Maryland
DEPARTMENT OF HEALTH

DORM

Data-Informed Overdose Risk Mitigation

2022 Annual Report

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I. EXECUTIVE SUMMARY

Overview

In 2018, House Bill (HB) 922, known as the Chapter 211 Act, was signed into law, requiring the Maryland Department of Health (MDH) to produce an annual report examining the history of individuals in the State of Maryland who suffered a fatal overdose (OD). As Chapter 211 specifies, this report shall include an assessment of multiple factors associated with fatal and NFOD risk and programs and services related to substance use (SU), among other issues., Where feasible, this report seeks to link de-identified, person-level data from at least 18 distinct data sources or data sets possessed by multiple state agencies. Collectively, the examination, collaboration, assessment, and report are subsequently referred to as the Data-Informed Overdose Risk Mitigation (DORM) initiative. The report is due to the Governor and General Assembly on July 1 of each year, with the statute sunsetting on July 1, 2024.

This year's report builds on work from previous years and includes linked analyses using data sets provided by the Vital Statistics Administration (VSA), the Prescription Drug Monitoring Program (PDMP), the Health Services Cost Review Commission (HSCRC), the Public Behavioral Health System (PBHS), Maryland Medicaid, and new to the report this year is data from the Maryland Institute for Emergency Medical Services Systems (MIEMSS). Additionally, programmatic data was provided from numerous offices within MDH, including the Center for Harm Reduction Services (CHRS) and the Environmental Health Bureau.

To support more secure usage of linked data, the Opioid Operational Command Center (OOCC), partnered with the MDH Behavioral Health Administration (BHA), Chesapeake Regional Information System for our Patients (CRISP), Maryland's health information exchange, and the Johns Hopkins Bloomberg School of Public Health (JHSPH) to migrate certain linked data sets supporting this project onto the Maryland Total Human-services Integrated Network (MD THINK) platform, Maryland's cloud-based data storage and management system.

High-Level Findings

There were 2,800 OD-related fatalities in Maryland in 2021, according to preliminary data provided by the VSA. This was the highest annual total in the State of Maryland's history. Fentanyl continues to be the leading contributor to OD deaths and was involved in 83.7 percent of OD deaths in 2021. Since 2018, cocaine has consistently been the second-most common substance involved in fatal ODs and was involved in 36.5 percent of OD deaths in 2021.

The Maryland Emergency Department Drug Surveillance (MD-EDDS) Program analyzes patient toxicology results in electronic health records (EHRs) for OD patients treated in local emergency departments (EDs). MD-EDDS provided 14 hospitals with urine dipsticks to test for fentanyl and found the substance in all of the hospitals, none of which routinely tested for fentanyl at the time. Data collected by MD-EDDS shows that 10 of 13 hospitals in the study had their lowest opioid-positive urine screens in 2022. For cocaine, 8 of 13 hospitals and, for methamphetamine/amphetamine, 7 of 13 hospitals, had their highest positive urine screens in 2022.

The MIEMSS data set was the most recent addition to the linked data sets for research and analysis for the DORM report. The addition of emergency medical services (EMS) encounter data could provide a more detailed account of interactions between EMS encounters and connections to hospital care or other

services outside of the medical system. Preliminary analysis of this data identified opioid OD-related incidents and examined the rate of transport for these incidents in 2021 and 2022. Overall, the rate of opioid-related OD incidents that resulted in a transport increased from 2021 to 2022. Comparing patients who were transported to patients who were not transported, patients not transported were found to be: 1) younger on average; 2) more likely to be male; 3) more likely to be recorded as of 'white' race; and 4) more likely to be located in the Eastern Shore region.

Between January 1, 2021, and December 31, 2022, out of 1,251,050 unique incidents identified in the MIEMSS data set, 34,094 were identified as related to an opioid OD (based on a definition of opioid OD incident that was adapted from the MDH workgroups). This definition combines information from the primary and secondary impression fields in EMS reports, narrative, and administered medications to identify opioid-related OD incidents (more details in Appendix C).

The new partnership between MIEMSS and MDH to provide EMS data for linked analysis opens the door for future linked analysis. This connects points of care from initial EMS encounter to hospital care to outside linked services. With a new data set, new trends can emerge to help provide a clearer picture of the factors surrounding OD events throughout Maryland and identify new opportunities to reduce the overall number of fatal ODs.

Maryland has continued to experience growing disparity in OD-related deaths across demographic groups. Between 2017 and 2021, OD deaths among non-Hispanic Black and Hispanic individuals increased, while OD deaths among non-Hispanic Whites decreased. Black individuals were also more likely than White individuals to have an all-cause ED visit or inpatient admission and were more likely to experience a subsequent NFOD in the year following an initial NFOD. Only 13.7 percent of individuals that experienced their first NFOD in Maryland between July 2016 and December 2021 received a prescription for buprenorphine in the year following the index NFOD.

Between 2017 and 2021, fatal ODs among people aged 55 and over have increased, while decreasing among those under the age of 25. Overall, the number of individuals who received a prescription for buprenorphine was lower among older adults. Non-Hispanic Black individuals aged 55 and over have been among the groups most impacted by fatal ODs in Maryland, with OD deaths among this cohort increasing by 264 percent since 2016 while concurrently receiving low rates of buprenorphine prescriptions.

Data from Maryland's PBHS, which provides publicly funded services for individuals who are enrolled in Medicaid or who are uninsured, shows the number of individuals who received any type of substance use disorder (SUD) service, excluding Medication for Opioid Use Disorder (MOUD), in Maryland increased by 32.0 percent from 2016 to 2020 before decreasing by 13.5 percent between 2020 and 2021. The number of individuals who received MOUD through PBHS, including buprenorphine, methadone, and long-acting naltrexone, increased by 11.7 percent from 2016 to 2021.

The majority of OD deaths in 2021 occurred in a residential setting and, in most cases, there was a bystander present. In 2021, 57.2 percent of all fatal ODs occurred in a residence and did not have naloxone administered. From 2020 to 2021, the percentage of overall naloxone administrations in situations where there was a fatal OD in a residential setting decreased from 17.7 to 11.9 percent. This highlights the continued need to promote bystander administration of naloxone through training and dispensing of naloxone.

Policy Implications

The findings presented in this report highlight several important considerations and opportunities for Maryland to continue its work to improve OD-related morbidity and mortality in the state.

1. Continue to Address Growing Racial Disparities

OD deaths in Maryland among non-Hispanic Black individuals continue to increase as OD deaths among non-Hispanic White individuals continue to decrease. In August 2022, Maryland's Racial Disparities in Overdose Task Force released a report which included policies and programmatic considerations for reducing OD mortality in Black communities. The OOCC will continue to work with state and local partners to implement the recommendations from the report.

2. Explore and Address Factors Driving Increasing Overdose Death Rates Among Individuals 55+

Given the rising rates of OD among older populations overall and the high percentage of older adults with first NFOD in the sample, expanding access to care coordination and buprenorphine for older adults and Medicare beneficiaries is a key area of intervention to explore. The OOCC will work with the BHA in coordination with the Maryland Department of Aging to further understand these trends and to identify interventions that can be tailored to reach this highly impacted population.

3. Continue to Promote Naloxone Training and Distribution

Naloxone is our most effective tool in preventing fatal ODs. In 2021, 83.8 percent of OD decedents in Maryland were not administered naloxone which shows the need for naloxone saturation. The majority of OD deaths in 2021 occurred in a residential setting and, in most cases, there was a bystander present. From 2020 to 2021, the percentage of overall naloxone administrations in situations where there was a fatal OD in a residential setting decreased from 17.7 to 11.9 percent. This highlights the continued need to promote bystander administration of naloxone through training and dispensing of naloxone, as well as education on Maryland's Good Samaritan Law. Particular attention should be focused on expanding education and training among friends and family members of people who use drugs. OD education and naloxone distribution targeted towards people who use drugs remains the top priority because they are best positioned to respond to an OD due to the frequency with which they witness them.

CHRS operates a successful community-based naloxone distribution program, which has expanded based on the enactment of the Statewide Targeted Overdose Prevention (STOP) Act of 2022. The STOP Act expanded targeted naloxone distribution efforts in Maryland by requiring certain entities, such as hospital systems, certain outpatient SUD treatment facilities, and correctional settings, to offer naloxone to certain individuals they serve. Policymakers should consider taking steps to ensure that adequate and consistent supply of naloxone is available for statewide distribution.

4. Increase Access to Low Barrier Buprenorphine

Only 13.7 percent of individuals that experienced their first NFOD in Maryland between July 2016 and December 2021 received a prescription for buprenorphine in the year following the index NFOD. Data show that individuals aged 55 and over had disproportionately low access to buprenorphine in the year following their NFOD, and also accounted for the majority of fatal ODs in Maryland in 2021. Policymakers

should explore opportunities to expand low-barrier access to buprenorphine, such as EMS and ED induction, and increased access in the community.

5. Gather Data on the Emerging Threat of Xylazine

Xylazine is not regulated under the Controlled Dangerous Substance Act as it is a veterinary anesthetic and not Food and Drug Administration (FDA) approved for human use. The emerging trend is for xylazine to be used as a cutting agent in fentanyl. Due to these two factors, and the fact that xylazine use in combination with opioids has been relatively rare until recent years, lab seizure data is limited. Naloxone is an opioid antagonist, and thus only works in reversing an opioid OD. Xylazine is not an opioid, and thus naloxone is ineffective in reversing the effects of xylazine. Xylazine is almost always seen with opioids, so administering naloxone is still important; however, the recovery from the OD may not appear the same as in cases where xylazine is not present because naloxone will not reverse the sedating effects of xylazine. The person may continue to be asleep or unconscious, and monitoring their breath and administering rescue breathing is particularly important. Even if they are unconscious, if they are breathing it means that the naloxone was effective at reversing the respiratory depression caused by opioids, and additional doses of naloxone are probably not needed. Expanding data collection on xylazine and regular urine screening for the substance will provide better information on trends relevant to OD-related factors.

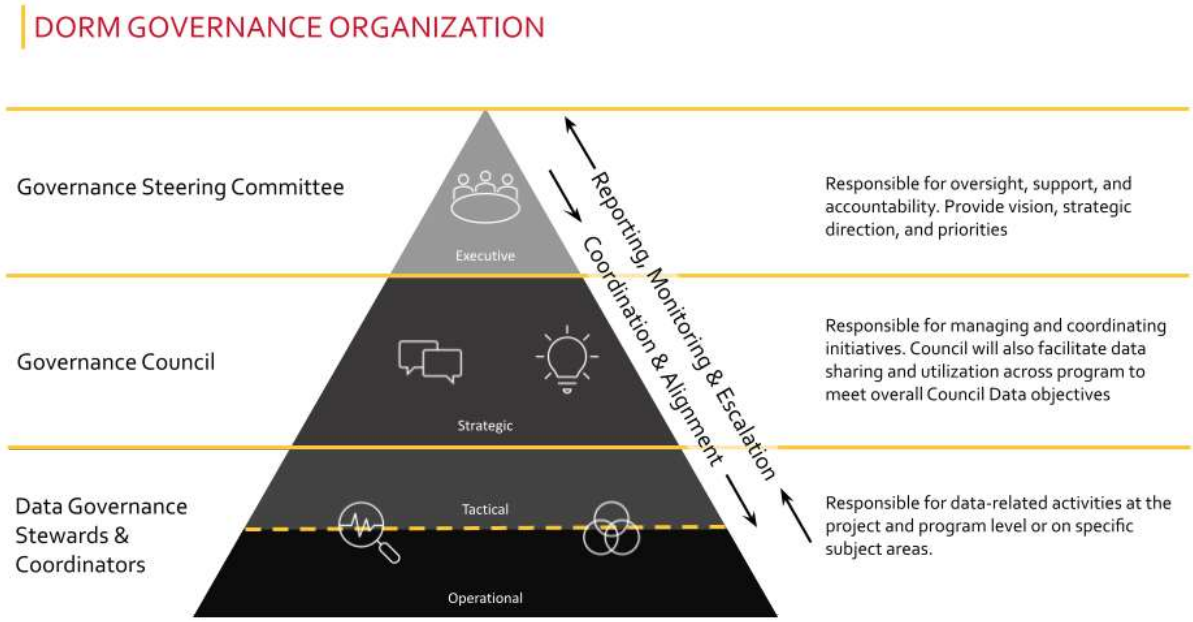
During the 2023 legislative session, MD-EDDS testing results were used to support HB 811/SB 0914 Hospitals - Testing for Fentanyl (The Josh Siems Act). The bill was enacted and will take effect October 1, 2023, requiring Maryland hospitals to begin testing for fentanyl when administering urine drug screenings. The OOCC is funding MD-EDDS in the 2024 fiscal year to continue the analysis of EHRs and to introduce expanded testing for over 500 licit and illicit substances to identify emerging drug trends. This expanded testing will enable the detection of additional substances, such as xylazine. The EHR data will be used to conduct sophisticated geospatial analyses to describe local variations in SU and SU-related health outcomes. The continued partnership between the OOCC and MD-EDDS will aid in gathering further information about xylazine content with testing of over 500 substances including xylazine in MD hospitals. This will enhance data for emerging trends and geographical identification of local variation in SU.

Next Steps

Data insights derived through the DORM initiative have informed state policy and funding decisions and will continue to do so as MDH works to enhance DORM by adding additional data sets and improving coordination among data owners. The 2023 report will include data from additional partners, including the Department of Public Safety and Correctional Services (DPSCS), as well as a more in-depth analysis of MIEMSS data.

Figure 1, below, represents the various levels of organization that guide how DORM is implemented. The DORM Governance Steering Committee will work to onboard additional data sets, including data from DPSCS within the next year.

Figure 1: Data-Informed Overdose Risk Mitigation Governance Structure

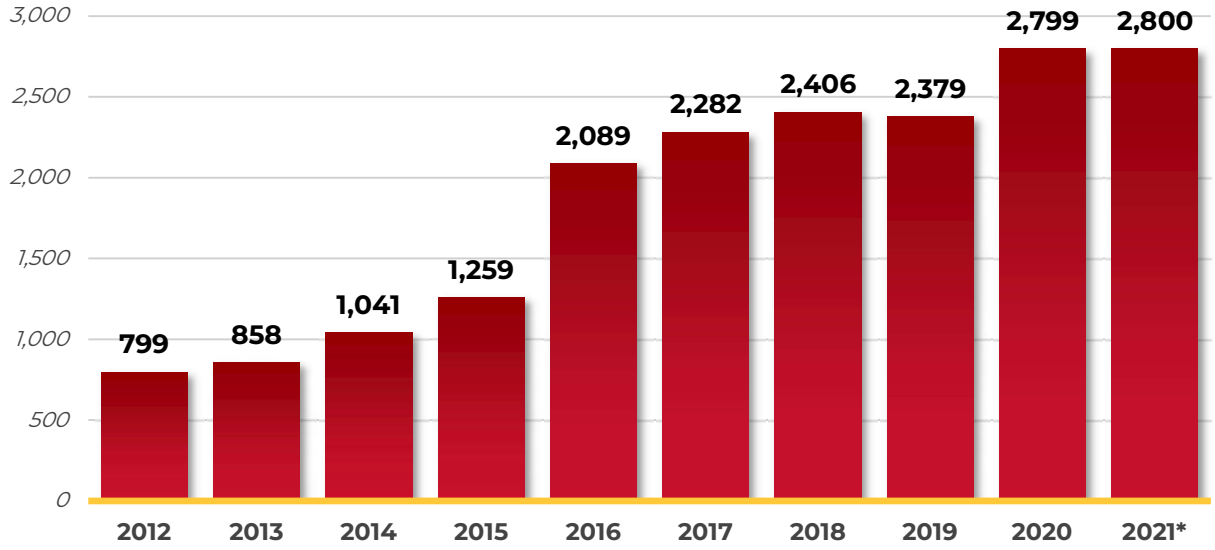


II. OVERDOSE DEATHS IN MARYLAND

The data overview below provides a demographic profile of individuals who experienced a fatal OD in Maryland in recent years.

Preliminary data provided by VSA show that the number of unintentional drug-and-alcohol-related OD fatalities increased from 799 deaths in 2012 to 2,800 deaths in 2021. Fatal ODs increased by 17.7 percent in 2020, following the onset of the coronavirus pandemic. This followed a 1.2-percent decrease in 2019, the first annual increase in fatal OD in over a decade.[1]

Figure 2: Fatal Overdoses Involving All Substances (2012–2021*)



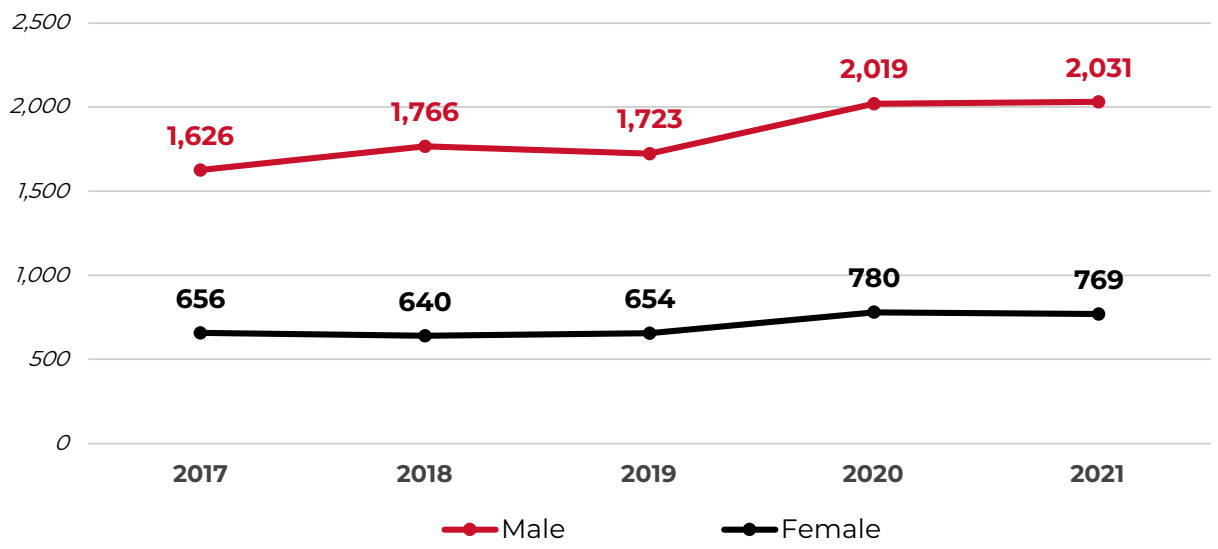
Source: MDH Vital Statistics Administration.

Gender

In 2021, 72.5 percent of OD decedents were male. This trend has been consistent in the last ten years; males have consistently accounted for more OD fatalities than females, peaking with a high of 73.4 percent of total fatal ODs in 2018. Additionally, fatal ODs in the last five years have increased faster among males than among females in Maryland. Between 2017 and 2021, fatal ODs among males grew by 24.9 percent while growing by 17.2 percent among females.[2]

[1] Maryland Department of Health Vital Statistics Administration: Fatal ODs in Maryland.
[2] Ibid.

Figure 3: Fatal Overdoses by Gender (2017–2021*)

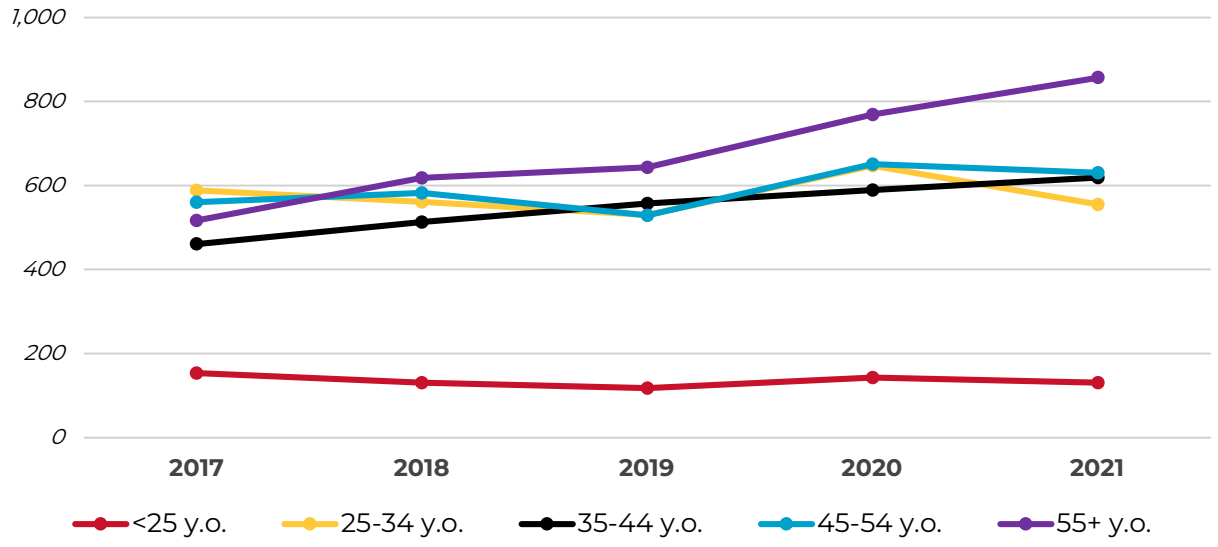


Source: MDH Vital Statistics Administration.

Age

In the last five years, fatal OD trends have varied across age groups in Maryland. For example, fatal ODs among people under 25 years of age have decreased by 14.9 percent while increasing by 65.8 percent among individuals over the age of 55.[3]

Figure 4: Fatal Overdoses by Age (2017–2021*)



Source: MDH Vital Statistics Administration.

[3] Ibid.

Year	<25 Years Old	25-34 Years Old	35-44 Years Old	45-54 Years Old	55+ Years Old
2017	154	588	461	560	517
2018	131	561	513	582	618
2019	118	530	557	529	643
2020	143	647	589	651	769
2021	131	555	619	630	857

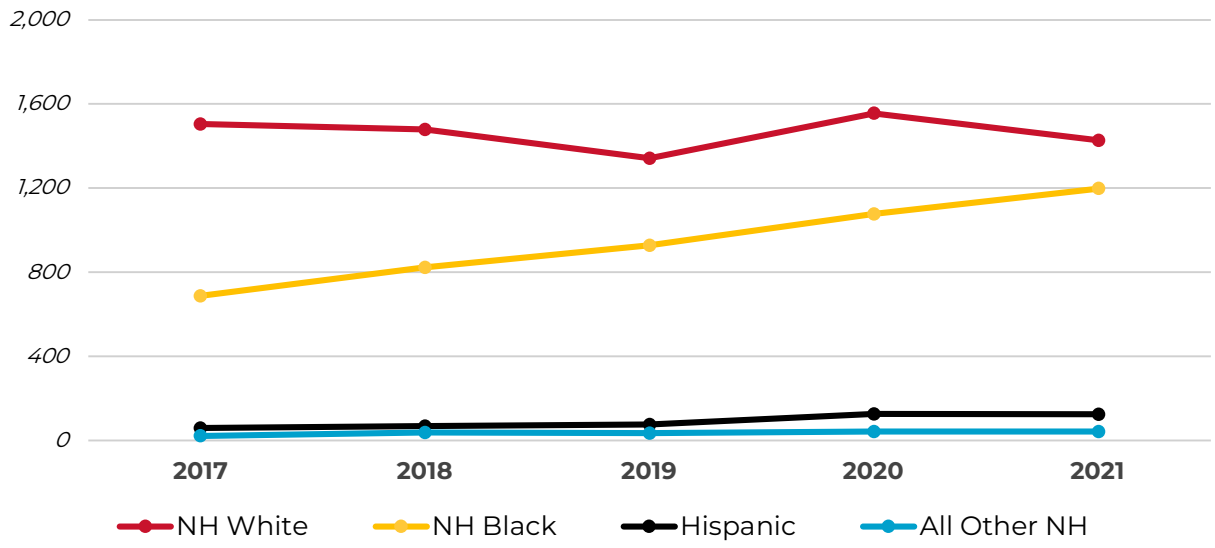
Source: MDH Vital Statistics Administration.

OD deaths among people aged 55 and up are a demographic of particular concern, with the increase in OD deaths in this age group mirrored among people who accessed PBHS services.

Race & Ethnicity

Between 2017 and 2021, the growth of OD fatalities among non-Hispanic Black individuals has outpaced those among non-Hispanic White individuals. During this time, the number of OD fatalities among non-Hispanic White individuals decreased by 5.2 percent (from 1,505 to 1,427) and increased by 74.4 percent (from 687 to 1,198) among non-Hispanic Black individuals.[4] OD fatalities increased by 110.2 percent (from 59 to 124) among Hispanic individuals during the same time frame.

Figure 5: Overdose Deaths by Race/Ethnicity (2017–2021*)



Source: MDH Vital Statistics Administration.

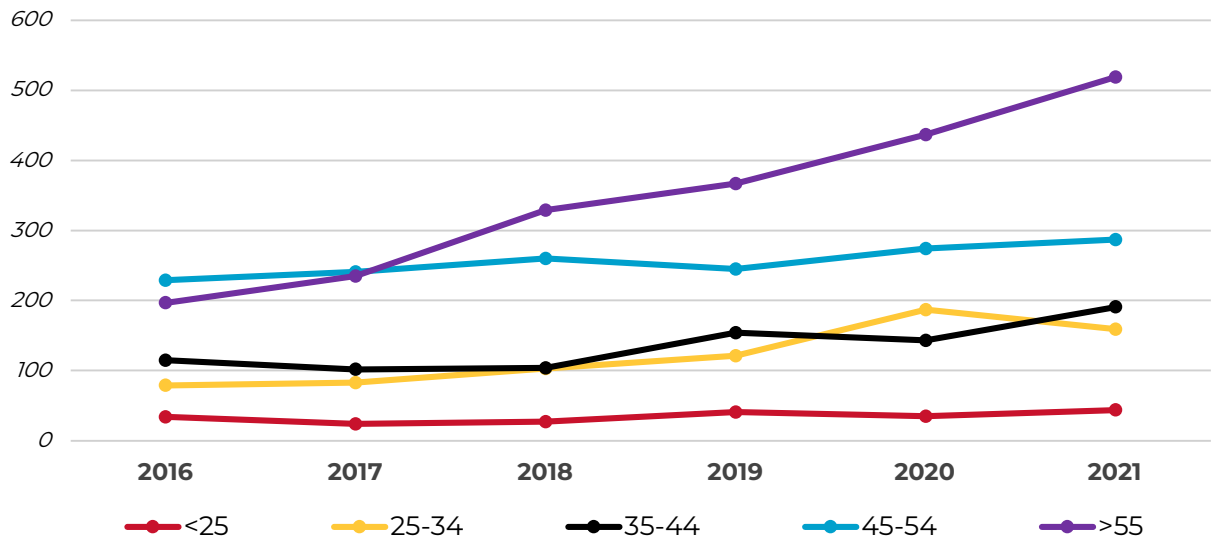
[4]Ibid.

Year	NH White	NH Black	Hispanic	All Other NH
2017	1,505	687	59	21
2018	1,479	823	67	37
2019	1,342	928	75	34
2020	1,556	1,076	126	41
2021	1,427	1,198	124	42

Source: MDH Vital Statistics Administration.

Non-Hispanic Black individuals above the age of 55 have been among the groups most impacted by fatal ODs in Maryland. Deaths among Non-Hispanic Black individuals aged 55 and older have increased by 264 percent since 2016, from 197 to 519.

Figure 6: Fatal Overdoses Among Non-Hispanic Black Individuals by Age (2016–2021*)



Source: MDH Vital Statistics Administration. Analysis performed by the Behavioral Health Administration.

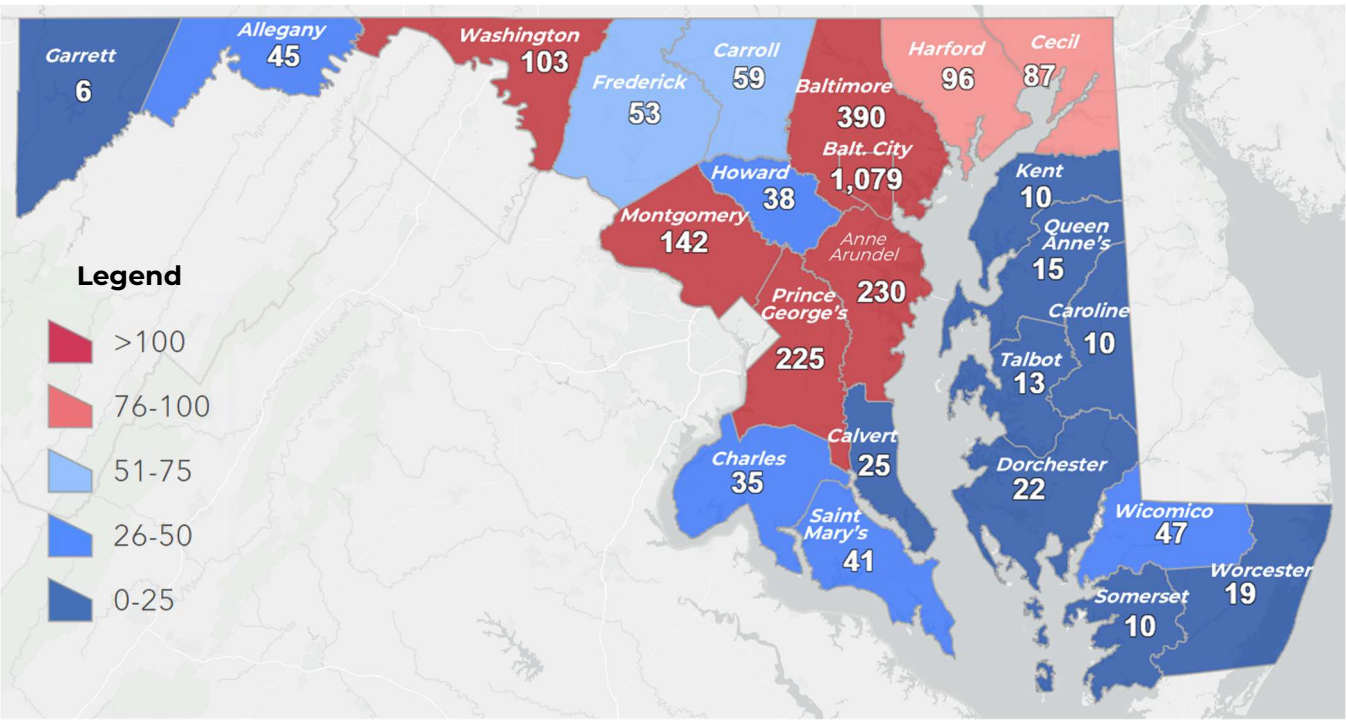
Year	<25	25-34	35-44	45-54	>55
2016	34	79	115	229	197
2017	24	83	102	241	235
2018	27	103	104	260	329
2019	41	121	154	245	367
2020	35	187	143	274	437
2021	44	159	191	287	519

Source: MDH Vital Statistics Administration. Analysis performed by the Behavioral Health Administration.

Geography

OD deaths in Maryland are largely concentrated in the central region of the state. In 2021, 60.4 percent of all OD deaths occurred in Baltimore City (1,079), Baltimore County (390), and Anne Arundel County (230).[5]

Map 1: Fatal Overdoses by Jurisdiction, All Substances (2021*)



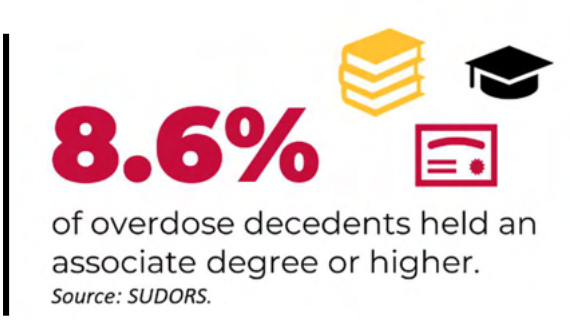
*Source: MDH Vital Statistics Administration. * Data are preliminary.*

[5] Ibid.

Educational Attainment

According to Statewide Unintentional Drug Overdose Reporting System (SUDORS) data, in 2021, 52.1 percent of OD decedents had a high school diploma or equivalent, and 23.9 percent had less than a high school diploma or equivalent.[6] 8.6 percent of people who died from an OD had an associate degree or higher.[7]

These findings indicate lower educational attainment may be associated with OD risk and higher educational attainment may be a protective factor against fatal OD.



Bystanders in Residential Settings

In 2021, 64.9 percent of people who died from an OD were found in a residence.[8] Of those who died in a residence, there was a bystander present in 63 percent of cases, 85.8 percent of which were family members or friends. Naloxone was administered in only 11.9 percent of all residential cases, which illustrates an opportunity to expand targeted naloxone distribution. This means 57.2 percent of fatal ODs were in a residence and did not receive naloxone.



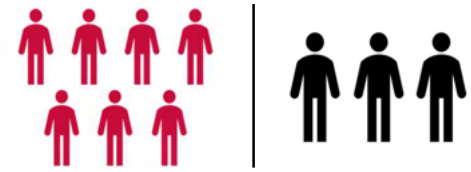
Among OD deaths that occurred in a residential setting in 2021 and in which naloxone was administered to the decedent, naloxone was administered by a first responder[9] in 48.3 percent of cases. In contrast, 61.6 percent of naloxone administrations were conducted by a first responder in 2020. This highlights decreased naloxone administration by first responders (61.6 to 48.3 percent) in situations where there was a fatal OD in a residential setting, however there was an increase in bystander administration (38.4 to 51.7 percent) over first responder administration.

[6] Statewide Unintentional Drug Overdose Reporting System (SUDORS) 2021.
[7] Ibid.
[8] Residential settings include nursing home, long-term care facility, decedent's home, or another person's residence.
[9] First responder includes: EMS/fire; Law enforcement; MIEMSS.

Medicaid Eligibility

A large majority (68.8 percent) of individuals who died from an OD in 2021 were enrolled in Medicaid in Maryland within 12 months of their death.[10]

Between 2017 and 2021, OD decedents who were enrolled in Medicaid within the 12 months preceding their death ranged between 65.0 percent in 2017 to 74.6 percent in 2018.



68.8 of overdose decedents were eligible for Medicaid within 12 months of their death.
Source: SUDORS.

Summary of Overdose Deaths in Maryland

There were 2,800 OD-related fatalities in Maryland in 2021, according to preliminary data provided by VSA. Fentanyl and cocaine are the leading contributors to OD deaths, fentanyl involved in 83.7 percent and cocaine involved in 36.5 percent of OD deaths in 2021. OD deaths among Non-Hispanic Black individuals aged 55 and older have increased by 264 percent since 2016 and have been among the groups most impacted. In 2021, 57.2 percent of all fatal ODs were in a residence and did not receive naloxone.

See Considerations and Limitations to Analysis section for more details.

[10] The Hilltop Institute. (2023, April 14). Medicaid Data for DORM Report. Baltimore, MD: UMBC.

III. NON-FATAL OVERDOSES IN MARYLAND

Demographics

The data shown below provide a demographic profile of individuals who experienced a first NFOD in Maryland between July 2016 and December 2020.

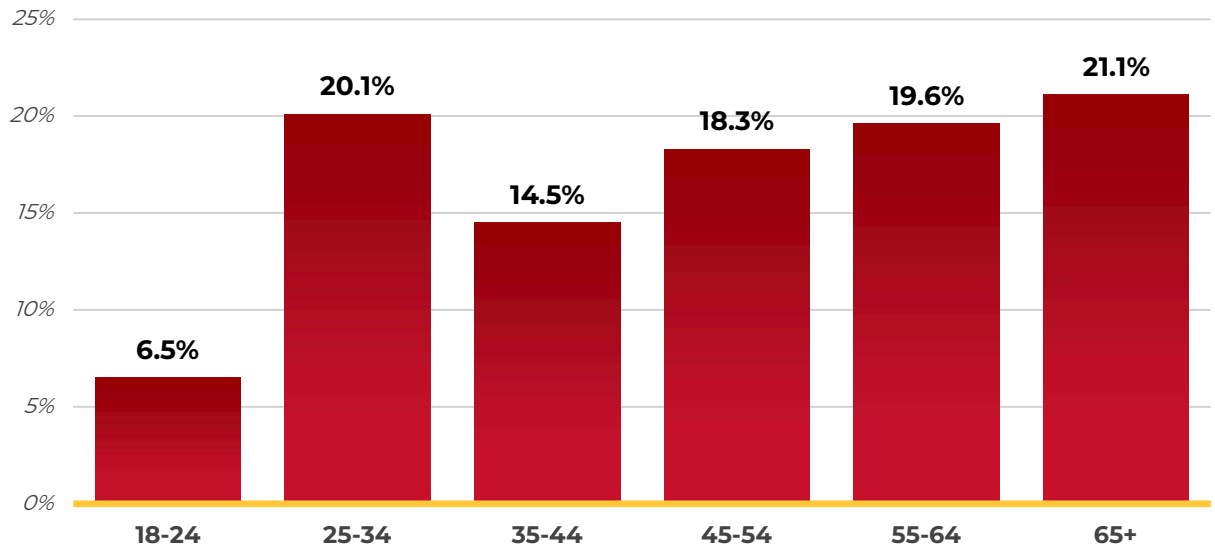
Data prepared and analyzed by JHSPH linked data from PDMP, HSCRC, and OCME to identify "first" NFOD episodes, or an index NFOD event, meaning the first NFOD that occurs in the data period from July 2016 through December 2020. There were 41,558 individuals who experienced a first NFOD between July 1, 2016, and December 31, 2020.

Researchers at JHSPH examined characteristics in the six months prior to index NFOD and the following year. Three sub-samples were examined to better illuminate characteristics associated with buprenorphine use after the index NFOD: 1) people who did not get buprenorphine in the year following the index NFOD; 2) people who had a buprenorphine prescription in the four weeks following the first NFOD; 3) people who had a buprenorphine prescription more than four weeks but less than a year after the first NFOD. Finally, subgroups of people who received buprenorphine by time were examined to understand if the amount of time from an index NFOD to receiving buprenorphine was associated with whether another health outcome occurred.

Age

40.6 percent of individuals with an index NFOD were aged 55 and over.

Figure 7: Non-Fatal Overdoses by Age (2016–2021)



Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

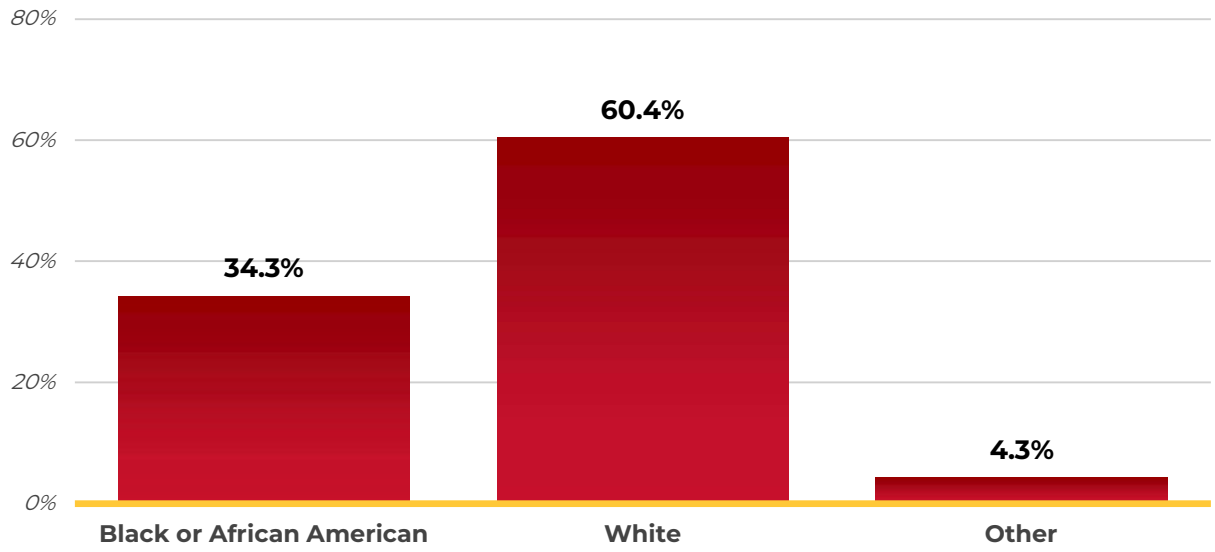
Gender

55.5 percent of individuals with an index NFOD between July 1, 2016, and December 31, 2020, were male.

Race

60.4 percent of people in this sample were white, and 34.3 percent of people in the sample were Black.

Figure 8: Non-Fatal Overdoses by Race (2016–2021)

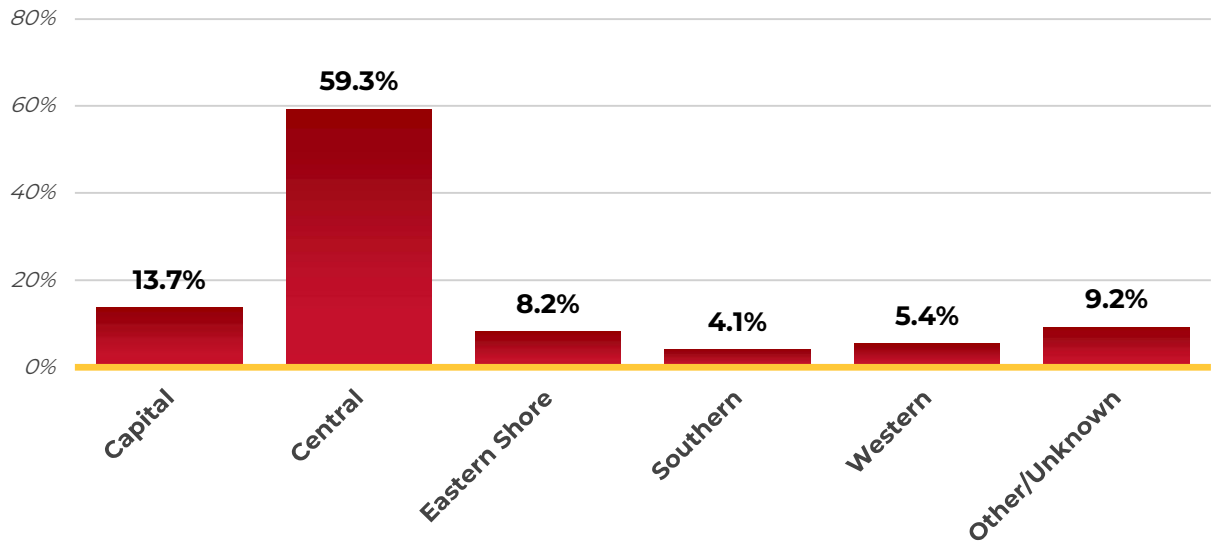


Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Geography

59.3 percent of people in the sample resided in the Central Region, 13.7 percent in the Capital Region, 8.2 percent on the Eastern Shore, 5.4 percent in the Western Region, and 9.2 percent resided out of state or had unknown residency status.

Figure 9: Non-Fatal Overdoses by Region (2016–2021)

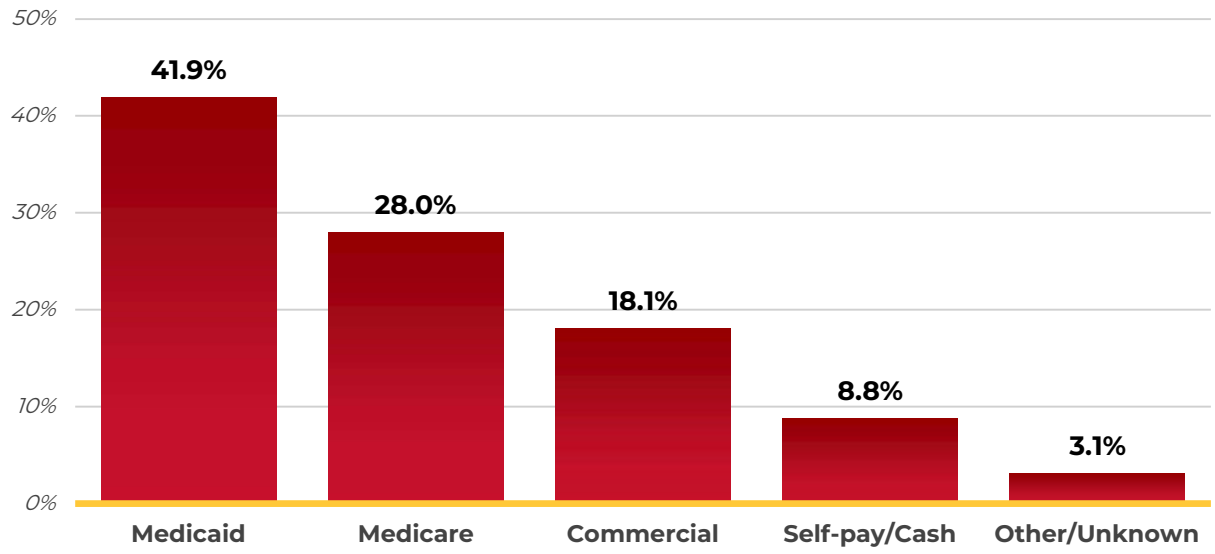


Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Payer Type

41.9 percent of individuals in this sample were covered by Medicaid, 28 percent were covered by Medicare, and 18.1 percent were covered by commercial insurance. 8.8 percent were self-pay, and 3.1 percent were unknown.

Figure 10: Non-Fatal Overdoses by Payer Type (2016–2021)



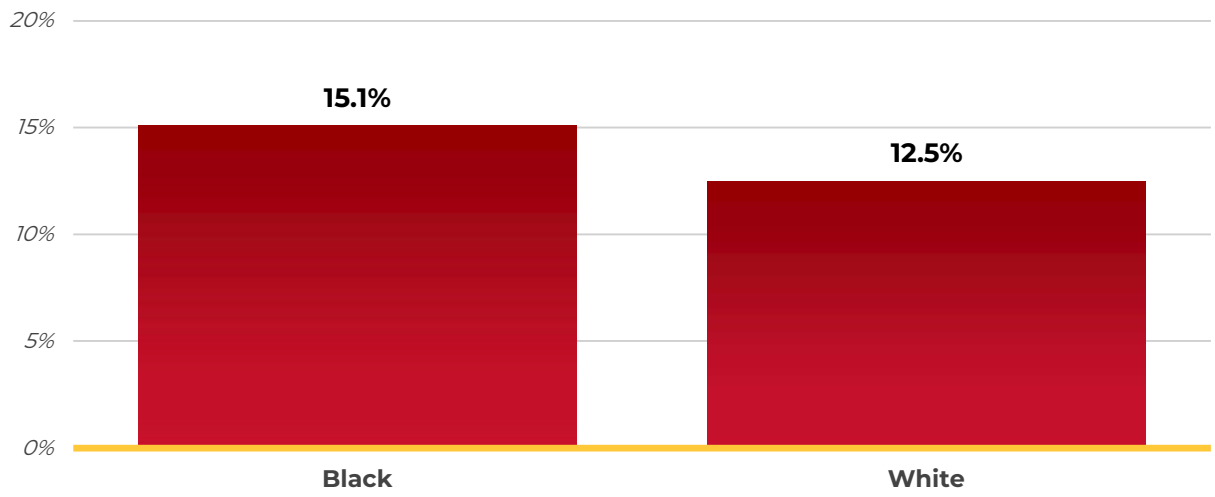
Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Post-NFOD Health Outcomes

13.2 percent of individuals with an index NFOD experienced a subsequent NFOD in the year following their index NFOD. ED visits in the year following an NFOD were somewhat common, with 62.5 percent of individuals visiting an ED in the year after their NFOD. Some individuals also experienced a hospitalization in the year following their NFOD, with 33.8 percent of the sample falling into that category.

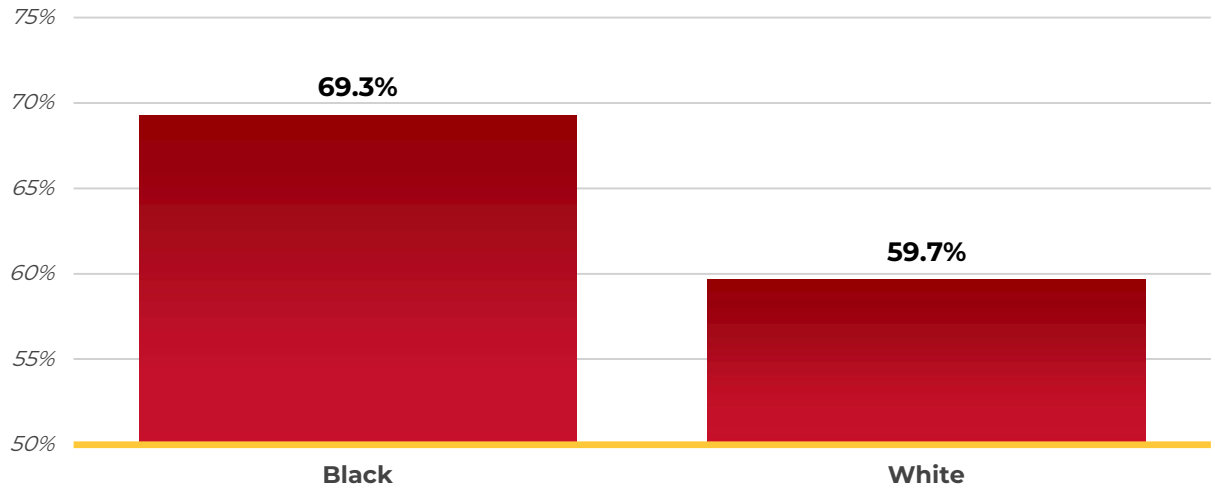
Black individuals in the sample were more likely than White individuals to have either a subsequent ED visit or hospitalization in the year after their index NFOD.

Figure 11: Subsequent Non-Fatal Overdose by Race (2016–2021)



Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Figure 12: Subsequent Emergency Department Visit (All Causes) by Race (2016–2021)



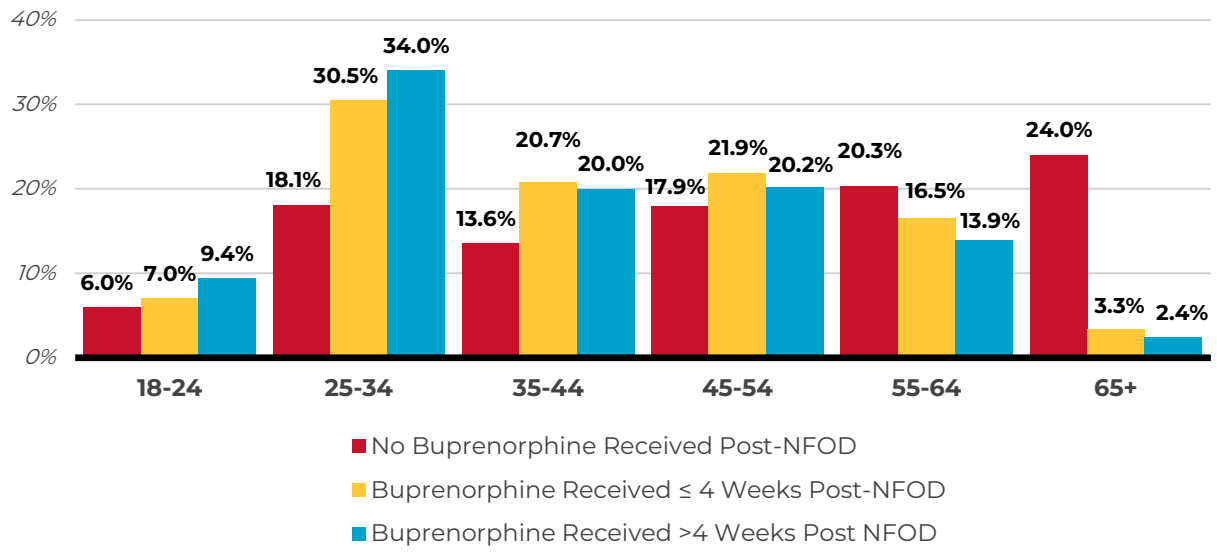
Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Post-NFOD Buprenorphine Access

Only 13.7 percent of people in the sample received a prescription for buprenorphine in the year following their index NFOD. 41 percent of people who received buprenorphine did so in the first four weeks following their index NFOD.

There were several important differences in buprenorphine access across demographics. Buprenorphine access following an NFOD was lower among older adults. People aged 55-64 and aged 65 and over had disproportionately low access to buprenorphine both in the four weeks immediately following their NFOD as well as in the year following. For example, among the population that received buprenorphine within a month of their index OD only 16.5 percent were age 55-64, and 3.3 percent were age 65 and over, but 20.3 percent of the population with no buprenorphine post index NFOD were age 55-64 and 24.4 percent were age 65 and over.

Figure 13: Buprenorphine Access Following a First Non-Fatal Overdose by Age (2016–2021)



Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Summary of Non-Fatal Overdoses in Maryland

Out of the sample of people who had a first NFOD in Maryland between July 2016 and December 2020, only 13.7 percent of people in the sample received a prescription for buprenorphine in the year following their index NFOD, 40.6 percent were aged 55 and over, and 13.2 percent experienced a subsequent NFOD in the year following their index NFOD. ED visits in the year following an NFOD were common, with 62.5 percent of individuals visiting an ED in the year after their NFOD. Black individuals in the sample were more likely than White individuals to have either a subsequent ED visit or hospitalization in the year after their index NFOD.

See Considerations and Limitations to Analysis section for more details.

IV. OVERDOSE RISK FACTORS

As the data in the following sections illustrate, there are various factors associated with an individual's risk of experiencing a fatal OD. These factors include, but are not limited to:

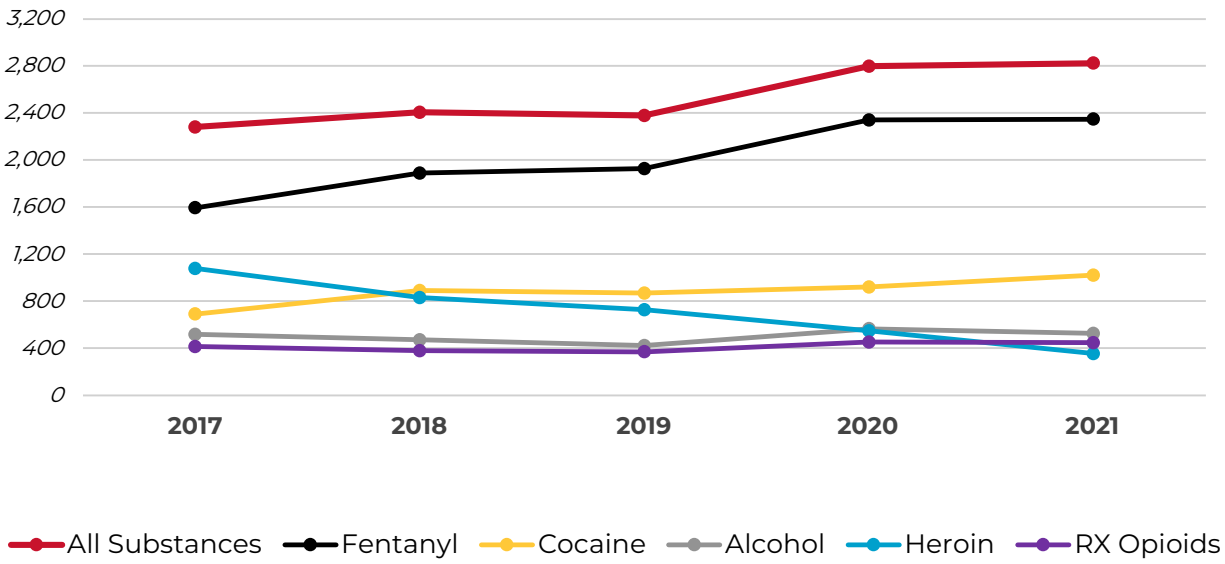
- Involvement with illicit drug markets (i.e., purchasing or usage of illicit drugs) characterized by inconsistency in drug potency and composition;
- Compulsive use of opioids, such as that associated with a clinical diagnosis of opioid use disorder (OUD), despite experiencing harm;
- Previous NFOD events;
- Medical and behavioral health comorbidities, including acute and chronic conditions such as chronic pain;
- Use of opioids in combination with other substances ("polysubstance use"), including prescription medications and alcohol; and
- Involvement with the criminal legal system, SUD treatment or detoxification programs, or extended inpatient hospital stays that may result in reduced tolerance.

Drug Supply Characteristics

Illicitly manufactured fentanyl is the leading contributor to OD deaths in the state. In 2021, fentanyl was involved in 83.7 percent of all fatal ODs. Fentanyl has largely displaced heroin in the illicit drug supply. Between 2017 and 2021, heroin-related fatal ODs decreased by 67.2 percent, and in 2021, heroin was involved in just 12.6 percent of all fatal ODs. Since 2018, cocaine has consistently been the second-most common substance involved in fatal ODs, following the rapid decline in heroin-related fatal ODs.[11]

[11] Maryland Department of Health Vital Statistics Administration: Fatal overdoses in Maryland.

Figure 14: Overdose Deaths in Maryland by Select Substances (2017–2021)



Substance	2017	2018	2019	2020	2021
All Substances	2,282	2,406	2,379	2,799	2,800
Fentanyl	1,594	1,888	1,927	2,342	2,344
Cocaine	691	891	869	921	1,021
Alcohol	517	472	423	566	517
Heroin	1078	830	726	548	354
RX Opioids	413	379	369	453	447
Benzodiazepines	146	127	107	114	114
Methamphetamine	28	32	41	76	99
Phencyclidine	28	37	58	75	68

Source: MDH Vital Statistics Administration.
Note: Most fatal overdoses involve the simultaneous use of more than one substance. The individual substance categories included here are not mutually exclusive (i.e., the sum total of deaths related to individual substance categories does not equal the total number of fatalities for a given time frame).

The market of illicit drugs is constantly evolving, and efforts to better understand the composition of illicit drugs can help inform OD-related mitigation efforts. Two ways in which Maryland can track the illicit drug supply are through drug-checking initiatives, such as the Rapid Analysis of Drugs (RAD) partnership between MDH's CHRS and the National Institutions of Standards and Technology (NIST), and through drug seizures analysis from law enforcement partners, such as the Washington/Baltimore High-Intensity Drug Trafficking Area (W/B HIDTA).

HIDTA Drug Seizures

Data provided by W/B HIDTA show that the amount of illicit drugs seized during HIDTA-funded law enforcement operations varied between 2020 and 2022. Notably, large increases in the amount of seized illicit drugs were reported in 2021 across all drug categories except for prescription narcotics. However, seizures declined in all but two drug categories in 2022. For example, the amount of cocaine seized in 2021 was 429.4 percent more than the amount of cocaine seized during the prior year (increasing from 1,086 kg to 5,749 kg), before falling by 65.0 percent in 2022 (decreasing from 5,749 kg to 2,015 kg). Similarly, the amount of heroin that was seized increased by 119.6 percent in 2021, followed by a 90.4 percent decrease in 2022.

The amount of fentanyl and methamphetamine that was seized increased in both 2021 and 2022. The amount of fentanyl that was seized increased by 46.8 percent between 2020 and 2022 (from 77 kg to 113 kg), and the amount of methamphetamine that was seized increased by 75.9 percent during the same time frame (from 58 kg to 102 kg).

Lastly, the amount of prescription narcotics that were seized fell for two consecutive years. Between 2020 and 2022, the amount of prescription narcotics that were seized fell by 91.7 percent, from 60 kg to 5 kg.

Table 1: Kilograms of Illicit Drugs Seized by W/B HIDTA-Funded Law Enforcement Operations (2020–2022)

Substance	2020	2021	2022
Cocaine	1,086	5,749	2,015
Methamphetamine	58	78	102
Heroin	51	112	40
Fentanyl	77	83	113
Prescription Narcotics	60	52	5
Cannabis	2509	13,377	5,546

Source: Washington/Baltimore High Intensity Drug Trafficking Area.

The Emergence of Xylazine

In March 2021 W/B HIDTA issued an informational bulletin identifying xylazine (also known as Tranq) as an emerging threat in the region. Xylazine has become increasingly prevalent in Maryland and across the

Northeastern United States. The substance is a veterinary anesthetic that, when used in humans, can slow breathing and heart rate. It is not regulated under the Controlled Dangerous Substance Act. Xylazine is most frequently found in combination with fentanyl when encountered by law enforcement.

Intelligence sources in the bulletin from 2019 to March 2021 showed a steady rise in xylazine availability and use of xylazine as a cutting agent. During that same time, xylazine appeared to be a contributing factor to fatal ODs when mixed with opioids, with some regional law enforcement reporting over a 200 percent increase in fatal ODs where xylazine was present. Because xylazine in combination with opioids was relatively rare until recent years and it is not classified as a controlled substance, available lab seizure data is limited. Xylazine is especially dangerous because it can make ODs more difficult to reverse. Naloxone, for example, is very effective at reversing the effects of opioids but it cannot reverse the effects of xylazine because it is not an opioid. As such, additional OD response steps, such as rescue breathing, may be needed to restore the breathing of someone experiencing an opioid OD if xylazine is present.

Although xylazine has been circulating the Washington/Baltimore area of responsibility (AOR) and beyond for the past several years in mixed form, it has also been seen in pure and/or wholesale amounts. W/B HIDTA and the Maryland State Police have partnered to analyze available drug seizure intelligence that is voluntarily provided by law enforcement. The research indicated that out of the total number of samples reported from June 2021 to December 2022, 19.7 percent tested positive for xylazine.

Out of the total number of xylazine-positive samples, 88 percent were mixed with other substances:

- 72 percent of xylazine-positive samples were also positive for fentanyl;
- 38 percent were also positive for cocaine;
- 22 percent contained mannitol;
- 16 percent contained caffeine; and
- 14 percent contained quinine.

Rapid Analysis of Drugs Program

RAD is a statewide drug-checking program that was launched in October 2021. The program uses de-identified drug paraphernalia samples (e.g., syringes, pipes, cookers, capsules, foil, baggies, etc.) provided voluntarily at Syringe Service Programs (SSPs) across Maryland, which are then tested using Direct Analysis in Real-Time Mass Spectrometry (DART-MS) by NIST. RAD testing results are provided in near real-time, and testing results are used by participating SSPs to tailor harm-reduction information to participants. RAD data can also help public health officials and policymakers better under changing dynamics in the supply of illicit drugs, including information regarding novel substances and emerging trends.

From July 1, 2020, through June 30, 2021, the RAD program analyzed 496 samples, 367 (74.0 percent) of which tested positive for an opioid and 364 (73.4 percent) tested positive for fentanyl. RAD results during this time frame also revealed that many samples submitted by SSP participants contained more substances other than the substance that was intended for purchase.

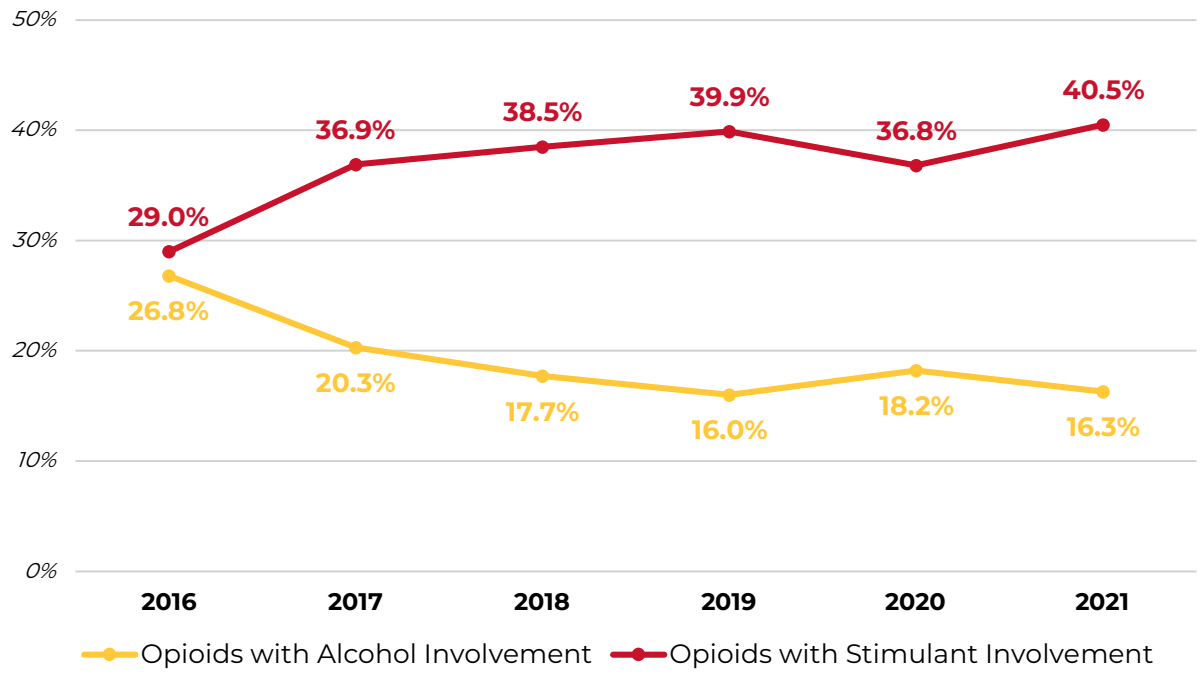
For 248 of the 496 samples, SSP participants completed a questionnaire about the drugs they had intended to purchase. Among the 212 participants who had intended to buy an opioid, 87.7 percent were exposed to fentanyl, fentanyl analogs, or both, and 85.8 percent were unknowingly exposed to xylazine.[12]

In response to an increasing number of ODs involving xylazine, Maryland's Overdose Data to Action initiative recently led a workgroup to examine fatal OD data and RAD program case data involving xylazine. The workgroup is expected to release a report this year.

Increasing Stimulant Use

Stimulants are increasingly involved in opioid OD mortality. Among PBHS participants, stimulant-involved OD deaths increased by 39.7 percent from 2016 to 2021. Over this same period, alcohol-involved OD deaths decreased by 29.2 percent.

Figure 15. Overdose Deaths Among PBHS Participants Involving Opioid and Stimulants (2016 – 2021)



Source: MDH Behavioral Health Administration.

[12] Russell E, Sisco E, Thomson A, et al. Rapid Analysis of Drugs: A Pilot Surveillance System to Detect Changes in the Illicit Drug Supply to Guide Timely Harm Reduction Responses — Eight Syringe Services Programs, Maryland, November 2021–August 2022. MMWR Morb Mortal Wkly Rep 2023;72:458–462. DOI: http://dx.doi.org/10.15585/mmwr.mm7217a2.

Year	Opioids with Alcohol Involvement	Opioids with Stimulant Involvement
2016	26.8%	29.0%
2017	20.3%	36.9%
2018	17.7%	38.5%
2019	16.0%	39.9%
2020	18.2%	36.8%
2021	16.3%	40.5%

Source: MDH Behavioral Health Administration.

Recent Incarceration

Data collected through SUDORS showed that at least 2.2 percent of OD decedents in 2021 were released from a prison, jail, or detention center in the 30 days prior to their death.

2.2%

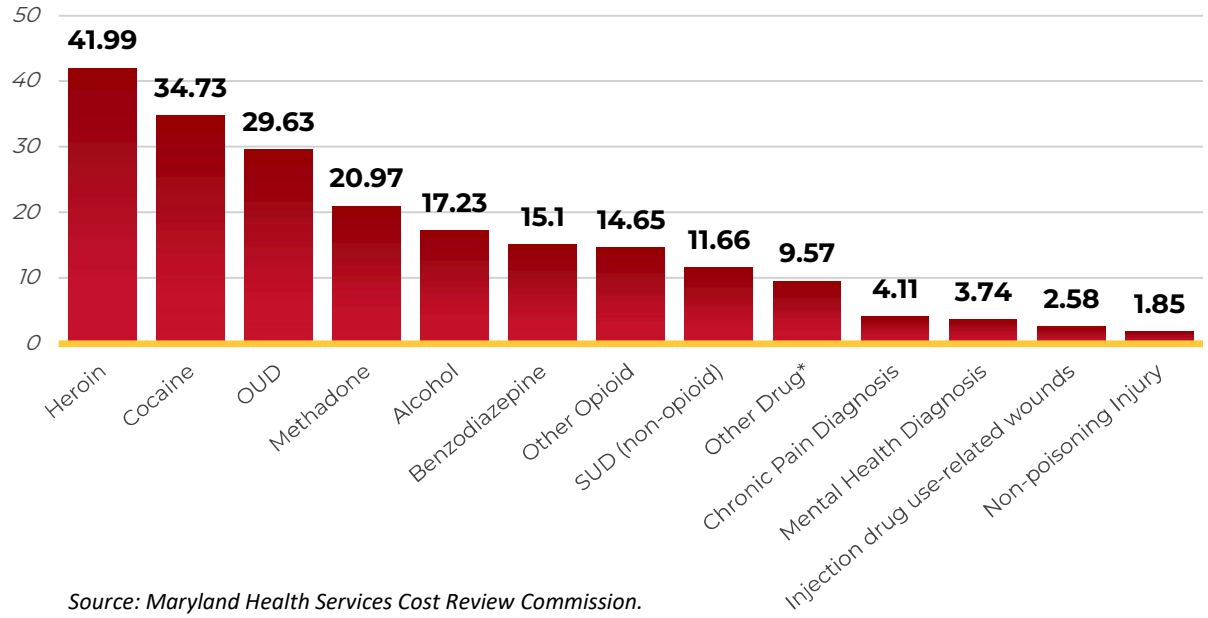
of overdose decedents in 2021 were released from incarceration in the 30 days prior to their death.

Source: SUDORS.

Comorbidities

Data show that between 2016 and 2021, OD decedents with mental and behavioral health comorbidities were much more likely to experience a fatal OD. According to data provided by HSCRC, individuals who experienced a heroin-related NFOD had 42.0 times the risk of experiencing a subsequent fatal OD involving any substance as compared to the general population accessing health services who did not experience a heroin-related OD during the study period. While the degree of risk associated with each diagnosis varied between each diagnosis, every combination raised the overall risk of a fatal OD.

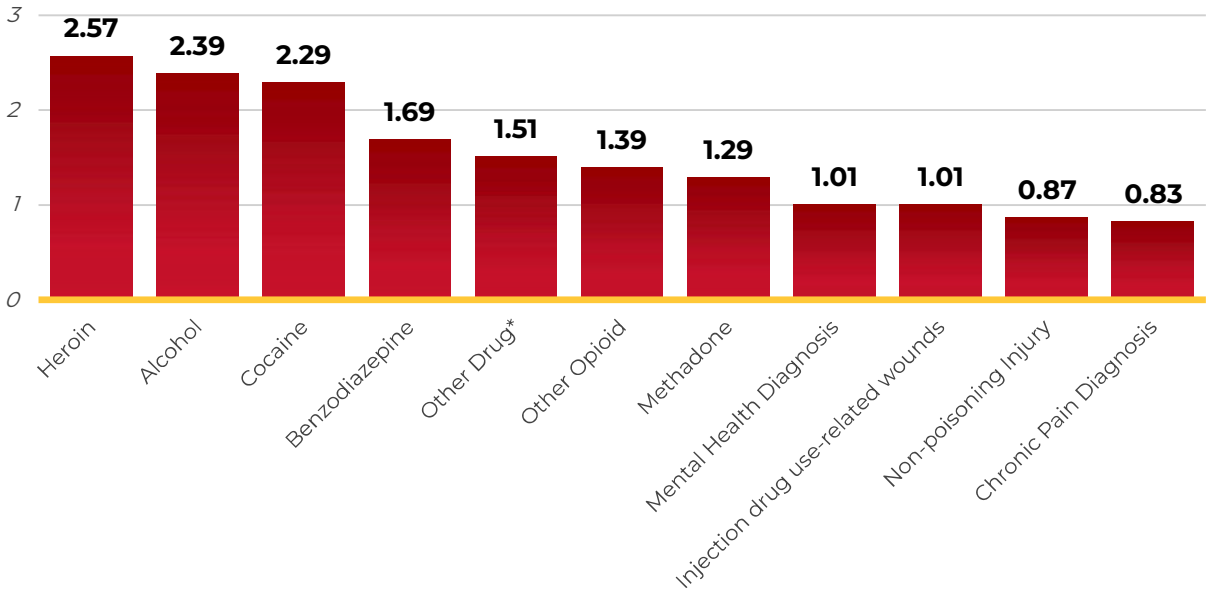
Figure 16: Relative Risk of Overdose Death Predicted by Previous Diagnosed Overdose and Related Conditions (2016–2021)



Source: Maryland Health Services Cost Review Commission.

When comparing people with OUD, individuals who had an additional comorbidity were at higher risk for a fatal OD as compared to those who only had an OUD diagnosis. For example, individuals with diagnosed OUD who also had a diagnosis of cocaine dependency during the study period were 2.3 times more likely to experience a fatal OD than an individual with OUD and no history of cocaine dependency.

Figure 17: Relative Risk of Overdose Death Predicted by Previous Overdose Among Those with Diagnosed OUD Relative to Intoxication Deaths (2016-2021)



Source: Maryland Health Services Cost Review Commission.

Summary of Overdose Risk Factors

In 2021, fentanyl was involved in 83.7 percent of all fatal ODs. Fentanyl has largely displaced heroin in the illicit drug supply. Between 2017 and 2021, heroin-related fatal ODs decreased by 67.2 percent, and in 2021, heroin was involved in just 12.6 percent of all fatal ODs. Since 2018, cocaine has consistently been the second-most common substance involved in fatal ODs, following the rapid decline in heroin-related fatal ODs. Stimulants are increasingly involved in opioid OD mortality. Among PBHS participants, stimulant-involved OD deaths increased by 39.7 percent from 2016 to 2021. The amount of prescription narcotics that were seized fell for two consecutive years. Between 2020 and 2022, the amount of prescription narcotics that were seized fell by 91.7 percent, from 60 kg to 5 kg. Additional comorbidities have been found to increase the risk of a fatal OD.

See Considerations and Limitations to Analysis section for more details.

V. SERVICE UTILIZATION

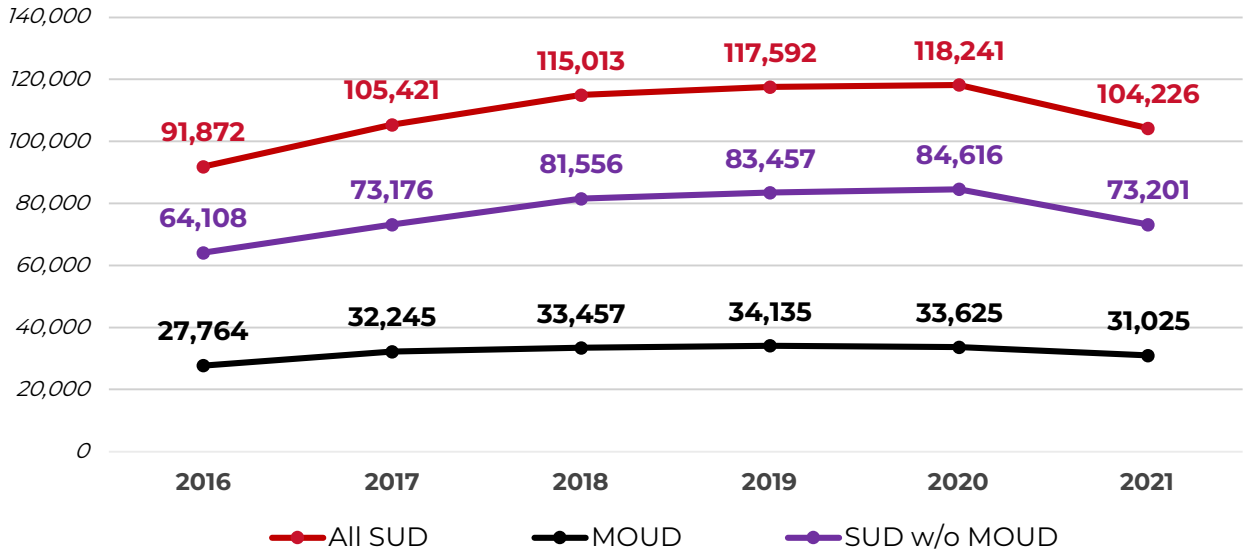
Service expansion for individuals who use drugs and have clinically diagnosed SUDs has grown in recent years. The following sections shown below provide data focused on healthcare service utilization for medications for OUD, other mental health and SUD services, targeted naloxone distribution, SSPs, non-behavioral health services, hospital characteristics, and service utilization by Medicaid participants.

Medication for Opioid Use Disorder

Data from Maryland's PBHS, which provides publicly funded services for individuals who are enrolled in Medicaid or who are uninsured, shows the number of individuals who received any type of SUD service, excluding MOUD, in Maryland increased by 32.0 percent from 2016 to 2020 before decreasing by 13.5 percent between 2020 and 2021. This brought the total number of people receiving PBHS SUD services, excluding MOUD, back near to the number that were receiving services in 2017 (73,201 in 2021 to 73,176 in 2017).

The number of individuals who received MOUD through PBHS, including buprenorphine, methadone, and long-acting naltrexone, increased by 21.1 percent from 2016 to 2020 before decreasing by 7.7 percent from 2020 to 2021. In total, the number of individuals who received MOUD through PBHS increased by 11.7 percent from 2016 to 2021.

Figure 18: All SUD and MOUD PBHS Service Participants by Year (2016–2021)

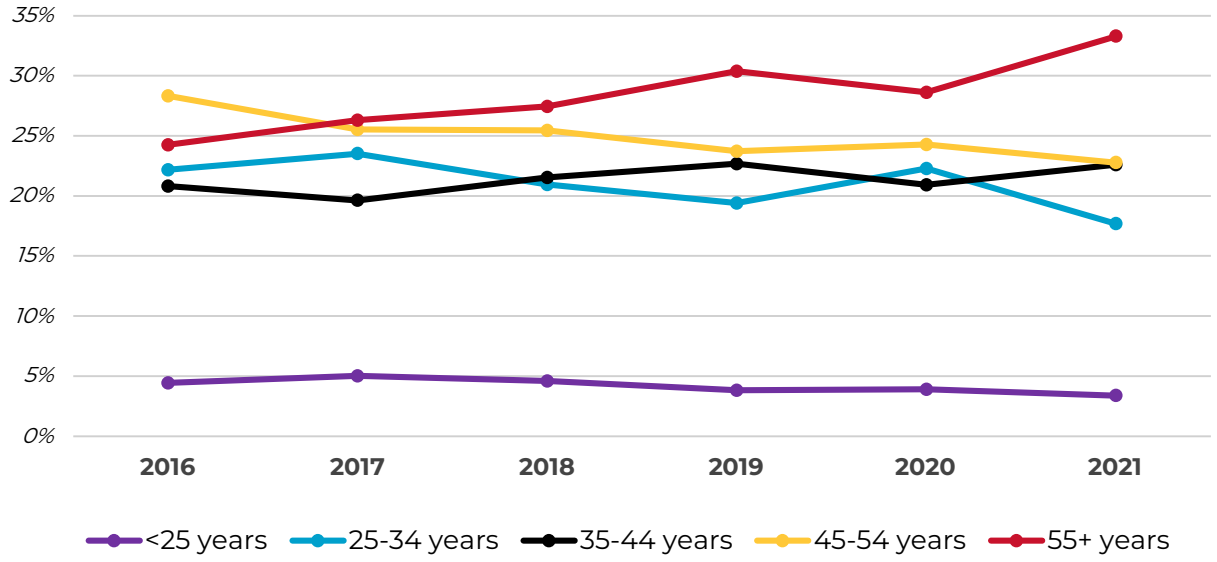


Source: MDH Behavioral Health Administration.
Note: Service utilization is analyzed based on a fiscal year from July to June as opposed to overdose data, which is being analyzed on a calendar year basis

Trends involving fatal ODs among individuals who were dispensed controlled substances between 2016 and 2021 mirrored the trends seen in total fatal ODs during the same time frame. For example, between 2016 and 2021, the proportion of individuals over the age of 55 who were dispensed a controlled

substance increased in the overall percentage of OD fatalities, while the proportion of individuals between the ages of 25 and 34 who were dispensed a controlled substance decreased in the overall percentage of OD fatalities. The proportion of OD decedents under the age of 25 remained comparatively low throughout the time frame.[13]

Figure 19: Overdose Decedents with Controlled Substance Dispense Records in the PDMP by Age Category (2016–2021)



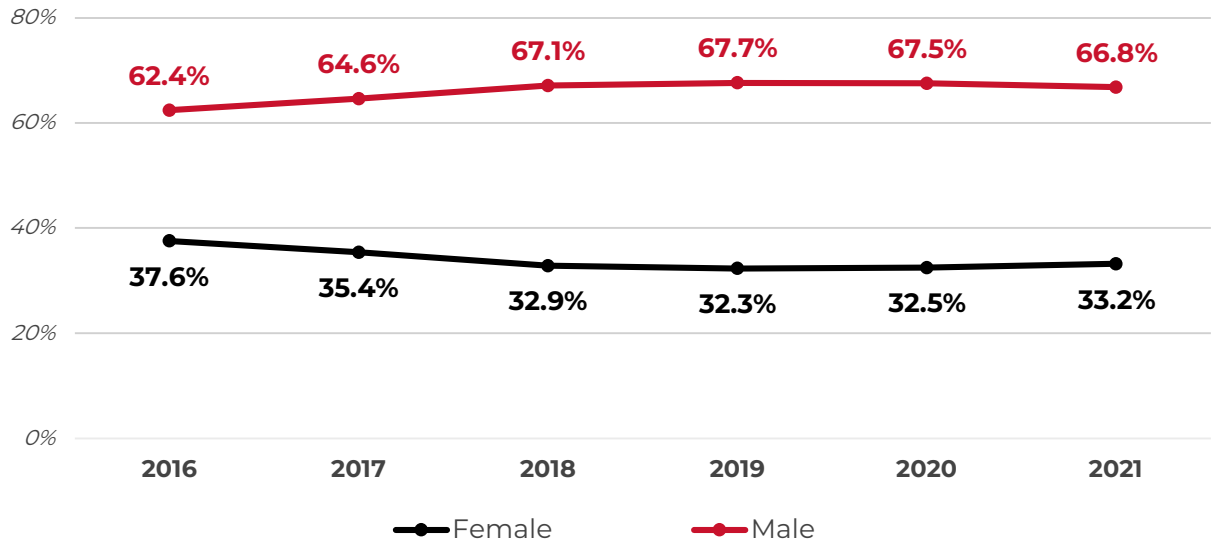
Year	<25 years	25-34 years	35-44 years	45-54 years	55+ years
2016	4.4%	22.2%	20.8%	28.3%	24.3%
2017	5.0%	23.5%	19.6%	25.5%	26.3%
2018	4.6%	21.0%	21.5%	25.5%	27.5%
2019	3.8%	19.4%	22.7%	23.7%	30.4%
2020	3.9%	22.3%	20.9%	24.3%	28.6%
2021	3.4%	17.7%	22.6%	22.8%	33.3%

Source: Maryland Prescription Drug Monitoring Program, MDH Behavioral Health Administration.

[13] BHA linked PDMP and ODR data.

The number of male OD decedents dispensed a controlled substance increased from 62.4 percent in 2016 to 66.8 percent in 2021, while female decedents dispensed a controlled substance decreased from 37.6 percent in 2016 to 32.5 percent in 2021.[14]

Figure 20: Percentage of Overdose Decedents with a Controlled Substance Dispensed by Gender (2016–2021)

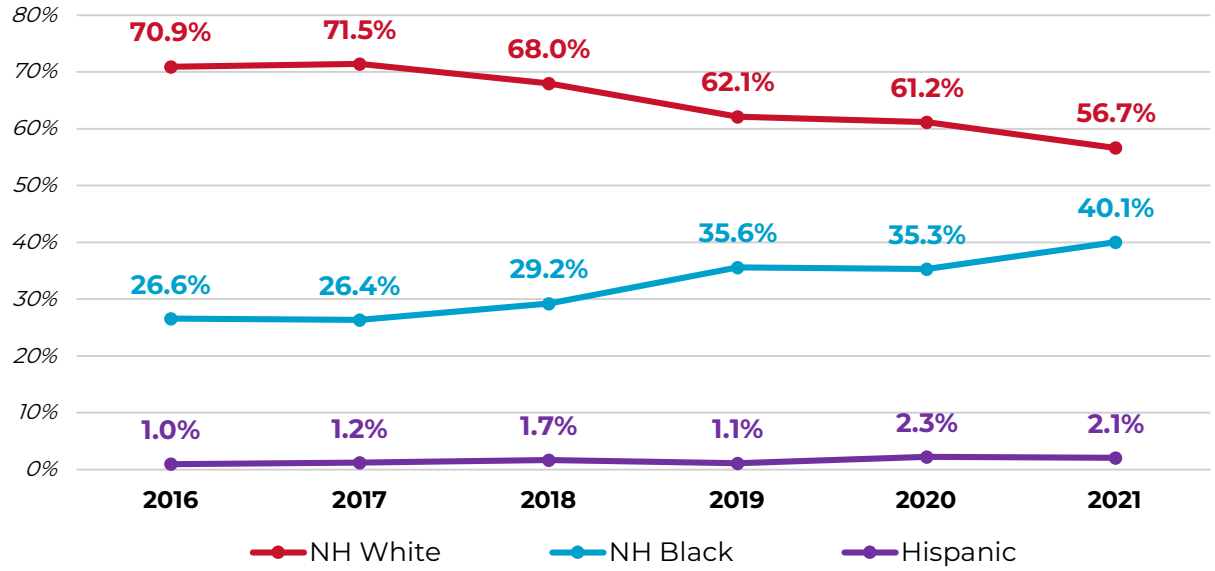


Source: MDH Prescription Drug Monitoring Program.

In 2021, non-Hispanic Black OD decedents with dispense records between 2016-2021 consisted of 33.2 percent of the overall decedents (2,694 of 8,106), while non-Hispanic White decedents consisted of 63.9 percent of the overall decedents (5,183 of 8,106). Non-Hispanic White decedents experienced a 73.6 percent increase during this time frame (from 576 to 1000) while non-Hispanic Black decedents saw an increase of 227.3 percent (from 216 to 707) over the 5-year span. Similar to total fatal OD trends, OD fatalities among non-Hispanic White individuals who were dispensed a controlled substance decreased from 2016 to 2021, while OD fatalities among non-Hispanic Black individuals who received controlled substances increased.[15] Hispanic individuals with a dispense record accounted for no more than 2 percent of OD decedents in any year.

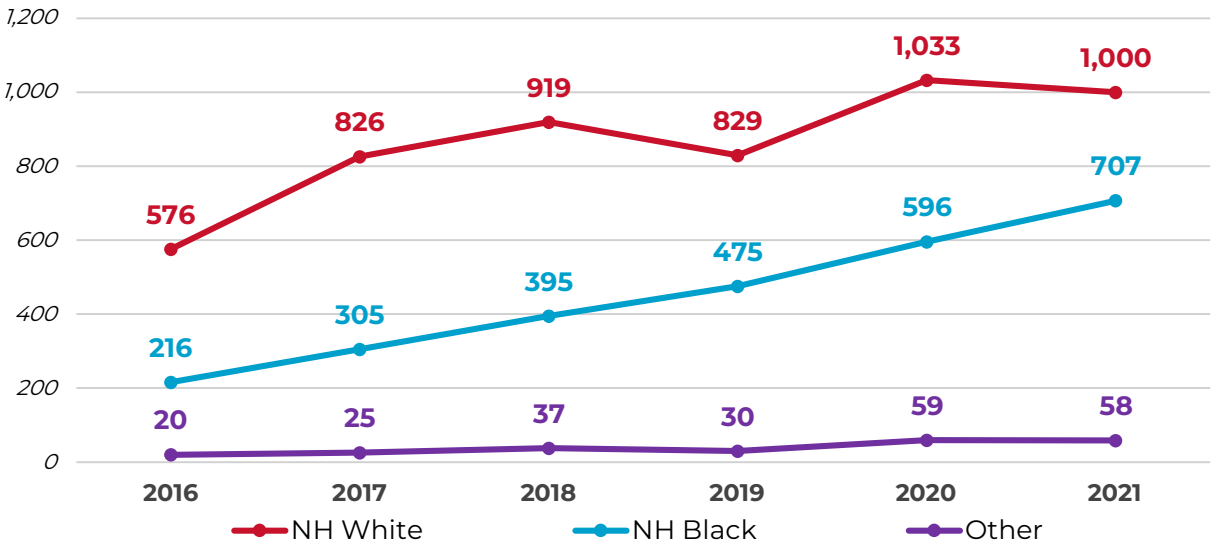
[14] Ibid.
[15] Ibid.

Figure 21: Percent of Overdose Decedents with a Controlled Substance Dispensed by Race (2016-2021)



Source: Maryland Prescription Drug Monitoring Program.

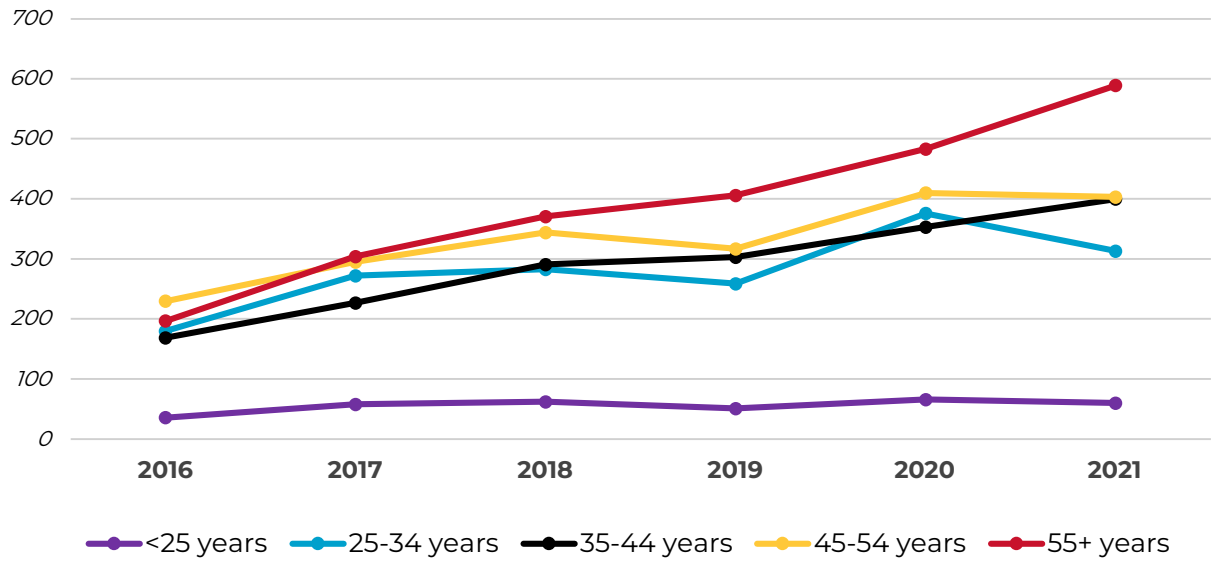
Figure 22: Overdose Decedents with a Controlled Substance Dispensed by Race (2016-2021)



Source: Maryland Prescription Drug Monitoring Program.

The age group of 55 years or older made up the majority of OD decedents with dispense records from 2016 to 2021 at 29.0 percent of the overall decedents (2,350 of 8,108). The second largest age group of OD decedents with dispense records was 45–54 at 24.7 percent of the overall decedents (1,999 of 8,108) from 2016 to 2021. OD decedents aged 35–44 with a dispense record increased from 2016 to 2021 climbing past the 25-34 age group and nearly matching the number of OD decedents aged 45–54 with dispenses in 2021.

Figure 23: Overdose Decedents with a Controlled Substance Dispensed by Age (2016–2021)



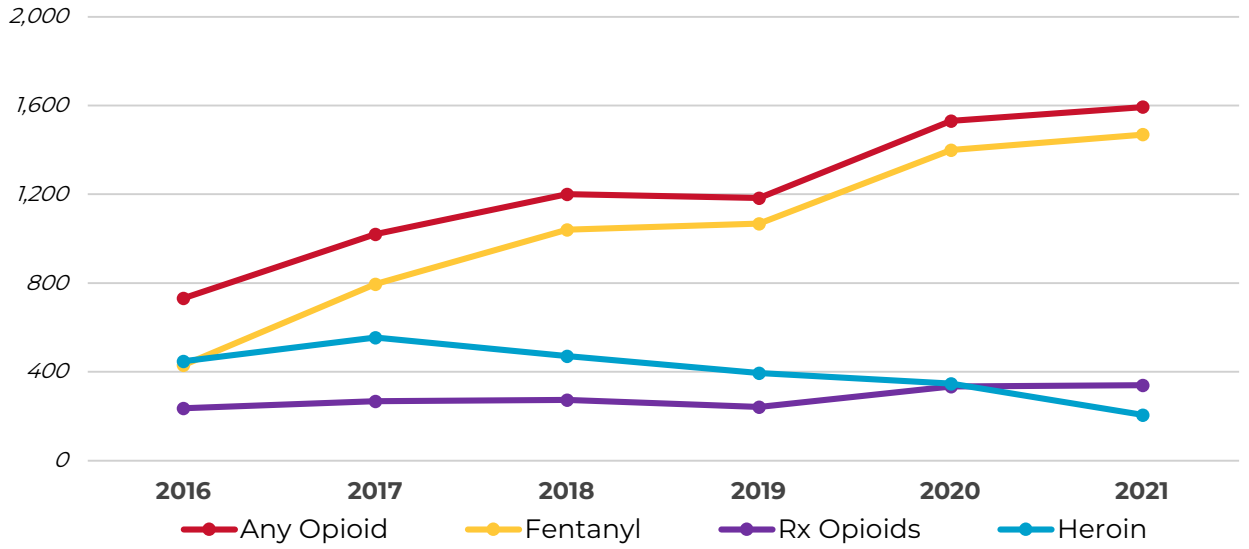
Year	<25 years	25-34 years	35-44 years	45-54 years	55+ years
2016	36	180	169	230	197
2017	58	272	227	295	304
2018	62	283	291	344	371
2019	51	259	303	317	406
2020	66	376	353	410	483
2021	60	313	400	403	589

Source: Maryland Prescription Drug Monitoring Program.

Over the past six years, heroin has decreased by 53.9 percent (from 447 to 206) in overall fatal ODs among those dispensed a controlled substance, while fentanyl has increased by 241.1 percent from 431 to 1470 in overall fatal ODs among those dispensed a controlled substance.

The highest number of OD deaths among decedents with a dispense record in the PDMP involve opioids, totaling 41.3 percent of deaths from 2016 to 2021. The second highest cause-of-death substance is fentanyl, making up 35.3 percent of OD deaths among decedents with a dispense record from 2016 to 2021. OD deaths involving heroin among decedents with dispense records have steadily decreased from 2016 to 2021, making up only 5.7 percent (206 of 3,610) of OD deaths among decedents with a dispense record in 2021. Both opioid-related and fentanyl-related deaths among decedents with dispense records increased slightly from 2020 to 2021 by 4.1 and 5.1 percent respectively.

Figure 24: Overdose Decedents with a Controlled Substance Dispensed by Substance (2016-2021)



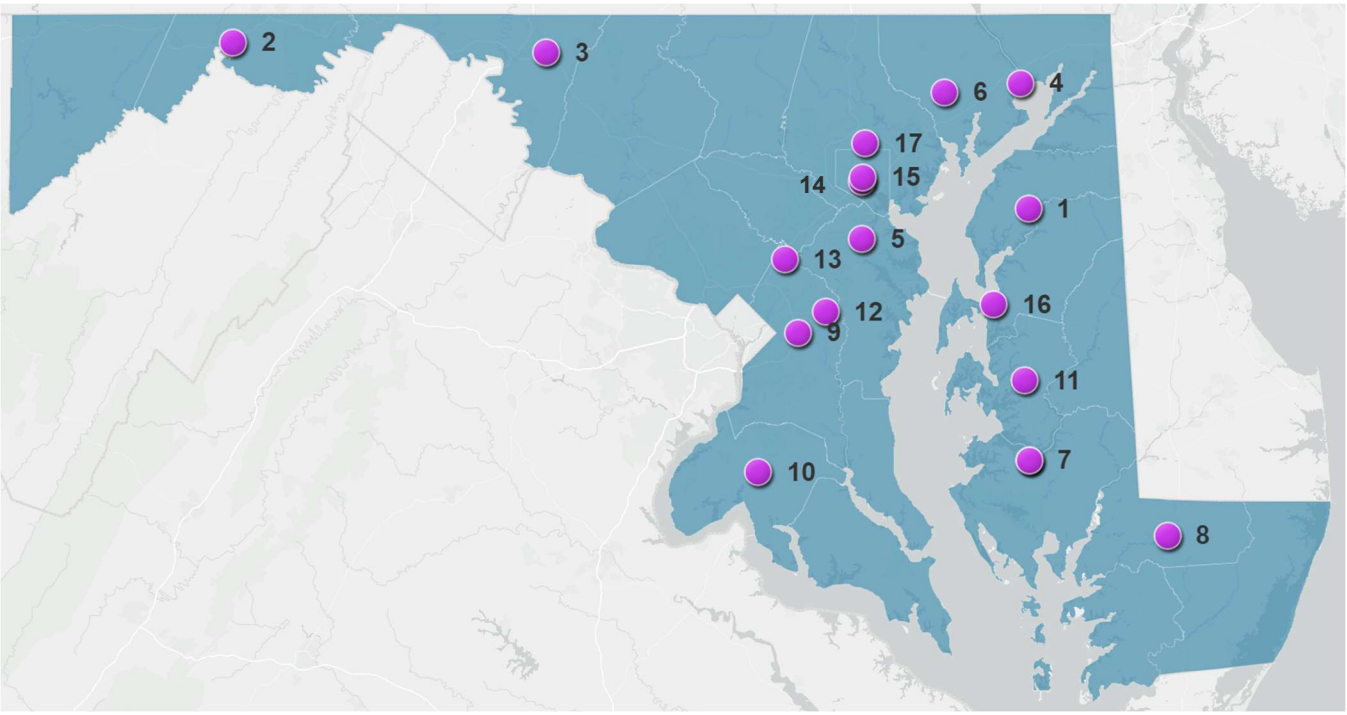
Year	Any Opioid	Fentanyl	Rx Opioids	Heroin
2016	732	431	236	447
2017	1021	795	267	555
2018	1201	1040	273	471
2019	1184	1068	242	395
2020	1531	1399	334	347
2021	1594	1470	340	206

Source: Maryland Prescription Drug Monitoring Program.

Hospital-Level Data

The data presented below comes from the MD-EDDS program which recruited 17 hospitals across the state in the 2023 fiscal year to obtain limited data sets of quarterly EHR from patients visiting each hospital's ED for a drug OD. MD-EDDS also provided 50 fentanyl urinalysis dipstick test kits each to 14 hospitals that were not yet routinely testing for fentanyl. Map 2 shows that participating hospitals came from each region of the State. The OOCC supports the MD-EDDS project at the University of Maryland's Center for Substance Use, Addiction & Health Research (CESAR). The following sections highlight key findings from the analyses of the EHR data and the fentanyl dipstick testing.

Map 2 Hospitals Participating in MD-EDDS



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

#	Hospital	City	Years Available	% Tested Across Timespan
1	UM Shore Medical Center at Chestertown	Chestertown	2019-2022	51
2	UPMC Western Maryland	Cumberland	2018-2022	25
3	Meritus Medical Center	Hagerstown	2019-2022	41
4	UM Harford Memorial Hospital	Havre De Grace	2020-2022	55
5	UM Baltimore Washington Medical Center	Glen Burnie	2016-2022	53
6	UM Upper Chesapeake Medical Center	Bel Air	2020-2022	54
7	UM Shore Medical Center at Cambridge	Cambridge	2022	46
8	TidalHealth Peninsula Regional	Salisbury	2018-2022	44

#	Hospital	City	Years Available	% Tested Across Timespan
9	UM Capital Region Medical Center	Largo	2021-2022	60
10	UM Charles Regional Health Center	La Plata	2019-2022	46
11	UM Shore Medical Center at Easton	Easton	2019-2022	52
12	UM Bowie Health Center	Bowie	2021-2022	29
13	UM Laurel Medical Center	Laurel	2021-2022	75
14	UM Medical Center	Baltimore	2016-2022	44
15	UM Medical Center, Midtown Campus	Baltimore	2016-2022	49
16	UM Shore Emergency Center at Queenstown	Queenstown	2019-2022	30
17	UM St. Joseph Medical Center	Baltimore	2016-2022	69

Source: University of Maryland Center for Substance Use, Addiction & Health Research.
**This represents the percentage of OD-related ED visits that had a toxicology screen. Not all visits had an accompanying toxicology test, often common when clinical presentation is uncomplicated (i.e., the overdose has been resolved).*

Overview of Findings from the Quarterly EHR Data

To date, 17 hospitals have joined MD-EDDS and submitted quarterly extracts from their EHRs for ED visits involving a drug OD. An ED visit for a drug OD is defined as any ED visit involving a patient aged 18-90 who reported a complaint of "OD" and/or had an International Classification of Diseases (ICD), Tenth Revision, Clinical Modification (ICD-10-CM) T36-T50 initial encounter discharge diagnosis code of poisoning with accidental (unintentional), intentional self-harm, or undetermined intent. The quarterly EHR extracts include information on urine screen administration and urine drug screen results, where available, for each identified ED drug OD visit, along with limited information about patient demographics, admission date, patient complaint(s) at admission, discharge diagnoses, and ICD-10-CM diagnosis codes. The MD-EDDS team is in the process of collecting EHR data from three additional hospitals, bringing the total number of hospitals participating to 20.

Classification Scheme

Toxicology screens are typically ordered when patients have symptoms that may be related to non-prescribed SU. Most commonly, this includes altered mental status, suspected OD, and psychiatric evaluations. Toxicology screens may not be ordered for patients for which the clinical presentation is uncomplicated - such as an opioid OD that appears to have been responsive to the administration of naloxone. Doctors request urine drug screens for patients for a variety of reasons, and the substances included in their screens often vary. As shown in the associated table for Map 2, the years for which drug screen results were available and the percentage of drug OD visits tested varied by hospital. In 2022, the

percentage of OD ED visits with a urine screen varied across the 17 MD-EDDS hospitals from 25 percent to 75 percent; 14 hospitals tested 40 percent or more. The median was 50 percent. The most frequently included substances in standard urine screens were cocaine, opiates, amphetamine/methamphetamine, and THC. Opiates, methadone, oxycodone, fentanyl, and buprenorphine are each identified by separate drug screens. The opiate screens are sensitive to natural opioids, such as morphine (typically a metabolite of heroin). Fentanyl is a semi-synthetic opioid and oxycodone is a synthetic opioid, so they are not detected by an opiate screen.

EHR findings are presented below for UM Medical Center Midtown Campus (UMMC Midtown) and UM St. Joseph Medical Center (UM SJMC) for two substance categories – opioids and stimulants. These hospitals were selected because both are located in Central Maryland where the majority of fatal ODs occur each year, however, they reflect distinct differences in the populations served – largely African American urban communities and largely White suburban communities. The findings presented for each hospital are only a subset of the information collected by MD-EDDS and additional information is available from MD-EDDS upon request to CESAR. For UMMC Midtown and UM SJMC, the opioid category includes opiates, oxycodone, methadone, and fentanyl. The stimulant category for these hospitals includes cocaine, amphetamine, and methamphetamine. The substances included in these categories vary across the other participating hospitals, depending on the specific substances included in standard drug screens.

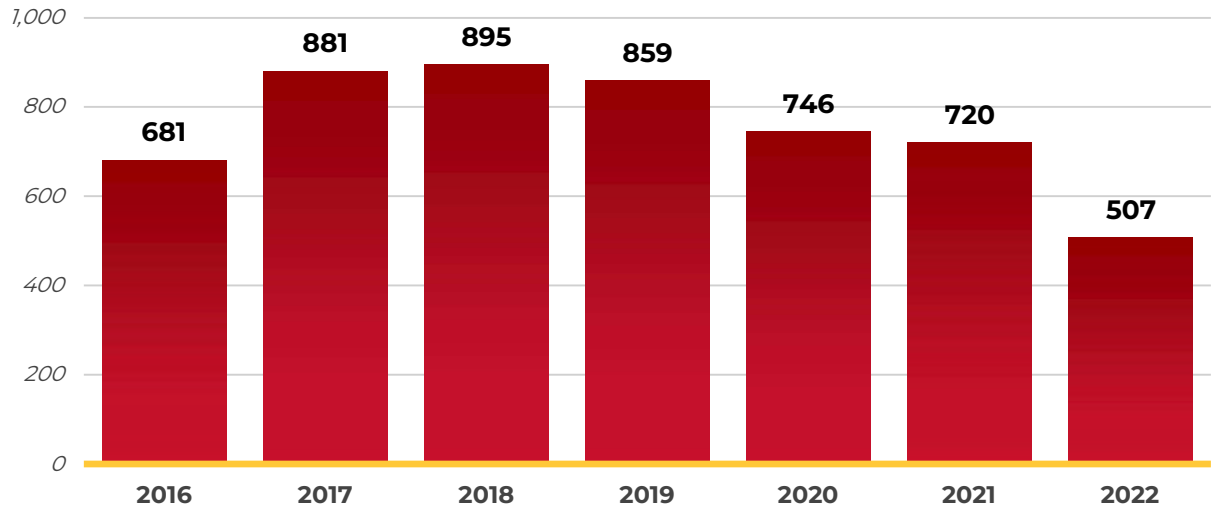
University of Maryland Medical Center, Midtown Campus (UMMC Midtown), 2016-2022

UMMC Midtown is located in the heart of Baltimore City, where the majority of fatal ODs in Maryland occur every year.

Number of Overdose-Related ED Visits by Year (2016–2022)

OD-related ED visits rose steadily from 2016 to 2018, when they peaked at 895 visits, (see Figure 25). After 2018, visits fell steadily, with the most dramatic drop occurring between 2021 and 2022, from 720 to 507, a 29.6 percent decrease. In the entire study period of 2016 to 2022 there was a 25.6 percent decrease in OD-related ED visits.

Figure 25: Number of OD-Related Emergency Department Visits by Year – UMMC Midtown

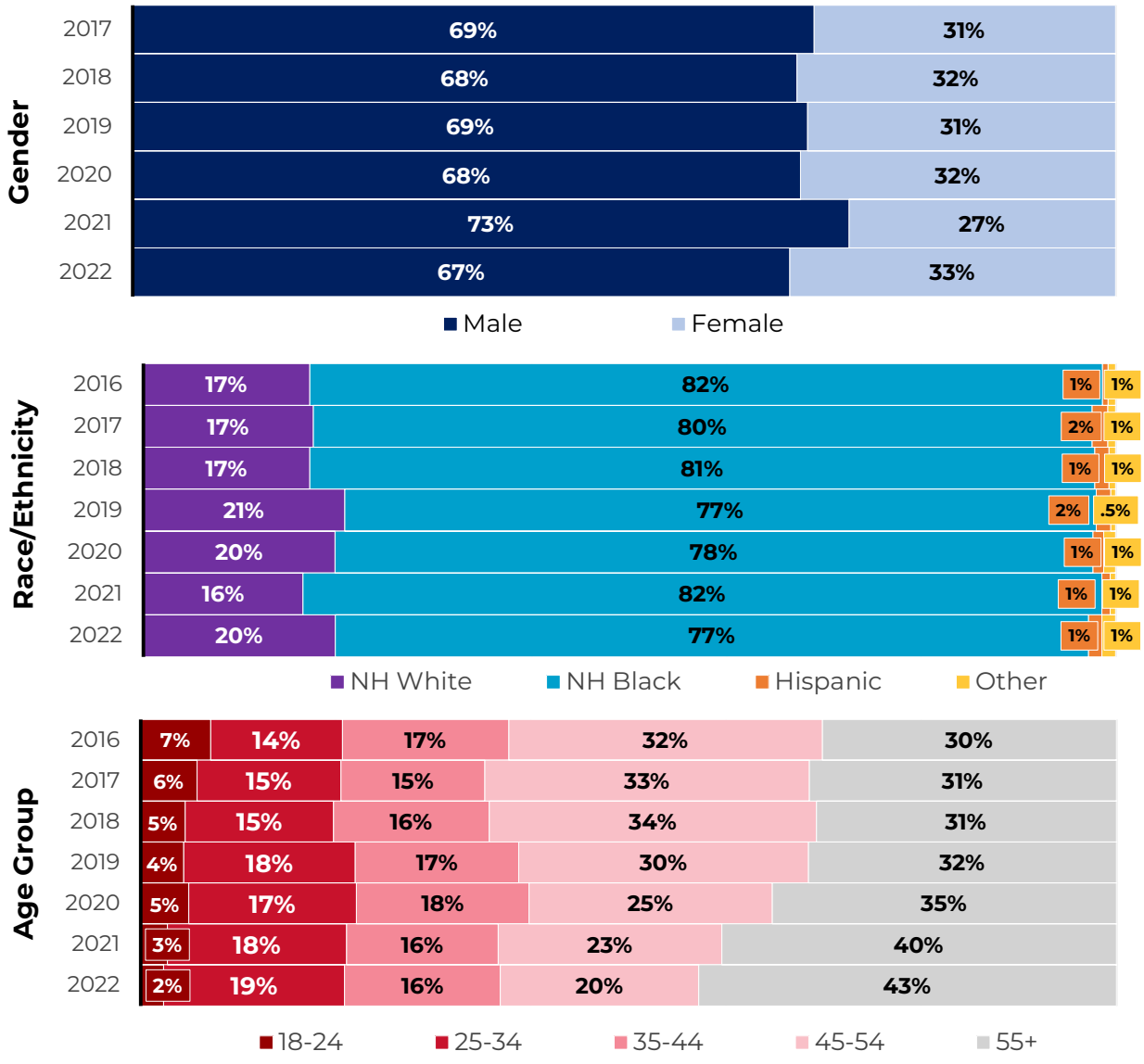


Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Overdose-Related ED Visits by Age, Race/Ethnicity, and Gender (2016–2022)

From 2016 to 2022, Non-Hispanic Black persons made up 77 percent to 82 percent of the OD-related ED patients. About two-thirds each year were males and 35 years or older (see Figure 26).

Figure 26: Drug Overdose-Related Emergency Department Visits, by Age, Race/Ethnicity, and Gender – UMMC Midtown



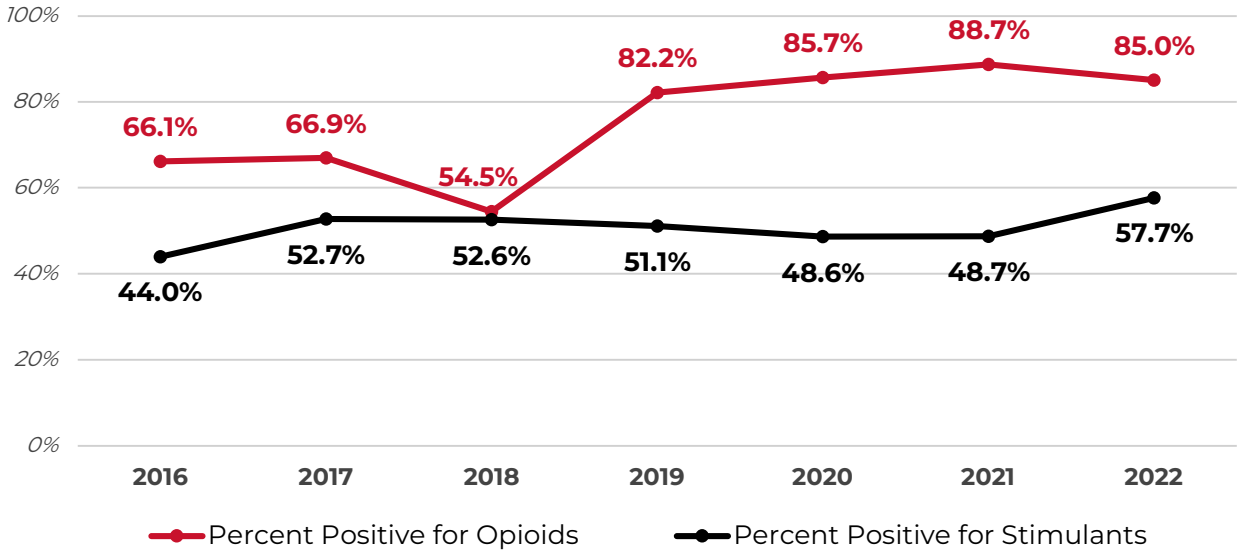
Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Overdose-Related ED Visits with a Positive Result for Any Opioid or Stimulant, 2016-2022

The percentage of patients who tested positive for opioids increased most dramatically from 2018 to 2019 (when the hospital began testing regularly for fentanyl), from 54.5 percent to 82.2 percent, although the total number of visits declined. From 2019 onwards, the percentages remained relatively similar, with a small decrease in 2022 (see Figure 27).

The percentage of urine screens positive for stimulants ranged from 44 percent in 2016 to 57.7 percent in 2022, a 31.1 percent increase. This is a different trend than seen with opioid positives, which were consistently higher than stimulants and held relatively steady from 2019 onwards.

Figure 27: Percentage of Overdose-Related Emergency Department Visits with a Positive Result for Opioids and Stimulants by Year – UMMC Midtown

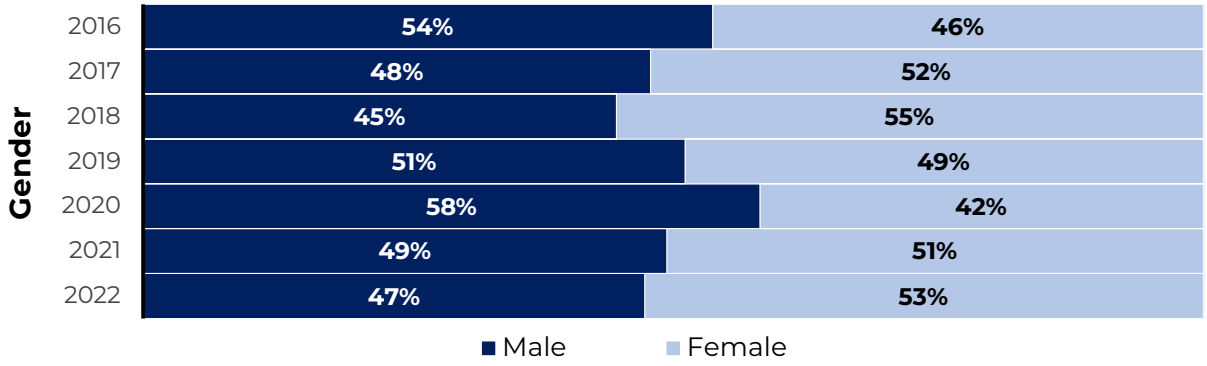


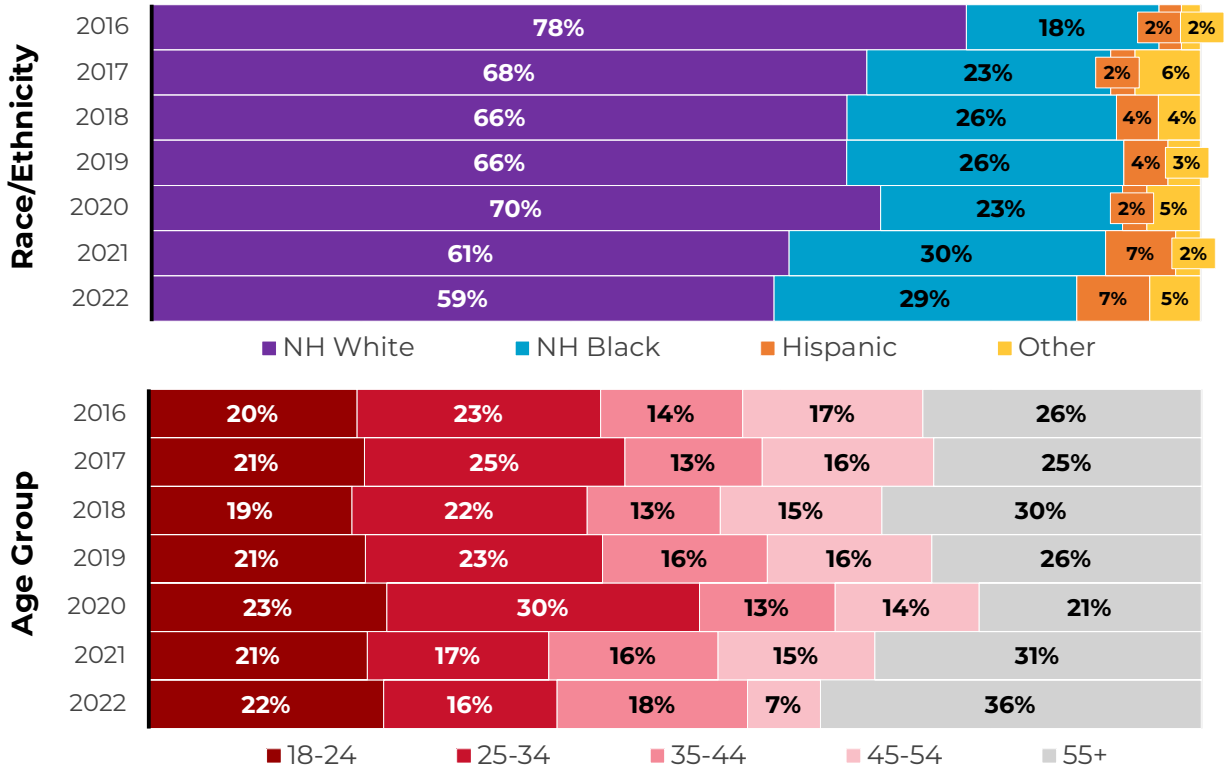
Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Demographic Characteristics of Patients Positive for Opioids, 2016-2022

Among patients positive for opioids, the proportion of those 55 or older increased from 27.1 percent in 2016 to 45.8 percent in 2022. The proportion of those aged 45-54 decreased, from 35.6 percent to 21.6 percent. Three-quarters or more of patients with a positive test for opiates each year were non-Hispanic Black and across the entire study period, 63–73 percent of patients with a positive test for opiates were males.

Figure 28: Overdose-Related Emergency Department Visits with Positive Opioid Results by Age, Race/Ethnicity, and Gender – UMMC Midtown





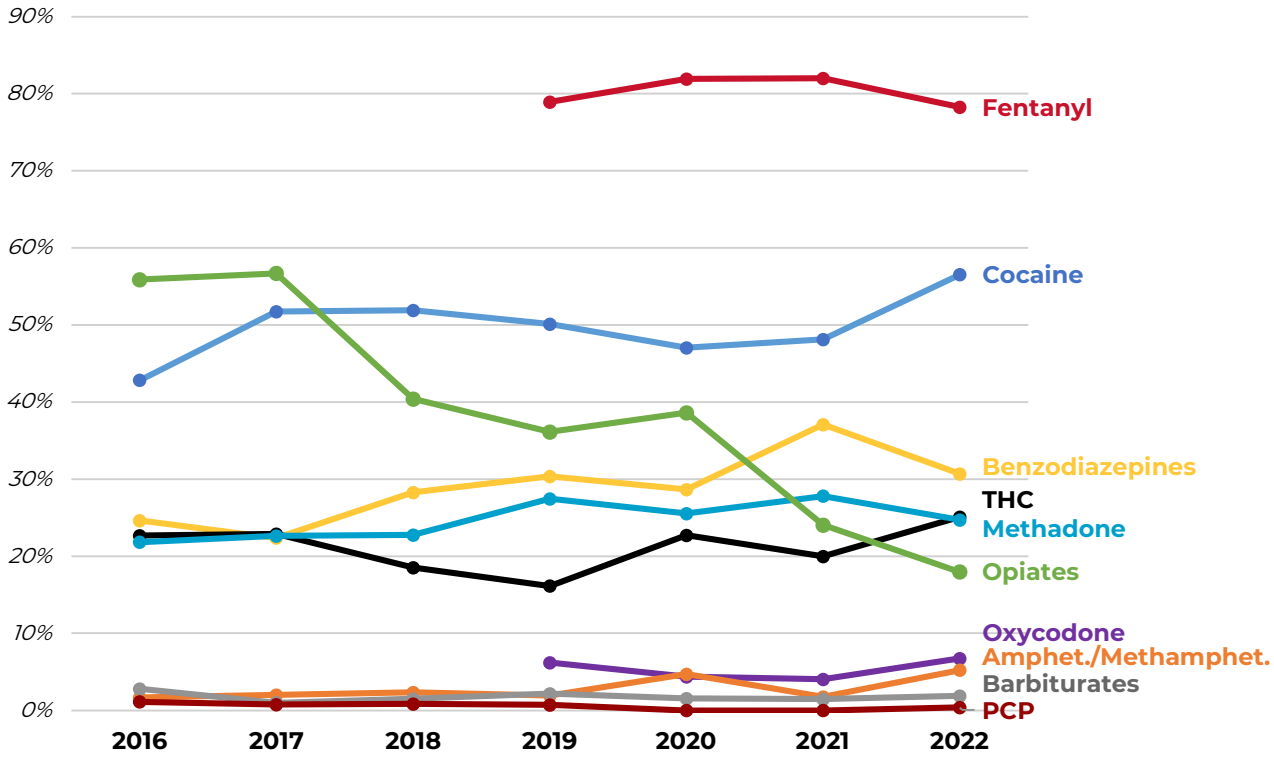
Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Trends Across all Drug Categories

Figure 29 shows trends in the substances detected in urine drug screens from 2016-2022. From 2020 onwards, opiate positives declined dramatically, from 56 percent in 2016 to 18 percent in 2022. This decrease is likely explained by the more limited availability of heroin, as fentanyl became more prominent in the illicit drug market. UMMC Midtown started testing for fentanyl in 2019 and it was shown to be present in approximately 80 percent of ODs since then.

Stimulant positives, including cocaine and amphetamine/methamphetamine, have been increasing in recent years. Cocaine positives increased from 48 percent in 2021 to 57 percent in 2022. Amphetamine/methamphetamine positives also increased during this time but remained below 10 percent. Benzodiazepine positives peaked at 37.1 percent in 2021 and decreased to 30.7 percent in 2022. It is unknown if any of these substances were prescribed during the patients' ED visits and thus caused the positive result. THC-positive specimens reached a series high of 25 percent in 2022.

Figure 29: Drugs Detected Among Tested Patients, by Year – UM Medical Center, Midtown Campus



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

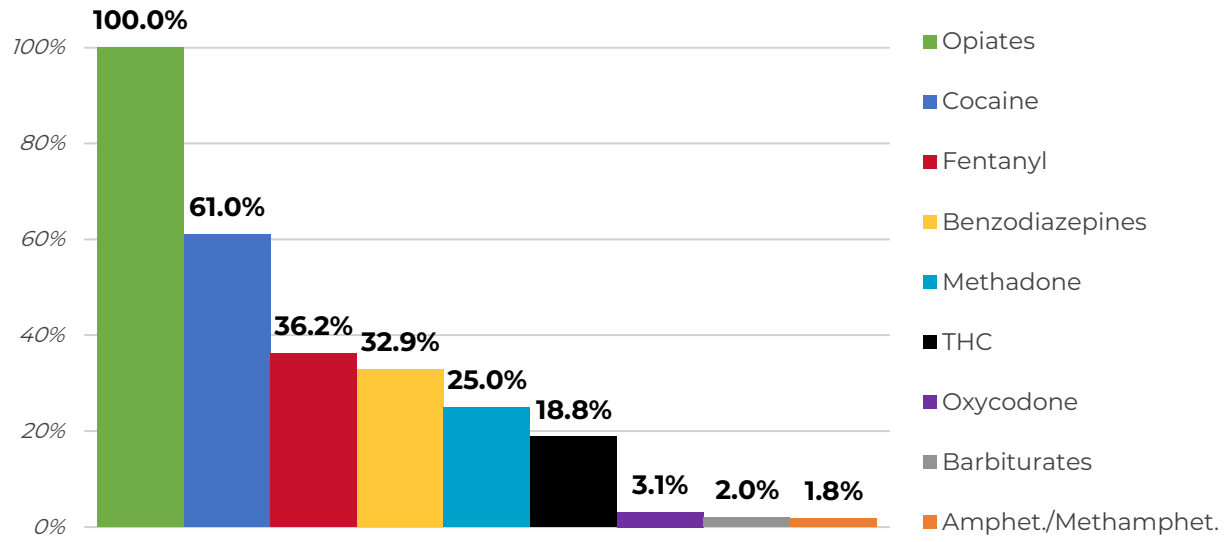
Substance	2016	2017	2018	2019	2020	2021	2022
Fentanyl	—	—	—	78.9%	81.9%	82.0%	78.3%
Cocaine	42.9%	51.7%	51.9%	50.1%	47.0%	48.1%	56.6%
Benzodiazepines	24.6%	22.4%	28.3%	30.4%	28.7%	37.1%	30.7%
THC	22.7%	22.9%	18.5%	16.1%	22.7%	20.0%	25.1%
Methadone	21.8%	22.6%	22.8%	27.5%	25.5%	27.8%	24.7%
Opiates	55.9%	56.7%	40.4%	36.1%	38.6%	24.1%	18.0%
Oxycodone	—	—	—	6.2%	4.4%	4.1%	6.7%
Amphetamine/ Methamphetamine	1.7%	2.0%	2.3%	1.9%	4.7%	1.7%	5.2%

Substance	2016	2017	2018	2019	2020	2021	2022
Barbiturates	2.8%	1.0%	1.5%	2.2%	1.6%	1.4%	1.9%
PCP	1.1%	0.7%	0.9%	0.7%	0.0%	0.0%	0.4%

Source: University of Maryland Center for Substance Use, Addiction & Health Research.

The most common other substance to appear in specimens testing positive for opiates was cocaine. Just over 60 percent of specimens testing positive for opiates also had cocaine present. Fentanyl was present in 36.2 percent of specimens. Benzodiazepines, methadone, and THC followed at 32.9 percent, 25 percent, and 18.8 percent, respectively.

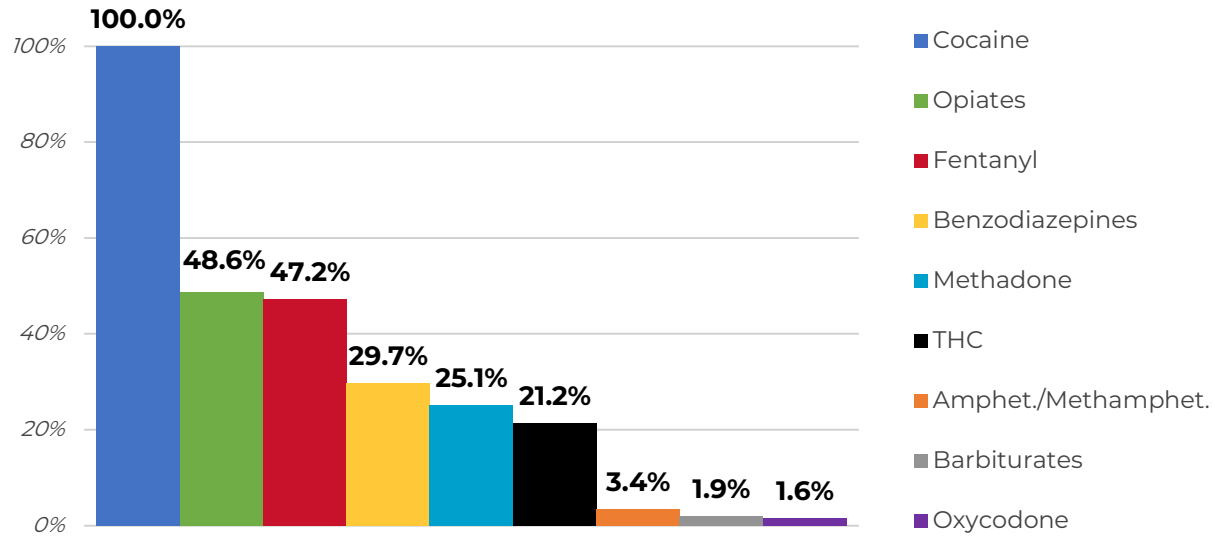
Figure 30: Percentage of Other Drugs Detected in Specimens that Tested Positive for Opiates – UM Medical Center, Midtown Campus (2022)



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Nearly half of the cocaine-positive specimens also tested positive for opiates or fentanyl. The third most common other substance found was benzodiazepines. Methadone and THC were found in 25.1 percent and 21.2 percent of cocaine-positive specimens, respectively.

Figure 31: Percentage of Other Drugs Detected in Specimens that Tested Positive for Cocaine– UM Medical Center, Midtown Campus, 2022



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

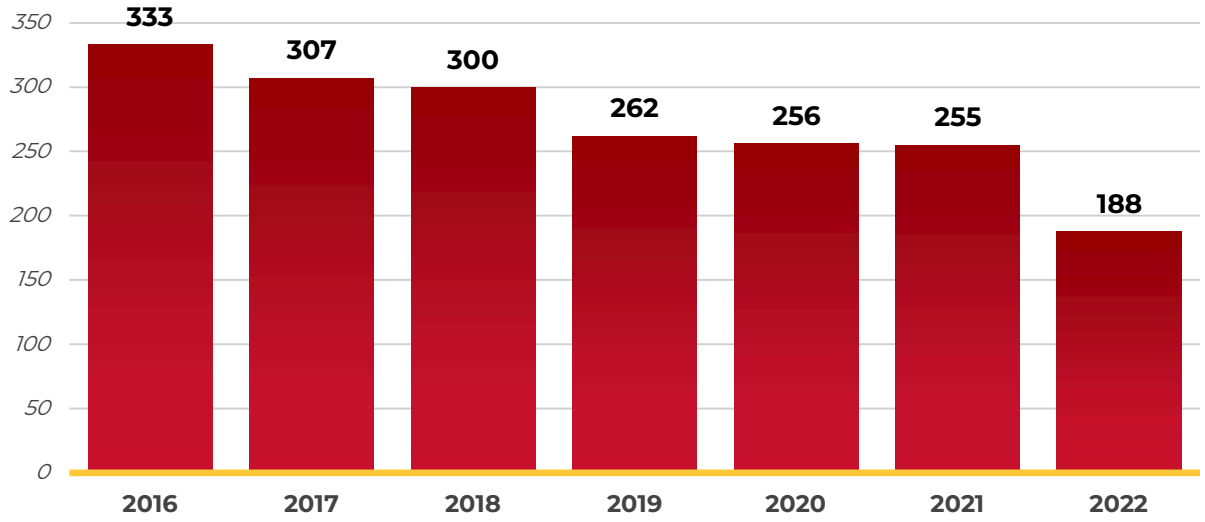
University of Maryland St. Joseph Medical Center (UM SJMC)

The data shown below represents a subset of the data collected by MD-EDDS. UM SJMC is located in Baltimore County, which is the jurisdiction with the second-highest OD fatality rate in Maryland. Data from UM SJMC differed compared to testing results from UMMC Midtown. For example, white patients made up the majority of OD-related ED visits at this hospital, and opioids were not involved in the majority of their OD-related ED visits between 2016 and 2022. It should be noted that fentanyl testing began at UM SJMC in April 2022, and the opioid results before that point are likely undercounted in the data and are not comparable to UMMC Midtown.

Number of Overdose-Related ED Visits (2016–2022)

There was a substantial decrease in drug OD-related ED visits at UM SJMC between 2016 and 2022, falling from 333 to 188 (42.5 percent reduction). The largest decrease occurred from 2021 to 2022, from 255 to 188 visits, or 26.3 percent.

Figure 32: Number of Overdose-Related Emergency Department Visits by Year – UM SJMC

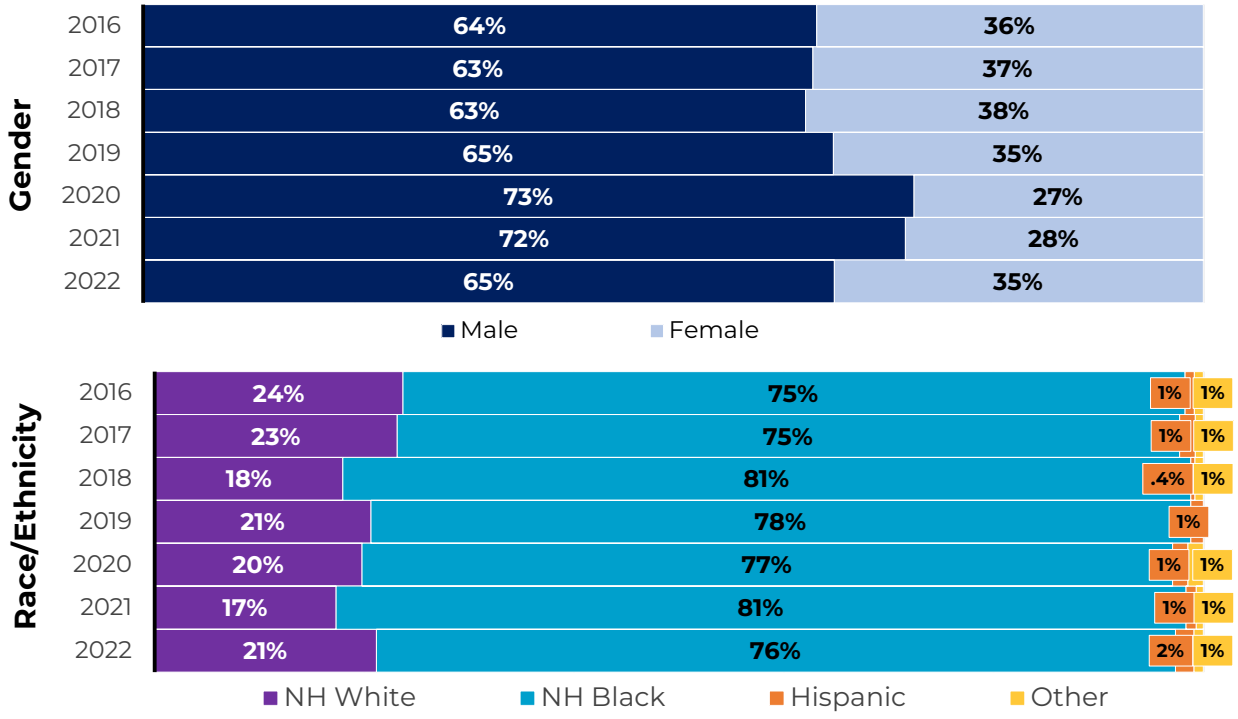


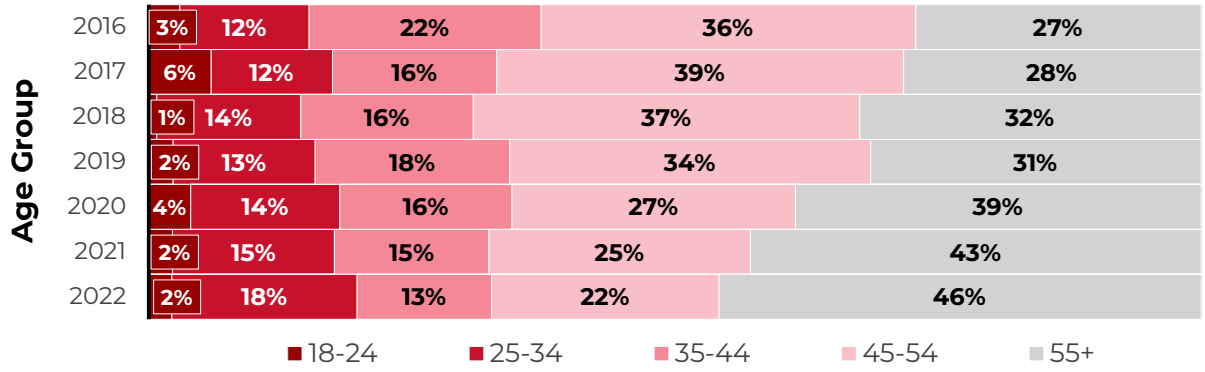
Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Drug Overdose ED Visits by Age, Race/Ethnicity, and Gender (2016–2022)

From 2016 to 2022, females accounted for 42–55 percent of patients with an OD-related ED visit, and 21–36 percent were aged 55 or older. Non-Hispanic Whites were involved in the majority of the visits during this period.

Figure 33: Overdose-Related Emergency Department Visits, by Age, Race/Ethnicity, and Gender – UM SJMC





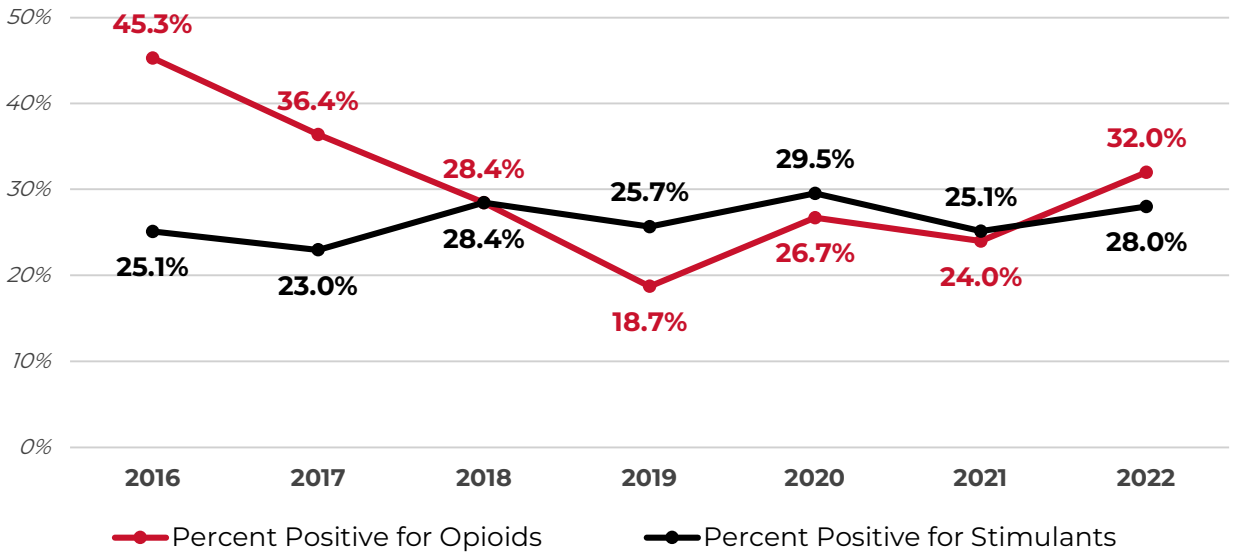
Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Drug Overdose-Related ED Patients Testing Positive for Any Opioid or Stimulant (2016–2022)

From 2016 to 2019, the number of patients who tested positive for an opioid decreased from 45.3 percent to 18.7 percent. In 2022, the number increased to 32 percent. Following the inclusion of fentanyl in toxicology screening in April 2022, the percentage who tested positive for fentanyl was higher than for all other substance categories except for THC.

The percentage of ED visits with positive tests for stimulants increased from 25.1 percent in 2016 to 28.0 percent in 2022. This trend differed as compared to positive tests for opioids during the same time frame, which had a decreasing trend.

Figure 34: Percentage of Drug Overdose-Related Emergency Department Visits with a Positive Result for Opioids and Stimulants by Year – UM SJMC

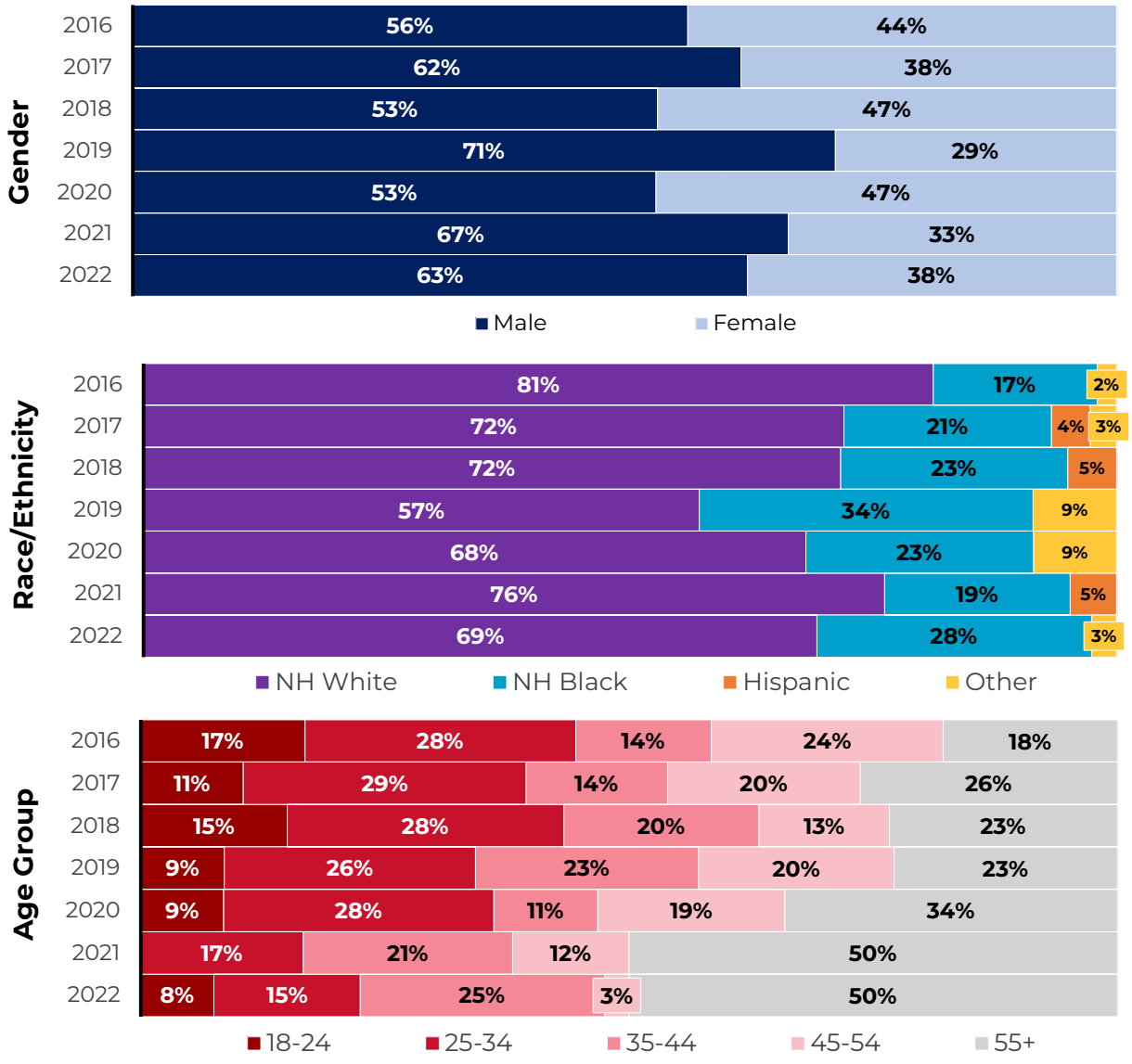


Source: University of Maryland Center for Substance Use, Addiction & Health Research.
**UM SJMC did not begin reporting testing for fentanyl until the 2nd quarter of 2022 so there were far fewer test results for fentanyl, compared with opiates and cocaine (86 tests for fentanyl vs. 1,306 for cocaine and opiates during the 2016-2022 time period).*

Demographic Characteristics of Patients Positive for Opioids, 2016-2022

The percentage of patients with positive test results for opioids who were 55 or older increased from 17.8 percent in 2016 to 50 percent in 2022. The 45–54 age category experienced a decrease from 23.8 percent to 2.5 percent in the same time frame. In all of the years studied, White patients and females constituted the majority of those testing positive for opioids.

Figure 35: Drug Overdose-Related Emergency Department Visits with Positive Opioid Results, by Age, Race/Ethnicity, and Gender – UM SJMC



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Trends Across all Drug Categories

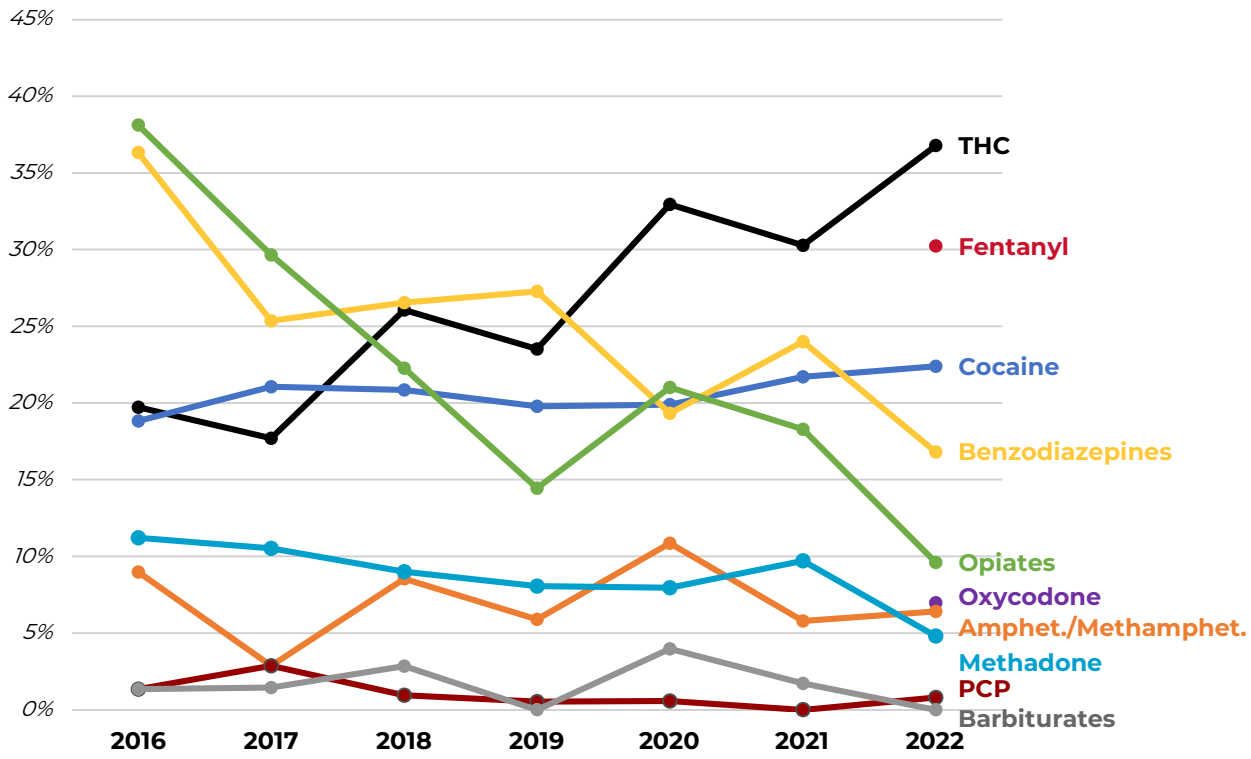
Figure 36 shows testing trends for various substances from 2016 to 2022. From 2020 onwards, the percentage of specimens testing positive for opiates fell dramatically, from 38 percent in 2016 to 10 percent in 2022. This decrease may be explained by the more limited availability of heroin in the illicit

drug supply as fentanyl became more prevalent. UM SJMC started testing for fentanyl in April 2022, after which fentanyl became the second-most frequently detected substance. Fentanyl was detected in 30 percent of specimens in 2022.

THC was the most frequently detected substance from 2020 to 2022, reaching a series high of 37 percent in 2022. The percentage positive for amphetamine/methamphetamine varied marginally but remained below 11 percent each year, and cocaine positives ranged from 18.8 percent to 22.4 percent.

Benzodiazepine positives gradually declined from 2016 to 2022 and reached a series low of 17 percent in 2022.

Figure 36: Drugs Detected Among Tested Patients, by Year – UM SJMC



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

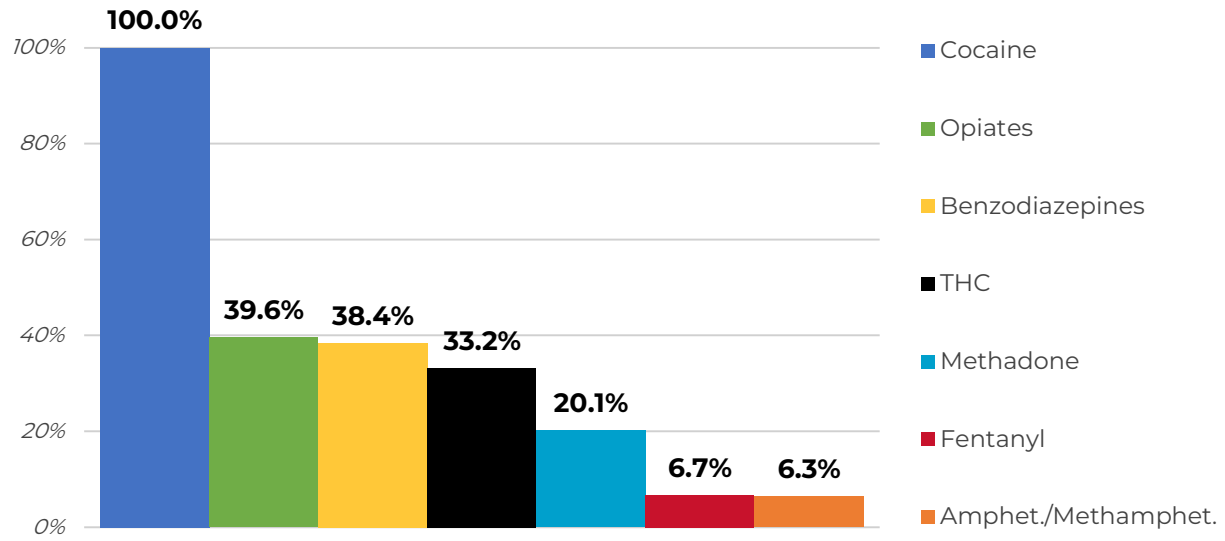
Substance	2016	2017	2018	2019	2020	2021	2022
THC	19.7%	17.7%	26.1%	23.5%	33.0%	30.3%	36.8%
Fentanyl	—	—	—	—	—	—	30.2%
Cocaine	18.8%	21.1%	20.9%	19.8%	19.9%	21.7%	22.4%

Substance	2016	2017	2018	2019	2020	2021	2022
Benzodiazepines	36.3%	25.4%	26.5%	27.3%	19.3%	24.0%	16.8%
Opiates	38.1%	29.7%	22.3%	14.4%	21.0%	18.3%	9.6%
Oxycodone	—	—	—	—	—	—	7.0%
Amphetamine/ Methamphetamine	9.0%	2.9%	8.5%	5.9%	10.9%	5.8%	6.4%
Methadone	11.2%	10.5%	9.0%	8.1%	8.0%	9.7%	4.8%
PCP	1.3%	2.9%	0.9%	0.5%	0.6%	0.0%	0.8%
Barbiturates	1.3%	1.4%	2.8%	0.0%	4.0%	1.7%	0.0%

Source: University of Maryland Center for Substance Use, Addiction & Health Research.

The most common substance found in combination with positive tests for cocaine were opiates at 40 percent. Benzodiazepines and THC followed at 38.4 and 33.2 percent, respectively).

Figure 37: Percentage of Other Drugs Detected in Specimens that Tested Positive for Cocaine– UM Medical Center, UM SJMC, 2022

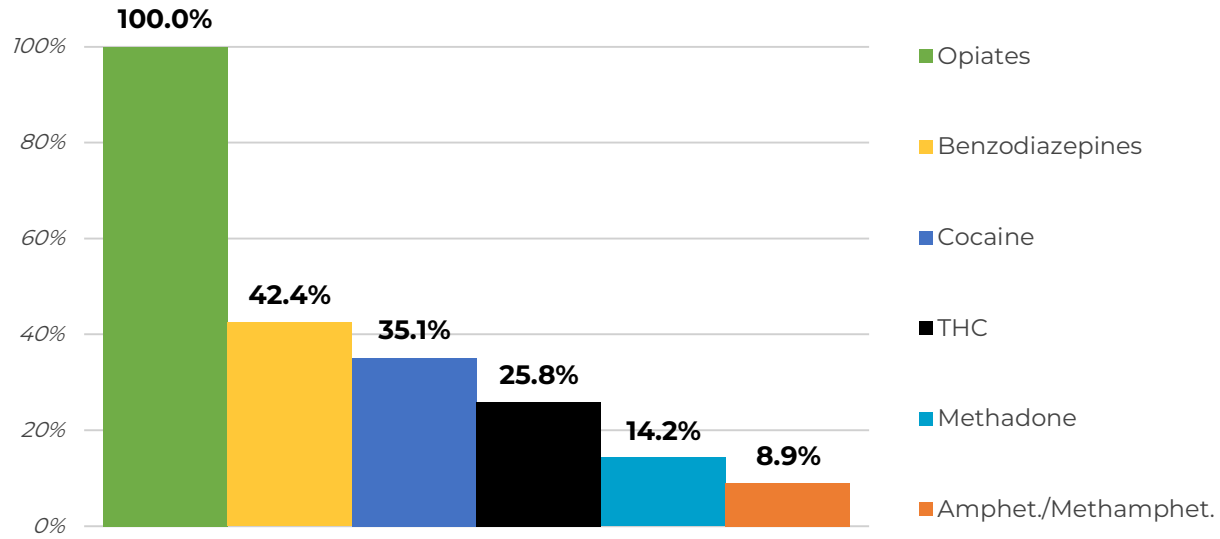


Source: University of Maryland Center for Substance Use, Addiction & Health Research.

The most common substance found in combination with positive tests for opiates were benzodiazepines at 42.4 percent. It is unknown if any of these substances were prescribed during the patients' ED visits and thus caused the positive result. Cocaine was present in 35.1 percent of opiate-positive specimens.

THC, methadone, and amphetamine/methamphetamine followed at 25.8 percent, 14.2 percent, and 8.9 percent, respectively.

Figure 38: Percentage of Other Drugs Detected in Specimens that Tested Positive for Opiates – UM SJMC, 2022



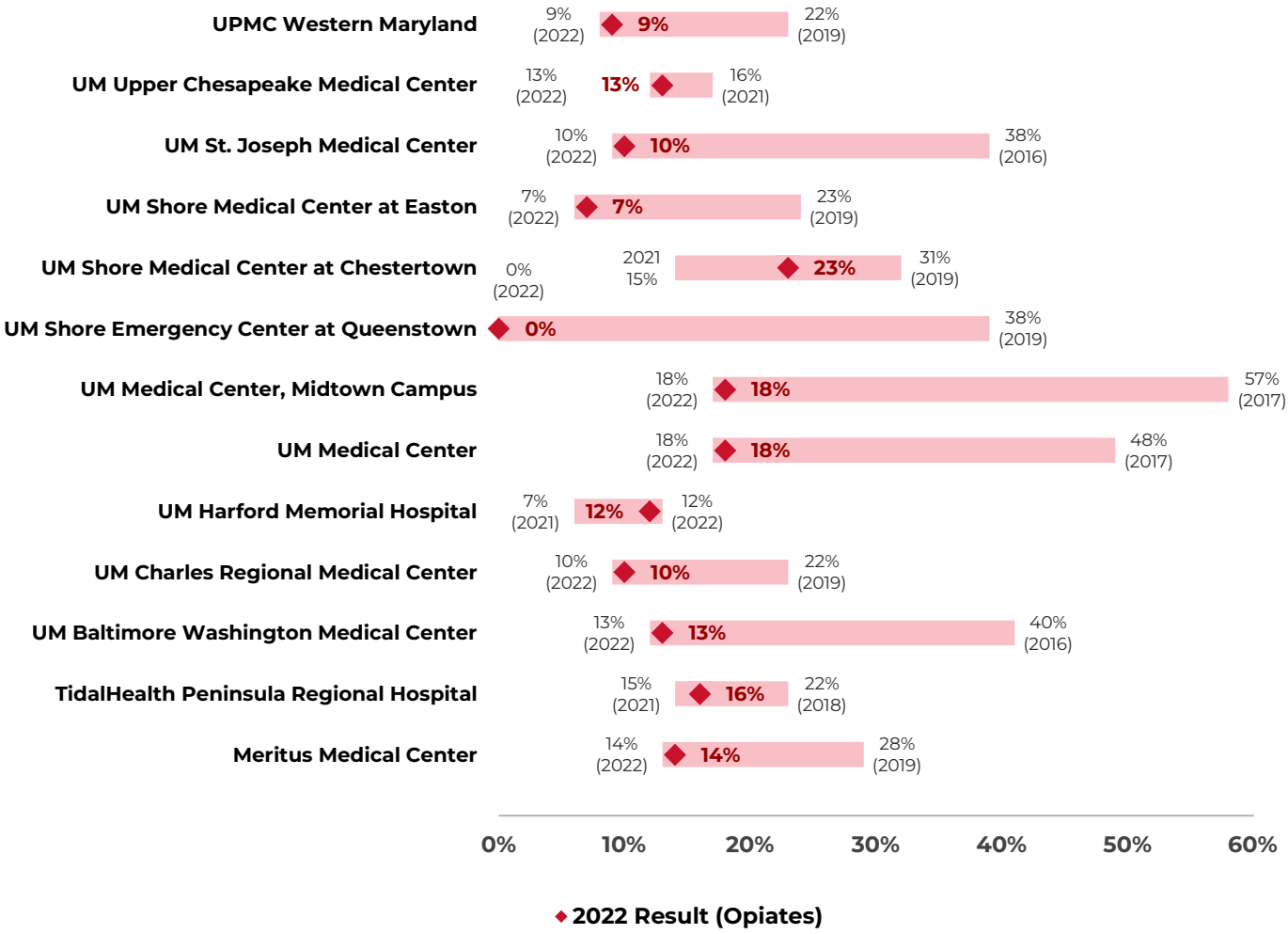
Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Cross-Site Comparisons of Drugs Detected

This section presents figures showing the high and low ranges of patients in 13 hospital EDs that tested positive for each substance from 2016 to 2022. They also indicate the percentage positive in 2022. Four hospitals were excluded from these analyses because they had very low positivity rates or too small a range of results to plot.

Figure 39 shows that in 2022, opiates reached a series low in 10 hospitals, including 5 of the 6 hospitals in Central Maryland. The decline in opiate-positive tests across Maryland reflects a decline in heroin use as fentanyl became widely available.

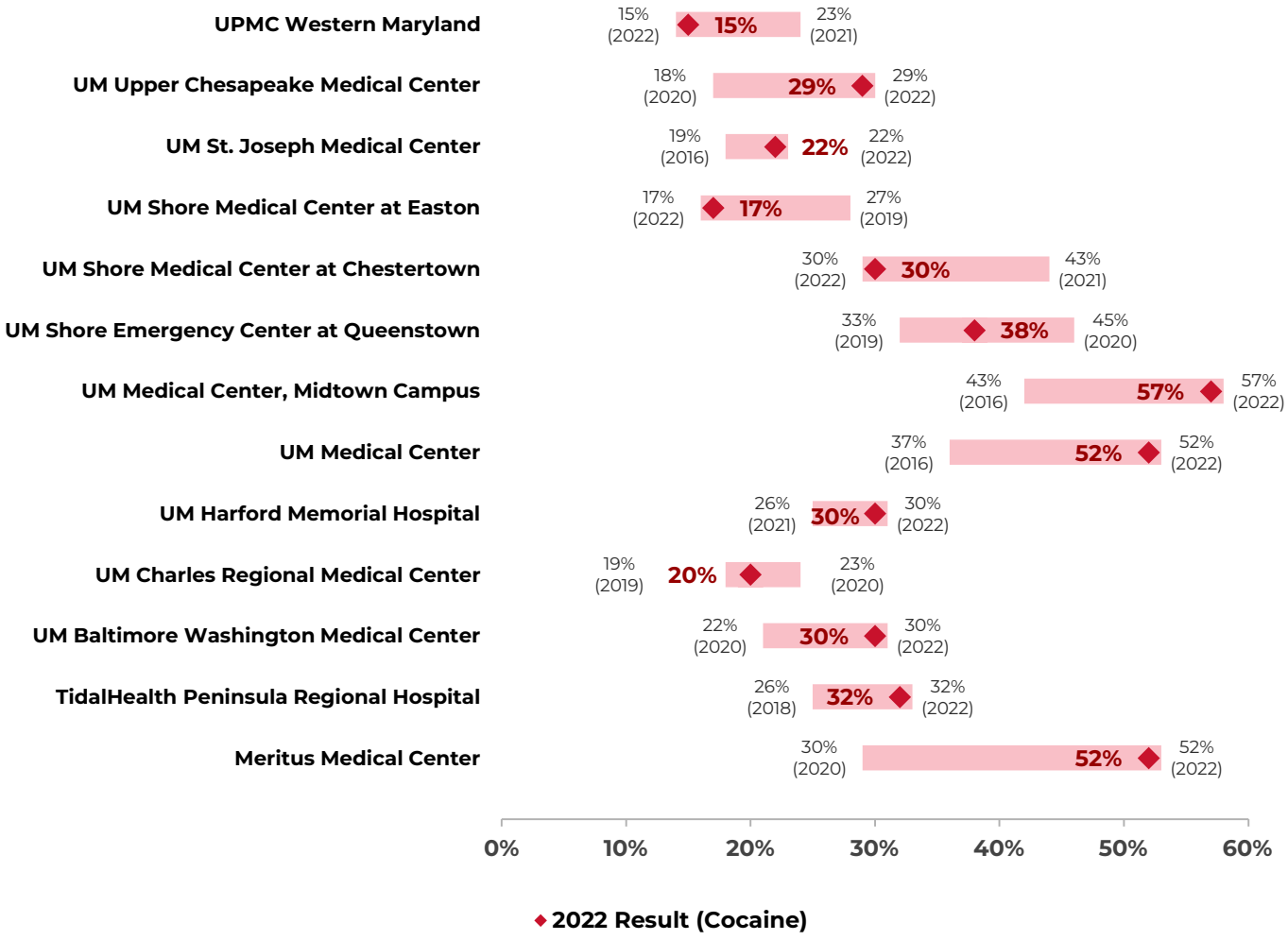
Figure 39: High and Low Yearly Percentages Testing Positive for Opiates at 13 Hospital EDs



Source: University of Maryland Center for Substance Use, Addiction & Health Research.
Note: UM Bowie Health Center, UM Capital Region Medical Center, UM Laurel Medical Center, and UM Shore Medical Center at Cambridge not shown because of very low rates or too small a range to plot. Only 11% of ED drug overdose visits to UPMC Western Maryland received urine drug screens in 2022. If the same percentage occurred in more than one year, the latest occurrence is shown.

Figure 40 shows that cocaine reached a series high in eight hospitals in 2022, including all six in Central Maryland in 2022. However, two hospitals on the Eastern Shore (UM Shore Easton, UM Shore Chestertown) and one in Western Maryland (University of Pittsburgh Medical Center-UPMC) reported a series low. Three hospitals reported that more than half of their specimens tested positive for cocaine – two in Baltimore City (UMMC Midtown, UMMC) and one in Washington County (Meritus Medical Center).

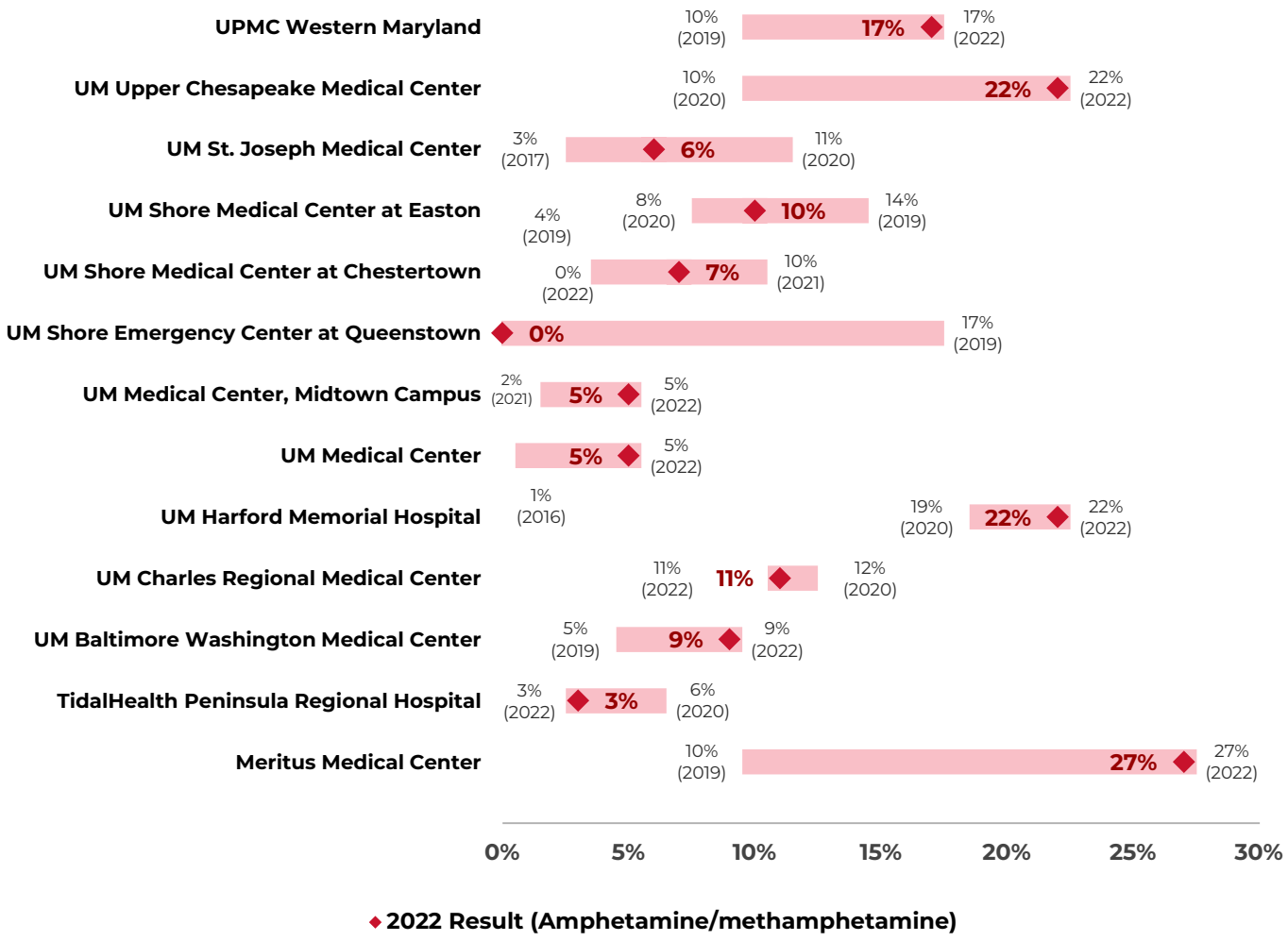
Figure 40: High and Low Yearly Percentages Testing Positive for Cocaine at 13 Hospital EDs



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Figure 41 shows that amphetamine/methamphetamine also reached series highs in seven hospitals in 2022, which included both hospitals in Western Maryland (UPMC, Meritus Medical Center). The series high percentages positive for amphetamine/methamphetamine ranged from 5 percent to 27 percent.

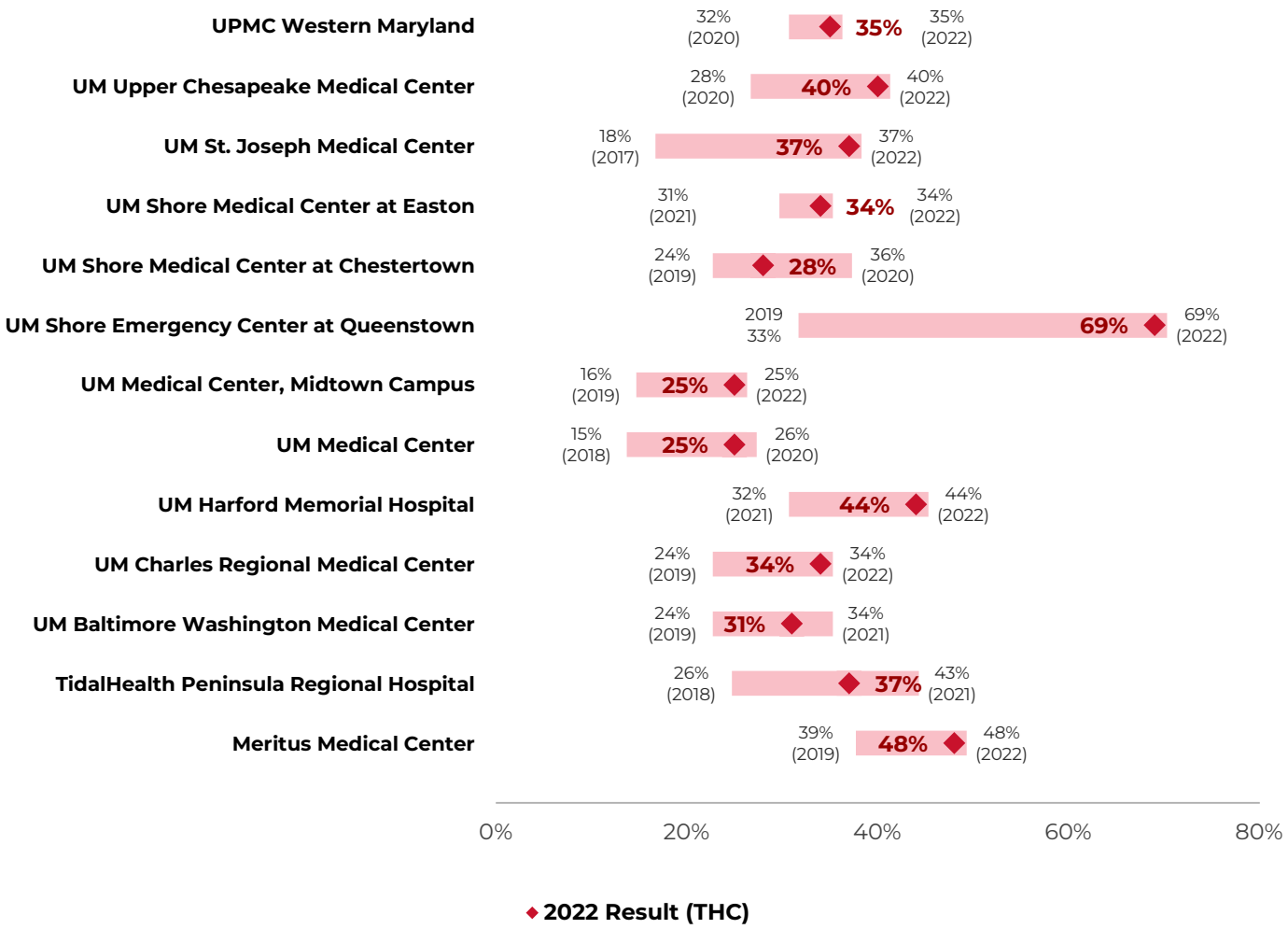
Figure 41: High and Low Yearly Percentages Testing Positive for Amphetamine/Methamphetamine at 13 Hospital Eds



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Positive tests for THC reached a series high in nine hospitals in 2022, with two other hospitals nearing a series high (UMMC, UM Baltimore Washington). Ten hospitals reported that more than 30 percent tested positive for THC.

Figure 42: High and Low Yearly Percentages Testing Positive for THC at 13 Eds



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Summary of Cross-Hospital Comparisons

Table 2, below, shows substances that reached an annual series high or low in 2022 in 13 hospitals. Six-year highs/lows could not be calculated for the three hospitals in the Capital Region and one on the Eastern Shore because they had very low positivity rates or too small a range of results to establish a meaningful range. All six of the hospitals in Central Maryland reached series highs for cocaine-positive test results in 2022, and five of them also reached series highs for amphetamine and/or methamphetamine. This suggests that stimulant use may be increasing among ED patients in these hospitals. In contrast, four of the six Central Maryland hospitals reached series lows in opiate-positive test results, reflecting a national trend towards lower heroin use as it is being displaced by fentanyl. Nine of the 13 hospitals, including four in Central Maryland, reached series highs for THC-positive test results. It is important to note that the presence of a positive test for THC does not necessarily indicate that cannabis use was related to the reason a patient came to the ED. Four hospitals – Meritus, UM Upper Chesapeake, UM Harford, and UMMC Midtown – reached series highs in three or more of the substances shown.

Table 2: MD-EDDS Hospitals with Yearly Series Highs and Lows for Four Substances in 2022

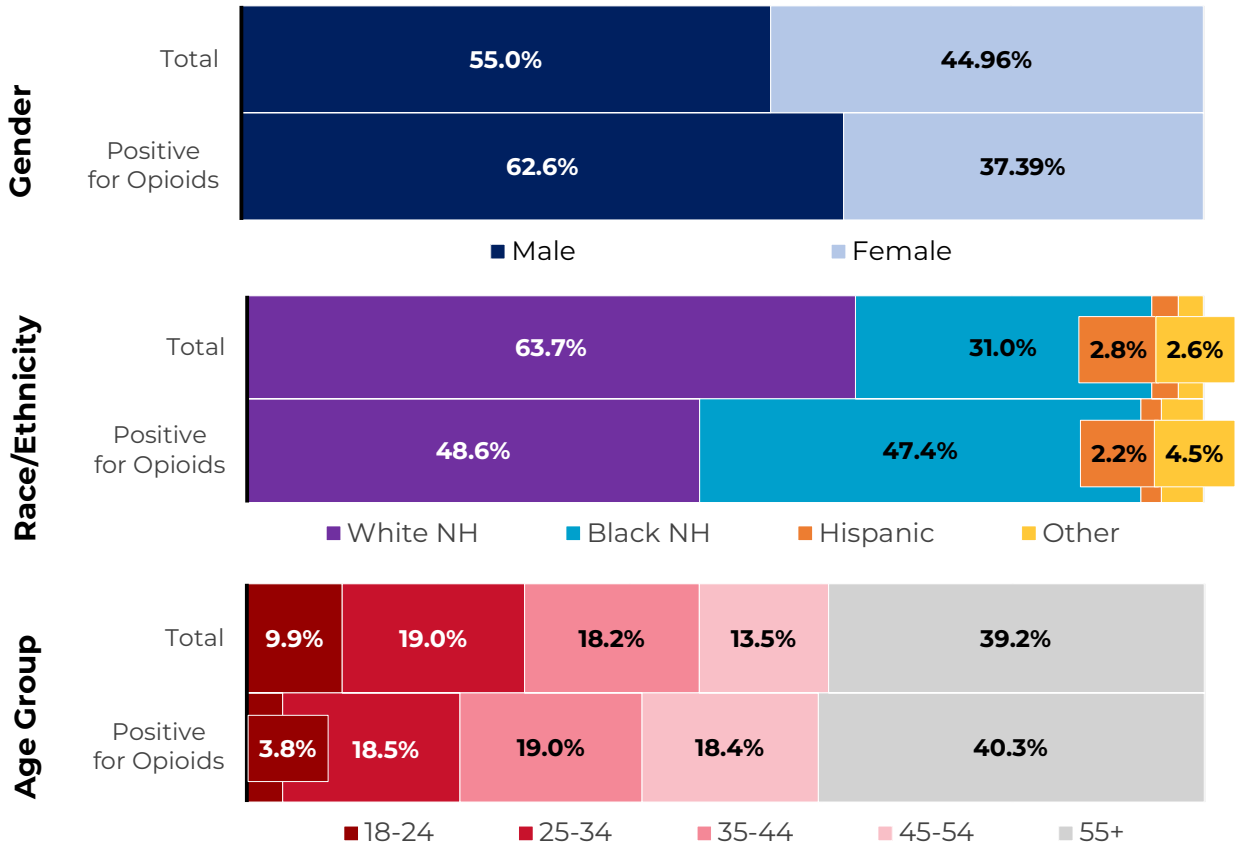
Hospital	THC	Opiates	Amphetamine/ Methamphetamine	Cocaine
Western Maryland				
Meritus Medical Center	H (48%)	L (14%)	H (27%)	H (52%)
UPMC	H (35%)	L (9%)	H (17%)	L (15%)
Southern Maryland				
UM Charles Regional Medical Ctr.	H (34%)	L (10%)	L (11%)*	—
Central Maryland				
UM Balt Wash Medical Center	—	L (13%)	H (9%)	H (30%)
UM Upper Chesapeake Med Ctr.	H (40%)	L (13%)	H (22%)	H (29%)
UM Harford Memorial Hospital	H (44%)	H (12%)	H (22%)	H (30%)
UM Medical Center	—	L (18%)	H (5%)	H (52%)
UM Medical Center, Midtown	H (25%)	L (18%)	H (5%)*	H (57%)
UM St. Joseph Medical Center	H (37%)	L (10%)	—	H (22%)*
Eastern Shore**				
UM Shore Med Ctr Chestertown	—	—	—	L (30%)
UM Shore Emergency Ctr. Queenstown	H (69%)	L (0%)	L (0%)	—
UM Shore Med. Ctr. Easton	H (34%)	L (7%)	—	L (17%)
TidalHealth Peninsula Regional Hospital	—	—	L (3%)*	H (32%)

Source: University of Maryland Center for Substance Use, Addiction & Health Research.
**If the same percentage occurred in more than one year, the latest occurrence is shown.*
***Series highs/lows not calculated for four hospitals: UM Bowie Health Center, UM Capital Region Medical Center, UM Laurel Medical Center, and UM Shore Medical Center Cambridge. Only 1-2 years in current data run.*

Statewide Hospital Demographics

Individuals aged 55 and older are represented in a higher proportion of OD-related ED visits compared to other age groups, regardless of whether there was an opioid-positive urine specimen or not. Non-Hispanic Whites made up the majority of OD-related ED visits. However, when looking specifically at visits that involved an opioid-positive specimen, non-Hispanic Whites and non-Hispanic Blacks experienced similar rates, at 48.6 percent and 47.4 percent, respectively. Males comprised a majority in all OD-related ED visits and those with an opioid-positive urine specimen with 55.0 percent and 62.6 percent, respectively.

Figure 43: Drug Overdose-Related ED Visits, with and without a Positive Opioid Specimen, by Age, Race/Ethnicity, and Gender – Statewide



Source: University of Maryland Center for Substance Use, Addiction & Health Research.

Fentanyl Dipstick Study Results

MD-EDDS staff offered 50 fentanyl dipstick tests to each MD-EDDS hospital that was not yet routinely testing fentanyl with which to test urine specimens they had collected. Each hospital tested up to 50 consecutive specimens obtained from adult patients that had tested positive for at least one substance on the hospital's toxicology screen. Patients came from any unit of the hospital that had not been administered fentanyl as part of their medical care. The results from the dipstick testing were reported to EDDS.

In 2023, the findings (below) from this sub-study were used to support Maryland's passage of the Josh Siems Act, which requires all Maryland hospitals to begin routinely testing for fentanyl in urine toxicology

screens when used for patient diagnoses. Between 2–4 percent of patient samples were positive for fentanyl. Three hospitals saw rates of 20 percent or more – UM Shore Medical Center in Chestertown, UPMC Western Maryland in Cumberland, and Meritus Medical Center in Hagerstown. Across all of the hospitals, only 23 percent of samples also tested positive for opiates like heroin by the hospitals' standard screens, suggesting that the opiate screen would have not identified these patients.

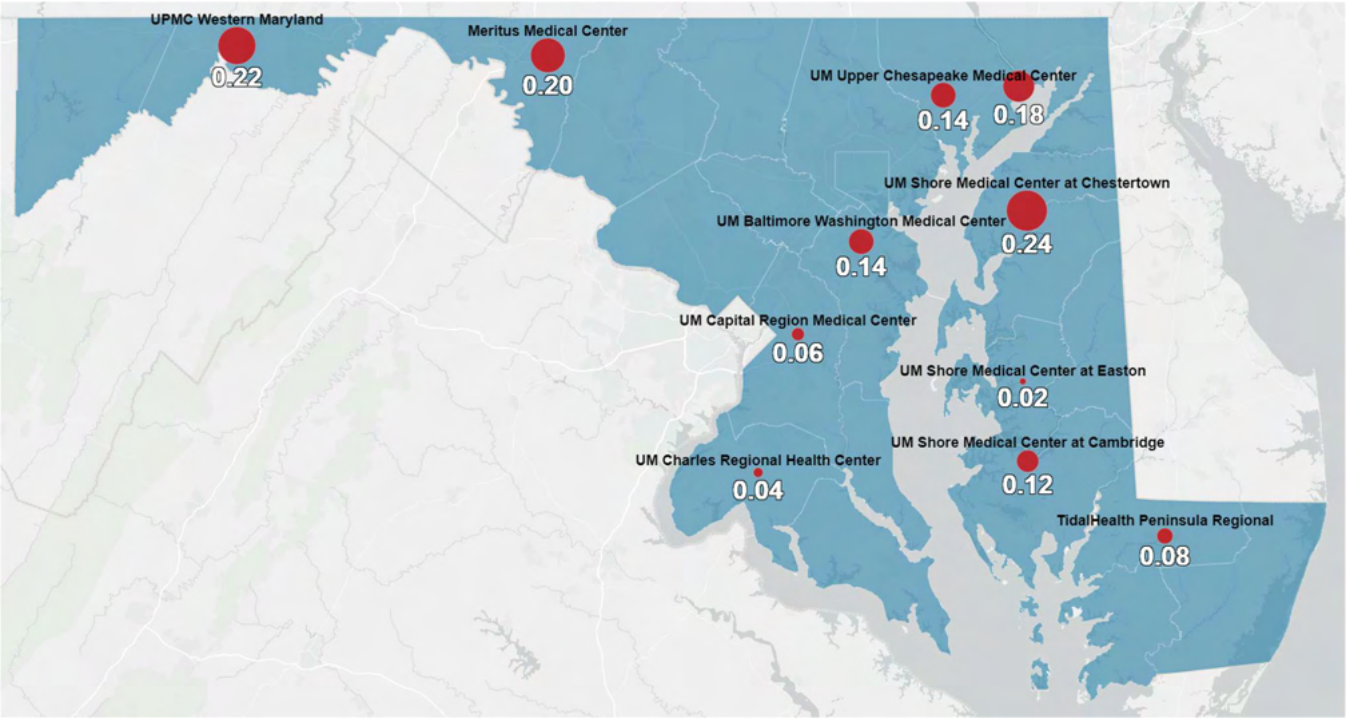
Table 3: MD-EDDS Fentanyl Dipstick Study Results by Hospital
(*50 positive specimens submitted by each hospital*)*

Hospital	Positive for Fentanyl by Dipstick
UM Shore Medical Center at Chestertown, Chestertown, MD	(n=50) 24%
UPMC Western Maryland, Cumberland, MD	(50) 22%
Meritus Medical Center, Hagerstown, MD	(50) 20%
UM Harford Memorial Hospital, Havre de Grace, MD	(50) 18%
UM Baltimore Washington Medical Center, Glen Burnie, MD	(50) 14%
UM Upper Chesapeake Medical Center, Bel Air, MD	(50) 14%
UM Shore Medical Center at Cambridge, Cambridge, MD	(50) 12%
TidalHealth Peninsula Regional, Salisbury, MD	(50) 8%
UM Laurel Medical Center, Laurel, MD*	(38) 8%
UM Capital Region Medical Center, Largo, MD	(50) 6%
UM Charles Regional Health Center, La Plata, MD	(50) 4%
UM Shore Medical Center at Easton, Easton, MD	(50) 2%
All Above Hospitals	**(588) 13%**

Source: University of Maryland Center for Substance Use, Addiction & Health Research.
**Consecutive specimens were selected from any hospital unit that the hospital's testing had found positive for at least one drug. Patients that were administered fentanyl as part of their medical care at the hospital were excluded. UM Laurel Medical Center only had 38 specimens collected. UM Bowie Health Center (N=11) and UM Shore Emergency Center at Queenstown (N=10) were excluded due to low specimen counts.*

The map below shows a red dot for the hospitals included in this study, with their corresponding locations. The size of the red dot reflects the percentage who tested positive for fentanyl.

Map 3: Hospitals Included in Study (2022)



Source: University of Maryland Center for Substance Use, Addiction & Health Research.
**Consecutive specimens were selected from any hospital unit that the hospital's testing had found positive for at least one drug. Patients that were administered fentanyl as part of their medical care at the hospital were excluded.*

Table 4, below, shows that patients testing positive for fentanyl were more likely to be males than persons testing negative (67 percent vs. 54 percent, $p < .05$). White patients made up the majority of patients testing positive or negative for fentanyl. The average age of both groups of patients was similar (39.4/40.5 years).

Table 4: MD-EDDS Fentanyl Dipstick Study—Patient Demographics by Fentanyl Dipstick Result, None of Which Routinely Test Patients for Fentanyl
*(588 specimens submitted by 12 hospitals)**

Demographics	Positive for Fentanyl by Dipstick (N=75) %	Negative for Fentanyl by Dipstick (N=513) %
Gender		
Male	67*	54*
Female	33	46
Total	100%	100%
Race*		
White	58	58
Black/African American	39	36
Asian	1	1
Other	3	5
Total	100%	100%
Mean Age	**39.4 (range 20-63)**	**40.5 (range 18-91)**

Source: University of Maryland Center for Substance Use, Addiction & Health Research.
**Consecutive specimens were selected from any hospital unit that the hospital's testing had found positive for at least one drug. Patients that were administered fentanyl as part of their medical care at the hospital were excluded.*
Hospitals include: UM Shore Medical Center at Chestertown (Chestertown, MD), Meritus Medical Center (Hagerstown, MD), UM Baltimore Washington Medical Center (Glen Burnie, MD), UM Upper Chesapeake Medical Center (Bel Air, MD), UM Shore Medical Center at Cambridge (Cambridge, MD), UM Capital Region Medical Center (Largo, MD), UM Charles Regional Health Center (La Plata, MD), UM Shore Medical Center at Easton (Easton, MD), UM Harford Memorial Hospital (Havre de Grace, MD), TidalHealth Peninsula Regional (Salisbury, MD), UPMC Western Maryland (Cumberland, MD), and UM Laurel Medical Center (Laurel, MD).
UM Laurel Medical Center only had 38 specimens collected. UM Bowie Health Center (N=11) and UM Shore Emergency Center at Queenstown (N=10) were excluded due to low specimen counts.
**p<.05 by Chi-Square.*
***One patient was missing race information.*

Table 5 shows the other substances found through routine testing in specimens that tested positive or negative for fentanyl. Cocaine, THC, and benzodiazepines were the substances most common in specimens positive for fentanyl. There were some differences in the substances detected between the two groups. Specimens positive for fentanyl were more likely to also test positive for cocaine (57 percent vs. 24 percent, $p < .001$), opiates (23 percent vs. 11 percent, $p < .01$), and methadone (27 percent vs. 8 percent, $p < .001$) and less likely to test positive for THC (43 percent vs. 59 percent, $p < .05$).

Table 5: Other Drugs Detected by the Hospital's Routine Tests by Fentanyl Dipstick Result

(*N=588 specimens submitted by 12 hospitals*)*

Hospital Also Found Positive for:	Specimens Positive for Fentanyl (N=75) %	Specimens Negative for Fentanyl (N=513) %
Cocaine	57***	24***
THC	(n=74) 43*	(n=511) 59*
Benzodiazepines	28	20
Methadone	(n=63) 27***	(n=340) 8***
Opiates	23**	11**
Amphetamines	17	10
Oxycodone	(n=26) 8	(n=224) 10
PCP	(n=56) 7	(n=382) 6
Barbiturates	3	4
Buprenorphine	(n=10) 0	(n=47) 9

Source: University of Maryland Center for Substance Use, Addiction & Health Research.

**Consecutive specimens were selected from any hospital unit that the hospital's testing had found positive for at least one drug. Patients that were administered fentanyl as part of their medical care at the hospital were excluded.*

Hospitals include: UM Shore Medical Center at Chestertown (Chestertown, MD), Meritus Medical Center (Hagerstown, MD), UM Baltimore Washington Medical Center (Glen Burnie, MD), UM Upper Chesapeake Medical Center (Bel Air, MD), UM Shore Medical Center at Cambridge (Cambridge, MD), UM Capital Region Medical Center (Largo, MD), UM Charles Regional Health Center (La Plata, MD), UM Shore Medical Center at Easton (Easton, MD), UM Harford Memorial Hospital (Havre de Grace, MD), TidalHealth Peninsula Regional (Salisbury, MD), UPMC Western Maryland (Cumberland, MD), and UM Laurel Medical Center (Laurel, MD).

UM Laurel Medical Center only had 38 specimens collected. UM Bowie Health Center (N=11) and UM Shore Emergency Center at Queenstown (N=10) were excluded due to low specimen counts.

*Ns vary due to hospitals not testing for each drug; *p<.05, **p<.01, ***p<.001 by Chi-Square.*

Medicaid MOUD

Table 6, below, presents the number and percentage of individuals who were enrolled in Medicaid at any point within 12 months of their death and received any form of MOUD between 2017 and 2021. Buprenorphine treatment was consistently the most utilized type of MOUD among participants. The number of participants who received buprenorphine treatment increased by 5.1 percentage points during this time frame. Methadone treatment was the next most commonly utilized MOUD among participants, decreasing by 5.5 percentage points across the evaluation period.[16] Naltrexone treatment was the least common type of MOUD, with a slight decrease of 0.8 percentage points in participants from 2017 to 2018 followed by a sudden increase in 2019 of 2.8 percentage points, a sharp decline in 2020 of 5 percentage points, and a slight increase in 2021 of 0.9 percentage points. The number of relevant dispenses and services billed for buprenorphine and methadone increased sharply between 2017 and 2018, as well as between 2019 and 2020. Trends for participants enrolled in Medicaid within 12 months of an OD death and for participants enrolled in Medicaid at the time of an OD death are similar.

Table 6 Medicaid Participants Who Received MOUD within a Year of Their Death (2017–2021)

Event Type	Eligible Within One Year of Death					
	2017			2018		
	Number of Participants	Percent of Total	Number of MOUD Dispenses or Services	Number of Participants	Percent of Total	Number of MOUD Dispenses or Services
At least one buprenorphine treatment	242	52.4%	2,921	294	53.3%	5,637
At least one methadone treatment	236	51.1%	5,720	263	47.6%	6,884
At least one Naltrexone treatment	68	14.7%	214	77	13.9%	183
Total	**462**	**-**	**8,855**	**552**	**-**	**12,704**

Source: The Hilltop Institute, Maryland Medicaid Administration, Maryland Vital Statistics Administration and Maryland's Medicaid Management Information System (MMIS2).

[16] The Hilltop Institute. (2023, April 14). Medicaid Data for DORM Report. Baltimore, MD: UMBC.

	2019			2020		
	Number of Participants	Percent of Total	Number of MOUD Dispenses or Services	Number of Participants	Percent of Total	Number of MOUD Dispenses or Services
At least one buprenorphine treatment	338	58.7%	5,568	384	58.3%	9,148
At least one methadone treatment	254	44.1%	6,408	293	44.5%	8,628
At least one Naltrexone treatment	96	16.7%	281	77	11.7%	254
Total	**576**	**-**	**12,257**	**659**	**-**	**18,025**

Source: The Hilltop Institute, Maryland Medicaid Administration, Maryland Vital Statistics Administration and Maryland's Medicaid Management Information System (MMIS2).

	2021		
	Number of Participants	Percent of Total	Number of MOUD Dispenses or Services
At least one buprenorphine treatment	371	57.5%	7,592
At least one methadone treatment	294	45.6%	9,073
At least one Naltrexone treatment	81	12.6%	196
Total	**649**	**-**	**16,861**

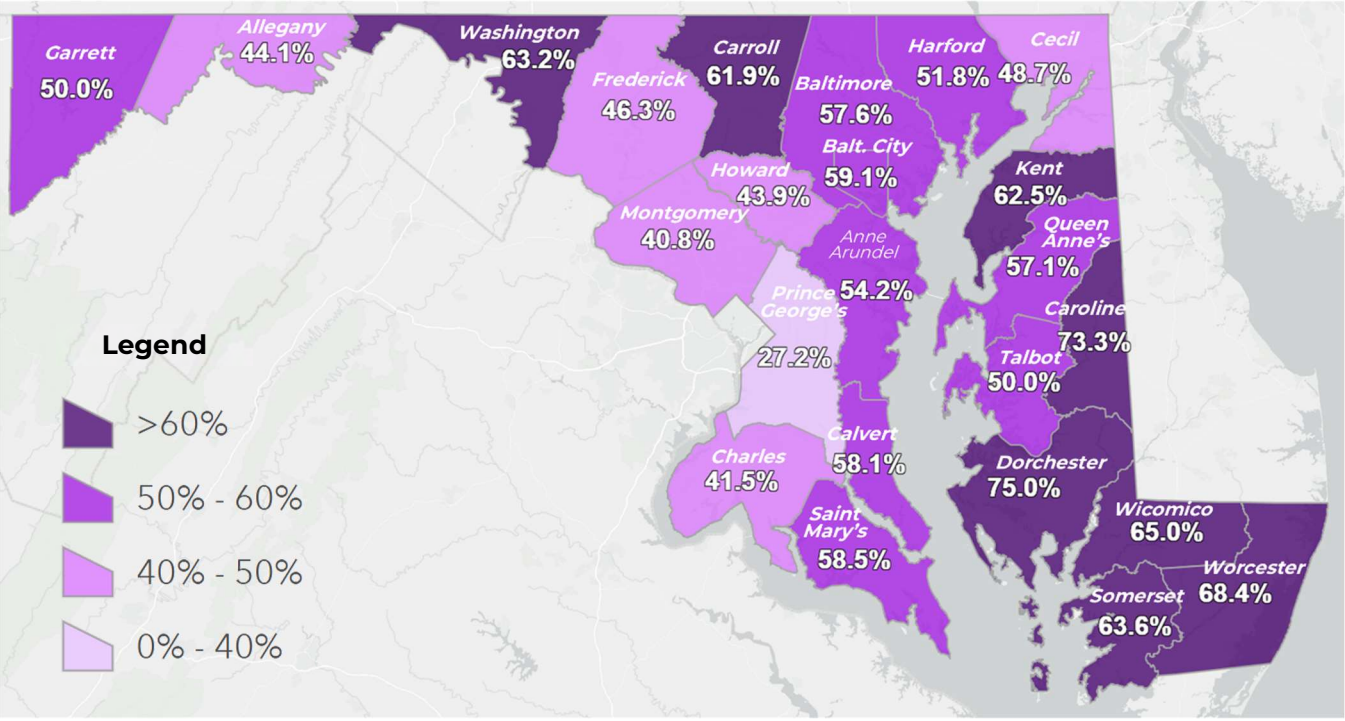
Source: The Hilltop Institute, Maryland Medicaid Administration, Maryland Vital Statistics Administration and Maryland's Medicaid Management Information System (MMIS2).

Other (non-MOUD) Mental Health and SUD Services

PBHS Service Connection

The following six jurisdictions had over 60 percent of their OD decedents engaged in PBHS services: Allegany County, Anne Arundel County, Baltimore City, Cecil County, Queen Anne's County, Washington County, and Wicomico County. The following five jurisdictions had less than 40 percent of their OD decedents engaged in PBHS services: Dorchester County, Garrett County, Kent County, Prince George's County, and Talbot County.

Map 4: Overdose Decedents Engaged in PBHS Services by Jurisdiction of Residence (2021)



Source: MDH Behavioral Health Administration.

Targeted Naloxone Distribution

Providing naloxone to individuals who are at the highest risk for OD is a critical strategy for reducing OD-related mortality. Targeted naloxone distribution programs work best when: 1) naloxone is provided to people at high risk of experiencing or witnessing an OD; and 2) outreach workers, harm reduction staff, trusted clinicians and first responders who are properly educated and comfortable distributing naloxone to those using illicit opioids or receiving a high-risk opioid prescription. To have the greatest impact in preventing OD death, individuals need to feel comfortable carrying and using naloxone. In 2021, 83.8

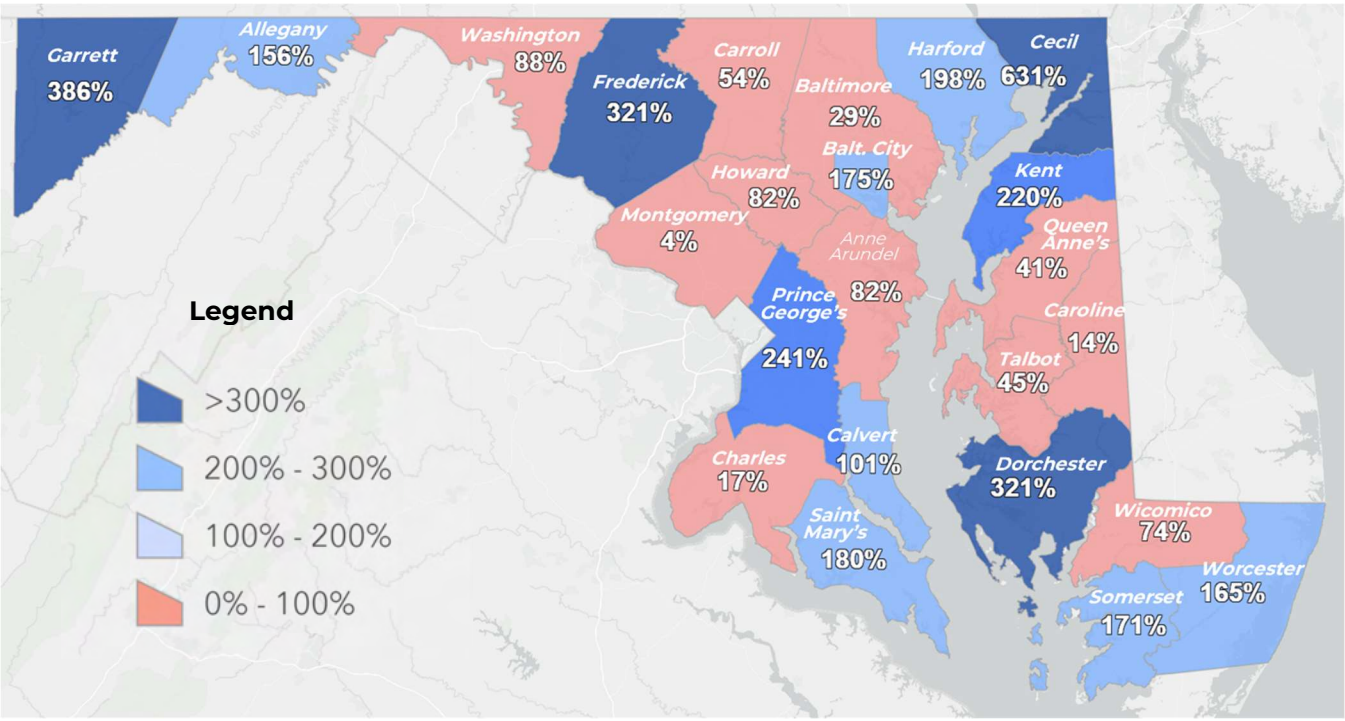
percent of OD decedents in Maryland were not administered naloxone showing the need for naloxone saturation.[17]

To better understand how local jurisdictions are reaching people at the highest risk for OD with naloxone distribution efforts, CHRS developed a naloxone saturation formula to track and identify the correlation between the level of distributed naloxone compared to the number of OD fatalities in each corresponding jurisdiction.

Applying the naloxone saturation formula provides a framework for how to best address naloxone distribution in communities. Technical assistance and resource allocation can be provided to jurisdictions to ensure jurisdictions are able to reach people at greatest risk for OD with naloxone and to ensure naloxone is distributed at levels where it can contribute to the greatest possible decrease in OD fatalities.

The map below shows naloxone saturation in 2022 by jurisdiction. In 2022, eleven jurisdictions did not reach naloxone saturation targets, one jurisdiction was between 0.0 and 49.9 percent above saturation targets, six jurisdictions achieved naloxone saturation between 50 and 100 percent, and six jurisdictions achieved more than 100 percent of their targeted naloxone saturation.

Map 5: Naloxone Saturation* Map of Maryland (2022)



Source: MDH Center for Harm Reduction Services.
**Saturation numbers are based on Overdose Response Program (ORP) Distribution only.*

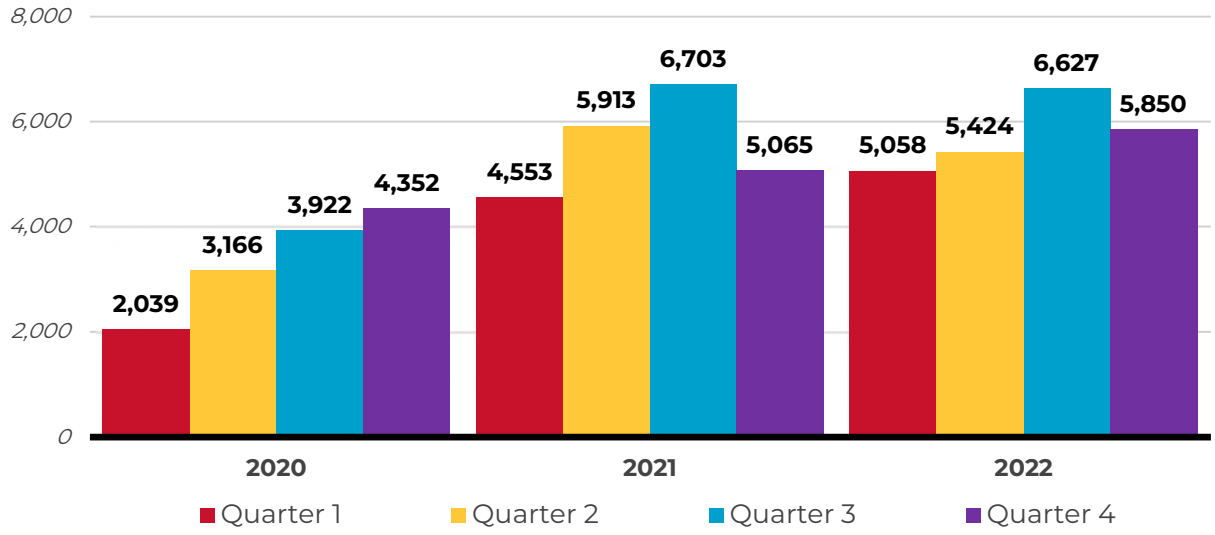
[17]Statewide Unintentional Drug Overdose Reporting System (SUDORS): overdose fatality circumstances and decedent characteristics.

Syringe Service Programs

SSPs are community-based programs that offer an array of services, including provisions to curtail the transmission of infectious disease, linkages to SUD treatment, and other social support resources, such as vaccinations, OD education and naloxone distribution, wound care, and both testing and linkage to care for infectious disease. There were 23 approved SSPs in Maryland by the end of the 2022 calendar year, three more than last year.

In 2022, 22,959 individuals were served by SSPs with 6,987 new/registered participants during calendar year 2022. There were 69,505 linkages to care made for individuals engaged with SSPs in 2022, up 59.2 percent from last year, demonstrating the importance of these programs in serving people who use drugs with low-barrier services.

Figure 44: Individuals Served Through SSPs by Quarter (2020–2021)



Source: MDH Center for Harm Reduction Services.

EMS Transportation

MIEMSS provided emergency encounter data to support the research and analysis of linked data sets related to EMS incidents involving opioid OD. Between January 1, 2021, and December 31, 2022, there were 34,094 EMS incidents identified as involving an opioid OD (out of a total of 1,251,050 incidents). Incidents were divided based on whether the patient was transported, not transported, or deceased. Incidents reflect only a unique incident, not necessarily a unique individual; thus, an individual may have had more than one opioid-involved incident with an EMS response.

72.5 percent of opioid-related OD incidents resulted in a transport in 2021, and 73.1 percent resulted in a transport in 2022. Comparing demographics of patients who were transported to patients who were not transported, data showed that patients who were transported tended to be younger, were more likely to be male, were more likely to be White, and were more likely to be in the Eastern Shore region.

Hospital Characteristics

The HSCRC collects a variety of demographic, financial, and other clinical information related to patient care (e.g., nature of admission, diagnostic codes, etc.) at acute care and licensed specialty hospitals across the State of Maryland. Between January 1, 2016, and December 31, 2021, 8,958 OD decedents received care through Maryland's hospital system in an inpatient or ED facility at some point during the same six-year period.

Of the individuals who died from an OD with an HSCRC record between 2016 and 2021, 40.9 percent had received care for an OD-related encounter at some point in the seven-year study period. Over one-quarter (24.2 percent) of individuals who died from an OD had a chronic pain diagnosis, as compared to 7.2 percent of non-OD decedents with HSCRC records. About one-fifth (22.0 percent) of non-OD decedents had a mental health diagnosis, while 51.5 percent of individuals with an HSCRC record who died from an OD had a mental health diagnosis. Less than half (45.9 percent) of people with an HSCRC record who died from an OD were previously diagnosed with OUD and 58.1 percent of people with an HSCRC record who died from an OD were previously diagnosed with a non-opioid SUD.

Table 7: HSCRC Encounters by Prior Diagnosis (2016–2021)

	Non-OD decedents with HSCRC records		OD decedents with HSCRC records		p value**
Total Individuals	3,392,034		8,958		
	N	**%**	**N**	**%**	
OD-related encounters, ever	100,907	3.0	3,666	40.9	<0.001
OD-related encounters, by substance…					
Heroin	20,427	0.6	1,949	21.8	<0.001
Methadone	3,071	0.1	176	2.0	<0.001
Other Opioid	41,224	1.2	1,405	15.7	<0.001
Alcohol	3,252	0.1	152	1.7	<0.001
Benzodiazepine	13,163	0.4	515	5.7	<0.001
Cocaine	6,507	0.2	608	6.8	<0.001
*Other Substance**	40,036	1.2	936	10.4	<0.001
OUD	90,523	2.7	4,111	45.9	<0.001
SUD (non-opioid)	356,089	10.5	5,203	58.1	<0.001
Non-poisoning Injury	1,288,577	38.0	4,764	53.2	<0.001
Chronic Pain Diagnosis	242,681	7.2	2,168	24.2	<0.001
Mental Health Diagnosis	747,161	22.0	4,612	51.5	<0.001

Injection SU-related wounds	418,099	12.3	2,390	26.7	<0.001

Source: Maryland Health Services Cost Review Commission.
Health services encounters were compared between overdose decedents and non-overdose decedents with records captured within the HSCRC case mix data stream between 2016-2021. Individuals identified as non-overdose decedents may either be alive or deceased due to means other than drug intoxication during the study period. Overdose-related encounters encapsulate any overdose encounter (overall or by substance) during the study period as a binary (0/1) count per individual. An individual may have had multiple overdoses, by multiple substances but would only be counted once under "Overdose-related encounters, ever" and once per specified substance(s). Thus, the total of "Overdose-related encounters, by substance" will sum to a greater total than overall overdose-related encounters.
** Other drugs include amphetamine, barbiturates, non-opioid analgesics, and other drug poisonings.*
***Chi-squared test of independence was used to assess any associations between the predictor variables of various overdose types and related diagnoses and overdose death.*
Source: HSCRC case mix and overdose death records data, 2016-2021

Even though there was an increase in fatal ODs nearly every year, this data illustrates a downward trend among individuals with OUD, SUD, or mental health diagnoses who were not interacting with hospital services at the same level they were in previous years. Fewer people reporting to hospitals for services could be attributed to expanded community-based services.

Table 8: HSCRC Encounters by Prior Diagnosis (2016–2021)

	2016		2017		2018		2019		2020		2021	
Total deaths (N)	1,848		2,008		2,241		2,235		2,629		2,632	
	N	%	N	%	N	%	N	%	N	%	N	%
Any service utilization	966	52.3	1004	50.0	1047	46.7	969	43.4	1091	41.5	1133	43.0
Any OD-related services	336	34.8	339	33.8	347	33.1	316	32.6	342	31.3	326	28.8
OUD	354	36.6	358	35.7	364	34.8	357	36.8	359	32.9	379	33.5
SUD (non-opioid)	461	47.7	469	46.7	477	45.6	442	45.6	496	45.5	515	45.5
Non-poisoning Injury	268	27.7	265	26.4	299	28.6	308	31.8	311	28.5	326	28.8
Chronic Pain Diagnosis	161	16.7	140	13.9	164	15.7	143	14.8	162	14.8	163	14.4
Mental Health Diagnosis	382	39.5	407	40.5	438	41.8	405	41.8	447	41.0	422	37.2

Source: Maryland Health Services Cost Review Commission.
Inpatient and emergency department health services utilization among MD resident drug intoxication decedents aged 15-90 during calendar year of death, 2016-2021. Decedents' service utilization and diagnoses are only counted here if they occurred during the same calendar year as their death. Decedents may have accessed services in previous years for overdose or other diagnoses, either during the study period or prior to 2016. Such service utilization is not captured here to maintain consistency across the years and avoid artificial inflation of service use in later years of the study period.
The denominator for (%) service utilization is "Total Deaths" in the year; otherwise, the (%) for subsequent care (e.g., any overdose-related services, opioid use disorder diagnosis, etc.) are calculated from the total (N) of "Any service utilization."
Source: HSCRC case mix and overdose death records data, 2016-2021

Service Utilization by Medicaid Participants

Table 9, below, presents the number and percentage of participants who had an ambulatory care visit, outpatient ED visit, or inpatient admission during the year of their fatal OD. Between 2017 and 2021, the majority of these individuals had an ambulatory care visit during the year of their fatal OD; the percentage with an ambulatory care visit rose from 59.4 percent in 2017 to 63.8 percent in 2020 and fell to 61.9 percent in 2021.[18]



The percentages of participants with a fatal OD who had an outpatient ED visit and an inpatient admission, respectively, each experienced a decrease of 4 percentage points each over the evaluation period.[19]

Table 9: Service Utilization of Medicaid Participants (Any Period of Eligibility) before a Fatal Overdose (2017–2021)

Service Type	2017		2018		2019		2020		2021	
	#	%	#	%	#	%	#	%	#	%
Ambulatory Care	822	59.4%	897	59.4%	901	62.0%	1,132	63.8%	1,107	61.9%
Outpatient ED	677	48.9%	711	47.1%	674	46.4%	789	44.5%	804	44.9%
Inpatient Admission	407	29.4%	411	27.2%	386	26.6%	440	24.8%	454	25.4%
Total	**1,384**		**1,509**		**1,453**		**1,774**		**1,789**	

Source: The Hilltop Institute, Maryland Medicaid Administration, Maryland Vital Statistics Administration and Maryland's Medicaid Management Information System (MMIS2).

Table 10, below, displays data for inpatient admissions with a diagnosis of poisoning within one year of death and within one day of death. Across both timeframes, the percentage of participants who had an inpatient admission with a diagnosis of poisoning during the respective timeframe decreased over the evaluation period. The number of participants who had an admission with a diagnosis of poisoning within a year of death decreased from 8.6 percent in 2017 to 6.2 percent in 2021, and the percentage of participants who had an admission with a diagnosis of poisoning within one day of their death fell from 3.0 percent to 1.7 percent. The number of users and the number of visits also decreased for both timeframes over the evaluation period. Trends for participants enrolled in Medicaid within 12 months of OD death and for participants enrolled in Medicaid at the time of OD death are similar.[20]

Table 10. Number of Visits and Participants (Any Period of Eligibility) with an Inpatient Admission with a Diagnosis of Poisoning Before a Fatal Overdose (2017–2021)

[18] The Hilltop Institute. (2023, April 14). Medicaid Data for DORM Report. Baltimore, MD: UMBC.
[19] Ibid.
[20] Ibid.

Year of Fatal Overdose	Within Year of Death				Within 1 Day of Death			
	Visits	Users	Total Eligible	% of Total	Visits	Users	Total Eligible	% of Total
2017	149	121	1,413	8.6%	46	43	1,413	3.0%
2018	142	121	1,548	7.8%	50	47	1,548	3.0%
2019	151	118	1,513	7.8%	38	33	1,513	2.2%
2020	141	116	1,834	6.3%	35	34	1,834	1.9%
2021	133	112	1,795	6.2%	31	31	1,795	1.7%

Source: The Hilltop Institute, Maryland Medicaid Administration, Maryland Vital Statistics Administration and Maryland's Medicaid Management Information System (MMIS2).

Summary of Service Utilization

The percent of OD decedents with a controlled substance dispensed by race from 2016-2021 shows a continued trend of decreasing percent of NH White individuals and an increasing percent of NH Black individuals. Six jurisdictions achieved more than 100 percent of their targeted naloxone saturation. In 2022, 22,959 individuals were served by SSPs with 6,987 new/registered participants and there were 69,505 linkages to care made for individuals engaged with SSPs in 2022, up 59.2 percent from last year. In 2021 and 2022, opioid-related OD incidents resulting in EMS transport, occurred 72.5 and 73.1 percent of the time respectively. In 2023, the findings from the EDDS fentanyl dipstick sub-study were used to support Maryland's passage of the Josh Siems Act, which requires all Maryland hospitals to begin routinely testing for fentanyl in urine toxicology screens when used for patient diagnoses. Over the past six years, heroin has decreased by 53.9 percent (from 447 to 206) in overall fatal ODs among those dispensed a controlled substance, while fentanyl has increased by 241.1 percent from 431 to 1470 in overall fatal ODs among those dispensed a controlled substance.

See Considerations and Limitations to Analysis section for more details.

Acknowledgments

The OOCC would like to acknowledge and thank the following partners for their contribution to the 2022 DORM report:

- Behavioral Health Administration (BHA)
- Chesapeake Regional Information Systems for our Patients (CRISP)
- Johns Hopkins Bloomberg School of Public Health (JHSPH)
- Maryland Department of Health (MDH)
- Center for Harm Reduction Services (CHRS)
- Environmental Health Bureau
- Health Services Cost Review Commission (HSCRC)
- Overdose Data to Action Program (OD2A)
- Prescription Drug Monitoring Program (PDMP)
- Vital Statistics Administration (VSA)
- Maryland Total Human-services Integrated Network (MD THINK)
- The Hilltop Institute, University of Maryland Baltimore County
- The University of Maryland School of Medicine Systems Evaluation Center
- Maryland Institute for Emergency Medical Services Systems (MIEMSS)
- Emergency Department Drug Surveillance (EDDS)
- Center for Substance Use, Addiction & Health Research (CESAR)

VI. CONSIDERATIONS AND LIMITATIONS TO ANALYSIS

Health Services Cost Review Commission

- The validity of matching individuals across disparate data sets is not wholly guaranteed and is limited by the availability and accuracy of the data contained within the informant data sources.
- Official substance and alcohol intoxication deaths are considered preliminary and subject to change until officially validated and released by VSA.
- Demographics and geographic residence were compared between OD decedents and non-OD decedents with inpatient and/or ED records captured within the HSCRC or OD death registry between 2016-2021
    - Individuals identified as non-OD decedents may either be alive or deceased due to means other than substance intoxication during the study period.
- Encounters consist of any health services encounter captured in the HSCRC between 2016-2021
- Small data sets have been suppressed to protect privacy.
- The total of "OD-related encounters, by substance" will sum to a greater total than overall OD-related encounters.
    - An individual may have had multiple ODs, by multiple substances but would only be counted once under "OD-related encounters, ever" and once per specified substance(s)
- Other substances include amphetamine, barbiturates, non-opioid analgesics, and other drug poisonings.

Prescription Drug Monitoring Program

- Data sets were linked in SQL Server on unique PatientID.
- Only the most recent dispense records were used from the PDMP data set to get patient-level data.
- The values in these tables represent the number of individuals who had a dispense record in the PDMP and an OD death record.
- All tables evaluate the OD decedents from 2016 to 2021 who also had dispense records in the PDMP.

Center for Harm Reduction Services

- Some active ORPs may be missing reports due to reporting lag.
- Kit/unit estimates are based on the assumption of two doses dispensed per kit/unit, which may occasionally be incorrect.
    - CHRS collects naloxone dispense data in terms of doses.
        - Each kit/unit of naloxone includes two (2) doses.
- Incomplete (not yet submitted) reports could impact data totals.
- Saturation numbers are based on ORP Distribution only, no pharmacy distribution due to a delay in reporting.

Washington/Baltimore High-Intensity Drug Trafficking Area

- The samples in this report are not representative of all drugs seized in the entire state of Maryland.

Hilltop

- The data provided follow the Department's cell suppression guidelines (i.e., cells with 10 or fewer participants are suppressed to avoid potential identification of participants)
- Hilltop used the list of OD deaths provided by the VSA to identify Medicaid participants who died of an OD.
    - After confirming that participants were enrolled in Medicaid at any point, Hilltop identified participants who had been enrolled in Medicaid for at least one day in the year prior to their death and/or at the time of their death.
    - Only participants who were enrolled in Medicaid within a year of their death were included in the analysis.
        - "eligible/eligibility" and "enrolled/enrollment" are used interchangeably.
- Hilltop gathered all fee-for-service (FFS) claims and managed care organization encounters for the services targeted for this analysis (e.g., MOUD, non-fatal poisoning, ED visits, ambulatory care visits, and inpatient admissions)
- Medicaid participants who died due to an OD may have died due to a non-opioid-related substance.
- ED visits were defined as an institutional claim or encounter with a revenue code starting with "045" or "0981."
    - ED visits resulting in an inpatient admission were classified as inpatient admissions.
        - Inpatient admissions were defined as inpatient institutional claims or encounters with a claim type of "I" or "M."
- Poisoning events were identified using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) diagnosis codes selected by the Department.
- The data presented are current as of March 2022

Johns Hopkins Bloomberg School of Public Health Center for Population Health Information Technology

- Data reported is analysis of matched records from PDMP, HSCRC, and OCME.
- Data linkage performed by CRISP.
- Analysis performed by research partners at JHSPH.
- JHSPH identified "first" NFOD episodes, or an index NFOD event, meaning the first NFOD occurring in the data between July 2016 - December 2020, and examined characteristics in the six months prior to the index NFOD and the following year.
- To understand the characteristics associated with buprenorphine use after an index NFOD, three subsamples were examined:
    - People who did not get buprenorphine in the year following the index NFOD;
    - People who had a buprenorphine prescription in the four weeks following the index NFOD; and
    - People who started buprenorphine more than four weeks but less than a year after the index NFOD.
- Rates displayed in Table 14 are crude (unadjusted) and do not account for differences in severity of SUD or underlying comorbidities at baseline between the three groups.
- Regions in Table 15 were specified as follows: 1) Capital: Frederick, Montgomery, Prince George's; 2) Central: Anne Arundel, Baltimore City, Baltimore County, Carroll, Harford, Howard; 3) Eastern Shore: Caroline, Cecil, Dorchester, Kent, Queen Anne's Somerset, Talbot, Wicomico, Worcester; 4) Southern: Calvert, Charles, St. Mary's; 5) Western: Allegany, Garrett, Washington.

Maryland Institute for Emergency Medical Services Systems

- MIEMSS manages the EMS system throughout Maryland in various ways. MIEMSS has partnered with MDH to provide emergency encounter data to support the research and analysis of linked data sets for the DORM report. This is the first year in partnership and this partnership opens the door for future linked analysis from EMS encounter to hospital to outside linked care.
- Data were drawn from the MIEMSS data set between January 1, 2021, and December 31, 2022. During this two-year period, out of 1,251,050 unique incidents identified in the MIEMSS data set, 34,094 were identified as related to an opiate OD, using a definition of opioid OD incident that was adapted from the MDH workgroups.
- Incidents are grouped into individuals who were transported, not transported, or deceased.
- Incidents reflect just that of one incident, not one patient. One patient may have multiple incidents over time in this data set.

Public Behavioral Health System

- Data is subject to change from delayed claims.
    - Outpatient services are generally not covered by Medicare.
- Sources of OD Deaths:
    - Office of the Chief Medical Examiner/VSA Database.
    - Unintentional OD Deaths Only.
- All data is provisional and subject to updating.
- Prior to January 1, 2020, race was collected independently as part of the registration process; a decision was made that this violated parity laws and race had to be determined using Medicaid eligibility data that does not have race information in many records drastically increasing the amount of unknown race records from 2020 on
- The decreases in the age group of 55 and over in 2020 are due to Medicare beginning to cover the service starting 1/1/2020.
- Mental health outpatient services are covered by Medicare, so any Medicare recipients will not be represented in mental health outpatient counts.
- PBHS sections of last year's report may not align with the 2022 report.
    - On January 1, 2000, a new provider, Optum, took over the duties of the Administrative Services Organization that included the adjudication and payment of claims.
    - A change in the reported number of people treated across multiple years took place due to retractions of claims previously approved, wrongfully rejected claims, and inconsistencies throughout the claims process.
    - PBHS sections of last year's report were based on claims data that had not been cleaned and reprocessed, and because of the effects of the pandemic, some reductions in the numbers of people treated will appear in the current report.

Acronyms

- Area of Responsibility (AOR)
- Behavioral Health Administration (BHA)
- Center for Harm Reduction Services (CHRS)
- Center for Substance Abuse Research (CESAR)
- Center for Population Health Information Technology (CPHIT)
- Chesapeake Region Information System for our Patients (CRISP)
- Data-Informed OD Risk Mitigation (DORM)
- Direct Analysis in Real Time Mass Spectrometry (DART-MS)
- Department of Public Safety and Correctional Services (DPSCS)
- Emergency Department (ED)
- Electronic Health Record (EHR)
- Emergency Medical Services (EMS)
- Food and Drug Administration (FDA)
- Fee for Service (FFS)
- Health Services Cost Review Commission (HSCRC)
- House Bill (HB)
- International Classification of Disease (ICD)
- Johns Hopkins University Bloomberg School of Public Health (JHSPH)
- Maryland Emergency Department Drug Surveillance (MD-EDDS)
- Maryland Department of Health (MDH)
- Maryland Total Human Services Integrated Network (MD THINK)
- Maryland Institute for Emergency Medical Services Systems (MIEMSS)
- Medication for Opioid Use Disorder (MOUD)
- National Institute of Standards and Technology (NIST)
- Non-fatal Overdose (NFOD)
- Opioid Operational Command Center (OOCC)
- Opioid Use Disorder (OUD)
- OD (OD)
- Overdose Death Record (ODR)
- Overdose Response Program (ORP)
- Public Behavioral Health System (PBHS)
- Prescription Drug Monitoring Program (PDMP)
- Rapid Analysis of Drugs (RAD)
- Statewide Targeted Overdose Prevention (STOP)
- Statewide Unintentional Drug Overdose Reporting System (SUDORS)
- Substance Use (SU)
- Substance Use Disorder (SUD)
- Syringe Service Programs (SSPs)
- University of Maryland Medical Center (UMMC)
- University of Maryland St. Joseph Medical Center (UM SJMC)
- University of Pittsburgh Medical Center (UPMC)
- Vital Statistics Administration (VSA)
- Washington/Baltimore High-Intensity Drug Trafficking Area (W/B HIDTA)

VII. DATA SOURCES & CITATIONS

- MDH Vital Statistics Administration: fatal ODs in Maryland, fatal OD demographics.
- Statewide Unintentional Drug OD Reporting System (SUDORS): OD fatality circumstances and decedent characteristics.
- University of Maryland, Center for Substance Use, Addiction & Health Research (CESAR): Maryland Emergency Department Drug Surveillance (MD-EDDS) program. Hospital emergency department electronic health records and urinalysis.
- The Center for Population Health Information Technology (CPHIT) in the Department of Health Policy & Management of the Johns Hopkins Bloomberg School of Public Health. Relative risk factors for OD.
- Analysis by the University of Maryland Systems Evaluation Center using OD Death data from the Vital Statistics Administration and Office of the Chief Medical Examiner and claims data from BHA and Optum.
- Rhonda R. Moody, Director of Data Insights, CRISP.
- The Hilltop Institute. (April 14, 2023). Medicaid Data for DORM Report. Baltimore, MD: UMBC. Medicaid claims.
- "Heroin, Fentanyl, Cocaine and Prescription Opioid Drug Trends in the State of Maryland 2020-2022"; Washington/Baltimore HIDTA Investigative Support Center; 2023. Drug seizure sample testing results.
- Russell E, Sisco E, Thomson A, et al. Rapid Analysis of Drugs: A Pilot Surveillance System to Detect Changes in the Illicit Drug Supply to Guide Timely Harm Reduction Responses — Eight Syringe Services Programs, Maryland, November 2021–August 2022. MMWR Morb Mortal Wkly Rep 2023; 72:458–462. DOI: http://dx.doi.org/10.15585/mmwr.mm7217a2.
- MDH Center for Harm Reduction Services: Participant date from Syringe Services Programs, Naloxone distribution through Maryland's Overdose Response Program (ORP).
- Health Services Cost Review Commission (HSCRC): service utilization at Maryland hospitals.
- Prescription Drug Monitoring Program: dispense records for controlled dangerous substances.
- MDH Behavioral Health Administration: Service utilization through the Public Behavioral Health System.

VIII. APPENDIX A: CHRS

Table 11: Naloxone Distribution and Training Saturation by Jurisdiction (2022)

Jurisdiction	Kits Distributed to At-Risk Individuals Calculation, Calendar year 2022 Q1			Kit Distribution Target Calculation, Calendar year 2021 Q1		Diff.: Target - Actual (E - G)	
	Est. # At-Risk People Trained	Medicaid Rx Claims (Pharmacy Location)	Est. # Kits Distributed to At-Risk People	Opioid OD Deaths (Incident Location)	Kit Distribution Target (20x # deaths)	#	%
Allegany County	2,488	0	**1,244**	40	**800**	**444**	**156%**
Anne Arundel County	6,889	0	**3,444**	209	**4,180**	**-736**	**82%**
Baltimore City	70,898	0	**35,449**	1,010	**20,200**	**15,249**	**175%**
Baltimore County	4,144	0	**2,072**	360	**7,200**	**-5,128**	**29%**
Calvert County	684	0	**342**	17	**340**	**2**	**101%**
Caroline County	46	0	**23**	8	**160**	**-137**	**14%**
Carroll County	1,129	0	**565**	52	**1,040**	**-475**	**54%**
Cecil County	19,168	0	**9,584**	76	**1,520**	**8,064**	**631%**
Charles County	217	0	**108**	31	**620**	**-512**	**17%**
Dorchester County	2,569	0	**1,285**	20	**400**	**885**	**321%**
Frederick County	5,656	0	**2,828**	44	**880**	**1,948**	**321%**
Garrett County	927	0	**464**	6	**120**	**344**	**386%**
Harford County	6,743	0	**3,372**	85	**1,700**	**1,672**	**198%**
Howard County	1,045	0	**523**	32	**640**	**-117**	**82%**
Kent County	703	0	**351**	8	**160**	**191**	**220%**
Montgomery County	186	0	**93**	121	**2,420**	**-2,327**	**4%**
Prince George's County	16,190	0	**8,095**	168	**3,360**	**4,735**	**241%**
Queen Anne's County	228	0	**114**	14	**280**	**-166**	**41%**
Somerset County	616	0	**308**	9	**180**	**128**	**171%**
St. Mary's County	2,659	0	**1,330**	37	**740**	**590**	**180%**
Talbot County	215	0	**108**	12	**240**	**-132**	**45%**
Washington County	3,305	0	**1,653**	94	**1,880**	**-227**	**88%**
Wicomico County	1,186	0	**593**	40	**800**	**-207**	**74%**
Worcester County	1,053	0	**527**	16	**320**	**207**	**165%**
Total	**148,945**	**0**	**74,472**	**2,509**	**50,180**	**24,292**	**148%**

IX. APPENDIX B: PBHS

Table 12: Overdose Decedents Active in PBHS at Time of Death (2020-2021)

Jurisdiction	% of Decedents Engaged in PBHS Services (2020)	% of Decedents Engaged in PBHS Services (2021)	Jurisdiction	% of Decedents Engaged in PBHS Services (2020)	% of Decedents Engaged in PBHS Services (2021)
Allegany	63.30%	44.12%	**Harford**	64.95%	51.82%
Anne Arundel	51.90%	54.18%	**Howard**	33.93%	43.90%
Baltimore	50.50%	57.56%	**Kent**	40.00%	65.50%
Baltimore City	58.20%	59.12%	**Montgomery**	33.58%	40.82%
Calvert	62.50%	58.06%	**Prince George's**	27.27%	27.17%
Caroline	65.00%	78.33%	**Queen Anne's**	42.11%	57.14%
Carroll	67.24%	61.90%	**Somerset**	28.57%	63.64%
Cecil	50.59%	48.68%	**St. Mary's**	44.12%	58.54%
Charles	41.38%	41.46%	**Talbot**	44.44%	50.00%
Dorchester	33.33%	75.00%	**Washington**	60.82%	63.22%
Frederick	45.59%	46.30%	**Wicomico**	44.19%	65.00%
Garrett	50.00%	50.00%	**Worcester**	56.25%	68.42%

XI. APPENDIX C: JHSPH

Non-Fatal Overdose Analysis

FOLLOW UP AFTER FIRST NON-FATAL OVERDOSE

Table 13: Overdose and Healthcare Outcomes in the Year Following "First" Non-Fatal Overdose, 2016-2021

	Total (n= 41,558)		No buprenorphine post-NFOD (n=35,815)		Buprenorphine received <= 4 weeks post NFOD (n=2,357)		Buprenorphine received >4 weeks post NFOD (n=3,386)		Likelihood Chi-2 Ratio Test
Subsequent non-fatal overdose	n	%	n	%	n	%	n	%	p-value
	5490	13.2	4053	11.3%	508	21.6%	929	27.4%	<.0001
Fatal overdose	91	0.2	81	0.2%	3	0.1%	7	0.2%	0.5874
ED Visit-all cause	25980	62.5	21524	60.1	1722	73.1%	2734	80.7%	<.0001
Inpatient Admission-all cause	14059	33.8	11912	33.3	785	33.3%	1362	38.2%	<.0001

Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Note: Rates displayed in the table are crude (unadjusted) and do not account for differences in severity of substance use disorder or underlying comorbidities at baseline between the three groups.

Table 14: Demographics by Buprenorphine Receipt in the Year Following Index Non-Fatal Overdose, 2015-2017

	Total (n= 41,558)		No buprenorphine post-NFOD (n=35,815)		Buprenorphine received <= 4 weeks post NFOD (n=2,357)		Buprenorphine received >4 weeks post NFOD (n=3,386)		Likelihood Chi-2 Ratio Test
	n	%	n	%	n	%	n	%	p-value
Age at time of NFOD									
18-24	2683	6.5	2199	6.1	165	7.0	319	9.4	<.0001
25-34	8367	20.1	6495	18.1	720	30.5	1152	34.0	
35-44	6029	14.5	4864	13.6	488	20.7	677	20.0	
45-54	7611	18.3	6411	17.9	517	21.9	683	20.2	
55-64	8126	19.6	7264	20.3	390	16.5	472	13.9	
65+	8742	21.1	8582	24.0	77	3.3	83	2.4	
Sex									
Female	18499	44.5	16486	46.0	812	34.5	1201	35.5	<.0001
Male	23054	55.5	19324	54.0	1545	65.5	2185	64.5	
Missing/Unknown	5	0.0	5	0.0	5	0.2	0	0.0	
Race									
Black or African American	14239	34.3	12218	34.1	837	35.5	1184	35.0	0.7278
White	25108	60.4	21561	60.2	1445	61.3	2102	62.1	
Other	1822	4.3	1690	4.7	58	2.5	64	1.9	
Missing/Unknown	389	0.9	346	1.0	17	0.7	26	0.8	
Ethnicity									
Hispanic or Latino	1020	2.5	946	2.6	34	1.4	40	1.2	0.9757
Not Hispanic or Latino	39372	94.7	33857	94.5	2257	95.8	3258	96.2	
Missing/Unknown	1166	2.8	1012	2.8	66	2.8	88	2.6	
Payer									<.0001
Medicaid	17417	41.9	13420	37.5	1685	71.5	2312	68.3	
Medicare	11657	28.0	11112	31.0	230	9.8	315	9.3	
Commercial	7509	18.1	6767	18.9	289	12.3	453	13.4	
Self-pay/Cash	3676	8.8	3310	9.2	116	4.9	250	7.4	
Other/Unknown	1278	3.1	1206	3.4	37	1.6	56	1.7	
Region									
Capital	5679	13.7	5233	14.6	173	7.3	273	8.1	<.0001
Central	24642	59.3	20851	58.2	1587	67.3	2204	65.1	
Eastern shore	3395	8.2	2846	7.9	219	9.3	330	9.7	
Southern	1718	4.1	1419	4.0	128	5.4	171	5.1	
Western	2262	5.4	1869	5.2	157	6.7	236	7.0	
Other/Unknown	3826	9.2	3597	10.0	93.0	3.9	172	5.1	

Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Note: Regions were specified as follows: 1) Capital: Frederick, Montgomery, Prince George's; 2) Central: Anne Arundel, Baltimore City, Baltimore County, Carroll, Harford, Howard; 3) Eastern Shore: Caroline, Cecil, Dorchester Kent, Queen Anne's, Somerset, Talbot, Wicomico, Worcester; 4) Southern: Calvert, Charles, St. Mary's; 5) Western: Allegany, Garrett, Washington.

Table 15: Overdose and Healthcare Outcomes in the Year Following "First" Non-Fatal Overdose by Race, 2016-2021

	Total (n= 41,558)		Black (n=14,239)		White (n=25,108)		Other/Missing (n=2,211)		Likelihood Chi-2 Ratio Test
	n	%	n	%	n	%	n	%	p-value
Buprenorphine received <= 4 weeks post NFOD	2357	5.7	837	5.9	1445	5.8	75	3.4	0.2347
Buprenorphine received >4 weeks post NFOD	3386	8.1	1184	8.3	2102	8.4	100	4.5	
Subsequent non-fatal overdose	5490	13.2	2149	15.1	3129	12.5	212	9.6	<.0001
Fatal overdose	91	0.2	34	0.2	51	0.2	6	0.3	0.291
ED Visit-all cause	25980	62.5	9861	69.3	14988	59.7	1131	51.2	<.0001
Inpatient Admission-all cause	14059	33.8	5173	36.3	8255	32.9	631	28.5	<.0001

Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Table 16: Overdose and Healthcare Outcomes in the Year Following "First" Non-Fatal Overdose by Region of Residence, 2016-2021

	Total		Capital		Central		Eastern Shore		Southern		Western		Out of State/ Unknown		Likelihood Chi-2 Ratio Test
	(n= 41,558)		(n=5,679)		(n=24,642)		(n=3,395)		(n=1,718)		(n=2,262)		(n=3,862)		
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	p-value
Buprenorphine received <= 4 weeks post NFOD	2357	5.7	173	3.0	1587	6.4	219	6.5	128	7.5	157	6.9	93	2.4	0.2347
Buprenorphine received >4 weeks post NFOD	3386	8.1	273	4.8	2204	8.9	330	9.7	171	10.0	236	10.4	172	4.5	
Subsequent non-fatal overdose	5490	13.2	548	9.6	3637	14.8	463	13.6	197	11.5	277	12.2	368	9.5	<.0001
Fatal overdose	91	0.2	12	0.2	54	0.2	5	0.1	2	0.1	8	0.4	10	0.3	0.5837
ED Visit- all cause	25980	62.5	3345	58.9	16385	66.5	2202	64.9	1122	65.3	1433	63.4	1493	38.7	<.0001
Inpatient Admission - all cause	14059	33.8	1996	35.1	9146	37.1	929	27.4	502	29.2	710	31.4	776	20.1	<.0001

Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

Table 17: Overdose Diagnosis Codes

Code Number	Code source	Descriptor
96500	ICD-9	Poisoning by opium (alkaloids), unspecified
96501	ICD-9	Poisoning by heroin
96502	ICD-9	Poisoning by methadone
96509	ICD-9	Poisoning by other opiates and related narcotics
E8500	ICD-9	Accidental poisoning by heroin
E8501	ICD-9	Accidental poisoning by methadone
E8502	ICD-9	Accidental poisoning by other opiates and related narcotics
T400*	ICD-10	Poisoning by adverse effect of and underdosing of opium
T401*	ICD-10	Poisoning by and adverse effect of heroin
T402*	ICD-10	Poisoning by adverse effect of and underdosing of other opioids
T403*	ICD-10	Poisoning by adverse effect of and underdosing of methadone
T404	ICD-10	Poisoning by adverse effect of and underdosing of other synthetic narcotics

Source: Linked data from the state prescription drug monitoring program, Health Services Cost Review Commission, and Office of the Chief Medical Examiner.

MIEMSS

Table 18: Descriptive Characteristics for MIEMSS-Recorded Opiate-Related Overdose Incidents, for Years 2021 and 2022, Cross-Tabulated with Transport Status. All Percentages Reflect Totals for Transport Status Group, for Each Year

	2021			2022		
	Transported	**Not Transported**	**Deceased**	**Transported**	**Not Transported**	**Deceased**
TOTAL INCIDENTS	13563 (100%)	4870 (100%)	276 (100%)	11240 (100%)	3897 (100%)	248 (100%)
% of Total Incidents	72.5% of 18,709	26.0% of 18,709	.01% of 18,709	73.1% of 15,385	25.3 % of 15,385	.01% of 15,385
Mean age (sd)	46.19 (15.16)	43.26 (13.98)	45.72 (13.74)	46.11 (15.44)	43.77 (13.87)	45.05 (14.38)
< 18	124 (0.91%)	11 (0.23%)	-	172 (1.53%)	16 (0.41%)	-
18 – 25	894 (6.59%)	298 (6.12%)	-	716 (6.37%)	204 (5.23%)	-
26 – 35	2874 (21.19%)	1345 (27.62%)	58 (21.01%)	2357 (20.97%)	1036 (26.58%)	54 (21.77%)
36 – 45	2470 (18.21%)	925 (18.99%)	64 (23.19%)	2096 (18.65%)	805 (20.66%)	57 (22.98%)
46 – 55	2556 (18.85%)	837 (17.19%)	56 (20.29%)	1908 (16.98%)	627 (16.09%)	41 (16.53%)
56 – 65	2925 (21.57%)	800 (16.43%)	48 (17.39%)	2452 (21.81%)	708 (18.17%)	46 (18.55%)
> 65	1214 (8.95%)	288 (5.91%)	25 (9.06%)	1181 (10.51%)	226 (5.8%)	19 (7.66%)
Missing Age	506 (3.73%)	366 (7.52%)	13 (4.71%)	358 (3.19%)	275 (7.06%)	15 (6.05%)
SEX						
Female	4146 (30.57%)	1359 (27.91%)	-	3726 (33.15%)	1184 (30.38%)	-
Male	9170 (67.61%)	3438 (70.6%)	192 (69.57%)	7278 (64.75%)	2645 (67.87%)	156 (62.9%)
Missing Sex	247 (1.82%)	73 (1.5%)	-	236 (2.1%)	68 (1.74%)	-
RACE						
Black	5513 (40.65%)	1669 (34.27%)	82 (29.71%)	4225 (37.59%)	1214 (31.15%)	97 (39.11%)
White	4539 (33.47%)	1797 (36.9%)	175 (63.41%)	3683 (32.77%)	1396 (35.82%)	135 (54.44%)
Other Race	367 (2.71%)	110 (2.26%)	-	359 (3.19%)	88 (2.26%)	-
Missing Race	3098 (22.84%)	1280 (26.28%)	-	2924 (26.01%)	1187 (30.46%)	-

	2021			2022		
	Transported	**Not Transported**	**Deceased**	**Transported**	**Not Transported**	**Deceased**
INCIDENT REGION						
Capital	1545 (11.39%)	535 (10.99%)	33 (11.96%)	1456 (12.95%)	541 (13.88%)	24 (9.68%)
Central	9924 (73.17%)	3545 (72.79%)	154 (55.8%)	7865 (69.97%)	2650 (68%)	147 (59.27%)
Eastern Shore	573 (4.22%)	271 (5.56%)	37 (13.41%)	542 (4.82%)	236 (6.06%)	31 (12.5%)
Southern	439 (3.24%)	147 (3.02%)	25 (9.06%)	386 (3.43%)	117 (3%)	21 (8.47%)
Western	943 (6.95%)	322 (6.61%)	-	831 (7.39%)	284 (7.29%)	-
Missing/Non-MD Region	139 (1.02%)	50 (1.03%)	-	160 (1.42%)	69 (1.77%)	-

Source: Maryland Institute for Emergency Medical Services Systems.
Notes: Columns are defined by grouping the eDisposition12 code into transported (4212023, 4212033, 4212035, 4212037), not transported (4212007, 4212009, 4212011, 4212021, 4212025, 4212027, 4212029, 4212031), deceased at the scene (4212013, 4212015, 4212017, 4212019), or other disposition (4212001, 4212003, 4212005, 4212039, 4212041, 4212043). There were no incidents associated with the "other" disposition in our sample, so a column is not shown for this category.

Definitions

1. **Incidents:** Incidents are defined using the IncidentKey variable in MIEMSS. The same patient may have multiple incidents during the sample period, but each IncidentKey is associated with exactly one individual. Multiple patients at the same scene would thus be associated with multiple incidents under this definition.

2. **Opioid-Related Overdose Definition:** The working definitions of the CSTE and MDH workgroups have been adapted for identifying opioid-related overdoses to this current deployment of MIEMSS records. This definition builds from four criteria: (1) "Overdose Incident": the PrimaryImpression or SecondaryImpression reflects some term/phrase related to being an 'overdose,' and eDispatch01 is coded for 'Overdose/Poisoning/Ingestion', (2) "Opioid-Specific": the eNarrative01 free text field includes specific language for opioids or two or more terms consistent with symptoms of opioid overdose (e.g., miosis, respiratory depression, loss of consciousness, etc.), (3) "Naloxone Administered": MedicationsAdministered or eNarrative01 include 'Naloxone,' and (4) "Patient Improvement with Naloxone": ResponseToMeds is 'Improved' with the administration of 'Naloxone.' Opioid-related overdoses are then identified using the four combination rules shown in the rows of the table below. An incident that meets any of these four rules is considered an opioid-related overdose in this report.

Criterion 1	Criterion 2	Criterion 3	Criterion 4
Overdose Incident	**Opioid Specific**	**Naloxone Administered**	**Patient Improvement w/ Naloxone**
X		X	
	X	X	
			X
X	X		

3. **Transport Status:** We grouped eDisposition12 codes according to whether the patient was transported (4212023, 4212033, 4212035, 4212037), not transported (4212007, 4212009, 4212011, 4212021, 4212025, 4212027, 421209, 4212031), deceased at the scene (4212013, 4212015, 4212017, 4212109). All other values of eDisposition12 (4212001, 4212003, 4212005, 4212039, 4212041, 4212043) were not observed in our sample, so these groups cover the full sample of opioid-related overdoses. Patients who were transported included those transported by the responding EMS unit (over 99 percent of transported cases) and those transported by law enforcement or other vehicles. Patients who were not transported included patients who were evaluated and did not need transport, patients who were treated at the scene and released per protocol, patients who were treated at the scene and then refused transport, and patients who refused evaluation/care at the scene and also refused transport.

4. **Patient Demographics.** Patient race is contained in the ePatient14 field. We group these responses into Black, White, and Other Race (which includes patients whose race was listed as American Indian or Alaska Native, Hispanic or Latino, and Native Hawaiian or Other Pacific Islander). There is no separate field for ethnicity in the MIEMSS data. Patient demographics were evaluated at the patient level by considering demographics to be static and aggregating non-missing observations per PatientID across all incidents. These patient-level demographics were then assigned to every incident belonging to a particular PatientID. In cases where there was disagreement across incidents for the same patient on a particular demographic variable, this variable was assigned to missing. Of the incidents involving opioid overdose, 11,719 (34.4 percent) were missing race. This was improved by patient-level imputation to 8,501 (24.9 percent) still missing race. Only 15 (0.0 percent) incidents were explicitly missing documentation of sex initially and this rose to 629 (1.8 percent) after the patient-level imputation process, because some PatientIDs were associated with more than one value for sex. Patient age was calculated at the incident level using recorded date of birth.

5. **Incident Jurisdiction.** Incident jurisdiction was used to determine the region an incident took place in. This value is distinct from both the home jurisdiction of the patient, and the transport destination jurisdiction.

XII. APPENDIX D: HSCRC

Table 19: ICD-10 Codes Used to Define Hospital-Based Predictors

Predictors	Diagnosis Codes
Any non-fatal overdose	*Includes all codes for non-fatal overdose defined by substance type below*
Non-fatal heroin overdose	ICD10: T401
Non-fatal methadone overdose	ICD10: T403*
Non-fatal other opioid overdose (includes prescription opioids, opium, or synthetic opioids)	ICD10: T400*, T402*, T404, T40601*, T40604*, T40691*, T40694*
Non-fatal alcohol overdose	ICD10: T510X1*, T510X4*, T511X1*, T511X4*, T512X1*, T512X4*, T513X1*, T513X4*, T518X1*, T518X4*, T520X1*, T520X4*, T521X1*, T521X4*, T5191*, T5194*
Non-fatal benzodiazepine overdose	ICD10: T424*
Non-fatal cocaine overdose	ICD10: T405*
Non-fatal other drug overdose (includes amphetamine, barbiturates, non-opioid analgesics, other drug poisoning)	ICD10: T390*-T394*, T398*, T399*, T423*, T4362*, T407X1*, T407X4*, T408X1*, T408X4*, T40901*, T40904*, T40991*, T40994*, T410X1*, T410X4*, T411X1*, T411X4*, T41201*, T41204*, T41291*, T41294*, T413X1*, T413X4*, T423X1*, T423X4*, T426X1*, T426X4*, T428X1*, T428X4*, T43011*, T43014*, T43021*, T43024*, T431X1*, T431X4*, T43201*, T43204*, T43211*, T43214*, T43221*, T43224*, T43291*, T43294*, T433X1*, *T433X4*, T434X1*, T434X4*, T43501*, T43504*, T43591*, T43594*, T43601*, T43604*, T43611*, T43614*, T43621*, T43624*, T43631*, T43634*,T43691* ,T43694*, T438X1*, T438X4*, T481X1*, T481X4*, T483X1*, T483X4*, T507X1*, T507X4*, T508X1*, T508X4*, T50901*, T50904*, T50991*, T50994*, T4141*, T4144*, T4271*, T4274*, T4391*, T4394*
Opioid use disorder (OUD)	ICD10: F11*
Other Substance Use Disorder (SUD)	ICD10: F10*, F12*-F16*, F18*F19*
Non-poisoning injury diagnosis	ICD10: S00-S99, T07-T34, T66-T76, T79

Chronic pain diagnosis	ICD10: G892, G8921, G8922, G8928, G8929, G894
Mental health diagnosis	ICD10: F20-F25, F28-F34, F39-F48, F60, F68, F69
Injection drug use-related wounds	ICD10: [Endocarditis] B376, I330, I39, I339, I340, I348, I350, I351, I352, I358, I359, I360, I368, I370, I378, I38, I39, I38; [Bacteremia or Sepsis] A409, A412, A4101, A4102, A411, A403, A414, A4150, A413, A4151, A4152, A4153, A4159, A4189, A419, I2690, I400, I76, R6521, R7881, R6510, A419, R6520, M8610,M8620, M86119, M86219, M86129, M86229, M86139, M86239, M86149, M86249, M86159, M86259, M86169, M86269, M86179, M86279, M8618, M8628, M8619, M8629, M8660, M86619, M86629, M86639, M86641, M86642, M86659, M86669, M86679, M8668, M8669, M869, M4630; [Wound botulism] A480, A4852, I96; [Necrotizing fasciitis] M726; [Cellulitis] L03019, L03029, L03019, L03039, L03049, L03029, L03039, K122, L03211, L03212, L03221, L03222, L03319, L03329, L03119, L03129, L03317, L03811, L03818, L03891, L03898, L0390, L0391, L03116, L03115, L03114, L03113; [Skin and soft tissue infections] G060,G061, G062, G09, K651, K6812, K6819, K630, K750, N10, L942, L988, M5402, M793, M793; [Open wounds] S41009A, S41109A, S51809A, S51009A, S61509A, S61409A, S61429A, S66929A, S61209A, S61229A, S61109A, S66529A, S71009A, S71109A, S76929A, S81109A, S81809A, S91009A, S91309A, S91329A, S96929A, S91109A; [Ulcers] L8990, L89009, L89209, L89309, L89509, L89819, L89899, L97909, L97109, L97209, L97309, L97509, L97809, L98419, L98429, L98499

Table 20: Inpatient and Emergency Department Health Services Utilization Among MD Resident Drug Intoxication Decedents Aged 15-90 During Calendar Year of Death, 2016-2021

	2016		2017		2018		2019		2020		2021	
Total deaths (N)	1,848		2,008		2,241		2,235		2,629		2,632	
	N	%	N	%	N	%	N	%	N	%	N	%
Any service utilization	966	52.3	1004	50.0	1047	46.7	969	43.4	1091	41.5	1133	43.0
Any overdose-related services	336	34.8	339	33.8	347	33.1	316	32.6	342	31.3	326	28.8
Opioid Use Disorder	354	36.6	358	35.7	364	34.8	357	36.8	359	32.9	379	33.5
Substance Use Disorder (non-opioid)	461	47.7	469	46.7	477	45.6	442	45.6	496	45.5	515	45.5
Non-poisoning Injury	268	27.7	265	26.4	299	28.6	308	31.8	311	28.5	326	28.8
Chronic Pain Diagnosis	161	16.7	140	13.9	164	15.7	143	14.8	162	14.8	163	14.4
Mental Health Diagnosis	382	39.5	407	40.5	438	41.8	405	41.8	447	41.0	422	37.2
Injection drug use-related wounds	147	15.2	147	14.6	160	15.3	144	14.9	163	14.9	210	18.5

XIV. APPENDIX E: EDDS

Table 21: Substances Tested in Urine Screens

Substance Category	Substance Name
Benzodiazepines	Benzodiazepines
Opioids	Fentanyl
	Methadone
	Opiates
	Oxycodone
Other Drugs	Barbiturates
Phencyclidine (PCP)	Phencyclidine (PCP)
Stimulants	Amphetamines
	Cocaine
Tetrahydrocannabinol (THC)	Tetrahydrocannabinol (THC)

XV. APPENDIX F: MEDICAID (PROVIDED BY HILLTOP)

Table 22: Number and Percentage of Fatal Overdoses Who Were Medicaid Participants in Maryland, CY 2017 - CY 2021*

Calendar Year	Any Medicaid Eligibility within 12 Months Prior to Month of Death		Medicaid Eligibility at Time of Death		Total Overdose Deaths*
	Number	Percent	Number	Percent	
CY 2017	1,413	65.0%	1,329	61.2%	2,173
CY 2018	1,548	74.6%	1,431	69.0%	2,074
CY 2019	1,513	68.3%	1,408	63.6%	2,214
CY 2020	1,834	70.4%	1,753	67.3%	2,605
CY 2021	1,795	68.8%	1,781	68.2%	2,610

Source: The Hilltop Institute, Maryland Medicaid Administration, Maryland Vital Statistics Administration and Maryland's Medicaid Management Information System (MMIS2).
**Total includes only viable records.*