



Data Brief: Stimulant-Related Data among Massachusetts Residents

Massachusetts Department of Public Health

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Introduction / Background

Although attention has focused on the ongoing opioid crisis, stimulant-related overdose deaths have also increased dramatically over the past decade, nationally and in Massachusetts. In Massachusetts there has been an increase in use of healthcare services, overdoses, and deaths involving stimulants, which include cocaine and methamphetamine. People who use stimulants are also at increased risk for exposure to fentanyl due to contamination of the drug supply. This report provides a baseline picture of stimulant-related overdoses based on data from three sources: death certificates, Emergency Medical Services, and Emergency Departments. To identify populations and communities who may be at greatest risk for negative health outcomes, the report examines demographic and geographic trends by race, Hispanic ethnicity, sex, age group, and county. In examining data by race, we acknowledge that race is a complex social construct that is a marker for social opportunity and disadvantage rather than biology or physiology. Monitoring health outcomes by race is a critical tool for identifying and addressing health inequities.

Stimulant-Related Deaths, EMS Incidents, and ED Visits in Massachusetts

Death Data

Figure 1 shows the monthly counts of stimulant-related deaths in Massachusetts from 2018 to 2021. The number of stimulant related deaths increased 10.3% from 2018 to 2019, 22.5% from 2019 to 2020, and 20.5% from 2020 to 2021. From January 2018 to December 2021 there was a statistically significant increase in all stimulant-related deaths with a monthly percent change of 1.34%.

Most deaths categorized as a stimulant-related death were the result of an acute poisoning. Acute stimulant poisoning deaths are those where the underlying cause of death was injury due to acute poisoning—unintentional, intentional, or undetermined intent—and a stimulant-class substance was found in the toxicology report. Other stimulant-related deaths represent deaths not due to acute poisonings, where stimulant-related diagnosis codes were found in the underlying or associated causes of death (e.g., someone dies from a heart attack and has a history of stimulant use that may have increased their risk for heart attack, but there was not evidence that their deaths was the result of an acute poisoning.).

From 2018 to 2021, acute stimulant poisonings were attributable for 89.1% of all stimulant-related deaths. As shown in Figure 5, in 90-95% of these acute poisonings, fentanyl was also present. The high percentage of fentanyl present indicates that the use of more than one substance (i.e., polysubstance use) makes up a large percentage of stimulant-related deaths. The use of more than one substance may be intentional (e.g., someone chooses to use both a stimulant and an opioid in the same period) or unintentional (e.g., someone uses a stimulant that was unknowingly combined with another substance).

Figure 1: Count of Stimulant-Related Deaths, Massachusetts Residents: 2018-2021

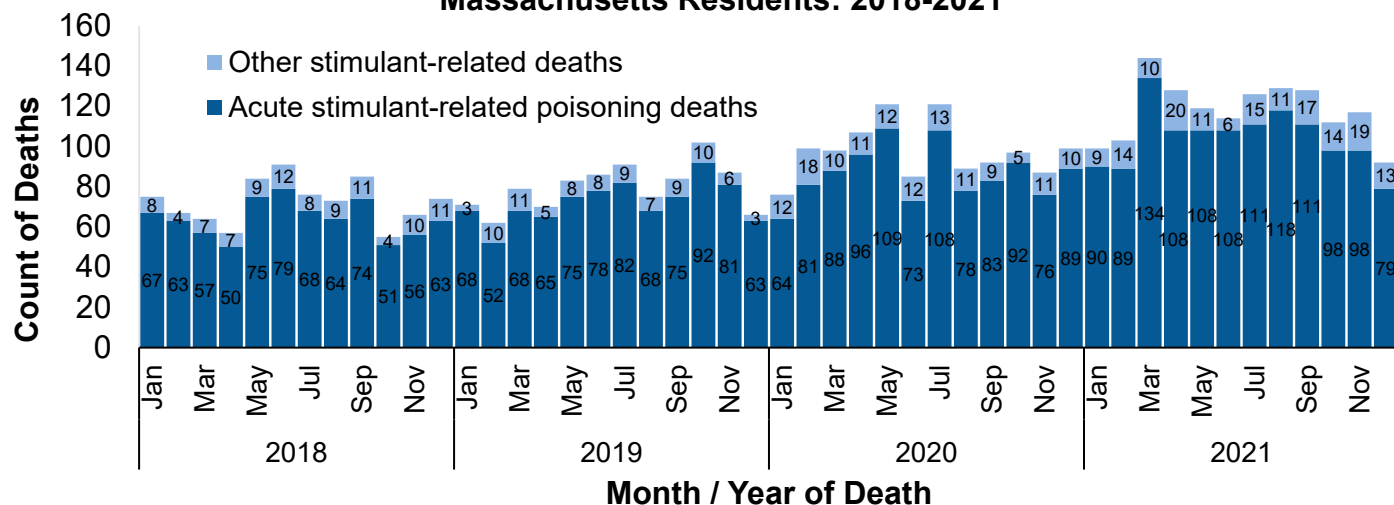
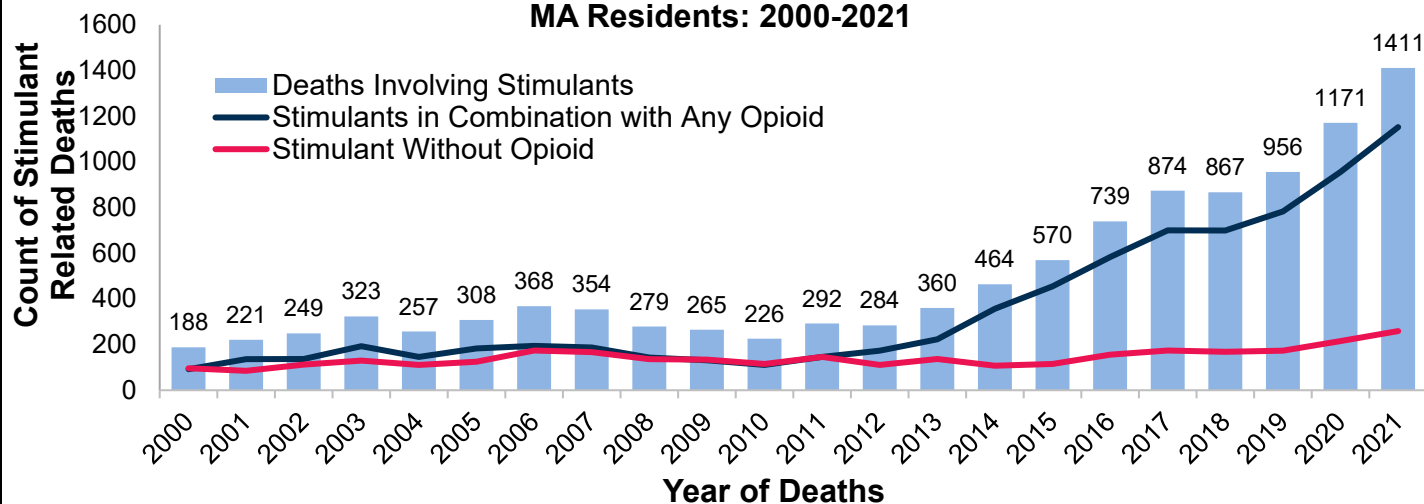


Figure 2 shows the yearly trend in stimulant-related deaths with and without opioids present among Massachusetts residents from 2000 to 2021. In 2000, stimulant-related deaths made up 0.3% (188) of all deaths. Starting in 2013 this started increasing and in 2021 reached an all-time high of 2.2% (1,411) of all deaths. From 2000 through 2021 there was a 0.86% per year increase in stimulant-related deaths. From 2013 through 2021 there was an a 1.4% per year increase in stimulant-related deaths. Beginning in 2012, the percent of stimulant-related deaths that included any opioid steadily increased, and from 2019 through 2021, 82% of stimulant related-deaths also included opioids.

Figure 2: Count of Stimulant-Related Deaths MA Residents: 2000-2021

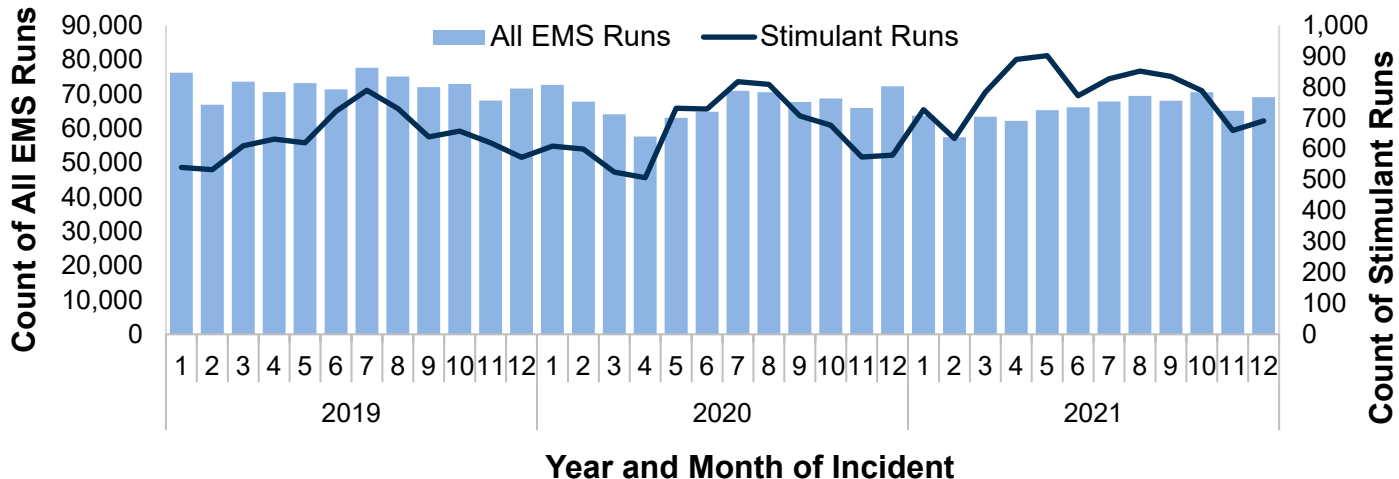


Notes: These deaths may include substances in addition to stimulants or opioids

Emergency Medical Services (EMS) Data

As seen in Figure 3, the number of stimulant-related EMS incidents differed by month from 2019 through 2021. There were increases in stimulant-related incidents from May through August of each year. In May of 2021, the highest ever number of stimulant-related EMS runs was recorded at 902. While all EMS incidents from January 2019 through March 2021 stayed mostly the same, a higher proportion of these runs were identified as stimulant-related over time.

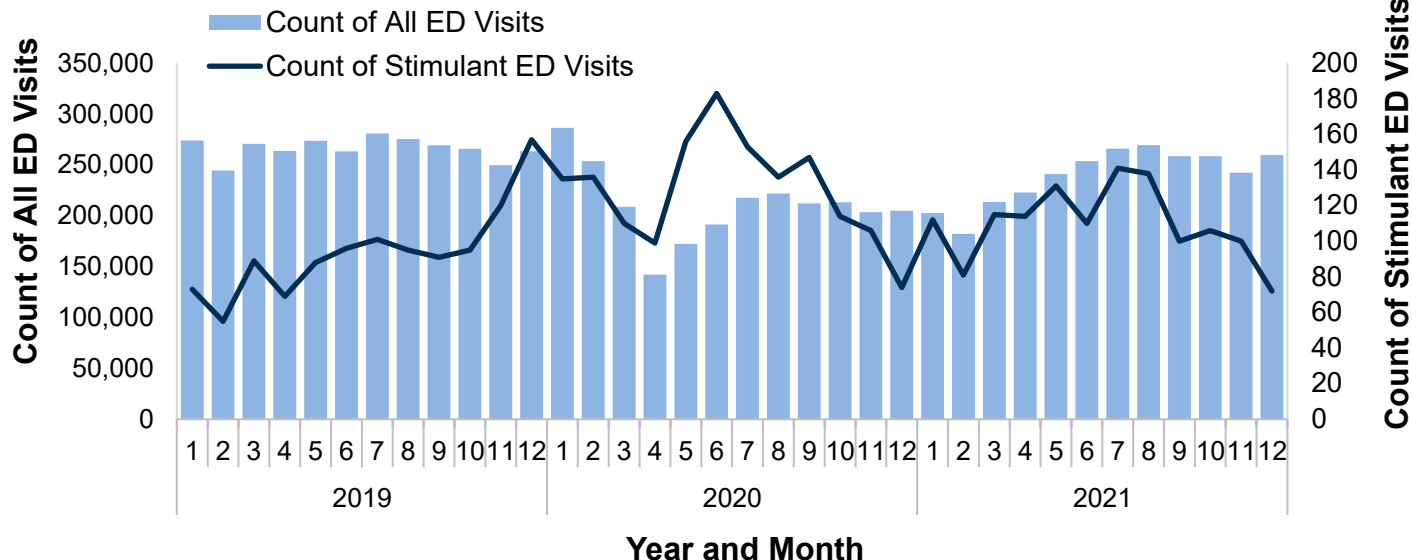
Figure 3: Count of Stimulant-Related Incidents and All EMS Incidents, MA Residents: January 2019-December 2021



Emergency Department (ED) Data

Figure 4 shows that visits to the emergency department (ED) for stimulant-related overdoses fluctuated from 2019 through 2021. Interestingly, the highest number of stimulant-related overdoses during this period corresponded with the lowest counts of all ED visits. This low count of overall ED visits is likely attributable to the decrease in patients seeking care at the ED in the early months of the COVID-19 pandemic due to lifestyle changes such as stay-at-home orders and engaging in fewer activities with a risk of injury, as well as changes in social perceptions such as fear of contracting infection. In June of 2020, stimulant-related overdose ED visits reached an all-time high of 183.

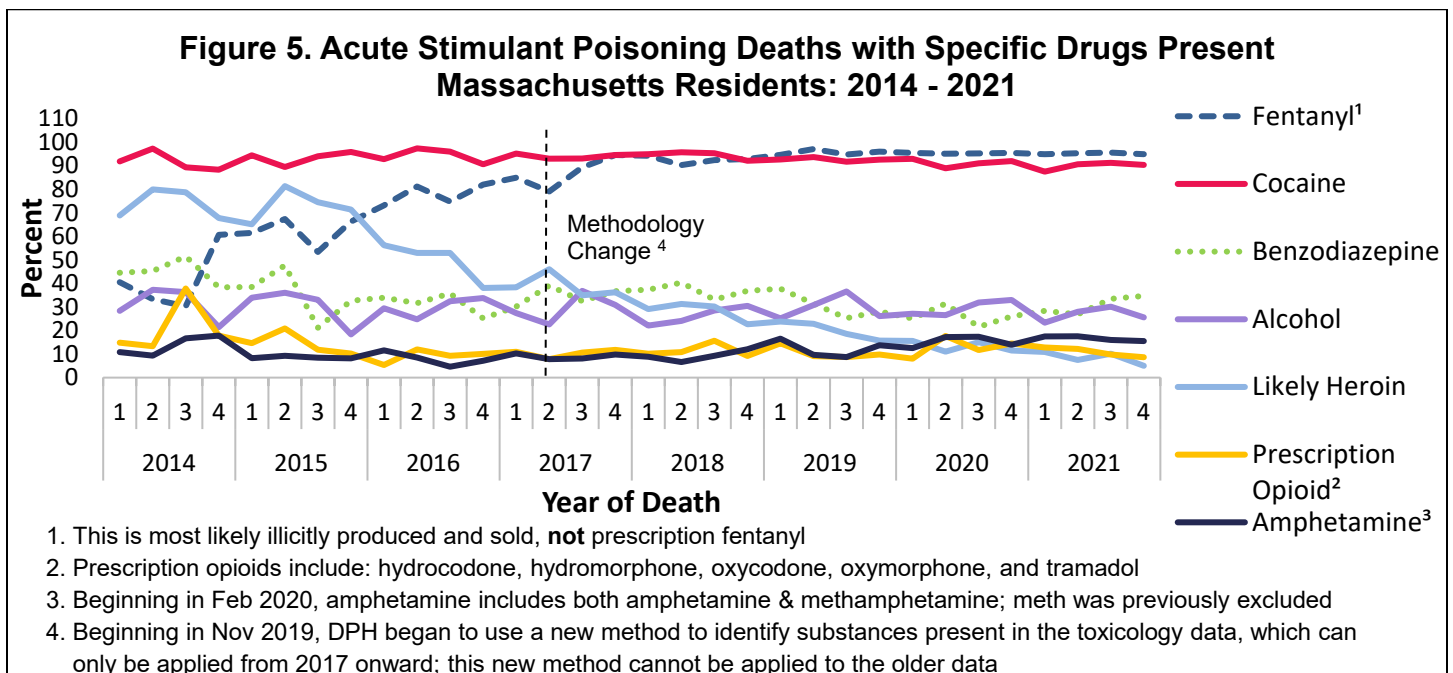
Figure 4: Count of Stimulant-Related ED Visits and All ED Visits, Massachusetts: 2019-2021



Toxicology of Stimulant-related Deaths

Figure 5 shows toxicology results by quarter from 2014 through 2021. Among stimulant-related deaths, cocaine has been the most common drug, occurring in 86-96% of these deaths. Amphetamines occurred in 7-18% of these deaths. Note that amphetamines includes both prescription amphetamines and methamphetamine. It is possible that the pattern of specific amphetamines present, including methamphetamine, has changed over time.

In nearly all deaths where stimulants were present since 2017, opioids were also present. Since 2019, Fentanyl has been the most common drug present among stimulant-related overdose deaths. In prior years, heroin – or a drug likely to be heroin – was more common. Between 2014 and 2015 stimulant-related deaths with heroin present reached a high of 70-80%. In 2014 approximately 45% of all deaths with stimulants present also included benzodiazepines. While that number has decreased over time, as of 2019, benzodiazepines were still present in 30% of deaths with stimulants present. Alcohol is present in 18-37% of these deaths.



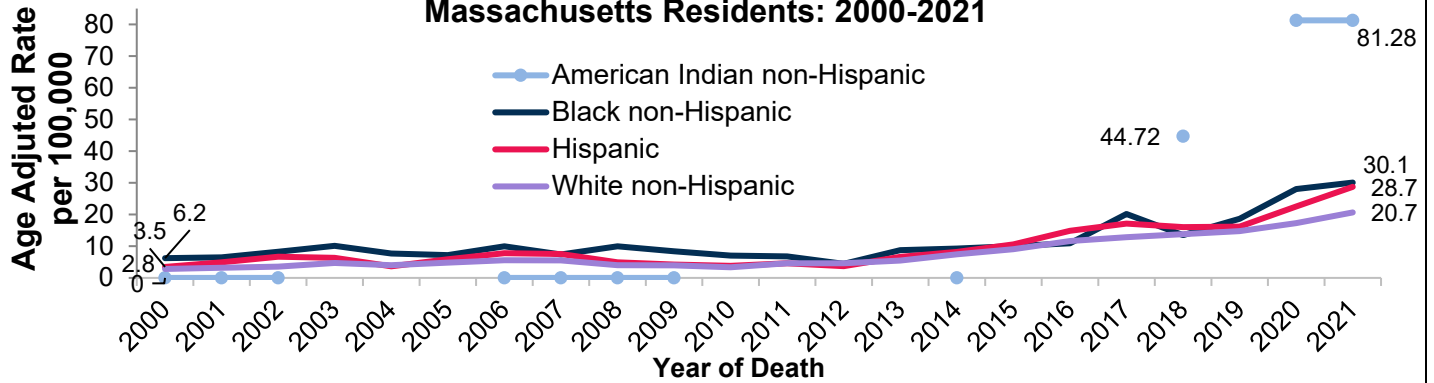
Race-Ethnicity Findings

Death Data

Age-adjusted stimulant-related death rates have been increasing for Black non-Hispanic, White non-Hispanic, and Hispanic populations over the past ten years. Year-over-year, the rate for Hispanic residents increased 25.9%, the rate for Black non-Hispanic residents increased 20.3%, and the rate for White non-Hispanic residents increased 27.2%. From 2018 to 2021, the death rate increased more for both Hispanic and Black non-Hispanic residents compared with White non-Hispanic residents. Hispanic residents saw an increase of 79.2%, Black non-Hispanic residents saw a rate increase of 122.5%, and White non-Hispanic residents saw a rate increase of 49.8%.

Data in Figure 6 are not shown because of small counts for American Indian non-Hispanic residents for 2019, but in 2020 and 2021 they had the highest rates of stimulant-related death at 81.28 per 100,000 individuals. This is almost three times greater than non-Hispanic Black residents, who had the second highest rate.

Figure 6: Rates of Stimulant-Related Deaths by Race/Ethnicity, Massachusetts Residents: 2000-2021



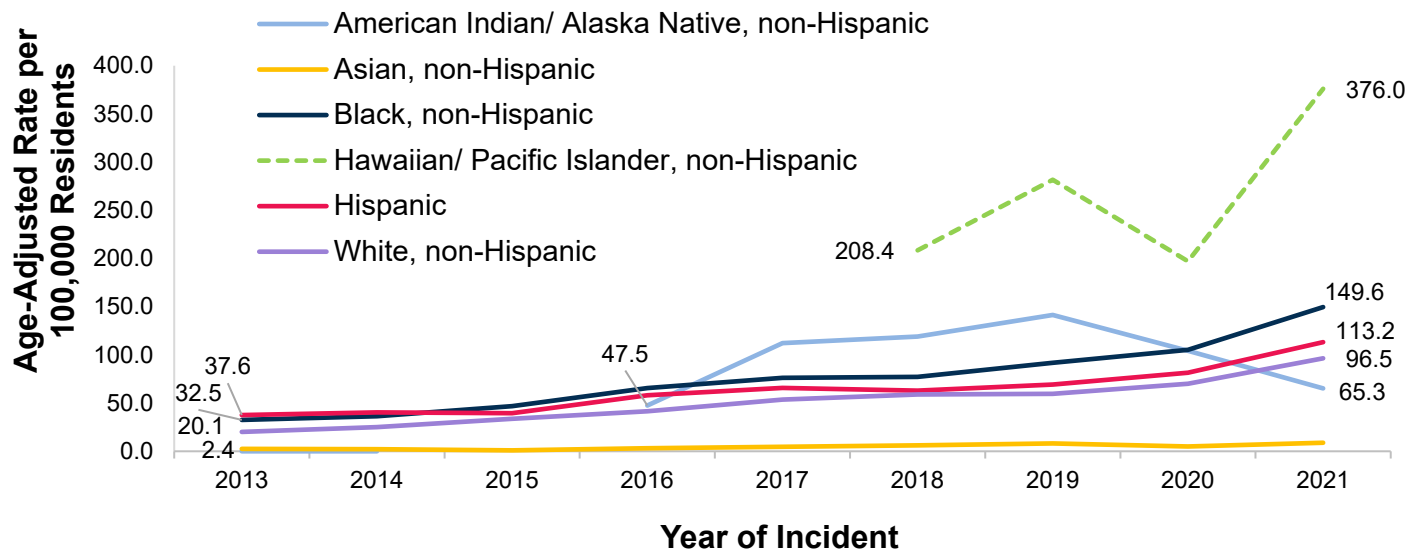
Notes: These deaths may include substances in addition to stimulants and opioids
 Number of deaths for Asian/Pacific Islander, non-Hispanic & Other, non-Hispanic are too low to calculate rates
 There were no reported deaths for American Indian non-Hispanic residents from 2000-2002, 2006-2009, or 2014

Emergency Medical Services Data

Information on race/ethnicity remain incomplete in EMS data. From 2013 through 2021 44.0% of incidents did not include information on race/ethnicity. Therefore, please use caution when interpreting these data. As shown Figure 7, the rate of stimulant-related emergency response incidents increased for most race/ethnicities since 2015. Black non-Hispanic, Hispanic, White non-Hispanic, and American Indian/Alaska Native non-Hispanic populations have all seen increasing rates. The American Indian/Alaska Native non-Hispanic population had a decrease from 2019 to 2020. The highest rates are among the Hawaiian/Pacific Islander non-Hispanic population. Due to small counts in earlier years, establishing a trend is not yet possible.

From 2019 to 2020, the rate of stimulant-related EMS incidents increased by 14.7% among the Black non-Hispanic population, 17.8% (69.17 per 100,000 to 81.50 per 100,000) among the Hispanic population, and 17.5% (59.65 per 100,000 to 70.07 per 100,000) among the White non-Hispanic population. From 2019 to 2020, the rate of stimulant-related EMS incidents decreased by 26.2% among the American Indian/Alaska Native non-Hispanic population, and 30.0% among the Hawaiian/Pacific Islander non-Hispanic population. From 2020 to 2021, rates increased by 90% for the Hawaiian/Pacific Islander non-Hispanic population. Rates of stimulant-related incidents decreased for the American Indian/Alaska Native population from 2020 to 2021 (37.4% decrease). Rates for Asian non-Hispanic populations remain low and stable.

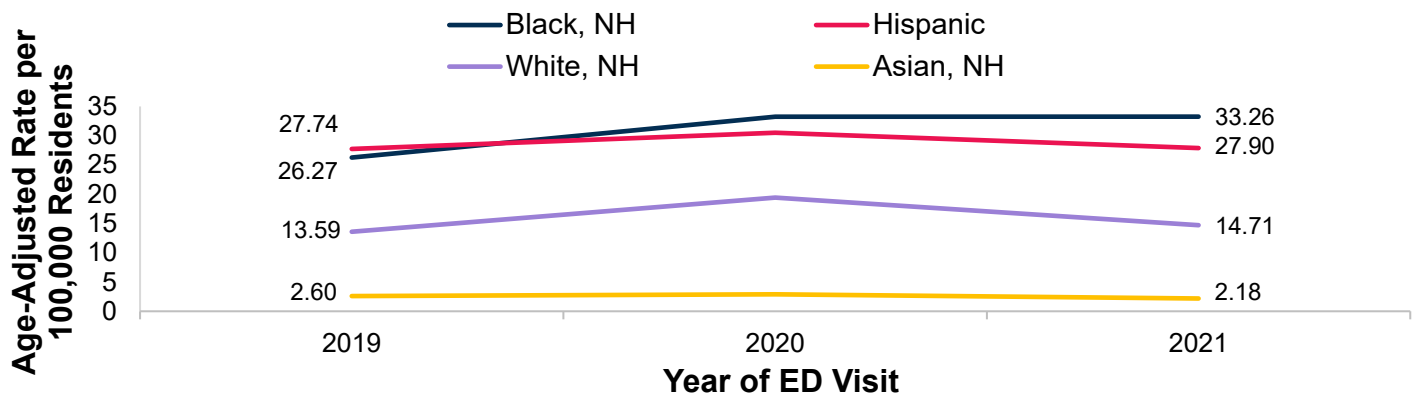
Figure 7: Age-Adjusted Rate of Stimulant-Related Incidents by Race/Ethnicity, Massachusetts: 2013-2021



Emergency Department Data

The rate of stimulant-related ED visits for the Black non-Hispanic population increased from 2019 to 2020 and then leveled off from 2020 to 2021 (Figure 8). Rates among Hispanic and White non-Hispanic populations increased from 2019 to 2020, and then decreased in 2021. Rates for the Asian non-Hispanic population remained low and stable during these years. The Black non-Hispanic population had the highest rates of stimulant-related ED visits, followed closely by the Hispanic population, and then by the White non-Hispanic population. The White non-Hispanic population had approximately half the rate of ED visits as Black non-Hispanic and Hispanic populations.

Figure 8: Rate of Stimulant-Related ED Visits by Race and Ethnicity, Massachusetts: 2019-2021



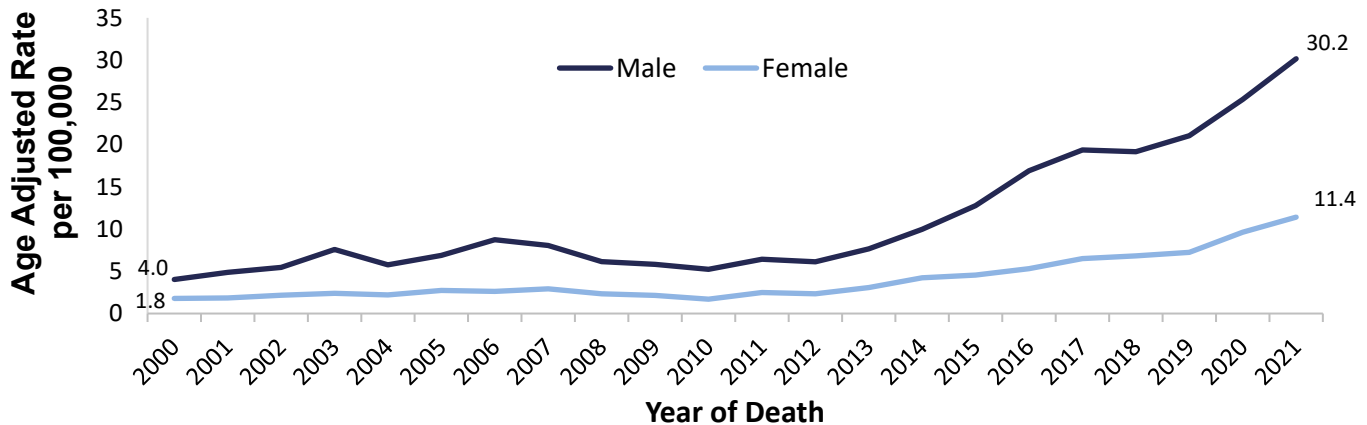
Note: American Indian/Alaska Native non-Hispanic, and Hawaiian/Pacific Islander non-Hispanic data are not shown due to low counts and incomplete data.

Sex Findings

Death Data

Stimulant-related death rates increased for both males and females over the past ten years. For these years, males have higher age-adjusted stimulant-related death rates than females. Annual stimulant-related death rates averaged 2.7 times higher in males compared to females from 2019 to 2021, however rates increased by 57.6% for females and 43.2% for males from 2019-2021.

Figure 9: Age-Adjusted Rate of Stimulant-Related Deaths by Sex, Massachusetts Residents: 2000-2021

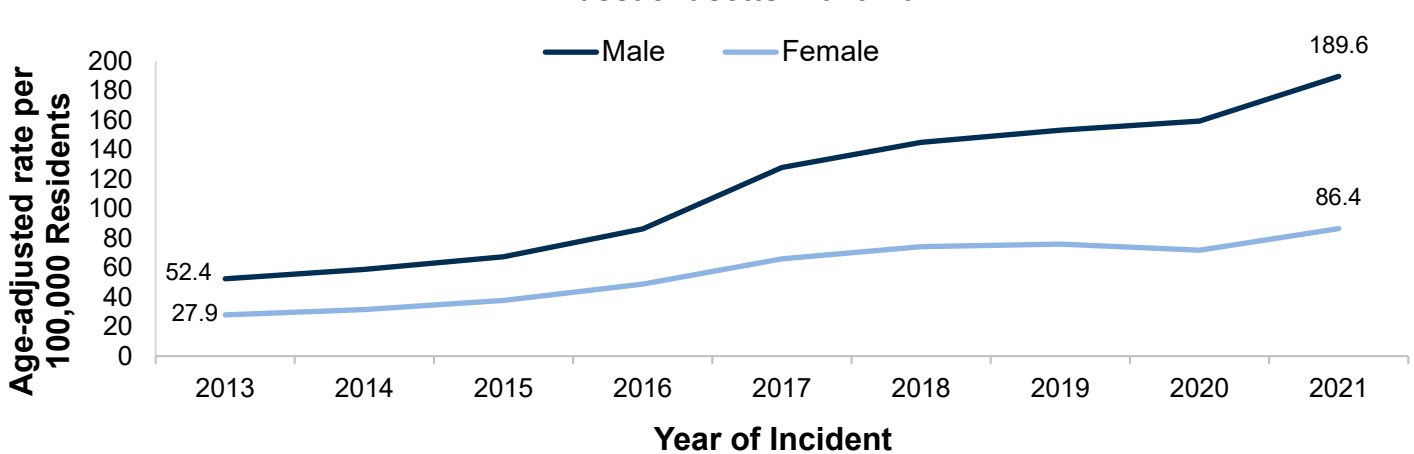


Note: These deaths may include substances in addition to stimulants and opioids. Data represents sex assigned at birth and only includes options for Male and Female.

Emergency Medical Services Data

As show in Figure 10, from 2013 through 2021, the age-adjusted rate of incidents with any reported stimulant use increased for both males and females. Like the death data, males have a higher rate of incidents than females. Annual stimulant-related EMS call rates averaged 2.1 times higher in males compared to females from 2019 to 2021. Rates increased by 23.8% for males and 13.8% for females from 2019-2021.

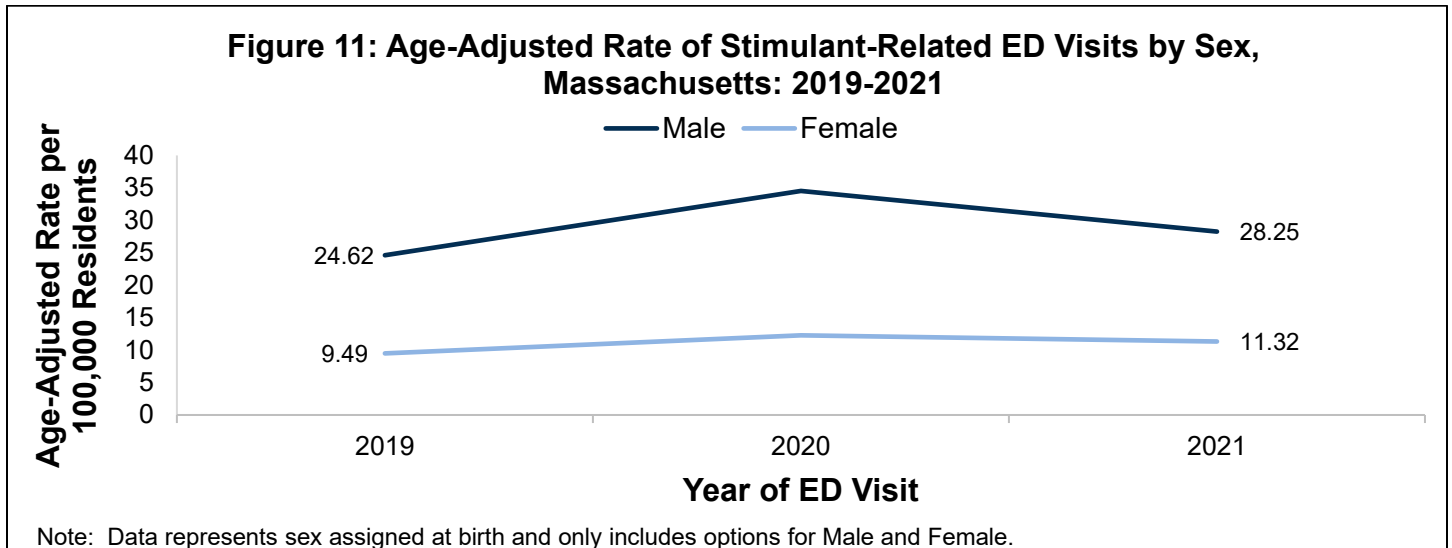
Figure 10: Age-Adjusted Rate of Stimulant-Related Incidents by Sex, Massachusetts: 2013-2021



Note: Data represents sex assigned at birth and only includes options for Male and Female.

Emergency Department Data

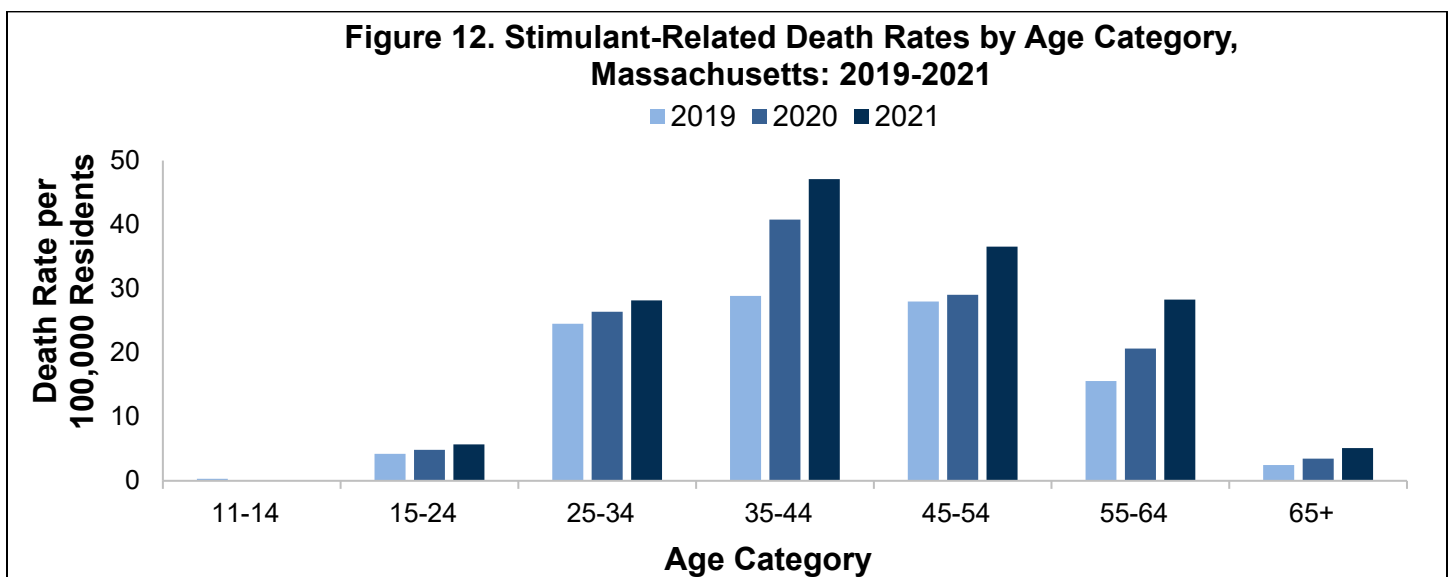
Age-adjusted rates of stimulant-related ED visits increased for males and females from 2019 to 2020, and then slightly decreased from 2020 to 2021 for males and females (Figure 11). Like the death and EMS data, males have a higher rate than females. Annual stimulant-related emergency department rates averaged 2.6 times higher in males compared to females from 2019 to 2021. Rates increased by 14.8% for males and 19.2% for females from 2019-2021.



Age Findings

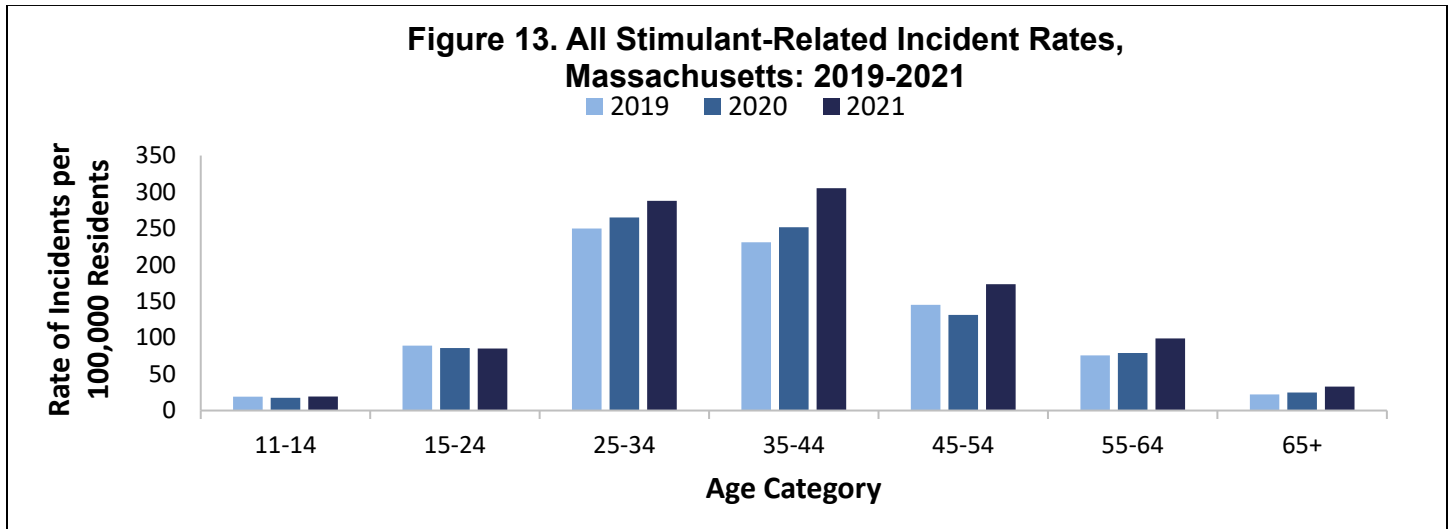
Death Data

As highlighted in Figure 12, from 2019 to 2021, the rate of stimulant-related deaths was highest among those 35-44. Those in this age range accounted for 29% of all stimulant-related deaths across all three years. There was a rise in stimulant-related deaths from 2019 to 2021. Increases were most notable among those that are 35 years of age or older, as death rates increased by 63% for 35-44-year-olds, 30% for 45-54-year-olds, and 81.4% for 55-64-year-olds.



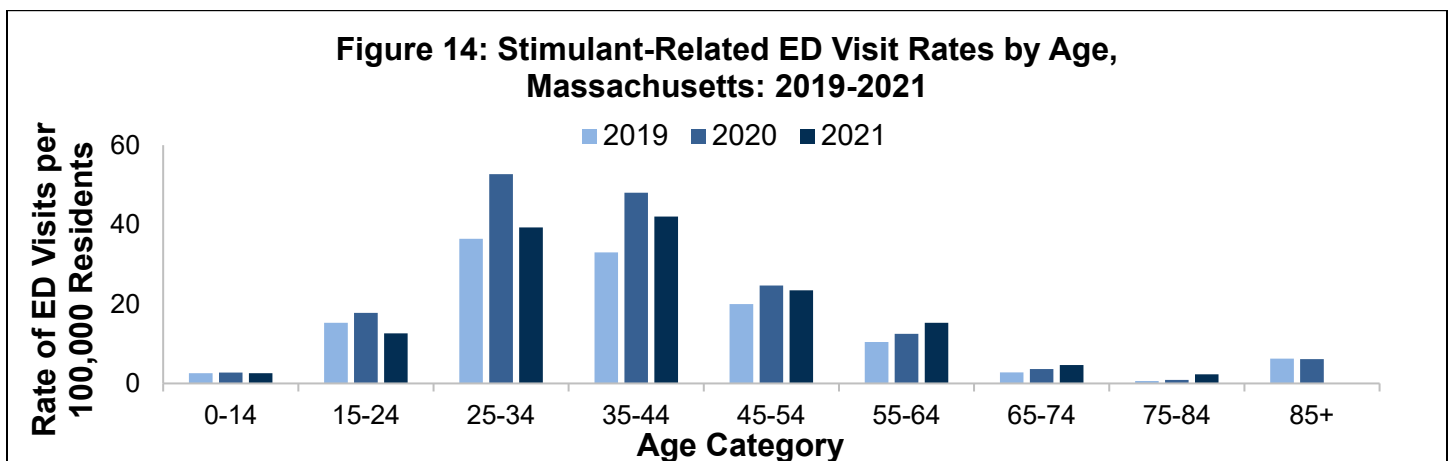
Emergency Medical Services Data

In Figure 13, for all years from 2019-2021, the highest rate of stimulant-related EMS incidents was among those aged 35-44, closely followed by those aged 25-34. These groups both saw minor increases in EMS call rates from 2019 to 2021 by 15.2% for 25-34-year-olds and 32% for 35-44-year-olds. The 45-54-year-old age group saw a 9.5% decrease in stimulant-related EMS incidents in 2020, followed by an increase of 32% again in 2021. All other age groups' rates remained relatively stable from 2019-2021, hovering around 85 incidents per 100,000 residents for 15-24-year-olds, 19 incidents per 100,000 residents for 11-14-year-olds, and 25 incidents per 100,000 residents for the 65+ population.



Emergency Department Data

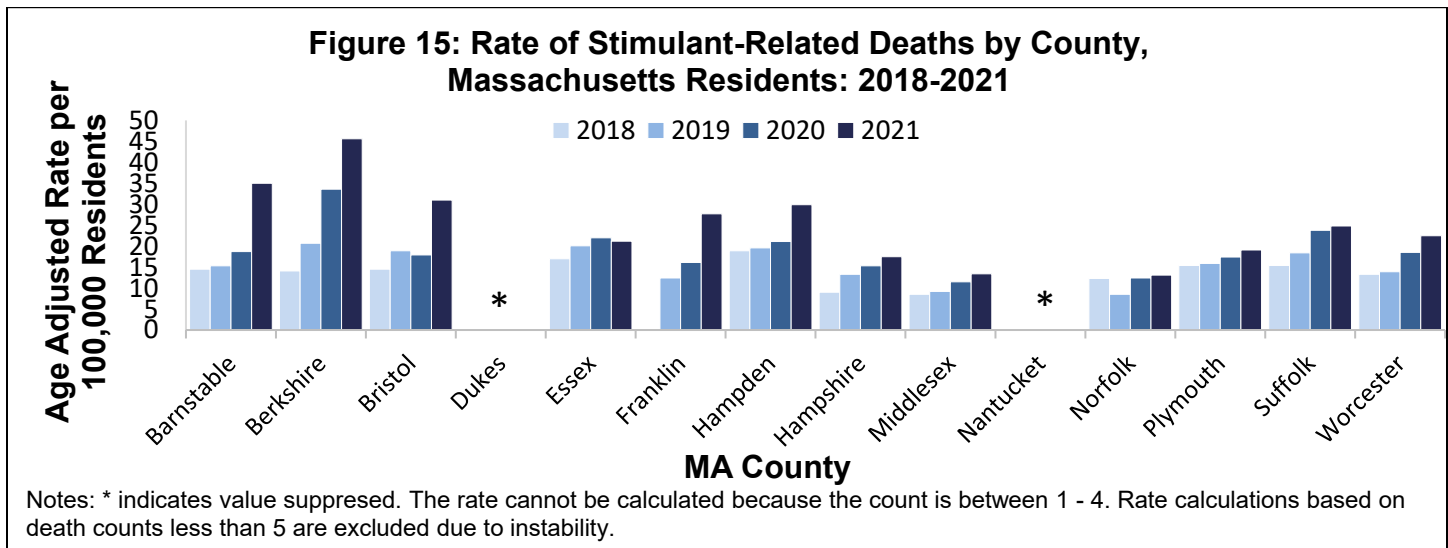
Figure 14 shows that stimulant-related overdose emergency department visits are highest among those 25-34 and 35-44 from 2019 to 2021. Additionally, both age groups saw a spike in stimulant-related ED visits in 2020 with a 44.8% increase for 25-34-year-olds and a 27.3% increase for 35-44-year-olds. In 2021, these age groups' rates dropped again. We hypothesize that the 2020 spike in ED visits may have been impacted by the COVID-19 pandemic.



County Findings

Death Data

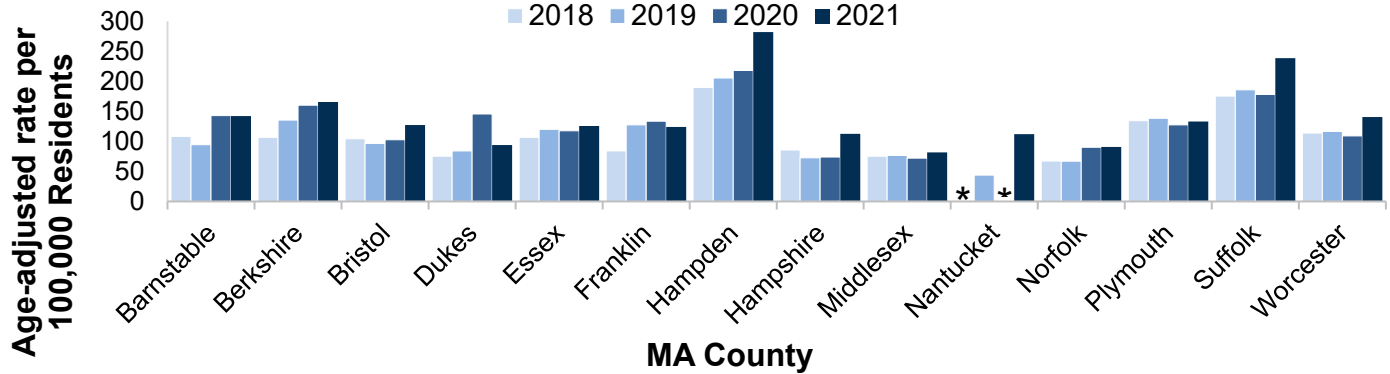
Figure 15 shows that some counties have seen greater increases in stimulant-related death rates than others. For example, while Berkshire County ranked seventh in the state for stimulant-related death rates in 2018, their rate increased by 223.4% from 2018 to 2021. In 2020 and 2021, Berkshire County had the highest rate out of all MA counties. Similarly, rates in Barnstable County increased by 141.4% from 2018 to 2021. Rates in Suffolk County also increased by 61.04% from 2018 to 2021. While Suffolk County's rate was approximately equal to the whole state in 2018, their rate increase was significantly larger, leading to a higher rate in Suffolk County than MA overall in 2021. Essex County has consistently higher rates than the state but did not have a significant rate increase over time. Bristol County experienced a 73.2% increase from 2020 to 2021. Overall, Middlesex County has had one of the lowest stimulant-related death rates but did experience an increase over time.



Emergency Medical Services Data

Overall stimulant-related incident rate remained stable from 2018 through 2021. Figure 16 shows that these rates are not the same at the county level. The counties with the highest rates over more than one year include Hampden County Suffolk County, and Berkshire County. The stimulant-related incident rate in Hampden County increased by 48.7% from 2018 to 2021, with the largest jump between 2020 and 2021. The stimulant-related incident rate in Berkshire County increased by 50.4% from 2018 to 2021. In 2018, Bristol, Hampshire, Middlesex, Franklin, and Norfolk counties had lower stimulant-related incident rates than the state average. However, the rate in Franklin County increased by 47.4% and the rate in Norfolk County increased by 34.8% from 2018 to 2021.

Figure 16: Rate of Stimulant-Related Incidents by County, Massachusetts: 2018-2021

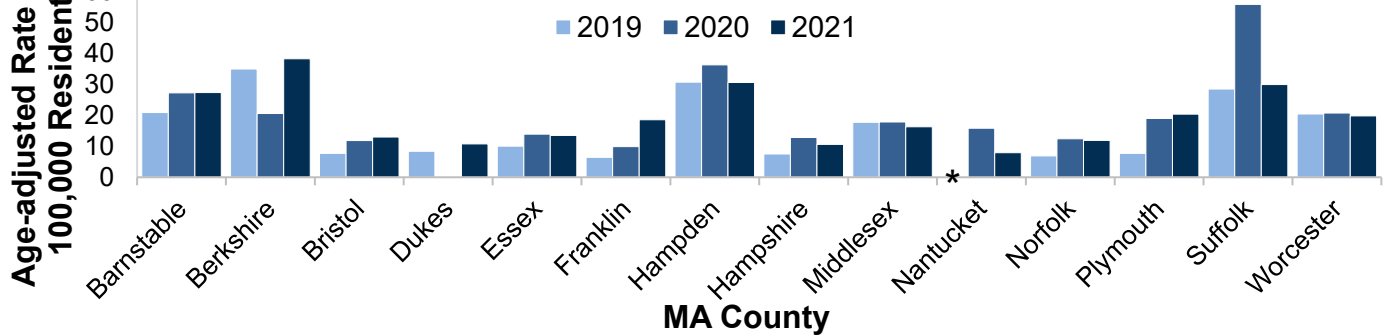


Notes: * indicates value suppressed. The rate cannot be calculated because the count is between 1 - 4. Rate calculations based on death counts less than 5 are excluded due to instability.

Emergency Department Data

The largest increases in rates are in counties in the southern part of the state. During this time, Franklin County's rate increased by 189.2%, Plymouth County's rate increased by 164.9%, and Bristol County's rate increased by 68.7%. Many counties saw a rapid change in stimulant-related ED visits in 2020. Suffolk County's rates increased by 96.1% from 2019 to 2020 but decreased again in 2021. Hampden County's rates increased in 2020 and decreased again in 2021. Barnstable County saw a 30.6% increase in 2020 that stayed relatively stable through 2021. Berkshire County observed a 41% decrease in stimulant-related emergency department rates in 2020 and then an increase in 2021 to rates almost 10% higher than they were in 2019. With only three years of data, we cannot determine long-term trends or look at how the COVID-19 Pandemic may have impacted these trends.

Figure 17: Rate of Stimulant Related ED Visits by County, Massachusetts: 2019-2021



Notes: * indicates value suppressed. The rate cannot be calculated because the count is between 1 - 4. Rate calculations based on death counts less than 5 are excluded due to instability.

Data Sources

Death Data (Registry of Vital Records and Statistics)

This report documents all stimulant-related deaths in Massachusetts, defined as poisoning deaths where: 1) Underlying cause of death field to identify poisonings/overdoses: X40-X44, X60-X64, X85, and Y10-Y14, 2) All multiple cause of death fields were then used to identify a stimulant related death: T405, T436. Death data are extracted from the Massachusetts Registry of Vital Records and Statistics at the Massachusetts Department of Public Health. Toxicology reports from the State Police lab are submitted to the Office of the Chief Medical Examiner assist in determining what substances are present among stimulant-related deaths.

Emergency Medical Services Data (MATRIS)

MATRIS, the Massachusetts Ambulance Trip Reporting Information System, is a statewide database for collecting emergency medical service (EMS) data from licensed ambulance services. It was not specifically designed to track stimulant incidents. DPH is currently working with all EMS providers to improve the quality and completeness of these data. Not all ambulance services have reported their most recent data at the time this report was generated, and therefore the numbers cited here may be underestimates. This report documents all stimulant-related incidents in MA among individuals ages 11 and older, defined as 911 calls in which stimulants are involved. Class 1 events are defined as “any stimulant use,” which include EMS events where the reason for the call was an acute stimulant-related issue such as intoxication or its associated behaviors, the person had a documented or claimed history of stimulant misuse or use disorder, or the person had a known prescription for stimulants. Not all these events in Class 1 are problematic stimulant use. Some populations may be more likely to have stimulant prescriptions or have a history of stimulant use disorder, but our analysis does not differentiate between types of stimulant use. All stimulant-related events are determined by a criterion of key words in the chief, secondary, or other patient complaint, the EMS provider’s primary, secondary, or other impression, the narrative report of the incident, and the patient’s age.

Emergency Department Data (SYS)

The MA syndromic surveillance program (SYS) receives data for 100% of statewide emergency departments visits within the Commonwealth. Real time data transmitted from ED facilities includes a free-text chief complaint or reason for visit, diagnosis codes, and basic patient demographic information. SYS data are collected at the visit level: a patient may have multiple visits and seek care at multiple facilities. The text and coded ED visit data are extracted from the facility electronic health record and submitted to MDPH SYS. There is variability in the terms and codes used for ED visits between hospitals. Even within a hospital, staff members may document or classify patient conditions using different terms or codes. Additionally, there may be daily fluctuations in the capture and quality of data submitted to MDPH SYS due to technical complications at the sending facility or jurisdictional level. Finally, the number of diagnostic codes assigned to each visit varies by facility. The MDPH SYS Program does not receive all diagnostic codes assigned to an ED visit for all facilities. Because of this variability, caution should be used in interpretations based on small numbers of visits or unusual presentations. When the data are viewed at the statewide level, syndromic surveillance can be a good indicator of overall trends. There is a time delay from visit date and final diagnostic code submissions. Discharge diagnostic codes may not be final at the date of pull and are subject to change. However, MDPH SYS staff do not expect large discrepancies between the data presented in this summary and additional analyses performed later for the same period.

Population Data

The population estimates used to calculate age-adjusted rates for years following the decennial census were developed by the University of Massachusetts Donahue Institute (UMDI) in partnership with the Massachusetts Department of Public Health’s Bureau of Environmental Health.

Acknowledgments

This report was prepared by the Massachusetts Overdose Surveillance Inter-Bureau Workgroup, comprised of the Bureau of Substance Addiction Services' Office of Statistics and Evaluation, the Bureau of Health Care Safety and Quality's Massachusetts Ambulance Trip Record Information System, the Office of Integrated Surveillance and Informatics Services' Syndromic Surveillance Program, and the Office of Population Health's Special Analytic Projects unit.