

OVERDOSE HEALTH EQUITY REPORT

MICHIGAN 2018



Michigan Overdose Data to Action Program



GRETCHEN WHITMER, GOVERNOR | ELIZABETH HERTEL, DIRECTOR

August 2021

State of Michigan

Governor – Gretchen Whitmer

Michigan Department of Health and Human Services

Director – Elizabeth Hertel

Bureau of Epidemiology and Population Health

Director – Sarah Lyon-Callo, PhD

Authors

Gabrielle Stroh-Steiner, MPH – Bureau of Epidemiology and Population Health, MDHHS
Samantha Jones, MS – Bureau of Epidemiology and Population Health, MDHHS
Kathie Boynton, BS – Bureau of Epidemiology and Population Health, MDHHS
Stephanie Larocco, MS, MSPH – Bureau of Epidemiology and Population Health, MDHHS

Contributors

Rita Seith, MPH – Bureau of Epidemiology and Population Health, MDHHS
Tom Largo, MPH – Bureau of Epidemiology and Population Health, MDHHS
MDHHS Office on Equity and Minority Health

This report would not have been possible without the data provided by the MDHHS Division for Vital Records and Health Statistics, the MDHHS Behavioral Health and Developmental Disabilities Administration, the MDHHS Division for Emergency, Trauma, and Preparedness, the Michigan Health & Hospital Association, the Michigan Department of Education, and the University of Michigan School of Social Work/Transcend the Binary.

Permission is granted for the reproduction of this publication, in limited quantity, provided the reproductions contain appropriate reference to the source.

This publication was supported by grant number 1 NU17CE925006-01-00 from the U.S. Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the CDC.

Suggested Citation

Stroh-Steiner G, Jones S, Boynton K, Larocco S. Overdose Health Equity Report, Michigan 2018. Michigan Department of Health and Human Services; 2021. Available at <https://www.michigan.gov/opioids>.

The Michigan Department of Health and Human Services will not exclude from participation in, deny benefits of, or discriminate against any individual or group because of race, sex, religion, age, national origin, color, height, weight, marital status, gender identification or expression, sexual orientation, partisan considerations, or a disability or genetic information that is unrelated to the person's eligibility.

Table of Contents

Acronym Glossary	1
Executive Summary	2
Key Findings	2
Public Health Implications and Recommendations	3
Background	4
Overdoses in Michigan	4
Health Equity, Health Disparities and Substance Use	4
Methods	5
Data Sources	5
Case Definitions	6
Statistical Analyses	7
Results	8
Fatal Overdoses in Michigan, 1999-2018	8
Age Group	9
Sex	17
Race and Ethnicity	24
Veteran/Military Status	37
LGBTQ+	40
Conclusions and Public Health Implications	42
Limitations	43
<i>Acknowledgements</i>	44
References	46
Appendices	49
Appendix 1: Data Sources	49
Appendix 2: Case Definitions	50
Appendix 3: Fatal and Non-fatal Overdose Rate Ratios by Race and Ethnicity	52

Acronym Glossary

ACRONYM	DEFINITION
AIAN	American Indian and Alaska Native
ANOVA	Analysis of variance
API	Asian and Pacific Islander
BHDDA	Behavioral Health and Developmental Disabilities Administration
DVRHS	Division of Vital Records and Health Statistics
ED	Emergency department
EMS	Emergency medical services
ICD-10(-CM)	International Classification of Diseases, Tenth Revision 10 (Clinical Modification)
LGBTQ+	Lesbian, gay, bisexual, transgender, and queer/questioning
MAT	Medication-assisted treatment
MDHHS	Michigan Department of Health and Human Services
MHA	Michigan Health and Hospital Association
MIDB	Michigan Inpatient Database
MIEMSIS	Michigan Emergency Medical Services Information System
MODB	Michigan Outpatient Database
NH	Non-Hispanic ethnicity
NH/UE	Non-Hispanic and unknown ethnicity
NSDUH	National Survey on Drug Use and Health
PSU	Primary substance of use
SUD	Substance use disorder
TEDS	Treatment Episode Dataset
VA	U.S. Department of Veteran Affairs
YRBS	Youth Risk Behavior Survey

Executive Summary

Fatal overdoses in Michigan increased drastically between 1999 and 2017 for all race and ethnicity groups (with the exception of Asian and Pacific Islanders), age groups (with the exception of those aged 12-17), and both sexes. In 2018, many demographic groups experienced declines in overdose deaths, but some groups, including Black non-Hispanic and unknown ethnicity (NH/UE) residents, Hispanic residents, and men aged 35-44, continued to experience increases. This report presents an analysis of fatal and non-fatal* overdose data, substance use disorder (SUD) treatment data and survey data to investigate disparities in SUD and overdose by age, sex, race and ethnicity group, lesbian, gay, bisexual, transgender, and queer/questioning (LGBTBQ+) status, and veteran/military status in Michigan in 2018.

Key Findings

- *Certain demographic groups had a disproportionately higher frequency of drug overdose deaths.*
 - American Indian and Alaska Native NH/UE, Black NH/UE, and Hispanic Michigan residents have disproportionately higher drug overdose mortality rates than white NH/UE residents.
 - Michigan residents aged 25-55 constituted 71 percent of drug overdose deaths, while comprising only 44 percent of the Michigan population aged 12 years and older. The highest overdose mortality rates were observed among men for ages 25-44 and among women for ages 25-54.
- *Synthetic opioids and opioid poly-drug deaths, in which multiple opioids or an opioid plus an additional drug are listed as contributing to the cause of death, made up a substantial proportion of drug deaths across demographic groups in 2018.*
 - Opioid poly-drug deaths contributed to at least 68 percent of drug deaths among all age, sex, and race and ethnicity groups. Synthetic opioids contributed to at least 55 percent of drug deaths among all age, sex, and race and ethnicity groups, with the exception of residents ages 65 and older and American Indian and Alaska Native NH/UE residents.
- *Black NH(/UE) Michigan residents had a disproportionately higher frequency of opioid overdoses responded to by Emergency Medical Services (EMS) and overdoses seen in Emergency Departments (EDs) in comparison to other race and ethnicity groups.*
 - The opioid overdose EMS rate among Black NH patients was 1.6 times higher than the rate among white NH patients.
 - The drug overdose ED rate among Black NH/UE patients was 1.5 times higher than the rate among white NH patients.
- *Medical treatment for opioid overdose and SUD varied significantly among certain demographic groups.*
 - Among all age groups, those 12-17 years were least likely to receive naloxone for an opioid overdose responded to by EMS (45% of responses).
 - Among race and ethnicity groups, Asian and Pacific Islander NH patients were least likely to receive naloxone for an opioid overdose responded to by EMS (62% of responses).

* Includes emergency department, hospitalization, and emergency medical services response data

- Compared to other corresponding demographic groups, Black NH, Hispanic, and those 55-64 years were more likely to refuse transport to an ED during an EMS opioid overdose response.
- American Indian and Native American NH/UE patients in publicly funded SUD treatment were least likely to receive mental health treatment for a co-occurring mental health condition (50%) and were least likely to receive medical assisted treatment (MAT) as part of their treatment plan for opioid use (36%) as compared to other race and ethnicity groups.
- *Self-reported characteristics of substance use among individuals entering SUD treatment varied by age, sex and race and ethnicity group.*
 - Among publicly funded SUD treatment episodes, those 25-34 years were most likely to report injection as the route of administration of their primary substance of use (48% of episodes). Black NH/UE individuals were least likely to report injection (11% of episodes) compared to corresponding demographic groups.
 - Women were significantly more likely than men to report having a co-occurring mental health condition in addition to their SUD (51% versus 40% of episodes).
- *There is limited information in Michigan's overdose surveillance systems for the demographic groups of veterans and LGBTQ+ individuals. Survey data suggests that LGBTQ+ high school students are more likely to abuse drugs compared to their heterosexual peers.*
 - Gay/lesbian/bisexual/other high school students were significantly more likely to have inappropriately taken prescription pain medicine (15% of students) and to have used a needle to inject illegal drugs (4% of students) than their heterosexual peers.

Public Health Implications and Recommendations

- Overdose frequency and SUD treatment characteristics vary by demographic group. A single model for overdose response and prevention will likely not achieve equitable outcomes and progress across demographic groups.
- Communities of color are at increased risk of fatal overdose. Racial and ethnic minority residents experience differences in EMS treatment for opioid overdoses and SUD treatment.
- The substance use surveillance system should be improved to include data sources that allow analysis of overdose risk for LGBTQ+ and veteran populations, which may be at increased risk for severe SUD outcomes.
- Public health programs aimed at reducing overdose and substance use should consider health disparities in their programmatic decision-making and should tailor their programs to reach vulnerable populations effectively and equitably.

Background

Overdoses in Michigan

Overdoses are an ongoing public health crisis in Michigan. From 1999 to 2017, all drug overdose deaths among Michigan residents increased five-fold, while opioid overdose deaths increased 17-fold. Drug overdose deaths decreased in 2018 for the first time since 2012.^{1,2} In 2018, more Michigan residents died as a result of drug overdose than by firearm-related and motor vehicle-related incidents combined.³

Increases in unintentional and undetermined intent overdose deaths have primarily been driven by significant increases in opioid overdoses.¹ Synthetic opioid overdose deaths, including deaths attributed to fentanyl and fentanyl analogues, have increased substantially in Michigan since 2014, surpassing heroin deaths in 2015.² Fentanyl is 50 to 100 times more potent than morphine, and its analogues are increasingly implicated in drug overdose deaths.⁴

Overdoses do not affect all demographic and socioeconomic groups in Michigan equally. While the total overdose death rate decreased in Michigan in 2018, the overdose death rate among Black Michigan residents increased by 15 percent.² This report describes the disparities observed among populations that experience overdoses and highlights particularly vulnerable groups.

Health Equity, Health Disparities and Substance Use

Health equity is defined as everyone having “the opportunity to attain their highest level of health”⁵ and no one being “disadvantaged from achieving this potential because of social position or other socially determined circumstances.”⁶ **Health disparities** refer to differences that exist between and within populations in terms of health outcomes and underlying determinants of health that prevent health equity from being achieved.⁷ Health disparities are the result of underlying health inequities. Healthy People 2020 states that “achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and health care disparities.”⁷

Overdoses and SUD do not affect all population groups equally. Mental health, healthy coping behaviors, and substance use are influenced by individual, societal and historical factors. Poverty, racism, classism, genetics, medical conditions, adverse childhood experiences, and historical trauma can all have significant effects on a person’s vulnerability to drug-related harms.⁸ In particular, Black and Hispanic communities have been shown to experience inequitable substance use outcomes (higher rates of abuse/overdose and more severe outcomes) as a result of structural racism and historical trauma.^{9–11} Historically, the criminalization of drug use, the “War on Drugs,”^{*} and mistreatment of individuals of color by health care systems have disproportionately negatively affected communities of color, resulting in distrust of health care providers, increased stigma, higher incarceration rates, and higher rates of harmful substance use outcomes.^{9,11,12} While the response has shifted to frame increasing SUD as a “Public Health Crisis” in recent years, the historical and ongoing effects of discrimination on communities of color continue to fuel disparities seen in overdose and SUD.¹²

^{*} For more in-depth information regarding the War on Drugs, refer to the following link detailing “War on Drugs”: <https://www.britannica.com/topic/war-on-drugs>.

Methods

Data Sources

Multiple data sources were used for this report to explore disparities across the many aspects of SUD and overdose, including medical treatment, healthcare utilization and mortality. Data sources in this report used data from 1999-2018. The primary data sources used in this report are detailed below.*

Michigan Resident Death Files

Drug overdose deaths were identified using the Michigan Resident Death Files, the dataset containing death certificate information for Michigan residents. These data are collected by the Michigan Department of Health and Human Services (MDHHS) Division of Vital Records and Health Statistics (DVRHS). Death data from 1999-2018 are included.

Michigan Inpatient Database/Michigan Outpatient Database

ED and inpatient hospitalization data came from the Michigan Inpatient and Outpatient Databases (MIDB/MODB). The MIDB/MODB consist of administrative discharge data that the Michigan Health and Hospital Association (MHA) collects from non-federal, acute-care hospitals. The MODB is comprised of ED visits where the patient was not subsequently admitted for inpatient care. The MIDB is comprised of inpatient hospitalization visits, including those in which the patient was admitted from the ED. Data in the MIDB/MODB are deidentified records for each episode of care. Therefore, it is not possible to count the number of care episodes for an individual person and a single individual could contribute multiple events during a given timespan. In 2018, 98 percent of acute care hospitals submitted ED data, and 97 percent of acute care hospitals submitted inpatient data to MHA. Data from 2018 are included in this report.

Michigan Treatment Episode Dataset

The Michigan Treatment Episode Dataset (TEDS) was the source of SUD treatment data. Treatment “episodes” are healthcare encounters in which a person experiencing SUD receives face-to-face treatment for their SUD. The TEDS system collects records of publicly funded admissions (those paid for by the state or federal government through programs such as Medicare or Medicaid) to SUD and mental health treatment facilities. This includes both inpatient residential treatment and outpatient treatment (an admission event constitutes the initial outpatient treatment interaction). This dataset is maintained by the MDHHS Behavioral Health and Developmental Disabilities Administration (BHDDA). For this report, data collected at the time of admission to the SUD treatment episode of care are used to describe the treatment episode. Like the MIDB/MODB, records in TEDS are deidentified; it is therefore possible that individuals may be contribute multiple treatment episodes during a given timespan. TEDS data from 2000 and 2018 are included.

Michigan Emergency Medical Services

Emergency medical services data in this report came from the Michigan Emergency Medical Services Information System (MiEMSIS). MiEMSIS is the electronic documentation system required for emergency medical services (EMS) responses in Michigan and is maintained by the MDHHS Division of EMS and Trauma. In 2018, most EMS agencies in Michigan reported data to the MiEMSIS. The precise

* Additional data sources are included and elaborated on in the LGBTQ+ section of this report.

percentage of participating agencies cannot be calculated due to frequent fluctuations in the number of reporting agencies. Similar to other datasets described above, records in MiEMIS are deidentified; it is therefore possible that individuals may contribute multiple treatment episodes during a given timespan. Data from 2018 are included in this report.

Case Definitions

Fatal Overdose

Drug overdose death was defined as a death in the Michigan resident death files with unintentional poisoning and undetermined intent poisoning (ICD-10* code of X40-X44, Y10-14) listed as the underlying cause of death on a death certificate. Specific drug deaths of interest for analysis were defined by having additional ICD-10 codes in a related cause of death field on the death certificate: heroin (T40.1), methadone (T40.3), synthetic opioids (T40.4), cocaine (T40.5), other psychostimulants (T43.60-T43.64, T43.69), and poly-drug including opioid (a T40.0-T40.4, T40.6 code AND an additional T36-T50 code). The analysis was limited to Michigan residents, regardless of the location of their death (i.e., deaths of Michigan residents that occurred outside of Michigan were included). The demographic patterns in unintentional mortality may differ from that observed for intentional overdoses and overdoses by assault; analysis in the current report is restricted to deaths determined to be unintentional or undetermined intent.

Emergency Department Visits and Hospitalizations for Overdose

Emergency Department (ED) visits and hospitalizations were defined as events in which poisonings of unintentional and undetermined intent were reported as the principal or any secondary diagnosis (ICD-10-CM† codes T36-T50, restricted to initial encounters).‡ ED visits and inpatient stays were combined to determine the frequency of hospital utilization for overdose. These analyses were restricted to Michigan residents at the time of their ED visit or hospitalization. Visits in which the patient's discharge disposition was "deceased" were excluded. As with the mortality analysis, overdoses of intentional manner or by assault were not included in this analysis.

Substance Use Treatment Episode

SUD treatment episodes in TEDS where a drug (including opioids, stimulants, hallucinogens, marijuana, benzodiazepines, and others) was reported as the primary substance of use§ by the patient at their treatment admission were included in this report. Episodes recorded as mental health treatment episodes and episodes in which alcohol was reported as the primary substance of use by the patient

* International Classification of Diseases (ICD), Tenth Revision (ICD-10) is the most current version of mortality classification system for the processing and presentation of mortality statistics.

† International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) is current version of the international standard diagnostic classification system for reporting diseases and health conditions for clinical and research purposes.

‡ For an explanation of ICD-10 coding of initial versus subsequent versus sequela encounter see <https://www.cmadoes.org/newsroom/news/view/ArticleId/34855/Coding-Corner-Initial-vs-subsequent-vs-sequela-in-ICD-10-CM-coding>

§In the TEDS dataset, this variable is labeled as "Primary Substance of Abuse." This report will refer to this variable/field as the "Primary Substance of Use" to avoid stigmatizing language.

were excluded. Specific drug categories were defined based on the drug recorded in the primary substance of use field. Episodes were restricted to "Initial SUD Start Records;" update SUD treatment records were excluded. Only Michigan residents were included in this analysis.

Emergency Medical Services Response for Opioid Overdose

EMS probable opioid overdoses are identified in MiEMSIS data through a likelihood formula* that considers EMS provider impression, chief complaint, narrative, respiratory rate, Glasgow Coma Scale, medications administered (includes naloxone administration), and procedures performed during the response to create a composite score. EMS responses are classified as probable opioid overdoses if the composite score from the likelihood formula is at least four or five, depending on the criteria present, or if the patient improved after being administered naloxone (see Appendix 2 for details on case definition). EMS responses for opioid overdose were missing information for patient's residence in 27 percent of responses. Therefore, all patients treated in Michigan were included in this analysis. This differs from the other data sources in this report, in which only Michigan residents are included for analysis. Among opioid overdose responses that had complete residence information, less than 1 percent were for out of state residents; therefore, the degree to which non-Michigan residents are included in analysis is expected to be minimal. The EMS data does not have a mechanism to systematically document the intent of an overdose. Therefore, it is possible that intentional overdoses were included in the EMS analyses in this report.

Statistical Analyses

Counts, proportions and population rates were calculated for this report. All population rates in this report were calculated using bridged-race vintage 2018 postcensal estimates from the National Center for Health Statistics as denominators. When age-adjusted, rates were adjusted to the 2000 U.S. standard population via the direct standardization method. Chi-squared tests, independent two-sample t-tests, one-way analysis of variance (ANOVA) tests, and Poisson regression models were conducted to calculate significant differences within various indicators. Statistical tests were considered significant with a p-value of less than 0.05 and confidence intervals were calculated as 95 percent equal-tailed intervals. Counts, proportions, and rates were suppressed when numerators were between 1 and 5 due to statistical unreliability and for confidentiality purposes.

*EMS opioid overdose identification formula adapted from Public Health – Seattle & King County formula (<https://www.kingcounty.gov/depts/health/overdose-prevention/non-fatal.aspx>)

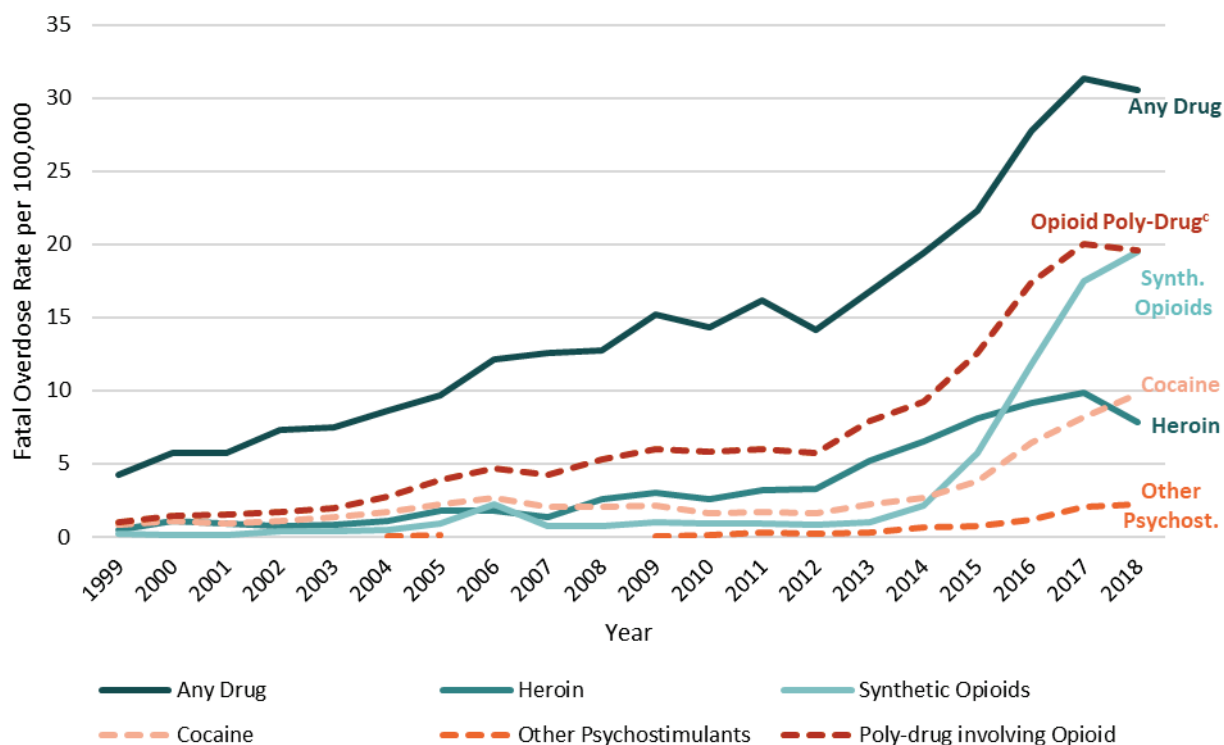
Results

Fatal Overdoses in Michigan, 1999-2018

Drug overdose deaths have increased substantially among Michigan residents 12 years and older since 1999 (increasing by 6.1 times between 1999 and 2018). Drug overdose deaths decreased in 2018 in this population for the first time since 2012 by 2.0 percent.

- Synthetic opioid overdose deaths increased by 8.2 times between 2014 and 2018.
- Opioid poly-drug deaths, in which an opioid is listed as a related cause of death alongside at least one other opioid or other drug, increased by 6.2 times from 2006 to 2018.
- While heroin deaths experienced a 20.5 percent decrease in 2018 as compared to 2017, deaths with cocaine listed as a contributing cause continued to increase by 19.6 percent from 2017 to 2018.

Figure 1. Age-adjusted unintentional and undetermined intent fatal overdose rate per 100,000^{a,b} among Michigan residents 12 years or older by drug contributing to cause of death, 1999-2018



Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Bridged-race vintage 2018 postcensal series of estimates, National Center for Health Statistics.

Abbreviations: Synth Opioids = Synthetic Opioids, Other Psychost. = Other Psychostimulants

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bRates are age-adjusted to the 2000 U.S. standard population by direct standardization. Statistics with numerators between 1 and 5 have been suppressed.

^cThe opioid poly-drug category includes all death certificates with either an opioid and another drug class listed as contributing causes of death or multiple opioids listed as contributing causes of death.

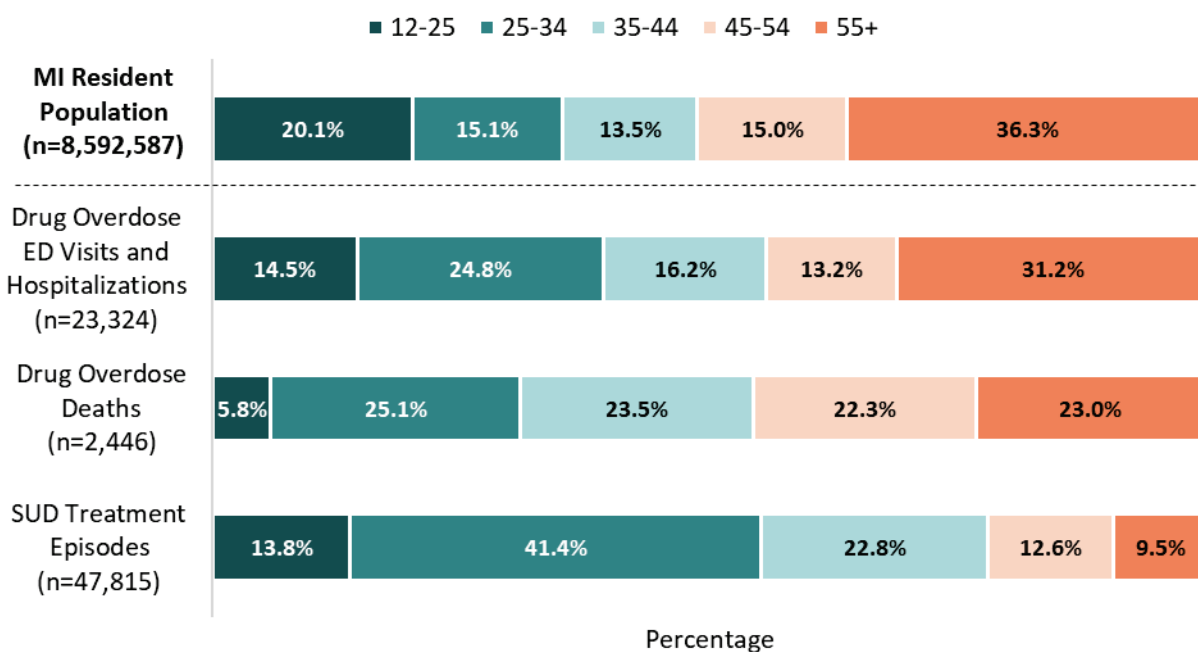
Age Group

Data from death certificates, ED visits and hospitalizations, EMS responses and SUD treatment episodes are included in this analysis of age groups. Age in years was categorized into the following groups: 12-17, 18-24, 25-34, 35-44, 45-54, 55-64, and 65+. In some figures and analyses, age groups have been combined for ease of interpretation or due to low numbers. Across all data sources in this section, age has very few unknown values and is unlikely to be misclassified.

Age group-specific percentages differed across drug overdose ED visits/hospitalizations, fatal overdoses, and drug-related SUD treatment episodes and from the Michigan population in 2018 (**Figure 2**).

- The 25–34-year age group accounted for approximately one quarter of drug overdose ED visits and hospitalizations and drug overdose deaths, while comprising 15.1 percent of the population aged 12 and older. This age group disproportionately made up the largest proportion of SUD treatment episodes (41.4%, 2.7 times their share of the population and 1.7 times their share of ED visit/hospitalization drug overdoses).
- Those 35-54 years accounted for 45.8 percent of drug overdose deaths, while only accounting for 29.4 percent of drug overdose ED visits/hospitalizations.

Figure 2. Percentage of fatal overdose^a, non-fatal overdose^{b,c,d}, and substance use disorder (SUD) treatment episodes^{c,e} by age group^f as compared to the Michigan population 12 years and older, 2018



Sources: Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics. Michigan Resident Inpatient & Outpatient Files, Michigan Health and Hospital Association. Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

Abbreviations: SUD=substance use disorder

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bEmergency department visits with the following ICD-10CM codes reported as the principal or any secondary diagnosis were included as drug overdoses: T36-T50. Codes were restricted to initial visits and overdoses of unintentional or undetermined intent.

^cNon-fatal overdose and SUD treatment data in this table are events/episodes and not individuals; individuals may therefore be represented more than once if they overdosed or sought treatment multiple times in 2018.

^dEMS data not included in this figure as this figure includes ED/hospitalization data as a non-fatal data source, and many EMS runs are transported to the ED.

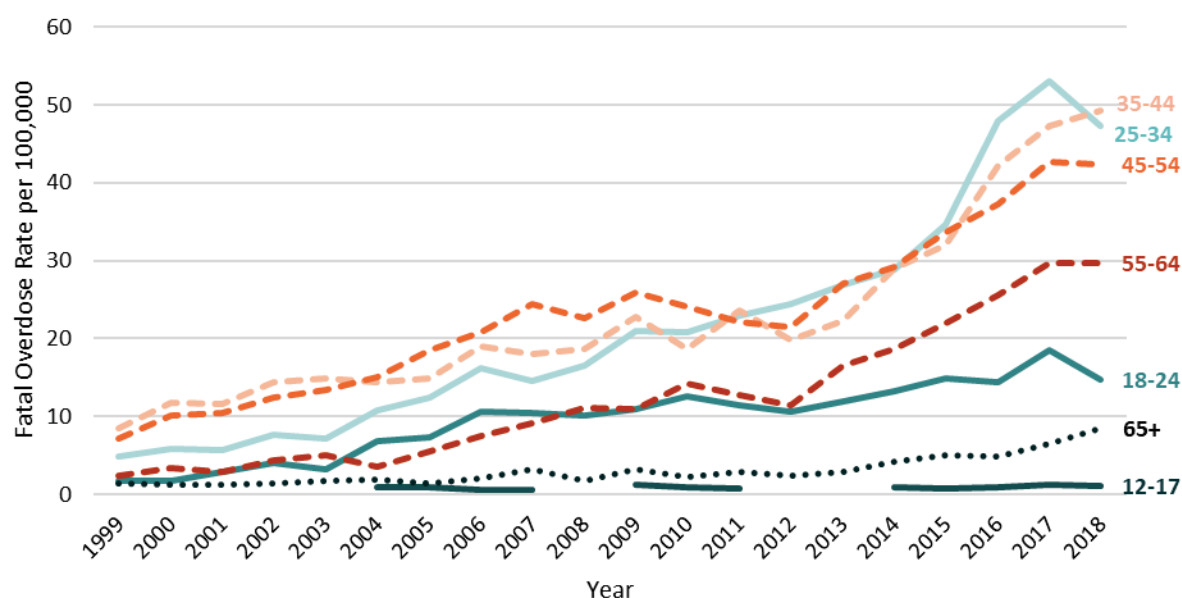
^eSubstance use treatment episodes where a drug was the primary substance were included (alcohol and non-drug treatment episodes were excluded). Episodes were restricted to treatment admissions for "Initial SUD Start Records."

^fOne non-fatal overdose was missing age data.

The change in drug overdose death rate between 1999 and 2018 varied by age group (**Figure 3**).

- All age groups, with the exception of those 12-17 years, experienced substantial increases in drug overdose deaths between 1999 and 2018.
- The 55-64 age group experienced the largest increase in death rate, increasing 1,088 percent from 2.5 to 29.7 deaths per 100,000 Michigan residents between 1999 and 2018.
- The 25-34 age group experienced the next largest increase (865%), followed by the 18-24 age group (771%).
- Rates continued to increase for the 35-44 and 65 and older age groups between 2017 and 2018, whereas they decreased or were level for the other age groups.

Figure 3. Unintentional and undetermined intent fatal overdose rate per 100,000^{a,b} by age group among Michigan residents 12 years and older, 1999-2018



Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

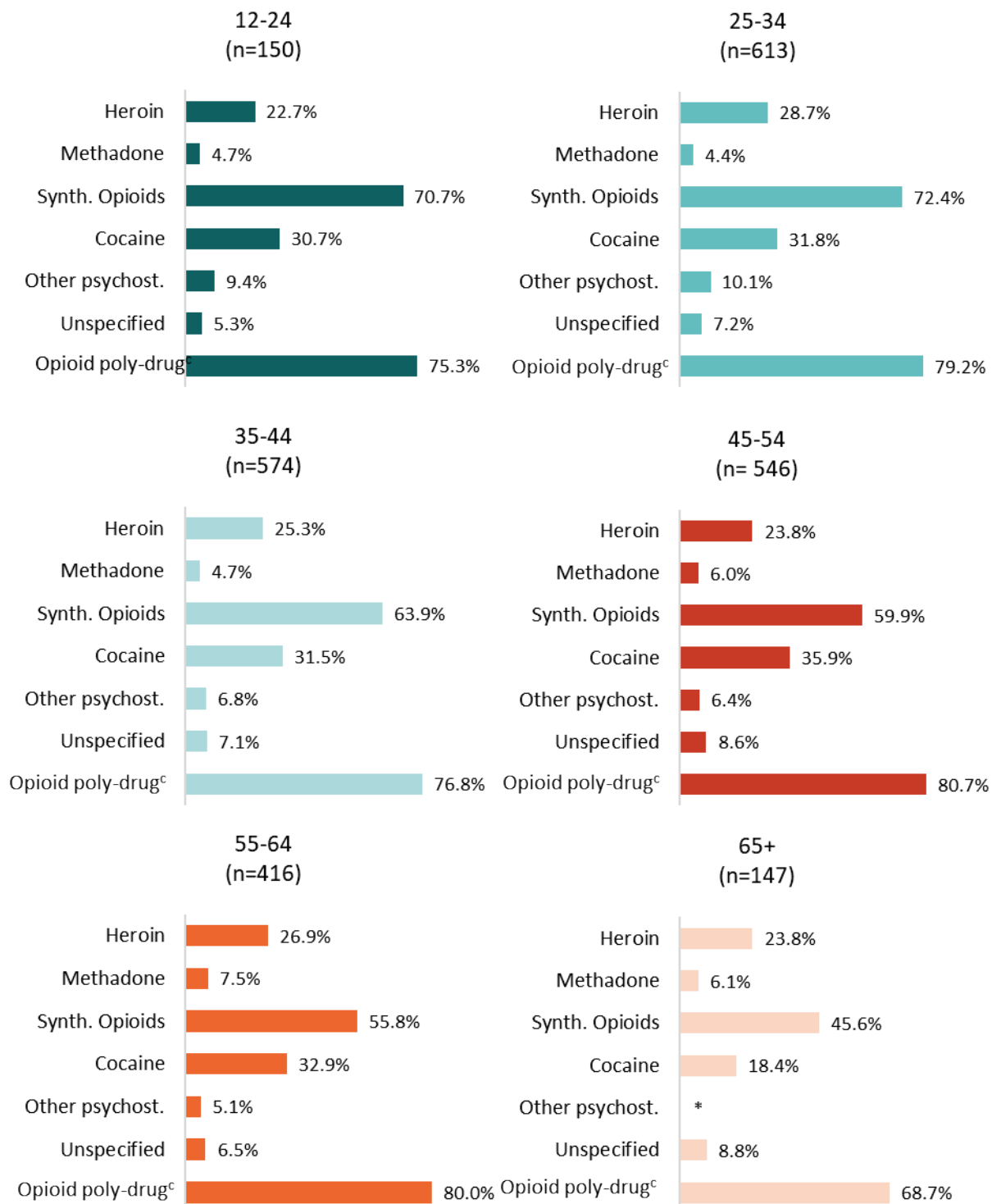
^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bStatistics with numerators between 1 and 5 have been suppressed.

Differences existed in the drugs listed as contributing to the cause of overdose deaths by age group (**Figure 4**).

- Across all age groups, opioid poly-drug deaths (in which one opioid plus another drug appear as contributing causes of death) accounted for a majority of drug deaths (68.7% to 80.7%).
- Synthetic opioids (which includes fentanyl and fentanyl analogues, among other opioids) contributed to a substantial proportion of drug overdose deaths. The proportion of deaths with synthetic opioids contributing was highest among those 25-34 years (72.4%), and lowest among those aged 65 and older (45.6%).
- Heroin contributed to approximately a quarter of drug overdose deaths across all age groups.
- Deaths with cocaine as a contributing cause increased substantially in recent years (**Figure 1**), increasing by five times between 2012 and 2018. Cocaine contributed to approximately 30 percent of deaths among all age groups, excluding the age group of those 65 and older, in which cocaine contributed to 18.4 percent of deaths.

Figure 4. Percentages of selected drugs* contributing to cause of death among Michigan residents 12 years and older, who died of unintentional and undetermined intent overdoses^{a,b}, by age group, 2018



*Drug categories are not mutually exclusive; a death may appear in multiple categories, including single drug categories or "Opioid poly-drug" (multiple drugs including at least one opioid), if multiple drugs were listed on the death certificate as a related cause of death.

Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics.

^aSpecific drug deaths were those deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death AND with the following codes in a related cause of death field: heroin (T40.1), methadone (T40.3), synthetic opioids (T40.4), cocaine (T40.5), other psychostimulants (T43.60-T43.64, T43.69), and poly-drug including opioid (a T40.0-T40.4, T40.6 code AND an additional T36-T50 code).

^bPercentages in these figures will not add to 100% as more than one drug can be listed as a contributing cause of death on a death certificate. For example, a death with heroin and cocaine listed as contributing causes of death would appear in the “Heroin,” “Cocaine,” and “Opioid poly-drug” categories.

^cThe opioid poly-drug category represents all death certificates with either an opioid and another drug class listed as contributing causes of death or multiple opioids listed as contributing causes of death.

*Statistics with numerators between 1 and 5 have been suppressed.

Rates of opioid overdose EMS responses and characteristics of those responses varied by age group (Table 1).

- The highest rate of opioid overdose responded to by EMS occurred among the 25-34 age group (291.1 per 100,000), followed by the 35-44 age group (209.9). The lowest rate occurred among the 12-17 age group (10.5).
- Youth aged 12-17 were significantly less likely to receive naloxone (either from a bystander or EMS personnel) than all other age groups ($p<0.001$), with only 45.0 percent of EMS opioid responses in this age group receiving naloxone. In all other age groups, with the exception of 65 and older (72.0%), at least 85 percent of opioid overdose responses involved naloxone administration.
- Persons in the 55-64 age group were significantly more likely to refuse transportation to an ED (13.1%) as compared to all other age groups ($p<0.001$). Of those age groups with enough data to analyze, those ages 18-24 (6.5%) and 65 and older (6.7%) were the least likely to refuse transport to an ED.

Table 1. Characteristics of EMS responses for opioid overdoses^{a,b} by age group^c among Michigan residents 12 years and older, 2018

Characteristic	Age Group							p-value ^d
	12-17	18-24	25-34	35-44	45-54	55-64	65+	
Number of opioid overdose EMS responses	80	993	3,238	2,116	1,589	1,788	1,360	n/a
Rate of opioid overdose EMS responses per 100,000 population	10.5	103.2	291.9	209.9	136.0	127.5	79.2	<0.001
Proportion of opioid overdose EMS responses that received naloxone	45.0%	86.4%	87.4%	85.0%	85.3%	87.0%	72.0%	<0.001
Proportion of opioid overdose EMS responses that refused transport	*	6.5%	7.8%	8.4%	8.6%	13.1%	6.7%	<0.001

Sources: Michigan Emergency Medical Services Information System, MDHHS Bureau of Emergency, Trauma, and Preparedness. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics. Abbreviations: EMS = Emergency Medical Services

^aEMS opioid overdoses are identified through a likelihood formula that considers EMS provider impression, chief complaint, narrative, respiratory rate, Glasgow Coma Scale, medications administered and procedures performed during the response.

^bData in this table are based on EMS responses and not individuals; individuals may therefore be represented more than once if they overdosed multiple times in 2018.

^c113 opioid overdose EMS responses were missing age data.

^dChi-squared test of independence was used to calculate p-values for proportion. A Poisson regression model was used to calculate significance of relationship between age group and opioid overdose rate. P-values were considered significant when less than 0.05.

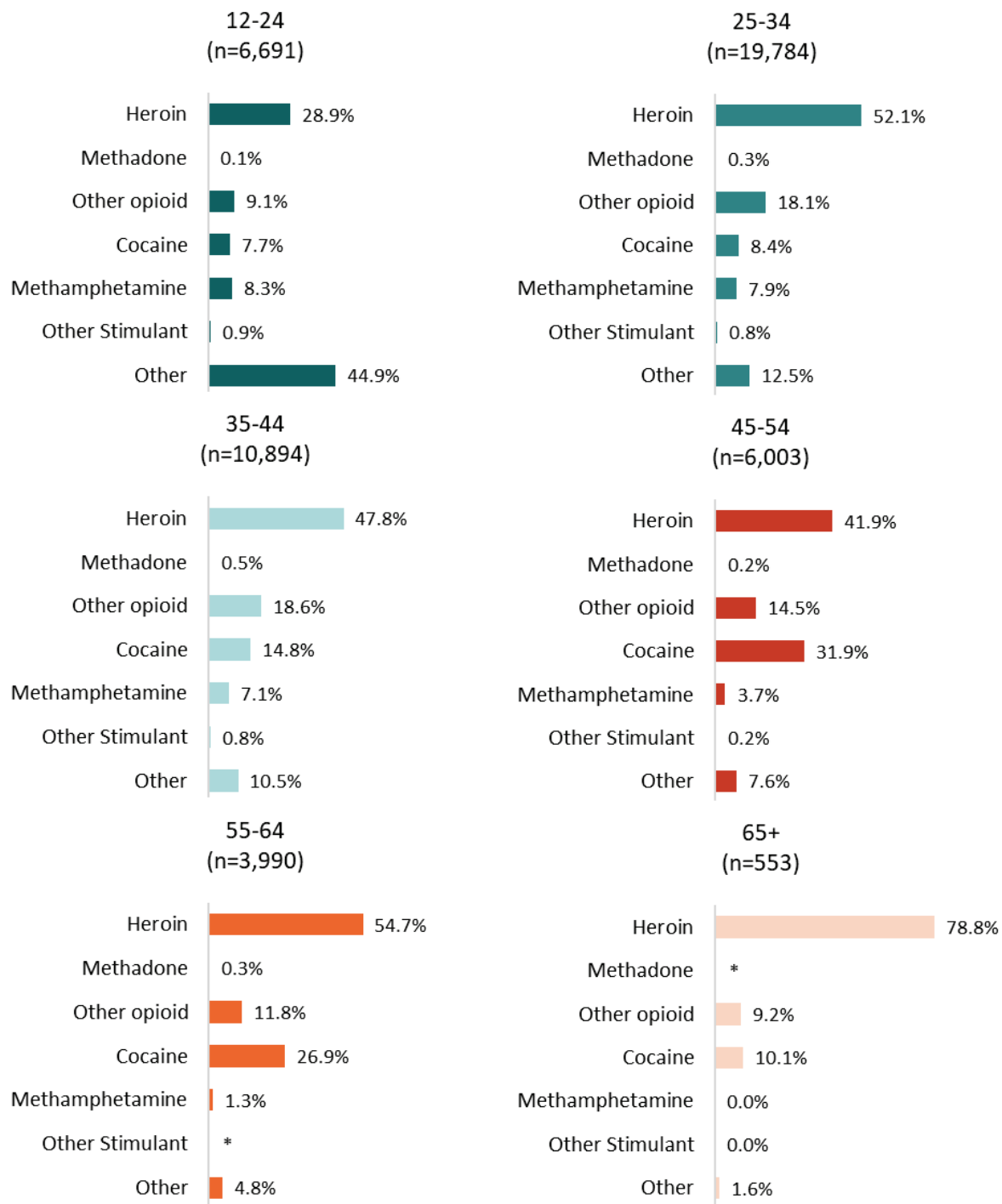
*Statistics with numerators between 1 and 5 have been suppressed.

The primary substance of use reported by individuals with SUD entering treatment varied by age group (**Figure 5**).

- Heroin was listed as the primary substance of use in the majority of episodes for all age groups, excluding the 12-24 age group. Heroin made up the highest proportion of primary substance of use among treatment episodes among the 65 and older age group (78.8%).
- Among those 12-24 years, the “Other Drug” category made up the highest proportion of primary substance of use among patients in treatment. Marijuana made up the majority of the “Other Drug” category in this age group (40.7% of all treatment episodes in those aged 12-24).
- The percentage of cocaine as the primary substance of use was highest among the 45-54 (31.9%) and 55-64 (26.9%) age groups, and lowest among the two youngest age groups (12-24: 7.7%, 25-34: 8.4%).

The SUD data in this figure represent SUD treatment episodes among individuals seeking treatment and whose treatment was publicly funded. This represents a specific population of individuals with SUD in Michigan, and this graph should not be interpreted as indicative of all individuals with SUD in Michigan.

Figure 5. Percentages of primary substances of use reported by those receiving substance use disorder treatment^{a,b} by age group among Michigan residents 12 years and older, 2018



Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

^aSpecific drug categories were based on the drug recorded in the "Primary Substance of Use" field. Episodes were restricted to treatment admissions for "Initial SUD Start Records." Substance use treatment episodes where a drug was the primary substance were included (alcohol and non-drug treatment episodes were excluded).

^bData in this table are based on treatment episodes and not individuals; individuals may therefore be represented more than once if they sought treatment multiple times in 2018.

*Statistics with numerators between 1 and 5 have been suppressed.

Different age groups in SUD treatment reported varying substance use patterns, treatment histories/characteristics and mental health condition frequencies (**Table 2**).

- Among SUD treatment episodes, injection as the route of administration of the primary substance of use was highest in the 25-34 age group (48.8%), followed by the 35-44 age group (40.1%), and lowest in the 12-17 age group (0.8%).
- Those aged 45-54 had the highest co-occurrence of mental health conditions alongside their SUD (50.5%), with those aged 12-17 having the lowest co-occurrence of mental health conditions (24.8%).
- Those aged 12-17 were the most likely to be treated in an ambulatory (outpatient) care setting (84.2%), followed by the 65 and older age group, and 18-24 age groups (62.6% and 63.7%, respectively).

The SUD data in Table 2 represent SUD treatment episodes among individuals seeking treatment and whose treatment was publicly funded. This represents a specific population of individuals with SUD in Michigan, and this table should not be interpreted as indicative of all individuals with SUD in Michigan.

Table 2. Characteristics of substance use among substance use disorder treatment episodes^{a,b} by age group among Michigan residents 12 years and older, 2018

Characteristic	Age Group							p-value ^c
	12-17 (n=1,060)	18-24 (n=5,531)	25-34 (n=19,784)	35-44 (n=10,894)	45-54 (n=6,003)	55-64 (n=3,990)	65+ (n=553)	
Injection as route of administration of PSU, %	0.8%	32.9%	48.8%	40.1%	24.4%	20.1%	24.6%	<0.001
Co-occurring mental health condition	24.8%	42.5%	43.8%	45.7%	50.5%	44.2%	31.8%	<0.001
Treated in ambulatory care setting	84.2%	63.7%	54.2%	55.3%	48.7%	46.7%	62.6%	<0.001

Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration. Abbreviation: PSU=primary substance of use

^aSubstance use treatment episodes where a drug was the primary substance were included (alcohol and non-drug treatment episodes were excluded).

Episodes were restricted to treatment admissions for "Initial SUD Start Records."

^bData in this table are based on treatment episodes and not individuals; individuals may therefore be represented more than once if they sought treatment multiple times in 2018.

^cChi-squared tests of independence and one-way ANOVA tests were used to calculate p-values. P-values were considered significant when less than 0.05.

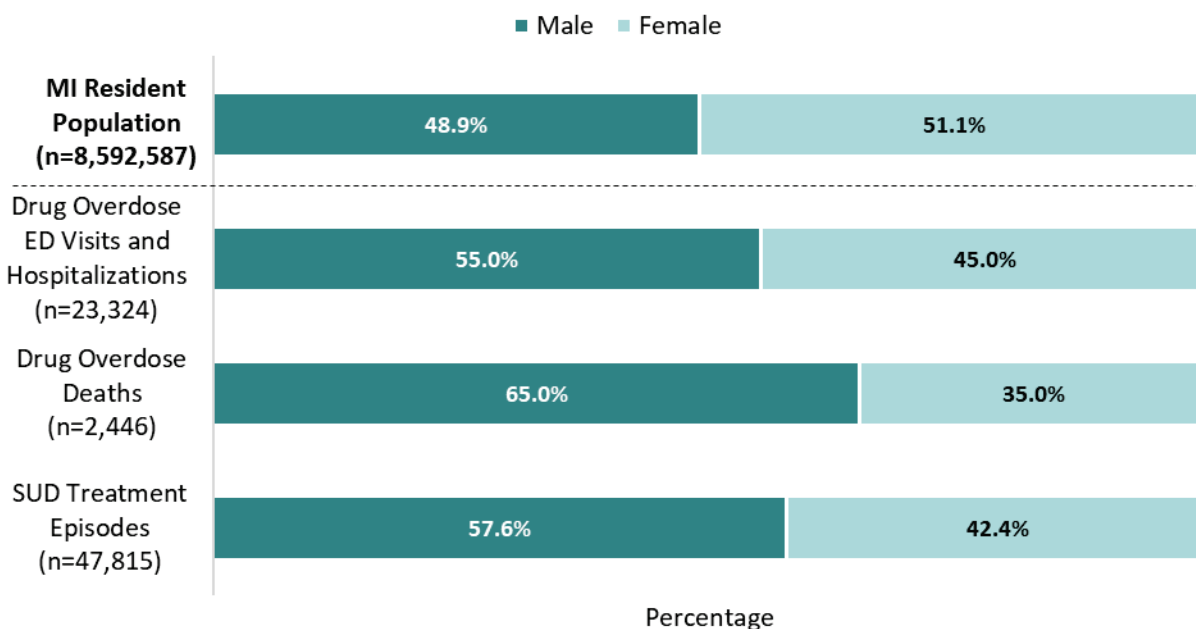
Sex

This section describes differences in SUD and overdose by sex and presents data from death certificates, ED visits and hospitalizations, EMS responses and SUD treatment episodes. Sex is well completed across all data sources analyzed for this section. The data sources do not specify if the sex variable was completed based on biological sex or the gender the individual identifies with for each event/episode; this may differ even within one dataset. It is unlikely, however, that differences in how sex is reported would cause bias in the data.

Sex-specific percentages differed across drug overdose ED visits/hospitalizations, fatal overdoses and drug-related SUD treatment episodes and from the Michigan population (**Figure 6**).

- Men made up slightly more of the drug overdose ED visit and hospitalizations population than the general population (55.0% compared to 48.9%, respectively).
- Overdose deaths were more likely to occur among men than women (65.0% versus 35.0%). The percentage of male overdose deaths was 16.1 percent higher than their percentage in the general population.
- Men comprised 57.6 percent of SUD treatment episodes.

Figure 6. Percentage of fatal overdoses^a, non-fatal overdoses^{b,c,d,e}, and substance use disorder (SUD) treatment episodes^{d,f} by sex as compared to general population among Michigan residents 12 years and older, 2018



Sources: Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics. Michigan Resident Inpatient & Outpatient Files, Michigan Health and Hospital Association. Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

Abbreviation: SUD=substance use disorder

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bEmergency department and hospitalization visits with the following ICD-10CM codes reported as the principal or any secondary diagnosis were included as drug overdoses: T36-T50. Codes were restricted to initial visits and overdoses of unintentional or undetermined intent.

^cTwo non-fatal overdoses were missing sex data.

^dNon-fatal overdose and SUD treatment data in this table are events/episodes and not individuals; individuals may therefore be represented more than once if they overdosed or sought treatment multiple times in 2018.

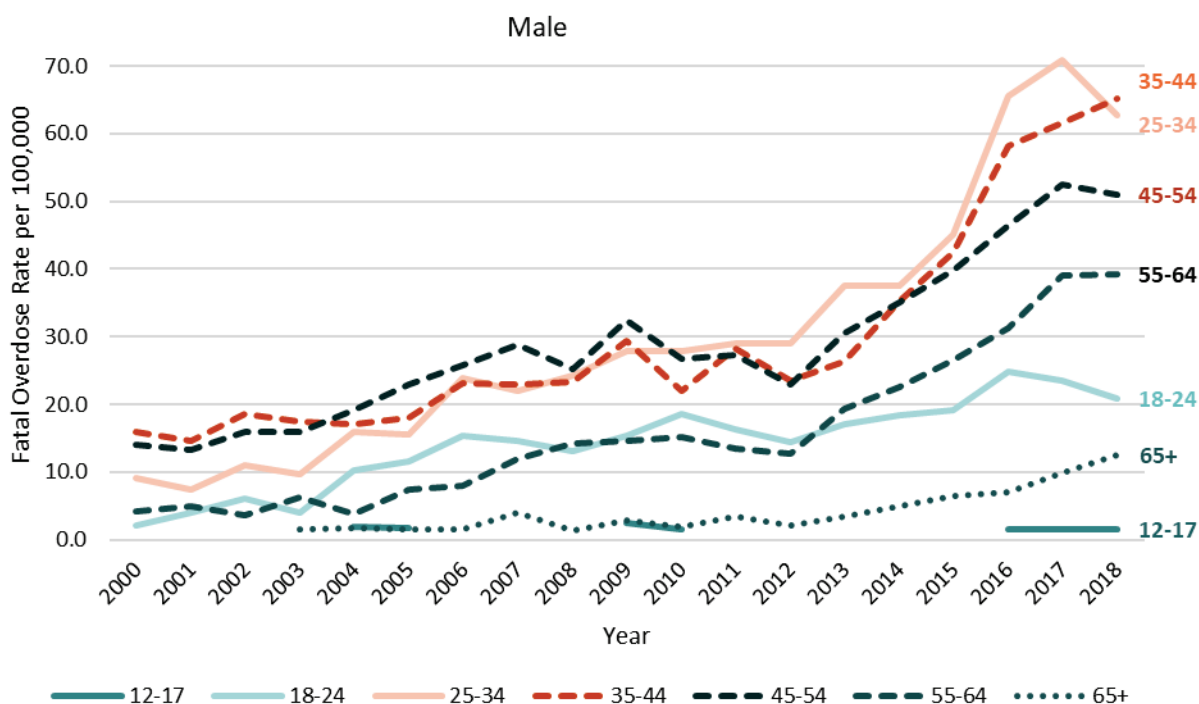
^eEMS data not included in this figure as this figure includes ED/hospitalization data as a non-fatal data source, and many EMS runs are transported to the ED.

^fSubstance use treatment episodes where a drug was the primary substance were included. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

The change in drug overdose death rate between 2000 and 2018 varied by sex and age group (**Figure 7** and **Figure 8**).

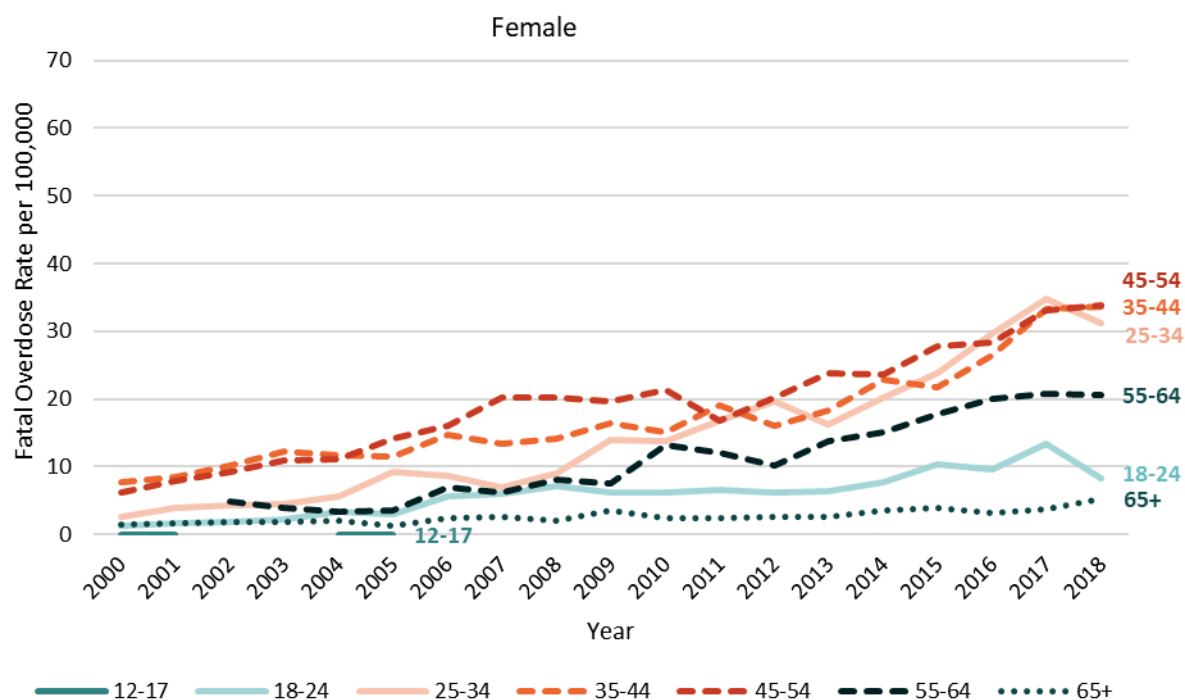
- All age groups among both males and females, with the exception of those 12-17 years, experienced increases in drug overdose rate between 2000 and 2018. The most substantial increases occurred among women in the 25-34 age group (1,059%), followed by men 65 and older (950%), men in the 18-24 age group (900%), men in the 55-64 age group (812%), and women aged 55-64 (728%).
- Overdose deaths among men in the 35-44 and 65 and older age groups increased from 2017 to 2018, while overdose deaths among all other age groups among men decreased or remained constant.
- Increases were seen in overdose deaths among women in the 65 and older age group from 2017 to 2018. All other age groups among women decreased or remained stable.

Figure 7. Unintentional and undetermined intent fatal overdose rate per 100,000^{a,b} by age group among male^c Michigan residents 12 years and older, 2000-2018^{d*}



*See footnotes for Figure 8.

Figure 8. Unintentional and undetermined intent fatal overdose rate per 100,000^{a,b} by age group among female^c Michigan residents 12 years and older, 2000-2018^d



Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bStatistics with numerators between 1 and 5 have been suppressed.

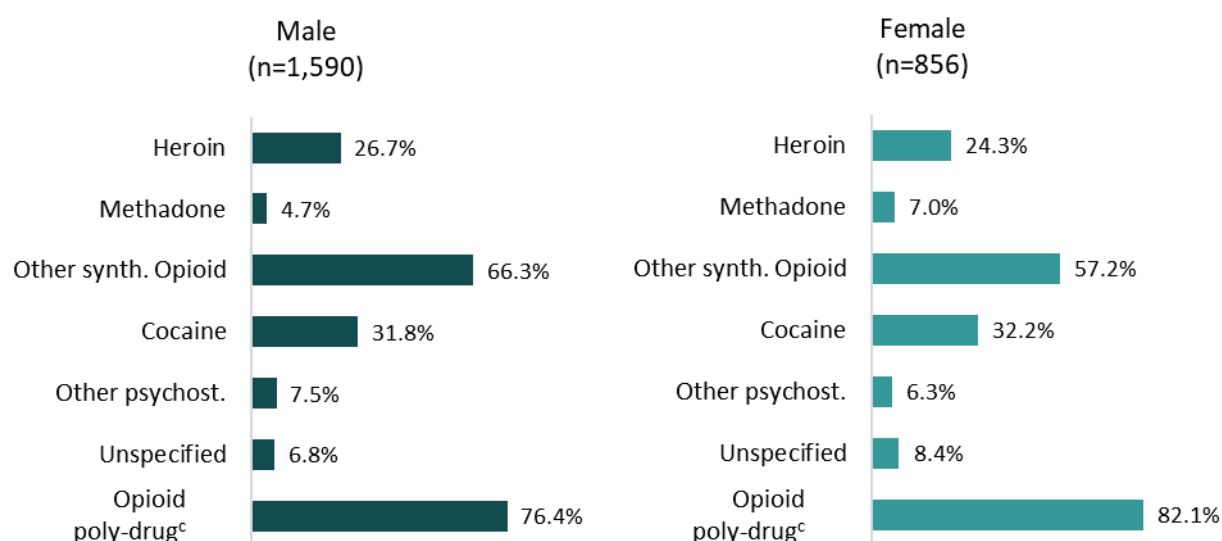
^cDeaths among unknown sex make up a small proportion of the data each year; rates for this group cannot be calculated.

^dEstimates by sex and age not available for 1999.

Differences existed in the drugs listed as contributing to the cause of overdose deaths by sex (**Figure 9**)

- Overall, the breakdown of drugs contributing to cause of death among men and women were similar.
- Heroin was listed on the death certificate as contributing to the cause of death for approximately a quarter of overdose deaths among both men and women.
- Men were more likely to have other synthetic opioids listed as a contributing cause of death as compared to women who died of drug overdose (66.3% versus 57.2%).
- Women were more likely to have either multiple opioids or an opioid and another drug (opioid poly-drug) listed as a contributing cause of death than men (82.1% versus 76.4%).

Figure 9. Percentage of selected drugs* contributing to cause of death among Michigan residents 12 years and older who died of unintentional and undetermined intent fatal overdoses ^{a,b} by sex, 2018



*Drug categories are not mutually exclusive; a death may appear in multiple categories, including single drug categories or "Opioid poly-drug" (multiple drugs including at least one opioid), if multiple drugs were listed on the death certificate as a related cause of death.

Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics.

^aSpecific drug deaths were those deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death AND with the following codes in a related cause of death field: heroin (T40.1), methadone (T40.3), synthetic opioids (T40.4), cocaine (T40.5), psychostimulants (T43.60-T43.64, T43.69), and poly-drug including opioid (a T40.0-T40.4, T40.6 code AND an additional T36-T50 code).

^bPercentages in these figures will not add to 100% as more than one drug can be listed as a contributing cause of death on a death certificate. For example, a death with heroin and cocaine listed as contributing causes of death would be counted in the "Heroin", "Cocaine", and "Opioid poly-drug" categories.

^cThe opioid poly-drug category represents all death certificates with either an opioid and another drug class listed as contributing causes of death or multiple opioids listed as contributing causes of death.

Rates of opioid overdose EMS responses and characteristics of those responses varied by sex (**Table 3**).

- The age-adjusted rate of opioid overdose EMS responses was 1.8 times higher among men than among women (142.7 opioid overdoses per 100,000 residents versus 79.5).
- Women were significantly less likely to be administered naloxone either prior to EMS's arrival or during the course of the EMS response than men (6.3% absolute difference).
- Men were significantly more likely to refuse transport to an emergency department during an EMS response for opioid overdose than women (9.7% versus 7.1% of opioid overdose responses).

Table 3. Characteristics of EMS responses for opioid overdoses^{a,b} by sex^c among Michigan residents 12 years and older, 2018

Characteristic	Male	Female	p-value ^e
Number of opioid overdose EMS responses	7,104	4,041	n/a
Rate ^d of opioid overdose EMS responses per 100K population	142.7	79.5	<0.001
Proportion of opioid overdose EMS responses that received naloxone	86.6%	80.3%	<0.001
Proportion of opioid overdose EMS responses that refused transport	9.7%	7.1%	0.015

Sources: Michigan Emergency Medical Services Information System, MDHHS Bureau of Emergency, Trauma, and Preparedness. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

Abbreviations: EMS = Emergency Medical Services

^aEMS opioid overdoses are identified through a likelihood formula that considers EMS provider impression, chief complaint, narrative, respiratory rate, Glasgow Coma Scale, medications administered, and procedures performed during the response.

^bData in this table are based on EMS responses and not individuals; individuals may therefore be represented more than once if they overdosed multiple times in 2018.

^c19 opioid overdose EMS responses were missing sex data.

^dRates are age-adjusted to the 2000 U.S. standard population via direct standardization.

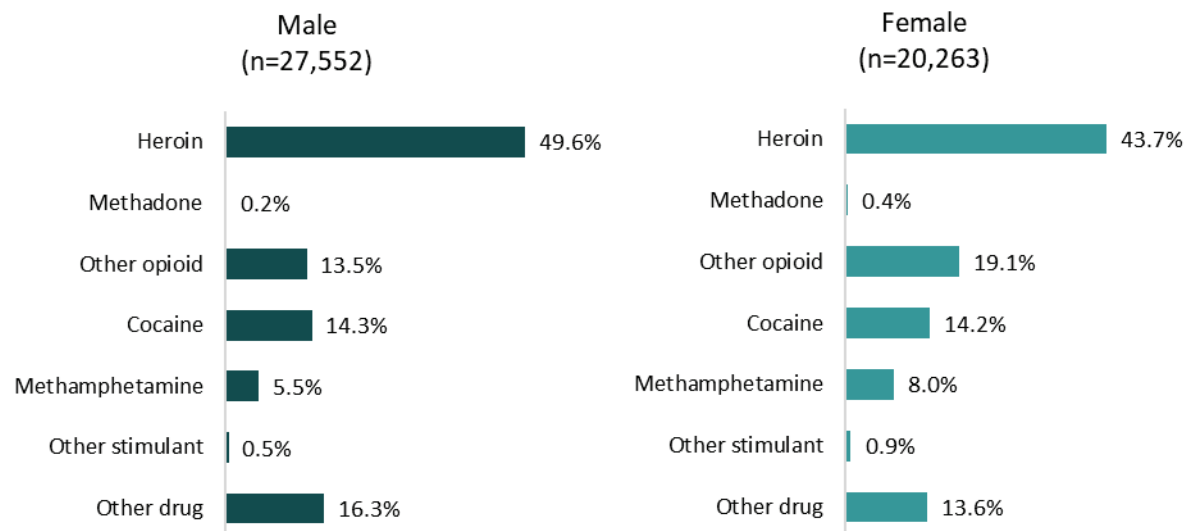
^eChi-squared test of independence was used to calculate p-values for proportion. A Poisson regression model was used to calculate significance of relationship between sex and opioid overdose rate, adjusted for age. P-values were considered significant when less than 0.05.

The primary substance of use reported by individuals with SUD entering treatment varied by sex (**Figure 10**).

- Men were more likely to report heroin as their primary substance of use during their admission for publicly funded SUD treatment as compared to women (49.6% versus 43.7%).
- Women were more likely to report other opioids as their primary substance of use in SUD treatment than men (19.1% versus 13.5%) and were slightly more likely to report methamphetamine as their primary substance of use than men (8.0% versus 5.5%).
- The percentage of men and women reporting methadone, cocaine, and other stimulants as their primary substance of use was similar among both groups.

The SUD data in this figure represent SUD treatment episodes among individuals seeking treatment and whose treatment was publicly funded. This represents a specific population of individuals with SUD in Michigan, and this graph should not be interpreted as indicative of all individuals with SUD in Michigan.

Figure 10. Percentages of primary substances of use reported by those receiving substance use disorder treatment^{a,b} by sex among Michigan residents 12 years and older, 2018



Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

^aSubstance use treatment episodes where a drug was the primary substance were included. Specific drug categories were based on the drug recorded in the "Primary Substance of Use" field. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

^bData in this table are based on treatment episodes and not individuals; individuals may therefore be represented more than once if they sought treatment multiple times in 2018.

^cThe opioid poly-drug category represents all death certificates with either an opioid and another drug class listed as contributing causes of death or multiple opioids listed as contributing causes of death.

Men and women in SUD treatment reported varying substance use patterns, treatment histories/characteristics and mental health condition frequencies (**Table 4**).

- Women were significantly more likely to experience a co-occurring mental health condition alongside their SUD than men (51.0% versus 39.6%).
- Men were more likely to start using their primary substance of use at a slightly younger age than women (22.7 versus 23.4 years old).
- Women experienced slightly longer delays from requesting treatment to the first face-to-face treatment service than men (5.8 versus 5.2 days).
- Women were significantly more likely to be treated in an ambulatory (outpatient) care setting for SUD treatment than men (57.5% versus 53.2%).

The SUD data in this table represent SUD treatment episodes among individuals seeking treatment and whose treatment was publicly funded. This represents a specific population of individuals with SUD in Michigan, and this table should not be interpreted as indicative of all individuals with SUD in Michigan.

Table 4. Characteristics of substance use among SUD treatment episodes^{a,b} by sex among Michigan residents 12 years and older, 2018

Characteristic	Male (n=27,552)	Female (n=20,263)	p-value ^c
Age at first use of PSU, mean	22.7	23.4	<0.001
Number of days from request to first face-to-face service, mean	5.2	5.8	<0.001
Injection as route of administration of PSU, %	38.8%	37.3%	<0.001
One or more prior attempt to address SUD with any treatment provider, %	75.3%	73.5%	<0.001
Co-occurring mental health condition, %	39.6%	51.0%	<0.001
Treated in ambulatory care setting, %	53.2%	57.5%	<0.001

Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

Abbreviations: PSU=primary substance of use, MAT=medication-assisted treatment

^aSubstance use treatment episodes where a drug was the primary substance were included. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

^bData in this table are based on treatment episodes and not individuals; individuals may therefore be represented more than once if they sought treatment multiple times in 2018.

^cChi-squared tests of independence and two-sample t-tests were used to calculate p-values. P-values were considered significant when less than 0.05.

Race and Ethnicity

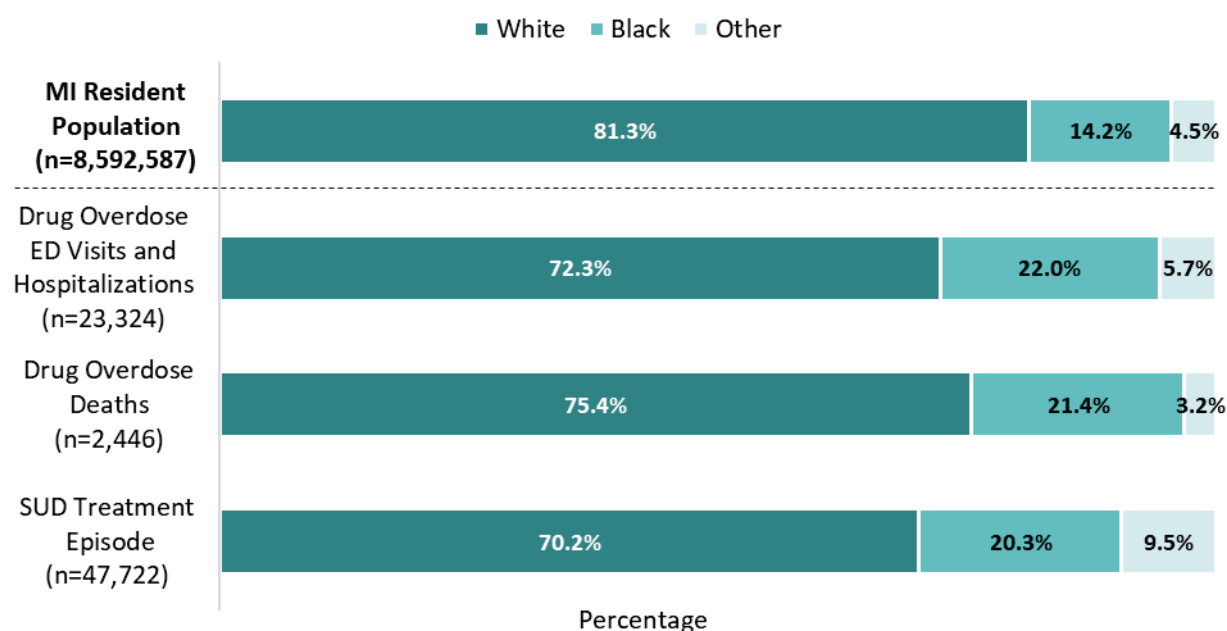
The following section analyzes differences in SUD and overdose by race and ethnicity group. Data from death certificates, ED visits and hospitalizations, EMS responses, and SUD treatment episodes are included in this analysis. Race and ethnicity were combined into the following categories: white non-Hispanic/unknown ethnicity (NH/UE), Black NH/UE, American Indian and Alaska Native NH/UE, Asian and Pacific Islander NH/UE, other NH/UE, Hispanic and unknown race NH/UE. Non-Hispanic and unknown ethnicity are combined in this section, due to higher missingness of ethnicity variables than race variables in the ED visit/hospitalization dataset (combining unknown ethnicity cases with unknown race would have led to many events with known race but unknown ethnicity being pulled into the unknown category), and to keep categories consistent across datasets. Unknown ethnicity is not a separate option from unknown race in the EMS dataset; thus, in the EMS tables/figures, non-Hispanic patient events are not combined with unknown ethnicity.

In some figures and analyses, race and ethnicity have been split out for ease of interpretation, and in other categories have been combined due to low numbers. Race and ethnicity variables are more likely to be missing or classified as unknown than age or sex, and are frequently subject to misclassification, especially if the person completing the event record is unable to verbally ascertain the race and ethnicity of the patient and assigns a category based on visual appearance.

Race- and ethnicity-specific prevalence differed across drug overdose ED visits/hospitalizations, fatal overdoses, and drug-related SUD treatment episodes and from the Michigan population (**Figure 11** and **Figure 12**).

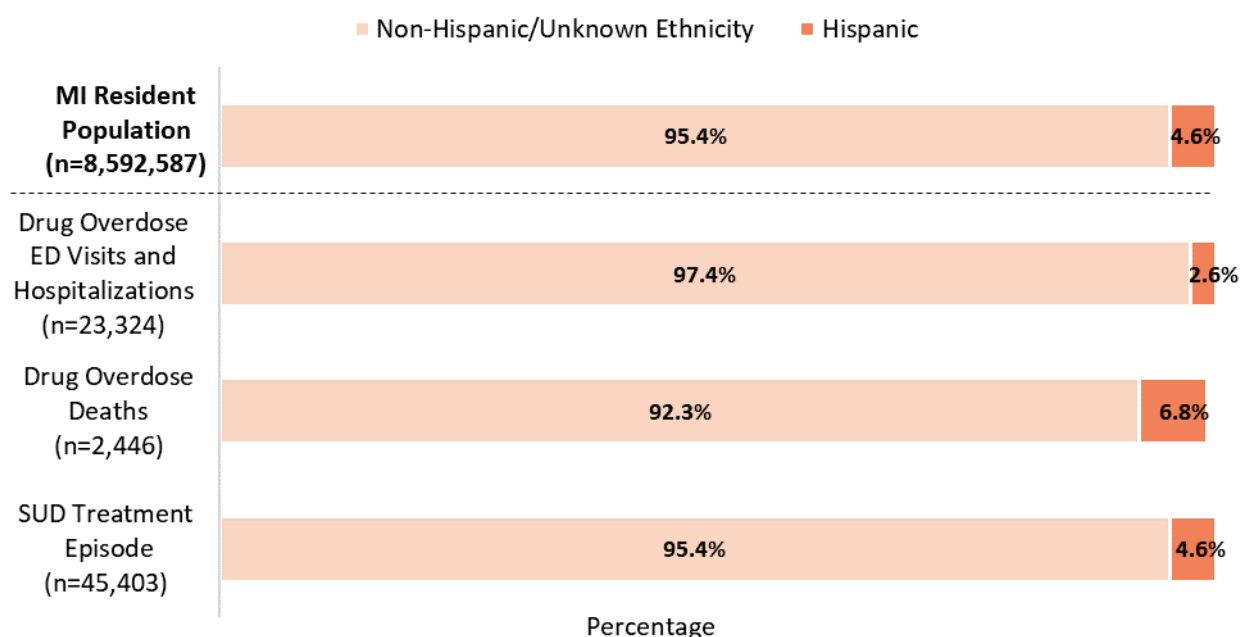
- Black NH/UE Michigan residents made up a disproportionately higher percentage of fatal and non-fatal overdoses and treatment episodes (20.1%-22.0%) as compared to their percentage of the Michigan population 12 years and older (14.2%). The percentage of white residents among fatal overdoses (75.4%), non-fatal overdoses (72.3%), and SUD treatment episodes (70.2%) was lower than expected based on the general population percentage (81.3%).
- Other Race residents made up a disproportionate percentage of SUD treatment episodes (9.5%) as compared to the general population (4.5%).
- Hispanic residents made up 4.6 percent of the Michigan population, and made up 2.6 percent of non-fatal overdose ED visits and hospitalizations, 6.8 percent of drug overdose deaths, and 4.6 percent of drug-related SUD treatment episodes.

Figure 11. Percentage of fatal overdoses^a, non-fatal overdoses^{b,c,d}, and substance use disorder treatment episodes^{c,e} by race^{f,g} compared to general population among Michigan residents 12 years and older, 2018



*See footnotes for Figure 13.

Figure 12. Percentage of fatal overdoses^a, non-fatal overdoses^{b,c,d}, and substance use disorder treatment episodes^{c,e} by ethnicity^f as compared to general population among Michigan residents 12 years and older, 2018



Sources: Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics. Michigan Resident Inpatient & Outpatient Files, Michigan Health and Hospital Association. Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

Abbreviations: SUD=substance use disorder

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bEmergency department visits with the following ICD-10CM codes reported as the principal or any secondary diagnosis were included as drug overdoses: T36-T50. Codes were restricted to initial visits and overdoses of unintentional or undetermined intent.

^cNon-fatal overdose and SUD treatment data in this table are based on events/episodes and not individuals; individuals may therefore be represented more than once if they overdosed or sought treatment multiple times in 2018.

^dEMS data not included in this figure as this figure includes ED/hospitalization data as a non-fatal data source, and many EMS runs are transported to the ED.

^eSubstance use treatment episodes where a drug was the primary substance were included. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

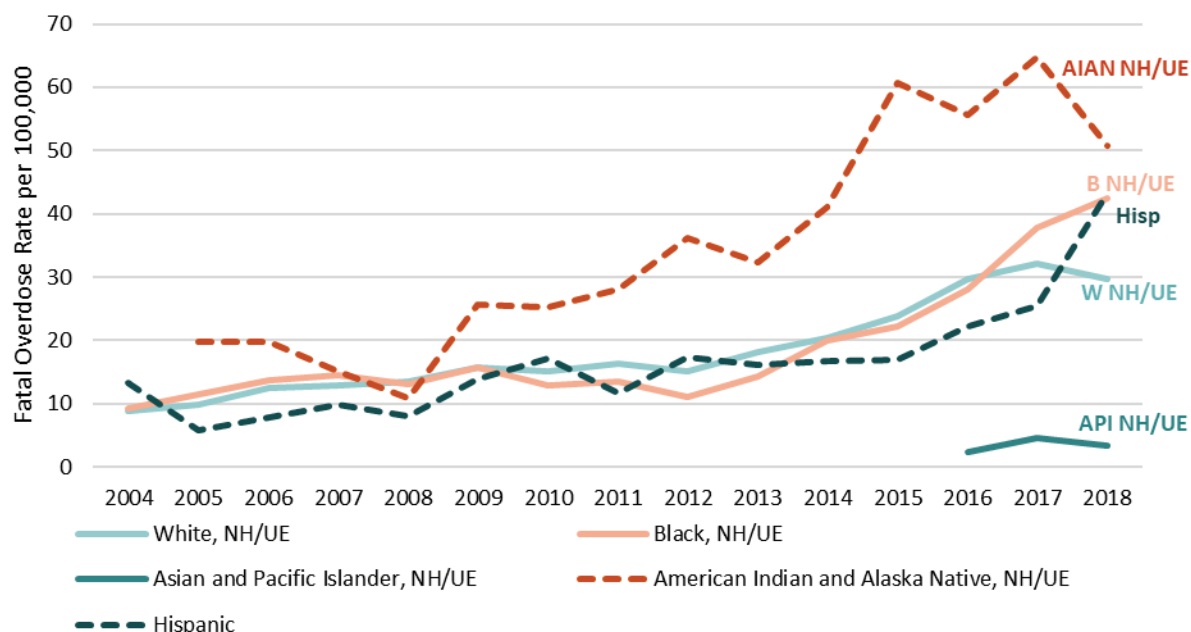
^fTwenty-four fatal overdoses, 501 non-fatal overdoses, and 91 treatment episodes were missing race data. Twenty-two fatal overdoses, 316 non-fatal overdoses, and 2,821 treatment episodes were missing ethnicity data.

^gOther race includes both individuals who listed specific races other than white or Black (ex. Asian American or American Indian) and those who listed their race as "Other."

The change in drug overdose death rate between 2004 and 2018 varied by race and ethnicity group (**Figure 13**).

- Between 2004 and 2018, Black NH/UE Michigan residents experienced the greatest increases in overdose deaths, increasing 356 percent from 9.3 overdose deaths per 100,000 Michigan residents to 42.2.
- Overdose deaths among Hispanic residents increased by 225 percent from 2004 to 2018, from 13.3 overdose deaths per 100,000 to 43.2.
- The overdose death rate among white NH/UE residents increased by 238 percent from 2004 to 2018, from 8.8 per 100,000 to 29.7.
- The rate for American Indian and Alaska Native NH/UE residents could not be calculated in 2004 due to low numbers. From 2005 to 2018, the overdose death rate in this population increased by 157 percent, from 19.8 overdose deaths per 100,000 to 50.8.
- While the white, Asian and Pacific Islander and American Indian and Alaska Native NH/UE populations experienced decreases in drug overdose deaths from 2017 to 2018, Black NH/UE residents experienced an increase of 12.4 percent and Hispanic residents experienced an increase of 70.3 percent during the same time period.

Figure 13. Age-adjusted unintentional and undetermined fatal overdose rate per 100,000^{a,b} from 2004-2018 by race and ethnicity group^c among Michigan residents 12 years and older, 2004-2018



Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

Abbreviations: W=White, B=Black, API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH/UE = non-Hispanic and unknown ethnicity, Hisp = Hispanic

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

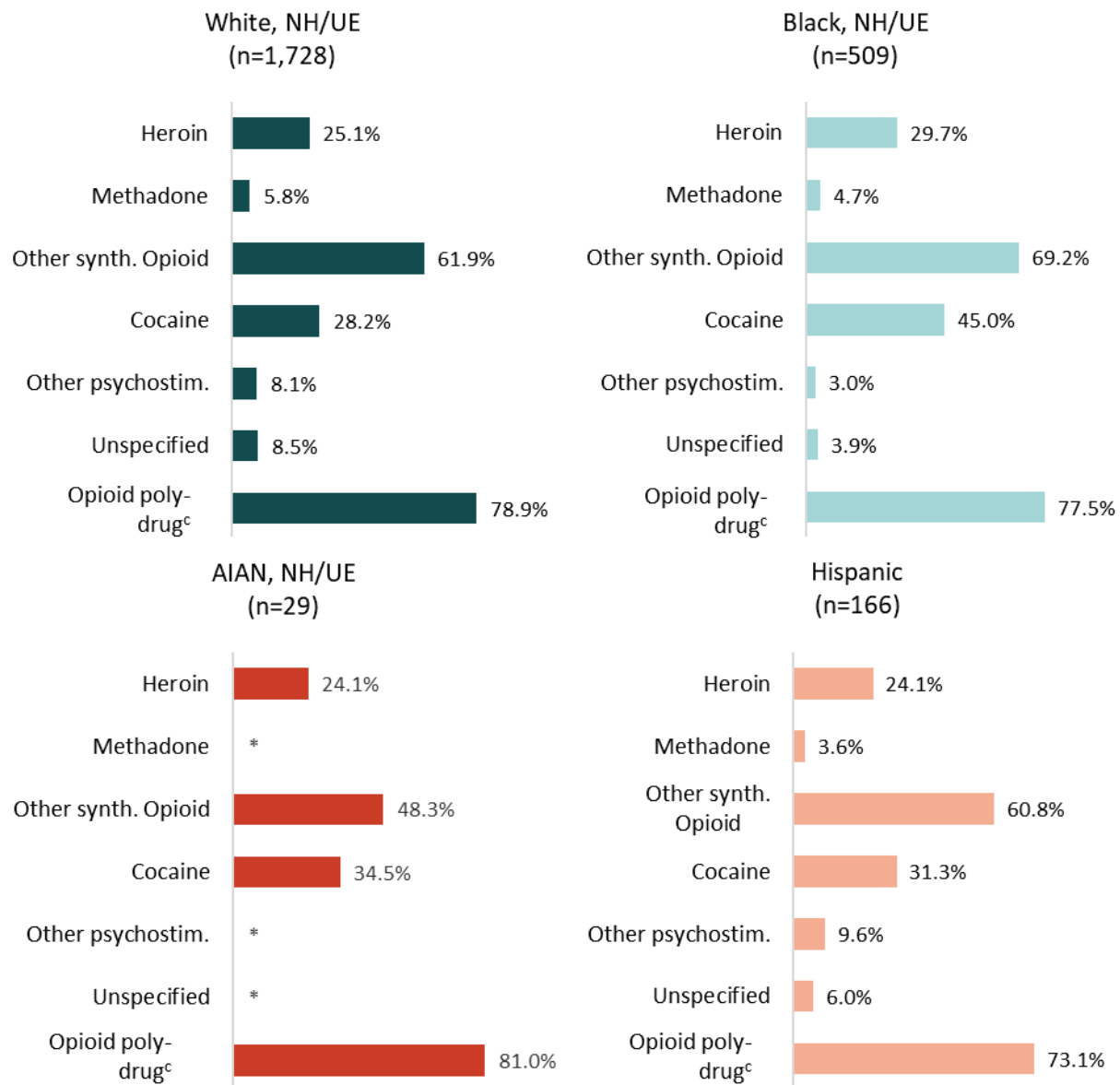
^bRates are age-adjusted to the 2000 U.S. standard population via direct standardization. Statistics with numerators between 1 and 5 have been suppressed.

^cDeaths among other/unknown race, non-Hispanic/unknown ethnicity make up a small proportion of the data each year (<5 deaths most years, except for 14 deaths in 2009); rates for these groups cannot be calculated.

Differences existed in the drugs listed as contributing to the cause of overdose deaths by race and ethnicity group (**Figure 14**).

- Opioid poly-drug deaths, in which multiple opioids or an opioid plus another drug were listed as contributing causes, were high among all race and ethnicity groups listed in this figure, between 73.1 percent among Hispanic residents and 81.0 percent among American Indian and Alaska Native NH/UE residents.
- Heroin was listed as a contributing cause of death in approximately one quarter of deaths among white NH/UE residents, American Indian and Alaska Native NH/UE residents and Hispanic residents. Heroin contributed to 29.7 percent of overdose deaths among Black NH/UE residents.
- Other synthetic opioids (which includes fentanyl and fentanyl analogues, among other synthetic opioids) were listed as a contributing cause to a substantial proportion of drug overdose deaths. Other synthetic opioids contributed to 61.9 percent of overdose deaths among white NH/UE residents, 69.2 percent among Black NH/UE residents, 48.3 percent among American Indian and Alaska Native NH/UE residents, and 60.8 percent among Hispanic residents.
- Cocaine had the highest presence in drug-related deaths among Black NH/UE residents (45.0%).

Figure 14. Percentage of selected drugs* contributing to cause of death among Michigan residents 12 years and older, who died of fatal unintentional and undetermined overdoses^{a,b} by race and ethnicity group^c, 2018



*Drug categories are not mutually exclusive; a death may appear in multiple categories, including single drug categories or "Opioid poly-drug" (multiple drugs including at least one opioid), if multiple drugs were listed on the death certificate as a related cause of death.

Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics.

Abbreviations: NH/UE = non-Hispanic and unknown ethnicity

^aSpecific drug deaths were those deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death AND with the following codes in a related cause of death field: heroin (T40.1), methadone (T40.3), synthetic opioids (T40.4), cocaine (T40.5), psychostimulants (T43.60-T43.64, T43.69), and poly-drug including opioid (a T40.0-T40.4, T40.6 code AND an additional T36-T50 code).

^bPercentages in these figures will not add to 100% as more than one drug can be listed as a contributing cause of death on a death certificate. For example, a death with heroin and cocaine listed as contributing causes of death would appear in the “Heroin,” “Cocaine” and “Opioid poly-drug” categories.

^cThree fatal overdoses were missing race data. Data for Asian Pacific Islanders and Other Races not shown due to low numbers.

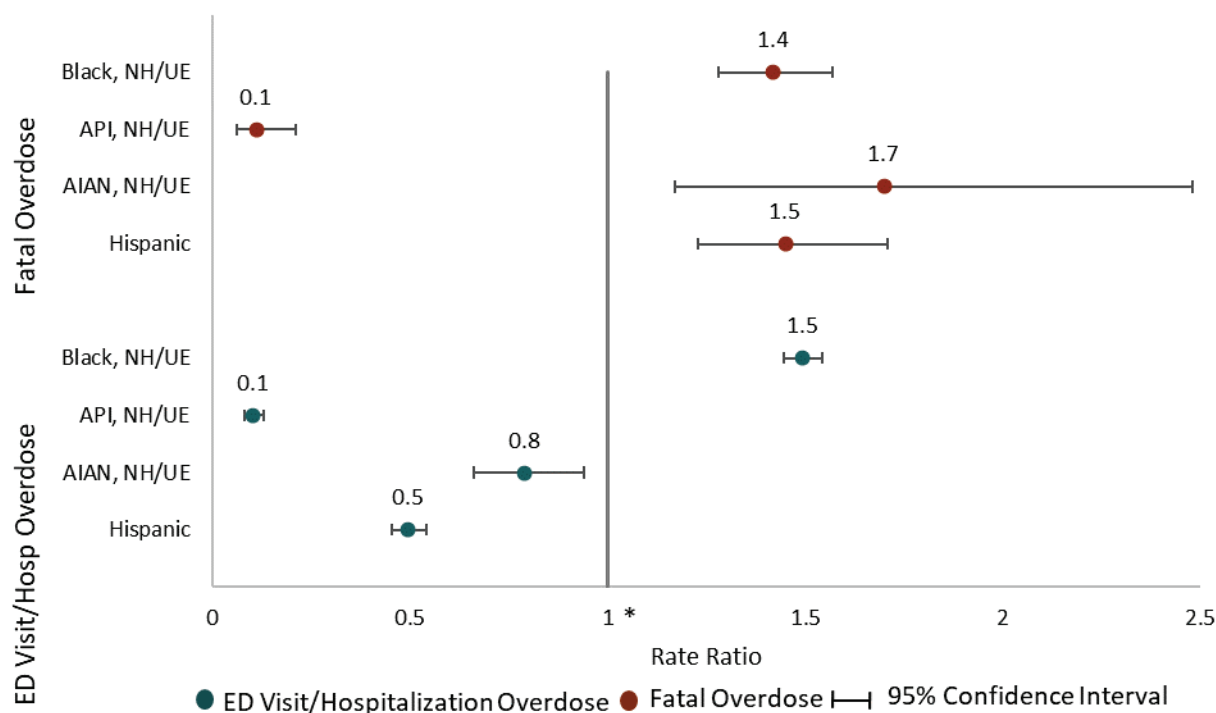
^dThe opioid poly-drug category represents all death certificates with either an opioid and another drug class listed as contributing causes of death or multiple opioids listed as contributing causes of death.

* Statistics with numerators between 1 and 5 have been suppressed.

Racial and ethnic minority groups had significantly different fatal and non-fatal overdose rates as compared to white Michigan residents (all findings below are statistically significant) (**Figure 15**).

- Fatal overdose rates for Black NH/UE, American Indian and Alaska Native NH/UE, and Hispanic Michigan residents exceeded the rate for white NH/UE Michigan residents.
- The ED visit/hospitalization overdose rate for Black NH/UE residents was higher than for white NH/UE residents. ED visit/hospitalization overdose rates were significantly lower for AIAN NH/UE and Hispanic residents than for white NH/UE residents.
 - The differences in the direction of overdose rate ratios among AIAN NH/UE and Hispanic patients could be explained by multiple factors: overdoses among these minority groups could have been more likely to be fatal; these groups could have been less likely to seek medical care when experiencing an overdose, or significant race misclassification could have occurred among these groups during ED/hospital visits (see limitations section).
- Asian and Pacific Islander NH/UE residents had significantly lower overdose rates (fatal and non-fatal) than white NH/UE residents.
- Breakdowns of rate ratios by race and ethnicity group by region of the state are available in Appendix 3.

Figure 15. Ratio of age-adjusted fatal and non-fatal overdose rates^{a,b,c} by race and ethnicity group^d as compared to white, non-Hispanic/unknown ethnicity among Michigan residents 12 years and older, 2018



*A rate ratio with a confidence interval that crosses 1 (bold line in figure) indicates that no significant difference exists in overdose rate between that race/ethnicity group and white Michigan residents. A rate ratio above 1 (to the right of the line) indicates the race/ethnicity group experiences a significantly higher overdose rate than the white population, and vice versa.

Sources: Michigan Resident Inpatient & Outpatient Files, Michigan Health and Hospital Association. Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

Abbreviations: API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH/UE = non-Hispanic and unknown ethnicity

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bEmergency department visits with the following ICD-10CM codes reported as the principal or any secondary diagnosis were included as drug overdoses: T36-T50. Codes were restricted to initial visits and overdoses of unintentional or undetermined intent.

^cRates are age-adjusted to the 2000 U.S. standard population via direct standardization. Ninety-five percent equal-tailed confidence intervals were calculated for each rate ratio.

^dThree fatal overdoses and 185 non-fatal overdoses were missing race data.

Rates of opioid overdose EMS responses and characteristics of those responses varied by race and ethnicity group (**Table 5**).

- The rate of EMS opioid overdose was highest among Black non-Hispanic Michigan residents at 156.2 opioid overdoses per 100,000 population. This rate was 1.6 times the rate of white non-

Hispanic residents (99.2 per 100,000), who had the second highest rate among race and ethnicity groups.

- Black residents received naloxone, either prior to EMS's arrival or during the course of the EMS response, in 92.5 percent of EMS opioid overdose responses, which was the highest percentage among any race and ethnicity group and significantly higher than among white residents. Asian and Pacific Islander residents were the least likely to receive naloxone (62.0%).
- Black residents were significantly more likely to refuse transport to an emergency department during an EMS opioid overdose response (15.6%) than white residents (7.4%). Hispanic residents (13.4%) were more likely than white residents to refuse transport, but the difference was non-significant.

Table 5. Characteristics of EMS responses for opioid overdoses^{a,b} by race and ethnicity group^c among Michigan residents 12 years and older, 2018

Characteristic	White, NH	Black, NH	API, NH	AIAN, NH	Hispanic	p-value ^e
Number of EMS runs for opioid overdose	7,171	2,358	21	41	60	n/a
Age-adjusted rate ^d of runs for opioid overdose per 100K population	99.2	156.2	5.5	33.5	37.6	<0.001
% of EMS opioid overdose runs that received naloxone	82.1%	92.5%	62.0%	86.3%	82.6%	<0.001
% of EMS opioid overdose runs that refused transport	7.4%	15.6%	*	*	13.4%	<0.001

Sources: Michigan Emergency Medical Services Information System, MDHHS Bureau of Emergency, Trauma, and Preparedness. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

Abbreviations: EMS = Emergency Medical Services, API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH = non-Hispanic

^aEMS opioid overdoses are identified through a likelihood formula that considers EMS provider impression, chief complaint, narrative, respiratory rate, Glasgow Coma Scale, medications administered, and procedures performed during the response.

^bData in this table are based on EMS responses and not individuals; individuals may therefore be represented more than once if they overdosed multiple times in 2018.

^c1,341 opioid overdose EMS responses were missing race and ethnicity data (12%).

^dRates are age-adjusted to the 2000 U.S. standard population via direct standardization.

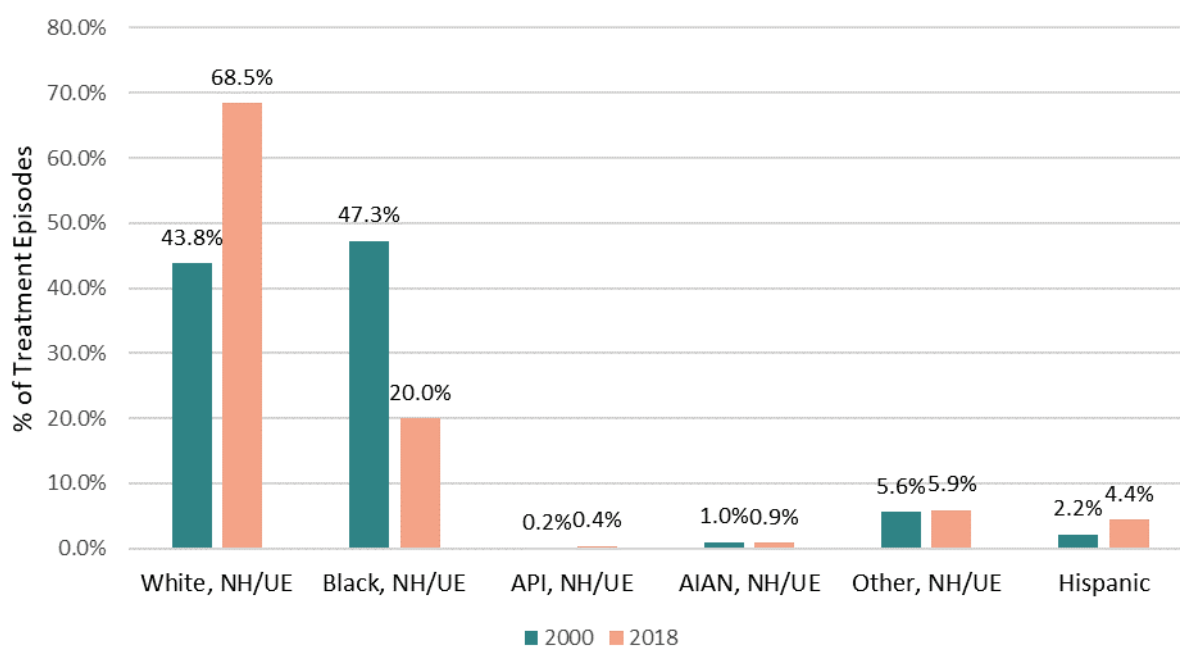
^eChi-squared test of independence was used to calculate p-values for proportion. A Poisson regression model was used to calculate significance of relationship between race and group and opioid overdose rate, adjusted for age. P-values were considered significant when less than 0.05.

*Statistics with numerators between 1 and 5 have been suppressed.

Between 2000 and 2018, the prevalence of race-ethnicity groups accessing publicly-funded SUD treatment changed (**Figure 16**).

- The most substantial changes between 2000 and 2018 occurred among white NH/UE and Black NH/UE patients in SUD treatment. In 2000, Black NH/UE patients made up 47.3 percent of SUD treatment episodes, while white NH/UE patients made up 43.8 percent. In 2018, Black NH/UE patients made up 20.0 percent of SUD treatment episodes, while white NH/UE patients made up 68.5 percent.
 - The breakdown between Black and white patients in treatment is more reflective of the underlying population of individuals experiencing drug overdose in 2018 than it was in 2000, with 22.0 percent of Black residents and 72.3 percent of white residents experiencing non-fatal overdoses (**Figure 12**).
- The percentage of Hispanic patients in SUD treatment increased slightly between 2000 and 2018.

Figure 16. Percentage of race and ethnicity group^a in substance use disorder treatment episodes among those who reported a drug as their primary substance of use (PSU)^{b,c} among Michigan residents 12 years and older, comparing 2000 (n=48,455) and 2018 (n=47,815)



Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

Abbreviations: API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH = non-Hispanic

^aEighty five treatment episodes were missing data for race and had unknown or non-Hispanic ethnicity.

^bSubstance use treatment episodes where a drug was the primary substance were included. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

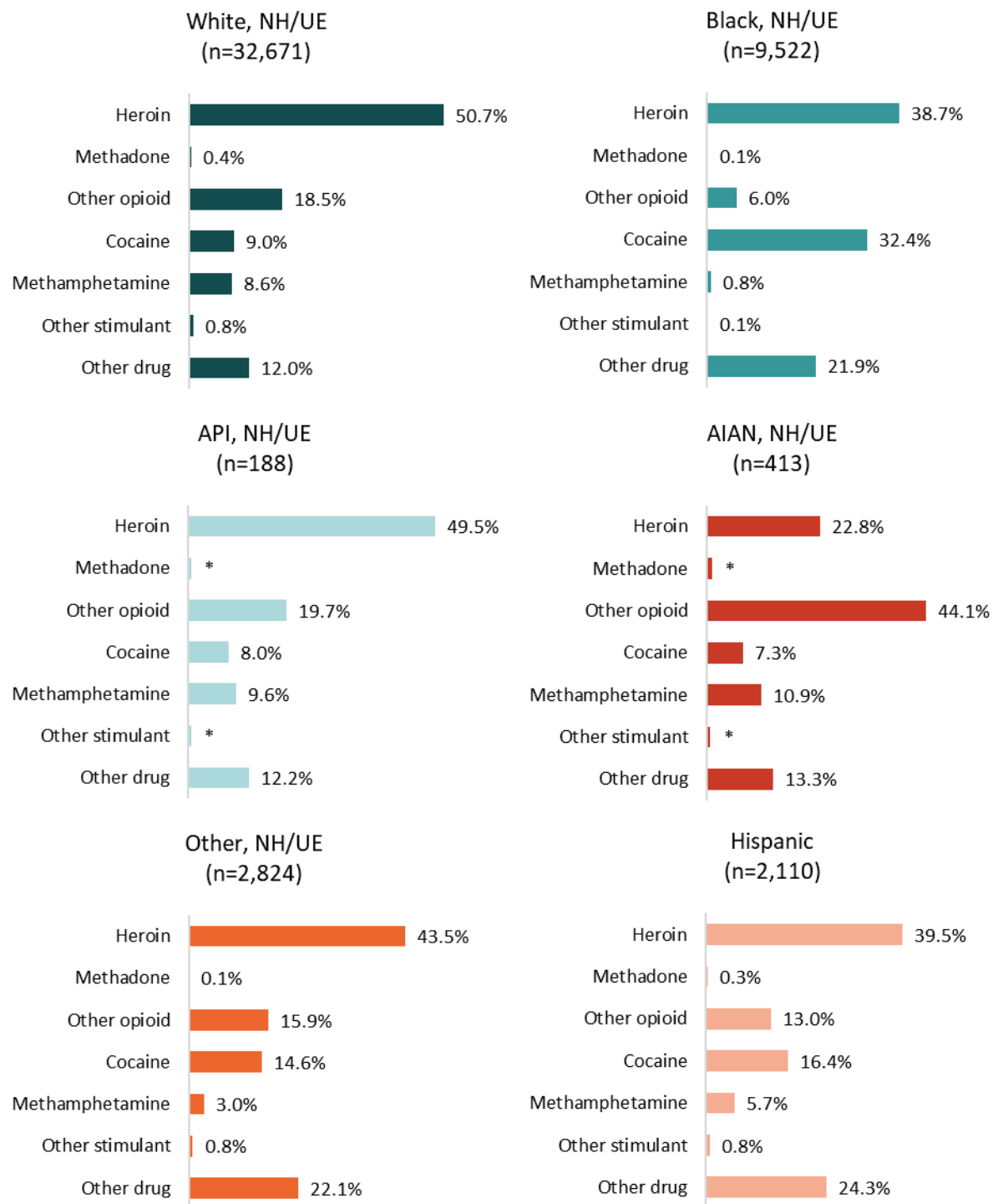
^cData in this table are based on treatment episodes and not individuals; individuals may therefore be represented more than once if they sought treatment multiple times in 2018.

The primary substance of use reported by individuals with SUD entering treatment varied by race and ethnicity group (**Figure 17**).

- Heroin was the highest PSU among Asian and Pacific Islander NH/UE residents (59.5%) and White NH/UE residents (50.7%). Among all groups except for American Indian and Native American NH/UE residents, heroin as PSU represented the largest share of SUD treatment episodes.
- Cocaine as the PSU among SUD treatment episodes was the highest among Black NH/UE residents (32.4%).
- Methamphetamine as the PSU among SUD treatment episodes was highest among American Indian and Alaska Native NH/UE residents (10.9%) and Asian and Pacific Islander residents (9.6%).

The SUD data in this figure represent SUD treatment episodes among individuals seeking treatment and whose treatment was publicly funded. This represents a specific population of individuals with SUD in Michigan, and this graph should not be interpreted as indicative of all individuals with SUD in Michigan.

Figure 17. Percentages of primary substance of use reported by those in substance use disorder treatment^{a,b} by race and ethnicity group^c among Michigan residents 12 years and older, 2018



Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.
Abbreviations: API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH = non-Hispanic

^aSubstance use treatment episodes where a drug was the primary substance were included. Specific drug categories were based on the drug recorded in the "Primary Substance of Use" field. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

^b Data in this table are based on treatment episodes and not individuals; individuals may therefore be represented more than once if they sought SUD treatment multiple times in 2018.

^cEighty-five treatment episodes were missing data for race and had unknown or non-Hispanic ethnicity.

^dThe opioid poly-drug category represents all death certificates with either an opioid and another drug class listed as contributing causes of death or multiple opioids listed as contributing causes of death.

*Statistics with numerators between 1 and 5 have been suppressed.

Substance use patterns, treatment histories/characteristics and mental health condition frequencies varied by age group (**Table 6**).

- Black NH/UE patients in SUD treatment reported the oldest age at first use of primary substance of use (PSU) (24.3 years), while Asian and Pacific Islander NH/UE patients reported the youngest age at first use (21.2 years).
- Black NH/UE patients NH/UE had shortest mean number of days from request to first face-to-face treatment service (4.5 days). All other race and ethnicity groups had a mean number of 5.2 to 5.9 days from request to first face-to-face service.
- Black NH/UE patients in SUD treatment were significantly less likely than all Other Race and ethnicity groups to report injection as the most common route of their PSU (11.3%). White NH/UE and Asian and Pacific Islander NH/UE patients were most likely to report injection as the most common route of their PSU (46.7% and 46.0%, respectively)
- Other Race NH/UE patients were most likely to have a co-occurring mental health condition alongside their SUD (49.0%), followed by Black NH/UE patients (48.0%). In both of these groups, the co-occurrence of mental health conditions was significantly higher than in white NH/UE patients (43.8%), American Indian and Alaska Native NH/UE patients (30.3%), and Hispanic patients (41.3%) based on pair-wise testing. Among those with co-occurring mental health conditions, American Indian and Alaska Native NH/UE patients were the least likely to be receiving integrated mental health treatment.
- American Indian and Alaska Native NH/UE patients were significantly less likely to have medication-assisted treatment (MAT) for opioid use as part of their treatment plan than all other race and ethnicity groups except for Other Race NH/UE.
- Asian and Pacific Islander NH/UE patients were significantly less likely to be treated in an ambulatory (outpatient) care setting (36.2%) than any other racial group.

The SUD data in this table represent SUD treatment episodes among individuals seeking treatment and whose treatment was publicly funded. This represents a specific population of individuals with SUD in Michigan, and this table should not be interpreted as indicative of all individuals with SUD in Michigan.

Table 6. Characteristics of substance use among substance use disorder treatment episodes^{a,b} by race and ethnicity group^c among those who reported a drug as their primary substance of use (PSU) among Michigan residents 12 years and older, 2018

Characteristic	White, NH/UE (n=32,671)	Black, NH/UE (n=9,522)	API, NH/UE (n=188)	AIAN, NH/UE (n=413)	Other, NH/UE (n=2,824)	Hispanic (n=2,110)	p-value ^d
Age at first use of PSU, mean	22.8	24.3	21.2	21.5	22.2	21.9	<0.001
Number of days from request to first face-to-face service, mean	5.7	4.5	5.8	5.9	5.8	5.2	<0.001
Injection as most common route of administration of PSU, %	46.8%	11.3%	46.8%	38.3%	33.1%	32.9%	<0.001
One or more prior attempt to address SUD with any treatment provider, %	75.6%	73.5%	80.1%	76.6%	72.1%	66.5%	<0.001
Co-occurring mental health condition, %	43.8%	46.7%	38.8%	30.3%	49.0%	41.3%	<0.001
Receiving integrated treatment for mental health, % ^e	61.9%	59.9%	71.2%	49.6%	66.9%	56.9%	<0.001
MAT is part of individual's treatment plan for current episode, % ^f	51.0%	55.2%	53.1%	35.9%	43.8%	51.9%	<0.001
Treated in ambulatory care setting, %	55.0%	50.4%	36.2%	62.2%	62.5%	66.0%	<0.001

Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

Abbreviations: API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH = non-Hispanic, PSU=primary substance of use, MAT=medication-assisted treatment

^aSubstance use treatment episodes where a drug was the primary substance were included. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

^bData in this table are based on treatment episodes and not individuals; individuals may therefore be represented more than once if they sought treatment multiple times in 2018.

^cEighty-five treatment episodes were missing data for race and had unknown or non-Hispanic ethnicity.

^dChi-squared tests of independence and one-way ANOVA tests were used to calculate p-values. P-values were considered significant when less than 0.05.

^e"Receiving integrated treatment for mental health" percentage is a subset of "Co-occurring mental health condition"; denominator for "Receiving integrated treatment for mental health" percentages are those that had a co-occurring mental health condition.

^fPercent is out of total individuals in treatment who reported an opioid as their primary, secondary, or tertiary substance of use.

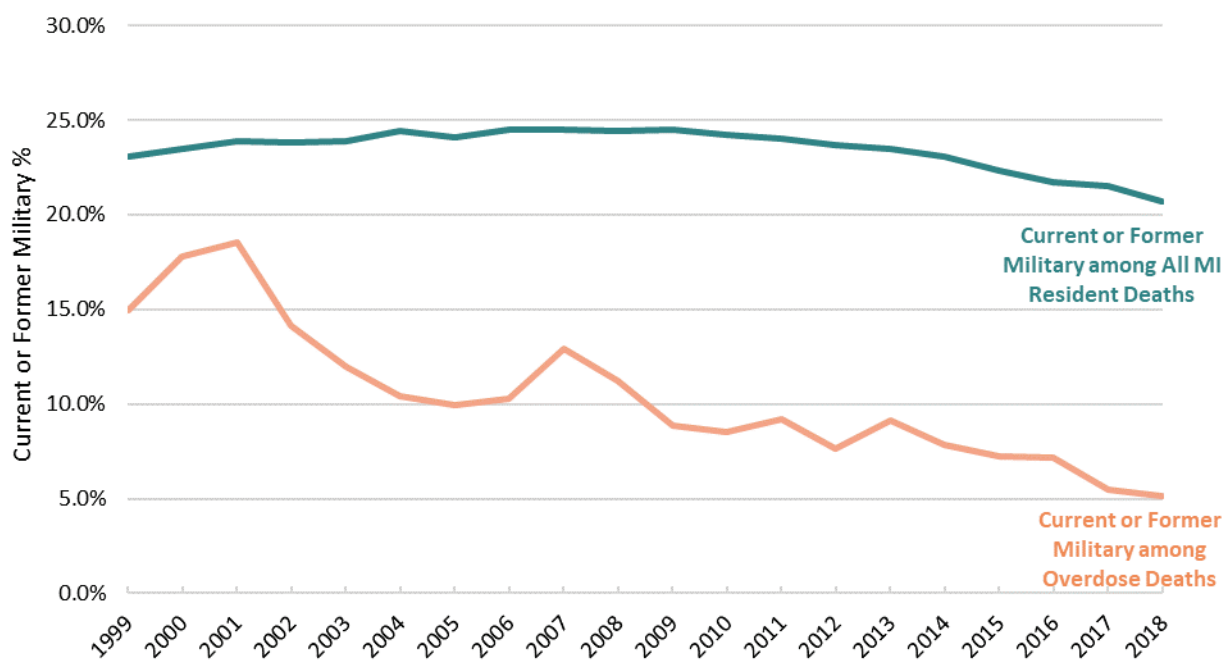
Veteran/Military Status

This section describes overdose and SUD trends by veteran or military status. Veterans/military members are a difficult population to study, as healthcare data on this population is not easily accessible at the individual level. Neither EMS nor ED data indicate patient's veteran or military status. Death certificates contain a field for if the decedent was current or former U.S. military. Rates cannot be calculated as there is not a population estimate for current or former military in Michigan. TEDS data captures information on veteran status, but TEDS data is not a comprehensive sample of individuals with SUD in Michigan; only data on individuals with SUD who seek treatment and receive publicly funded treatment are in the dataset. Despite the lack of data, the veteran/military population is important to analyze with regards to SUD. High prevalence of chronic pain, post-traumatic stress disorder, and depression among veterans could cause this population to be vulnerable to SUD and overdose.¹³

The percent of overdose deaths that occurred among current or former military decreased between 1999 and 2018 (**Figure 18**).

- The percent of current or former military members deaths among all resident deaths did not change substantially between 1999 and 2018. In 1999, current or former military deaths made up 23 percent of resident deaths, while in 2018, they made up 21 percent of resident deaths.
- The percent of current or former military among overdose deaths peaked in 2001 at 19 percent and decreased to 5 percent in 2018. An additional peak occurred in 2007, when current or former military made up 13 percent of overdose deaths.

Figure 18. Percent of current or former military^{a,b} among all fatalities and fatal unintentional and undetermined overdoses^c among Michigan residents 12 years and older, 1999-2018



Sources: Michigan Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

^aVeteran status is not collected on death certificates; current or former military status is used in this figure as an approximation. Rates cannot be calculated for current or former military due to the lack of a population estimate.

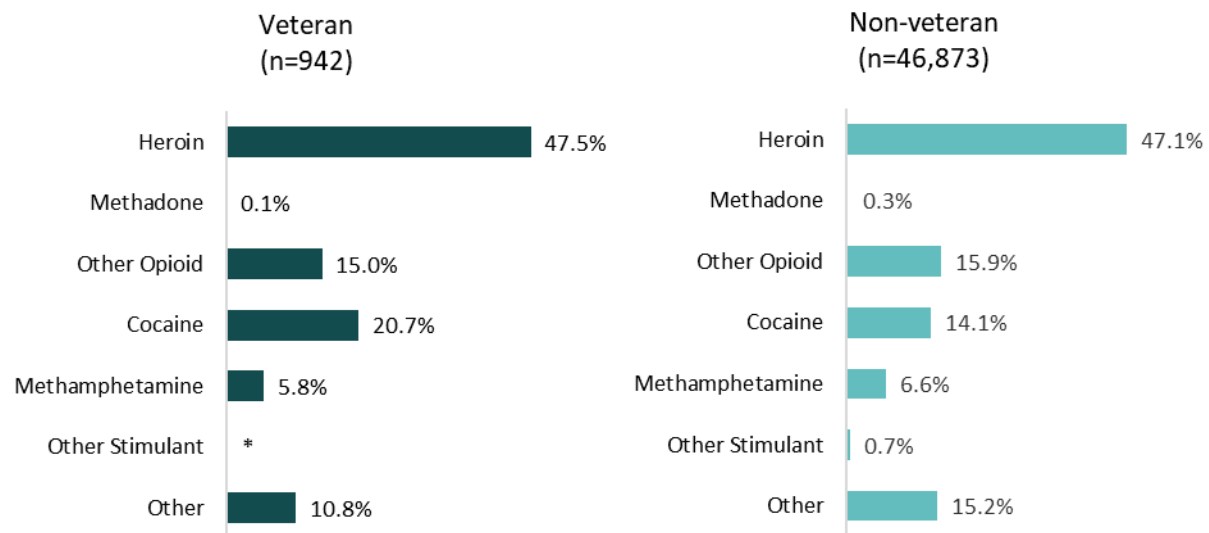
^bIn 2015, 14 decedents were missing military status; in 2017, 10 were missing military status; in 2018, 24 were missing military status. In all other years, less than seven decedents were missing military status.

^cAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

The primary substance of use reported by individuals with SUD entering treatment varied slightly by veteran status (**Figure 19**).

- Both veterans and non-veterans most frequently reported heroin as their PSU (47.5% versus 47.1%, respectively).
- The second most common PSU among veterans was cocaine (20.7%). Among non-veterans, the second most common PSU was other opioids (15.9%).

Figure 19. Primary substance of use percentage among those in substance use disorder treatment^a by veteran status among Michigan residents 12 years and older, 2018



Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

^aSubstance use treatment episodes where a drug was the primary substance were included. Specific drug categories were based on the drug recorded in the "Primary Substance of Use" field. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

*Statistics with numerators between 1 and 5 have been suppressed.

Substance use patterns, treatment histories/characteristics, and mental health condition frequencies of individuals entering publicly funded SUD treatment differed by veteran status (**Table 7**).

- Non-veterans were significantly more likely to report injection as the route of administration for their PSU than veterans (38.3% versus 31.1%).
- Veterans reported having sought treatment at least once previously more frequently than non-veterans (78.6% versus 74.5%).

Table 7. Characteristics of substance use among substance use disorder treatment episodes^a by veteran status among Michigan residents 12 years and older, 2018

Characteristic	Veteran (n=942)	Non-veteran (n=46,873)	p-value ^b
Number of days from request to first face-to-face service, mean	5.2	5.5	0.593
Injection as route of administration of PSU, %	31.1%	38.3%	<0.001
One or more prior attempt to address SUD with any treatment provider, %	78.6%	74.5%	0.005
Co-occurring mental health condition, %	44.7%	44.4%	0.854
Treated in ambulatory care setting, %	51.7%	55.1%	0.040

Source: Treatment Episode Data Set, MDHHS Behavioral Health and Developmental Disabilities Administration.

Abbreviations: PSU=primary substance of use

^aSubstance use treatment episodes where a drug was the primary substance were included. Episodes were restricted to treatment admissions for "Initial SUD Start Records."

^bChi-squared tests of independence and two sample t-tests were used to calculate p-values. P-values were considered significant when less than 0.05.

While the authors of this report do not have access to further veteran data for analysis, more in-depth data is collected by the U.S. Department of Veteran Affairs (VA). In 2014, the VA published the inaugural National Veteran Health Equity Report for fiscal year 2013 (FY13), which includes data at the national level on substance use and mental health disorders among veterans who utilized any Veterans Health Administration care in FY13. This report can be accessed and downloaded at the following website:

<https://www.va.gov/healthequity/NVHER.asp>.¹⁴

LGBTQ+

Data regarding people who identify as lesbian, gay, bisexual, transgender and queer/questioning (LGBTQ+) in Michigan are scarce. Variables assessing sexual orientation are not routinely collected in health records for EMS responses or ED visits or on death certificates. While medical examiners (MEs) collect data on LGBTQ+ status as part of death investigations, this data field is often unknown for the decedent and left blank, leading to small numbers of reporting among LGBTQ+ populations. The Michigan Behavioral Risk Factor Surveillance System (BRFSS) collects data on LGBTQ+ populations, but only recently added a module regarding substance use, which is not yet able to be reported on due to small numbers.

While concrete data is scarce regarding SUD and overdose among this population, it is important to assess the available data and anecdotal evidence on SUD in this vulnerable and often stigmatized population. As a result of stigma, discrimination, harassment, violence, and other life stressors, people identifying as LGBTQ+ experience increased risk for behavioral health issues, including SUD.¹⁵ In 2015, the National Survey on Drug Use and Health (NSDUH) found that, nationally, sexual minorities were more likely to have SUD and mental health conditions than their heterosexual counterparts, including having been more likely to have used an illicit substance in the past year (39% versus 17%, respectively.)¹⁶ Data gathered in Washington State among persons in publicly funded treatment programs demonstrated that openly LGBT clients entered treatment with more severe SUD than their sexual majority peers.¹⁷

While comprehensive statewide data are not available in Michigan, two surveys provide insight into SUD among sexual and gender minorities. The Michigan Youth Risk Behavior Survey (YRBS) monitors health, behavior, and health risks among students in grades 9 through 12. The YRBS collects data on sexual orientation as well as two questions regarding substance use. The YRBS survey is considered a representative sample of all Michigan high school students.

Self-reported substance use by gay/lesbian/bisexual/other high school students and by heterosexual high school students differed significantly (**Figure 20**).

- Gay/lesbian/bisexual/other high school students were significantly more likely to have taken prescription pain medicine without a prescription or differently than prescribed in the past 30 days as compared to heterosexual students (14.8% versus 5.0%, respectively).
- Gay/lesbian/bisexual/other students were significantly more likely than heterosexual students to have injected an illegal drug at least once in their lifetime (4.1% versus 1.6%).

Figure 20. Substance use characteristics by sexual orientation among high school students, Michigan 2019

Characteristic	Gay/Lesbian/ Bisexual/Other		Heterosexual	
	%	95% CI	%	95% CI
Taken prescription pain medicine without prescription or differently than prescribed in past 30 days				
0 times	85.2%	(80.4, 89.0)	94.5%	(93.4, 95.3)
1+ times	14.8%	(11.0, 19.6)	5.5%	(4.7, 6.3)
Used needle to inject illegal drug one or more times in lifetime				
0 times	95.9%	(93.6, 97.4)	98.4%	(97.6, 98.9)
1+ times	4.1%	(2.6, 6.4)	1.6%	(1.1, 2.4)

Source: Michigan Youth Risk Behavior Survey, Michigan Department of Education.

The Michigan Trans Health Survey¹⁸ is a statewide survey conducted by the University of Michigan School of Social Work/The Center for Sexuality and Health Disparities and the community organization Transcend the Binary that assesses the health experiences of transgender and non-binary communities in Michigan. Survey participants were recruited through Facebook and through word of mouth in a convenience/snowball sampling method. In total, 659 persons responded to the survey. Respondents needed to be 18 years or older and to not identify as cisgender to participate in the survey. This survey is not necessarily representative of the Michigan transgender/non-binary population as a whole but contains important information on a population in Michigan lacking comprehensive health data. This survey additionally does not include a comparison group. The below bullet points summarize the findings of this survey regarding substance use. When relevant/comparable, national estimates from the National Survey on Drug Use and Health (NSDUH) are included.

- 33 percent of transgender/non-binary survey respondents in Michigan reported having ever inappropriately using a prescription pain reliever in their lifetimes (n=600). In the past year, 24 percent of transgender/non-binary survey respondents reported inappropriately using a prescription pain reliever at least one time (n=596).¹⁸
 - The 2018 NSDUH estimates that 9 percent of the general population 12 years and older in the U.S. had misused a prescription pain reliever at any point in their life, and 4 percent misused a prescription pain reliever in the past year.¹⁹
- 11 percent of transgender/non-binary survey respondents in Michigan reported using any illicit substances (other than marijuana or prescription pain relievers) within the past year (n=600).¹⁸
 - The 2018 NSDUH estimates that 9 percent of the general population 12 years and older in the U.S. had used an illicit drug other than marijuana in the past year (including prescription pain relievers).¹⁹
- 19 percent of transgender/non-binary survey respondents who tried to access a substance use program in the previous 12 months encountered discrimination based on their gender identity (n=105).¹⁸

Conclusions and Public Health Implications

SUD and overdose are an on-going crisis in Michigan. This report demonstrates that significant disparities exist in the experience and treatment of SUD and overdose by age group, sex, and particularly by race and ethnicity group. The data presented in this report have important implications for intervention programs aimed at reducing and preventing drug overdose morbidity and mortality in Michigan.

While some trends and statistics are similar across demographic groups, such as the significant number of opioid poly-drug deaths and synthetic opioid deaths and the rise of stimulant use, other statistics in this report reveal inequities that exist in SUD, overdose and subsequent medical response. While many demographic groups experienced decreases in fatal overdoses from 2017 to 2018, drug overdose deaths continued to increase for Black NH/UE residents, Hispanic residents, men aged 35-44 and 65 and older, and women aged 65 and older. Racial minorities made up a disproportionate amount of overdose deaths, and Black NH/UE patients made up a disproportionate amount of drug overdose ED visits and hospitalizations and EMS responses. EMS response patients who were between the ages of 12 and 17, female, or identified as Asian and Pacific Islander NH/UE were significantly less likely to receive naloxone for an opioid overdose than their counterparts. Black NH/UE and Hispanic EMS patients were significantly more likely to refuse transport to an ED after experiencing an opioid overdose. gay/bisexual/transgender/other youth were significantly more likely than their peers to have abused prescription pain medication and to have injected illicit drugs. These differences demonstrate that the experience of SUD and overdose is not uniform across demographic groups, but rather that underlying inequities and biases may impact SUD and overdose outcomes in different populations.

While it is widely acknowledged that disparities exist in overdose and substance use disorder, recent published research regarding these disparities is limited. This report demonstrates that overdose disparities exist in Michigan and have increased in recent years with Black and Hispanic overdose deaths increasing while white overdose deaths decreased in 2018. Similar findings from the Minnesota Department of Health, the Massachusetts Department of Public Health, and national CDC data show increasing overdose deaths among residents of color in their respective jurisdictions in 2018²¹⁻²³, suggesting that the inequities causing these disparities in overdose deaths are a widespread problem.

To reduce the burden of overdose morbidity and mortality in Michigan and particularly to reduce the disparities present among overdoses and SUD, prevention and treatment programs need to incorporate a health equity/health disparities lens into their decision-making and program planning. It is not enough to target geographic areas of Michigan where overdoses are statistically higher and to assume that intervention programs will reach and impact all groups equally. Trends such as differing patterns of substances used, routes of administration of drugs, and refusal of transport to ED among the demographic groups studied in this report suggest that intervention programs need to tailor their interventions for specific groups to achieve widespread and equitable impact.

Data such as differing naloxone administration rates (Asian and Pacific Islanders and women were less likely to receive naloxone for opioid overdose during an EMS response) and differing experiences in SUD treatment programs (in SUD treatment programs, American Indians and Alaska Natives were less likely to receive integrated mental health treatment when relevant and to have MAT as part of their treatment plan for opioid use) additionally could indicate that implicit bias is affecting the manner in

which overdose and SUD are treated in certain populations, although more study is needed to understand the underlying causes of these disparities. Implicit bias towards certain racial, ethnic, gender, or age groups in healthcare providers is well-documented and associated with lower quality of care.²⁰ Implicit bias, and especially its intersection with institutional racism, needs to be addressed at the healthcare provider and healthcare institution level in order for all population groups to receive equitable treatment. Interventions aimed at healthcare personnel should add implicit bias training and incorporate health disparities into training materials.

It is inequitable for overdoses to decrease in the general population while overdose morbidity and mortality continues to increase among racial and ethnic minorities and other demographic groups. Differing patterns of SUD, implicit bias, institutional racism, and the historical treatment of minorities by healthcare institutions need to be addressed and rectified to truly make progress in the effort to combat overdoses.

Limitations

This report is subject to several limitations, as follows:

Race Misclassification

Misclassification of race and ethnicity in medical records and death certificates is well documented and can occur for several different reasons. While race and ethnicity reporting on death certificates has improved in recent years, misclassification of AIAN decedents remains a significant problem.^{26–28} Race and ethnicity reporting in medical records is an on-going concern among minority patients.²⁹ Race and ethnicity may be misclassified if the person completing the record, such as the medical examiner or EMS/hospital intake personnel, assigns race based on appearance rather than the patient or someone close to the patient reporting their race. This can occur if a patient is unconscious or if the race is unable to be determined for a decedent's death record. Misclassification can additionally occur if a person is biracial, but a data source only records one race. While it is important to analyze trends among racial and ethnic minorities, misclassification bias should be considered when interpreting the trends in this report; this could cause overdoses/SUD trends to be over- or under-reported.

Death Certificate Data

The specificity of drugs reported as contributing to overdose deaths has continuously improved since 1999. In 1999, 58.0 percent of overdose deaths had a specific drug listed as a contributing cause of death, while in 2018, 93.0 percent of overdose deaths had a specific drug listed as contributing to the death. The increase in drug specificity on overdose death certificates likely contributes to the increases seen in specific drug deaths between 1999 and 2018. Despite improvements, 2018 drug overdose counts in 2018 are likely to be underestimates, due to drugs that were not specified on the death certificates or could not be determined.

EMS Data

The EMS data in this report are subject to several limitations. First, MiEMSIS was undergoing a transition in reporting systems in 2018 (from version two to version three). On January 1, 2018, 44 percent of agencies still reported to NEMSIS2. On January 1, 2019, all facilities were transitioned to NEMSIS3 and NEMSIS2 data were no longer accepted. The same case definition is applied to both systems, but

variables may be reported differently between the two versions, which may affect how many probable opioid overdoses are identified. Second, participation in MiEMSIS by EMS agencies in Michigan was increasing during 2018 and had not yet reached 100%. Some EMS agencies may have only reported data for part of the study period. Third, MiEMSIS collects data on events and not individuals; it is possible that an individual could be included multiple times in the EMS statistics in this report if they were treated by EMS for an opioid overdose multiple times in 2018. Fourth, all EMS responses in Michigan were included in this analysis, whether the patient's residence was in Michigan or outside of Michigan, due to the high missingness of resident geographic information (27%). In responses where resident address was present, less than 1 percent of responses were for out of state patients. Finally, race and ethnicity reporting was completed more often by the end of 2018 in MiEMSIS as compared to the beginning of 2018. It is possible that some EMS agencies only reported race and ethnicity data for part of the study period.

ED Visit and Hospitalization Data

Approximately 3 percent of hospitals did not report ED and/or inpatient hospitalization data to MHA in 2018 and are therefore excluded from ED/hospitalization estimates in this report. Hospitals that did not report ED data include: Michigan Medicine and Sheridan Community Hospital. Hospitals that did not report inpatient hospitalization data include: Sheridan Community Hospital, Pontiac General Hospital, Henry Ford Health Center – Brownstown, and McLaren Northern Michigan – Cheboygan Campus. The populations in the service area of these hospitals may be underrepresented in this analysis. An additional limitation to this dataset is that ED and inpatient visits represent unique events, rather than unique individuals. One person could be included in this data if they sought treatment for overdose in an ED or were admitted for overdose treatment multiple times in 2018. A final limitation is that coding practices for overdose may vary by hospital, thus affecting which overdoses were identified for inclusion in this report.

TEDS Data

A major limitation of the Treatment Episode Dataset is that it only contains information from publicly funded admissions to treatment programs. Data from privately or otherwise funded treatment admissions are not captured. TEDS additionally only contains data on the subset of individuals with SUD in Michigan who have sought treatment. This population may differ substantially from individuals with SUD who have not sought treatment or whose treatment is not publicly funded. Statistics from TEDS should not be considered as representative of individuals with SUD in Michigan as a whole. Additionally, TEDS is an event-based system and is de-identified; an individual may be represented multiple times in the statistics presented in this report if they received SUD treatment multiple times in 2018.

Acknowledgements

The authors of this report acknowledge the MDHHS Division for Vital Records and Health Statistics for the provision of death certificate data, the MDHHS Bureau of Emergency, Trauma and Preparedness for the provision of MiEMSIS data, the MDHHS Behavioral Health and Developmental Disabilities Administration for the provision of TEDS data, the Michigan Department of Education for the provision of YRBS data, and the Michigan Health and Hospital Association for the provision of ED visit and hospitalization data for the purpose of overdose and SUD surveillance in Michigan. The authors of this report additionally acknowledge the University of Michigan School of Social Work/The Center for

Sexuality and Health Disparities for the provision of Michigan Trans Health Survey data for use in this report. Finally, the authors acknowledge the Centers for Disease Control and Prevention for the provision of funding for overdose surveillance and the analysis completed for this report.

References

1. Drug Overdose Deaths. Michigan Substance Use Disorder Data Repository. Accessed July 14, 2020. <https://mi-suddr.com/blog/2018/09/26/opioid-heroin-poisonings/>
2. Michigan Department of Health and Human Services. *Drug Poisoning Deaths among Michigan Residents 1999-2018.*; 2019. Accessed July 14, 2020. https://www.michigan.gov/documents/opioids/1999-2018_All_Drug_and_Opioid_Poisoning_Deaths_Fact_Sheet_672096_7.pdf
3. Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System. Injury Prevention & Control. Published July 14, 2020. <https://www.cdc.gov/injury/wisqars/>
4. Centers for Disease Control and Prevention. Fentanyl. Opioid Overdose. <https://www.cdc.gov/drugoverdose/opioids/fentanyl.html>
5. American Public Health Association. Health Equity. APHA. Accessed July 16, 2020. <https://www.apha.org/topics-and-issues/health-equity>
6. Centers for Disease Control and Prevention. Health Equity. National Center for Chronic Disease Prevention and Health Promotion. Accessed July 16, 2020. <https://www.cdc.gov/chronicdisease/healthequity/index.htm>
7. HealthyPeople.gov. Disparities. Healthy People 2020. Accessed July 16, 2020. <https://www.healthypeople.gov/2020/about/foundation-health-measures/Disparities>
8. Minnesota Department of Health. *Race Rate Disparity in Drug Overdose Death.*; 2018. Accessed September 28, 2020. <https://www.health.state.mn.us/communities/opioids/documents/raceratedisparity.pdf>
9. Drug Policy Alliance. Race and the Drug War. Accessed September 28, 2020. <https://www.drugpolicy.org/issues/race-and-drug-war>
10. Lippold KM, Jones CM, Olsen EO, Giroir BP. Racial/Ethnic and Age Group Differences in Opioid and Synthetic Opioid–Involved Overdose Deaths Among Adults Aged ≥18 Years in Metropolitan Areas — United States, 2015–2017. *MMWR Morb Mortal Wkly Rep.* 2019;68(43):967-973. doi:10.15585/mmwr.mm6843a3
11. Substance Abuse and Mental Health Services Administration. *The Opioid Crisis and the Black/African American Population: An Urgent Issue.* U.S. Department of Health and Human Services; 2018. Accessed September 28, 2020. https://store.samhsa.gov/sites/default/files/SAMHSA_Digital_Download/PEP20-05-02-001_508%20Final.pdf
12. James, K. Jordan, A. The Opioid Crisis in Black Communities. *J Law Med Ethics.* 2018;46(2):404-421. doi:<https://doi.org/10.1177%2F1073110518782949>

13. Bennett AS, Elliott L, Golub A. Opioid and Other Substance Misuse, Overdose Risk, and the Potential for Prevention Among a Sample of OEF/OIF Veterans in New York City. *Subst Use Misuse*. 2013;48(10):894-907. doi:10.3109/10826084.2013.796991
14. Veterans Health Administration. *National Veteran Health Equity Report– FY2013*. Department of Veteran Affairs. Accessed September 25, 2020. https://www.va.gov/HEALTHEQUITY/docs/National_Veterans_Health_Equity_Report_FY2013_FINAL_508_Comp.pdf
15. National Institute on Drug Abuse. Substance Use and SUDs in LGBTQ* Populations. DrugAbuse.gov. Accessed August 27, 2020. <https://www.drugabuse.gov/drug-topics/substance-use-suds-in-lgbtq-populations#references>
16. Medley, G., Lipari, R.N, Bose, J. *Sexual Orientation and Estimates of Adult Substance Use and Mental Health: Results from the 2015 National Survey on Drug Use and Health*. SAMHSA; 2016. Accessed August 27, 2020. [https://www.samhsa.gov/data/sites/default/files/NSDUH-SexualOrientation-2015/NSDUH-SexualOrientation-2015.htm](https://www.samhsa.gov/data/sites/default/files/NSDUH-SexualOrientation-2015/NSDUH-SexualOrientation-2015/NSDUH-SexualOrientation-2015.htm)
17. Cochran BN, Cauce AM. Characteristics of lesbian, gay, bisexual, and transgender individuals entering substance abuse treatment. *J Subst Abuse Treat*. 2006;30(2):135-146. doi:10.1016/j.jsat.2005.11.009
18. Kattari, S.K.; Misiolek, B.A. *Michigan Trans Health Survey, 2018*. University of Michigan School of Social Work/The Center for Sexuality and Health Disparities; Transcend the Binary Accessed September 1, 2020. <https://www.transcendthebinary.org/survey/>
19. National Survey on Drug Use and Health, 2018. Substance Abuse and Mental Health Data Archive. Accessed August 27, 2020. https://pdas.samhsa.gov/#/survey/NSDUH-2018-DS0001/crosstab?results_received=false&run_chisq=false&weight=ANALWT_C
20. FitzGerald C, Hurst S. Implicit bias in healthcare professionals: a systematic review. *BMC Med Ethics*. 2017;18(1):19. doi:10.1186/s12910-017-0179-8
21. Wilson N, Kariisa M, Seth P, Smith H, Davis NL. Drug and Opioid-Involved Overdose Deaths — United States, 2017–2018. *MMWR Morb Mortal Wkly Rep*. 2020;69(11):290-297. doi:10.15585/mmwr.mm6911a4
22. Massachusetts Department of Public Health. *Opioid-Related Overdose Deaths, All Intents, MA Residents – Demographic Data Highlights.*; 2020. <https://www.mass.gov/doc/opioid-related-overdose-deaths-demographics-november-2020/download>
23. DeLaquil, M. *Differences in Rates of Drug Overdose Deaths by Race*. Minnesota Department of Health; 2020. <https://www.health.state.mn.us/communities/opioids/documents/raceratedisparity2019prelimfinal.pdf>
24. Lagisetty PA, Ross R, Bohnert A, Clay M, Maust DT. Buprenorphine Treatment Divide by Race/Ethnicity and Payment. *JAMA Psychiatry*. 2019;76(9):979. doi:10.1001/jamapsychiatry.2019.0876

25. Kilaru AS, Xiong A, Lowenstein M, et al. Incidence of Treatment for Opioid Use Disorder Following Nonfatal Overdose in Commercially Insured Patients. *JAMA Netw Open*. 2020;3(5):e205852. doi:10.1001/jamanetworkopen.2020.5852
26. Bigback KM, Hoopes M, Dankovchik J, et al. Using Record Linkage to Improve Race Data Quality for American Indians and Alaska Natives in Two Pacific Northwest State Hospital Discharge Databases. *Health Serv Res*. 2015;50:1390-1402. doi:10.1111/1475-6773.12331
27. Dougherty TM, Janitz AE, Williams MB, et al. Racial Misclassification in Mortality Records Among American Indians/Alaska Natives in Oklahoma From 1991 to 2015: *J Public Health Manag Pract*. 2019;25:S36-S43. doi:10.1097/PHH.0000000000001019
28. Arias E, Heron M, National Center for Health Statistics, Hakes J, US Census Bureau. The Validity of Race and Hispanic-origin Reporting on Death Certificates in the United States: An Update. *Vital Health Stat 2*. 2016;(172):1-21.
29. Klinger EV, Carlini SV, Gonzalez I, et al. Accuracy of Race, Ethnicity, and Language Preference in an Electronic Health Record. *J Gen Intern Med*. 2015;30(6):719-723. doi:10.1007/s11606-014-3102-8

Appendices

Appendix 1: Data Sources

Data Source	Abbreviation	Year Included	Type of Data	Data Owner
Michigan Resident Death Files	N/A	1999-2018	Death certificates; surveillance data	MDHHS Division for Vital Records and Health Statistics
Michigan Emergency Medical Services Information System	MiEMSIS	2018	EMS responses; surveillance data	MDHHS Bureau of Emergency, Trauma, and Preparedness
Michigan Inpatient and Outpatient Databases	MIDB/MODB	2018	ED visits and hospitalizations; surveillance data	Michigan Health and Hospital Association
Treatment Episode Dataset	TEDS	2018	Substance use treatment admissions; surveillance data	MDHHS Behavioral Health and Developmental Disabilities Administration
Michigan Youth Risk Behavioral Survey	YRBS	2019	Survey data	Michigan Department of Education
Michigan Trans Health Survey		May-September 2018	Survey data	University of Michigan School of Social Work/The Center for Sexuality and Health Disparities; Transcend the Binary

MDHHS=Michigan Department of Health and Human Services

Appendix 2: Case Definitions

Data Source	Indicator	Case Definition
Michigan Resident Death Files	All drug overdose	Deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death
	Specific drug overdoses	Deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, X60-X64) as the underlying cause of death AND the following as a related cause of death: <i>Heroin</i> : T40.1 <i>Methadone</i> : T40.3 <i>Synthetic opioids</i> : T40.4 <i>Cocaine</i> : T40.5 <i>Psychostimulants</i> : T43.60-T43.64, T43.60) <i>Opioid poly-drug</i> : a T40.0-T40.4, T40.6 code AND an additional T36-T50 code
Michigan Emergency Medical Services Information System	Probable opioid overdose	EMS opioid overdoses are identified through a likelihood formula that creates a composite score based on EMS provider impression, chief complaint, case narrative, respiratory rate, Glasgow Coma Scale, medications administered, and procedures performed during the response. EMS responses are classified as probable opioid overdoses if the patient improved after naloxone administration and/or had a minimum composite score of four or five, depending on the criteria present.
Michigan Inpatient and Outpatient Databases	All drug overdose	Emergency department visits with the following ICD-10CM codes reported as the principal or any secondary diagnosis: T36-T50. Codes were restricted to initial visits and overdoses of unintentional or undetermined intent.
Treatment Episode Dataset	Any drug as primary substance of use	Substance use treatment episodes where a drug was the primary substance of use (mental health treatment episodes without co-occurring SUD treatment and episodes related to alcohol use were excluded). Episodes were restricted to "Initial SUD Start Records."
	Specific drug as primary substance of use	Substance use disorder treatment episodes where a drug was the primary substance (mental health treatment episodes without co-occurring SUD treatment and episodes related to alcohol use were excluded). Specific drug categories were defined based on the drug recorded in the "Primary Substance of Abuse" field. Episodes were restricted to "Initial SUD Start Records."

PROBABLE OPIOID OVERDOSE RESPONDED TO BY EMS CASE DEFINITION

One point is tallied for each of the following indicators that is present. The resulting number of points is called the overdose score (potential values 0-7):

1. EMS impressions:
 - a. First/second provider impression (eSituation.11/.12) indicates overdose (T36-T50)
 - b. First provider impression (eSituation.11) indicates opioid use disorder (F11).
2. Chief Complaint (eSituation.04) or narrative (Narrative.01) mentions opioids: opioid, opiate, heroin, morphine, codeine, fentanyl, hydrocodone, hydromorphone, methadone, oxycodone and brand names and misspellings.
3. Chief Complaint (eSituation.04) or narrative (Narrative.01) mentions overdose: od, o/d, overdose and misspellings for overdose.
4. Respiratory distress/depression:
 - a. Initial Respiratory rate (eVitals.14) of less than 11
 - b. Chief Complaint (eSituation.04) or narrative (Narrative.01) mentions respiratory distress/depression: sob, apneic, bradypnea, shallow respirations, respiratory depression, respiratory arrest, difficulty/trouble breathing, respirations decreased, breathing problems, breathing shallow, breathing rate slow, not breathing, breaths were poor, ventilations, barely breathing, along with misspellings. An incident is not considered to have narrative mention of respiratory symptoms if the terms are preceded by a negative (no, not, denies, denied).
5. Consciousness:
 - a. Initial Glasgow Coma Scale (eVitals.23) of less than 15
 - b. Chief Complaint (eSituation.04) or narrative (Narrative.01) mentions altered level of consciousness: loc, ams, unresponsive, only responsive, altered mental status, decreased consciousness, semiconscious, not responding, passed out, consciousness declined, altered loc, altered level of consciousness, not responsive. An incident is not considered to have narrative mention of altered level of consciousness if the narrative contains the phrases no loss of consciousness, denies loss of consciousness, or no loc.
6. Treatment:
 - a. Medications (eMedications.03) contains Narcan or naloxone.
 - b. Procedures (eProcedures.03) contains valve, cardiopulmonary, chest compressions or oxygen mask.
 - c. Chief Complaint (eSituation.04) mentions Narcan or narrative (Narrative.01) includes the terms rebreath, bag valve, bag mask, Narcan, nalox, CPR or compressions.
7. Eyes:
 - a. Chief Complaint (eSituation.04) or narrative (Narrative.01) contains pinpoint pupil, pupils are/were constricted, to be pinpoint or pupils are/were pinpoint.

A person has an opioid overdose if one of the following circumstances applies:

- A. An overdose score of 5 or greater.
- B. An overdose score of 4 and at least one of the first three indicators is present.
- C. The person improved after being administered Narcan.

This syndrome is restricted to only those incidents where the Type of Service (eResponse.05) is 911 response (scene), intercept or mutual aid.

Appendix 3: Fatal and Non-fatal Overdose Rate Ratios by Race and Ethnicity

Table 8. Ratio of age-adjusted fatal overdose rates^{a,b,c} by race and ethnicity group^d as compared to White, non-Hispanic and Unknown Ethnicity Decedents, Michigan Emergency Preparedness Regions^e 2018

PEHP Region	Rate Ratio			
	Black, NH/UE (n=511)	API, NH/UE (n=10)	AIAN, NH/UE (n=29)	Hispanic (n=166)
Region 1	1.4 (0.9, 2.3)	*	*	1.5 (0.9, 2.5)
Region 2N	0.7 (0.5, 0.9)	*	*	1.5 (1, 2.1)
Region 2S	1.2 (1, 1.4)*	*	2.9 (1.7, 5.2)	1.4 (1.1, 1.8)
Region 3	1.1 (0.8, 1.6)	*	*	1.4 (0.9, 2.3)
Region 5	1 (0.6, 1.8)	*	*	1.2 (0.7, 2.3)
Region 6	1.7 (1.1, 2.6)	*	5.1 (2.5, 10.7)	0.8 (0.4, 1.5)
Region 7	*	*	*	4.2 (1.8, 9.9)
Region 8	1.2 (0.2, 8.6)	*	*	9.6 (3.9, 23.7)
Statewide	1.4 (1.3, 1.6)	0.1 (0.1, 0.2)	1.7 (1.2, 2.5)	1.5 (1.2, 1.7)

Sources: Resident Death Files, MDHHS Division for Vital Records and Health Statistics. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

Abbreviations: API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH/UE = non-Hispanic and unknown ethnicity

*Estimates in orange are statistically significant.

^aAll deaths with unintentional or undetermined manner drug overdose (ICD-10 codes of X40-X44, Y10-14) as the underlying cause of death are included as drug overdose deaths.

^bRates are age-adjusted to the 2000 U.S. standard population via direct standardization. Ninety five percent equal-tailed confidence intervals were calculated for each rate ratio. Rate ratios were considered statistically significant when the confidence interval did not overlap with 1.0.

^cRate ratios bolded in orange are statically significant.

^dThree fatal overdoses were missing race data and one fatal overdose was other NH/UE race. Eight fatal overdoses were missing county of residence data.

^eSee Figure 21 for map of Michigan Emergency Preparedness Regions.

Table 9. Ratio of age-adjusted nonfatal overdose rates^{a,b,c} by race and ethnicity group^d as compared to White, non-Hispanic and Unknown Ethnicity Decedents, Michigan Emergency Preparedness Regions^e 2018

PEHP Region	Rate Ratio			
	Black, NH/UE (n=5,129)	API, NH/UE (n=84)	AIAN, NH/UE (n=132)	Hispanic (n=552)
Region 1	1.5 (1.3, 1.7)*	0.1 (0.1, 0.3)	0.8 (0.4, 1.6)	0.8 (0.6, 1)
Region 2N	1.1 (1, 1.1)	0.1 (0.1, 0.1)	0.4 (0.2, 0.8)	0.2 (0.2, 0.3)
Region 2S	1.3 (1.2, 1.3)	0 (0, 0.1)	0.4 (0.2, 0.6)	0.4 (0.3, 0.4)
Region 3	1.4 (1.3, 1.6)	*	0.4 (0.2, 0.9)	0.6 (0.5, 0.8)
Region 5	1.6 (1.4, 1.9)	*	0.8 (0.4, 1.5)	0.5 (0.4, 0.7)
Region 6	1.6 (1.4, 1.9)	0.3 (0.2, 0.5)	2 (1.4, 2.9)	0.7 (0.6, 0.9)
Region 7	*	0 (n/a)	1 (0.6, 1.9)	*
Region 8	0.8 (0.4, 1.6)	*	1.4 (1, 2.1)	*
Statewide	1.5 (1.4, 1.5)	0.1 (0.1, 0.1)	0.8 (0.7, 0.9)	0.5 (0.5, 0.5)

Sources: Michigan Resident Inpatient & Outpatient Files, Michigan Health and Hospital Association. Bridged-race vintage 2018 postcensal series of population estimates, National Center for Health Statistics.

Abbreviations: API= Asian and Pacific Islander, AIAN=American Indian and Alaska Native, NH/UE = non-Hispanic and unknown ethnicity

*Estimates in orange are statistically significant.

^aEmergency department visits with the following ICD-10CM codes reported as the principal or any secondary diagnosis were included as drug overdoses: T36-T50. Codes were restricted to initial visits and overdoses of unintentional or undetermined intent.

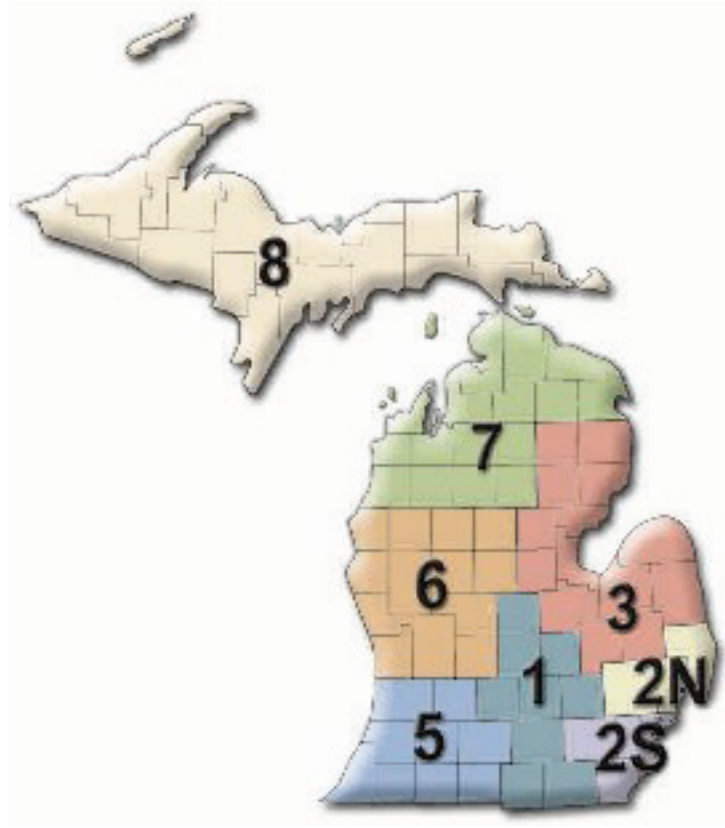
^bRates are age-adjusted to the 2000 U.S. standard population via direct standardization. Ninety five percent equal-tailed confidence intervals were calculated for each rate ratio. Rate ratios were considered statistically significant when the confidence interval did not overlap with 1.0.

^cRate ratios bolded in orange are statically significant.

^d185 overdoses were missing race data and 383 overdoses were other NH/UE race.

^eSee Figure 21 for map of Michigan Emergency Preparedness Regions.

Figure 21. Michigan Emergency Preparedness Regions



Source: https://www.michigan.gov/mdhhs/0,5885,7-339-71548_54783_54826_56171-237197--,00.html