

DELAWARE 2017

**DRUG
OVERDOSE
MORTALITY**
SURVEILLANCE
REPORT

AUGUST 2019



DELAWARE HEALTH AND SOCIAL SERVICES
Division of Public Health

John Carney Jr., Governor

State of Delaware

Kara Odom Walker, MD, MPH, MSHS, Secretary

Delaware Department of Health and Social Services

Karyl Thomas Rattay, MD, MS, Director

Division of Public Health

Delaware Department of Health and Social Services

MISSION

Protect and Promote the Health of All People in Delaware

VISION

Healthy People in Healthy Communities

CORE VALUES

Integrity > Respect > Participation > Accountability > Teamwork > Excellence



SUGGESTED CITATION

Delaware Epidemiology, Health Data, and Informatics Section. Drug Overdose Mortality Surveillance Report, Delaware, 2017. Delaware Department of Health and Social Services, Division of Public Health, August 2019.

ACKNOWLEDGEMENTS

This report was prepared under the leadership of Tabatha Offutt-Powell, DrPH, MPH and Caroline Judd, MPH of the Epidemiology, Health Data, and Informatics Section, Division of Public Health, Delaware Department of Health and Social Services. Dr. Offutt-Powell led the conception, design, acquisition of data, presentation, interpretation of the data, and final preparation of the report. Caroline Judd led the data management, analysis, presentation, interpretation of the data, and final preparation of the report.

We gratefully acknowledge the staff of the Delaware Health Statistics Center who provided the vital statistics data for this report, which served as the foundational dataset to integrate with other state agency data. Furthermore, we gratefully acknowledge the Delaware Department of Safety and Homeland Security, Division of Forensic Science for their expertise and contributions to the death certificate information.

The authors of this report would like to thank several other collaborators within the State of Delaware for their key roles in its creation. We gratefully acknowledge our colleagues from the following state agencies and programs for providing their expertise, time, and data to create an integrated dataset that resulted in a groundbreaking report for Delaware.

- Department of State, Division of Professional Regulations, Prescription Drug Monitoring Program
- Department of Correction
- Department of Health and Social Services, Division of Substance Abuse and Mental Health
- Department of Health and Social Services, Division of Public Health
 - Emergency Medical Services and Preparedness Section
 - Bureau of Communicable Diseases
 - Epidemiology Research Unit

Through this statewide partnership, Delaware has successfully integrated key risk factor and system utilization information from 12 multi-agency datasets supporting Delaware's efforts to create a Delaware Integrated Data System.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
BACKGROUND	8
PURPOSE	10
OVERVIEW OF DRUG OVERDOSE DEATHS: 2000 TO 2017	11
IDENTIFYING DELAWARE'S 2017 DRUG OVERDOSE DEATHS	14
DESCRIBING DELAWARE'S 2017 DRUG OVERDOSE DEATHS	16
Marital status	18
Month of death	18
Occupation	18
Infectious disease	19
Drugs identified at death	19
DELAWARE HEALTH SYSTEM AND PROGRAM SPECIFIC INTERACTIONS PRIOR TO DEATH	22
Number of Delaware health systems	22
Program-specific health system utilization	24
Emergency Department visits	26
Emergency Medical Services	27
Prescription Monitoring Program	29
Department of Correction	33
Division of Substance Abuse and Mental Health	38
Hospitalizations	40
Medicaid eligibility and claims	41
WHO IS NOT INTERACTING WITH DELAWARE SYSTEMS?	43
SUMMARY	44
ADDRESSING THE HEALTH CRISIS	46
Prevention	46
Treatment	47
Harm Reduction	48
Criminal Justice	49
Epidemiology, Data, and Surveillance	49
CONCLUSION	50
REFERENCES	51
APPENDIX A	52
NOTES	54

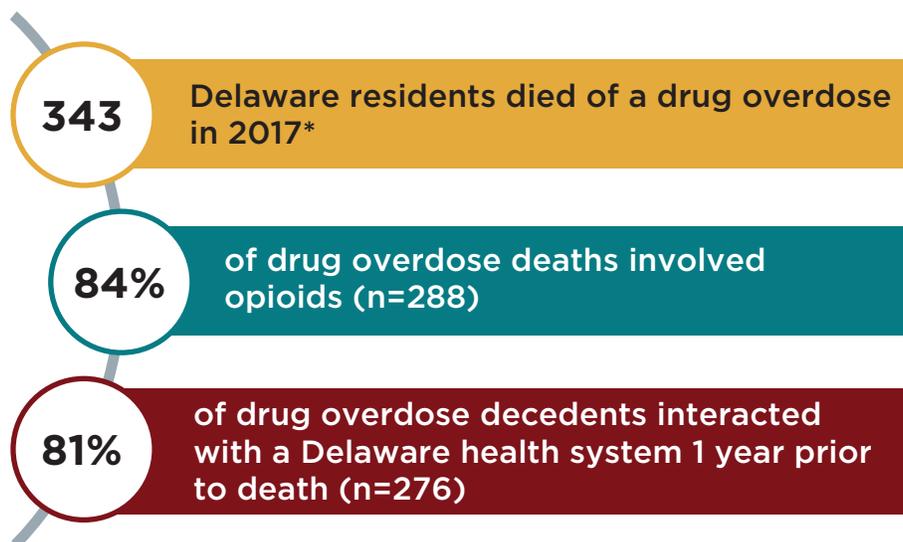
EXECUTIVE SUMMARY

Across the nation and in Delaware, drug overdose deaths are increasing. During the past six years, Delaware recorded a 144% increase in the number of drug overdose deaths from 142 deaths (age-adjusted rate: 15.3 deaths per 100,000 population) in 2012, to 346 deaths (age-adjusted rate: 37.1 deaths per 100,000 population) in 2017. In 2017, the rate of drug overdose deaths among males was twice as high as the rate among females (age-adjusted rates: 51.3 deaths per 100,000 population and 23.4 deaths per 100,000 population, respectively). The highest age-specific

rates of drug overdose deaths occurred among 25- to 34-year-olds (54.6 deaths per 100,000 population), and these rates increased 86% between 2008 and 2017.

As drug overdose deaths continued to increase, it became clear that there was a need to integrate data to more fully understand the drug crisis by taking a more in-depth look at the people who die from drug overdoses in Delaware. In response to this need, the Delaware Department of Health and Social Services (DHSS), Division of Public Health (DPH) integrated and analyzed drug overdose

FIGURE 1. Key findings:
Drug Overdose Mortality Surveillance Report, Delaware, 2017



*Data Source: Delaware Department of Health and Social Services, Division of Public Health.
Includes decedents without a state of residence; excludes homicides and natural deaths.

death data from 12 multi-agency datasets. This report presents the final product of the analysis and descriptive study. Its purpose is to provide: (1) an overview of the drug overdose mortality 18-year trends; (2) an in-depth description of Delaware's 2017 drug overdose decedents including sociodemographic characteristics, types of drugs used, and interactions with Delaware health and related systems; and (3) a description of key statewide efforts to address the drug overdose and substance use crisis.

DPH identified 343 Delaware residents who died of a drug overdose including decedents with no known state of residence who met the inclusion and exclusion criteria for the analysis (Figure 1). Overall, drug overdose decedents were primarily males (67%), between the ages of 25 and 54 years (76%), non-Hispanic white (79%), never married (59%), and who had a high school diploma or General Educational Development (GED) (55%). The top two occupational industries among males who died of drug overdoses were construction (36%) and the installation, maintenance, and repair industry (9.1%; includes mechanics, HVAC repair, engine repair, maintenance, and other occupations), while 11% were not employed (persons not working, students, disabled persons, homemakers, or retired persons). The top two occupational industries among females who died of drug overdoses were food service (14.7%) and office support (12.8%); however, 33% were not employed. More than one in four decedents (28.3%) had a past or present Hepatitis C infection. Opioids, a class of drugs that includes heroin, fentanyl, oxycodone, hydrocodone, codeine, and others, accounted for the majority of drug overdose deaths (84%). Synthetic opioids other than methadone (e.g. fentanyl, tramadol, etc.) were responsible for the highest mortality rates among opioid drug overdose deaths (age-adjusted rate: 21.9 deaths per 100,000 population).

Summary of key Delaware health system interaction findings

A Delaware health system interaction was defined as a decedent's use of, encounter, or interaction in Delaware with at least one of the following: a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, and discharge from a Delaware hospital. Incarceration, probation and parole data, and Medicaid eligibility and claims were presented in an expanded analysis. Key results of the analysis of Delaware health system interactions among the 2017 drug overdose decedents are presented in Figure 2.

Eighty-one percent of people who died of a drug overdose in 2017 interacted with a Delaware health system in the year prior to their deaths; 34% interacted with at least three different health systems. Furthermore, nearly half of all drug overdose decedents (48.4%) interacted with a Delaware health system within the month preceding their deaths. In the year prior to death, half of drug overdose decedents had an emergency department visit. Half of drug overdose decedents had a prescription in the PMP for a controlled substance; and two out of five drug overdose decedents had an encounter with EMS. One out of four received mental health services through DSAMH. One in 10 drug overdose decedents were hospitalized (Figure 2).

Expanded analyses included Department of Correction (DOC) interactions and Medicaid eligibility and claims. One out of three decedents had an interaction with the DOC in the year prior to their deaths (Figure 2). Three out of five decedents (60.1%) were eligible for Medicaid. Of those who were Medicaid eligible, 73.8% of male and 76.8% of female drug overdose decedents had at least one Medicaid claim for a mental, behavioral, and/or neurodevelopmental disorder in the year prior to their deaths.

FIGURE 2. Percentage of drug overdose decedents who interacted with Delaware health systems* one year prior to death, Delaware, 2017

54.2%	Emergency Department Visit
47.8%	Prescription in PMP
43.1%	Emergency Medical Services Encounter
35.3%	Department of Correction Interaction
26.8%	DSAMH Treatment Services
11.7%	Hospitalization

*Data Source: Data source: Delaware Department of Health and Social Services, Division of Public Health. *Delaware health system interaction was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. Includes Department of Correction (DOC) interactions as part of the expanded analysis. EMS encounters and ED visits at the time of death were not included.*

Emergency department visits: One in two drug overdose decedents (54.2%) visited a Delaware emergency department (ED). It is important to note that not all visits in the year prior to death were necessarily related to the decedents’ drug use. Ten percent of drug overdose decedents had a previous drug overdose ED visit in the year prior to their death. Twenty-three percent of drug overdose decedents had mental-health related diagnoses within the year prior to death. Drug overdose and pain diagnoses were more often recorded among females than males.

Emergency Medical Services: Less than half of drug overdose decedents (43.1%) had a history of an EMS encounter not related to the death event, in the year prior to death. Of the drug overdose decedents, 6.7% had an EMS encounter for a non-fatal drug overdose. Of those decedents with a non-fatal overdose recognized during an EMS encounter, 39.1% had naloxone administered.

Prescription Monitoring Program: Among drug overdose decedents, 164 (47.8%) had a prescription in the PMP in the year prior to death. Nearly one in four drug overdose decedents (23.6%) had a prescription for an opioid in the PMP in the year prior to their death. Forty-three drug overdose decedents (12.5%) had at least one prescription of each an opioid and a benzodiazepine in the year prior to death, although prescriptions may have not been overlapping. .

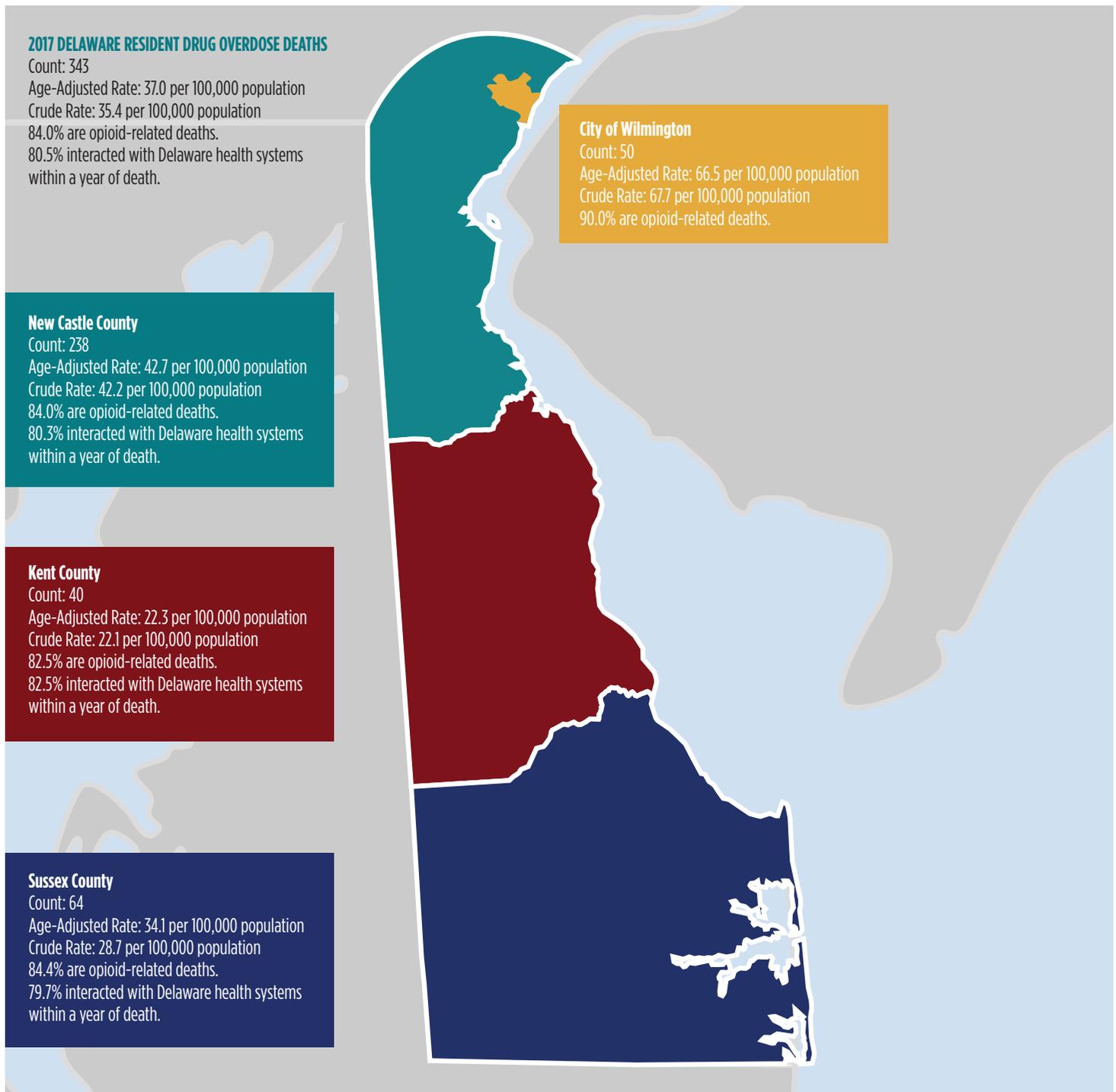
Department of Correction: One in four opioid drug overdose decedents (25%) were released from incarceration one year prior to death. More than 40% of opioid decedents were released from incarceration during the five years preceding death. There were 103 drug overdose decedents (30%) who were on probation and parole in the year that preceded their deaths; 76 (22.2%) of decedents were on probation and parole at the time of death.

Division of Substance Abuse and Mental Health: Within the year prior to death, one in four decedents (26.8%) received DSAMH services. Approximately 10% of decedents were receiving services from DSAMH at the time of death. Of the decedents who received services at DSAMH, 25.3% had a history of homelessness.

Hospitalizations: Approximately 12% of drug overdose decedents were hospitalized in the year prior to their deaths. Nearly 10% of drug overdose decedents were hospitalized with a diagnosis of a mental, behavioral, or neurodevelopmental disorder. The findings of this report provide Delaware with an opportunity to gain new insight into the state’s drug overdose decedents and identify potential opportunities to intervene at crucial reachable moments. A deeper understanding of the decedents’ system utilization may provide insight into potential opportunities for intervention, improve health systems and programs to touch each person at critical points during their addiction, and improve the quality of life of those affected by drug abuse.

DELAWARE DRUG OVERDOSE SNAPSHOT

FIGURE 3. The number and rate of drug overdose deaths by county of residence and City of Wilmington residence, Delaware, 2017



Data Source: Delaware Department of Health and Social Services, Division of Public Health. Notes: Age-adjusted rates were calculated using the direct method, 2000 U.S. Standard Population, and Delaware Population Consortium estimates. Deaths were classified using the International Classification of Diseases, Tenth Revision (ICD-10). Drug overdoses were identified using underlying cause-of-death codes X40–X44 (unintentional) and Y10–Y14 (undetermined). Opioid drug overdose deaths are drug overdose deaths with a multiple cause-of-death code of T40.0–T40.4 and T40.6. Non-residents, homicides, and natural deaths were excluded. Decedents without a state of residence were included. Delaware health system interaction was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

BACKGROUND

Across the nation and in Delaware, drug overdose deaths have been increasing. In response to the drug epidemic, the Delaware Department of Health and Social Services (DHSS), under the leadership of Secretary Kara Odom Walker, MD, MPH, MSHS; Division of Public Health (DPH) Director Karyl T. Rattay, MD, MS; and Division of Substance Abuse and Mental Health (DSAMH) Director Elizabeth Romero developed and are implementing a statewide substance use disorder strategic framework to coordinate efforts across state agencies to combat the epidemic. Simultaneously, the Behavioral Health Consortium, chaired by Lieutenant Governor Bethany Hall-Long, brings together stakeholders and state agencies to coordinate efforts addressing mental health and substance abuse more broadly. And, Delaware's Addiction Action Committee, led by Dr. Rattay, is a public-private partnership that supports comprehensive statewide efforts to address addiction, including safer prescribing practices, better pain management, access to a continuum of coordinated and person-centered treatment services, and enhanced engagement and treatment in the criminal justice system.

Delaware's vision embodies a coordinated and comprehensive approach to prevent, identify, effectively treat, and support those impacted by substance use disorder (SUD).¹ Leadership within DHSS are focusing their efforts on strategic objectives that will achieve this vision. Central to

these efforts was the passage of House Bill 440 in 2018, which established an Overdose System of Care to "coordinate the treatment and care provided to individuals who have overdosed or require acute management of substance use disorder, including opioid use disorder."² The Overdose System of Care is designed to identify and engage persons suffering from substance use disorder during reachable moments.^{1,2} To effectively impact the epidemic, it is critical that Delaware make connections with those at greatest risk of a fatal drug overdose during reachable moments. These moments can occur when persons struggling with addiction interface and interact with health and other systems in Delaware.

The opioid crisis is evolving. In 2009, nearly all Delaware overdose deaths involved prescription opioids such as oxycodone and hydrocodone.³ Now, illicit fentanyl and other synthetic opioids are the major drivers of overdose deaths, contributing to 72% of the 400 deaths in 2018.⁴ Although opioid prescribing rates decreased 25% from 2013 to 2017, Delaware is ranked 18th in the nation for opioid prescribing and has the less than enviable distinction of being the highest-prescribing state for high doses of opioids and long-acting opioids.⁵ The number of people with opioid use disorder (OUD) in Delaware nearly doubled from 6,000 in 2006 to 11,000 in 2017.⁶ The rate of Neonatal Abstinence Syndrome (NAS) among infants, a condition in which babies are born drug-dependent, has more than doubled in Delaware over the past decade.⁷

While the opioid epidemic is a crisis of the moment, in many states other drugs such as methamphetamine, cocaine, and benzodiazepines, often in combination with opioids, are emerging as causes of substance abuse and misuse and death among some populations. Public health agencies closely monitor these changes to ensure that response activities and interventions reflect the current landscape of the epidemic as it continues to evolve and change.

DPH conducts routine surveillance of the SUD epidemic to measure and track changes over time. Reduction in substance abuse, non-fatal drug overdoses, and overdose deaths are primary outcomes used to measure the changing landscape of the drug epidemic. Furthermore, surveillance is a foundational objective in DHSS's SUD strategy and provides guidelines and standards to enable the State to describe the distribution and determinants of the epidemic and affected populations. It provides data to drive action. As a result of a statewide, coordinated, and collaborative surveillance system, timely, high-quality actionable data can be used to make evidence-based, data-informed decisions about the interventions, programs, and policies designed to reduce SUD and drug overdose deaths in Delaware.

In July 2018, the Johns Hopkins Bloomberg School of Public Health submitted a report to DHSS titled "A Blueprint for Transforming Opioid Use Disorder Treatment in Delaware."⁸ The report recommended that Delaware use data to guide and monitor progress by linking multi-agency data to more

fully understand individuals with substance use disorders and their utilization of Delaware's systems.⁸ Many of the current analyses of data were limited by presenting information using disparate datasets that did not allow for the analysis of interagency and program utilization patterns.

With the continued increase in drug overdose deaths, it became clear that there was a need to integrate data from multiple state agencies to more fully understand the drug crisis by taking a more in-depth look at the people who die from drug overdoses in Delaware. In 2018, DPH began a descriptive epidemiologic study linking multiple state agency datasets to describe Delawareans who died of a drug overdose in 2017, their interactions within Delaware systems, and the potential for identifying reachable moments for intervention. DPH obtained administrative and public health surveillance data from four state agencies, 11 information systems, and 12 datasets.

PURPOSE

The goal of the descriptive study was to quantify and describe the drug epidemic through a comprehensive analysis of Delaware drug overdose decedents. The purpose of this report is to provide Delaware with an opportunity to gain new insight into the state's drug overdose decedents and identify potential opportunities to intervene at crucial reachable moments. A deeper understanding of the decedents' system utilization may provide insight into potential opportunities for intervention, improve health systems and programs to touch each person at critical points during their addiction, and improve the quality of life of those affected by drug abuse.

This study is unique because it combined key risk factor and system utilization information from 12 multi-agency datasets and supports efforts to create the Delaware Integrated Data System. The impetus for the study led to a collaborative data-sharing partnership between four state agencies, provided an opportunity to build a framework for future analyses, and highlighted the need for continued epidemiologic studies of not only drug overdose mortality but also similar studies of Delawareans who are living and suffering from substance use disorder and its related sequelae (i.e., morbidity). These efforts are foundational to ensure that policies, programs, and interventions are grounded in data and evidence.

The report is divided into three main sections:

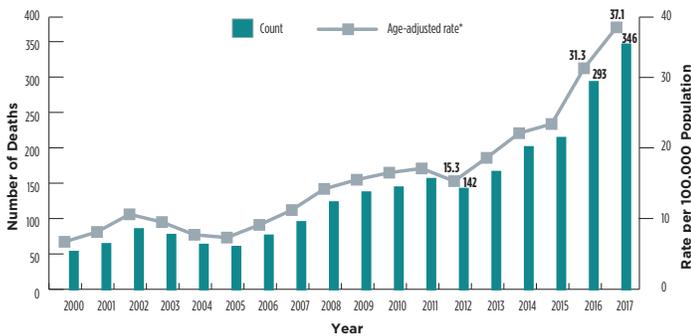
1. An overview of drug overdose deaths among Delawareans from 2000 to 2017.
2. An in-depth description of Delaware's 2017 drug overdose decedents including sociodemographic characteristics, types of drugs used, and interactions with Delaware health and related systems.
3. A description of key statewide efforts to address the drug overdose and substance use crisis.

OVERVIEW

OF DRUG OVERDOSE DEATHS: 2000 to 2017

During the first decade of the 21st century, Delaware experienced a steady but gradual increase in drug overdose deaths among residents. From 2012 to 2017, the number and rate of deaths attributed to drug overdoses increased drastically over a relatively short period of time (Figure 4). Most notably in this six-year period, Delaware recorded a 144% increase in the number of drug overdose deaths, from 142 deaths (age-adjusted rate: 15.3 deaths per 100,000 population) in 2012 to 346 deaths (age-adjusted rate: 37.1 deaths per 100,000 population) in 2017 (Figure 4).

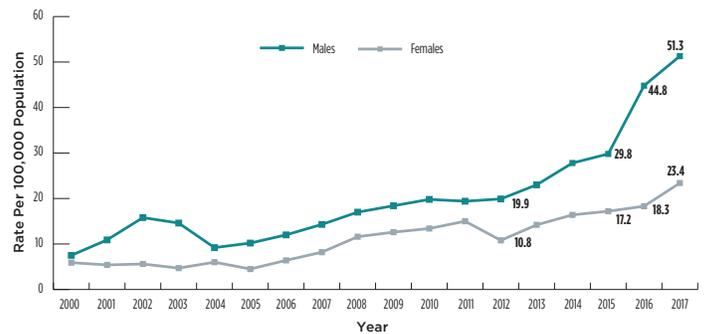
FIGURE 4. Drug overdose deaths, Delaware residents, 2000-2017



Data Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *Rates are age-adjusted to the 2000 U.S. Standard Population. Notes: Deaths are classified using the International Classification of Diseases, Ninth and Tenth Revisions (ICD-9 and ICD-10). Drug overdoses are identified using underlying cause-of-death codes X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), and Y10-Y14 (undetermined).

In 2017, the age-adjusted rate of drug overdose deaths among males was twice as high as the age-adjusted rate among females (51.3 deaths per 100,000 population and 23.4 deaths per 100,000 population, respectively). Deaths among both males and females increased between 2000 and 2017; however, the disparity between sexes widened more noticeably in 2015, when the age-adjusted rate of drug overdose deaths among males drastically increased from 29.8 deaths per 100,000 population to 44.8 deaths per 100,000 population in 2016. This represented a 50% increase in the age-adjusted rate of drug overdose deaths among males from 2015 to 2016. Although the age-adjusted rates of drug overdose deaths among females were lower than among males during the same period, mortality rates among females continued to increase (females—2015: 17.2 deaths per 100,000 population; 2016: 18.3 deaths per 100,000 population) (Figure 5).

FIGURE 5. Age-adjusted drug overdose mortality rates* by sex, Delaware residents, 2000-2017

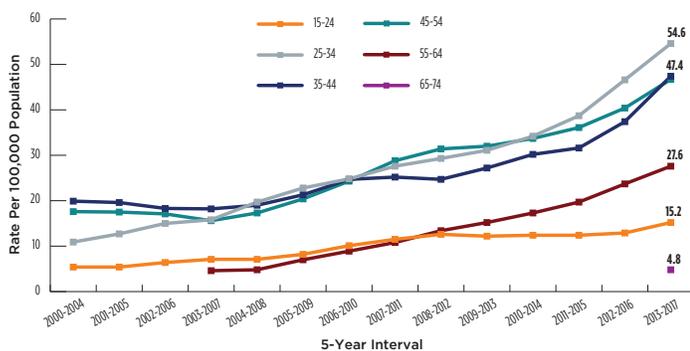


Data Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *Rates are age-adjusted to the 2000 U.S. Standard Population. Notes: Deaths are classified using the International Classification of Diseases, Ninth and Tenth Revisions (ICD-9 and ICD-10). Drug overdoses are identified using underlying cause-of-death codes X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), and Y10-Y14 (undetermined).

Figure 6 presents five-year age-specific drug overdose mortality rates. Age groupings of 10-year increments were created to compare trends over time among different age distributions of the population. As a result, the number of deaths in each 10-year age group is relatively small and can vary from year to year. Therefore, five-year rolling averages were calculated to address the fluctuations in the annual number of deaths while still presenting age-specific rates to better describe changes in drug overdose deaths over time by age.

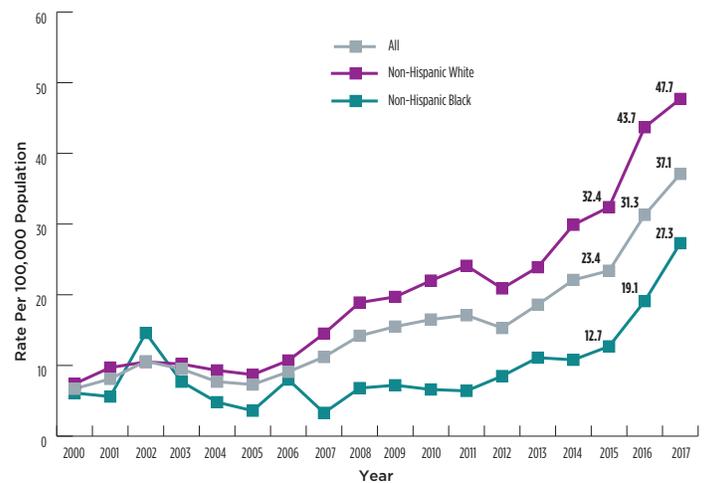
From 2000-2004 to 2013-2017, the rates of drug overdose deaths increased for all age groups. In 2013-2017, the highest rates of drug overdose deaths occurred among 25- to 34-year-olds (54.6 deaths per 100,000 population), and these rates increased 86% from 2008-2012 and 2013-2017. Most notably, in 2013-2017, the rate of drug overdose deaths among the 35- to 44- year-old age group (47.4 deaths per 100,000 population) recently surpassed the rate of drug overdose deaths among the 45- to 54-year-old age group (46.7 deaths per 100,00 population) (Figure 6).

FIGURE 6. Five-year age-specific drug overdose mortality rates*, Delaware residents, 2000-2017



Data Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *Rates are age-adjusted to the 2000 U.S. Standard Population. Notes: Deaths are classified using the International Classification of Diseases, Ninth and Tenth Revisions (ICD-9 and ICD-10). Drug overdoses are identified using underlying cause-of-death codes X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), and Y10-Y14 (undetermined).

FIGURE 7. Age-adjusted drug overdose mortality rates* by race, Delaware residents, 2000-2017



Data Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *Rates are age-adjusted to the 2000 U.S. Standard Population. Notes: Deaths are classified using the International Classification of Diseases, Ninth and Tenth Revisions (ICD-9 and ICD-10). Drug overdoses are identified using underlying cause-of-death codes X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), and Y10-Y14 (undetermined).

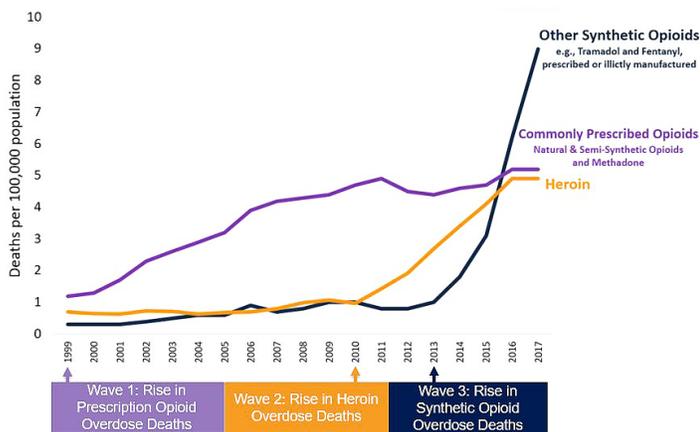
Figure 7 presents age-adjusted rates of drug overdose deaths by race. Age-adjusted rates were notably higher among non-Hispanic white decedents, with a 47% increase in the rate of drug overdose deaths from 2015 to 2017. Although age-adjusted rates were lower among non-Hispanic black decedents from 2015 to 2017, there was a greater percentage increase (115%) in the age-adjusted rate of deaths among non-Hispanic black decedents (12.7 deaths per 100,000 population and 27.3 deaths per 100,000 population, respectively).

Disparities in the rate of drug overdose deaths exist between sex, age, and race but overall trends showed continued increases in drug overdose deaths across all populations regardless of sex, race, or age.

Drug overdose deaths by drug type

The Centers for Disease Control and Prevention (CDC) describes three distinct waves of the rise in opioid overdose deaths in the United States. The first wave began in the 1990s, reflecting the increased prescribing of opioids. Wave 2 began in 2010 with the rapid increase in heroin overdose deaths (Figure 8).

FIGURE 8. Waves of the opioid overdose epidemic in the United States, CDC, 1999-2017



Source: CDC, <https://www.cdc.gov/drugoverdose/resources/graphics.html>

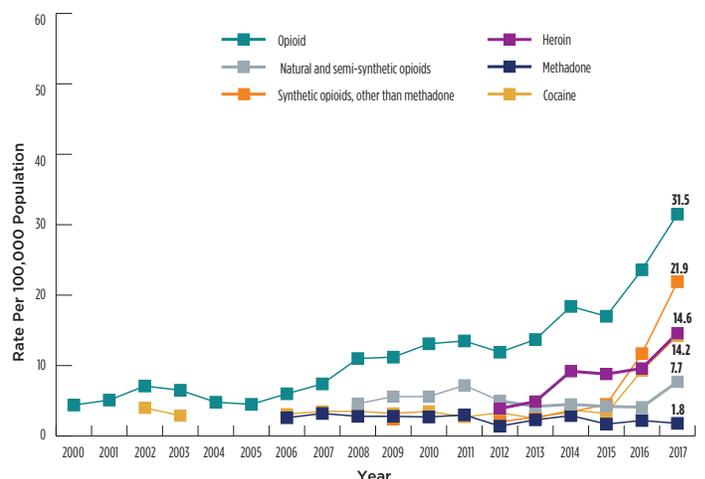
The third and most recent wave of the epidemic began in 2013 with rising numbers of deaths from synthetic opioids such as fentanyl. The use of illicit fentanyl in combination with other drugs resulted in increased numbers of deaths nationwide.⁹

A relatively similar trend was observed in Delaware. Wave 1 began in the late 1990s and early 2000 with the increase in prescription drug related deaths. The number of heroin-related overdose deaths began to increase in 2012 and marked the beginning of Wave 2. Three years later, in 2015, Wave 3 of the epidemic was detected when drug overdose deaths resulting from synthetic opioids drastically increased. The number and age-adjusted rate of opioid drug deaths in 2017 was the highest recorded in Delaware up to the time of this report. Similar to trends in overall drug overdose deaths and among specific subgroups of the population, the age-adjusted rate of opioid

drug overdose deaths steadily increased over the past 18 years. Drastic increases in deaths from specific drugs such as synthetic opioids (e.g., fentanyl) were documented in 2016 and 2017.

Figure 9 presents age-adjusted drug overdose mortality rates by drug type. The age-adjusted rate of deaths involving opioids in 2017 was 31.5 deaths per 100,000 population, which accounted for 84% of the all drug overdose deaths. Synthetic opioids other than methadone (e.g. fentanyl, tramadol, etc.) were responsible for the highest age-adjusted mortality rates among opioid drug overdose deaths (21.9 deaths per 100,000 population). A drastic increase in cocaine-related deaths occurred between 2015 and 2017 such that cocaine rivaled heroin for the top three drug types listed on the death certificate as a contributing cause of death. The age-adjusted rate of deaths from natural and semi-synthetic opioids (e.g., oxycodone and hydrocodone) increased between 2016 and 2017 (4.1 deaths per 100,000 population and 7.7 deaths per 100,000, respectively). Methadone-related deaths accounted for a smaller percentage of all drug deaths with an age-adjusted rate of 1.8 deaths per 100,000 population.

FIGURE 9. Age-adjusted drug overdose mortality rates* by drug type, Delaware residents, 2000-2017



Data Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *Rates are age-adjusted to the 2000 U.S. Standard Population. Notes: Deaths are classified using the International Classification of Diseases, Ninth and Tenth Revisions (ICD-9 and ICD-10). Drug overdoses are identified using underlying cause-of-death codes X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), and Y10-Y14 (undetermined).

IDENTIFYING

DELAWARE'S 2017 DRUG OVERDOSE DEATHS

This section of the report describes the approach that DPH used to take a deeper in-depth look at Delaware's 2017 drug overdose decedents.

Methodology

All deaths that occur in Delaware are reported to DPH's Office of Vital Statistics and registered electronically via the Delaware Electronic Vital Records System. Death records are transmitted by the Delaware Health Statistics Center (DHSC) to the National Center for Health Statistics for cause of death coding. Delaware residents whose death event occurred out of state are reported to DPH through a number of mechanisms. Annually, DHSC prepares a final statistical file that is used for analysis.

DPH's Epidemiology, Health Data, & Informatics Section (EHDIS) led the descriptive study that resulted in this report. EHDIS submitted a data request to the DPH Privacy Board: (1) for record-level data of all drug overdose deaths that occurred in Delaware including both residents and occurrences; (2) for data from internal DPH programs on the drug overdose decedents; and (3) to share the drug overdose decedent list with external agencies to obtain relevant data on the decedents for a specified period of time prior to their death.

After receiving approval from the DPH Privacy Board to obtain and share data, the DHSC created a statistical file that included a list of decedents with a drug overdose as the cause of death and included toxicology codes, demographic characteristics, and other relevant variables from the death certificate. This file was used as the source file for matching, merging, and analysis. [Appendix A](#) illustrates the project's data flow process.

The following data were requested from internal DPH programs and other state agencies:

1. Death certificate
2. Infectious disease reports of HIV, Hepatitis B, and Hepatitis C
3. Birth certificate to determine whether decedent had a birth (mother or father) in the year prior to death
4. Emergency Department (ED) visits
5. Emergency Medical Service (EMS) encounter
6. Prescription Monitoring Program (PMP) prescriptions
7. Department of Correction (DOC) incarceration, probation, and parole
8. Division of Substance Abuse and Mental Health (DSAMH) treatment services
9. Hospital discharges
10. Medicaid eligibility and claims

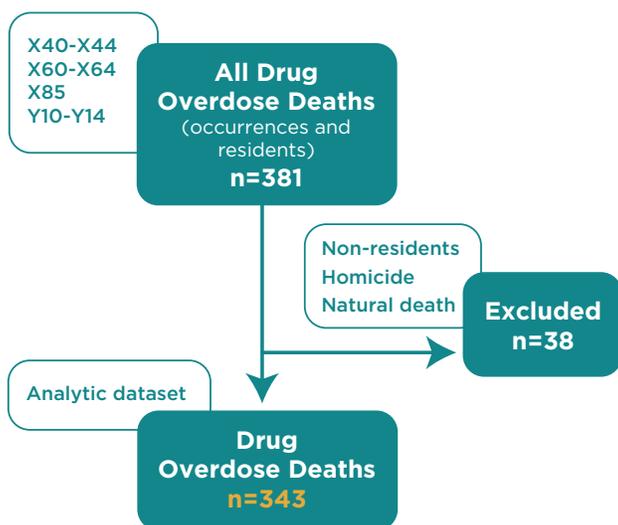
All Delaware drug overdoses

Once all data were successfully created into a statistical file for analysis, EHDIS began the descriptive study. Figure 10 displays the criteria used to identify the final analytic population. EHDIS selected the population for analysis based on two primary criteria: 1) use of standard national drug overdose mortality surveillance definitions and 2) potential opportunities for intervention through access to services from Delaware health systems.

DHSC identified 381 drug overdose deaths in 2017 that met the following criteria:

1. Died in Delaware and a resident of another state (occurrence).
2. Died in Delaware and a Delaware resident (occurrence and resident).
3. Died in another state and a Delaware resident (resident).
4. Death certificate included underlying cause of death codes X40-X44 (accidental poisonings by drugs), X60-X64 (intentional self-poisoning by drugs), X85 (assault by drug poisoning), and Y10-Y14 (drug poisoning of undetermined intent).

FIGURE 10. All drug overdose deaths, analytic population, Delaware, 2017



Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. * Includes decedents with no state of residence listed. Underlying cause of death codes from death certificate included: X40-X44 (accidental poisonings by drugs), X60-X64 (intentional self-poisoning by drugs), X85 (assault by drug poisoning), and Y10-Y14 (drug poisoning of undetermined intent).

DPH initially included non-resident decedents who died in Delaware to determine whether and to what extent non-residents were interacting with Delaware health systems.

Non-residents

Of the 381 drug overdose deaths that occurred in 2017 and included Delaware residents who died out of state, 34 decedents were not Delaware residents. The largest percentage of non-residents (85%) were residents of neighboring states. Non-residents were similar to residents in sex, race, and ethnicity. Health system interaction among non-residents was minimal with the exception of EMS encounters and ED visits on the date of death. Each of these services were utilized by over half of the non-resident population (EMS= 55.9%, ED= 52.3%).

Non-residents rarely engaged in non-death related EMS and ED interactions or with other Delaware health systems in which data were available for this study. Given the low level of interactions with Delaware health systems by this population, there may be limited opportunities to intervene in the time prior to death. As a result and consistent with national mortality surveillance definitions, the non-resident population was removed from further analyses. However, decedents who died in Delaware but did not have a state of residence remained in the final analytic population.

Final analytic population

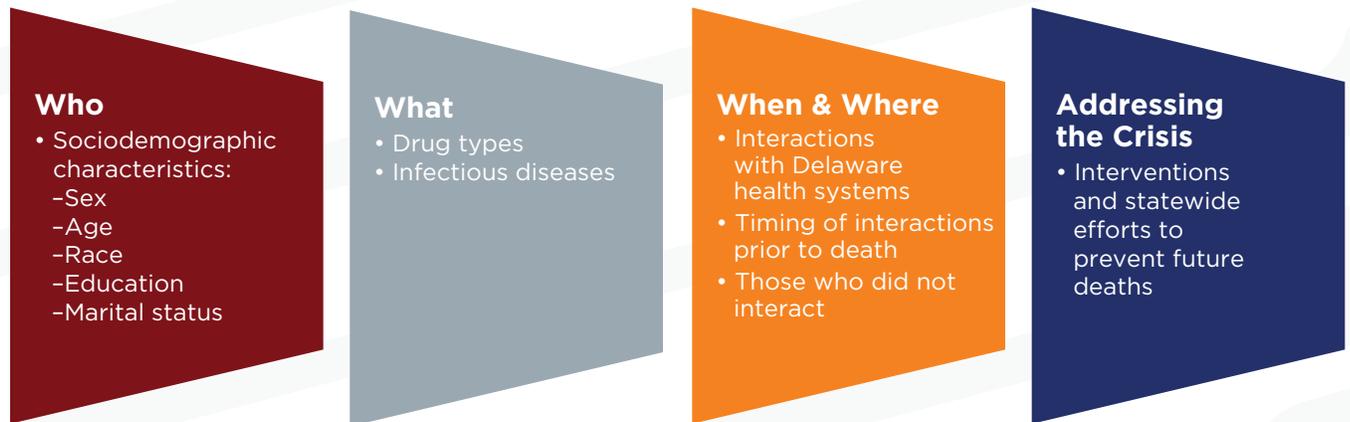
After removal of the non-resident population, additional exclusion criteria were applied, which focused on the objective of the study, to quantify decedent interactions with health systems prior to death in an effort to identify reachable moments for intervention. As such, homicides and natural deaths were removed from the final analytic population because the circumstances, specifically the manner of death, differed from those of other drug overdose deaths. The final analytic population after applying the exclusion criteria resulted in 343 Delaware drug overdose decedents.

DESCRIBING

DELAWARE'S 2017 DRUG OVERDOSE DEATHS

The remainder of the report focuses solely on describing the drug overdose deaths that occurred among Delaware residents and any decedents who died in Delaware but had no known state of residence (e.g., homeless individuals). Summary information is presented about the decedents' sociodemographic characteristics (i.e., sex, age, race, education, marital status, and occupation), their interactions with Delaware health systems, and the timing of their interactions with Delaware health systems prior to their deaths.

Throughout the report, data and statistics provide greater insight into four primary areas:



(n= 288, 84%). Within sex, age groups, races, marital status, and education categories, more than 80% of drug overdose decedents in each sociodemographic category had an opioid listed as a contributing cause of death.

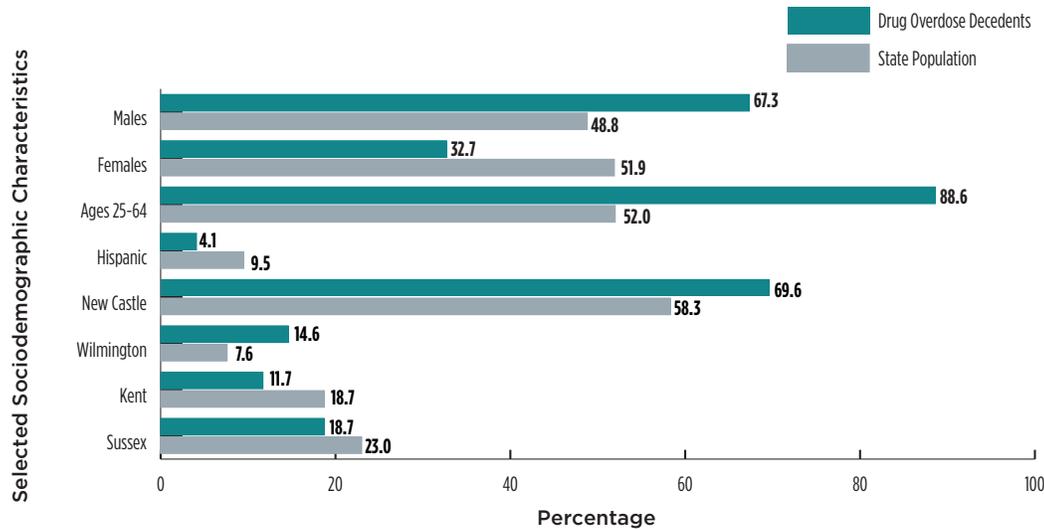
The distribution of sociodemographic characteristics of Delaware residents who died of a drug overdose differed from the distribution of the state population. Whereas 67% of the drug overdose decedents were male, only 49% of the state population were male. A larger percentage of drug overdose decedents were aged 25 to 64 years as compared to the state

Who are the Delaware residents who died of a drug overdose in Delaware, 2017?

In 2017, 343 of the 346 Delaware residents who died of drug overdose met the criteria for inclusion in the study. Overall, drug overdose decedents were primarily males (67%), between the ages of 25 and 54 years (76%), white (79%), never married (59%), and had a high school diploma or General Educational Development (GED) (55%). Opioids accounted for the majority of drug overdose deaths

population, 89% and 52%, respectively. Furthermore, drug overdose deaths included a larger percentage of New Castle County (70%, state: 58%) and Wilmington residents (15%, state: 8%) compared with the state population. More detail is presented in [Figure 11](#) using a side-by-side comparison of key sociodemographic characteristics of the drug overdose decedent population and the state population.

FIGURE 11. Selected population characteristics of drug overdose decedents and the state population*, Delaware, 2017



Data source:
Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center; Delaware Population Consortium.

Table 1 presents a summary of sociodemographic and other characteristics of the study population of drug overdose decedents. Separate columns titled ‘Opioid’ and ‘Delaware Health system interaction within one year prior to death’ were also included to provide a snapshot of the distribution of sociodemographic characteristics among drug overdose decedents within these categories. The section titled “Delaware Health System Specific Interactions Prior to Death” is dedicated to the presentation of results from the analysis of Delaware health system interaction of drug overdose decedents. Percentages in the ‘Opioid’ and ‘Delaware Health system interactions within one year prior to death’ columns are calculated within the sociodemographic group stratification (i.e. row percentage). For example, 79% of the male drug overdose decedents interacted with a Delaware health system in the year prior to death (182 males with a health system interaction/231 male drug overdose decedents) multiplied by 100 = 79%). This is different from presenting the column percentages and stating that 66% of drug overdose decedents who interacted with a Delaware health system were male (182 males with a health system interaction/276 drug overdose decedents who had a health system interaction) multiplied by 100= 66%). From an intervention perspective, it is important to present

TABLE 1. Sociodemographic and other characteristics of drug overdose decedents, Delaware, 2017

Characteristic ¹ , n (%)	All Decedents	Opioid ²	Delaware Health system ³ interaction within 1 year prior to death
Total	343 (100)	288 (84)	276 (81)
Sex			
Males	231 (67)	199 (86)	182 (79)
Females	112 (33)	89 (79)	94 (84)
Age			
18-24	30 (9)	27 (90)	25 (83)
25-34	91 (27)	78 (86)	78 (86)
35-44	83 (24)	75 (90)	67 (81)
45-54	85 (25)	70 (82)	66 (78)
55-74	54 (16)	38 (70)	40 (74)
Race⁵			
White	272 (79)	235 (86)	232 (85)
Black	61 (18)	46 (75)	50 (82)
Other	10 (3)	*	*
Ethnicity			
Hispanic	14 (4)	13 (93)	*
Marital status			
Never Married	204 (59)	176 (86)	170 (83)
Married	54 (16)	43 (80)	48 (89)
Divorced	69 (20)	56 (81)	56 (81)
Other ⁴	13 (4)	10 (77)	10 (77)
Educational attainment			
Less than high school	70 (20)	59 (84)	43 (61)
High school diploma or GED	188 (55)	161 (86)	156 (83)
More than High School	78 (23)	63 (81)	56 (68)
Hepatitis C status			
HCV past or present	97 (28)	83 (86)	85 (88)
Military Service			
Armed Forces	23 (7)	19 (83)	14 (61)

Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and other state agency program specific datasets were used to create the health system interaction category. *Counts of less than 10 events were suppressed. 1. Some categories were collapsed or removed for cells with small numbers; 2. ‘Opioid’ includes drug overdose deaths with a multiple cause-of-death code of T40.0–T40.4 and T40.6. 3. Delaware health system interaction was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included; 4. ‘Other’ includes widowed, married but separated. 5. Race categories include Hispanic ethnicity.

the row percentage and describe the percentage of decedents within sociodemographic characteristics who died of an opioid drug overdose and separately who interacted with Delaware health systems.

Among drug overdose deaths, 81% of decedents interacted with a Delaware health system within one year prior to death, not including events that occurred at the time of death. While the prevalence of health system utilization was relatively similar across all sociodemographic groups, a smaller percentage of drug overdose decedents with a previous history of serving in the United States Armed Forces (61%) interacted with Delaware health systems within the year prior to their death. The analysis did not include data from U.S. Department of Veterans Affairs; therefore, it is uncertain as to whether drug overdose decedents with a history of serving in the Armed Forces utilized Veterans Affairs services. Few drug overdose decedents were identified as a mother or father from review of Delaware birth certificates in the year prior to their deaths, and as such, statistics were not presented.

Marital status

Over 80% of drug overdose decedents were unmarried (never married, divorced, or widowed) or married and living separately. Unmarried male drug overdose decedents accounted for more than half of all drug overdose deaths (male= 57%, female= 25%) (Figure 12).

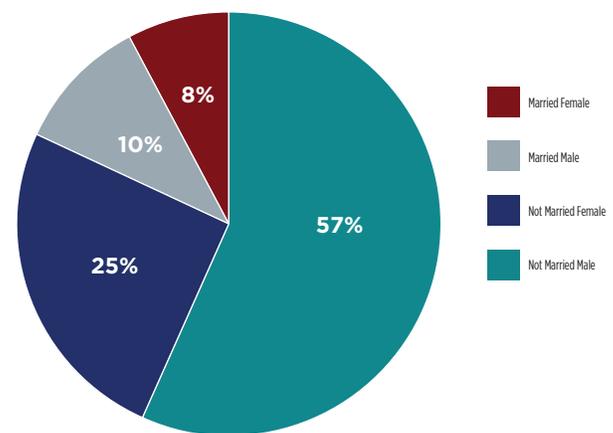
Month of death

A larger percentage of drug overdose decedents in the 18 to 44 age group died in January (12.3%) with noticeable decreases in February (5.9%) and March (5.4%). Deaths among 45 to 74 year olds occurred at a higher percentage in July (13.7%), August (11.5%), and November and were lowest in December (3.6%) (Figure 13).

Occupation

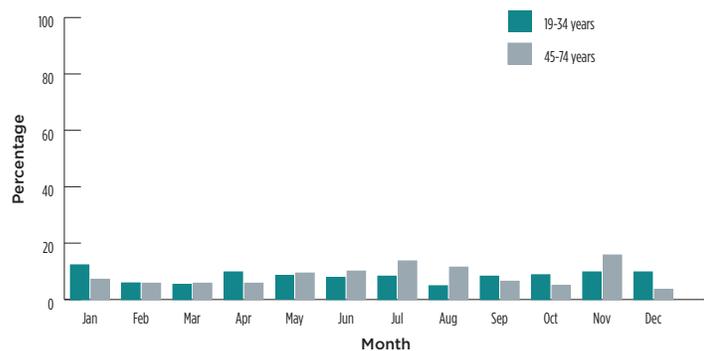
Occupational information was available from the death certificate. Industry codes were used to classify “usual occupation” as reported by the person completing the death certificate (i.e., informant). The most common occupational industries among those who died of drug overdoses were: construction (23%), not employed, students, disabled, homemakers, or retired (17%); food service (10%); and office support (8%) (Figure 14).

FIGURE 12. Percentage of drug overdose deaths by sex and marital status, Delaware, 2017



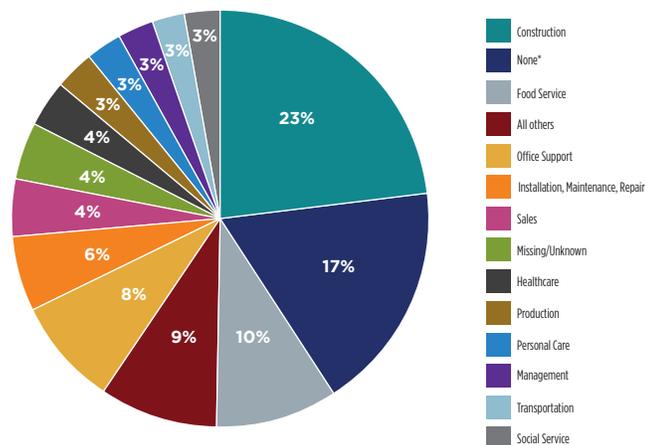
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center

FIGURE 13. Percentage of drug overdose deaths by age group and month, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center

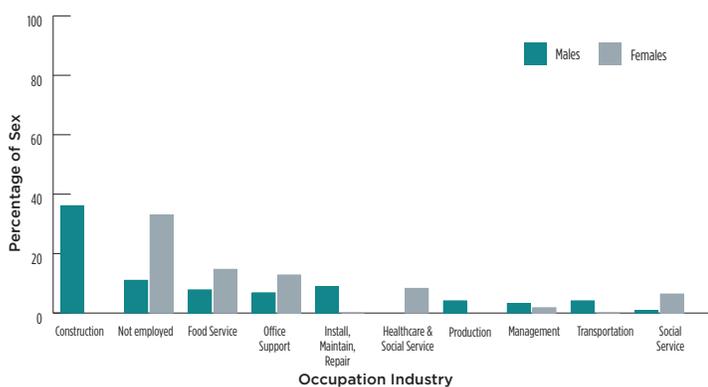
FIGURE 14. Percentage of drug overdose deaths by occupational industry, Delaware, 2017



*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *None* includes persons who were unemployed, students, disabled, homemakers, or retired. Notes: Occupation was categorized using the federal 2018 Standard Occupational Classification system. Industry of occupation was utilized when applicable.*

The top two occupational industries of jobs held by males who died of a drug overdose were construction (36%) and the installation, maintenance, and repair industry (9.1%; includes mechanics, HVAC repair, engine repair, maintenance, and others), while 11% were not employed (persons not working, students, disabled, homemakers, or retired). The top two occupational industries of jobs held by females who died of a drug overdose were food service (14.7%) and office support (12.8%); however, 33% of females who died of a drug overdose were not employed (Figure 15).

FIGURE 15. Percentage of drug overdose deaths by occupational industry and sex, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. 'Not employed' includes persons who were unemployed, students, disabled, homemakers, or retired. 'Healthcare' includes practitioners and support staff.

Infectious disease

Infectious diseases that are reportable to the state of Delaware and nationally to the CDC are captured in DPH's infectious disease surveillance systems. Human Immunodeficiency Virus (HIV) case data are collected in the Enhanced HIV/AIDS Reporting system (eHARS). Hepatitis B and Hepatitis C case data are collected in the Delaware Electronic Reporting and Surveillance System (DERSS). Hepatitis C infection was defined as a past or present infection based on available laboratory results and following CDC's 2012 surveillance case definition.¹⁰

Based on available public health surveillance data, no decedents were diagnosed with Hepatitis B infection and very few had documented infection with HIV; however, 97 of the drug overdose decedents (28.3%) had documentation of a past or present Hepatitis C infection. Of decedents with a Hepatitis C infection, 87.6% interacted with Delaware health systems in the year prior to death. Of drug overdose decedents with a Hepatitis C history, 85.6% had an opioid indicated as a cause of death. Drug overdose decedents with a past or present Hepatitis C infection were similar to the overall decedent population in sex, race, ethnicity, marital status, education level, occupation, and county of residence. However, a larger percentage of drug overdose decedents with a Hepatitis C infection (51.5%) had heroin listed on the death record compared to the overall drug overdose decedent population (39.3%).

Drugs identified at death

In this section of the report, information on drug type originates from the death certificate. Medical examiners report toxicology results in the death certificate, which are subsequently coded by the National Center for Health Statistics using the *International Classification of Diseases Tenth Revisions (ICD-10)* codes. The ICD-10 codes were used to quantify the drugs identified in the drug overdose deaths. Since drug overdose deaths may involve more than one drug, the drug overdose mortality rates are not mutually exclusive and

FIGURE 16. List of drug types by ICD-10* multiple cause-of-death codes, Delaware, 2017

Opium	T40.0
Heroin	T40.1
Natural and semi-synthetic opioids	T40.2
Methadone	T40.3
Synthetic opioids, other than methadone	T40.4
Cocaine	T40.5
Other and unspecified narcotics	T40.6

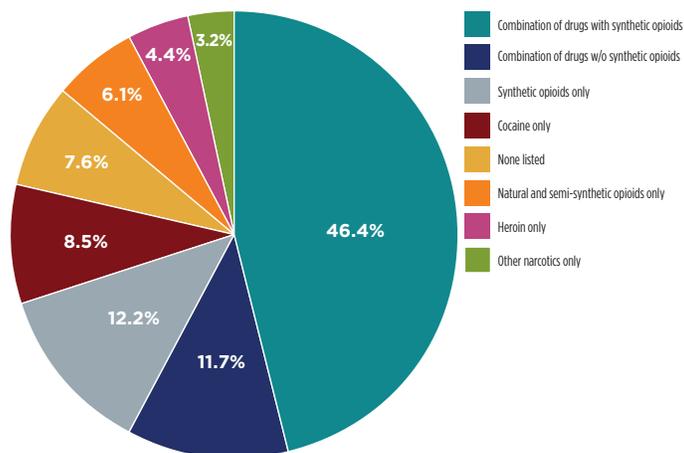
*Data source: Centers for Disease Control and Prevention, National Center for Health Statistics. *International Classification of Diseases, Tenth Revision*

as such, the rates or counts of drug overdose deaths for natural, semi-synthetic, and other opioids will not sum to the rate of drug deaths involving opioids.

As defined by CDC for public health surveillance purposes, certain drugs fall within the opioid drug category under the multiple cause-of-death codes used in death certificates. These drugs are natural and semi-synthetic opioids, methadone, synthetic opioids other than methadone, heroin, and other and unspecified narcotics. Cocaine is not an opioid, but is another important drug included in this report (Figure 16).

Additionally, it was important to quantify the potential combination of drug types listed on death certificates using the cause-of-death codes. Figure 17 depicts the percentage of drug overdose decedents with combinations of drugs and drug types with and without synthetic opioids listed on the death certificate. More than half of all drug overdose decedents (58.1%) had a combination

FIGURE 17. Percentage of drug overdose deaths by drug type, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center.

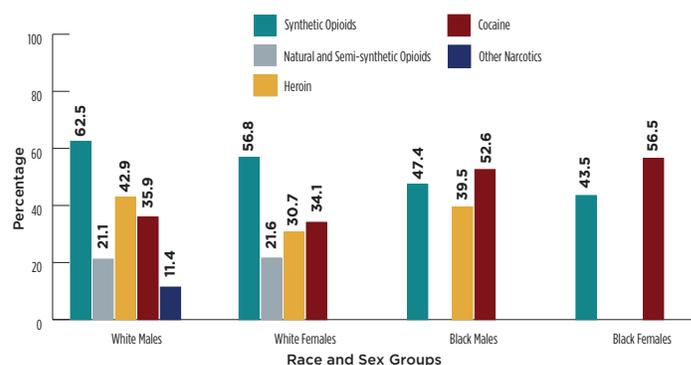
of drugs either with or without synthetic opioids. Synthetic opioids alone (12.2%) or in combination with other drugs (46.4%) accounted for the largest percentage of drug overdose deaths (58.6%). To a lesser extent, other drugs or drug types alone were involved in the drug overdose deaths.

Synthetic opioids (e.g., tramadol and fentanyl) were involved in more than half of all drug overdose deaths among white males and white females (62.5% and 56.8%, respectively); and nearly half of all deaths among black males and females (47.4% and 43.5%, respectively). However, cocaine accounted for the largest percentage of deaths among both black males (52.6%) and black females (56.5%). Heroin also contributed to a large percentage of drug overdose deaths among white males (42.9%), black males (39.5%), and white females (30.7%) (Figure 18).

Synthetic opioids were the most common drug type associated with drug overdose deaths among all age groups (Figure 19). Over 60% of deaths among 25- to 34-year-olds (67.0%) and 35- to 44-year-olds (62.7%) were attributed to synthetic opioids. Cocaine and heroin were involved in nearly half of drug overdose deaths occurring among 45- to 54-year-olds (cocaine: 48.2%; heroin: 47.1%) (Figure 19).

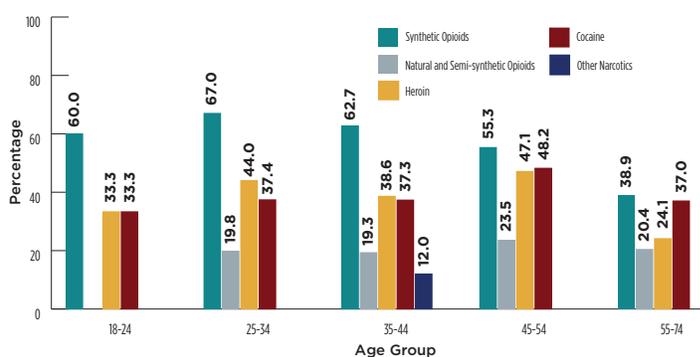
Drug overdose deaths due to synthetic opioids accounted for the highest percentages among those who had never married (59.8%), those who were married (59.3%), and those who were divorced (50.7%). A smaller percentage of decedents who were married at the time of death died from cocaine (25.9%) than those who were divorced (42.0%) or never married (41.7%) (Figure 20).

FIGURE 18. Percentage of drug overdose deaths by drug type, race, and sex, Delaware, 2017



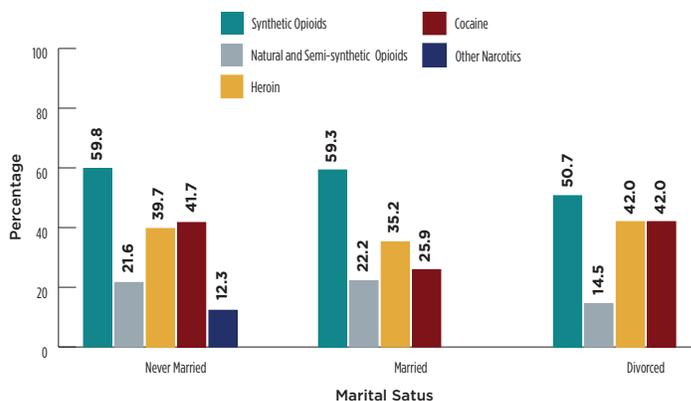
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 19. Percentage of drug overdose deaths by drug type and age group, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 20. Percentage of drug overdose deaths by drug type and marital status, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. Percentages were suppressed for counts of less than 10 in the numerator.

DELAWARE HEALTH SYSTEM

INTERACTIONS

PRIOR TO DEATH

Persons facing addiction may interact with one or more health systems and as such, these interactions provide opportunities for care coordination. Interactions with Delaware health systems represent potential reachable moments in which treatment or intervention may be an option for a person who is facing addiction. Describing and understanding the timing, frequency, and the type of interactions during the time that preceded death may provide greater insight into touch points for the implementation of evidence-based interventions and policies.

In this report, Delaware health system interaction by a drug overdose decedent was defined as: a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter (e.g., EMS responds to a 9-1-1 call via ambulance to a residence where a patient is in cardiac arrest, provides emergency medical care, and transports the patient to an emergency department), a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. Because it is important to identify possible opportunities for intervention prior to the time of death, EMS and ED encounters and visits at the time of death were either included as a separate category in the analysis or removed from the analysis to more accurately quantify opportunities for intervention at a time when the decedent was alive. Expanded analyses of incarceration, probation, and parole data (as documented by the DOC) and Medicaid eligibility and claims are presented to provide additional insight into key risk factor and system specific intervention opportunities.

FIGURE 21. Definition of Delaware health system interaction and expanded analyses

Health System Interaction

- Visit to a Delaware emergency department
- Emergency Medical Services encounter
- Prescription drug monitoring program
- Treatment administered by a Division of Substance Use and Mental Health (contracted) site.
- Hospital discharge from a Delaware hospital

Expanded Analysis

- Incarceration, probation, and parole as documented by the Department of Correction
- Medicaid eligibility and claims

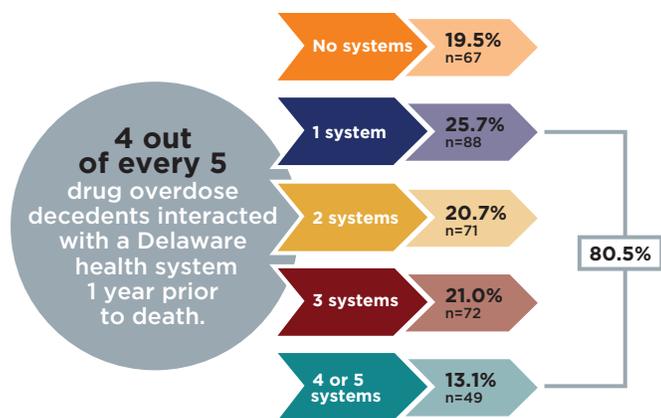
Number of Delaware health systems

The figures in this section present data that describe the characteristics of decedents who died of a drug overdose and the number of Delaware health systems in which drug overdose decedents interacted across specific time periods preceding their deaths. These analyses did not include interactions that occurred at the time of death.

Four out of every five persons who died of a drug overdose (80.5%) interacted with at least one Delaware health system in the year preceding their deaths. Approximately 34% of drug overdose decedents interacted with at least three different health systems in the year prior to their deaths. No interaction with health systems in the year prior to death may limit the ability to intervene at critical reachable moments. One in five drug overdose decedents did not interact with a Delaware health system in the year prior to death (19.5%) (Figure 22).

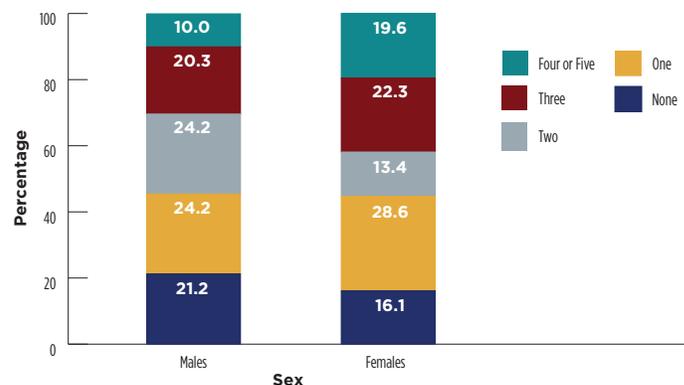
Health system utilization did not vary noticeably among those who died of opioids and those in which opioids were not implicated. By sex, health system utilization varied slightly among males and females. One in five females interacted with four or five systems in the year prior to death. Although a smaller percentage of males interacted with four or five health systems (10.0%) than females (19.6%), one in five males interacted with three systems in the year prior to death (20.3%) similar to that of females (22.3%). A larger percentage of female drug overdose decedents only interacted with one system in the year that preceded death; however, this difference was minimal compared to males. Approximately one in four males and females who died of drug overdoses only interacted with one health system in the year prior to their deaths. Furthermore, one in five males and one in six females who died of a drug overdose did not interact with a Delaware health system one year prior to their death (Figure 23).

FIGURE 22. The number and percentage of drug overdose decedents who interacted with Delaware health systems one year prior to death, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

FIGURE 23. The percentage of drug overdose decedents who interacted with Delaware health systems one year prior to death by number of health systems and sex, Delaware, 2017

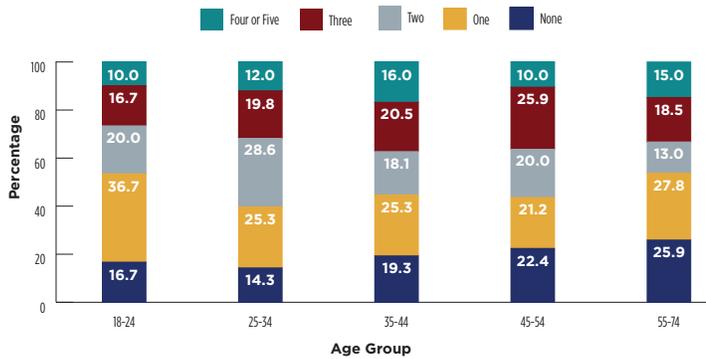


Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

As age increased, a larger percentage of those who died of a drug overdose did not interact with a Delaware health system in the year prior to their deaths (18-24 years: 16.7%, 55-74 years: 25.9%). Across all age groups, but especially among the youngest and oldest ages (18-24 years and 55-74 years), a larger percentage of drug overdose decedents within those age groups interacted with only one health system in the year prior to death (36.7% and 27.8%, respectively) (Figure 24). One out of every four 45- to 54-year-olds (25.9%) had an interaction with three health systems in the year prior to their deaths.

When stratified by race, a larger percentage of black drug overdose decedents (21.3%) than white decedents (18.4%) did not interact with a health system in the year preceding their death. The percentage within the race group was relatively similar for the number of health systems; however, a larger percentage of white drug overdose decedents interacted with only one system (27.2%) than black drug overdose decedents (19.7%) in the year prior to their deaths. Notably, 16.4% of black

FIGURE 24. The percentage of drug overdose decedents by age group and the number of Delaware health systems they interacted with in the year prior to death, Delaware, 2017

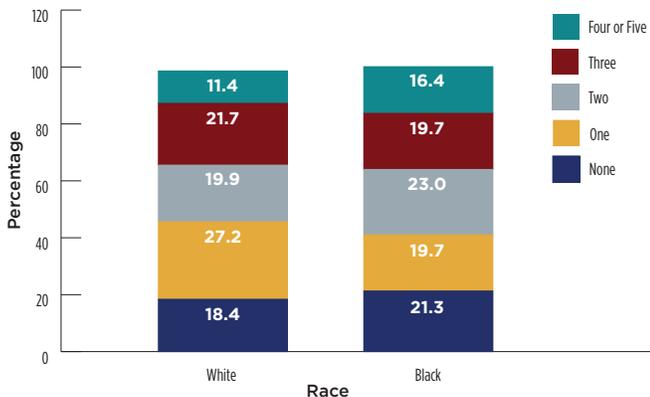


Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

drug overdose decedents interacted with four or five health systems compared to 11.4% of white drug overdose decedents who interacted with four or five health systems in the year prior to their deaths (Figure 25).

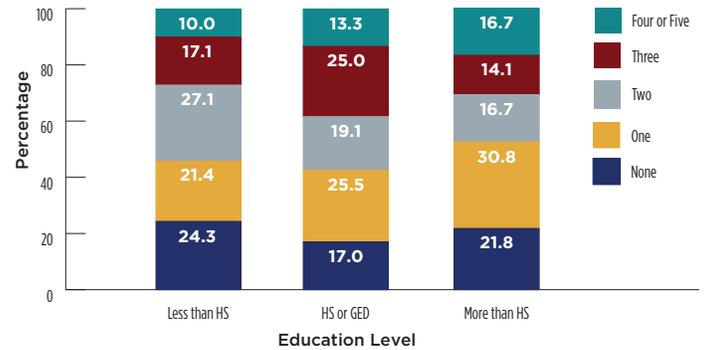
Twenty-four percent of drug overdose decedents with less than a high school education had no interaction with a Delaware health system in the year prior to their death. Among drug overdose decedents with an high school education, one in four interacted with only one health system

FIGURE 25. The percentage of drug overdose decedents by race and the number of Delaware health systems they interacted with in the year prior to death, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

FIGURE 26. The percentage of drug overdose decedents by education level and the number of Delaware health systems they interacted with in the year prior to death, Delaware, 2017

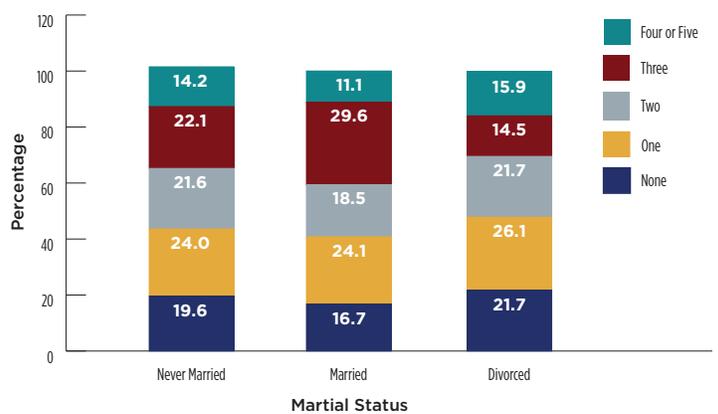


Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

in the year prior to their death (Figure 26). A large percentage (30.8%) of drug overdose decedents with more than a high school education interacted with one health system in the year prior to their deaths.

A large percentage (83.3%) of married drug overdose decedents interacted with one to five Delaware health systems in the year prior to their deaths (Figure 27).

FIGURE 27. The percentage of drug overdose decedents by marital status and the number of Delaware health systems they interacted with in the year prior to death, Delaware, 2017



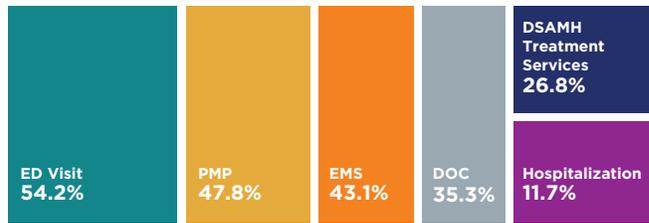
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

Program-specific health system utilization

While 80.5% of all drug overdose decedents interacted with at least one health system, utilization varied by Delaware health system. Understanding program-specific system utilization provides insight into where and when points may exist for potential intervention. Figure 28 provides a high-level overview of health system interaction by drug overdose decedents in the year prior to death and by Delaware health system. The highest percentage of drug overdose decedents' interactions in the year prior to their deaths occurred in the ED (54.2%) and EMS (43.1%) settings. In the year prior to death, one in two decedents (47.8%) had a prescription in the PMP. One in four received DSAMH services (26.8%), and more than one in 10 were hospitalized (11.7%). One out of three had a DOC interaction (35.3%), which included incarceration and/or probation and parole. (Figure 28).

Figure 29 provides an overview of drug overdose decedents' utilization with Delaware systems, both under the health system and expanded definitions, by sex. Nearly twice as many male drug overdose decedents (n=182) as female drug overdose decedents (n=94) had an interaction with a Delaware health system in the year prior to their death. A larger percentage of females (17.9%) were hospitalized in the year prior to death than males (8.7%). More male drug overdose decedents (n=89) than female drug overdose decedents

FIGURE 28. Percentage of drug overdose decedents with Delaware health system* interactions in the year prior to death, Delaware, 2017

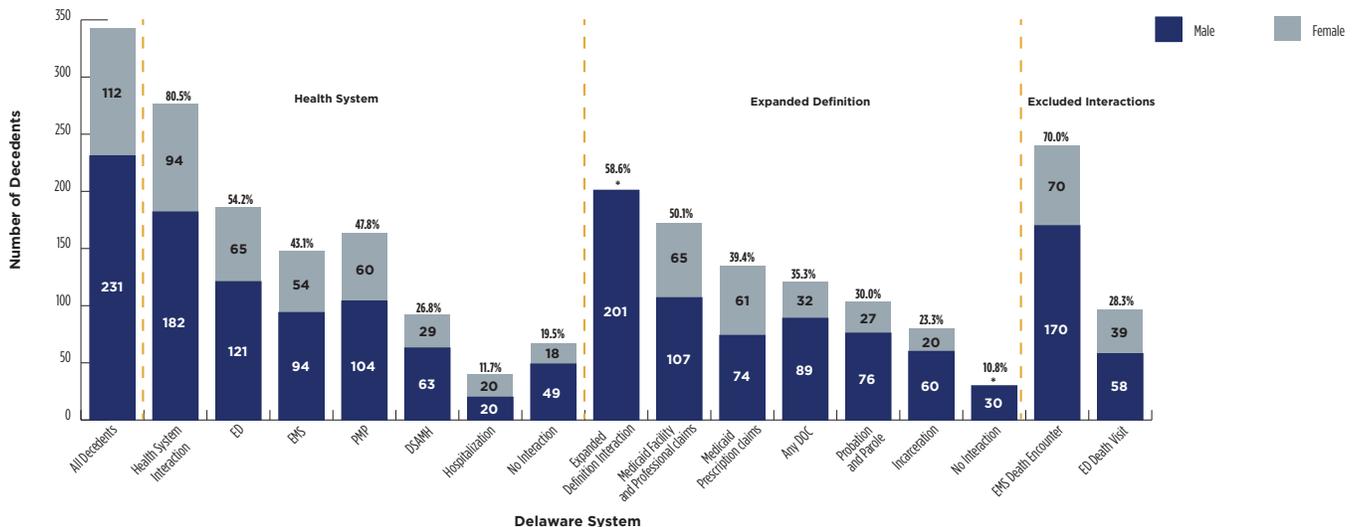


Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Notes: Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. Includes Department of Correction (DOC) interactions as part of the expanded analysis.

(n=32) were incarcerated and were on probation and parole in the year prior to their deaths. Figure 29 also provides Emergency Department and Emergency Medical Services death-related encounters. Although these system interactions would not be an intervention opportunity and thus excluded from interaction analyses, they demonstrate that ED and EMS systems are tasked with the bulk of end-of-life service needs related to the drug overdose decedent population (70.0% and 28.3%, respectively). About, about 20% of drug overdose decedents did not interact with a Delaware health system in the year prior to their deaths.

One in two decedents (48.4%) interacted with these systems within one month prior to their deaths. Although more male drug overdose decedents interacted with a Delaware health system in

FIGURE 29. Number and percentage of drug overdose decedents who had an interaction with a Delaware system in the year prior to death by sex, Delaware 2017



*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Notes: Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. The expanded definition of a Delaware system includes Department of Correction encounters and Medicaid facility, professional, and prescription claims. EMS and ED death-related encounters were excluded from interaction analyses. *Counts were suppressed for counts of less than 10.*

the year prior to death, across all time periods preceding death, a larger percentage of female drug overdose decedents interacted with Delaware health systems compared to males (females: 57.1% at one month and 83.9% at one year prior to death; males: 44.2% at one month and 78.8% at one year prior to death) (Figure 30).

Emergency Department visits

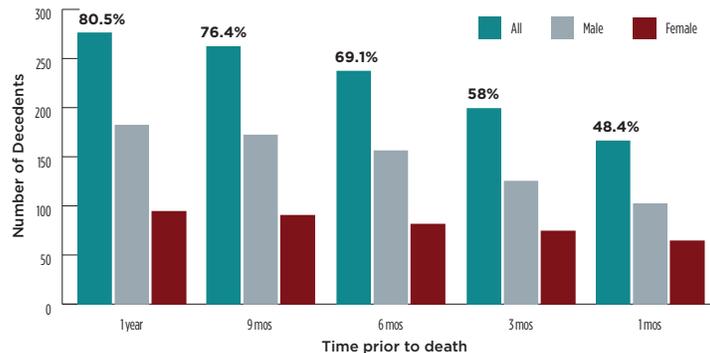
Emergency department visits represent an interaction or encounter with a Delaware emergency department at a hospital or a freestanding ED. Emergency department visit data were available for the years 2016 and 2017, which for some decedents represented up to two years of ED data prior to their deaths. Although the focus of this section is on ED visits of drug overdose decedents in the year prior to their deaths, it is worth mentioning that for the available ED visit data (years 2016 to 2017), a majority of drug overdose decedents (70.0%) were seen at Delaware ED. Further analyses only report data on the year prior to death.

In the year prior to and including at the time of their deaths, 64% of drug overdose decedents had at least one visit to an ED and approximately 14% of drug overdose decedents had two visits to an ED (Figure 31). Excluding visits that occurred at the time of death, 54.2% of drug overdose decedents had visited a Delaware ED in the year prior to death.

Any diagnosis codes for ED visits in the year prior to death were categorized as mental health, pain, or drug overdose. In the year prior to their death, 9.9% of drug overdose decedents had a previous drug overdose ED visit (Figure 32). Of drug overdose decedents seen at an ED in the year before their death, 23% had a mental health-related diagnosis and 6.7% had a pain diagnosis. Drug overdose and pain diagnoses were more often recorded among female drug overdose decedents (drug overdose diagnosis: 13.4%; pain diagnosis: 10.7%) than male drug overdose decedents (drug overdose diagnosis: 8.2%; pain diagnosis: 4.8%).

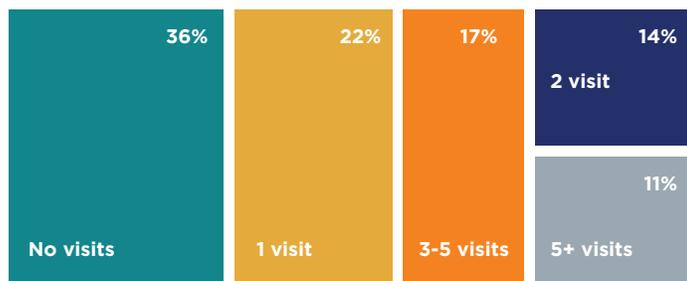
A larger percentage of female drug overdose decedents than male drug overdose decedents

FIGURE 30. Number of drug overdose decedents who had an interaction with a Delaware health system in the year prior to death, Delaware, 2017



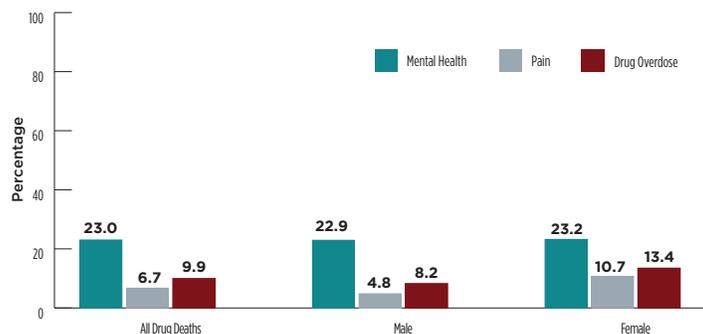
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and data from state agencies included in health system definition. Health system was defined as a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter, a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital. EMS encounters and ED visits at the time of death were not included.

FIGURE 31. Percentage of emergency department utilization of drug overdose decedents in the year prior to and including at the time of death, Delaware, 2017



Data source: Delaware Department Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Electronic Surveillance System for the Early Notification of Community-based Epidemics

FIGURE 32. Percentage of drug overdose decedents by emergency department diagnosis category in the year prior to death by sex, Delaware, 2017



Data source: Delaware Department Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Electronic Surveillance System for the Early Notification of Community-based Epidemics. Notes: Disease categories were defined using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10CM) diagnosis codes: Mental Health: F0-F9; Pain: G89; Drug Overdose: T36-T50.

were seen at the ED across all time periods. The percentage of female and male drug overdose decedents seen at the ED decreased in the three months immediately prior to death; however, two in five females (38.4%) and one in five males (23.4%) had some type of interaction with the ED three months prior to death (Figure 33).

ED utilization prior to death was relatively similar across age groups. A larger percentage of drug overdose decedents in the 35- to 44- year age group (6 months: 49.4%; 1 year: 59.0%) were seen at the ED between six months and one year prior to their deaths than all other age groups. Most notably, a smaller percentage of the 18- to 24-year-old age group was seen during throughout the year prior to death compared to other age groups (Figure 34).

A smaller percentage of white drug overdose decedents were seen across all time periods compared with black drug overdose decedents (Figure 35).

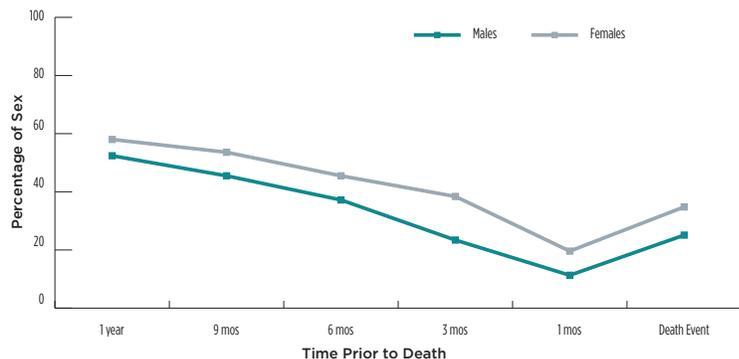
There were similar trends in ED utilization among drug overdose decedents of different educational levels in the year preceding death. However, a larger percentage of decedents with less than a high school diploma (32.9%) were seen at the ED during in the three months prior to their death than among decedents of other educational levels (Figure 36).

Likewise, there were similar trends in ED utilization among drug overdose decedents of varying marital statuses. Drug overdose decedents who were divorced used ED services at a smaller percentage across all time periods compared with decedents who were either married or never married (Figure 37).

Emergency Medical Services

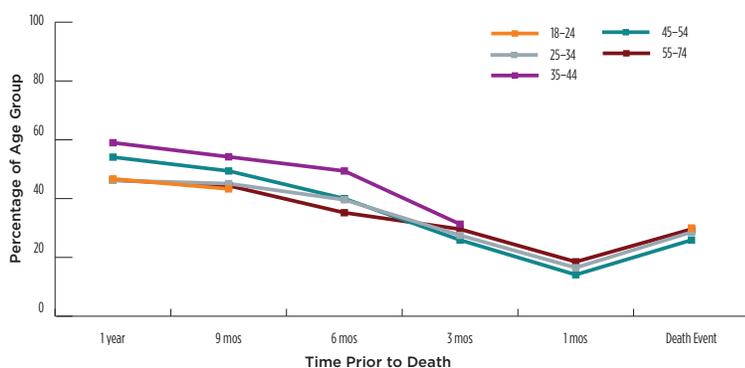
EMS provides emergency care to persons in Delaware. Persons with a SUD may interact with EMS during a drug overdose or on other occasions that may or may not be related to their substance use condition. Encounters that occur outside of the time of death may indicate potential opportunities in which persons suffering from a SUD or drug overdose could be referred for treatment, if they do not refuse care.

FIGURE 33. Percentage of drug overdose decedents with emergency department visits in the year prior to death by sex, Delaware, 2017



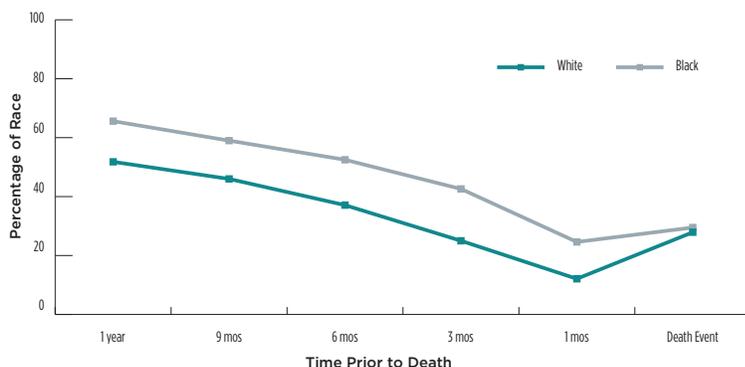
Data source: Delaware Department Health and Social Services, Division of Public, Health Statistics Center and Delaware Electronic Surveillance System for the Early Notification of Community-based Epidemics

FIGURE 34. Percentage of drug overdose decedents with emergency department visits in the year prior to death by age group, Delaware, 2017



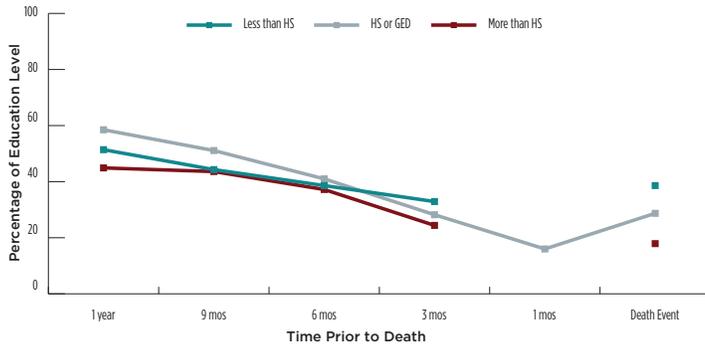
Data source: Delaware Department Health and Social Services, Division of Public, Health Statistics Center and Delaware Electronic Surveillance System for the Early Notification of Community-based Epidemics

FIGURE 35. Percentage of drug overdose decedents with emergency department visits in the year prior to death by race, Delaware, 2017



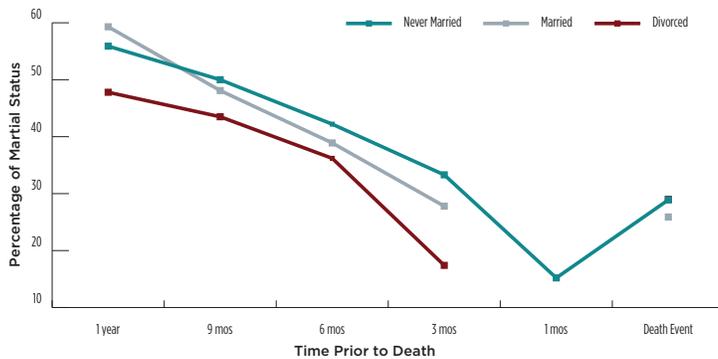
Data source: Delaware Department Health and Social Services, Division of Public, Health Statistics Center and Delaware Electronic Surveillance System for the Early Notification of Community-based Epidemics

FIGURE 36. Percentage of drug overdose decedents with emergency department visits in the year prior to death by educational attainment, Delaware, 2017



Data source: Delaware Department Health and Social Services, Division of Public, Health Statistics Center and Delaware Electronic Surveillance System for the Early Notification of Community-based Epidemics

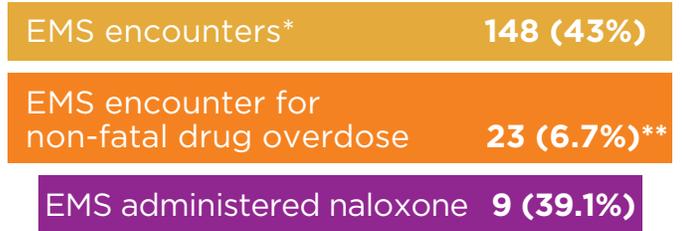
FIGURE 37. Percentage of drug overdose decedents with emergency department visits in the year prior to death by marital status, Delaware, 2017



Data source: Delaware Department Health and Social Services, Division of Public, Health Statistics Center and Delaware Electronic Surveillance System for the Early Notification of Community-based Epidemics

EMS encounter data were available for the years 2016 and 2017. In the year prior to and including at the time of their deaths, the majority of drug overdose decedents (84%) interacted with EMS. However, it is important to quantify and describe those encounters that are not related to the death event as potential opportunities for intervention. When removing EMS encounters that occurred at the time of death, 43.1% of drug overdose decedents had an EMS encounter in the year prior to death. Of the drug overdose decedents, 6.7% had an EMS encounter for a non-fatal drug overdose in which 39.1% of drug overdose

FIGURE 38. Percentage of decedents who interacted with Emergency Medical Services (EMS), non-death encounters and naloxone administration in the year prior to death, Delaware, 2017

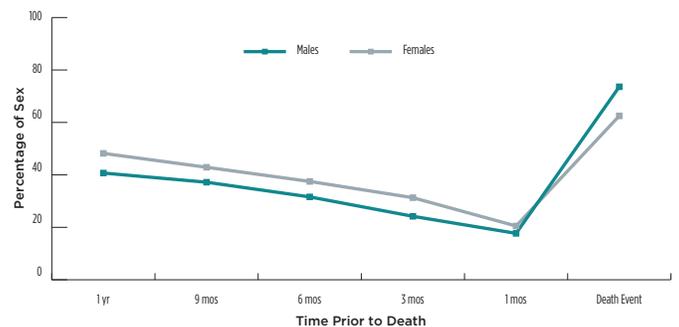


*Data source: Delaware Department Health and Social Services, Division of Public, Health Statistics Center and Delaware Emergency Medical Services Response System. *Does not include EMS encounters at the time of death. **Calculated as a percentage of all drug overdose decedents (n=343)*

decedents with a non-fatal drug overdose had naloxone administered by EMS during the encounter. (Figure 38).

EMS system utilization patterns among males and females were similar across all times preceding death. However, a larger percentage of female drug overdose decedents interacted with EMS in all time periods prior to death compared to male decedents. In the three months prior to death, 31.3% of female drug overdose decedents and 24.2% of male drug overdose decedents had an EMS encounter. In contrast, there were larger percentages of male and female drug overdose decedents (73.6% and 62.5%, respectively) with EMS encounters at the time of their deaths (Figure 39).

FIGURE 39. Percentage of drug overdose decedents with an Emergency Medical Services encounter in the year prior to death by sex, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and the Delaware Emergency Medical Services Response System.

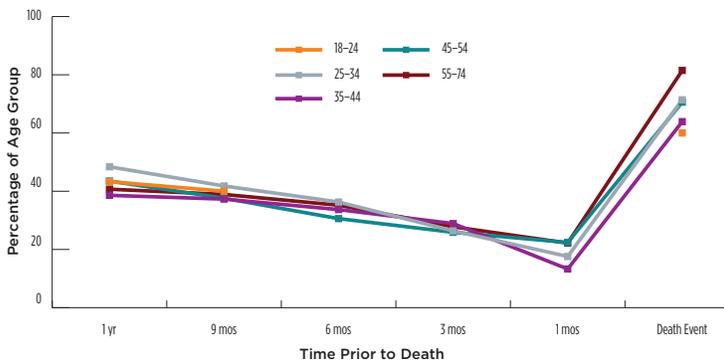
Similar percentages of drug overdose decedents within each age group had documented interactions with EMS during the various time periods preceding death. Nearly half of 18- to 24-year-old drug overdose decedents (48.4%) had an EMS encounter in the year prior to death; however, this same age group had the smallest percentage of decedents (60.0%) who interacted with EMS at the time of death (Figure 40).

Utilization trends were relatively similar across race groups. A higher percentage of black drug overdose decedents interacted with EMS in the year prior to death compared to white drug overdose decedents (black: 49.2%, white: 41.9%) (Figure 41).

Higher percentages of utilization occurred among those with less than a high school education and decreased with increasing education level consistently across at all time periods preceding death. A similar percentage and more than one fourth of drug overdose decedents with less than a high school education (28.6%) and those with a high school diploma or GED (28.7%) had an EMS encounter three months prior to their deaths (Figure 42).

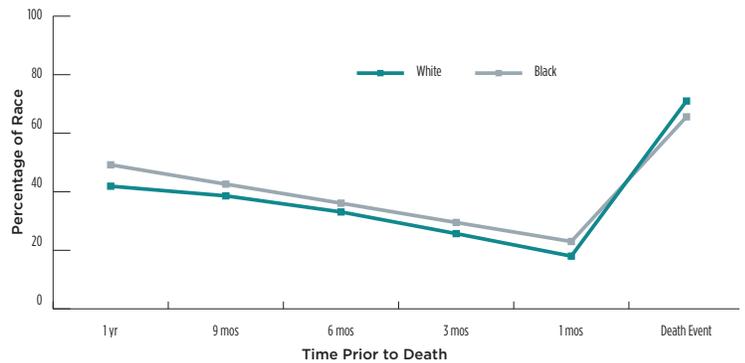
Higher percentages of EMS utilization occurred in the six months prior to death among drug overdose decedents who were never married (36.3%) and decreased among drug overdose decedents who were either married (27.8%) or divorced (31.9%). Utilization of EMS services at the time of death was approximately 70% regardless of marital status (Figure 43).

FIGURE 40. Percentage of drug overdose decedents with an Emergency Medical Services encounter in the year prior to death by age group, Delaware, 2017



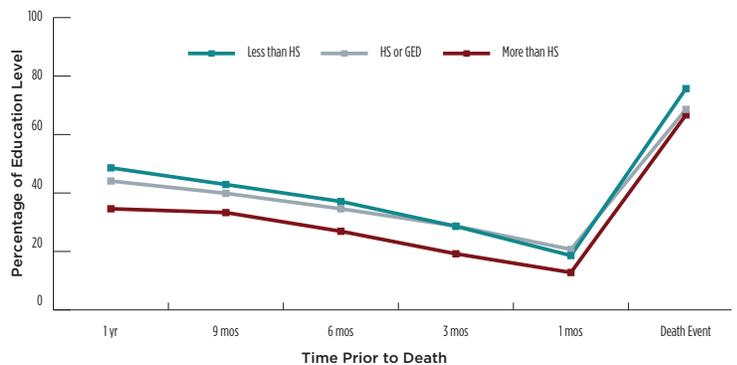
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and the Delaware Emergency Medical Services Response System.

FIGURE 41. Percentage of drug overdose decedents with an Emergency Medical Services encounter in the year prior to death by race, Delaware, 2017



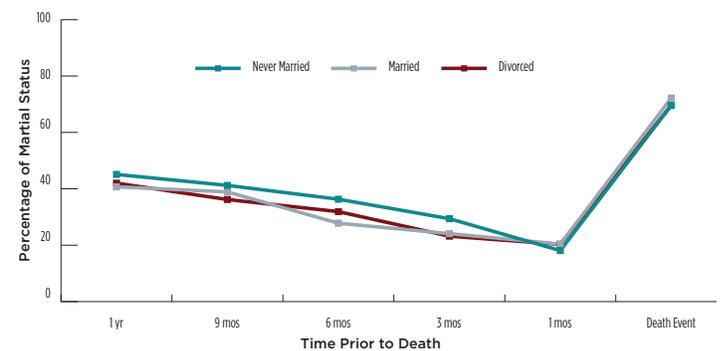
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and the Delaware Emergency Medical Services Response System.

FIGURE 42. Percentage of drug overdose decedents with an Emergency Medical Services encounter in the year prior to death by educational attainment, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and the Delaware Emergency Medical Services Response System.

FIGURE 43. Percentage of drug overdose decedents with an Emergency Medical Services encounter in the year prior to death by marital status, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and the Delaware Emergency Medical Services Response System.

Prescription Monitoring Program

Data are collected from prescribers and dispensers for every prescription of a class II through V controlled substance in the state of Delaware. Using the PMP, Delaware-licensed pharmacies and prescribers both report and access data about patients for which prescriptions are dispensed. PMP data were available for the years 2011 to 2017. Although the focus of this section is primarily on the percentage of drug overdose decedents who had a prescription in the PMP in the year prior to death, analysis of available data up to six years prior to death were also included to better quantify the extent of historical controlled substance prescriptions among drug overdose decedents.

Of the 343 drug overdose deaths, 260 (75.8%) decedents had a prescription in the PMP in the six years prior to their deaths. Within one year prior to death, the percentage of decedents with controlled substance prescriptions decreased 37% to 164 drug overdose decedents, 47.8% of drug overdose decedents. Among drug overdose decedents, a slightly larger percentage of females (53.6%) than males (45.0%) had a prescription for a controlled substance in the year prior to death (Figure 44).

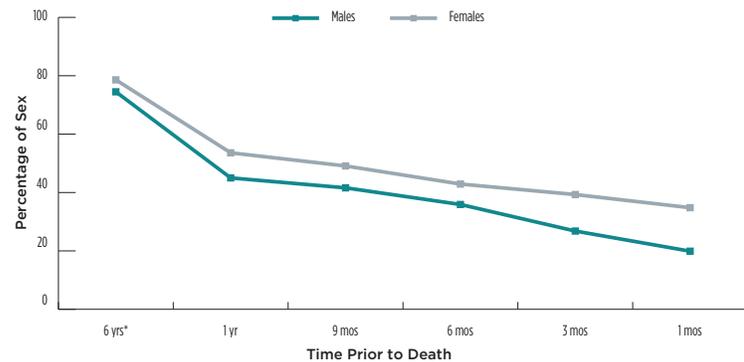
Approximately half of all drug overdose decedents across all age groups had a controlled substance prescription in the PMP in the year prior to death. As age increased, the percentage of decedents in each age group having a controlled substance prescription in the year prior to death also increased. A higher percentage of decedents aged 45 to 54 years (51.8%) and 55 to 74 years (55.6%) had controlled substance prescriptions within the year prior to death compared to other age groups and this trend continued especially in the nine months preceding death (53.7% and 47.1%, respectively) (Figure 45).

In the year prior to death, half of all white drug overdose decedents and two out of every five black drug overdose decedents (41%) had a controlled substance prescription. In the 30 days preceding death, nearly 30% of white decedents had a controlled substance prescription, compared to 15% of black drug overdose decedents (Figure 46).

A larger percentage of drug overdose decedents with more than a high school education (53.8%) had a controlled substance prescription in the year prior to death compared to drug overdose decedents with less than high school education (35.7%) or with a high school diploma or GED (50.5%) (Figure 47).

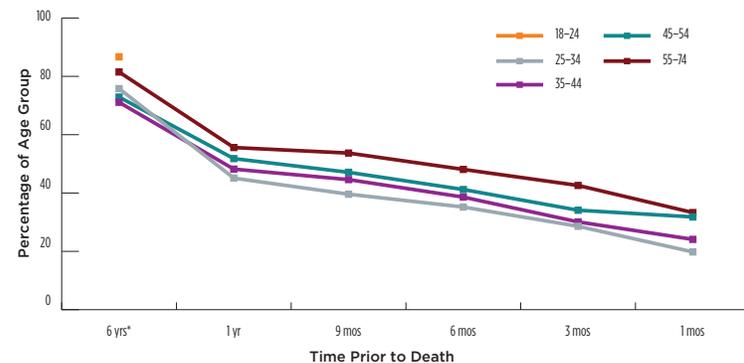
Controlled substance prescriptions in the PMP in the year prior to death varied by marital status. More than half of married (66.7%) and divorced (55.1%) drug overdose decedents had controlled substance prescriptions in the year prior to death, compared to drug overdose decedents who were never married (40.2%) (Figure 48).

FIGURE 44. Percentage of drug overdose decedents with a prescription in the Prescription Monitoring Program in the time prior to death by sex, Delaware, 2017



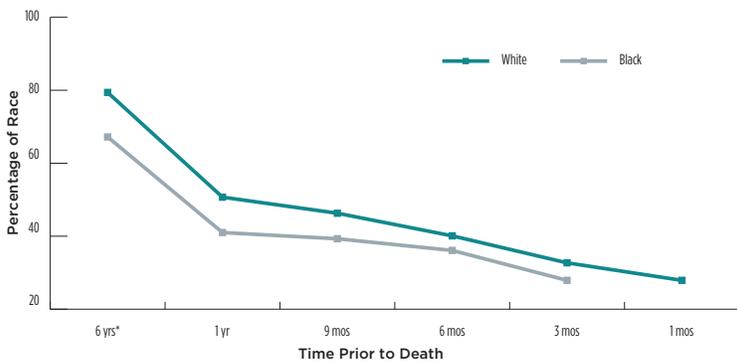
*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware. *Includes a prescription in the PMP with a dispensation date between 2011 and the date of death.*

FIGURE 45. Percentage of drug overdose decedents with a prescription in the Prescription Monitoring Program in the time prior to death by age group, Delaware, 2017



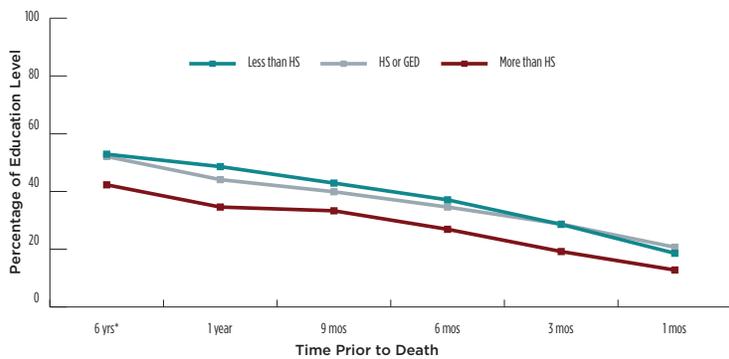
*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware. *Includes a prescription in the PMP with a dispensation date between 2011 and the date of death.*

FIGURE 46. Percentage of drug overdose decedents with a prescription in the Prescription Monitoring Program in the time prior to death by race, Delaware, 2017



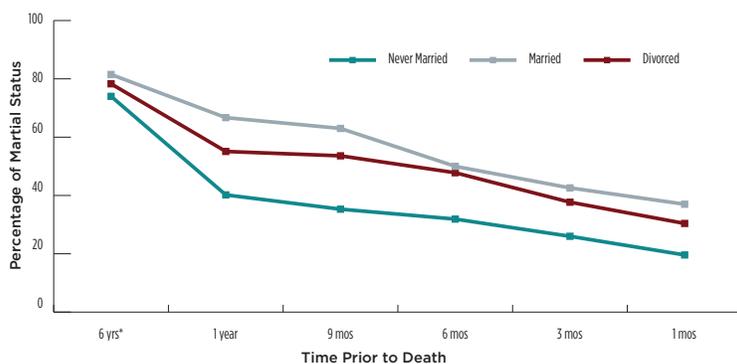
*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware. *Includes a prescription in the PMP with a dispensation date between 2011 and the date of death.*

FIGURE 47. Percentage of drug overdose decedents with a prescription in the Prescription Monitoring Program in the time prior to death by educational attainment, Delaware, 2017



*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware. *Includes a prescription in the PMP with a dispensation date between 2011 and the date of death.*

FIGURE 48. Percentage of drug overdose decedents with a prescription in the Prescription Monitoring Program in the time prior to death by marital status, Delaware, 2017



*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware. *Includes a prescription in the PMP with a dispensation date between 2011 and the date of death.*

Prescription categories and specific drugs

Prescriptions in the PMP were categorized into drug classes including opioids, partial opioids, benzodiazepines, and stimulants. Prescription opioids are a class of drugs that are commonly used to relieve pain (e.g., oxycodone, hydrocodone, codeine, morphine, etc.). Nearly one in four Delaware drug overdose decedents (23.6%) had a prescription for an opioid in the PMP in the year prior to their death (Figure 49). Partial opioids such as buprenorphine and tramadol are opioids that are used to treat not only pain but also opioid use disorder. Only opioid treatment programs (OTP) certified by the Substance Abuse and Mental Health Services Administration (SAMHSA) dispense medications used to treat OUD or opioid addiction. In the year prior to death, 6.1% and 5.5% of drug overdose decedents had a prescription for a partial opioid or more specifically, buprenorphine, respectively.

Benzodiazepines are prescription sedatives used to treat seizures, anxiety, or insomnia (diazepam, alprazolam, etc.). Among drug overdose decedents, just over 20% had a prescription for a benzodiazepine in the PMP in the year prior to death. A disproportionately higher percentage of females than males who died of a drug overdose had a prescription for a benzodiazepine in the PMP. Of the drug overdose decedents with controlled substance prescriptions in the PMP, a larger percentage of females (60%) than males (38.5%)

FIGURE 49. Percentage of drug overdose decedents with prescriptions in PMP by drug class in the year prior to death, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware.

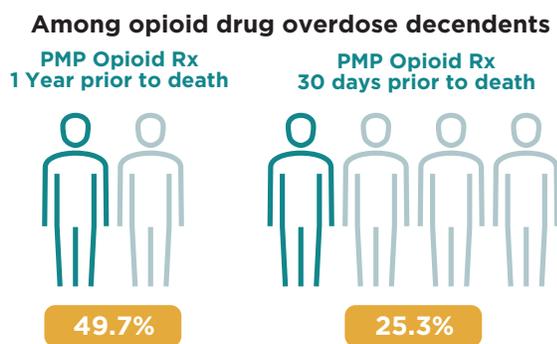
had a prescription for a benzodiazepine in the year prior to death.

Prescription stimulants, drugs that are typically used to treat attention-deficit hyperactivity disorder such as dextroamphetamine, methylphenidate, were also found in the PMP among a smaller percentage of drug overdose decedents (4.7%).

One in two decedents (49.7%) who died of an opioid drug overdose also had a prescription for an opioid in the PMP in the year prior to death. Although the percentage of opioid drug overdose decedents with an opioid prescription in the PMP decreased close to the time of death, one in five decedents (25.3%) who died of an opioid drug overdose had a prescription for an opioid in the PMP in the month that preceded their deaths (Figure 50).

Guidelines released in 2016 by the Centers for Disease Control and Prevention (CDC) recommend against concurrently prescribing opioids with benzodiazepines. Forty-three drug overdose decedents (12.5%) has at least one prescription of each an opioid and a benzodiazepine in the year prior to death, although prescriptions may not be

FIGURE 50. Percentage of opioid drug overdose decedents with an opioid prescription in the PMP, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware.

FIGURE 51. Percentage of drug overdose decedents with a prescription for benzodiazepine and an opioid in the year prior to death, Delaware, 2017

Prescriptions for benzodiazepine and an opioid in the year prior to death



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of State, Division of Professional Regulations, Prescription Monitoring Program. Includes any prescription class II-V controlled substance in the State of Delaware.

overlapping. A larger percentage of female drug overdose decedents (21.4% at one year prior to death) than male drug overdose decedents (8.2% at one year prior to death) had prescriptions for a benzodiazepine and an opioid in the PMP across all time periods prior to their deaths. Among drug overdose decedents who had prescriptions for both a benzodiazepine and an opioid, a slightly larger percentage of decedents aged 55 to 74 years (18.5%) had prescriptions for a benzodiazepine and an opioid in the PMP in the year prior to death compared to other age groups. There were no concurrent prescriptions for benzodiazepines and opioids among drug overdose decedents aged 18 to 24 years (Figure 51).

Prescribers and pharmacies

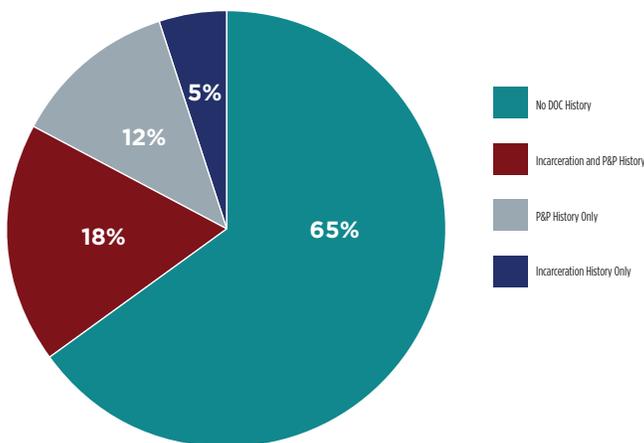
There were 57 drug overdose decedents (16.7%) with more than three prescribers in the PMP one year prior to death. A larger percentage of females (22.3%) compared to males (13.9%) had more than three prescribers for controlled substances in the PMP in the year prior to death. Of drug overdose decedents, 26 (7.6%) had more than four pharmacies listed in the year prior to death, a finding that was more pronounced among female drug overdose decedents (12.5%) than male drug overdose decedents (5.2%).

Department of Correction

The DOC provides an unified correctional system that falls under the jurisdiction of the State. There are five levels of supervision for offenders ranging from Level I, administrative supervision, to Level V, 24-hour incarceration (jail or prison). For this report, DOC provided data from 2012 to 2017 on on incarceration and probation and parole on drug overdose decedents. For this analysis, a DOC history was defined as a drug overdose decedent in the DOC system with a record of ncarceration or probation and parole. The remainder of this section provides the results of the analyses using DOC data.

More than half of drug overdose decedents (53.1%) had any known prior interaction with DOC documented in their systems. Of the 343 drug overdose decedents, 142 (41.4%) were incarcerated and 154 (44.9%) had been on probation and parole. A smaller percentage of drug overdose decedents (35%) had an interaction with DOC in the year prior to death. Nearly one out of every five drug overdose decedents (18%) had a history of both

FIGURE 52. Percentage of drug overdose decedent with Department of Correction (DOC) interactions in the year prior to death, Delaware, 2017

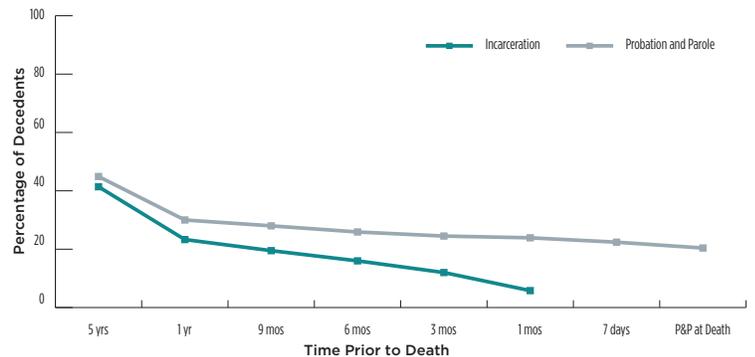


Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: 'P&P' is defined as Probation and Parole.

incarceration and probation and parole (Figure 52). The majority of drug overdose decedents who interacted with the DOC in the year prior to death were male (75%).

Figure 53 presents the percentage of drug overdose decedents who interacted with DOC at specific times prior to their deaths by interaction type. The percentage of drug overdose decedents interacting with the DOC in the year prior to death decreased closer to death. Nearly one in three drug overdose decedents (30.0%) were released from probation and parole one year prior to death and one in five drug overdose decedents (23.3%) were released from incarceration in the year prior to death. Furthermore, one in five drug overdose decedents (20.4%) were on probation and parole at the time of their deaths (Figure 53).

FIGURE 53. Percentage of drug overdose decedents with Department of Correction interactions in the time prior to death by type of interaction, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Notes: 'P&P' is defined as Probation and Parole. Percentages were suppressed for counts of less than 10 in the numerator.

Incarceration

Nearly half of male drug overdose decedents (45%) and one third of female drug overdose decedents (33.9%) were incarcerated and released in the five years prior to their deaths. A larger percentage of males (26%) than females (17.9%), and a larger percentage of those in younger age groups, were incarcerated and released in the year prior to their deaths (46.7% of 18- to 24-year-olds, 27.7% of 25-34 year olds) (Figures 54 and 55).

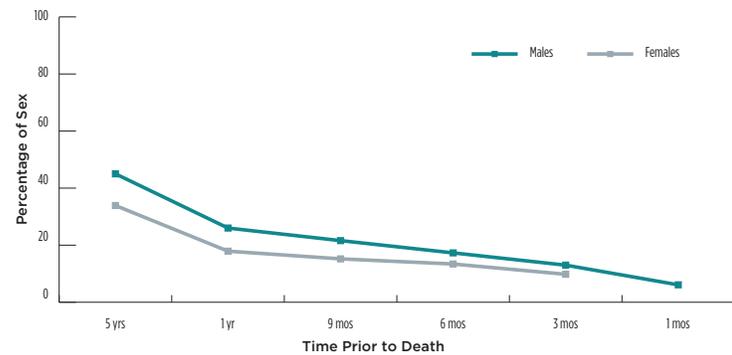
A larger percentage of black drug overdose decedents (29.5%) than white drug overdose decedents (22.1%) were incarcerated and released in the year prior to their deaths (Figure 56).

More than half (58.6%) of the 70 drug overdose decedents with less than a high school diploma were incarcerated and released within the five years that preceded death. Within a year prior to death, 28.6% of drug overdose decedents with less than a high school diploma and 28.6% of drug overdose decedents with a high school diploma or GED were incarcerated and released. Only 11.5% of drug overdose decedents with more than high school diploma were incarcerated and released within one year of their deaths (Figure 57).

Marital status varied slightly among those released from incarceration and died within a year of release. A larger percentage of drug overdose decedents were never married (27.5%) and died within a year of release from incarceration, compared to those who were either married (18.5%) or divorced (17.4%) (Figure 58).

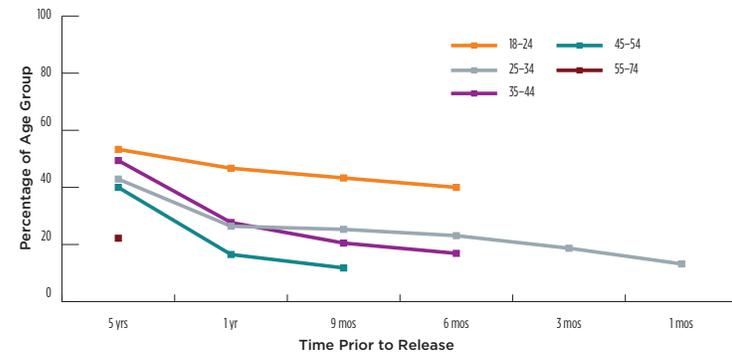
One in four opioid drug overdose decedents (25%) were released from incarceration one year prior to death. More than 40% of opioid decedents were released from incarceration during the five years preceding death.

FIGURE 54. Percentage of drug overdose decedents who were incarcerated in the time prior to death by sex, Delaware, 2017



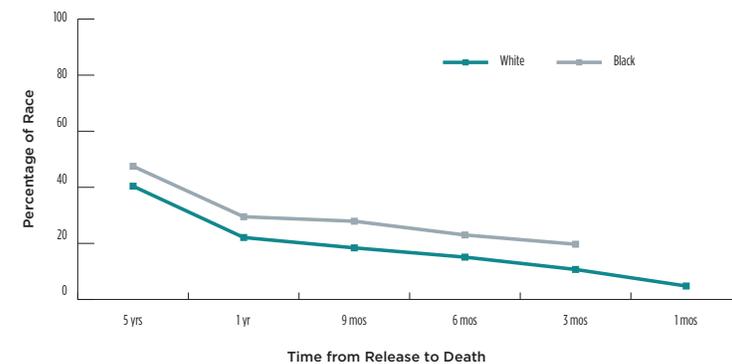
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 55. Percentage of drug overdose decedents who were incarcerated in the time prior to death by age group, Delaware, 2017



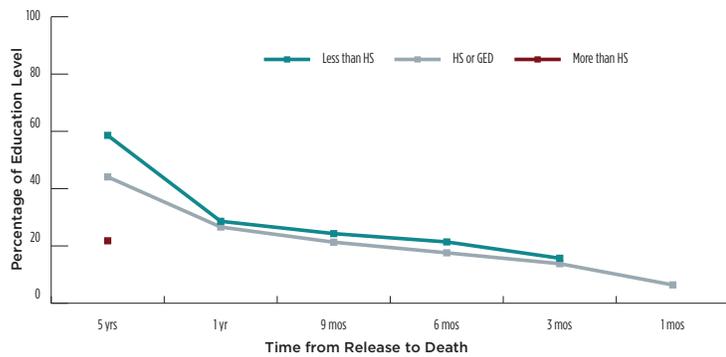
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 56. Percentage of drug overdose decedents who were incarcerated in the time prior to death by race, Delaware, 2017



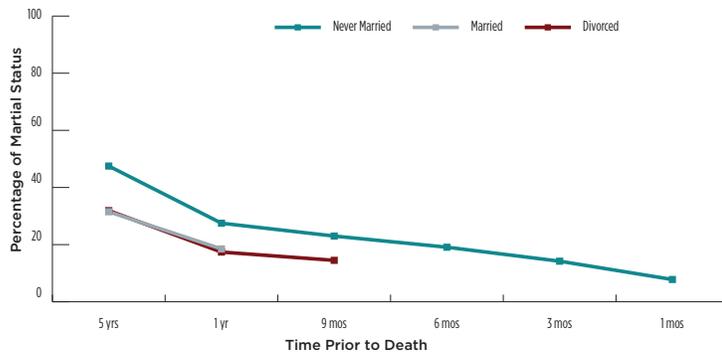
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 57. Percentage of drug overdose decedents who were incarcerated in the time prior to death by educational attainment, Delaware, 2017



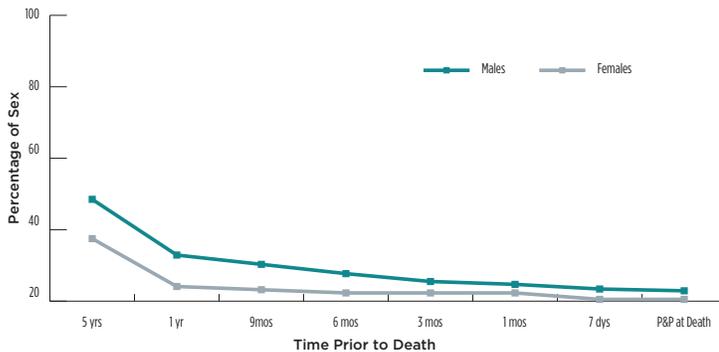
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 58. Percentage of drug overdose decedents who were incarcerated in the time prior to death by marital status, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 59. Percentage of drug overdose decedents who were on probation and parole in the time prior to death by sex, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: 'P&P- Death' is defined as decedents who were on probation and parole at the time of death.

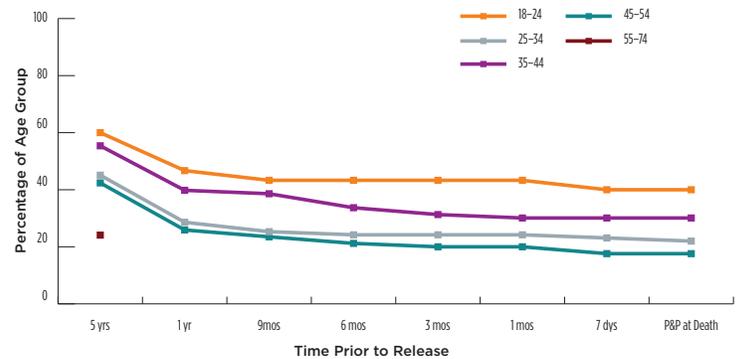
Probation and Parole

One hundred three drug overdose decedents (30%) were on probation and parole in the year that preceded their deaths, and 76 (22.2%) decedents were on probation and parole at the time of death. Figures 59 to 63 depict the percentage of drug overdose decedents within specific demographic groups (i.e., sex, age, race, education, and marital status) who were on probation and parole in the time prior to their deaths, as well as at their time of death. It is important to note that there is little change in the overall percentage of drug overdose decedents who were on probation and parole as time neared their date of death.

Similar percentages of male and female drug overdose decedents, 22.9% and 20.5% respectively, were on probation and parole at the time of death (Figure 59).

A larger percentage of drug overdose decedents in the 18 to 24 and 35 to 44 year age groups were on probation and parole at the time of death (40% and 30.1%, respectively) (Figure 60).

FIGURE 60. Percentage of drug overdose decedents who were on probation and parole in the time prior to death by age group, Delaware, 2017

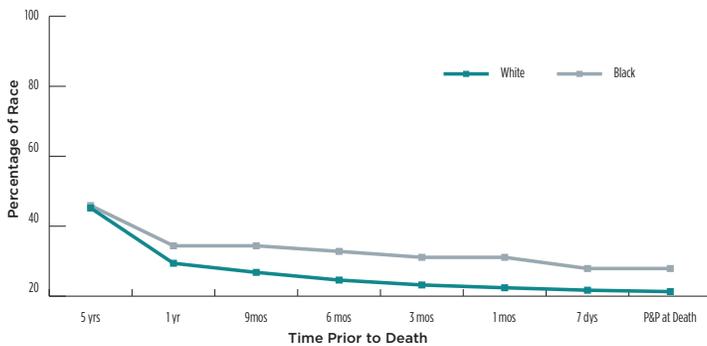


Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: 'P&P- Death' is defined as decedents who were on probation and parole at the time of death. Percentages were suppressed for counts of less than 10 in the numerator.

One in five drug overdose decedents were on probation and parole at the time of their deaths; 27.9% of black drug overdose decedents and 21.3% of white drug overdose decedents (Figure 61).

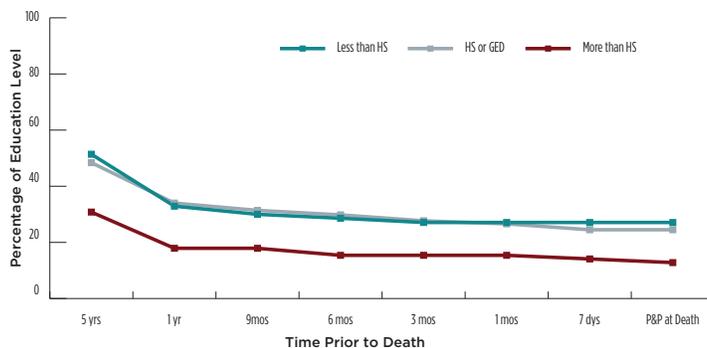
Drug overdose decedents with less than a college education had the highest percentage of decedents within those educational levels to be on probation and parole at the time of death (less than high school: 27.1%, high school diploma or GED: 24.5%) compared to drug overdose decedents with more than a high school education (Figure 62).

FIGURE 61. Percentage of drug overdose decedents who were on probation and parole in the time prior to death by race, Delaware, 2017



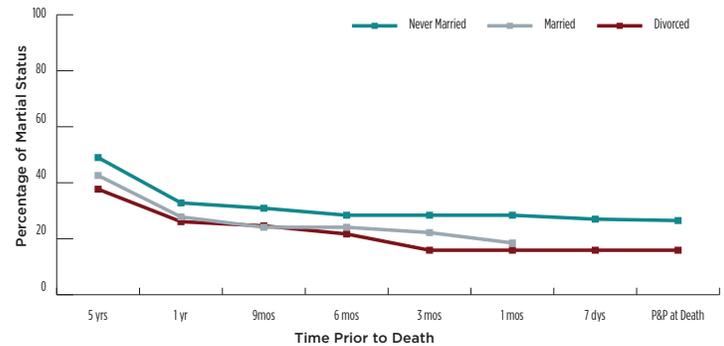
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: 'P&P- Death' is defined as decedents who were on probation and parole at the time of death.

FIGURE 62. Percentage of drug overdose decedents who were on probation and parole in the time prior to death by educational attainment, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: 'P&P- Death' is defined as decedents who were on probation and parole at the time of death.

FIGURE 63. Percentage of drug overdose decedents who were on probation and parole in the time prior to death by marital status, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Notes: 'P&P- Death' is defined as decedents who were on probation and parole at the time of death. Percentages were suppressed for counts of less than 10 in the numerator.

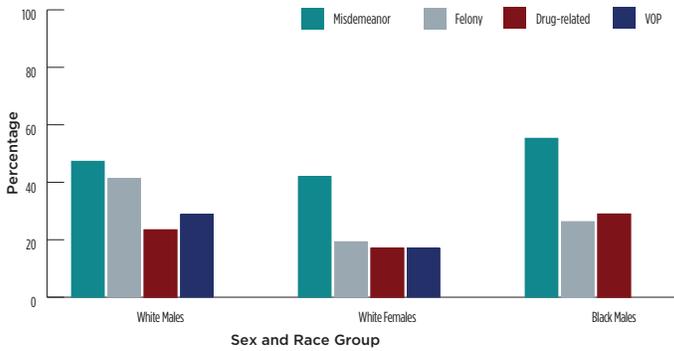
A larger percentage of drug overdose decedents who were never married (28.4%) were on probation in the month prior to their deaths as compared to 18.5% of married and 15.9% of divorced drug overdose decedents (Figure 63).

Offenses

The DOC provided prior known criminal offense data that were available in their systems. The following figures represent any prior history of known criminal offenses that occurred prior to death. Criminal offenses were categorized as either misdemeanor or felony. Misdemeanors included, for example: criminal trespass, resisting arrest, shoplifting, menacing, endangering the welfare of a child, terroristic threatening, possession of drug paraphernalia, offensive touching, civil contempt, drug-related loitering, disorderly conduct, criminal impersonation, and others. Felonies included, for example: driving under the influence (DUI), failure to register or register sex offender address, burglary, theft, conspiracy (1st and 2nd), strangulation, aggravated menacing, robbery (1st and 2nd), theft of motor vehicle, assault (1st and 2nd), drug dealing, and others. Drug-related offenses and violation of parole were also included as separate categories of criminal offenses in the analysis of DOC data.

Nearly half of the 343 drug overdose decedents (45.8%) had a prior record of a misdemeanor, 32.7% had a record of a felony, 25.4% violated parole, and 20.4% had drug-related offenses (Figure 64).

FIGURE 65. Percentage of drug overdose decedents by any prior offenses, sex, and race, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Notes: 'VOP' is defined as Violation of Parole. Percentages were suppressed for counts of less than 10 in the numerator.

Misdemeanors account for the largest percentage of offenses within sex and age groups, especially among black male drug overdose decedents (55.3%). Approximately one in four black male drug overdose decedents (28.9%) and white male drug overdose decedents (23.4%) had a drug-related offense. However, among drug overdose decedents, the percentage of white males with felony offenses (41.3%) was higher than among black males (26.3%) (Figure 65).

Within age groups, the largest percentage of drug overdose decedents by offense type were misdemeanors followed by felonies, violation of parole, except among 55- to 74-year-olds, and drug-related offenses. More than half of 19- to 24- and 35- to 44-year-old decedents had at least one misdemeanor offense, 56.7% and 53.0%, respectively (Figure 66).

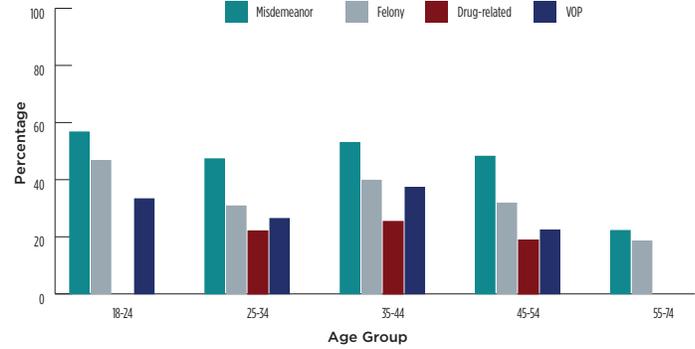
A large percentage of drug overdose decedents with less than a high school education (62.9%) had misdemeanors. Drug-related offenses were more common in drug overdose decedents with

FIGURE 64. Number and percentage of drug overdose decedents by prior criminal offenses, Delaware, 2017

Criminal Offenses			
Misdemeanor	Felony	Violation of Parole	Drug-related
157 45.8%	112 32.7%	87 25.4%	70 20.4%

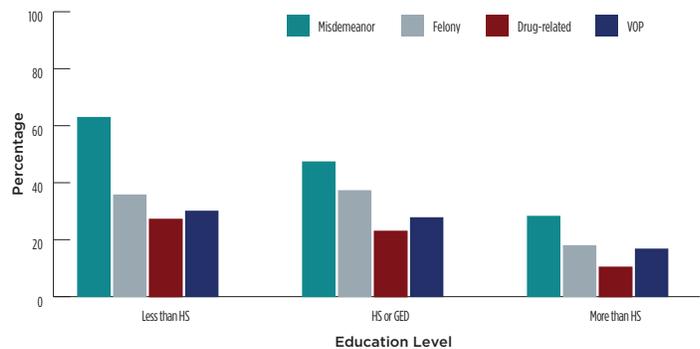
Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction.

FIGURE 66. Percentage of drug overdose decedents by any prior offenses and age group, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Notes: 'VOP' is defined as Violation of Parole. Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 67. Percentage of drug overdose decedents by any prior offenses and educational attainment, Delaware, 2017

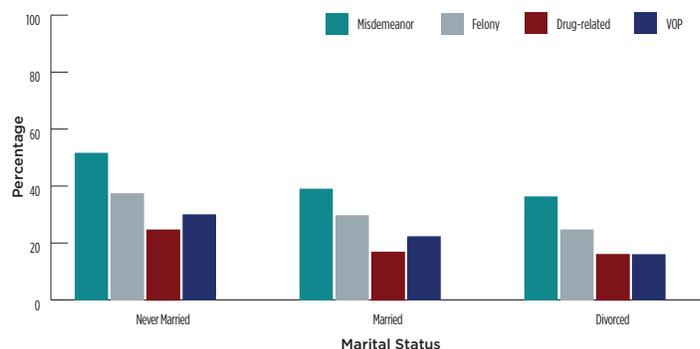


Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: 'VOP' is defined as Violation of Parole.

less than a college degree (less than high school: 30.0%; high school diploma or GED: 27.7%; more than high school: 16.7%) (Figure 67).

Half of drug overdose decedents who were never married had a misdemeanor and 29.9% violated parole.

FIGURE 68. Percentage of drug overdose decedents by any prior offenses and marital status, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center and Delaware Department of Correction. Note: 'VOP' is defined as Violation of Parole.

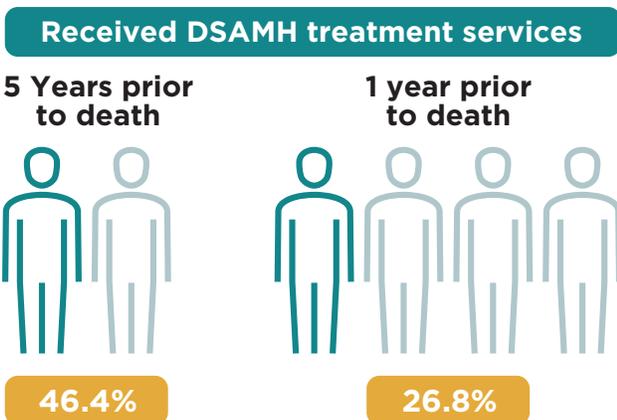
Division of Substance Abuse and Mental Health

DSAMH, a division within DHSS, provides public drug and alcohol treatment services to adults through contracts and private agencies. DSAMH provides a wide range of services, which include, but are not limited to outpatient counseling, opioid treatment, short- and long-term residential services, and case management for adult offenders with alcohol and/or drug abuse conditions involved in the court system.

DSAMH searched historical records of the 343 drug overdose decedents, which was used to create a category indicating “ever” and represented historical information that was available more than five years preceding death. Of the 288 opioid drug overdose decedents, there were 166 opioid overdose decedents (57.6%) who were documented as “ever” receiving DSAMH services. Of the decedents who died of an opioid overdose, 121 (42.0%) had opiate use documented by DSAMH.

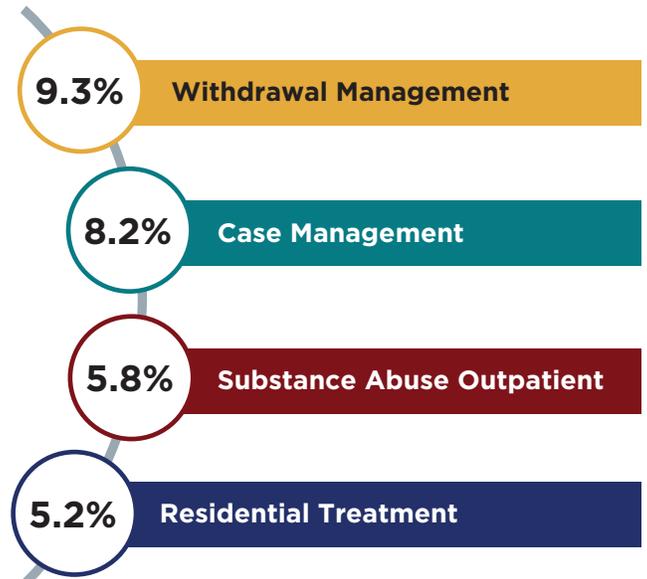
One in two drug overdose decedents (46.4%) had a history of treatment services through DSAMH (48.1% of male and 42.1% of female drug overdose decedents) in the five years prior to death. Within the year prior to death, one in four drug overdose decedents (26.8%) received DSAMH services (Figure 69). Approximately 10% of decedents were receiving services from DSAMH at their time of death.

FIGURE 69. Percentage of drug overdose decedents and utilization of DSAMH services, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health and Division of Substance Abuse and Mental Health

FIGURE 70. Percentage of drug overdose decedents by Division of Substance Abuse and Mental Health services used in the year prior to death, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health and Division of Substance Abuse and Mental Health.

Drug overdose decedents interacted with DSAMH utilizing different services provided by the agency. Of the 343 drug overdose decedents, 9.3% were engaged in withdrawal management, 8.2% used case management services, 5.8% used substance abuse outpatient services, 5.2% were receiving residential treatment (Figure 70).

Of the 343 drug overdose decedents, 14.3% were seen for OUD, 7.3% were seen for substance use disorder, and 5.2% were seen for a mental health condition at DSAMH in the year prior to their deaths.

The following graphs depict the percentage of drug overdose decedents within specific demographic groups (i.e., sex, age, education, and marital status; race was not presented as a result of suppression from small numbers) who received DSAMH treatment services in the time prior to their deaths, including at the time of death.

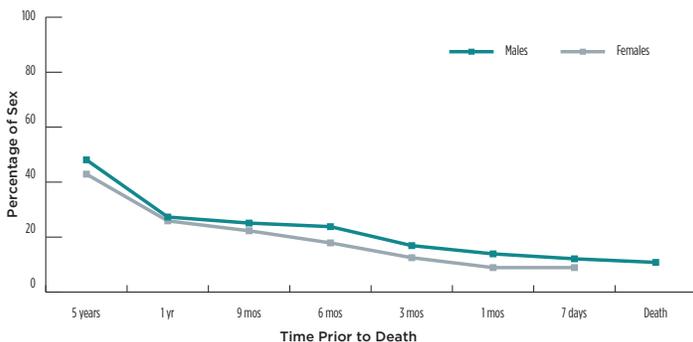
A slightly higher percentage of male drug overdose decedents used DSAMH services across all time periods that preceded death than female drug overdose decedents. Approximately 14% of male and 8.9% of female drug overdose decedents were receiving DSAMH services in the month preceding their deaths (Figure 71).

Utilization of DSAMH by drug overdose decedents within age groups varied during the time preceding death. Most notably, a larger percentage of drug overdose decedents aged 19 to 24 years and 35 to 44 years utilized services in the year prior to death, 43.3% and 36.1%, respectively (Figure 72).

Drug overdose decedents with more than a high school education interacted with DSAMH services at a noticeably smaller percentage than those decedents with a high school education or less from the time of death to five years prior to death. There was a noticeable decrease in utilization of DSAMH services from five years prior to death to one year prior to death (42% decrease among those with a high school education or GED between five years and one year prior to death) (Figure 73).

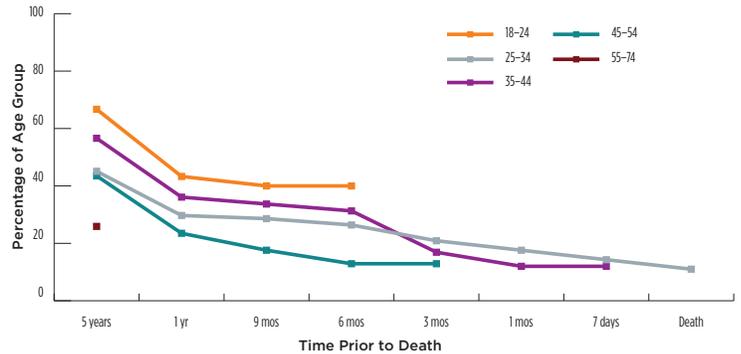
In the five years prior to death, similar percentages of drug overdose decedents who were either married (37%) or divorced (37.7%) utilized DSAMH services compared to a larger percentage of drug overdose decedents who were never married (52.9%). Overall, a larger percentage of drug overdose decedents who had never been married utilized DSAMH services in the year prior to death (33.3%) and 13.2% were using services at the time of death (Figure 74).

FIGURE 71. Percentage of drug overdose decedents by Division of Substance Abuse and Mental Health treatment service utilization and sex, Delaware, 2017



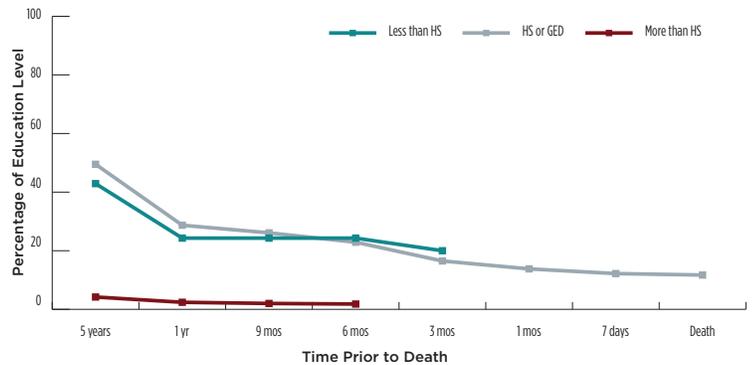
Data source: Delaware Department of Health and Social Services, Division of Public Health and Division of Substance Abuse and Mental Health. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 72. Percentage of drug overdose decedents by Division of Substance Abuse and Mental Health treatment service utilization and age group, Delaware, 2017



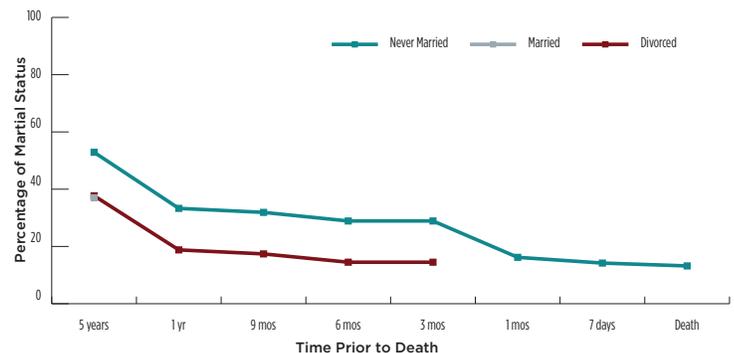
Data source: Delaware Department of Health and Social Services, Division of Public Health and Division of Substance Abuse and Mental Health. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 73. Percentage of drug overdose decedents by Division of Substance Abuse and Mental Health treatment service utilization and educational attainment, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health and Division of Substance Abuse and Mental Health. Note: Percentages were suppressed for counts of less than 10 in the numerator.

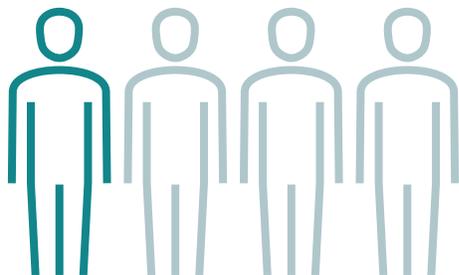
FIGURE 74. Percentage of drug overdose decedents by Division of Substance Abuse and Mental Health treatment service utilization and marital status, Delaware, 2017



Data source: Delaware Department of Health and Social Services, Division of Public Health and Division of Substance Abuse and Mental Health. Note: Percentages were suppressed for counts of less than 10 in the numerator.

FIGURE 75. Percentage of drug overdose decedents who received DSAMH services with a history of homelessness, Delaware, 2017

History of homelessness



25.3%

*Data source: Delaware Department of Health and Social Services, Division of Public Health and Division of Substance Abuse and Mental Health. *Homelessness was defined only for those who received DSAMH services and reflected homelessness at the time of discharge or at the time of death if still active in the program.*

Homelessness

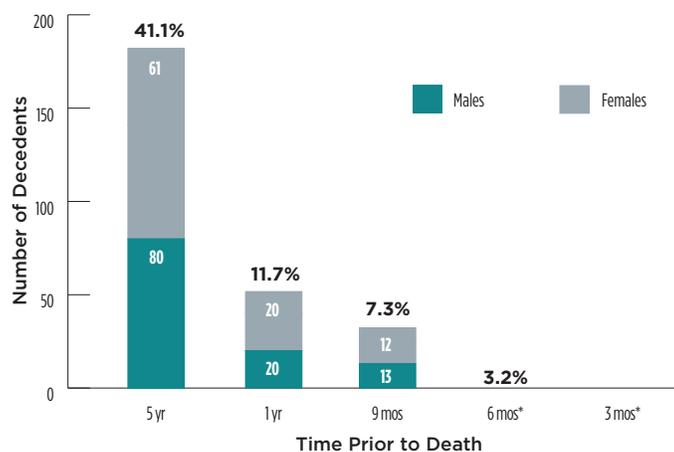
DSAMH captures homelessness in their treatment facility records. For the drug overdose decedents included in this report, DSAMH provided a homelessness indicator that represented the decedents' homelessness status at the time of discharge from DSAMH services or reflected that the decedent was still active in a program at the time of death (n=48). One in four drug overdose decedents with a DSAMH history (25.3%) had a documented history of homelessness at any DSAMH visit. Of the 48 drug overdose decedents with a homeless history, 83.3% interacted with a Delaware health system in the year prior to death and 83.3% were opioid-related deaths. The drug overdose decedents who were identified as homeless by DSAMH were similar to the drug overdose decedent population with regards to the distribution of sociodemographic characteristics. Additionally, among drug overdose decedents with a homelessness history, 60.4% (n=29) had a past or present Hepatitis C infection compared to 28.3% (n=97) of the drug overdose decedent population.

Hospitalizations

Hospitalization or hospital discharge data are available from the DHSC and refer to any discharge from a non-federal, short-stay, acute-care hospital in Delaware. Delaware hospital discharge data are based upon inpatient hospitalizations and do not include outpatient, clinic, or emergency room data. The data presented represents discharges from the following hospitals and systems: A. I. duPont Hospital for Children, St. Francis Hospital, Christiana Care Health System (consists of Wilmington Hospital and Christiana Care), Bayhealth Medical Center (consists of Kent General Hospital and Milford Memorial Hospital), Beebe Medical Center, and Nanticoke Memorial Hospital. Hospitalization data of drug overdose decedents were analyzed to better understand the utilization of hospital services, specifically inpatient hospitalization, prior to death.

From 2012 to 2017, 41.1% of drug overdose decedents had at least one hospitalization. Within one year of death, a history of a hospitalization was documented for 11.7% of drug overdose decedents; 8.2% of drug overdose decedents had only one hospitalization in the year prior to death (Figure 76). Of drug overdose decedents who were hospitalized in the year prior to death, 80% had the Centers for Medicare and Medicaid Services as the payer.

FIGURE 76. Number and percentage of drug overdose decedents with an inpatient hospitalization in the time prior to death, Delaware, 2017



*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *Percentages and counts were suppressed for counts of less than 10 in the numerator.*

The *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9CM)* and the *International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10CM)* diagnosis codes were used to specify the broad disease categories for hospitalizations of drug overdose decedents prior to death. The percentage of drug overdose decedents by diagnosis category for hospitalization is presented in [Table 2](#) using the top 10 diagnostic categories. Drug overdose decedents were seen for other diagnostic categories at a smaller percentage. Of note, nearly 10%

TABLE 2. Percentage of drug overdose decedents by hospital discharge diagnosis category in the year prior to death, Delaware, 2017

Percentage of decedents	Diagnostic category*
9.3%	Mental, Behavioral and Neurodevelopmental disorders
8.7%	Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism
7.6%	Factors influencing health status and contact with health services
7.3%	Diseases of the circulatory system
5.2%	Diseases of the respiratory system
5.0%	Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified
4.7%	Diseases of the digestive system
4.4%	Diseases of the nervous system, eye, adnexa, ear and mastoid process
3.5%	Diseases of the skin and subcutaneous tissue
3.2%	Diseases of the genitourinary system

*Data source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center. *Disease category was defined using International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9CM) and the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10CM) diagnosis codes.*

of decedents were hospitalized with a diagnosis of a mental, behavioral, and neurodevelopmental disorders in the year prior to their deaths.

Medicaid eligibility and claims

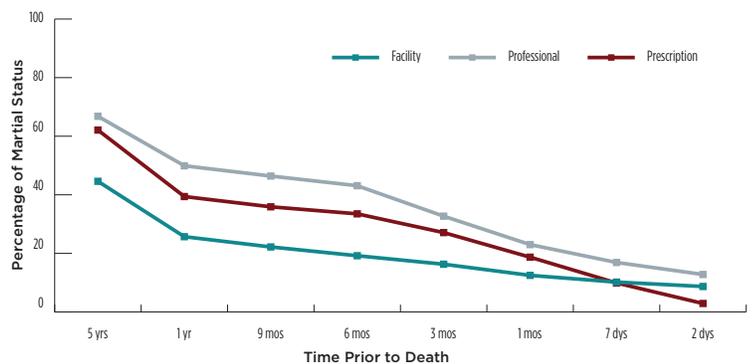
Medicaid is the State of Delaware program that provides medical assistance to eligible people of low income and who are blind and/or have disabilities via a variety of health care services. Data regarding monthly eligibility of Medicaid

and claims specific to health care facility, professional visits, and prescriptions were available for the analysis.

Of the 343 drug overdose decedents, 208 (60.6%) were eligible for Medicaid for at least one month in the year prior to death; 126 (36.7%) were male and 82 (23.9%) were female. Trends in eligibility in the months leading up to death remained stable across different sociodemographic stratifications. Population characteristics of the Medicaid-eligible drug overdose decedent population were similar to the overall drug overdose decedent population when comparing age, race, ethnicity, marital status, and education level. A key difference between the Medicaid-eligible drug overdose decedent population and the overall drug overdose decedent population was that females were represented to a greater extent than males; 73.2% of female drug overdose decedents were Medicaid eligible compared to 54.5% of male drug overdose decedents.

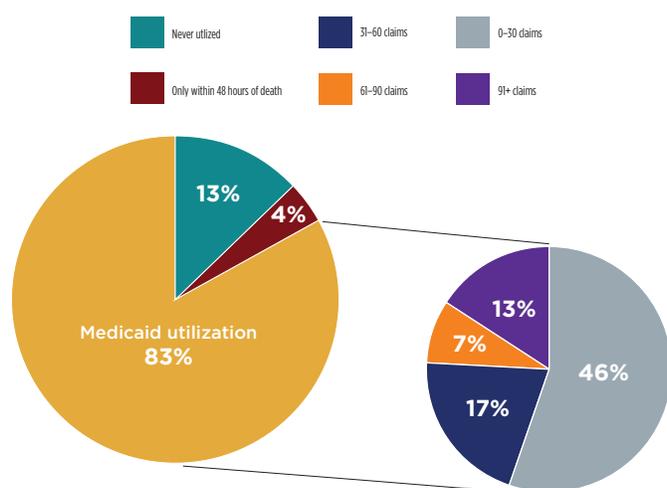
Documented eligibility of Medicaid in and of itself does not necessarily provide the opportunity to interact and provide essential healthcare services; however, Medicaid claims data provide further insight into the healthcare utilization. Among the 343 drug overdose decedents, 49.9%

FIGURE 77. Percentage of drug overdose decedents with Medicaid claims in the time prior to death by claim type, Delaware, 2017



Data source: Delaware Health and Social Services, Division of Public Health, Health Statistics Center and the Division of Medicaid and Medical Assistance.

FIGURE 78. Percentage of drug overdose decedents by Medicaid utilization and number of claims, Delaware, 2017



Data source: Delaware Health and Social Services, Division of Public Health, Health Statistics Center and the Division of Medicaid and Medical Assistance. Note: Prescription claims not included.

had professional Medicaid claims, 39.4% had prescription claims, and 25.7% had facility claims within the year prior to death (Figure 77).

Of the drug overdose decedents who were eligible for Medicaid, 13% never utilized any facility or professional services, and 172 (83%) had Medicaid claims for non-death related visits. One in two Medicaid eligible drug overdose decedents (45.7%) had less than 31 claims and 50 (24.0%) had between 31 and 90 claims (Figure 78).

The *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9CM)* and the *International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10CM)* diagnosis codes were used to specify the broad disease categories for Medicaid claims of drug overdose decedents prior to death. The percentage of drug overdose decedents' diagnoses from Medicaid claims for males and females are presented in Tables 3 and 4, respectively. A large percentage of both male (73.8%) and female (76.8%) drug overdose decedents with Medicaid claims had diagnoses for mental, behavioral, and neurodevelopmental disorders.

TABLE 3. Percentage of Medicaid eligible male drug overdose decedents with Medicaid claims in the year prior to death by diagnostic category, Delaware, 2017

Percentage	Diagnostic category*
73.8%	Mental, behavioral and neurodevelopmental disorders
69.0%	Symptoms, signs and abnormal clinical and laboratory findings
62.7%	Injury, poisoning and certain other consequences of external causes, external causes of morbidity
53.2%	Diseases of musculoskeletal system and connective tissue
49.2%	Factors influencing health status and contact with health services
47.6%	Diseases of the respiratory system
45.2%	Diseases of the nervous system, eye, adnexa, ear and mastoid process
45.2%	Diseases of the circulatory system
37.3%	Diseases of the skin and subcutaneous tissue
36.5%	Diseases of the digestive system
26.2%	Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism
22.2%	Certain infectious and parasitic diseases
21.4%	Diseases of the genitourinary system
12.7%	Neoplasms
*	Congenital malformations, deformations, and chromosomal abnormalities

Data source: Delaware Health and Social Services, Division of Public Health, Health Statistics Center and the Division of Medicaid and Medical Assistance. *Percentages were suppressed for counts of less than 10 in the numerator. Disease category was defined using *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9CM)* and the *International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10CM)* diagnosis codes.

TABLE 4. Percentage of Medicaid eligible female drug overdose decedents with Medicaid claims in the year prior to death by diagnostic category, Delaware, 2017

Percentage	Diagnostic category*
76.8%	Mental, behavioral, and neurodevelopmental disorders
73.2%	Symptoms, signs, and abnormal clinical and laboratory findings
64.6%	Factors influencing health status and contact with health services
63.4%	Injury, poisoning, and certain other consequences of external causes, external causes of morbidity
62.2%	Diseases of musculoskeletal system and connective tissue
52.4%	Diseases of the nervous system, eye, adnexa, ear and mastoid process
48.8%	Diseases of the respiratory system
47.6%	Diseases of the genitourinary system
45.1%	Diseases of the digestive system
43.9%	Diseases of the skin and subcutaneous tissue
42.7%	Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism
41.5%	Diseases of the circulatory system
26.8%	Certain infectious and parasitic diseases
18.3%	Neoplasms
14.6%	Pregnancy, childbirth, and the puerperium
*	Congenital malformations, deformations, and chromosomal abnormalities
0.0%	Certain conditions originating in the perinatal period

Data source: Delaware Health and Social Services, Division of Public Health, Health Statistics Center and the Division of Medicaid and Medical Assistance. *Percentages were suppressed for counts of less than 10 in the numerator. Disease category was defined using *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9CM)* and the *International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10CM)* diagnosis codes.

WHO IS NOT INTERACTING WITH DELAWARE SYSTEMS

When persons with SUD interact with health systems, these interactions provide opportunities to engage them in services that can help address their addiction. It is just as important, if not more so, to understand the people who have no documented interactions. As described earlier in this report, Delaware health system interaction by a drug overdose decedent was defined as: a visit to a Delaware emergency department (ED), an Emergency Medical Services (EMS) encounter (e.g., EMS responds to a 9-1-1 call via ambulance to a residence where a patient is in cardiac arrest, provides emergency medical care, and transports the patient to an emergency department), a prescription in the Prescription Monitoring Program (PMP), treatment or services administered by a Division of Substance Abuse and Mental Health (DSAMH) contracted site, or discharge from a Delaware hospital.

Sixty-seven (19.5%) of Delawareans who died of drug overdoses did not interact with any Delaware systems in the year leading up to their fatal overdose. Drug overdose decedents who did not interact with Delaware systems had relatively similar sociodemographic characteristics to interacting decedents; however, some differences were noted. There was a larger percentage of males (no interaction: 73.1%; interactions: 65.9%) and those who were older than 35 years of age (no interaction: 73.1%; interactions: 62.7%).

A smaller percentage of drug overdose decedents who had no interaction with Delaware health systems (17.9%) had a past or present Hepatitis C infection compared to drug overdose decedents who interacted with Delaware health systems (30.8%). In particular, a larger percentage of drug overdose deaths were attributed to synthetic opioids (no interaction: 67.6%; interactions: 56.9%), heroin (no interaction: 42.0%; interactions: 28.4%), and semi-synthetic opioids (no interaction: 21.7%; interactions: 14.9%).

SUMMARY

Summary information is presented about the decedents' sociodemographic characteristics (i.e., sex, age, race, education, marital status, and occupation), their interactions with Delaware health systems, and the timing of their interactions with Delaware health systems prior to their deaths.

The results of the descriptive epidemiologic study serve as a foundation for understanding drug overdose mortality trends across time and within key demographic characteristics of Delaware drug overdose decedents. The findings describe Delawareans who died of a drug overdose in 2017 and their interactions and the timing of their interactions with Delaware health systems. Drug overdose decedents who were not Delaware residents primarily only interacted with EMS and EDs at their time of death. The findings also describe the sociodemographic characteristics of decedents who did not interact with Delaware health systems.

Delaware drug overdose decedents were primarily males who were between the ages of 25 and 54 years, white, never married, and had a high school diploma or GED. Construction industry jobs among males (36%) and females who are primarily not employed (33%) are key occupational and employment indicators. Infectious diseases, such as Hepatitis C, play a role in the drug epidemic; 28.3% of drug overdose decedents had a past or present Hepatitis C infection. Homelessness was also a concern among drug overdose decedents; however, this was only identified in the analysis of the DSAMH treatment service data where

homelessness is captured at the time of discharge. A more thorough understanding and analysis of homelessness among drug overdose decedents could provide additional insight risk factors and potential reachable moments in this population. Opioids accounted for the majority of drug overdose deaths (84%). More specifically, synthetic opioids such as fentanyl were responsible for the highest mortality rates among opioid drug overdose deaths (age-adjusted rate: 21.9 deaths per 100,000 population).

The key message is that drug overdose decedents interacted with Delaware health systems in the year prior to death. In fact, eight out of every ten drug overdose decedents (80.5%) interacted with a Delaware health system within one year prior to death (not including the death event); 34% interacted with at least three different health systems. Furthermore, nearly half of all drug overdose decedents (48.4%) interacted with a Delaware health system within the month preceding their deaths.

In the year prior to death, half of decedents had an ED visit. Half of drug overdose decedents had a prescription in the PMP for a controlled substance; and two out of five drug overdose decedents had an encounter with EMS. One out of four received mental health services through DSAMH. One in 10 drug overdose decedents were hospitalized.

Expanded analyses included DOC interactions and Medicaid eligibility and claims. One out of three decedents had an interaction with the DOC in the year prior to their deaths. Three out of five decedents (60.1%) were eligible for Medicaid. Of those who were Medicaid eligible, 73.8% of male and 76.8% of female drug overdose decedents had at least one Medicaid claim for a mental, behavioral, and/or neurodevelopmental disorder in the year prior to their deaths.

Emergency department visits: One in two drug overdose decedents (54.2%) visited an ED in the year prior to death. It is important to note that not all visits in the year prior to death were necessarily related to the decedents' drug use. Ten percent of decedents had a previous drug overdose ED visit in the year prior to their death. Twenty-three percent of drug overdose decedents had mental health related diagnoses within the year prior to their deaths, which was similar between males (22.9%) and females (23.3%).

Emergency Medical Services: Less than half of decedents (43.1%) had a history of an EMS encounter related to the death event, in the year prior to death. Of the drug overdose decedents, 6.7% had an EMS encounter for a non-fatal drug overdose. Of those decedents with a non-fatal overdose recognized during an EMS encounter, 39.1% had naloxone administered.

Prescription Monitoring Program: Among drug overdose decedents, 164 (47.8%) had a prescription in the PMP within a year prior to death. Nearly one in four Delaware drug overdose decedents (23.6%) had a prescription for an opioid in the PMP in the year prior to their death. Forty-three drug overdose decedents (12.5%) had at least one prescription of each an opioid and a benzodiazepine in the year prior to death, although prescriptions may have not been overlapping.

Department of Correction: One in four opioid drug overdose decedents (25%) were released from incarceration one year prior to death. More than 40% of opioid decedents were released from incarceration during the five years preceding death. There were 103 drug overdose decedents (30%) who were on probation and parole in the year that preceded their deaths; 76 (22.2%) of decedents were on probation and parole at the time of death.

Division of Substance Abuse and Mental Health: Within the year prior to death, one in four decedents (26.8%) received DSAMH services. Approximately 10% of decedents were receiving services from DSAMH at the time of death. Of the decedents who received services at DSAMH, 25.3% had a history of homelessness.

Hospitalizations: Approximately 12% of drug overdose decedents were hospitalized in the year prior to their deaths. Nearly 10% of decedents were hospitalized with a diagnosis of a mental, behavioral, or neurodevelopmental disorder.

ADDRESSING THE

HEALTH CRISIS

Delaware has been working intensely over the past few years to restructure and redefine the approach to addressing substance use disorder across the state. These efforts are far-reaching and cross into multiple sectors of government and the community. Addressing the drug crisis is a statewide effort. On May 9, 2019, DPH Director Dr. Karyl Rattay testified on Delaware's response to the opioid epidemic to the United States House Committee on Oversight and Government Reform.¹¹

Her testimony succinctly describes the efforts underway in Delaware to combat the epidemic and is contained, in part, herewithin.

Collectively, states, territories, and local health departments recognize the opioid crisis as a public health emergency. As with any emergency, the response must be with resources necessary to sustain a full continuum of care. Maximizing limited resources ensures that the State of Delaware, its contractors, and its partners are able to deploy proven prevention, treatment, harm-reduction, and recovery services as well as coordinate efforts and collect the data needed to track the epidemic.

Delaware is addressing the drug crisis through various components of a comprehensive and multipronged approach including: (1) prevention; (2) treatment; (3) harm reduction; (4) criminal justice; and (5) epidemiology, data, and surveillance.

Prevention

Preventing the misuse of, and addiction to, opioids and other substances is the best way to end the opioid epidemic. It's crucial that statewide efforts look "upstream" and intervene in areas that will support prevention efforts. This includes a continued focus on safer prescribing of opioids and other controlled substances, better management of pain, and safe disposal of unused medications. The Delaware Department of State, in collaboration with DPH, implemented opioid prescribing regulations for acute and chronic use, is using PMP data to target outlier prescribers, and integrated the PMP with Electronic Health Records (EHRs) systems. Delaware implemented a robust education and awareness initiative for a variety of prescribers, including surgeons and dentists, and provided them with support materials like sample screening templates to aid in their daily practice needs, and patient education materials for direct distribution to patients. Furthermore, Delaware is providing in-office academic detailing for prescribers. The focus has been on implementing a comprehensive approach to increasing education about, and access to, evidence-based alternative approaches to pain management, including legislation to require that insurers lift the caps for coverage of physical therapy and chiropractic care.

To fully address this epidemic, as well as substance abuse and misuse disorders as a whole, it is necessary to address the exposures during the life course that can lead to addiction, such as toxic stress in infants and adverse childhood experiences. Continued efforts should be bolstered to work with schools and school-age children,

build resilient communities, and increase investments in programs that work to address the social determinants of health. Delaware's early childhood home visiting continuum of services is a great example of proven programs that prevent childhood trauma. First Chance Delaware is an initiative that is advancing the recognition of and effective response to adverse childhood experiences.

Treatment

It is crucial for federal and state governments, working with local partners, to continue expanding access to evidence-based treatment. Perhaps the greatest challenges to ending this epidemic are the substantial barriers that people must overcome to access the services they need to manage their addiction and reclaim their lives. Delaware has worked tirelessly to increase treatment capacity over the past decade, increasing the number of people receiving OUD treatment by 500 percent from 1,000 in 2006, to 5,000 in 2017.⁶

DSAMH launched its Substance Use Treatment and Recovery Transformation initiative (START) in 2018. START is designed to increase access to care and treatment for individuals living with OUD and other SUDs by fostering a system-wide, improvement-based framework that measures client outcomes. Through the START Initiative, DSAMH seeks to transform the full continuum of care for SUD, including engaging primary care providers (PCPs). START uses certified recovery peers connected to EDs, primary care, urgent care, EMS, police officers, and families as the gateway to treatment. Recovery peers assist individuals suffering from SUD as they navigate their way through both the treatment and social services systems, helping meet not only their treatment needs, but also their social needs: housing, transportation, employment, social services, legal or financial counseling, and other behavioral health or medical care. START builds on the best evidence-based treatment and wrap-around services needed for long-term recovery, while offering technical support to community providers to evaluate for quality and standards. These efforts were aided by the federal State Targeted Response

(STR) to the State Opioid Response (SOR) grant, and the Substance Abuse Treatment Block grants that Delaware received from SAMHSA.

Delaware also launched a new online treatment referral system called Delaware Treatment and Referral Network (DTRN) that allows Delaware health care providers seeking SUD treatment or mental health services for their patients to make digital referrals in real time. Since its launch in September 2018, over 4,000 referrals have been made in DTRN, reducing the time needed to identify open appointments, walk-in availability, and in-patient treatment capacity.

Over the past decade, Delaware has continuously worked to increase its OUD treatment capacity, including withdrawal management, outpatient treatment, residential treatment, and sober living facilities. Recently DSAMH marked the opening of its first integrated treatment home in Delaware, a new 30-bed home for men recovering from SUD. The home is open to adult men transitioning from management withdrawal or from residential treatment, but who still need the support of clinical treatment in their recovery. The home provides transitional housing, vocational and educational training, and social services case management. It recently launched a construction apprenticeship program to help those in recovery identify meaningful career paths. DSAMH also established a 20-bed home for women and a home for women and their children, and effort aided by the federal SOR grant.

Delaware's Medicaid program within the Division of Medicaid and Medical Assistance (DMMA) has played a key role in the response to the opioid crisis. Expanding Medicaid has been critical to allow individuals to access treatment, and the expansion has allowed the State to free up treatment dollars to increase treatment capacity and include wrap-around services. Buprenorphine and naloxone have been available without prior authorization since July 1, 2018. At the same time, the co-payment was removed for naloxone prescriptions. Medicaid also began paying for certified recovery peer services in 2015.

Additionally, DMMA coverage policy has continued to be more restrictive for long-acting opioid agents and the higher-potency products. Limiting initial amounts and dosage are other strategies used to combat the epidemic. Over the past few months and looking toward the remainder of 2019, Delaware's Medicaid program is focused on putting controls in place for benzodiazepine therapies, which have a very high rate of addiction and dependency; and, in combination with opioids, are often fatal.

Prioritizing treatment among those who are justice-involved is another critical piece to ending this epidemic. Untreated substance use in prison settings is a significant predictor of overdose death upon release. Based on the information in this report, among those who died of drug overdoses in 2017, 53% had some previous history of involvement with the DOC. Our colleagues in Rhode Island experienced a reduction of more than 60% in opioid overdose deaths among those who were recently incarcerated after Medication-Assisted Treatment (MAT) was offered. Following this model, Delaware is implementing all forms of MAT treatment across our Correctional system. This effort includes continuing MAT for those receiving MAT prior to incarceration and ensuring that, upon their release, inmates are connected to long-term care in the community. Delaware has also worked to prevent individuals with OUD from becoming justice-involved through our drug court pathway, and with financial assistance through the federal Drug Court Expansion & Enhancement Project (DCT-AD).

Buprenorphine is another proven, effective treatment for OUD and is an essential tool in the fight to end the opioid epidemic. Removing federal restrictions on prescribing buprenorphine will ultimately save lives and eliminate unnecessary barriers that prevent people with OUD from having access to treatment. The DATA 2000 regulatory framework

was implemented prior to the current wave of opioid addiction and our understanding of the potential role of—and appropriate prescribing practices for—buprenorphine has grown substantially, even since the 2016 amendments to DATA 2000. For example, we have learned that buprenorphine, even in the absence of comprehensive services, is highly effective in preventing morbidity and mortality associated with OUD. Furthermore, the number of buprenorphine-associated deaths is dwarfed by those related to full agonist opioids.

Harm Reduction

Naloxone saves lives and gives people a second chance to receive medical care and get connected to resources to treat their addiction. In 2018, first responders in Delaware administered 3,728 doses of naloxone, compared to 2,861 in 2017, a 30% increase.¹² Delaware's goal is for every first responder in the state to carry naloxone, from law enforcement, to campus security, from firefighters to ambulance crews. Several pieces of legislation were signed in Delaware to allow first responders to provide the medication. In 2018, Governor Carney signed legislation to protect firefighters, park rangers, ambulance drivers, campus security, lifeguards, and other emergency personnel to carry and administer naloxone. Federal funding through the SAMHSA First Responder Grant allowed the State to provide naloxone to law enforcement agencies. Now in combination with dedicated state funding at our fingertips, Delaware significantly increased distribution and saturation of this life-saving medication among first responder agencies statewide.

Syringe Services Programs (SSP) are another critical harm reduction component to addressing this crisis. These evidence-based programs prevent the spread of bloodborne infections like HIV and hepatitis, but they also are a valuable touch point to engage individuals into treatment. As a result of legislation and increased state funding, Delaware expanded its SSP statewide. Over 1,000 people were successfully referred into OUD treatment through this program.

Criminal Justice

Law enforcement officers are on the front lines of addressing this nationwide crisis. In Delaware, our law enforcement and criminal justice partners are implementing innovative approaches and are collaborating with one another and with public health and our substance abuse treatment agency in many ways. The Delaware State Police requires a Criminal Investigative Unit detective to respond to, and investigate, fatal drug overdoses and requires a Drug Unit detective to initiate an investigation into the source of the drugs. A recent example of this occurred when troopers in the Sussex County Drug Unit and the Governor's Task Force followed up on a fatal overdose investigation involving a common stamp associated with three deaths. The substance was determined to be 93% fentanyl, with no other drug compound identified. Within a few days, the Drug Unit traced the origin of the packages and arrested two drug dealers.

Delaware's largest county, New Castle County, implemented a diversion program called HERO HELP. A significant component of the HERO HELP program is the staff's outreach and engagement into treatment utilizing actionable, real-time overdose data provided by their Crime Analysis Unit. The program consists of a HERO HELP Coordinator, a registered nurse who specializes in SUD treatment, and a uniformed New Castle County police officer. This three-person team follows up non-fatal overdoses with the goal of getting the individual into treatment. The HERO HELP Program was the first police initiative recognized in Delaware as a community-based naloxone program. HERO HELP provides training to individuals who have overdosed on the proper administration and storage of naloxone, and provide them with naloxone that is free of charge. This training occurs in the individual's home and includes family members.

Epidemiology, Data, and Surveillance

It is critical that the State of Delaware has the best information possible to respond to the SUD epidemic. DPH conducts routine surveillance of the SUD epidemic to measure and track changes over time. Surveillance efforts focus on measurement of social determinants, risk and protective factors, morbidity, and mortality across the life course. Early detection and monitoring of changes in the distribution and determinants of SUD as well as the ability to support alerting mechanisms and trigger points for rapid response to patient and population-level needs are key priorities of SUD surveillance activities. Reduction in substance abuse, non-fatal drug overdoses, and overdose deaths are primary outcomes used to measure the changing landscape of the drug epidemic. Furthermore, surveillance is a foundational objective in DHSS's SUD strategy and provides guidelines and standards to enable the State to describe the distribution and determinants of the epidemic and affected populations. It provides data to drive action. As a result of a statewide, coordinated, and collaborative surveillance system, timely, high-quality actionable data can be used to make evidence-based, data-informed decisions about the interventions, programs, and policies designed to reduce SUD and drug overdose deaths in Delaware.

The analysis of data and interpretation of results in the context of existing knowledge and evidence have influenced the state's prioritization and the monitoring of implementation efforts. Using data from this report and continued surveillance of key factors and measures to track and monitor mental health and SUD in Delaware will be critical to quantifying the effectiveness and impact of these efforts.

CONCLUSION

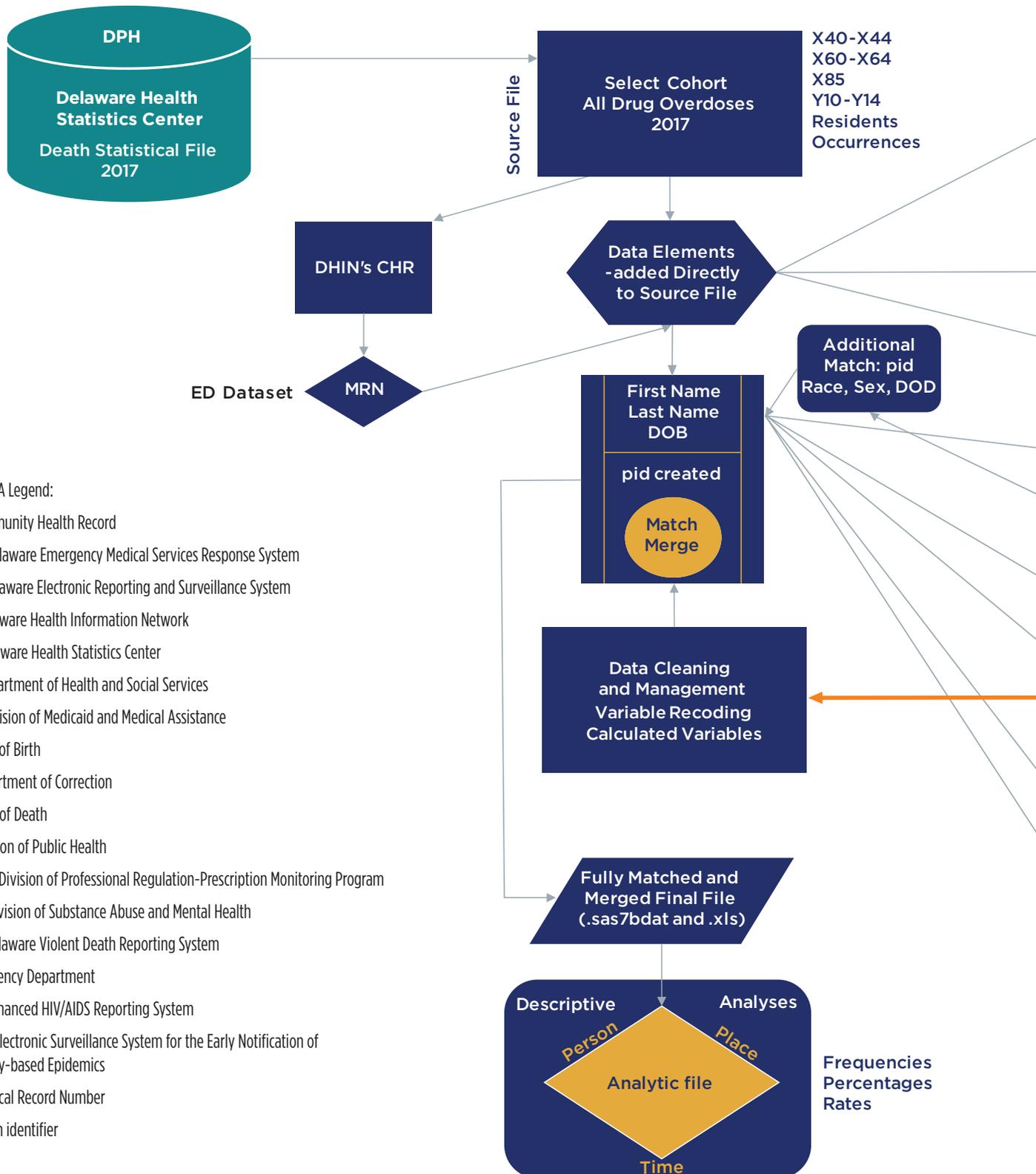
The cost of addiction is measured not only in terms of human lives lost but also in terms of the emotional impact on friends and families. The opioid crisis and substance misuse will not be solved by an individual agency or a single state. This report provides Delaware with the first in-depth exploration of Delawareans lost to the drug epidemic. Through the integration of multiple state agency datasets, we now have a better understanding of those who died of a drug overdose and their interactions with Delaware health systems during the time that preceded their deaths. We can use this knowledge to support a comprehensive, coordinated, data-driven, and sustainable approach.

The information in this report also supports efforts to identify reachable moments, and channels through which to attempt to engage those struggling with SUD. Based on the findings of this report, the areas in which DHSS and Delaware's many partners have chosen to focus efforts on over the past couple of years are the right ones and additional insight into new opportunities can be considered. This report serves as a benchmark and foundation for the State to refer back to as it continues to give those struggling with SUD hope for the future.

REFERENCES

1. Walker, KO, Rattay K. A vision for the SUD Treatment System in Delaware. Delaware Journal of Public Health. Aug 2017; 3(4):16-17.
2. Del. Legis. Assembly. HB-440. 149th General Assembly (2017 - 2018).
3. Delaware Health Statistics Center. Drug overdose mortality in Delaware-2010. Delaware Department of Health and Social Services, Division of Public Health. February 2013.
4. Delaware Division of Forensic Science. 2018 Annual Report. May 2019. Available at <https://forensics.delaware.gov/contentFolder/pdfs/2018%20DFS%20Annual%20Report.pdf>
5. National Institute on Drug Abuse. Opioid summaries by state. Opioids prescriptions, 2017. Available at <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state>.
6. Delaware Department of Justice. Prescription opioid and heroin addiction treatment needs assessment. August 2017.
7. Hussaini, SK. Neonatal abstinence syndrome: Delaware, 2010-2017. Research Brief. Delaware Department of Health and Social Services, Division of Public Health. Published June 2019.
8. Johns Hopkins Bloomberg School Public Health and the Bloomberg American Health Initiative. A blueprint for transforming opioid use disorder treatment in Delaware. Submitted to the Delaware Department of Health and Social Services. July 2018. Available at <https://dhss.delaware.gov/dhss/files/johnshopkinsrep.pdf>.
9. Centers for Disease Control and Prevention. Opioid overdose, Understanding the basics. <https://www.cdc.gov/drugoverdose/epidemic/index.html>. Last updated December 19, 2018.
10. Centers for Disease Control and Prevention. National Notifiable Disease Surveillance System. Hepatitis C, Past or Present, 2012 Case Definition. Available at <https://www.cdc.gov/nndss/conditions/hepatitis-c-chronic/case-definition/2012/>.
11. Rattay, K. United States House Committee on Oversight and Government Reform. "The Trump Administration's Response to the Drug Crisis, Part II". May 9, 2019. Available at <https://docs.house.gov/meetings/GO/GO00/20190509/109435/HHRG-116-GO00-Wstate-ThomasRattay-MDMSK-20190509.pdf>.
12. Delaware Department of Health and Social Services, Division of Public Health, Emergency Medical Services.

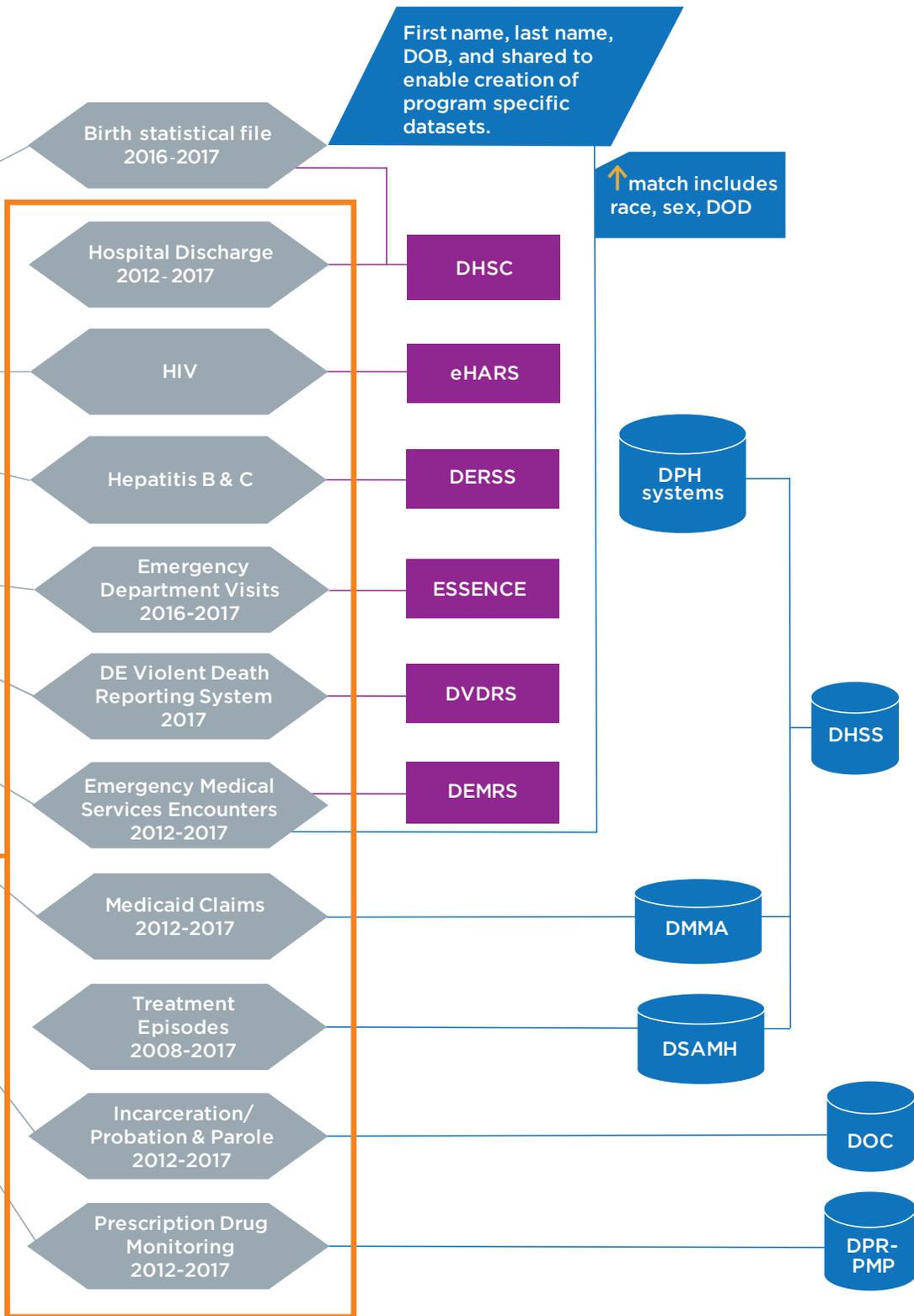
APPENDIX A



Appendix A Legend:

- CHR: Community Health Record
- DEMRS: Delaware Emergency Medical Services Response System
- DERSS: Delaware Electronic Reporting and Surveillance System
- DHIN: Delaware Health Information Network
- DHSC: Delaware Health Statistics Center
- DHSS: Department of Health and Social Services
- DMMA: Division of Medicaid and Medical Assistance
- DOB: Date of Birth
- DOC: Department of Correction
- DOD: Date of Death
- DPH: Division of Public Health
- DPR-PMP: Division of Professional Regulation-Prescription Monitoring Program
- DSAMH: Division of Substance Abuse and Mental Health
- DVDRS: Delaware Violent Death Reporting System
- ED: Emergency Department
- eHARS: Enhanced HIV/AIDS Reporting System
- ESSENCE: Electronic Surveillance System for the Early Notification of Community-based Epidemics
- MRN: Medical Record Number
- pid: person identifier

2017 DRUG OVERDOSE MORTALITY SURVEILLANCE REPORT DATA FLOW DESCRIPTION





DELAWARE HEALTH AND SOCIAL SERVICES

Division of Public Health