**
High school diploma or GED	34.7 (33.8–35.7)	27.5 (26.6–28.4)
Some college	33.0 (32.2–33.9)	24.6 (23.8–25.4)
College and above	26.0 (25.4–26.6)	16.5 (16.0–17.1)
Household income, $		
<25,000	**47.9 (46.3–49.4)**	**39.8 (38.3–41.3)**
25,000–49,999	36.2 (35.2–37.2)	29.6 (28.6–30.7)
50,000–74,999	30.4 (29.3–31.6)	22.4 (21.3–23.5)
75,000–99,999	27.0 (25.8–28.3)	18.5 (17.4–19.6)
100,000–149,999	23.6 (22.5–24.8)	14.6 (13.7–15.5)
≥150,000	21.2 (20.2–22.3)	13.8 (12.8–14.7)
Unknown	34.7 (33.5–36.0)	25.6 (24.5–26.8)



U.S. Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

Weekly / Vol. 73 / No. 24 June 20, 2024

Loneliness, Lack of Social and Emotional Support, and Mental Health Issues — United States, 2022

Katherine V. Bruss, PsyD[1]; Puja Seth, PhD[1]; Guixiang Zhao, MD, PhD[1]

Abstract

Loneliness and lack of social connection are widespread and negatively affect physical and mental health and well-being. Data are limited for persons disproportionately affected by social disconnection, especially those who do not identify as heterosexual and cisgender. Using data from the 2022 Behavioral Risk Factor Surveillance System in 26 U.S. states, CDC examined associations of loneliness and lack of social and emotional support to mental health variables. Prevalence estimates for the mental health variables were significantly higher among adults who reported loneliness and lack of social and emotional support than among those adults who did not. The prevalence of loneliness was highest among respondents who identified as bisexual (56.7%) and transgender (range = 56.4%–63.9%). Prevalence of lack of social and emotional support was highest among those who identified as transgender female (44.8%), transgender gender nonconforming (41.4%), and those with household income below $25,000 (39.8%). Prevalences of stress, frequent mental distress, and history of depression were highest among bisexual (34.3%–54.4%) and transgender adults (36.1%–67.2%). Addressing the threat to mental health among sexual and gender minority groups should include consideration of loneliness and lack of social and emotional support. Providing access to health services that are affirming for sexual and gender minority groups and collecting data to address health inequities might help improve the delivery of culturally competent care.

Introduction

Social connection is a social determinant of health associated with significant health benefits (*1*). Social connection reflects the degree to which persons have and perceive a desired number, quality, and diversity of relationships that create a sense of belonging, and of being cared for, valued, and supported. Loneliness and isolation are indicators of social disconnection that can lead to poor mental and physical health outcomes, including increased risk for heart disease, stroke, dementia, type 2 diabetes, depression, anxiety, and premature mortality (*1–3*). Although these risks are well documented, a more comprehensive understanding of the impact of loneliness and lack of social and emotional support on mental health–related outcomes is needed, particularly among persons experiencing the most social disconnection, such as those who do not identify as heterosexual and cisgender. Sexual and gender minority (SGM) data are often not collected in research, resulting in a lack of data on and evidence-based interventions for loneliness and lack of social and emotional support among these groups (*4,5*). The objectives of this study were to assess the association between social connection and mental health among U.S. adults and to determine the prevalence of loneliness, lack of

INSIDE

546 Successful Distribution of Tecovirimat During the Peak of the Mpox Outbreak — Los Angeles County, June 2022–January 2023

551 Emergency Medical Services Encounters for Firearm Injuries — 858 Counties, United States, January 2019–September 2023

558 Findings from the First Year of a Federally Funded, Direct-to-Consumer HIV Self-Test Distribution Program — United States, March 2023–March 2024

565 QuickStats

Continuing Education examination available at https://www.cdc.gov/mmwr/mmwr_continuingEducation.html

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

answer continued →

Black Adults Face Greater Gaps in Social Support

The CDC's March 24, 2024, MMWR report again using the 2022 BRFSS data shows that Black adults have a higher adjusted prevalence of lacking social and emotional support (29.3%) than White adults (22.5%) and Hispanic adults (23.8%) and are about 30% more likely than White adults to lack social and emotional support after accounting for other factors. In contrast, the adjusted prevalence of social isolation or loneliness among Black adults (32.4%) is like White adults (32.4%) and does not meaningfully differ from most other racial and ethnic groups after adjustment.

Adjusted Prevalence for Adverse Social Determinants of Health - CDC BRFSS 2022

Characteristic	Race and ethnicity, no. (95% CI)						
	American Indian/ Alaskan Native	Asian	Black or African American	Native Hawaiian/ Pacific Islander	White	Hispanic or Latino	Multiracial
Lack of social and emotional support							
Adjusted Prevalence	26.8 (24.3–29.6)	39.5 (36.7–42.5)	**29.3 (28.3–30.4)**	36.3 (30.3–43.4)	22.5 (22.1–22.9)	23.8 (22.9–24.8)	27.2 (25.2–29.3)
Adjusted Prevalence Ratio	1.19 (1.08–1.32)	1.76 (1.63–1.89)	**1.30 (1.25–1.36)**	1.61 (1.35–1.93)	Reference Group	1.06 (1.01–1.11)	1.21 (1.12–1.31)
Social isolation or loneliness							
Adjusted Prevalence	32.5 (29.7–35.4)	33.0 (30.6–35.6)	**32.4 (31.2–33.6)**	37.9 (31.9–44.9)	32.4 (32.0–32.8)	29.3 (28.4–30.3)	36.4 (34.2–38.8)
Adjusted Prevalence Ratio	1.00 (0.92–1.09)	1.02 (0.94–1.10)	**1.00 (0.96–1.04)**	1.17 (0.98–1.39)	Reference Group	0.90 (0.87–0.94)	1.12 (1.05–1.20)

Morbidity and Mortality Weekly Report

Racial and Ethnic Differences in Social Determinants of Health and Health-Related Social Needs Among Adults — Behavioral Risk Factor Surveillance System, United States, 2022

Machell Town, PhD[1]; Paul Eke, PhD[1]; Guixiang Zhao, MD, PhD[1]; Craig W. Thomas, PhD[1]; Jason Hsia, PhD[1]; Carol Pierannunzi, PhD[2]; Karen Hacker, MD[3]

Abstract

Social determinants of health (SDOH) are a broad array of social and contextual conditions where persons are born, live, learn, work, play, worship, and age that influence their physical and mental wellbeing and quality of life. Using 2022 Behavioral Risk Factor Surveillance System data, this study assessed measures of adverse SDOH and health-related social needs (HRSN) among U.S. adult populations. Measures included life satisfaction, social and emotional support, social isolation or loneliness, employment stability, food stability/security, housing stability/security, utility stability/security, transportation access, mental well-being, and health care access. Prevalence ratios were adjusted for age, sex, education, marital status, income, and self-rated health. Social isolation or loneliness (31.9%) and lack of social and emotional support (24.8%) were the most commonly reported measures, both of which were more prevalent among non-Hispanic (NH) American Indian or Alaska Native, NH Black or African American, NH Native Hawaiian or other Pacific Islander, NH multiracial, and Hispanic or Latino adults than among NH White adults. The majority of prevalence estimates for other adverse SDOH and HRSN were also higher across all other racial and ethnic groups (except for NH Asian) compared with NH White adults. SDOH and HRSN data can be used to monitor needed social and health resources in the U.S. population and help evaluate population-scale interventions.

Introduction

Social determinants of health (SDOH) are the nonmedical factors that influence health outcomes. They are the conditions in which persons are born, live, learn, work, play, worship, and age that affect a wide range of health risks, functioning, and quality of life.* Examples of SDOH measures include economic stability, transportation availability, housing and food security, access to health care, built environment, and social connectedness (*1*). SDOH are driven by intersecting systematic influences such as economic policies and institutional racism that unequally affect different populations. SDOH and health-related social needs (HRSN) play a significant role in health status, health care utilization, and well-being of individual persons and populations (*2*). Whereas HRSN focus primarily on screening and connecting persons to resources and services to fulfill unmet social needs, SDOH exist at the community or population level and reflect the policies and environments that support health or create barriers to health (*2*). Some adverse SDOH have been linked to a higher risk for poor health outcomes, including chronic diseases (*3*,*4*).

This study measured the prevalence of adverse SDOH and HRSN across U.S. adult populations using data from the 2022 Behavioral Risk Factor Surveillance System (BRFSS). Understanding disparities in SDOH and HRSN among populations is essential to determining and deploying strategies toward advancing health equity. For the first time, data from a new Social Determinants and Health Equity (SD/HE) module in BRFSS were used to investigate adverse SDOH and HRSN by race and ethnicity in the United States.

Methods

Data Source

BRFSS is a state-based landline and cellular telephone survey of noninstitutionalized U.S. civilian residents aged ≥18 years.† BRFSS collects data on health-related risk behaviors, chronic diseases and conditions, health care access, and use of preventive services in all 50 states, the District of Columbia, and participating U.S. territories. The optional SD/HE module was introduced in 2022. Details of the 2022 BRFSS survey and SD/HE module are described elsewhere (*5*); data were collected by 39 states, District of Columbia, Puerto Rico, and U.S. Virgin Islands.§ SD/HE module questions were developed based on the Center for Medicare & Medicaid Services' Accountable Health Communities Health-Related Social Needs Screening Tool¶ and from a previous BRFSS SDOH optional module

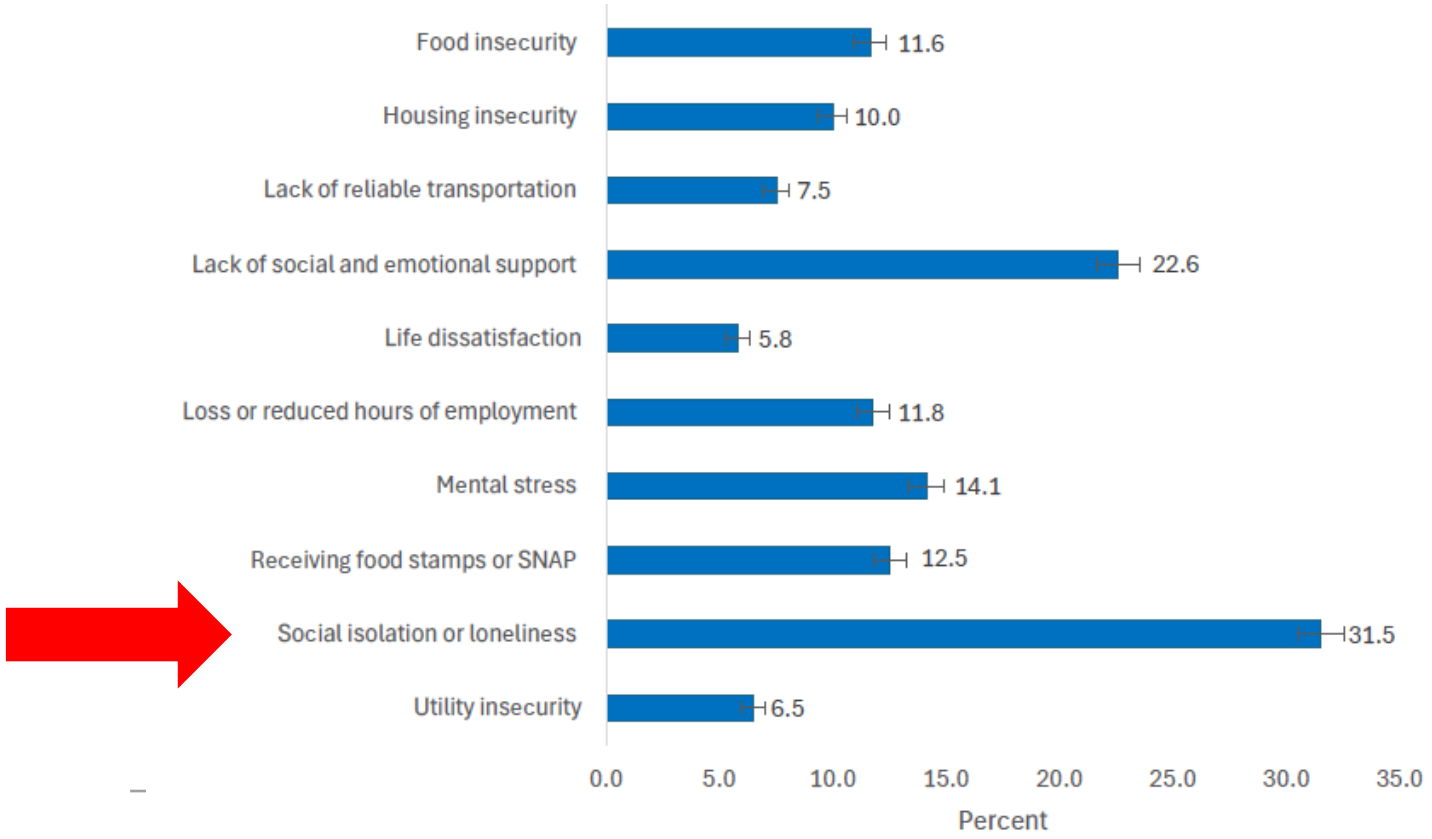
*https://health.gov/healthypeople/priority-areas/social-determinants-health
†https://www.cdc.gov/brfss/
§Alabama, Alaska, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, North Carolina, Ohio, Oklahoma, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming, Puerto Rico, and U.S. Virgin Islands.
¶https://innovation.cms.gov/innovation-models/ahcm

answer continued →

In Massachusetts Social Isolation or Loneliness is the Most Prevalent Adverse Social Determinant of Health

In Massachusetts, overall, 55.6% of Massachusetts adults reported experiencing at least one adverse social determinant of health, the most reported was feeling socially isolated or lonely (31.5%), followed by a lack of social and emotional support (22.6%).

Massachusetts Adverse Social Determinants of Health - BRFSS 2022-2023



ADVERSE MEASURES OF SOCIAL DETERMINANTS OF HEALTH AND HEALTH-RELATED SOCIAL NEEDS AMONG MASSACHUSETTS ADULTS, 2022-2023

Health Survey Program
Data Science, Research, and Epidemiology Division
Office of Population Health
Massachusetts Department of Public Health

Massachusetts Department of Public Health
DPH

NOVEMBER 11, 2025

answer continued

In Massachusetts Social Isolation or Loneliness by Age

Social isolation or loneliness emerged as the most prevalent adverse social determinant among Massachusetts adults, affecting 31.5% overall, with markedly higher prevalence among younger adults, females, racial and ethnic minoritized groups, individuals with disabilities, underscoring its unequal population burden. Moreover, social isolation clustered with other adverse social and health-related needs and scaled strongly with worse health outcomes, including sharply elevated odds of poor mental health and fair or poor overall health as cumulative adversities increased.

Definition of Measures Sent to Survey Respondents

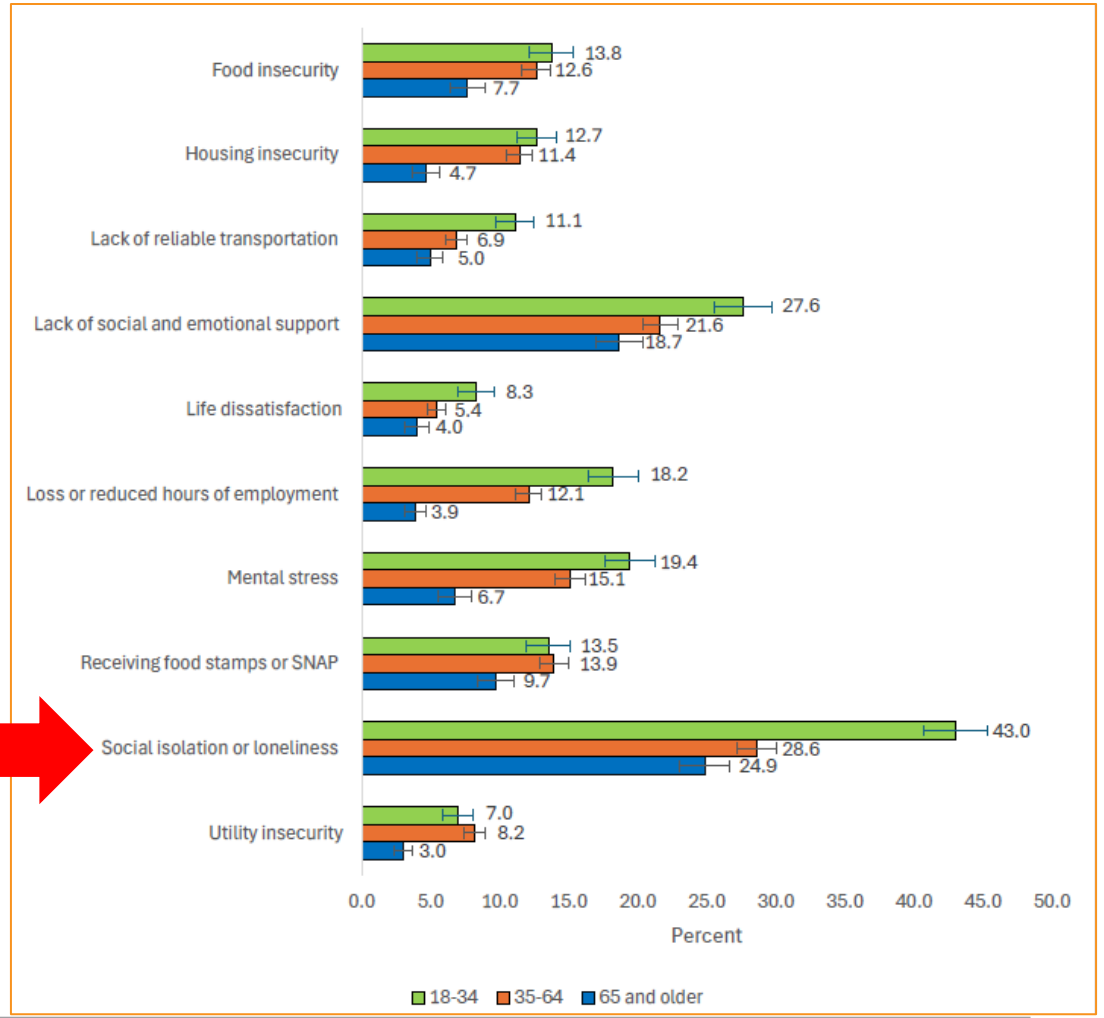
Social isolation or loneliness

• Defined with a response of “always/usually/sometimes” to the question, “How often do you feel socially isolated from others? Is it…” in 2022 or a response of “always/usually/sometimes” to the question “How often do you feel lonely? Is it…” in 2023.

Lack of social and emotional support

• Defined with a response of “sometimes/rarely/never” to the question, “How often do you get the social and emotional support that you need? Is that…”

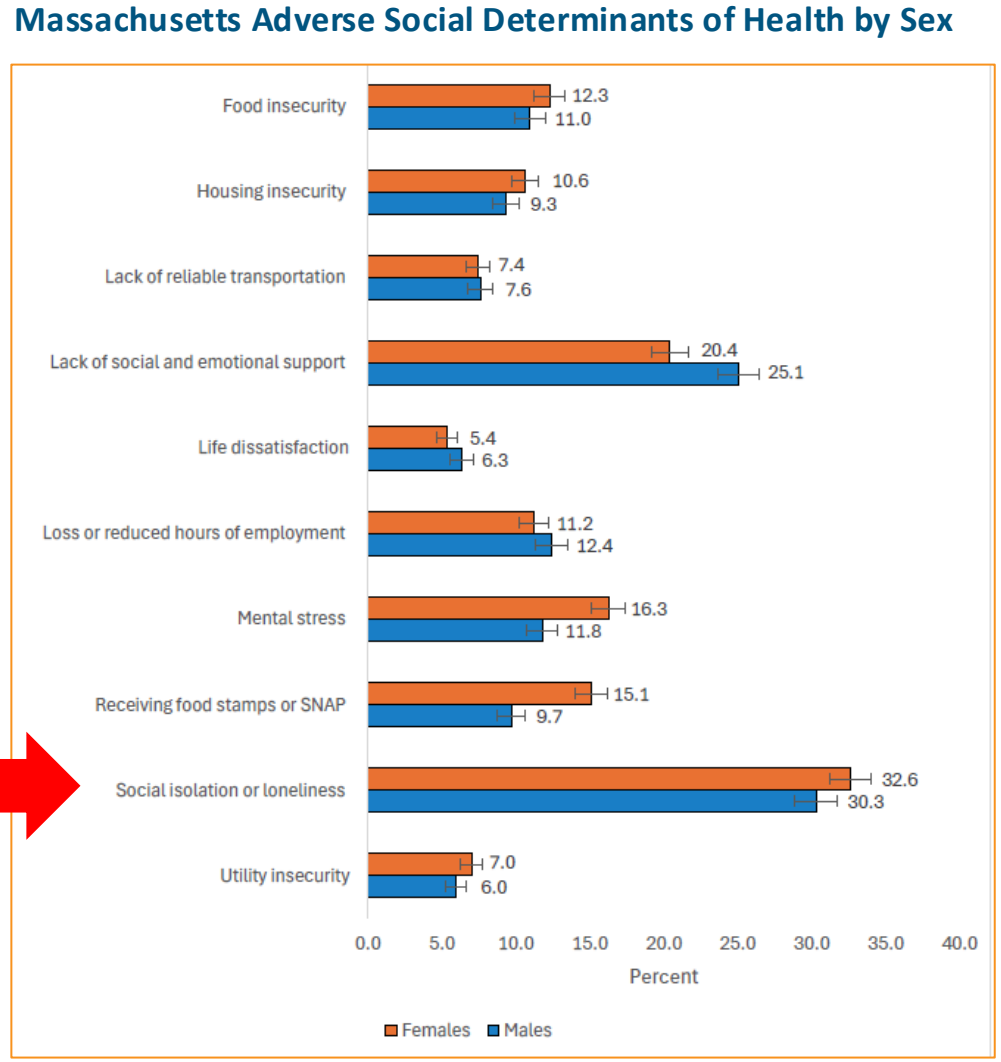
Massachusetts Adverse Social Determinants of Health by Age



answer continued

In Massachusetts Social Isolation or Loneliness by Sex

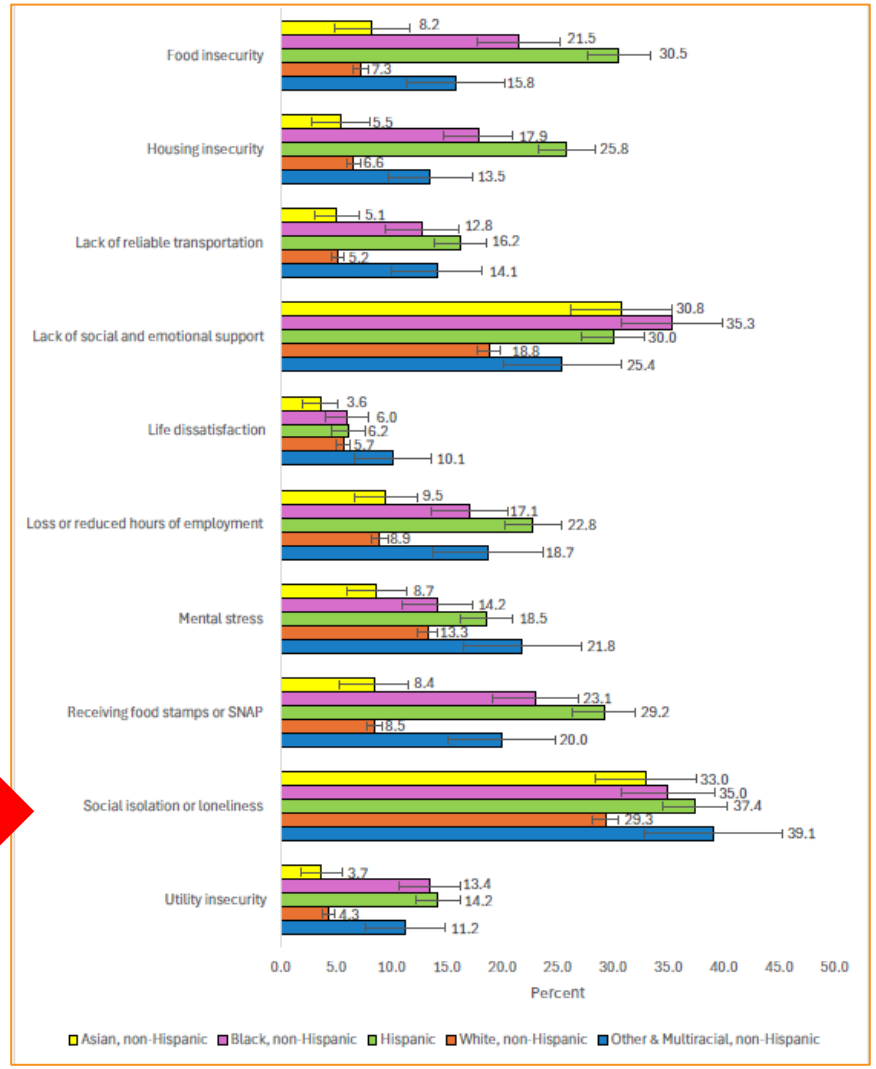
For both males and females, social isolation or loneliness and lack of social and emotional support were the most prevalent adverse measures of SDOH or HRSN; however, females were more likely than males (32.6% vs. 30.3%) to report social isolation or loneliness, while males were more likely than females (25.1% vs. 20.4%) to report lack of social or emotional support.



answer continued

In Massachusetts Social Isolation or Loneliness by Race/Ethnicity

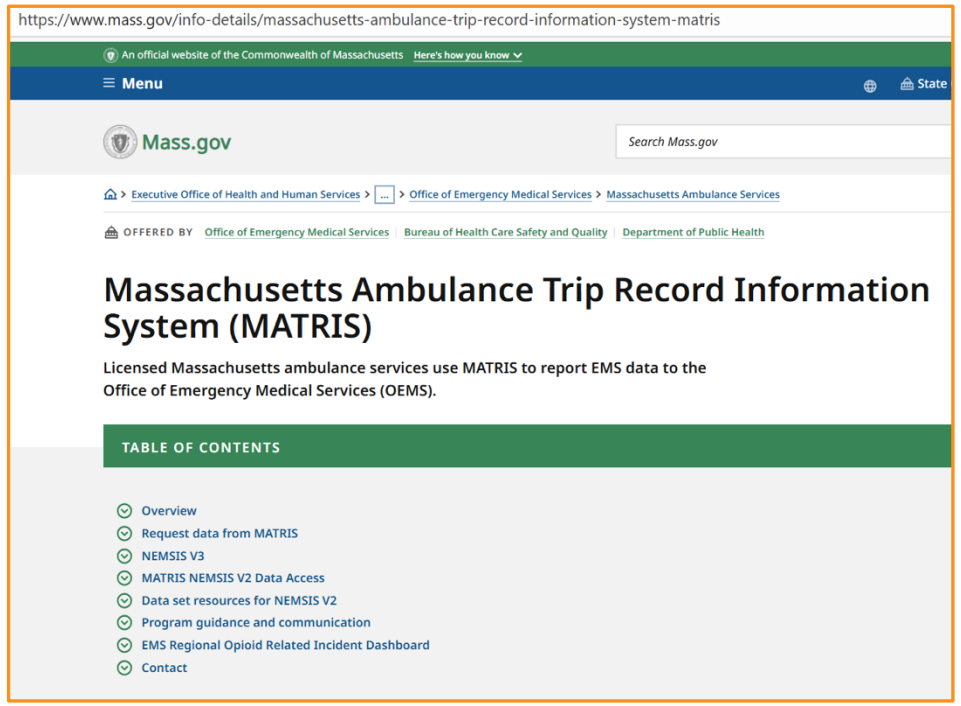
The prevalence of nearly all adverse measures of SDOH was higher among Black non-Hispanic, Hispanic, and Other/Multiracial non-Hispanic adults than among White non-Hispanic adults. This included lack of social and emotional support (35.3%, 30.0%, and 25.4% vs. 18.8%), social isolation or loneliness (35.0%, 37.4%, and 39.1% vs. 29.3%), loss or reduced hours of employment (17.1%, 22.8% and 18.7% vs. 8.9%), receiving food stamps or SNAP benefits (23.1%, 29.2%, and 20.0% vs. 8.5%), food insecurity (21.5%, 30.5%, and 15.8% vs. 7.3%), housing insecurity (17.9%, 25.8%, and 13.5% vs. 6.6%), utility insecurity (13.4%, 14.2% and 11.2% vs. 4.3%), and lack of reliable transportation (12.8%, 16.2%, and 14.1% vs. 5.2%). Asian non-Hispanic adults were more likely than White non-Hispanic adults to report lack of social and emotional support (30.8% vs. 18.8%) and social isolation or loneliness (33.0% vs. 29.3%) but were less likely to report mental stress (8.7% vs. 13.3%).

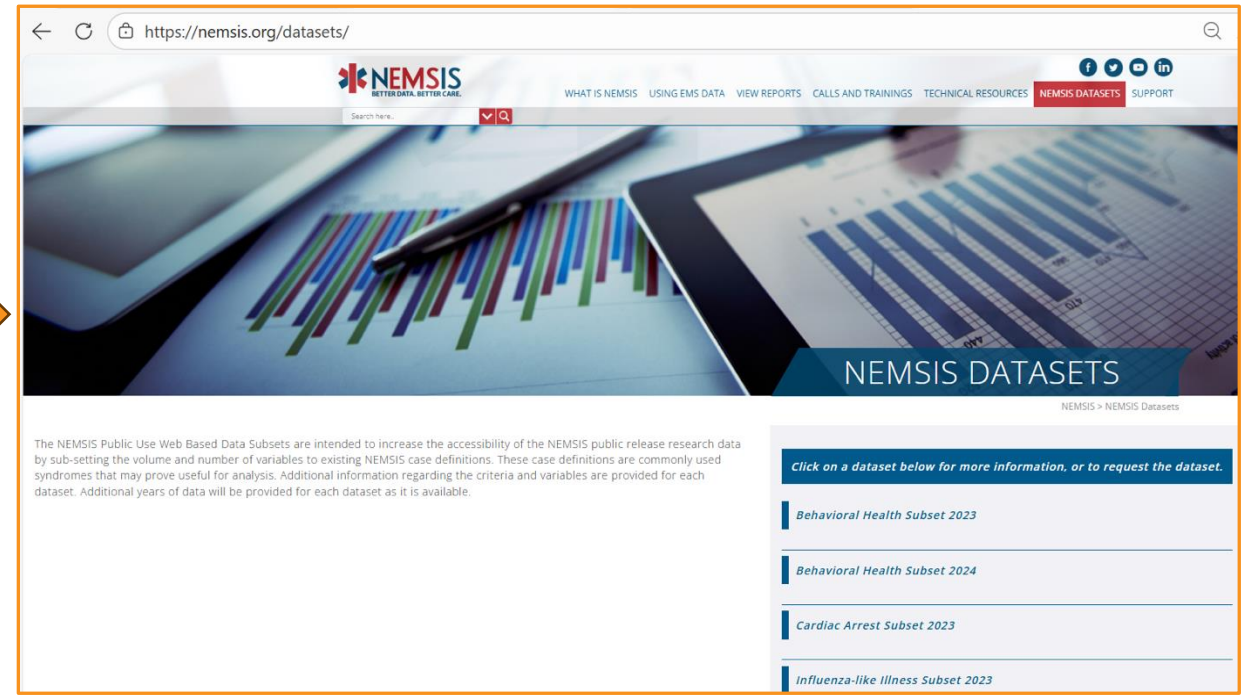


answer continued

Question: I am specifically looking for prehospital population-based data to study behavioral health. Is there an equivalent to AHRQ-HCUP data for prehospital data?

Answer: Yes, the NEMSIS Public Use Web Based Data Subsets are available to increase the accessibility of the NEMSIS public release research data by sub-setting the volume and number of variables to existing NEMSIS case definitions. These case definitions are commonly used syndromes that may prove useful for analysis. Additional information regarding the criteria and variables are provided for each dataset. Additional years of data will be provided for each dataset as it is available. There is a subset for behavioral health data, and the Commonwealth of Massachusetts does submit data from the Massachusetts Ambulance Trip Record Information System (MATRIS) to NEMSIS . See: https://nemsis.org/datasets/





Question: I am trying to determine what fraction of MCO/MMC members are in capitated contracts (with respect to the payer to provider reimbursement and specifically want wondered if I could use the medical claims CAPITATED Flag=1 on the claim line)?

Answer: The researcher is referring to MC081 Capitated Encounter Flag where 1=Yes. For all the medical claim lines and all payers in the CY2024 Release that coding option of 'Yes' is not frequently used. **See Table 1**.

Nevertheless, using Capitated Encounter Flag = Yes for a percent of distinct memberlinkeid who are in a MCO - MassHealth Managed Care Organization Enrollee (i.e., APCDID Code = 4) or who are in an ACO - Accountable Care Organization Enrollee (i.e., APCDID Code = 7). **See Table 2.**

Table 1. Capitated Flag Frequency

CAPITATED ENCOUNTER FLAG	FREQUENCY
YES	1.62443%
NO	95.68562%
UNKNOWN	0.13029%
OTHER	0.00001%
NOT APPLICABLE	2.55962%
BLANK	0.00002%

Table 2. APCD ID Code Flag Frequency

Date of Service to Year	MCO - MassHealth Managed Care Organization Enrollee	ACO – Accountable Care Organization Enrollee (MassHealth only – unless approved by CHIA)
2020	0.0089%	7.787%
2021	0.0003%	7.251%
2022	-	7.038%
2023	-	56.176%
2024	0.0002%	64.248%

answer continued

Answer (Continued): The payment arrangement type **(MC131)** field also has a capitated option. (Code 01). Capitation's claim line volume of payment arrangements declined from 4.26% in Release 8.0 to roughly 3.20–3.27% in Releases CY2022–CY2024, reflecting an overall decrease of about one percentage point over the period. **See Table 3 below**. Across the five releases, the year-to-year variation was minimal after 2021, with capitation stabilizing within a narrow range of 3.20% to 3.27%.

Capitated Claims

Table 3. Capitation Claim line Volume Frequency by Payment Arrangement Type Across Five Releases

Payment Arrangement Type	Code	Release 8.0	Release CY2021	Release CY2022	Release CY2023	Release CY2024
Capitation	01	4.26%	3.45%	3.20%	3.21%	3.27%
Fee for Service	02	58.66%	63.72%	64.68%	62.96%	62.51%
Percent of Charges	03	1.64%	1.05%	1.37%	1.76%	1.74%
DRG	04	18.63%	15.85%	15.40%	15.59%	15.43%
Pay for Performance	05	0.07%				
Global Payment	06	0.75%	0.87%	0.74%	0.68%	0.73%
Other	07	5.88%	4.96%	5.03%	5.42%	5.50%
Bundled Payment	08		0.18%	0.29%	0.49%	0.52%
Payment Amount Per Episode (MassHealth) (PAPE)	09	1.82%	0.70%	0.64%	0.59%	0.58%
Enhanced Ambulatory Patient Grouping (MassHealth)	10	1.17%	2.60%	2.51%	2.34%	2.38%
Blank	Blank	7.13%	6.63%	6.16%	6.98%	7.33%

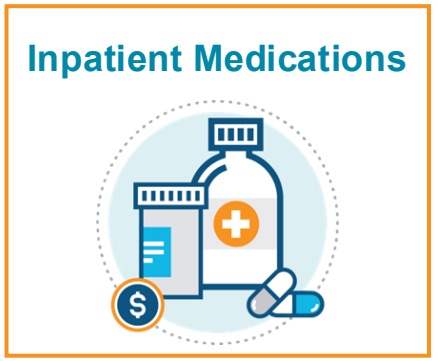
Reminder Concerning Denied Claims

Denied claims and/or denied claim lines are adjudicated service requests that a payer has determined to be non-payable based on unmet eligibility criteria, benefit-coverage limitations, coding or documentation deficiencies, medical-necessity determinations, or other contractual or regulatory prohibitions, and are therefore excluded from reimbursement within the payer's claim payment system. Some denials can be reversed as part of adjudication. For example, CMS describes a denied claim as an insurer's determination not to pay for a submitted service, triggering the patient's or provider's right to an internal appeal and, if needed, external review. See: https://www.cms.gov/cciio/resources/fact-sheets-and-faqs/indexappealinghealthplandecisions

The MA APCD filing specifications state that "Wholly denied claims should not be reported at this time. However, if a single procedure is denied within a paid claim that denied line should be reported." While some carriers have opted to submit some wholly denied claims, when using the MA APCD to study denials data users should remember that:

- ❑ The MA APCD intentionally excludes wholly denied claims from submission requirements, while requiring reporting of denied service lines only when they occur within paid, adjudicated claims.
- ❑ Because wholly denied claims are not completely present in the MA APCD, any analytic method or published research should remember the methodological distinction between excluded wholly denied claims and included denied line items and how this limitation impacts cost, utilization, and access-to-care analyses focused on analyzing denials.

Question: What is the feasibility of identifying medications administered in the outpatient emergency department (ED) and inpatient setting using either MA APCD and/or hospital case mix data? Does MA APCD pharmacy claims drugs administered in an inpatient setting or in the ED?



Answer:

OUTPATIENT SETTING

In the case mix outpatient ED data, and in the case mix outpatient Observation Stay data, and in the MA APCD outpatient claims, certain specific drugs can be identified using a range of **HCPCS Level II drug codes** are considered "high-fidelity" identifiers of drugs administered in the outpatient setting, they contain the drug's active ingredient and the billable does increment. All "J" codes can be used, but only specific ranges of "C" codes and "Q" codes.

- "J" codes are the backbone for physician-office and hospital outpatient drug billing.
- "C" codes are CMS OPPS temporary pass-through, or new-technology designations frequently used by hospital outpatient departments.
- "Q" codes are temporary codes that often capture brand-, formulation-, or biosimilar-specific products before they transition to permanent J-codes.

By "high-fidelity" identifier with regards to ingredient and dosage, you can see that specificity where J9271 denotes pembrolizumab billed per 1 mg; J9035 denotes bevacizumab billed per 10 mg; C9066 denotes sacituzumab govitecan-hziy billed per 2.5 mg; and Q5107 denotes bevacizumab-awwb (Mvasi), a bevacizumab biosimilar, billed per 10 mg. Each of these codes permit direct identification of the specific ingredient and billable quantity. Likewise, some codes for thrombolytics and radiopharmaceuticals used in outpatient care, for example, J3105 (tenecteplase, 50 mg), C9061 (teprotumumab-trbw, 10 mg), and C9060 (fluoroestradiol F-18, diagnostic, per 1 mCi) which show how the "J," "C," and "Q" codes also include monoclonal antibodies, small molecules, gene/cell therapies, contrast or diagnostic agents, and advanced biologics.

answer continued

Answer *(continued):*

Inpatient Medications

INPATIENT SETTING

In the inpatient setting, UB-04 revenue codes identify drug administration but not the specific drug. Only general codes for pharmacy services (0250–0256), including general, generic and non-generic drugs, IV solutions, take-home drugs, and experimental agents. There are separate codes for how those drugs are administered with IV therapy codes (0260–0263) and chemotherapy revenue codes (0331–0339) to distinguish injected, oral, IV, and other chemotherapy services provided during the inpatient hospitalization.

Drug revenue codes

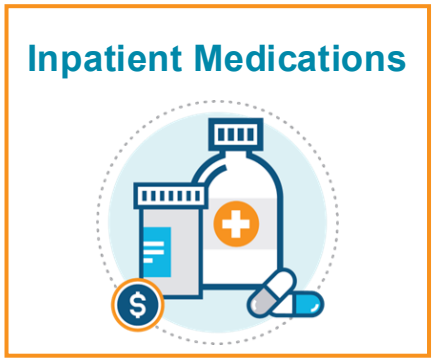
Revenue Code	Description
0250	Pharmacy – General
0251	Pharmacy – Generic Drugs
0252	Pharmacy – Non-generic Drugs
0253	Pharmacy – Take-Home Drugs
0254	Pharmacy – Incident to Other Services
0255	Pharmacy – IV Solutions
0256	Pharmacy – Experimental Drugs

Method of Drug Administration

Revenue Code	Description
0260	IV Therapy – General
0261	IV Therapy – Infusion Pump
0262	IV Therapy – IV Push
0263	IV Therapy – IV Therapy (Other)

answer continued

Answer *(continued):*



DIFFERENCE BETWEEN INPATIENT CHEMO AND OUTPATIENT CHEMO

When chemo is administered in the inpatient care setting, you cannot see the specific drug, just one of the following generic revenue codes:

Inpatient Revenue Chemo Codes for Cancer

Revenue Code	Description
0331	Chemotherapy Injected
0332	Chemotherapy Oral
0335	Chemotherapy IV
0339	Chemotherapy – Other

HCPCS drug codes do list the specific drugs used for outpatient chemotherapy are identified almost entirely by HCPCS J-codes, especially J9000–J9999, with occasional Q-codes for new agents and limited C-code use in hospital outpatient settings. The J code range J9000-J9999 includes most injectable and infused antineoplastic agents such as doxorubicin, cyclophosphamide, paclitaxel, cisplatin, pembrolizumab, nivolumab, trastuzumab, and many targeted and immunotherapy drugs. Some examples include:

- **J9025** – Injection, azacitidine, 1 mg
- **J9171** – Injection, docetaxel, 1 mg
- **J9310** – Injection, rituximab, 10 mg
- **J9271** – Injection, pembrolizumab, 1 mg

For full list of Chemotherapy Drugs HCPCS Code range J9000-J9999 used in the outpatient setting, see: https://www.aapc.com/codes/hcpcs-codes-range/10

answer continued

Answer *(continued):*

Case Mix Inpatient Setting and MA APCD Inpatient Setting

In Massachusetts case mix data, the term “inpatient setting” refers strictly to acute care hospitalizations in MDPH licensed acute hospitals, where DRG-based payment and consolidated institutional pharmacy operations ensure that revenue code drug entries reliably represent drugs administered during an acute inpatient stay. In contrast, the MA APCD “inpatient” file includes all institutional inpatient environments, such as long term psychiatric, rehabilitation, nursing home, residential treatment, and specialty hospitals. Although both datasets contain drug-related revenue codes, long term care billing structures differ fundamentally from acute care billing, especially in how medications are obtained and charged.

Long term care (LTC) facilities may dispense drugs through hospital-based pharmacies, contracted long term care pharmacies, or external pharmacy vendors. As a result, medications used during extended inpatient stays may appear either as revenue code items or as pharmacy claims, depending on the facility’s acquisition and billing pathways. Thus, revenue code drugs in the MA APCD represent administered drugs but do not signify a uniform clinical or operational context, unlike acute case mix data. Because MA APCD links medical and pharmacy claims, analysts can identify pharmaceuticals associated with long term stays, but doing so requires precise alignment of service dates, recognition of facility type and licensure, and an understanding of each institution’s pharmacy and billing configuration.

The MA APCD enables linkage between medical claims and pharmacy claims. This allows analysts to infer whether drugs were obtained during an inpatient long-term stay. However, this linkage requires exact alignment of service dates, awareness of facility type and license taxonomy, and understanding of institutional pharmacy arrangements. In sum, the phrase “drugs administered in the inpatient setting” can unintentionally obscure whether a medication was:

- ❑ Hospital dispensed
- ❑ Facility dispensed but pharmacy billed
- ❑ Resident obtained through an LTC pharmacy under a separate claim stream

Therefore, when referring to “inpatient”, keep in mind the distinction between:

- ❑ Acute care inpatient hospital–administered drugs
- ❑ Non acute institutional administered drugs
- ❑ Drugs dispensed during institutional residence but billed via pharmacy claims

When is the next Data User Group meeting?

- The next User Group meeting is Tuesday, February 24, 2026
- http://www.chiamass.gov/ma-apcd-and-case-mix-user-workgroup-information/

Questions?

- Questions related to MA APCD email:
  apcd.data@chiamass.gov
- Questions related to Case Mix email:
  casemix.data@chiamass.gov