

# TENNESSEE'S ANNUAL OVERDOSE REPORT 2021

*Report on Epidemiologic Data,  
Efforts, and Collaborations to  
Address the Overdose Epidemic*



Department of  
**Health**

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**Produced by**  
**The Office of Informatics & Analytics**  
**Tennessee Department of Health**

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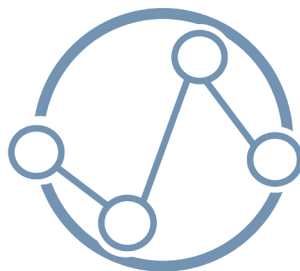
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Office of Informatics  
& Analytics

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# Who Are We?

## About the Office of Informatics and Analytics

Since its inception in 2016, the Office of Informatics and Analytics (OIA) has worked steadily to build a robust data infrastructure that guides best practices for data sharing, interoperability, analysis, and reporting for the Tennessee Department of Health (TDH). OIA consists of three units that work on specific aspects of the data lifecycle: Data Governance, Core Informatics, and Advanced Analytics and Visualization.

**Data Governance** leads the development of TDH's data governance strategy, including data collection, sharing, release, and oversight. The Data Governance unit confers with scientists, statisticians, and legal counsel to set standards for processes that assess and approve data releases. They work to balance the need to provide good data to advance public health with requirements designed to protect the privacy of the individuals whom the data represent. Data Governance runs the TDH Institutional Research Board (IRB) and Data Release Committees (DRC) which serve as the approval bodies for much of the data that are released from TDH. The unit also runs the TDH Data Request System which allows internal and external requesters to initiate the process of receiving data and routes requests to the IRB, DRC, or the appropriate data steward at TDH.

**Core Informatics** serves a number of roles in developing and maintaining best practices and standards for public health reporting and interoperability. This work includes participation in the development of national and international health data standards, consultation and endorsement for TDH data, reporting, and interoperability activities, and development of electronic case reporting methods. Core Informatics established and maintains TDH's Drug Overdose Reporting System and the TDH Trading Partner Registry. The Informatics unit is also responsible for the development and architecture of the Integrated Data System (IDS), which brings data from across the department into a single unified system. The IDS is being designed to support various divisions across TDH to provide a definitive source for linked data that has been rigorously checked and validated.

**Advanced Analytics and Visualization (AAV)** has created a robust data and analytic infrastructure for several projects and programs that support the TDH, including analytics focusing on drug overdose and prescription use and abuse in Tennessee. AAV has expertise in producing timely, reliable, and high-quality analyses and data visualizations. The unit has also developed expertise on the translation and dissemination of data to broad audiences, including the creation of infographics that have been used across content areas to capture the impact of health conditions. OIA AAV values innovation and data agility—whether for enhanced data analytics and creating dynamic visualizations, or for exploring newly emerging techniques in the fields of data science and biostatistics.

**The creation of this report was led by the Advanced Analytics and Visualization unit, with support from Data Governance and Core Informatics.**

*A letter*

# FROM THE DIRECTOR

Dear Reader,

Unprecedented times call for unprecedented action. We have an important opportunity to turn the lessons we've learned from the COVID-19 pandemic into a data-driven and data savvy enterprise at the Tennessee Department of Health (TDH). A collective effort to accomplish this buttresses the TDH mission-- to protect, promote and improve the health and prosperity of people in Tennessee--and the Office of Informatics and Analytics (OIA) is committed to leading and supporting our colleagues in this effort.

Redesigned in 2019 to promote a more nimble and innovative approach to our work, OIA's mission and vision rebranding laid the groundwork for new ways of approaching a data savvy public health enterprise.

*Our vision: To be a trusted leader in providing data-driven solutions for public health practice in Tennessee.*

*Our mission: To develop, use, and promote best practices of informatics, data governance, and analytics that drive insightful public health decision-making for the Tennessee Department of Health and its partners.*

During 2020, we leaned heavily on our new vision and mission, working to equip our leaders with data and information to drive insightful public health decision-making, from supporting COVID-19 response efforts to enhancing data integration and public health surveillance, including public health surveillance of drug overdose.

OIA is TDH's trusted leader in providing data-driven analyses on drug overdoses and controlled substance prescribing trends. This report not only characterizes these trends but hones in on the increasing prevalence of illicit drug overdose due to fentanyl, cocaine, methamphetamine, and synthetic opioids. We also highlight our grant collaborations and our partnerships, without whom our work would not be possible.

One of OIA's five core values is People First. The best way OIA can address TN's drug overdose epidemic is by equipping our TDH leadership, our state and federal agency partners, and our most important stakeholder—you—with the data and information you need to act.

Partners and the public are connecting and using drug overdose data and information to drive and inform programs in and around Tennessee. People are using data and information to target locations for the distribution of naloxone to rural and metropolitan areas combating opioid overdose, scale locations of syringe service programs in the state, and place additional regional overdose prevention specialists in areas with higher overdoses.

We have an important opportunity ahead for 2021 in addressing drug overdose and we at OIA are committed to providing the most reliable and timely data and information that support our colleagues, and our communities, in using data to drive insightful public health decision-making.

**Erin Holt Coyne, MPH | Chief Public Health Informatics Officer & Acting Director OIA**

# OUR MISSION, VISION, AND VALUES

Our vision is to be a trusted leader in providing data-driven solutions for public health practice in Tennessee.

Our mission is to develop, use, and promote best practices of informatics, data governance, and analytics that drive insightful public health decision-making for the Tennessee Department of Health and its partners.



## EXCELLENCE

We strive to deliver innovative services and solutions of the highest quality.



## ONE VOICE

We endeavor to be reliable and cohesive in how we operate and communicate.



## INTEGRITY

We commit to serve with consistency, transparency, and honesty.



## CROSS-SECTOR COLLABORATION

We intend to mindfully leverage synergy, collective knowledge and diversity of stakeholders ideas.



## PEOPLE FIRST

We commit to balance the need for an individual's privacy with opportunities for improvement in public health.

# Executive Summary

Tennessee's overdose epidemic continues to worsen. In 2019, over 2,000 Tennesseans were lost to drug overdose, and overdose deaths involving illicit fentanyl and stimulants increased again for yet another year. The burden of the state's drug overdose epidemic on Tennessee's healthcare resources has also grown with hospitals in the state having reported a higher number of nonfatal drug overdoses than previous years. Though 2020 data are still preliminary, the trend of increasing overdoses through 2019 combined with the exacerbating effects of the COVID-19 pandemic have created what current data suggest will be the state's deadliest year for overdose.

Despite the bleak news, there were some promising signs in 2019 and 2020. Indicators still show the overdose epidemic shifting away from prescription pain relievers. For three years, the number of overdose deaths involving prescription pain relievers has declined. At the same time, Tennessee's prescribers are writing fewer prescriptions for opioids and, perhaps more importantly, fewer high dose opioid prescriptions. Additionally, the number of patients receiving prescriptions for buprenorphine, a common drug used for medication-assisted treatment of opioid use disorder, has increased. The Tennessee Department of Health (TDH) considers the overdose crisis to be one of the most important public health problems facing Tennesseans and is organizing a number of projects to combat overdoses in communities throughout the state

Through state support and federal funding from the Centers for Disease Control and Prevention and the Department of Justice Bureau of Justice Assistance, the Office of Informatics and Analytics (OIA) has been well positioned to support the TDH's comprehensive and multi-faceted data-driven response to the drug overdose epidemic. OIA is an expert in applying rigorous public health surveillance methods and epidemiologic analysis on mortality, morbidity, and prescription data to provide accurate and timely information to TDH leadership, state and federal agency partners, and the public. OIA leads many activities that support overdose data dissemination for a variety of projects and collaborative statewide efforts.

This report is OIA's annual culmination of the work done to identify, calculate, and disseminate overdose and controlled substance prescribing data. The first three sections provide an overview of state trends in fatal overdose, nonfatal overdose, and controlled substance prescribing, respectively. In each section, we highlight some of the surveillance programs and projects led by the Office of Informatics and Analytics to turn these data into action. We also showcase our partnerships with federal agencies, the TDH Opioid Response Coordination Office (ORCO), the Tennessee Department of Mental Health and Substance Abuse Service (TDMHSAS), and others to highlight how we provide overdose data and information to partners who need it most. Finally, we close the report with a preliminary look at the effects of the COVID-19 pandemic on drug overdoses in 2020.

The following pages provide a brief summary of selected epidemiologic data trends from this year's report:

# Executive Summary

**2,089 Tennesseans died of drug overdose in 2019, 15% more deaths than in 2018, a trend that has been driven by illicit fentanyl and stimulants (Drug Overdose Death Trends, page 18).**

- The age-adjusted rate of all drug overdose deaths increased from 22.1 per 100,000 residents in 2015 to of 31.2 per 100,000 residents in 2019 (a 41.2% increase).
- Overdose deaths involving prescription opioids (pain relievers) decreased for the third year in a row from a high of 739 deaths in 2016 to 515 deaths in 2019.
- The rate of fentanyl overdoses increased substantially, from 11.6 per 100,000 residents in 2018 to 16.8 per 100,000 residents in 2019 (a 44.8% increase). For the first year, fentanyl was involved in more than half of fatal drug overdoses.
- Deaths involving stimulants other than cocaine, a category that includes primarily deaths due to methamphetamine, have increased substantially over the past five years (from 112 deaths in 2015 to 651 deaths in 2019).

**The demographics of fatal opioid overdose are changing. Those who die of a drug overdose are more likely to be between the ages of 25-44, more likely to be male, and more likely to be Black than they were in previous years (Drug Overdose Death Trends, page 18).**

- Although there was an increase in opioid deaths among White Tennesseans, there was a much sharper increase among Black Tennesseans from 2018 to 2019 (from a rate of 11.4 per 100,000 to 19.1 per 100,000).
- All age groups showed an increase in opioid overdose deaths in 2019, but the age groups 25-34 and 35-44 years old had the highest rates of deaths.
- Males have had increasing rates of opioid overdose deaths from 2015 to 2019, while females' age-adjusted rates stayed relatively stable during this period.

**Tennessee hospitals saw more overdoses in 2019. In particular, nonfatal heroin and stimulant overdose outpatient visits and inpatient stays increased. (Nonfatal Drug Overdose Trends, page 59).**

- For every drug overdose death in 2019, nearly 12 nonfatal overdose discharges were identified in TN's Statewide Hospital Discharge Data System. Outpatient visits for all drug overdoses increased and ranged from 232.9 per 100,000 in 2016 to 255.5 per 100,000 in 2019.



# Executive Summary

- Though females compared to males had higher age-adjusted rates for all drug overdoses until 2018, males had the highest rate in 2019 as well as the largest increase in age-adjusted rate (205.4 per 100,000 in 2016 to 257.4 per 100,000 in 2019).
- The age-adjusted rate for heroin and stimulant overdose visits more than doubled among Black Tennesseans by 2019. The age-adjusted rates for heroin increased from 9.7 per 100,000 in 2016 to 25.8 per 100,000 in 2019, while the stimulant overdose rates increased from 7.3 per 100,000 in 2016 to 15.3 per 100,000 in 2019.
- The median cost for a nonfatal overdose inpatient stay has gradually increased, from \$4,510.55 in 2016 to \$4,927.29 in 2019. The median cost for an outpatient visit, however, has gradually decreased over the same period, declining from \$875.57 to \$751.25.

## The numbers of opioid prescriptions for pain dispensed in TN continued to decline in 2020 (Prescription Trends, page 111).

- In Q1 2016, 1.96 million prescriptions of opioids for pain were filled (a rate of 295 prescriptions per 1,000 residents). Since this quarter, opioid prescriptions for pain have fallen to 1.26 million filled prescriptions in Q4 2020 (a rate of 184 per 1,000 residents), representing a decrease of 35.7%.
- From 2019 to 2020, the rate of opioid prescriptions for pain decreased in every TN county.
- The total morphine milligram equivalents (MME) dispensed in TN has decreased significantly for a number of years. In Q1 2016, 1.9 billion MME were dispensed. By Q4 2020, the total MME had dropped to 956 million, a 48.6% decrease.

## Indicators of risky opioid prescribing practices have continued to decrease in 2020 (Understanding Opioid Prescription Risk, page 126).

- The percentage of patients who received opioid prescriptions for pain that exceed 90 morphine milligram equivalents per day has declined from 2016 to 2020. In early 2016, 10.3% of all opioid for pain patients received an opioid for pain with a daily MME greater than 90. In late 2019, this decreased to 6.3% of patients who received a prescription of more than 90 daily MME.
- In TN, the rate of Multiple Provider Episodes for opioid prescriptions for pain has continued to decline, from 28.5 per 100,000 residents in the first half of 2016 to just 3.5 per 100,000 residents in the last half of 2020.
- The percentage of patients filling opioid prescriptions for pain who had overlapping benzodiazepine prescriptions (>1 overlapping day) has continued to decrease steadily from a high of 22.3% in early 2015 to 14.1% at the end of 2019.

# Executive Summary

**Patients receiving buprenorphine for medication-assisted treatment (MAT) of opioid use disorder have increased through 2020 (Buprenorphine for MAT Prescription Trends, page 145).**

- Patients filling buprenorphine prescriptions for MAT have steadily increased from 2016 through 2020. In Q1 2016, there were about 30,000 patients filling buprenorphine prescriptions. By Q4 2020, that number had risen to about 43,000 patients, an increase of 42.7%.
- Beginning in late 2019, the percentage of buprenorphine prescriptions paid through Medicaid increased as the share paid with cash decreased. Medicaid has risen from one of the least used payment types for buprenorphine to the third most common.
- The number of patients on long-term buprenorphine maintenance therapy is increasing. From 2016 to 2020, the percent of patients with active buprenorphine prescriptions for 270 days or more in the year increased from 29.6% in 2016 to 42.7% in 2020. At the same time, the percent with active buprenorphine prescriptions for shorter periods of time decreased somewhat.

**Highlights from the OIA Partnerships section (page 158) include:**

- Overviews of the federal grants that support OIA's and our partners work.
- Partnership with TDH's ORCO to identify three areas in the state considered "high-impact" to receive enhanced prevention and treatment programs and services.
- In collaboration with TDMHSAS and TN Together, OIA participated in International Overdose Awareness Day and the ResilienTN social media campaign to educate Tennesseans about overdose prevention and local TN resources.
- OIA has released new tools to help Tennesseans interact with drug overdose data including a new data dashboard, monthly nonfatal opioid overdose briefs, and infographics.

**Preliminary data for 2020 show that overdoses increased to new alarming levels, likely made worse during the COVID-19 pandemic (Impacts of COVID-19, page 182).**

- Suspected overdose rates per 10,000 emergency department (ED) visits involving all drugs, opioids, heroin, and stimulants were highest during April-June, the early months of the pandemic.
- More opioid overdoses were reported during the month of May than any other month in 2020.
- The number of opioid overdoses reported to TDH's Drug Overdose Reporting system increased 22% from 2019 to 2020.
- Fatal overdoses in 2020 are expected to greatly exceed those in 2019. In 2020, provisional estimates of the number of overdose deaths from January to September 2020 had already surpassed the total number for all of 2019.

# Learn about the Data

## Where do drug overdose and prescribing data come from?

To provide a complete picture of TN drug overdoses and related health outcomes for public health surveillance and prevention activities, the Office of Informatics and Analytics (OIA) relies on many diverse sources of data. Fatal overdose information come through the statewide electronic vital records system for inclusion in the state's death statistical file. Nonfatal overdose data currently come from three hospital-based sources: syndromic surveillance, the Drug Overdose Reporting System, and the Hospital Discharge Data System. Prescription data are reported to the Controlled Substance Monitoring Database. Most of these data sources serve administrative purposes and were not initially set up to be used for public health surveillance of drug overdose. The epidemiologists, informaticians, and statistical specialists in OIA ensure that these data, and the analytics produced from them, are available to enable insightful public health decision-making for stakeholders and the public. A key component of OIA's analytics strengths is the Integrated Data System (IDS).

## What is the Integrated Data System (IDS)?

The IDS, established and maintained by OIA, was created to integrate data from the various divisions within the Tennessee Department of Health (TDH) and elsewhere and provide a definitive source which supports analysis and data visualization across the entire department. This system, which was built originally to support work on the prescription drug overdose epidemic, has pivoted to support the overdose epidemic broadly, and is currently being used to support other use cases where consistent data linkage and rapid analytics are needed.

The IDS includes data from the Controlled Substance Monitoring Database (CSMD), the Hospital Discharge Data System (HDDS), Vital Records and Statistics (Vital Records Information System Management, Death Statistical File), the Drug Overdose Reporting System (DOR), the Drug Enforcement Administration registry (DEA), the National Provider Identifier Database (NPI), opioid-related arrest data from TBI's Tennessee Incident Based Reporting System (TIBRS), and TDH's Licensing and Regulatory System (LARS) data. Additional data sets being added include the Emergency Management System (EMS) and Birth Certificate data. The IDS supports the work of epidemiologists and statisticians as well as the TDH Office of General Counsel (OGC). The IDS has allowed TDH to have a persistent source of data to link individual patients across various health data systems. This allows epidemiologists from the department to, for example, understand the relationship of prescribing history (from the CSMD) to clinical outcomes (from HDDS, Vital Statistics, and DOR). In addition, the IDS can be directly accessed to obtain data to conduct on demand surveillance, data analyses, and epidemiologic studies as the need arises.

## What is in the IDS?

The IDS includes two major components: a repository for all source data, and a data warehouse specifically architected to support efficient and intuitive usability. The full data from each source is permanently stored in a database called the Repository. This server also maintains the entity management process for all sources, to provide unique identifiers for de-duplicated entities such as patients and healthcare providers. The Warehouse is designed to support fast analytics. It accomplishes this goal by reducing data elements to the minimum needs of each use case, linking disparate data sources via use of entity management techniques, standardizing definitions of common elements across data sources, and providing well defined data hierarchies where possible.

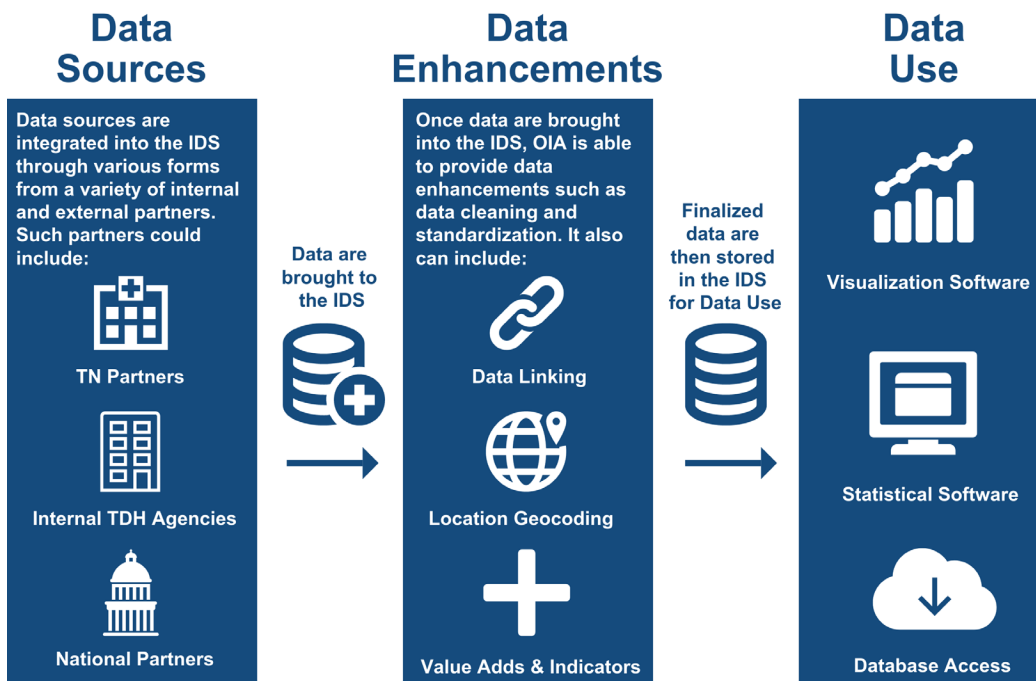
# Learn about the Data

## How does the IDS enhance existing data?

Several additional services process the data for analytics and visualization. SQL Server Integrated Services is used to load data from the original sources into SQL Server. ArcGIS provides geocoding information for relevant addresses. SAS Data Management Studio (also known as DataFlux) provides some of our entity management processing services. Tableau is being used to provide visualization through interactive dashboards. OIA's epidemiologists are able to directly connect to the IDS through their statistical programming software of choice such as R, SAS, or STATA.

One of the primary purposes of the IDS is to calculate new variables that serve as indicators in the overdose epidemic that can be recalculated regularly and automatically as needed. These indicators are used to guide public health policy and resource allocation at the department. They also provide helpful information to TN's stakeholders through public facing products such as this report and the TDH Drug Overdose dashboard. These indicators track drug overdose deaths, overdose-related inpatient and outpatient hospital visits, and a variety of prescription trends (see the **Appendix A** for a detailed list of indicators). Another purpose of the IDS is to automate the analysis of high risk patient and prescriber models that will run regularly as appropriate and flag high risk individuals and situations (see **Prescribing Section: Ongoing and Future Work**). Indicators of high-risk prescribing and dispensing undergo continued refinement to best support the work of over-prescribing investigators. The models for high-risk patient behaviors are being developed in collaboration with Vanderbilt University Medical Center (see **Partnership with VUMC: Predictive Modeling for Drug Overdose**).

## How does the IDS enhance existing data?



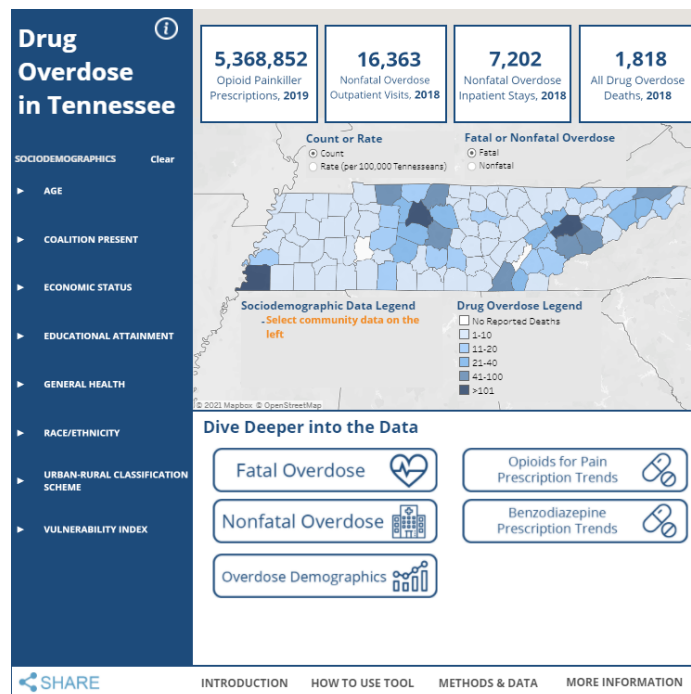
# Learn about the Data

## How can I access the data used in this report?

OIA offers a variety of reports on its Facts & Figures page on the TDH website (<https://www.tn.gov/health/health-program-areas/pdo/pdo/facts-figures.html>). On that page, you can find a link to this report, along with slide sets from the many visualizations throughout. Fatal and nonfatal overdose reports summarizing annual data are made available on the website shortly after the data are finalized. The Facts & Figures page also includes monthly data briefs from the Drug Overdose Reporting system. If you prefer a more interactive way to explore the data, our Drug Overdose Data Dashboard includes the ability to view fatal, nonfatal, and prescription data over time, compare counties and select demographics, and overlay relevant community data (<https://www.tn.gov/health/health-program-areas/pdo/pdo/data-dashboard.html>). The dashboard will be updated regularly throughout 2021.

If you are looking for data not already available in a report, data brief, or dashboard, please submit a request through the TDH Data Request System (<https://www.surveymzmo.com/s3/5819792/TDH-Data-Request-Form>). The Data Request System (DRS), run by OIA's Data Governance team, determines if requests for TDH data require Institutional Review Board (IRB) approval and assesses the request according to departmental data release rules, HIPAA, and other applicable statutory regulations. Requests that meet these requirements are routed to the appropriate offices and data stewards for fulfillment and follow-up. If you are looking for overdose data, OIA recommends reviewing this report, especially the list of indicators in **Appendix A**, and being as specific as possible on the request form to ensure a speedy review.

## Explore the data presented in this report in the interactive data dashboard!



# Abbreviations

The following abbreviation table can serve as a reference for the 2021 Tennessee Annual Overdose Report:

Abbreviations	Title
AAV	Advanced Analytics and Visualization
AD	Academic Detailing
ADHD	Attention Deficit Hyperactivity Disorder
BJA	Bureau of Justice Assistance
CAAP	Cocaine and Alcohol Awareness Program
CCR	Cost to Charge Ratio
CDC	Centers for Disease Control and Prevention
CEDEP	Communicable and Environmental Disease and Emergency Preparedness
CME	Coroner/Medical Examiner
CMO	Chief Medical Officer
COAP	Comprehensive Opioid Abuse Program
COSSAP	Comprehensive Opioid Abuse and Simulant Site-based Programs
COVID-19	Coronavirus disease
CPRS	Certified Peer Recovery Specialists
CSMD	Controlled Substance Monitoring Database
CSTE	Council of State and Territorial Epidemiologists
CT	Computerized Tomography
DCS	Department of Children's Services
DDPI	Data-Driven Prevention Initiative Programs
DEA	Drug Enforcement Agency
DOJ	Department of Justice
DOR	Drug Overdose Reporting System
DOSE	Drug Overdose Surveillance and Epidemiology
DRC	Data Release Committees
DRS	Data Request System
e-codes	External Causes of Injury Codes
eCR	Electronic Case Reporting
ED	Emergency Department
EHR	Electronic Health Record
EMS	Emergency Management System
ESOOS	Enhanced State Opioid Overdose Surveillance
ESSENCE	Electronic Surveillance System for Early Notification of Community-based Epidemics

# Abbreviations

The following abbreviation table can serve as a reference for the 2021 Tennessee Annual Overdose Report:

Abbreviations	Title
FDA	Food and Drug Administration
HDDS	Hospital Discharge Data System
HIA	High-Impact Areas
HIE	Health Information Exchanges
HIPAA	Health Insurance Portability and Accountability Act
HIV	Human Immunodeficiency Virus
HLR	Health Licensure and Regulation
ICD-10-CM	International Classification of Diseases, Tenth Revisions, Clinical Modification
IDS	Integrated Data System
IMED	Interim Medical Examiner Database
IMF	Illicitly-Manufactured Fentanyl
IOAD	International Overdose Awareness Day
IQR	Interquartile Range
IRB	Institutional Research Board
JAR	Joint Annual Report
KIPRC	Kentucky Injury Prevention and Research Center
KY	Kentucky
LARS	Licensing and Regulatory System
MAT	Medication-Assisted Treatment
MDI	Medicolegal Death Investigation
mg	Milligram
MME	Morphine Milligram Equivalents
MOU	Memorandum of Understanding
MPE	Multiple Provider Episodes
MPH	Master of Public Health
MRI	Magnetic Resonance Imaging
NCHS	National Center for Health Statistics
NDC	National Drug Code
NPI	National Provider Identifier
NSSP	National Syndromic Surveillance Program
NVDRS	National Violent Death Reporting System
OD	Overdose

# Abbreviations

The following abbreviation table can serve as a reference for the 2021 Tennessee Annual Overdose Report:

Abbreviations	Title
OD2A	Overdose Data to Action
OEMS	Office of Emergency Medical Services
OGC	Office of General Counsel
OIA	Office of Informatics and Analytics
ORCO	Overdose Response Coordination Office
OSCME	Office of the State Chief Medical Examiner
OTP	Opioid Treatment Program
OD	Opioid Use Disorder
PDMP	Prescription Drug Monitoring Program
PfS	Prevention for States
PMPi	PMP Interconnect
PWID	Persons Who Inject Drugs
PWUD	People Who Use Drugs
QC	Quality Control
QR	Quick Response
RODD	Rapid Opioid Overdose Detection
ROI	Report of Investigation
ROPS	Regional Overdose Prevention Specialist
SAMHSA	Substance Abuse and Mental Health Services Administration
SNOMED CT	Systemized Nomenclature of Medicine Clinical Terms
SSP	Syringe Service Programs
SUD	Substance Use Disorder
SUDORS	State Unintentional Drug Overdose Reporting System
TAADAS	Tennessee Association of Alcohol, Drug and other Addiction Services
TBI	Tennessee Bureau of Investigation
TCA	Tennessee Code Annotated
TDH	Tennessee Department of Health
TDMHSAS	Tennessee Department of Mental Health and Substance Abuse Services
THA	Tennessee Hospital Association
TIBRS	Tennessee Incident Based Reporting System
TN	Tennessee
U.S.	United States
VA	Veterans Affairs



# Abbreviations

The following abbreviation table can serve as a reference for the 2021 Tennessee Annual Overdose Report:

Abbreviations	Title
VRISM	Vital Records Information System Management
VUMC	Vanderbilt University Medical Center

# 2,089

The number of  
Tennesseans who  
died of a drug  
overdose in 2019

## DRUG OVERDOSE DEATH TRENDS

Drug overdose deaths increased 15% in 2019. Although the number of deaths from prescription opioid overdoses (pain relievers) has been decreasing since 2017, overdose deaths due to fentanyl and methamphetamine have only continued to rise. In 2019, more Tennesseans died from an overdose involving the illicit drug fentanyl than prescription opioids, a trend that reflects the shift from prescription to illicit drugs in the overdose epidemic. This section includes more information about 2019 fatal drug overdose trends, including analyses by age, sex, and race. Additionally, this section provides an overview of the State Unintentional Drug Overdose Reporting System (SUDORS) and the Rapid Opioid Death Detection (RODD) project- two activities that are critical to understanding new and emerging drug overdose trends in TN.



# Introduction

Statewide drug overdose death statistics presented in this section are derived from the Tennessee Department of Health (TDH) Death Statistical Files, the primary source of finalized statewide mortality data in Tennessee (TN).<sup>1</sup> This file contains death certificate information for all individuals who have died in the state of TN as well as TN residents who died out of state. For in-state deaths, causes of death are approved by county medical examiners and standardized by the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS) using ICD-10 codes<sup>2</sup>. The ICD-10 coding scheme classifies drug overdose deaths as poisonings and provides information on intent and contributing substances.

**For drug overdose deaths, *Intent* refers to suicide or homicide (intentional) or accidental overdose (unintentional).**

***Contributing substances* include the drug(s) that caused the overdose death.**

As each state sends death certificate data to NCHS for ICD-10 coding, death statistics can be compared across U.S. jurisdiction and to overall national mortality statistics. A key limitation of NCHS coding is lack of ICD-10 T codes for specific drug types that are important to monitor for public health surveillance, including fentanyl, buprenorphine, and specific types of prescription drugs (such as oxycodone and hydrocodone).<sup>3,4</sup> As NCHS ICD-10 codes do not capture all specific types of drug overdoses, OIA has developed methods for scanning and summarizing the text fields that comprise the cause of death.<sup>5</sup> OIA, in collaboration with the Office of the State Chief Medical Examiner (OSCME), is working to incorporate data from the medical examiners' death reports to enhance drug overdose death surveillance. In this section of the TN Annual Overdose Report, we will describe drug overdose deaths in TN from 2015-2019 using ICD-10 codes and literal cause of death text from death certificates in the TN Death Statistical File. In addition to presenting trends from the TN Death Statistical File, data and visualizations from the State Unintentional Drug Overdose Reporting System (SUDORS) and Rapid Opioid Death Detection (RODD) projects will be presented.

**In this section...**

Trends for TN Death Statistical File, **pg 20-50**

Trends for SUDORS Project, **pg 51-55**

Trends for TN RODD project, **pg 56-58**

<sup>1</sup> Tennessee Department of Health. Bureau of Policy, Planning and Assessment. Division of Health Statistics. Death Statistical File User Manual. January 2014.

<sup>2</sup> [https://www.cdc.gov/nchs/nvss/instruction\\_manuals.htm](https://www.cdc.gov/nchs/nvss/instruction_manuals.htm)

<sup>3</sup> Adele Lewis, TDH Deputy State Chief Medical Examiner. How to Best Certify Deaths Due to Substance Use. [https://www.tn.gov/content/dam/tn/health/documents/officeofthestatechiefmedicalexaminersoffice/resourcesforthemedicalexaminer/Certification\\_drug\\_overdose.pdf](https://www.tn.gov/content/dam/tn/health/documents/officeofthestatechiefmedicalexaminersoffice/resourcesforthemedicalexaminer/Certification_drug_overdose.pdf)

<sup>4</sup> Ossiander EM: Using textual cause-of-death data to study drug poisoning deaths. Am J Epidemiology 2014, 179(7):884-894; Slavova S, O'Brien DB, Creppage K, Dao D, Fondario A, Haile E, Hume B, Largo TW, Nguyen C, Sabel JC et al: Drug Overdose Deaths: Let's Get Specific. Public Health Rep 2015, 130(4):339-342.

<sup>5</sup> Trinidad JP, Warner M, Bastian BA, Minino AM, Hedegaard H. Using Literal Text From the Death Certificate to Enhance Mortality Statistics: Characterizing Drug Involvement in Deaths. Natl Vital Stat Rep. 2016 Dec;65(9):1-15.

# Methods & Data Quality

Completeness of cause of death information is critical when using mortality statistics to monitor trends and evaluate drug overdose-related mortality burden in susceptible populations. Information on specific types of drugs may be missing from the death certificate based on availability of toxicology analysis and drug reporting differences by time and by jurisdiction. This can result in underestimates of the contribution of drug class and types to drug overdose deaths.

Epidemiologists used the following ICD-10 codes to identify incomplete cause of death information in the death certificate data:

- **R99:** Cause of death is blank, listed as 'PENDING,' or listed as 'UNKNOWN'
- **T509:** Cause of death is drug overdose, but the type of drug involved is unknown
- **T406:** Cause of death is opioid overdose, but the type of opioid involved is unknown

When determining the percentages of these deaths in the TN death records, we compare R99 deaths to the total number of deaths, T509 deaths to the total number of drug overdoses, and T406 deaths to the total number of opioid overdoses. As shown in the table below, information on cause of deaths increased in 2019 in comparison to any other year; whereas, information on type of drugs involved in overdose deaths and opioid deaths has improved from 2015 to 2019.

	2015		2016		2017		2018		2019	
	n	%	n	%	n	%	n	%	n	%
R99 Deaths	522	0.8	477	0.7	484	0.7	573	0.8	349	0.5
T509 Deaths	121	8.3	135	8.3	111	6.3	95	5.2	64	3.1
T406 Deaths	46	3.2	28	1.7	44	2.5	23	1.3	25	1.2

There are three ICD-10 codes (above) that impact the counts and rates of overdose death in TN:

- **Impact of R99 Deaths:**

- Deaths coded as R99 inform us the cause of death is unknown. It is important to have as few R99 coded deaths as possible to ensure accurate count and rate calculations of drug overdose deaths in TN. Each year it is likely that some R99 coded deaths are due to drug overdose and therefore, this report may be undercounting drug overdose deaths.

- **Impact of T509 Deaths:**

- Deaths coded as T509 inform us the cause of death was due to a drug overdose but the drug class or substance(s) involved are unknown. Drug overdose deaths without a known drug class/substance are still included in the all drug overdose metrics. Since the types of drug(s) involved are unknown, the metrics presented in this report for specific drug classes (such as opioids or stimulants) may be undercounted.

- **Impact of T406 Deaths:**

- Similar to T509 deaths, T406 coded deaths inform us the cause of death was due to an opioid overdose without indication of the specific opioids involved, such as fentanyl, heroin, or pain relievers. By not knowing the type of opioid(s) involved, the metrics presented in this report for a specific opioid category may be undercounted.

# Note for 2018 Deaths

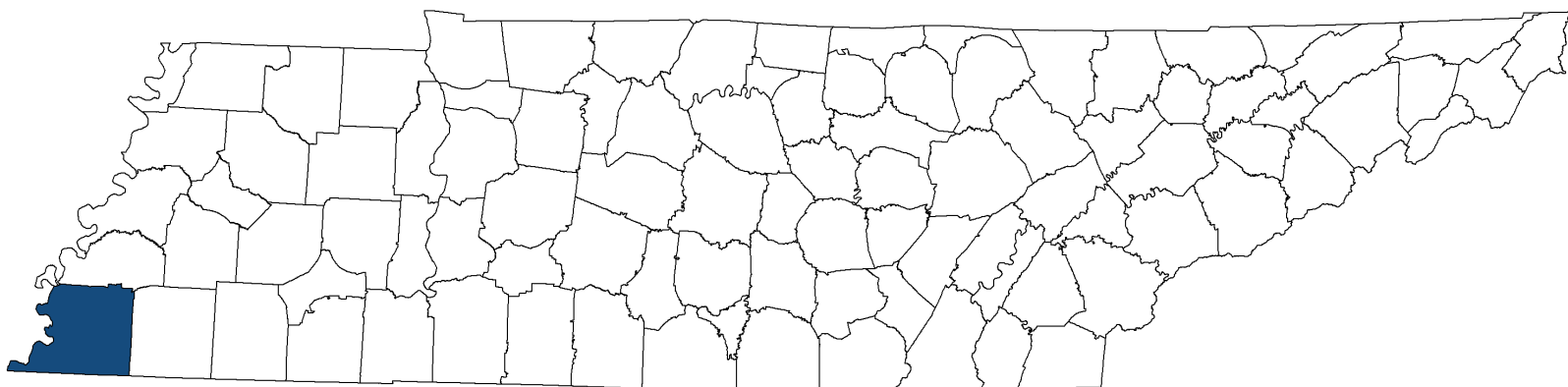
TDH is aware of an undercount of overdose deaths in 2018, primarily those occurring in Shelby County. A higher number of deaths of Shelby County residents were reported with unknown causes of death due to more pending death investigations than in previous years.<sup>6</sup>

## How did this Occur?

The process of submitting death certificate data from the previous calendar year to CDC closes in July of each year (e.g., 2018 deaths are finalized in July 2019). Deaths which do not have a cause of death listed at this time are given a code by CDC indicating that the cause was undetermined. Drug overdose deaths often take longer to determine than other causes because they require autopsy and toxicology reports to be completed and reviewed before a final cause is determined. Therefore, overdose deaths may be more likely to be coded as unknown causes by the CDC and not represented in the official counts provided by TDH. In 2018, a large number of deaths that occurred in Shelby County did not have completed cause of death information at the time the CDC coding process was finalized. For example, approximately 1.9% of Shelby county deaths in 2018 (nearly 200) were still pending as of the final submission to CDC and will not receive ICD-10 codes. While it is not likely that all of these deaths were determined to be overdose-related, this represents a large increase from 2017 (0.6% pending in Shelby) and an even larger increase from 2016 (0.2% pending in Shelby).

## What does this mean for the Overdose Mortality Statistics?

We advise caution in interpreting the downward trend in overdose deaths across all categories of drugs among Shelby County residents for 2018. Due to the smaller numbers in overdose deaths, we also advise caution in interpreting the large change in all of the change maps for Shelby County from 2018 to 2019.



**\* An undercount of overdose deaths in 2018 occurred in Shelby County**

<sup>6</sup> 2018 Tennessee Drug Overdose Deaths: <https://www.tn.gov/content/dam/tn/health/documents/pdo/Fatal%20Drug%20Overdose%20in%20TN%20Report.pdf>

# Drug Overdose Deaths by Intentionality

In TN, drug overdose deaths are counted and analyzed based on the information provided in the death certificate. This includes both information on the contributing substances and intent. While the visualizations presented in this section will primarily focus on the contributing substances, this page will focus on understanding drug overdose deaths by intentionality.

The intent, sometimes referred to as manner of death, is the general classification of how the injury led to the death. For all drug overdoses in TN, there are four classifications of intent: Unintentional (accidental), Suicide, Assault, or Undetermined. In the table below, the number and percent of drug overdose deaths by intentionality from 2015 to 2019 are displayed. Deaths due to assault were excluded due to small numbers. Drug overdose deaths due to unintentional poisoning continue to increase, whereas intentional overdose deaths have decreased from 2015 to 2019. In 2019, about 94% of all drug overdose deaths (n=1,953) in TN were due to unintentional poisoning while 4.4% of overdose deaths were intentional. About 2.2% of all drug overdose deaths were undetermined in 2019, a decrease from 2015.

**Drug Overdose Deaths by Intentionality, 2015-2019**

	2015		2016		2017		2018		2019	
	n	%	n	%	n	%	n	%	n	%
Unintentional	1,264	87.1	1,453	89.1	1,617	91.0	1,675	92.1	1,953	93.5
Suicide	124	8.5	124	7.6	100	5.6	98	5.4	91	4.4
Undetermined	63	4.3	53	3.2	57	3.2	44	2.4	45	2.2

Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents.  
Data Source: TN Death Statistical File.

Overdose deaths due to suicide are preventable. If you or a loved one is experiencing a mental health crisis, the Tennessee Statewide Crisis Line is available 24 hours a day/365 days a year.

**STATEWIDE**

# CRISIS LINE

**HELP IN A MENTAL HEALTH CRISIS**

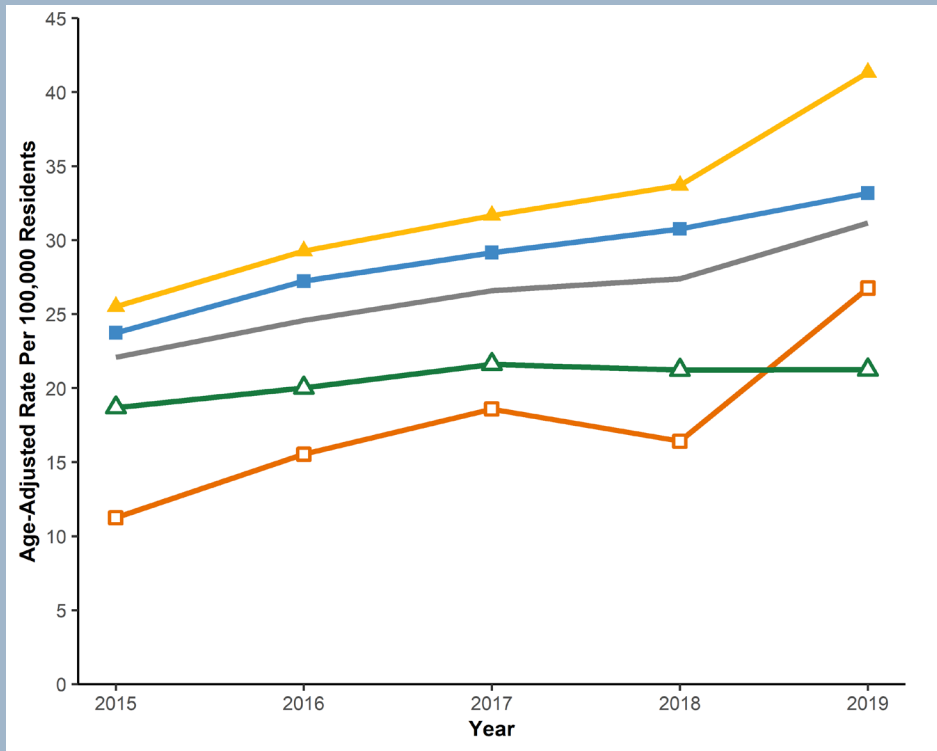
**855-CRISIS-1** [TN.gov/CrisisLine](https://www.tn.gov/CrisisLine)

**855-274-7471**

# All Drug Overdose Deaths

All drug overdose deaths<sup>7</sup> continue to increase in TN. The total number of all drug overdose deaths by year were as follows: 1,451 (2015), 1,631 (2016), 1,776 (2017), 1,818 (2018), and 2,089 (2019).

## Age-Adjusted Rates for All Drug Overdose Deaths by Sex and Race in TN, 2015-2019



**Legend**

- All Drug Overdoses
- Black
- White
- Female
- Male

Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

As shown in the figure above, the rate for all drug overdose deaths per 100,000 TN residents increased from 22.1 in 2015 to 31.2 in 2019.<sup>8</sup> Rates increased for both males as well as White Tennesseans.<sup>9</sup> Highest rates were observed for males and Whites in 2019, with rates of 41.3 and 33.2, respectively. Among Black Tennesseans, the rate increased from 11.3 in 2015 to 18.6 in 2017 followed by a decrease in 2018, then increase again in 2019 to 26.8. Between 2018 and 2019, drug overdose deaths involving Black Tennesseans has increased 66%.<sup>10</sup> Rates for females have held steady for the last three years.

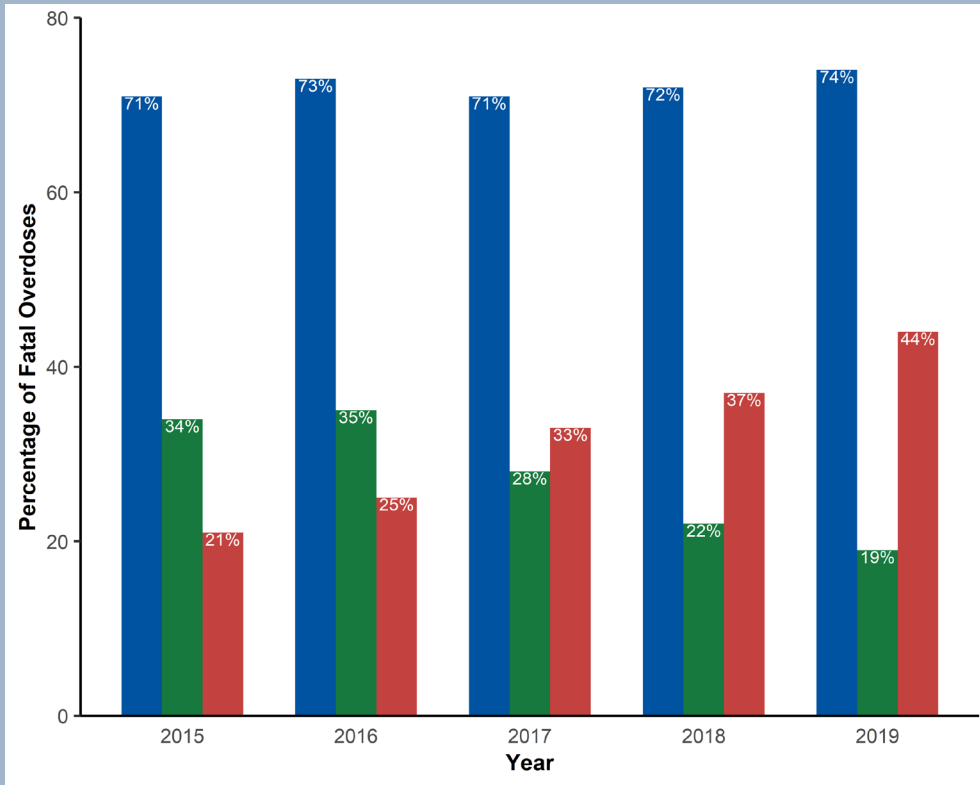
<sup>7</sup> Drug overdose deaths caused by acute poisonings, regardless of intent (i.e., unintentional, suicide, assault, or undetermined).

<sup>8</sup> In this section, all rates are age-adjusted and per 100,000 residents unless otherwise specified.

<sup>9</sup> Other races were excluded due to small sample sizes, which preclude calculation of reliable rates.

<sup>10</sup> [2019 Tennessee Drug Overdose Deaths](#). Office of Informatics and Analytics. Tennessee Department of Health, Nashville, TN. September, 2020.

# Opioids, Benzodiazepines, and Stimulants Present in All Drug Overdoses in TN, 2015-2019



## Legend

- Opioids
- Benzodiazepines
- Stimulants

Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

The above figure displays the proportion of all drug overdose deaths that involved opioids, benzodiazepines, and stimulants as a contributing substance. Categories are not mutually exclusive. The proportion of all drug overdose deaths involving any type of opioid has been consistently over 70% from 2015 to 2019. The proportion of all drug overdoses involving benzodiazepines decreased from 34% in 2015 to 19% in 2019. During 2015 to 2019, all drug overdose deaths involving stimulants increased from 21% in 2015 to 44% in 2019.

The average age of Tennesseans who died of a drug overdose in 2019 was 42.6 years old.



# Polydrug Deaths in Tennessee

We identified 3,527 deaths in the TN death records from 2015 to 2019 that involved usage of multiple classes of drugs (i.e., polydrug deaths) and had an underlying cause of death due to drug overdose. The trend of polydrug deaths has been relatively steady from 2015 to 2019.

**Polydrug Overdose Counts by Class Type, 2015-2019**

	2015		2016		2017		2018		2019	
	n	%	n	%	n	%	n	%	n	%
All drugs	568	39.2	695	42.6	718	40.4	714	39.3	832	39.8
All opioids*	560	54.2	681	57.4	706	55.7	699	53.6	820	53.1
Benzodiazepines	455	92.5	536	93.5	459	91.1	369	90.2	371	98.9
All stimulants**	184	61.1	256	62.0	353	60.1	434	64.7	589	64.7
Muscle relaxants	16	100	26	89.7	30	88.2	22	91.7	21	75.0

Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

\*All opioids is a drug class that includes the illegal drugs heroin or fentanyl as well as powerful pain relievers available legally by prescription. \*\*All stimulants is a drug class that includes both cocaine and psychostimulants (including methamphetamine).

## Interpreting the Table

The following are two examples of how to read the table above:

- In 2019, 2,089 Tennesseans died of a drug overdose. Of these 2,089 deaths, 832 (39.8%) of these deaths involved two or more different drug classes (opioids, benzodiazepines, stimulants, or muscle relaxants). This trend has remained stable since 2015.
- In 2019, 75% of deaths involving the drug class muscle relaxants also involved at least one other class of drug (opioids, benzodiazepines, or stimulants). This trend has decreased since 2015 when all deaths involving the drug class muscle relaxants were considered polydrug (deaths that involved 2 or more classes of drugs).

## What is a polydrug death?

In TN, there are a rising number of drug overdoses (both fatal and nonfatal) that are considered polydrug or polysubstance. Polydrug use occurs when an individual is exposed to multiple drugs, with or without their knowledge.<sup>11</sup> It is especially dangerous to use drugs in combination with one another and doing so increases the risk of the individual having an overdose. However, it is often the case that individuals are unaware they are taking drugs in combination, as illicit drugs may be contaminated with other illicit substances. One such substance that has commonly been found in combination with other substances (either intentionally or from accidental contamination) is fentanyl.

## Why is understanding polydrug deaths important?

Although the opioid epidemic is well-publicized, it is important to recognize that the majority of TN opioid overdose deaths are polydrug. Additionally, the majority of Tennesseans with a substance use disorder are polydrug users (e.g. other drugs, alcohol). As programs and policies are developed to address the drug overdose epidemic, we must move from an opioids-only perspective to a comprehensive understanding of substance use disorders to ensure effective prevention and treatment measures.<sup>12</sup>

<sup>11</sup> Centers for Disease Control and Prevention (2019). Other Drugs (Polysubstance). Retrieved from: <https://www.cdc.gov/drugoverdose/data/otherdrugs.html>

<sup>12</sup> Cicero, T. J., Ellis, M. S., & Kasper, Z. A. (2020). Polysubstance Use: A Broader Understanding of Substance Use During the Opioid Crisis. American journal of public health, 110(2), 244–250. <https://doi.org/10.2105/AJPH.2019.305412>

## Polydrug Overdose Counts by Common Drug Type in TN, 2019

	Prescription Opioid (n = 515)	Heroin (n= 380)	Fentanyl (n=1,087)	Benzodiazepine (n=395)	Psychostimulant (n=651)	Cocaine (n=334)
Prescription opioid	-	59	227	170	104	46
Heroin	59	-	274	93	130	66
Fentanyl	227	274	-	225	319	192
Benzodiazepine	170	93	225	-	105	51
Psychostimulant	104	130	319	105	-	75
Cocaine	46	66	192	51	75	-

Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents.  
Data Source: TN Death Statistical File.

**In 2019, roughly 3 out of 4 heroin overdose deaths also involved the illicit drug fentanyl.**

In addition to analyzing polydrug overdose deaths by class, the table above presents the number of drug overdose deaths shared by two substances (or in some cases like prescription opioids or psychostimulants, a group of substances).

For example, the cell circled in red represents 59 Tennesseans who died of a drug overdose involving prescription opioids and heroin. This represents 11.5% (59 out of 515) of the deaths involving prescription opioids. The counts in this table are not mutually exclusive, therefore the total percentage of polysubstance prescription opioids deaths can not be interpreted.

# Opioid-Related Drug Overdose Deaths

## What is an Opioid?

Opioids are a class of drugs that include the illegal drug heroin as well as powerful pain relievers available legally by prescription (e.g. hydrocodone, oxycodone). When an opioid is taken, it signals the release of endorphins, chemicals that minimize the perception of pain and boost feelings of pleasure. This combination makes opioids highly effective as pain relievers, but dangerous due to their high potential for misuse and addiction.

## What is an Opioid Overdose?

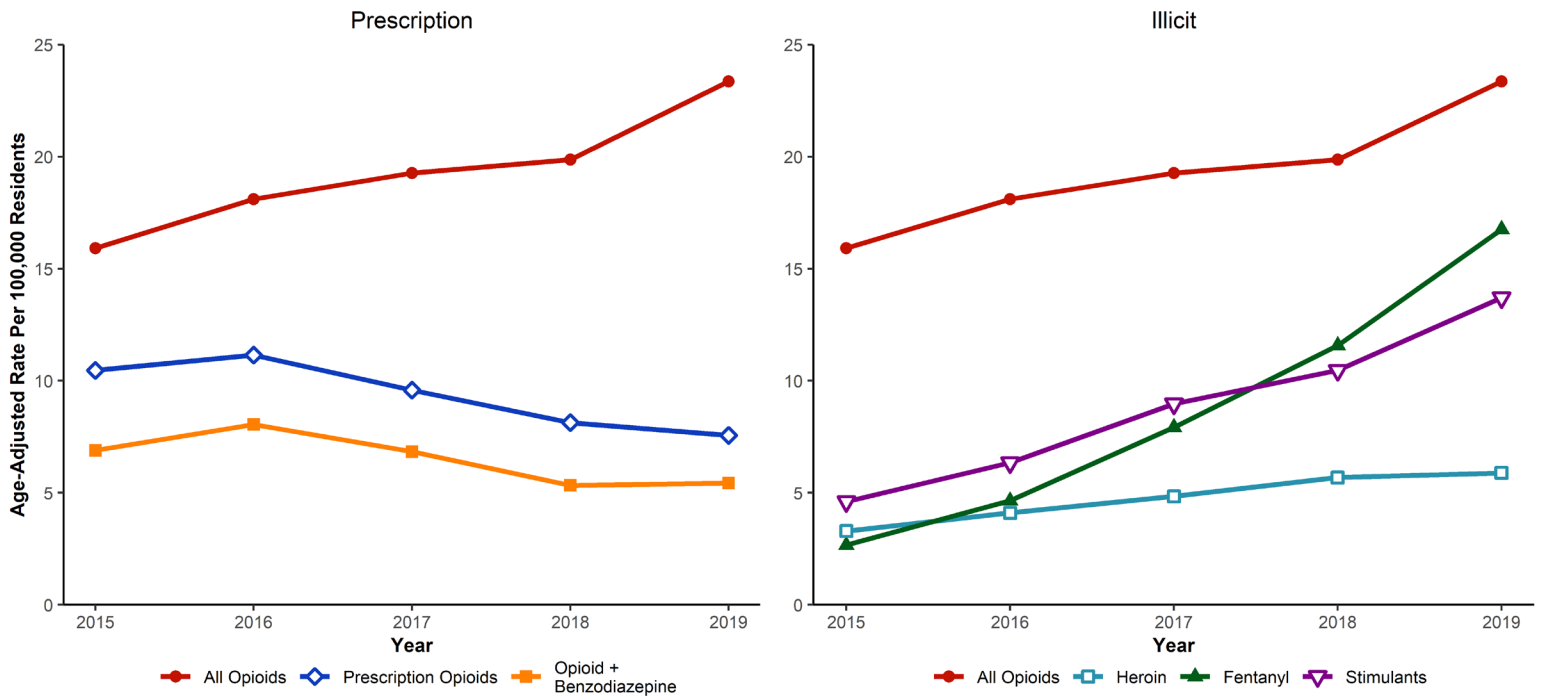
An opioid overdose can occur when an opioid is taken in excess amounts or in combination with other drugs. Opioids affect the brain's regulation of breathing and can cause breathing to slow until it eventually stops, resulting in death. All opioids can cause an overdose, including medications prescribed by a doctor or purchased over the counter. However, not all opioid overdoses are fatal. Naloxone, also known as Narcan, is the only successful opioid overdose reversal medication. Resources on where to learn more about naloxone and naloxone administration can be found in the blue box below.

## Why is this important to Tennessee?

In 2019, drug overdose deaths continued to increase in TN. From 2018 to 2019, TN drug overdose deaths increased by 15%, and this epidemic continues to evolve. Opioids have consistently been common contributing causes among drug overdose deaths in TN. While deaths involving opioids identified as “pain relievers” (i.e., those typically obtained through a prescription) have decreased for the past three years, deaths involving **any** opioid have continued to increase. The increase in opioid overdose deaths is primarily driven by deaths involving heroin and fentanyl. Heroin and fentanyl are two of the most common opioids that are obtained illicitly. In 2019, more Tennesseans died from the powerful illicit drug fentanyl than prescription opioids. Deaths due to all stimulants, a category that includes primarily deaths due to methamphetamine and cocaine, have also increased substantially over the past five years with a sharp rise in 2019.

Opioid overdose deaths are preventable with naloxone (Narcan), the only successful opioid overdose reversal medication. To learn more about the signs and symptoms of an overdose or get trained to administer naloxone, please use the resources provided by the Department of Health (<https://www.tn.gov/behavioral-health/substance-abuse-services/prevention/prevention/rops.html>) or contact your [Regional Overdose Prevention Specialist \(ROPS\)](#) who may be able to provide additional information and trainings.

# Age-Adjusted Rates for Opioid Overdose Deaths in TN, 2015-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents.  
Data Source: TN Death Statistical File.

As shown above, the rate of all opioid overdose deaths<sup>13</sup> continued to increase in TN from a rate of 15.9 in 2015 to a rate of 23.4 in 2019. The number of all opioid overdose deaths increased from 1,034 in 2015 to 1,543 in 2019. Prescription opioid death rates<sup>14</sup> decreased from 2015 to 2019 (10.5 and 7.6 per 100,000 TN residents, respectively). Deaths involving both opioids (any type) and benzodiazepines<sup>15</sup> were high in 2016 (522 deaths) but showed a downward trend starting in 2017 to a rate of 6.8 and have continued to decrease in 2019 to a rate of 5.4. Substantial increases were observed for heroin<sup>16</sup> and fentanyl<sup>17</sup> deaths since 2015. The rate of heroin overdose deaths increased from 3.3 in 2015 to 5.9 in 2019, with counts increasing from 205 to 380. The rate of fentanyl overdose deaths increased from 2.7 in 2015 to 16.8 in 2019, with counts increasing from 169 to 1,087.

<sup>13</sup> Drug overdose deaths caused by acute poisonings that involve any opioid as a contributing cause of death.

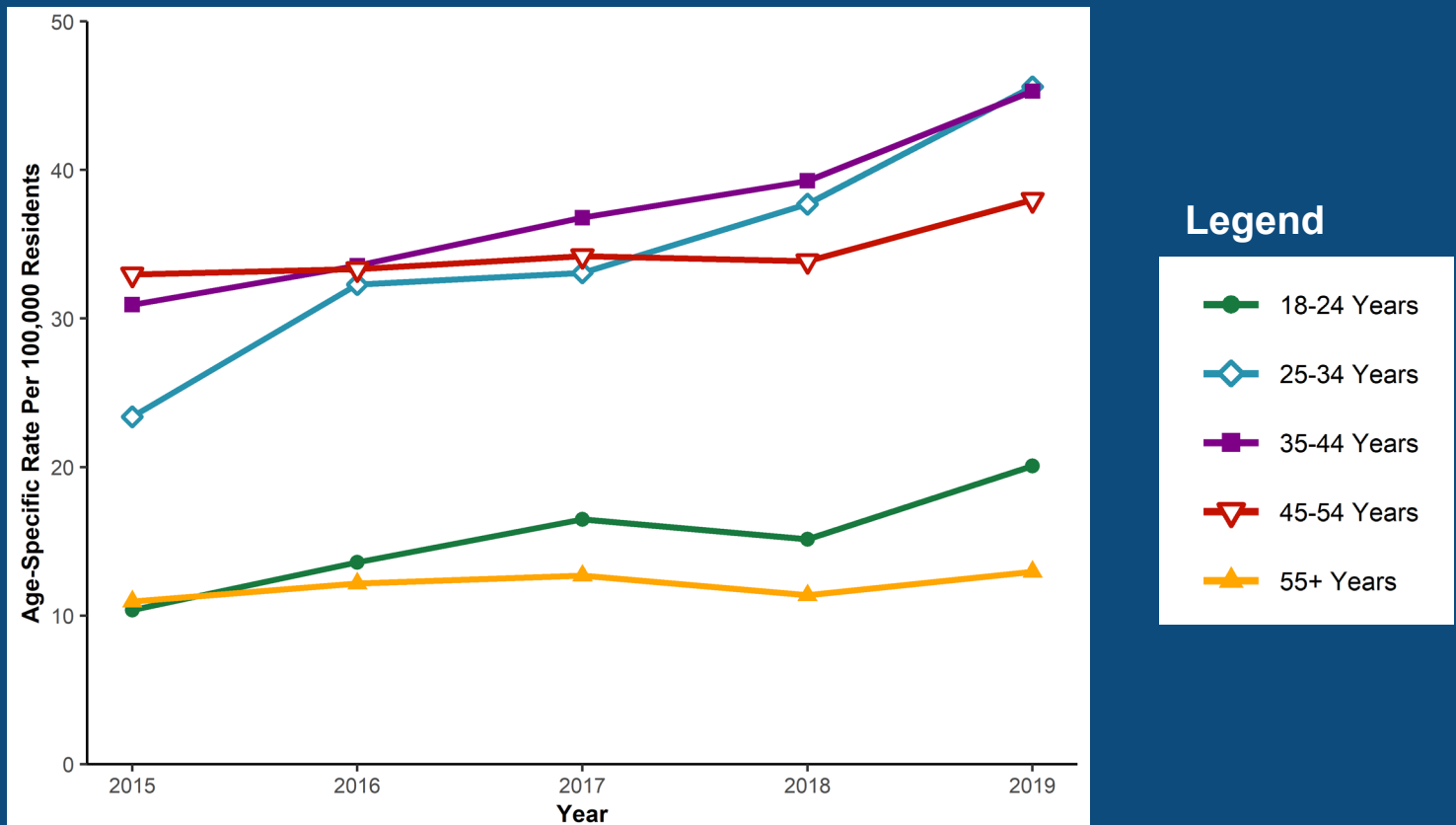
<sup>14</sup> Drug overdose deaths caused by acute poisonings that involve prescription opioids as a contributing cause of death (e.g., hydrocodone, oxycodone, morphine).

<sup>15</sup> Drug overdose deaths caused by acute poisonings that involve both an opioid and benzodiazepine as a contributing cause of death.

<sup>16</sup> Drug overdose deaths caused by acute poisonings that involve heroin as a contributing cause of death.

<sup>17</sup> Drug overdose deaths caused by acute poisonings that involve fentanyl.

## Age-Specific Rates of All Opioid Overdose Deaths in TN, 2015-2019

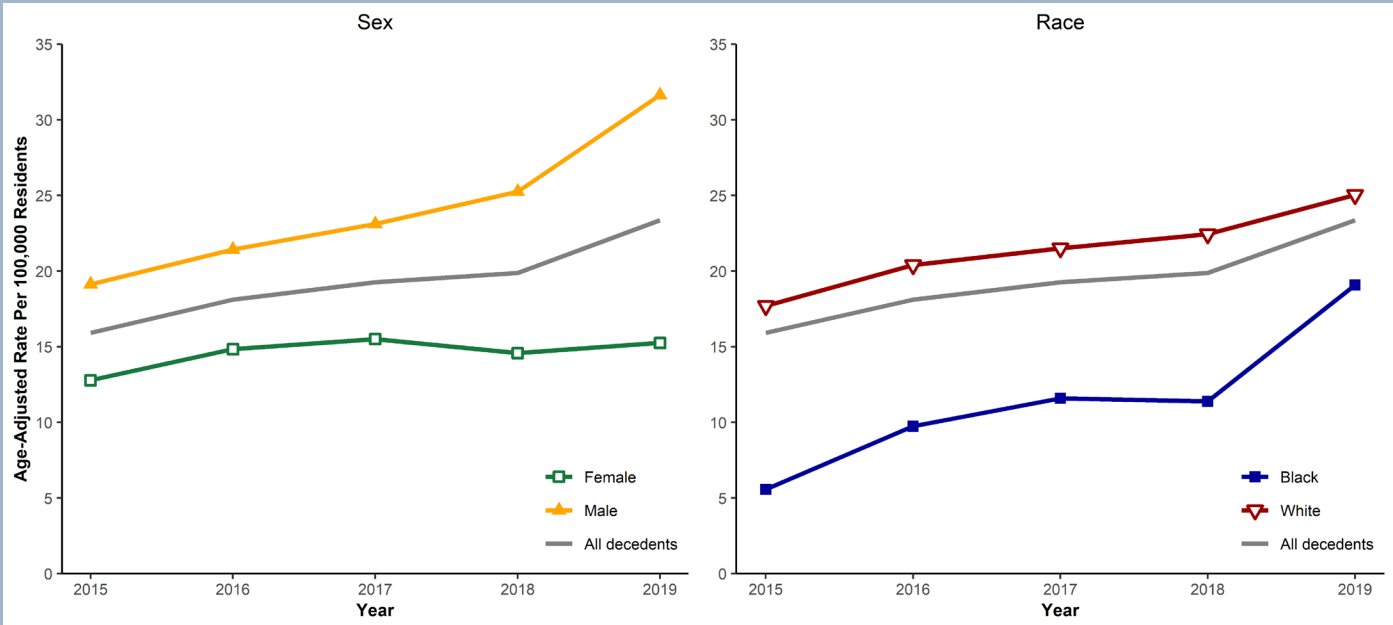


Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents.  
Data Source: TN Death Statistical File.

The graph above displays the age-specific rates for all opioid overdose deaths in TN from 2015 to 2019. In 2019, all age groups showed an increase for all opioid overdose deaths. Persons aged 35-44 years and 25-34 years had the highest rates of death. The lowest rates were observed among individuals aged 18-24 years and 55+ years. For the visualization above and all age-specific rate visualizations in this report, deaths for individuals < 18 years of age were excluded due to small sample sizes.

**The average age of Tennesseans who died of an opioid overdose in 2019 was 40.8 years old.**

## Age-Adjusted Rates for All Opioid Overdose Deaths by Race and Sex in TN, 2015-2019



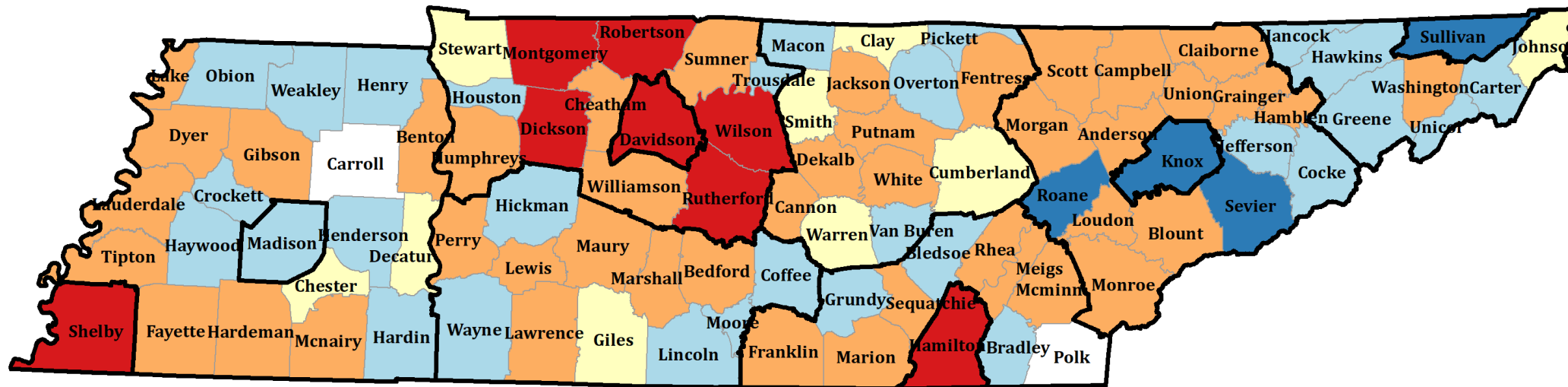
Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Limited to Black and White TN residents for analyses by race. Data Source: TN Death Statistical File.

**The total drug overdose deaths in TN involving opioids increased by 18% between 2018 and 2019.**

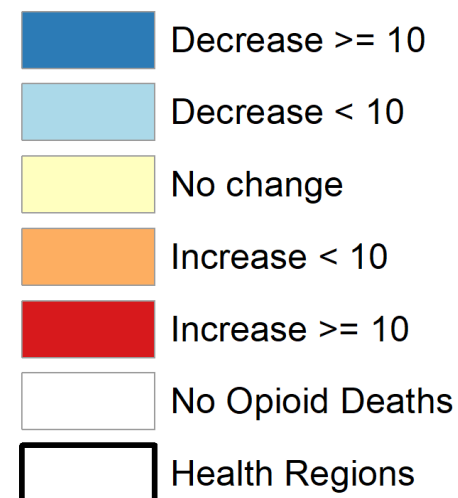
The above graph presents age-adjusted rates for opioid overdose deaths by sex and race (Black and White) for 2015 to 2019. The age-adjusted rate for all decedents is included for comparison. Males had higher age-adjusted rates for all opioid overdose deaths, compared to females with an increasing trend from 2015 to 2019. Females' age-adjusted rates stayed relatively stable.

White Tennesseans had higher age-adjusted rates for opioid overdose deaths compared to Black Tennesseans. Although an increase in opioid deaths continued to be observed in 2019 among White Tennesseans, there was a sharp increase among Black Tennesseans from 2018 to 2019 (11.4 to 19.1).

## Change in the Number of All Opioid Overdose Deaths by TN County of Residence, 2018-2019



### Change in Opioid Overdose Deaths by TN County of Residence



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents.  
Data Source: TN Death Statistical File.

The map on the left shows the change in the number of opioid overdose deaths from 2018 to 2019 in TN by county. Fifty-one out of 95 counties (54%) had an increase in opioid overdose deaths from 2018 to 2019, whereas, 9 counties reported no change in opioid overdose deaths.

The largest decrease in opioid overdose deaths was observed in Knox county (218 deaths in 2018 to 186 deaths in 2019) while the largest increase was observed in Shelby County<sup>18</sup> (123 deaths in 2018 to 204 deaths in 2019). No opioid deaths were observed in Polk or Carroll County in either year.

The counties with an increase of  $\geq 10$  overdose deaths involving opioids from 2018 to 2019 were:

- Davidson County
- Dickson County
- Hamilton County
- Montgomery County
- Robertson County
- Rutherford County
- Wilson County

The counties with a decrease of  $\geq 10$  overdose deaths involving opioids from 2018 to 2019 were:

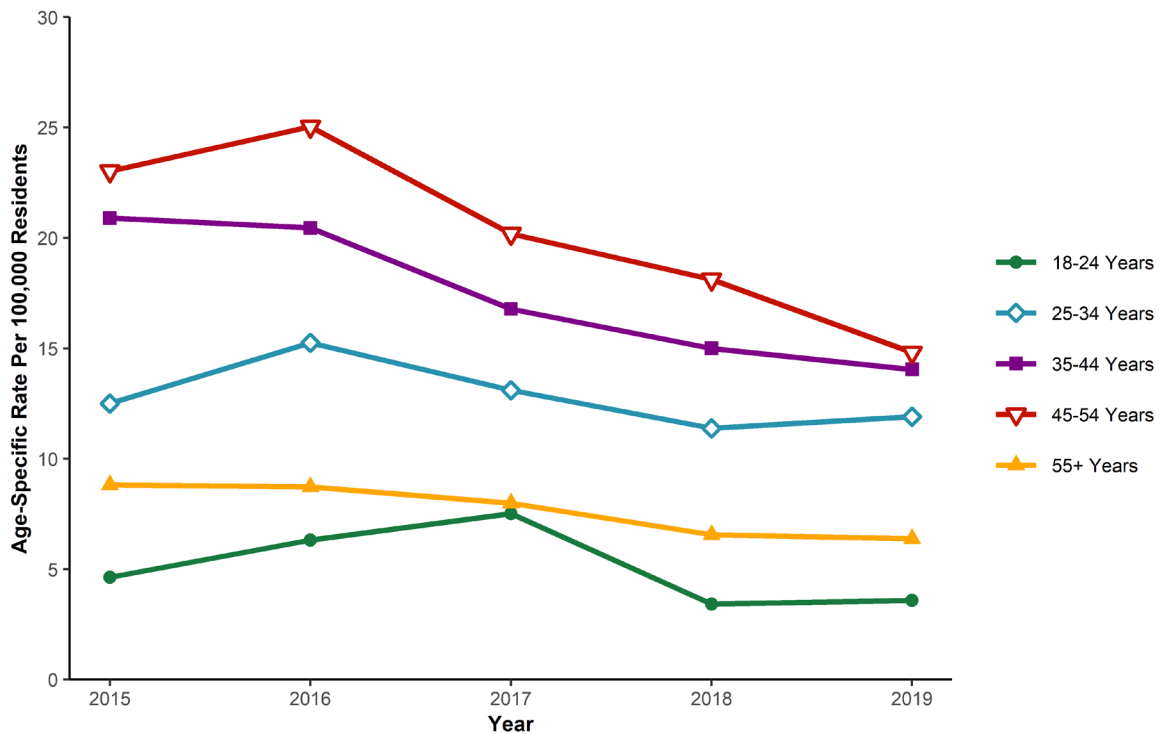
- Knox County
- Roane County
- Sevier County
- Sullivan County

<sup>18</sup> TDH is aware of an undercount of overdose deaths in 2018 primarily occurring in Shelby County. This undercount should be considered when analyzing overdose trends in Shelby County from 2018 to 2019.

# Prescription Opioid Overdose Deaths

The next few pages focus on overdose deaths involving prescription opioids. In TN, we define prescription opioid overdose deaths as those due to prescription opioids such as hydrocodone, oxycodone, or methadone. Note that categories of death are not mutually exclusive and deaths involving prescription opioids may have also involved illicit drugs like fentanyl. To learn more about the prescribing trends for opioids in TN, please read the [Prescription Trends](#) section of this report.

## Age-Specific Rates for Prescription Opioid Overdose Deaths in TN, 2015-2019

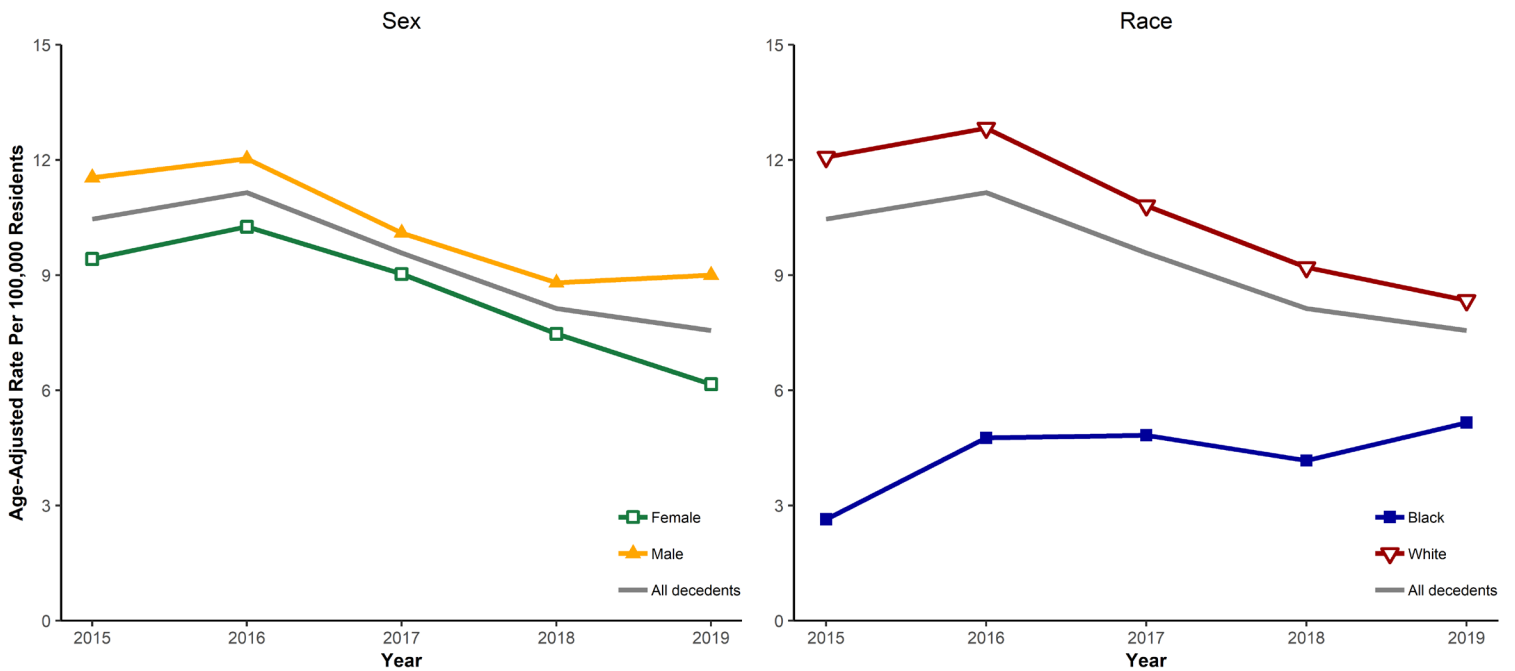


Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents ≥ 18 years. Data Source: TN Death Statistical File.

The above graph shows age-specific rates for prescription opioid overdose deaths from 2015 to 2019. From 2016 to 2018, the age-specific rates for all age groups except 18-24 years declined. Then from 2018 to 2019, the age-specific rates for those 35 years and older, experienced a decline in prescription opioid overdose deaths.



# Age-Adjusted Rates for Prescription Opioid Overdose Deaths by Race and Sex in TN, 2015-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Limited to Black and White TN residents for analyses by race. Data Source: TN Death Statistical File.

**Drug overdose deaths in TN involving prescription opioids decreased by 6% from 2018 and 2019.**

The above graph presents age-adjusted rates for prescription opioid overdose deaths by sex and race (Black and White) for 2015 to 2019. The age-adjusted rate for all decedents is included for comparison. Males had higher rates than females, with a similar trend in rates over time, though diverging in 2019. Specifically, the decrease seen for overall rates for prescriptions opioid overdoses from 2016 to 2018 was observed for both males and females with a slight increase for males in 2019.

While White Tennesseans had higher rates than Black Tennesseans from 2015 to 2019, rates decreased for White Tennesseans from 2016 to 2019, but not for Black Tennesseans.

## Change in the Number of Prescription Opioid Overdose Deaths by TN County of Residence, 2018-2019

The map on the right shows the change in the number of prescription opioid overdose deaths from 2018 to 2019 in TN by county. Thirty-six out of 95 counties (38%) had an increase in prescription opioid overdose deaths from 2018 to 2019, whereas, 12 counties reported no change in prescription opioid overdose deaths.

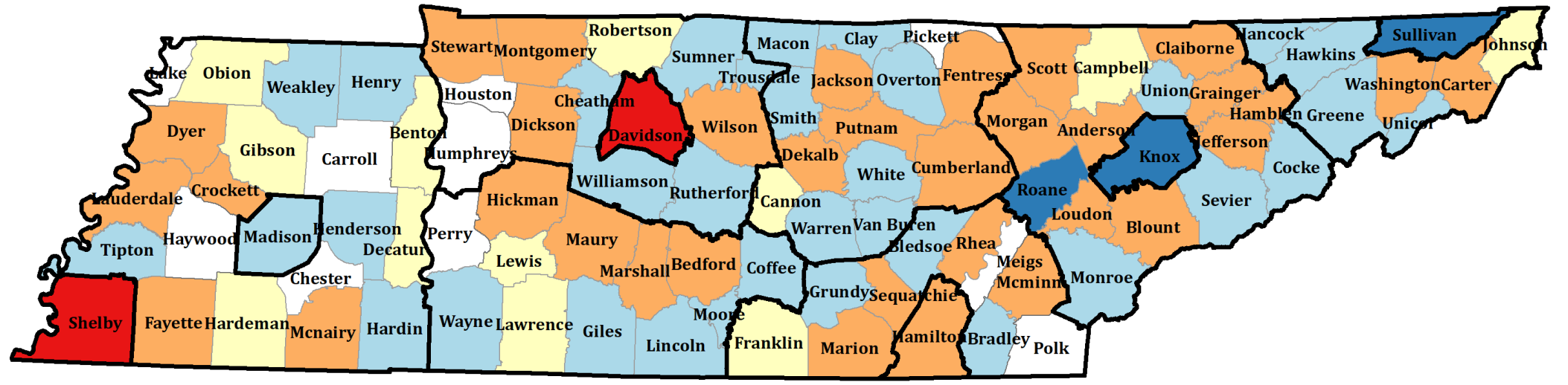
The largest decrease in prescription opioid overdose deaths was observed in Sullivan County (30 deaths in 2018 to 8 deaths in 2019) while the largest increase was observed in Davidson County (62 deaths in 2018 to 78 deaths in 2019).

The counties with an increase of  $\geq 10$  overdose deaths involving prescription opioids from 2018 to 2019 were:

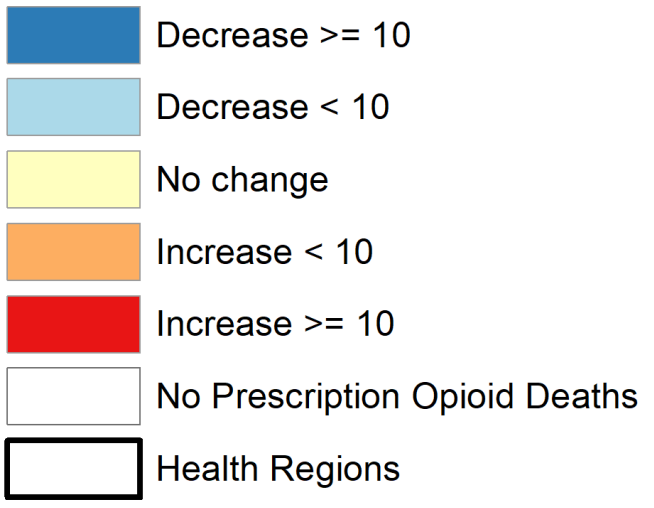
- Davidson County
- Shelby County<sup>19</sup>

The counties with a decrease of  $\geq 10$  overdose deaths involving prescription opioids from 2018 to 2019 were:

- Knox County
- Roane County
- Sullivan County



**Change in Prescription Opioid Overdose Deaths by TN County of Residence**



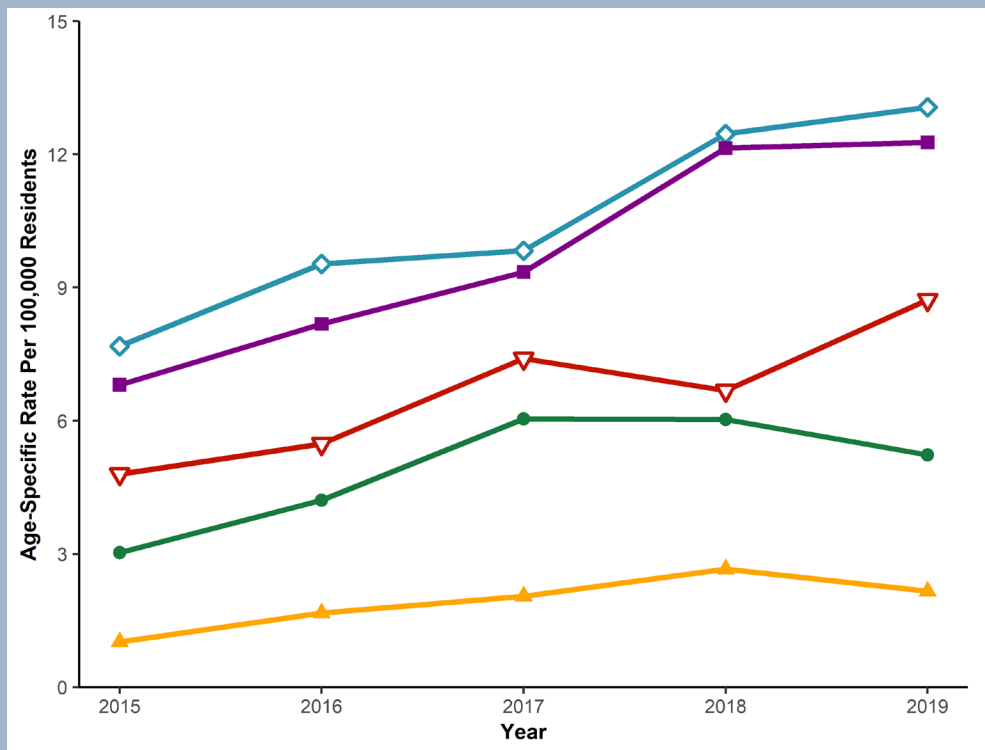
<sup>19</sup> TDH is aware of an undercount of overdose deaths in 2018 primarily occurring in Shelby County. This undercount should be considered when analyzing overdose trends in Shelby County from 2018 to 2019.

Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

# Heroin Overdose Deaths

The next few pages focus on overdose deaths involving the illicit opioid, heroin. Heroin is an illegal, semi-synthetic opioid that is made from morphine and in 2019 was involved in roughly 18% of all drug overdose deaths in TN.

## Age-Specific Rates for Heroin Overdose Deaths in TN, 2015-2019



### Legend

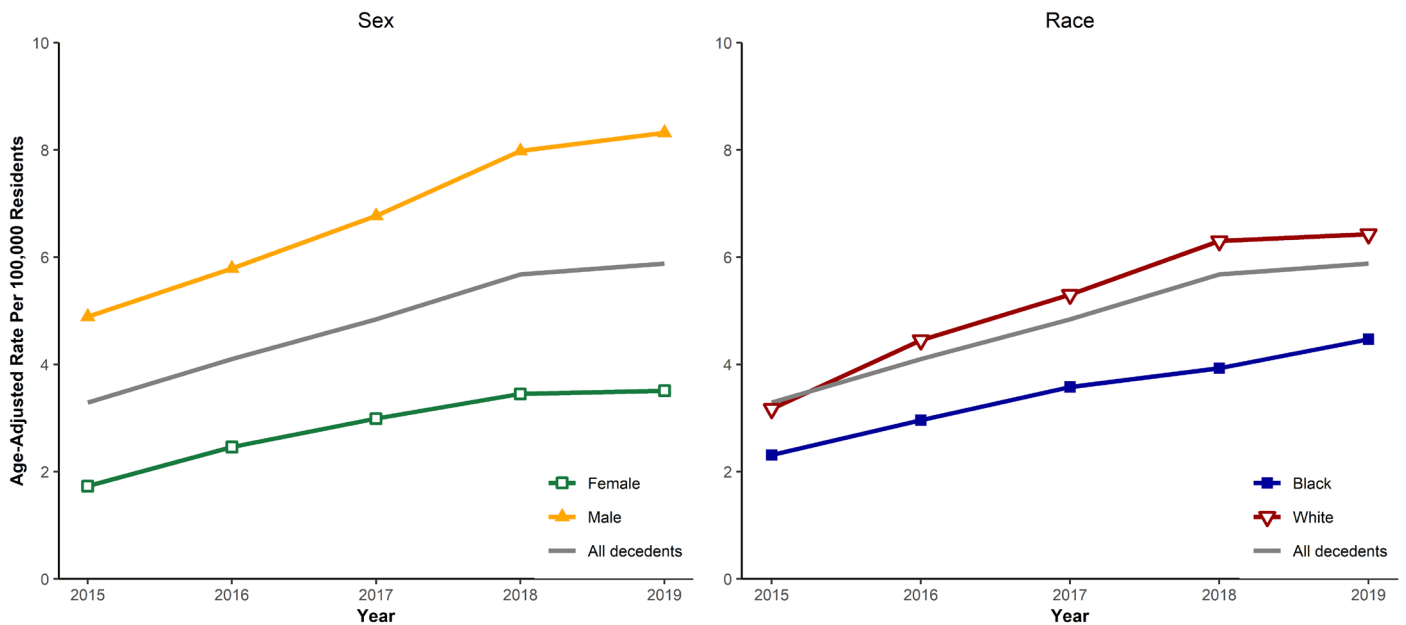
- 18-24 Years
- 25-34 Years
- 35-44 Years
- 45-54 Years
- 55+ Years

Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents.

Data Source: TN Death Statistical File.

The above graph displays age-specific rates for heroin overdose deaths in TN from 2015 to 2019. Individuals aged 25-34 years had the highest rates, with increases from 7.7 per 100,000 in 2015 to 13.1 per 100,000 TN residents in 2019. Individuals aged 35-44 years were the age group with the second highest rates of heroin overdose deaths, with increases from 6.8 per 100,000 in 2015 to 12.3 per 100,000 TN residents in 2019. A decreasing trend was seen for over 55 years and 18-24 years, whereas an increase in rate was observed among the 45-54 years age group from 2018 to 2019.

# Age-Adjusted Rates for Heroin Overdose Deaths by Race and Sex in TN, 2015-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Limited to Black and White TN residents for analyses by race. Data Source: TN Death Statistical File.

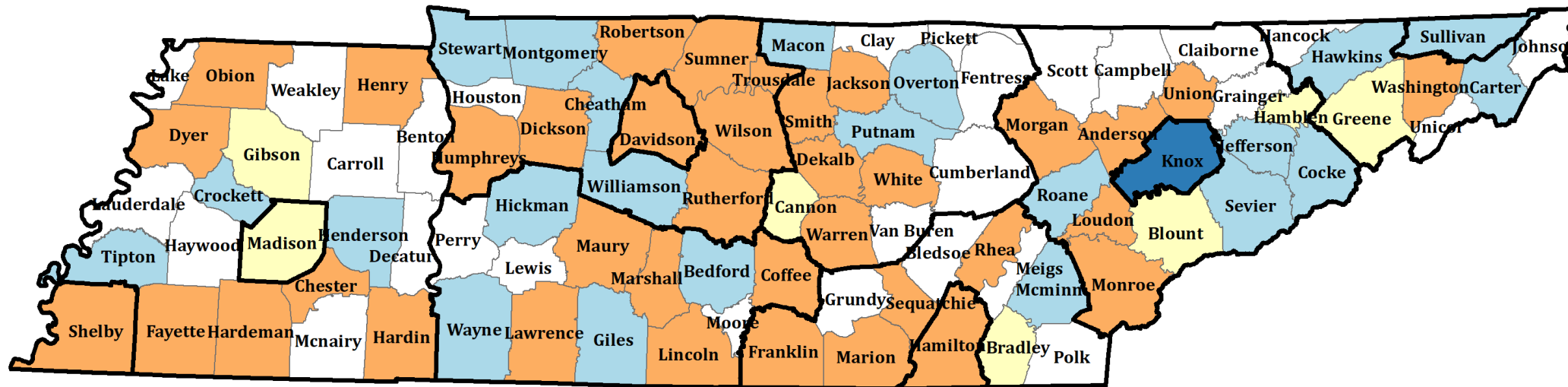
The above graph presents age-adjusted rates for heroin overdose deaths by sex and race <sup>20</sup> (Black and White) for 2015 to 2019. The age-adjusted rate for all decedents is included for comparison. Males had higher rates for heroin deaths, compared to females, with an increasing trend more apparent among males than females.

White Tennesseans had higher rates for heroin deaths compared to Black Tennesseans. Though the rate of heroin deaths among White Tennesseans remained unchanged from 2018 to 2019, the rate for Black Tennesseans continued to increase.

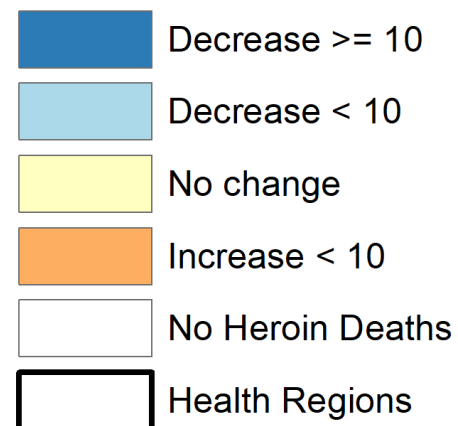
**The number of drug overdose deaths in TN involving heroin increased by 4% between 2018 and 2019.**

<sup>20</sup> A high proportion of heroin overdose decedents did not have their race recorded in the death statistical file in 2015. As a result, rates calculated by race in 2015 are slightly lower than expected.

## Change in the Number of Heroin Overdose Deaths by TN County of Residence, 2018-2019



### Change in Heroin Overdose Deaths by TN County of Residence



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

The map on the left shows the change in the number of heroin overdose deaths from 2018 to 2019 in TN by county. Only 23 counties reported a decrease of heroin deaths from 2018 to 2019 with Knox County (67 deaths in 2018 to 45 deaths in 2019) reporting the highest decrease in the number of heroin overdose deaths.

Seven counties reported no change in heroin overdose deaths from 2018 to 2019, whereas 37 (39%) counties had an increase of heroin overdose deaths from 2018 to 2019 with Wilson County having the highest increase in the number of heroin overdose deaths (8 deaths in 2018 to 16 deaths in 2019).<sup>21</sup>

The only county with a decrease of  $\geq$ 10 overdose deaths involving heroin from 2018 to 2019 was:

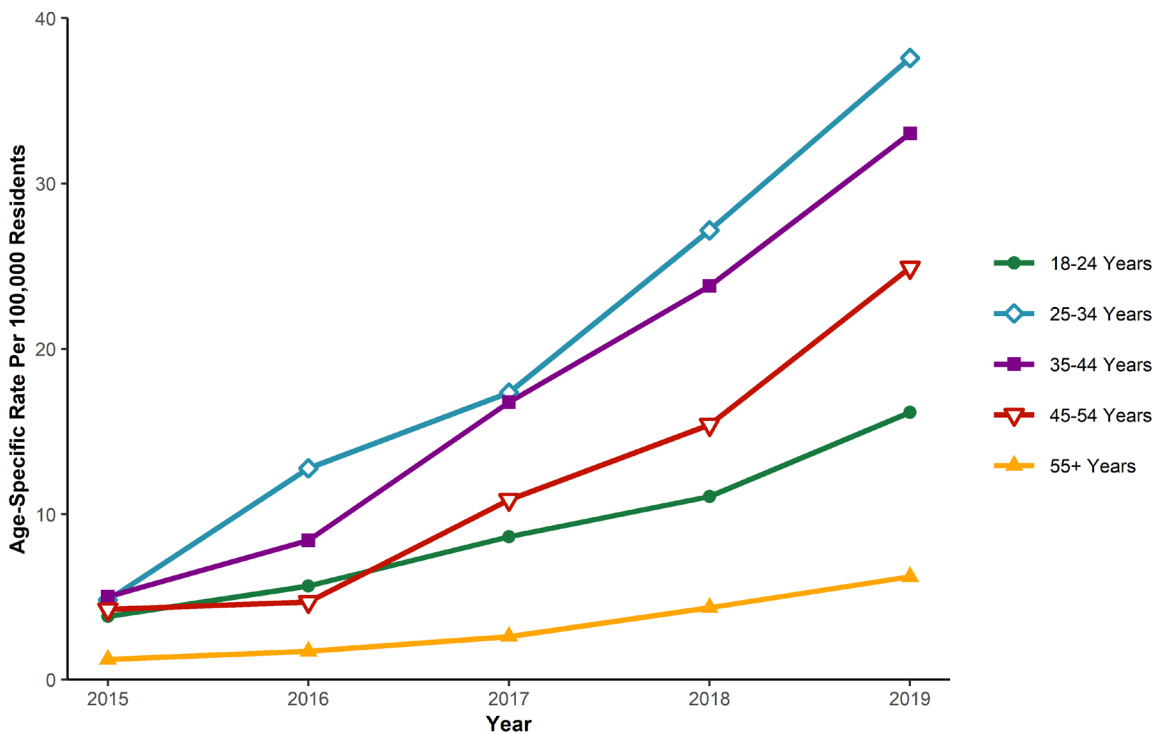
- Knox County

<sup>21</sup> TDH is aware of an undercount of overdose deaths in 2018 primarily occurring in Shelby County. This undercount should be considered when analyzing overdose trends in Shelby County from 2018 to 2019.

# Fentanyl Overdose Deaths

The next few pages focus on overdose deaths involving fentanyl in TN. Fentanyl is a semi-synthetic opioid that is more powerful than both heroin and most opioid pain relievers, making it especially dangerous. While fentanyl can be legally prescribed, overdose deaths in TN primarily involve illicitly-manufactured fentanyl (IMF). Illicit (non-pharmaceutical) fentanyl has increased as a contributing substance in overdose deaths since 2015 in TN and over half (54.1 %) of the deaths involving fentanyl in 2019 were found to be polydrug. This rise in overdose deaths and number of deaths being reported as polydrug is likely due to fentanyl often being found mixed in with other illicit drugs (such as heroin, cocaine, or methamphetamine). Fentanyl in combination with other illicit drugs poses a high risk for overdose due to fentanyl's high potency.

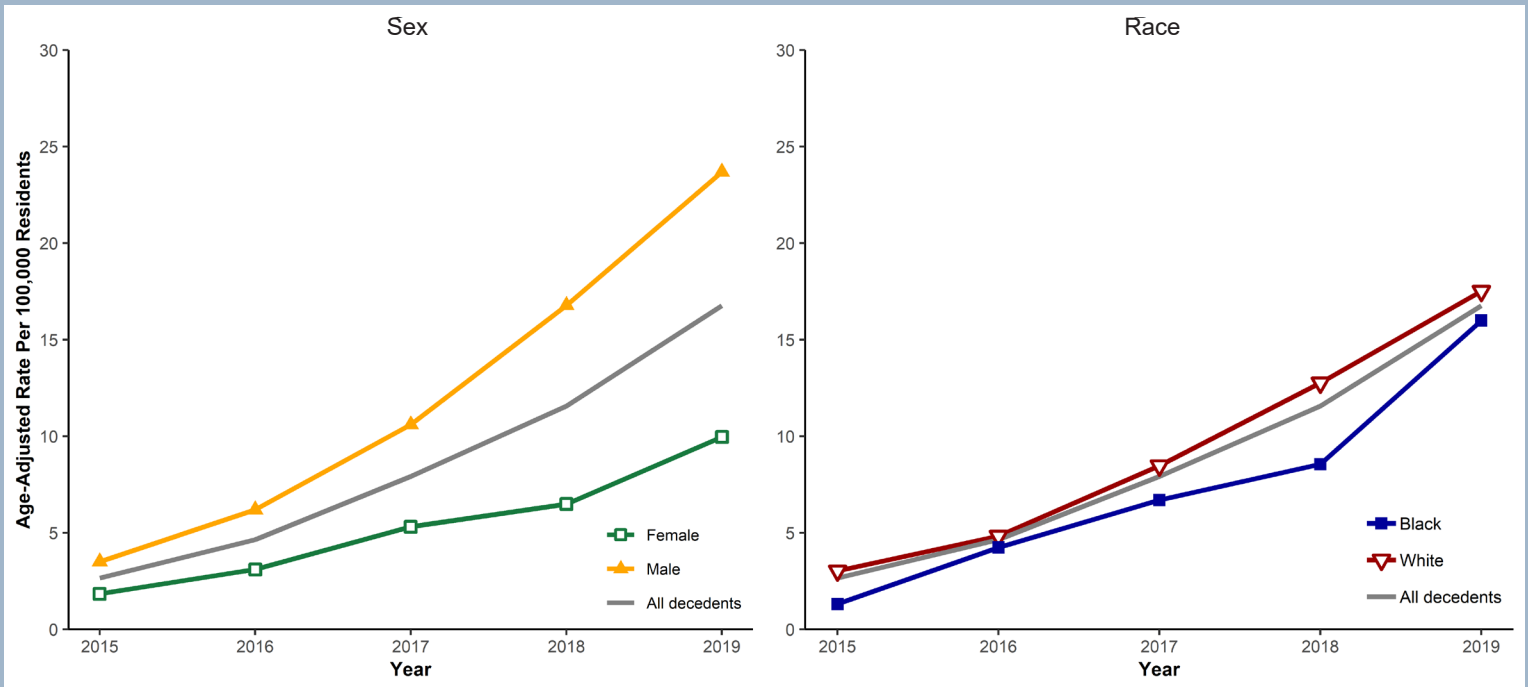
## Age-Specific Rates for Fentanyl Overdose Deaths in TN, 2015-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

The above graph displays age-specific rates for fentanyl overdose deaths in TN from 2015 to 2019. All age groups showed an increase in fentanyl overdose deaths between 2015 and 2019. Individuals aged 25-34 years had the highest overdose rates, increasing from 4.8 per 100,000 in 2015 to 37.6 per 100,000 in 2019.

# Age-Adjusted Rates for Fentanyl Overdose Deaths by Race and Sex in TN, 2015-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Limited to Black and White TN residents for analyses by race. Data Source: TN Death Statistical File.

The above graph presents age-adjusted rates for fentanyl overdose deaths by sex and race (Black and White) for 2015 to 2019. The age-adjusted rate for all decedents is included for comparison. Males had higher rates for all fentanyl overdose deaths, compared to females with increasing trends among both males and females. Rates for White Tennesseans were higher than Black Tennesseans for fentanyl overdose, with increases in both groups through 2019.

Overdose deaths in TN involving fentanyl increased by 46% between 2018 and 2019.

## Change in the Number of Fentanyl Overdose Deaths by TN County of Residence, 2018-2019

The map on the right shows the change in the number of fentanyl overdose deaths from 2018 to 2019 in TN by county. Fifty-two out of 95 counties (55%) had an increase in fentanyl overdose deaths from 2018 to 2019 with Shelby County<sup>22</sup> reporting the highest increase in fentanyl overdose deaths (88 deaths in 2018 to 171 deaths in 2019).

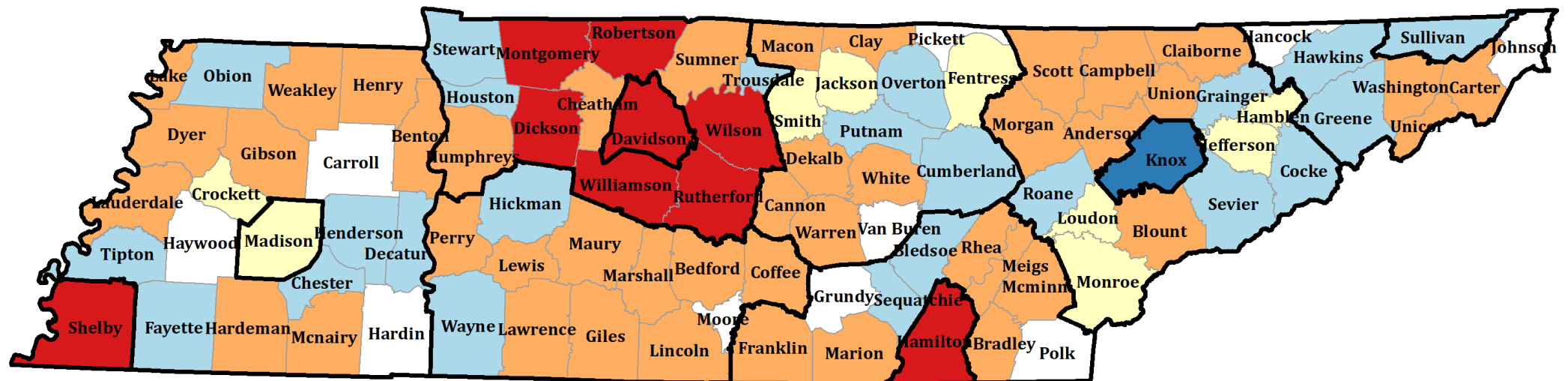
Twenty-four counties showed a decrease in fentanyl overdose deaths with the highest decrease in Knox County (154 deaths in 2018 to 143 deaths in 2019), whereas 9 counties reported no change in fentanyl overdose deaths from 2018 to 2019.

The counties with an increase of  $\geq 10$  overdose deaths involving fentanyl from 2018 to 2019 were:

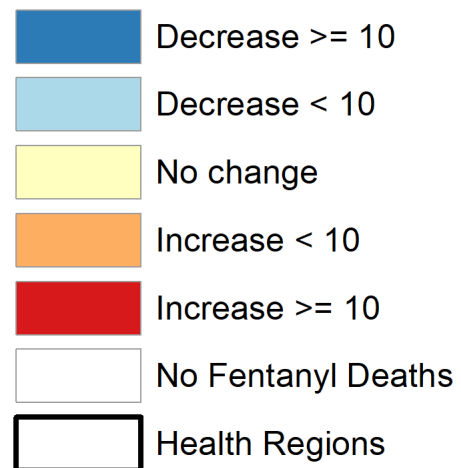
- Davidson County
- Dickson County
- Hamilton County
- Montgomery County
- Robertson County
- Rutherford County
- Shelby County
- Williamson County
- Wilson County

The only county with a decrease of  $\geq 10$  overdose deaths involving fentanyl from 2018 to 2019 was:

- Knox County



**Change in Fentanyl Overdose Deaths by TN County of Residence**



<sup>22</sup> TDH is aware of an undercount of overdose deaths in 2018 primarily occurring in Shelby County. This undercount should be considered when analyzing overdose trends in Shelby County from 2018 to 2019.

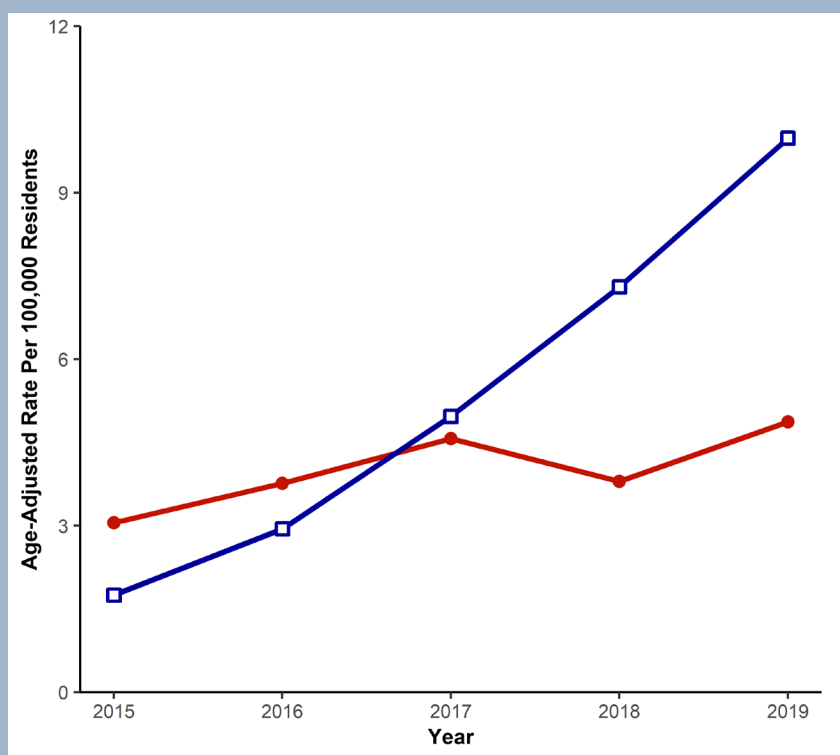
Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.



# Stimulant Overdose Deaths

The next few pages focus on overdose deaths involving stimulants in TN. This includes both illicit drugs (such as methamphetamine, cocaine, and ecstasy) as well as drugs that can be legally obtained by a prescription (such as medications prescribed to treat attention deficit hyperactivity disorder (ADHD) and depression). For the first graph below, stimulant information is separated into two categories, cocaine and psychostimulants (including methamphetamine).

## Age-Adjusted Rates for Stimulant Overdose Deaths in TN, 2015-2019



### Legend

- Cocaine
- Psychostimulants (including methamphetamine)

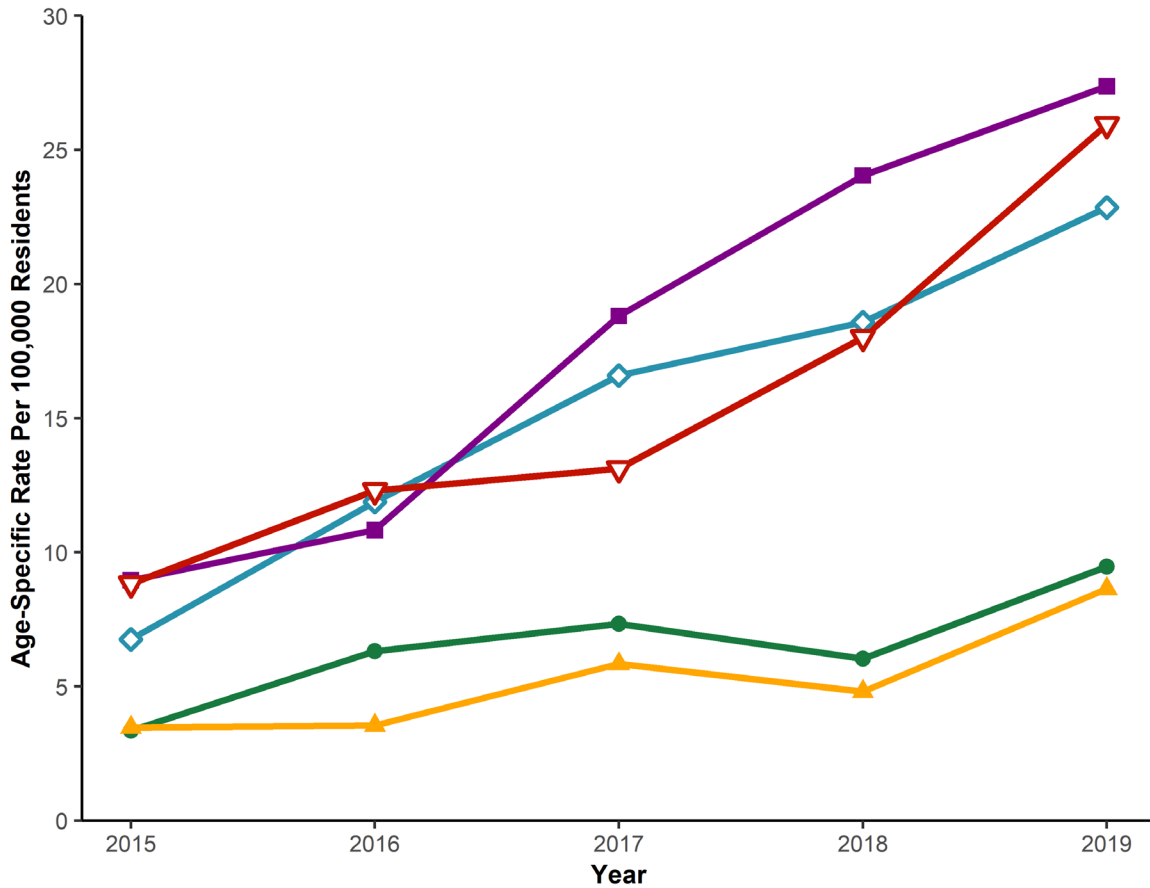
Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents.  
Data Source: TN Death Statistical File.

As shown above, the rate of cocaine overdose deaths<sup>23</sup> increased in TN from 2015 to 2017 with a rate of 3.1 in 2015 (203 total deaths) and a rate of 4.6 in 2017 (306 total deaths) followed by a decrease in rate in 2018 (3.8). The rate then increased again to 4.9 in 2019. The rate of psychostimulants (including methamphetamine) overdose deaths<sup>24</sup> had a sharp increase from 2015 to 2019 (1.8 to 10.0).

<sup>23</sup> Drug overdose deaths caused by acute poisonings that involve cocaine as a contributing cause of death.

<sup>24</sup> Drug overdose deaths caused by acute poisonings that involve a psychostimulant with abuse potential (including methamphetamine).

## Age-Specific Rates for All Stimulant Overdose Deaths in TN, 2015-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

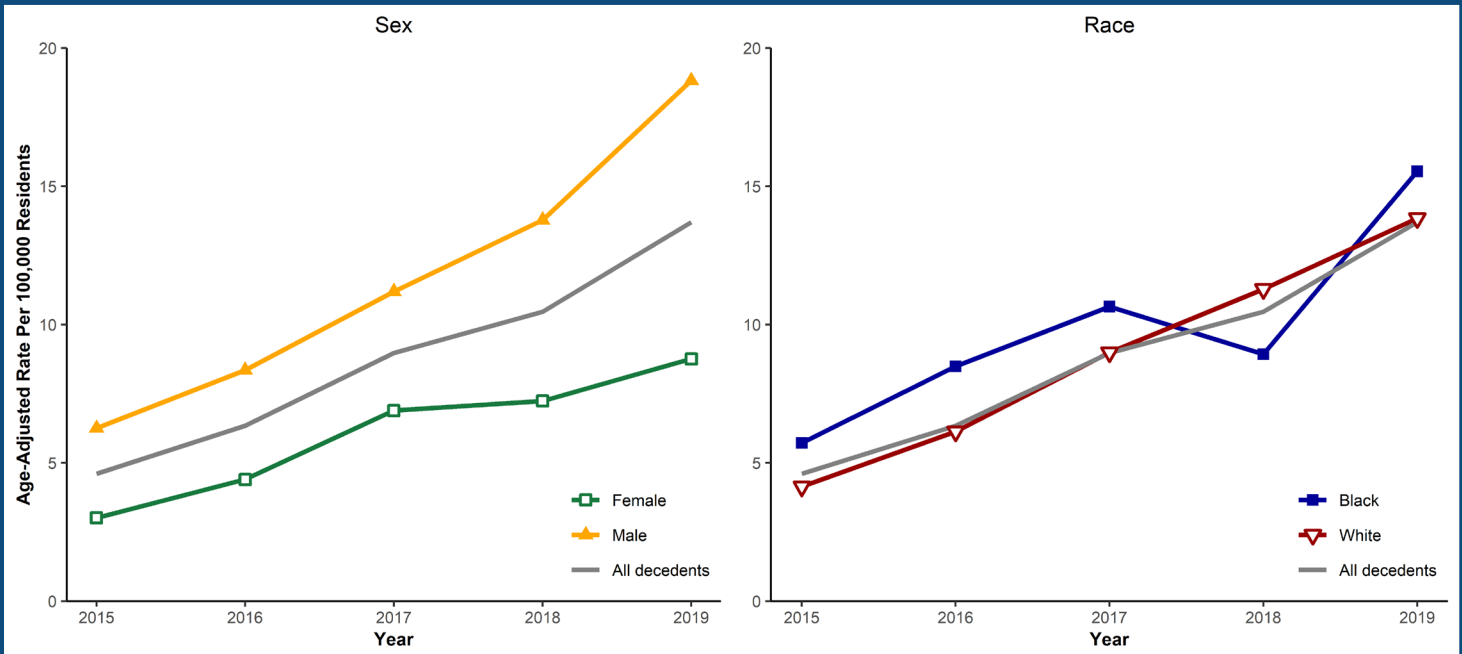
### Legend

- 18-24 Years
- ◇— 25-34 Years
- 35-44 Years
- ▽— 45-54 Years
- ▲— 55+ Years

The above graph displays age-specific rates for stimulant overdose deaths<sup>25</sup> in TN. All age groups showed an increase in stimulant overdose deaths between 2015 and 2019. Individuals aged 35-44 years had the highest overdose rates, increasing from 9.0 per 100,000 in 2015 to 27.4 per 100,000 in 2019. Rates for 45-54 year-olds have also rapidly increased.

<sup>25</sup> All stimulant drug overdose deaths include both cocaine and psychostimulants with abuse potential (including methamphetamine).

# Age-Adjusted Rates for All Stimulant Overdose Deaths by Race and Sex in TN, 2015-2019



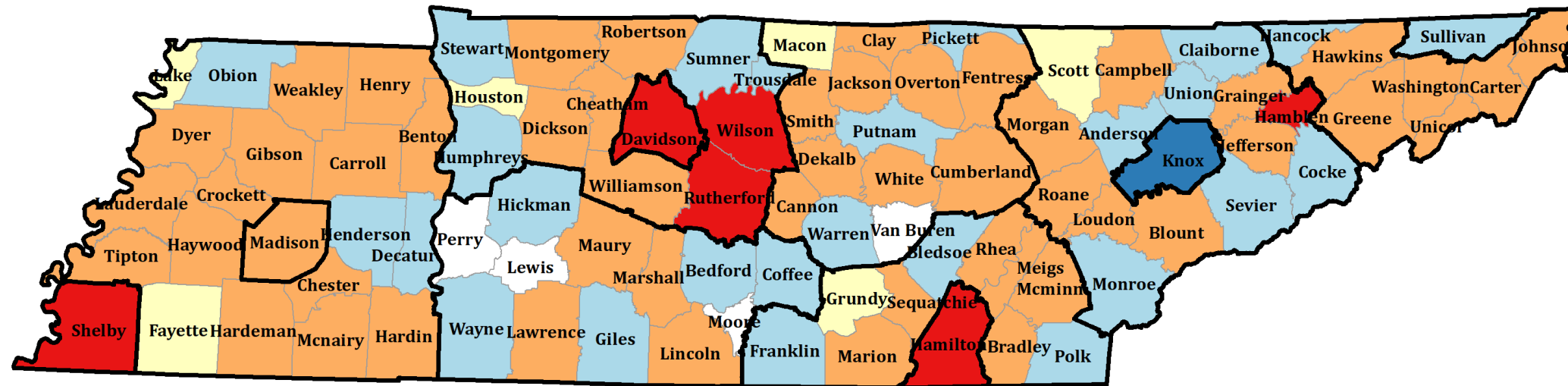
Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Limited to Black and White TN residents for analyses by race. Data Source: TN Death Statistical File.

The above graph presents age-adjusted rates for stimulant overdose deaths by sex and race (Black and White) for 2015 to 2019. The age-adjusted rate for all decedents is included for comparison. Males had higher age-adjusted rates for all stimulant overdose deaths, compared to females.

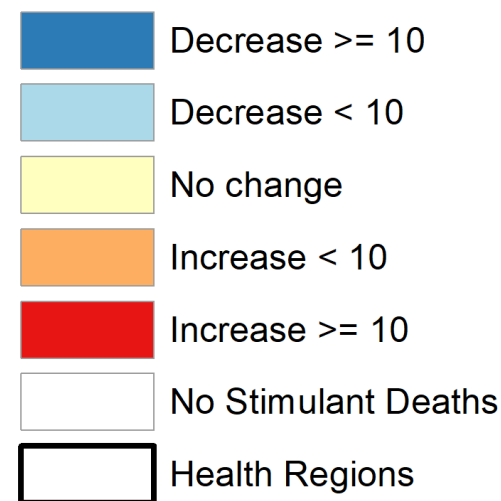
Rates for White Tennesseans were lower than Black Tennesseans for all stimulant overdoses, with the rate for White Tennesseans surpassing Black Tennesseans in 2018. After decreasing in 2018, there has been a sharp increase for stimulant overdose death rates for Black Tennesseans in 2019. While not pictured in the visualization above, it should be noted that rates for cocaine are higher for Black Tennesseans (12.8 in 2019) as compared to White Tennesseans (3.4 in 2019) and rates for psychostimulants including methamphetamine are higher for White Tennesseans (11.6 in 2019) as compared to Black Tennesseans (4.3 in 2019).

**The number of drug overdose deaths in TN involving stimulants increased by 36% between 2018 and 2019.**

## Change in the Number of All Stimulant Overdose Deaths by TN County of Residence, 2018-2019



### Change in Stimulant Overdose Deaths by TN County of Residence



Analysis by the Office of Informatics and Analytics, TDH (last updated November 12, 2020). Limited to TN residents. Data Source: TN Death Statistical File.

The map on the left shows the change in the number of stimulant overdose deaths from 2018 to 2019 in TN by county. Fifty-eight out of 95 counties (61%) had an increase in stimulant overdose deaths from 2018 to 2019. Six counties reported no change in stimulant overdose deaths from 2018 to 2019.

The largest decrease in stimulant overdose deaths was observed in Knox County (119 deaths in 2018 to 100 deaths in 2019). The largest increase was observed in Shelby County<sup>26</sup> (76 deaths in 2018 to 139 deaths in 2019).

The counties with an increase of  $\geq$ 10 overdose deaths involving stimulants from 2018 to 2019 were:

- Davidson County
- Hamblen County
- Hamilton County
- Rutherford County
- Shelby County
- Wilson County

The only county with a decrease of  $\geq$ 10 overdose deaths involving stimulants from 2018 to 2019 was:

- Knox County

<sup>26</sup> TDH is aware of an undercount of overdose deaths in 2018 primarily occurring in Shelby County. This undercount should be considered when analyzing overdose trends in Shelby County from 2018 to 2019.

# 2020 SUDORS Updates

## Introduction to SUDORS

The National Violent Death Reporting System (NVDRS) is a nationwide surveillance system developed by the CDC to collect comprehensive information on violent deaths. A component of the NVDRS is the State Unintentional Drug Overdose Reporting System (SUDORS), which was created to provide more complete data on fatal drug overdoses. Tennessee began participating in SUDORS in the fall of 2017 under CDC's Enhanced State Opioid Overdose Surveillance (ESOOS) grant, which only collected data on deaths from an opioid overdose. Beginning in the fall of 2019, TN was funded by the CDC under the Overdose Data to Action (OD2A) grant, expanding data collection to include all fatal drug overdoses. Under the OD2A grant, SUDORS data are submitted to the CDC every six months for the period of Jan 2019 through December 2022. During this time, fatal drug overdose cases will be considered a SUDORS case if they meet the following criteria:

- A drug overdose of any age, where the death certificate and/or the coroner or medical examiner report indicates that acute drug toxicity directly caused the death **OR**
- In the absence of coroner/medical examiner (CME) report, death certificate ICD-10 codes and/or literal cause of death text, and/or law enforcement reports can be used to determine if a case meets the definition **AND**
- The drug meets the Council of State and Territorial Epidemiologists (CSTE) definition of a drug which specifically excludes inhalants, tobacco, and deaths where only alcohol caused the death **AND**
- The manner of death is unintentional/accidental or undetermined **AND**
- Jurisdictions are responsible for all deaths that occurred (in this case TN) in that jurisdiction regardless of decedent residence or injury location

## SUDORS Data Collection Process Summary

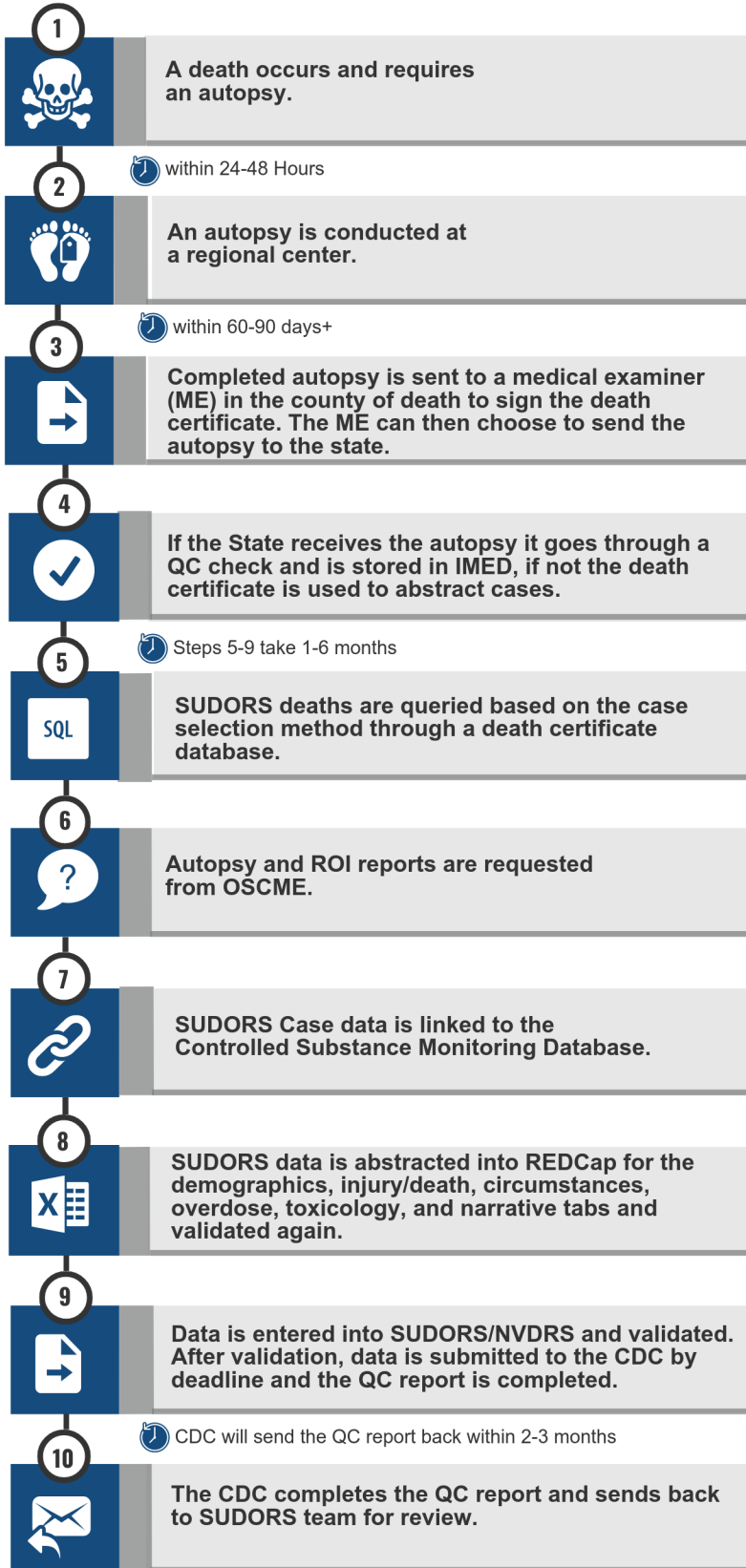
The TN SUDORS team created an algorithm adapted from the CSTE definition to identify fatal drug overdoses in TN for a given time period using ICD-10 codes and literal cause of death text search. After cases are identified, autopsy and Report of Investigation (ROI) information are requested from the Office of the State Chief Medical Examiner (OSCME). If an autopsy was performed and sent to the State, it is used along with the death certificate to confirm the death is a SUDORS case. If an autopsy was not performed or not available, the death certificate and any additional information collected is used to verify a SUDORS case. SUDORS cases are then abstracted and entered in the NVDRS-SUDORS database using all sources available.

While autopsies are conducted within 48 hours of death, it can take months to receive toxicology reports, medical records, and other crucial investigation details needed to make a final determination on the cause and manner of death. Due to the COVID-19 pandemic, this process could be delayed even further. Additionally, not every SUDORS case is autopsied, particularly if the decedent died while in the hospital. For additional details regarding the SUDORS data collection process and timeline, see the graphic on the following page that was prepared by the TDH SUDORS team in collaboration with the OSCME.



# SUDORS Data Collection Process

(Prepared by TDH SUDORS Team & OSCME)



### KEY

**QC** - Quality Control

**SUDORS** - State Unintentional Drug Overdose Reporting System

**ROI** - Report of Investigation

**OSCME**- Office of the State Chief Medical Examiner

**IMED**- Interim Medical Examiner Database

**NVDRS** - National Violent Death Reporting System

## 2019 SUDORS Data

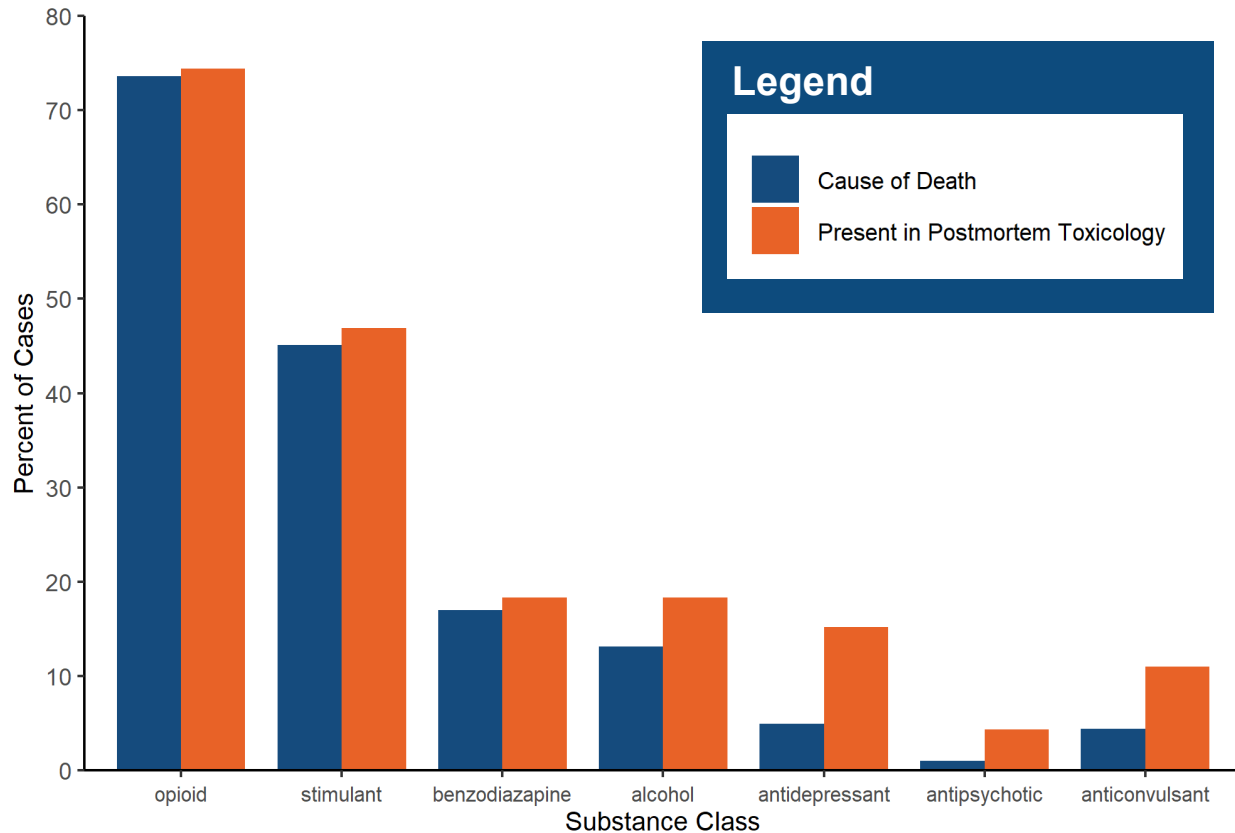
The table to the right shows overdose deaths occurring in TN from January 1, 2019 to December 31, 2019. For this time period, 2,052 SUDORS cases were identified. Of those cases, 1,477 had an autopsy and 1,475 had a toxicology report available at the time of abstraction. **Due to the differences in the identification of SUDORS cases, data and trends in this section may not align with trends reported from death certificates (pages 20-50).**

Data Source	n (%)
Death certificate	2,052 (100%)
Report of investigation	1,149 (56%)
Autopsy	1,477 (71.9%)
Toxicology	1,475 (71.8%)

The table below shows the demographic characteristics for the 2,052 individuals in TN who died of an unintentional or undetermined drug overdose in 2019. Jurisdictions are responsible for all SUDORS cases if the death occurred in their state or territory regardless of the decedent's residence. Most deaths occurred in white (83.6%) males (65.1%), between the ages of 19-54 years old (77.7%), and who were TN residents at the time of death (94.7%). The majority (74.4%) of these individuals had a high school education or above at the time of death.

Characteristic	n (%)
<b>Age:</b>	
1-18 years	13 (0.6%)
19-34 years	632 (30.8%)
35-54 years	962 (46.9%)
55+ years	444 (21.7%)
<b>Sex:</b>	
Male	1,336 (65.1%)
<b>Race:</b>	
White	1,708 (83.6%)
<b>Marital status:</b>	
Single/Never Married	900 (43.9%)
Married or domestic partnership	440 (21.4%)
Widowed/divorced/separated	666 (32.5%)
Unknown	46 (2.2%)
<b>Education:</b>	
< High school	463 (22.6%)
High school graduate or GED	999 (48.7%)
> High school	528 (25.7%)
Unknown	62 (3.0%)
<b>State of residence:</b>	
Tennessee	1,943 (94.7%)

## Major Drug Classes Involved in SUDORS Drug Overdose Deaths in TN, 2019 (n= 1,475)<sup>27</sup>



Analysis by the Office of Informatics and Analytics, TDH (last updated December 29, 2020). Data Source: SUDORS 2019 file.

The graph above shows the most common drug classes listed as a cause of death and found in the toxicology of the 2019 SUDORS cases. Of the 2,052 cases in 2019, 1,475 had a forensic toxicology report available. The other 577 SUDORS cases did not have full toxicology reports available at the time of data submission and thus are not included in the figure above.

Substances that were present in the toxicology reports<sup>28</sup> and were determined to contribute to the death are represented by the blue bars above. Substances that were present in the toxicology report but were not determined to contribute to the death are represented by the orange bars above. These categories are not mutually exclusive as multiple substances may be present in one toxicology report, and multiple substances may have contributed to the cause of death. Of the 1,475 SUDORS cases with toxicology in 2019, the most common classes of substances listed as the cause of death (blue bar) were opioids (80.7%); stimulants including amphetamine, methamphetamine, and cocaine (46.6%); benzodiazepines (19.0%); and alcohol (14.0%).

<sup>27</sup> Heroin cannot be directly tested, and therefore heroin may be a cause of death but will not present in toxicology reports. However, heroin may still be listed as a cause of death if the Medical Examiner determined scene information and toxicology metabolites of heroin indicated heroin to have caused or contributed to the death,

<sup>28</sup> Not all SUDORS cases had toxicology reports available, and therefore, not all decedents are included in the visualization above.



## Most Commonly Identified Substances in SUDORS Toxicology Reports and Listed as Cause of Death, 2019

The table below shows the distribution of frequently identified substances in SUDORS toxicology reports and listed as the cause of death. Out of 2,052 total cases, only 1,475 (71.9%) had a full toxicology report available and thus only those 1,475 cases are displayed in the chart below. These categories are not mutually exclusive, as multiple substances may be present in one toxicology report. Additionally, multiple substances may have contributed to the cause of death. Out of these 1,475 cases, the top substances listed as a cause of death were fentanyl (59.7%) and methamphetamine (34.0%).

For these 1,475 cases, the most common substances found in the decedent's system at the time of death, regardless of whether or not that substance caused the death, were fentanyl (60.3%), methamphetamine (34.6%), amphetamine (32.8%), cocaine (16.4%), heroin metabolite (19.4%), alprazolam (15.2%) oxycodone (13.6%), oxymorphone (10.7%), gabapentin (9.9%), hydrocodone (5.8%), kratom (3.1%), and tramadol (3.1%).

### Substances Identified in Toxicology Report or Cause of Death of SUDORS Cases in TN, 2019

Substance	Found in Toxicology Report (n=1,475) n (%)	Reported as Cause of Death (n=1,475) n (%)
Fentanyl	889 (60.3%)	880 (59.7%)
Methamphetamine	510 (34.6%)	501 (34.0%)
Amphetamine	484 (32.8%)	26 (1.8%)
Cocaine	242 (16.4%)	224 (15.2%)
Heroin metabolite <sup>29</sup>	286 (19.4%)	281 (19.1%)
Alprazolam (Xanax)	224 (15.2%)	177 (12.0%)
Oxycodone (Oxy/Oxycontin)	201 (13.6%)	153 (10.4%)
Oxymorphone	158 (10.7%)	64 (4.3%)
Gabapentin	146 (9.9%)	64 (4.3%)
Hydrocodone	85 (5.8%)	64 (4.3%)
Kratom	46 (3.1%)	41 (2.8%)
Tramadol	46 (3.1%)	28 (1.9%)

<sup>29</sup> Heroin cannot be tested for directly and therefore heroin may be a cause of death but will not present in toxicology reports.

# Section Spotlight

## Overview of the Tennessee Rapid Opioid Death Detection (TN-RODD) Project

Identification of drug overdose deaths is critical for prevention and reduction of drug-related fatalities across the U.S. One barrier in identifying drug overdose deaths is the amount of time it takes for some states to receive death data regarding fatal drug overdoses. Tennessee functions under a decentralized medical examiner system; hence, the state's Chief Medical Examiner has no control over the number of autopsies that are sent to the state for review or the time frame in which they are sent. Currently, it can take up to a month for our state to receive preliminary information needed to identify a drug overdose death. The goal of the Rapid Opioid Death Detection (RODD) project is to create a method to identify opioid overdose deaths within one month of death and make data available sooner for use in prevention efforts. Establishing partnerships at the local level is vital to accomplishing this goal.

OIA partnered with Knox County to pilot the RODD project falling under the Overdose Data to Action (OD2A) grant to receive data and develop a case definition for early detection of suspected opioid overdose deaths. Knox County had the highest burden of fatal opioid overdoses in TN based on 2018 data, approximately 17% of the total opioid overdose deaths, and was thus selected to pilot this project. Medicolegal Death Investigation Log (MDI) reports are utilized by the county to identify overdose deaths. The MDI Log report contains circumstantial information, suspected manner and cause of death, preliminary postmortem observations, and investigator summary including medical history, prescription information, and scene evidence for each decedent. Our RODD case definition for early detection of suspected opioid drug overdose deaths in Knox County has been derived from these MDI log reports, and they are provided to OIA by Knox County within one month of death for each suspected case. The Knox County suspected opioid overdose case definition appears on the next page.

We have completed the first data submission of line-level data for RODD cases occurring from May 2020 to September 2020. Fatal opioid overdose cases will be confirmed once the finalized autopsy and toxicology data are received and entered into the National Violent Death Reporting System (NVDRS). We will then analyze the accuracy of the case definition and make necessary adjustments. We plan to expand our RODD project by partnering with additional counties within TN beginning with counties of highest fatal opioid overdose burden as of 2019 (Davidson County, 18% and Shelby County, 13%).

**The RODD project is a part of the CDC's OD2A grant. To learn more about OD2A and the CDC's effort to combat the overdose epidemic scan the QR Code or click the link [here](#).**



## Rapid Fatal Opioid Overdose Definition by Knox County

The following is the definition currently being used by the Knox County Medical Examiners to identify RODD cases. Suspected fatal opioid overdoses are identified following the guidance provided by the National Association of Medical Examiners.

A death that is not otherwise explained by trauma or natural disease **AND** with scene findings **OR** medical history that indicates a history of drug use, misuse, or overuse, such as:

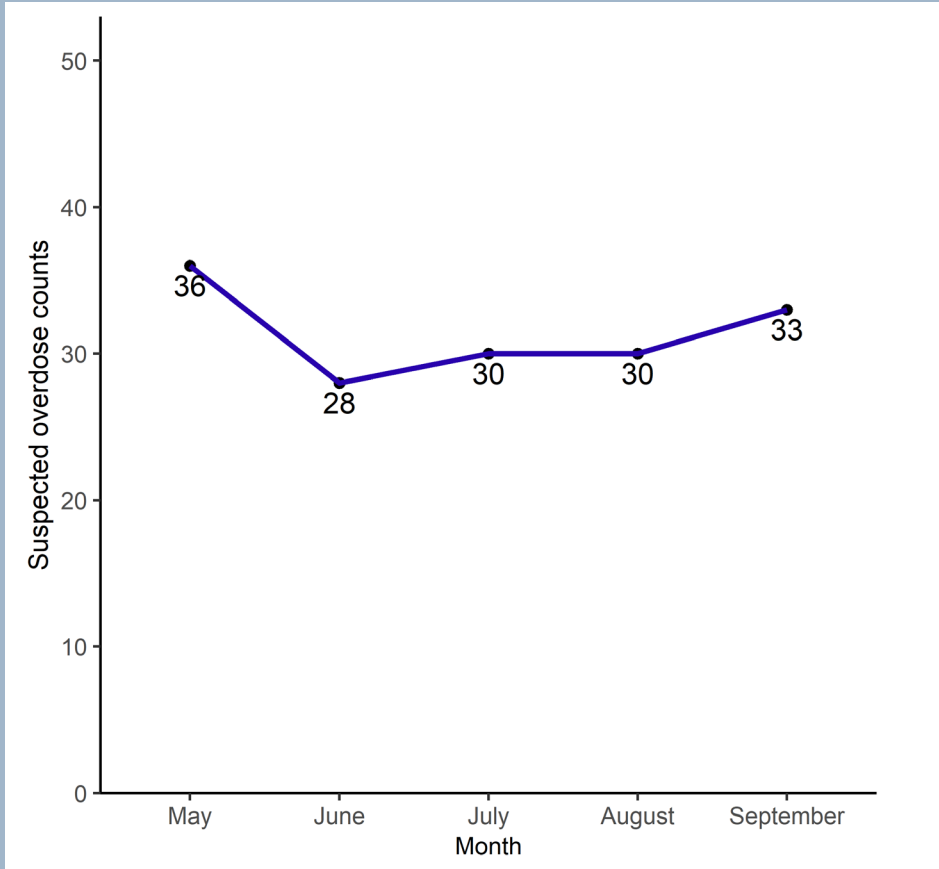
- Opioid medications on scene that appear to be “out of count”, or are not prescribed to the decedent based on review of medical records or prescription monitoring program transcript
- Evidence of multiple prescribers for overlapping opioid medication prescription on prescription monitoring program transcript
- The presence on scene of medication not prescribed to the decedent
- History of medication-assisted treatment (buprenorphine, methadone, etc.)
- Drug paraphernalia indicating intravenous drug use or insufflation: needles, spoons, baggies, white powdery residue, powdered substances, tourniquets, etc.)
- History of bacterial endocarditis not associated with valve prosthesis
- History of previous overdoses
- Intravenous drug use, opioid abuse, or general history of opioid overuse or misuse
- Cutaneous puncture sites or dermal puncture scars

## Identification Criteria for Suspected Opioid Overdose Deaths in Knox County, TN from May 2020 to September 2020 (n=157)

The table to the right displays the criteria used to identify cases in Knox County as suspected opioid overdose deaths. Line-level data on each of the identification criteria for suspected opioid deaths were collected and submitted to CDC. Many of the suspected opioid overdose deaths had evidence of drug use on scene (72%), followed by evidence of opioid abuse history (64.3%), and external postmortem observations (21%).

Criteria	Suspected opioid overdose death definition	n (%)
History	Evidence of opioid abuse history	101 (64.3%)
Witness	Witness report of drug use	13 (8.3%)
Scene	Physical evidence of drug use reported on scene	113 (72.0%)
Clinical scene	Clinical signs of opioid overdose reported by witnesses or first responders	17 (10.8%)
External postmortem observations	Presence of track marks, puncture sites not due to medical intervention, pulmonary edema, bladder distension	33 (21.0%)
Toxicology	Preliminary toxicology results (e.g. urine drug screen performed at hospital)	12 (7.6%)

## Monthly Trends in Suspected Opioid Overdose Deaths in Knox County, TN, May 2020 - September 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated October 12, 2020). Limited to those who died in Knox County, TN.

Data Source: RODD Data

The monthly trends in suspected opioid overdose deaths from the first RODD data submission with cases occurring in Knox County between May 2020 and September 2020 are shown above. The month of May had the highest number of suspected opioid overdose deaths with 36 identified cases, although the number of suspected cases remained steady throughout the five-month time period with an average of 31 suspected cases. Males represented a higher percentage of the suspected cases than females (67.5%) and the mean age was 45 years ( $\pm 12.95$  years) ranging between 20 - 80 years.

TDH-OIA looks forward to learning more as we continue our work with this project and appreciate our partners in Knox County and the Office of the State Chief Medical Examiner for helping us throughout this process.

# 23,910

The number of drug overdose-related discharges for all outpatient visits and inpatient stays in TN in 2019<sup>30</sup>

## NONFATAL DRUG OVERDOSE TRENDS

Nonfatal drug overdoses continue to increase across Tennessee. The number of overdoses reported from 2016 to 2020 show marked increases, particularly for individuals experiencing opioid overdose (excluding heroin), heroin overdose, and stimulant overdose (excluding caffeine). In general, the groups most affected by nonfatal drug overdoses include males, White Tennesseans, and those aged 25-34 years old. In this section, trends for nonfatal drug overdose hospital discharges will be highlighted from the three sources of nonfatal overdose data available to TDH. Additionally, this section will spotlight ongoing OIA research that aims to better understand the annual costs associated with overdose-related discharges in TN.



<sup>30</sup> The number of drug overdose-related discharges was calculated from the 2019 Hospital Discharge Data System (HDDS).

# Introduction

TDH's public health surveillance of nonfatal drug overdose relies on several data sources, each with varying levels of reporting timeliness. Near-real time data (e.g. daily) are helpful for identifying suspected overdoses and monitoring current trends while less timely data (e.g. weekly, quarterly) provide a more accurate and complete picture of the burden of nonfatal overdose across TN.

TDH utilizes three primary data systems for nonfatal drug overdose surveillance: the **Hospital Discharge Data System (HDDS)**, the **Drug Overdose Reporting System (DOR)** and **Electronic Surveillance System for Early Notification of Community-based Epidemics (ESSENCE)**. In this section, we present trends in overdose from finalized HDDS data for the period from 2016 to 2019. We also provide preliminary 2020 data from DOR and ESSENCE. Each of these data systems is unique, and understanding the nuances about each system is important when interpreting the data and information in this section.

Data Source	Data Source Characteristics	Drug Overdose Indicators	Geographic Level	Most Recent Available Data
<b>TN Hospital Discharge Data System (HDDS)</b>	<ul style="list-style-type: none"> <li>Data are received quarterly</li> <li>Data include outpatient visits (primarily Emergency Department visits and 23 hours or less observations) and inpatient stays (longer than 24 hours) from non-federal, acute care hospitals</li> <li>All hospital facilities in TN report HDDS data</li> </ul>	<ul style="list-style-type: none"> <li>Nonfatal overdoses- including all drug, opioid, heroin, and stimulant-identified through ICD-10-CM diagnosis codes in billing data</li> </ul>	TN, Region, County	<ul style="list-style-type: none"> <li>Due to statutory restrictions public release of data occurs with an 18 month lag</li> <li>More recent data are available internally to TDH</li> </ul>
<b>TN Drug Overdose Reporting System (DOR)</b>	<ul style="list-style-type: none"> <li>Data are received weekly (previous week Sunday-Saturday)</li> <li>Data include non-federal Emergency Department (ED) and acute care hospitals and freestanding ambulatory surgical treatment centers affiliated with a hospital</li> <li>Approximately 118 facilities report to DOR</li> </ul>	<ul style="list-style-type: none"> <li>Nonfatal overdoses- including opioid, stimulant, benzodiazepine and muscle relaxants- identified through ICD-10-CM diagnosis and Systemized Nomenclature of Medicine Clinical Terms (SNOMED CT) codes in billing data reported to TDH</li> </ul>	TN, Region, County, Address	<ul style="list-style-type: none"> <li>Monthly Hospital Reported Nonfatal Opioid Overdose reports are posted online <a href="#">here</a><sup>31</sup></li> <li>Weekly data are available internally to TDH</li> </ul>
<b>Syndromic Surveillance (ESSENCE)</b>	<ul style="list-style-type: none"> <li>Data are received daily</li> <li>Data include Emergency Department (ED) facilities</li> <li>Approximately 105 facilities report to ESSENCE</li> </ul>	<ul style="list-style-type: none"> <li>Data are <u>suspected</u> data, before clinical or laboratory confirmation</li> <li>Syndromic data include all drugs, all opioid, heroin and all stimulants</li> <li>Identification of overdose cases relies on a CDC-algorithm that searches discharge diagnosis codes or SNOMED codes and chief complaint text</li> </ul>	Region, Health Facility Region, County	<ul style="list-style-type: none"> <li>Daily data are available internally to TDH</li> </ul>

<sup>31</sup> TDH-OIA. (2020). Monthly Hospital Reported Nonfatal Opioid Overdose Briefs. Retrieved from: <https://www.tn.gov/health/health-program-areas/pdo/pdo/facts-figures.html>

# HDDS Overdose Trends

## Hospital Discharge Drug Overdose Trends

As HDDS represents the most complete data source of nonfatal drug overdoses statewide, it is featured as the primary data source in this report. Billing codes from hospital discharges statewide for inpatient hospitalizations and outpatient visits (including emergency department visits) are included in the HDDS. These billing codes are based on the International Classification of Diseases, Tenth Revisions, Clinical Modification (ICD-10-CM) and provide a standardized method for identification of drug overdoses using administrative data. The full documentation manual is available [online](#).<sup>32</sup> TDH makes provisional HDDS data available on a quarterly basis for internal use. The annual finalized data are used in this report.

HDDS data in this report highlights all drug, opioid (excluding heroin), heroin, and stimulant (excluding caffeine) overdose data. The current report includes discharges for TN residents at non-federal, acute care hospitals for four primary drug overdose morbidity indicators for inpatient stays and outpatient visits with a discharge date between January 1, 2016 and December 31, 2019. We describe drug overdoses overall and by age, race, sex, and total cost as feasible.

Definitions for these overdose indicators are based on guidelines from the Centers for Disease Control and Prevention (CDC) Toolkit 3.0 developed for use by the Prevention for the States (PfS) and Data-Driven Prevention Initiative Programs (DDPI).<sup>33</sup> The validity of the definitions has been evaluated by cross-jurisdiction analyses and expert consultation conducted by the Council for State and Territorial Epidemiologists (CSTE) ICD-10-CM Drug Poisoning Indicators Workgroup.

Briefly, the drug overdose morbidity indicators include:

1. **All drug overdose outpatient visits or inpatient stays** - caused by nonfatal acute poisonings due to the effects of drugs.
2. **Opioid overdose excluding heroin outpatient visits or inpatient stays** - caused by nonfatal acute poisonings due to the effects of all opioid drugs (excluding heroin).
3. **Heroin overdose outpatient visits or inpatient stays** - caused by nonfatal acute poisonings due to the effects of heroin.
4. **Stimulant overdose excluding caffeine outpatient visits or inpatient stays** - caused by nonfatal acute poisonings due to the effects of stimulants (excluding caffeine).

**Intent for all drug overdose types:** intentional, unintentional, assault, or undetermined.

Events related to late effects, adverse effects, underdosing, and chronic poisonings due to the effects of drugs (e.g., damage to organs from long-term drug use), are excluded. Unless otherwise indicated, data exclude records with discharge status of deceased. Since the ICD-10-CM transition, which added codes for encounter type (initial encounter, subsequent encounter, sequela), <0.2% of discharge records in TN are coded as a subsequent encounter or sequela. Therefore, the above indicators are limited to only initial and missing encounters following PfS and DDPI indicator definitions.

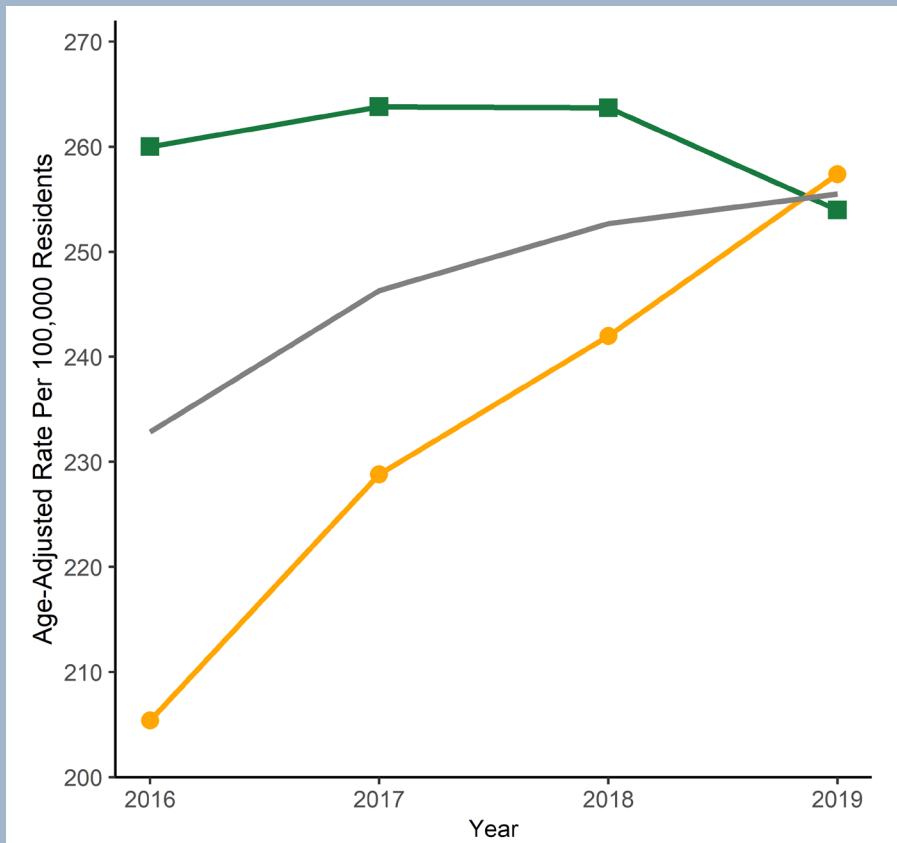
<sup>32</sup> Hospital Discharge Data System User Manual (2020). Retrieved from: [https://www.tn.gov/content/dam/tn/health/program-areas/reports\\_and\\_publications/2020-Hospital-Discharge-Data-System-User-Manual.pdf](https://www.tn.gov/content/dam/tn/health/program-areas/reports_and_publications/2020-Hospital-Discharge-Data-System-User-Manual.pdf)

<sup>33</sup> Centers for Disease Control and Prevention (2018). CDC's Opioid Overdose Indicator Support Toolkit: Guidance for building and reporting on opioid-related mortality, morbidity, and PDMP indicators (Versions 3.0). Atlanta, GA.

# All Drug Nonfatal Overdose

HDDS data in this report highlights all drug, opioid (excluding heroin), heroin, and stimulant (excluding caffeine) overdose data. For the next few pages in this section trends for all drug overdose outpatient visits and inpatient stays in TN are displayed.

## Age-Adjusted Rates for All Drug Overdose Outpatient Visits by Sex in TN, 2016-2019



### Legend

- Female
- Male
- All Patients

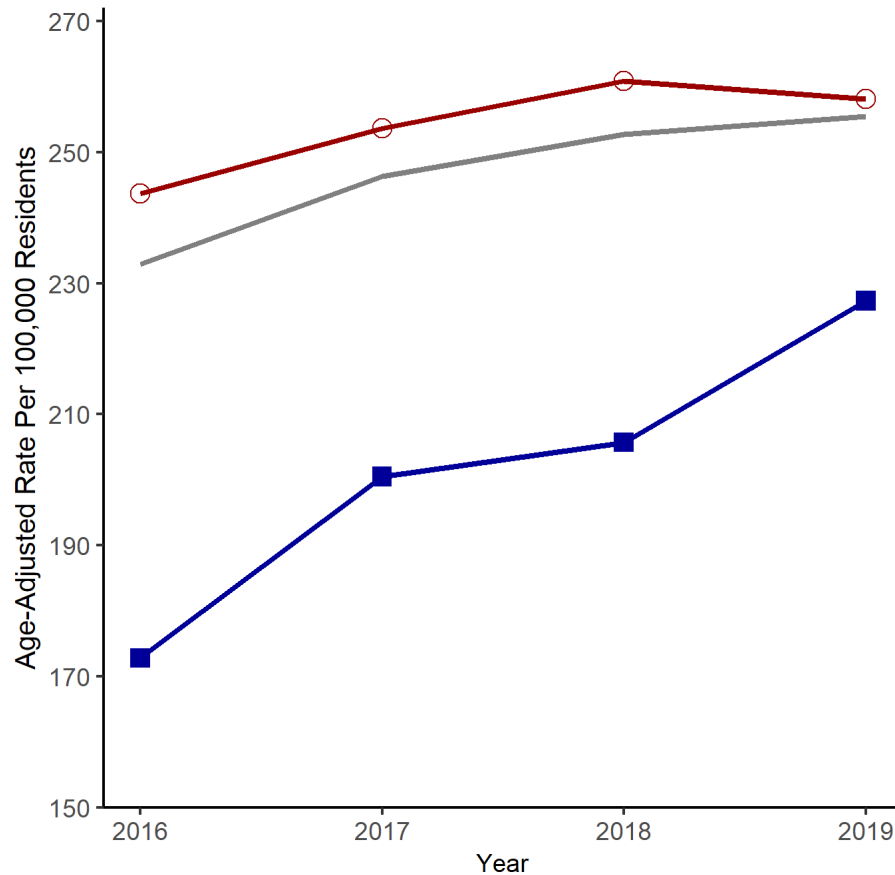
Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The above graph shows age-adjusted rates for all drug overdose outpatient visits by sex from 2016 to 2019. In TN, the rate<sup>34</sup> for all drug overdose outpatient visits increased from 232.9 per 100,000 in 2016 to 255.5 per 100,000 in 2019. Though females had higher age-adjusted rates compared to males until 2018, males had the highest rate in 2019 as well as the largest increase in age-adjusted rate observed during this period (205.4 in 2016 to 257.4 in 2019).

<sup>34</sup> In this section, all rates are per 100,000 residents unless otherwise specified.



## Age-Adjusted Rates for All Drug Overdose Outpatient Visits by Race in TN, 2016-2019



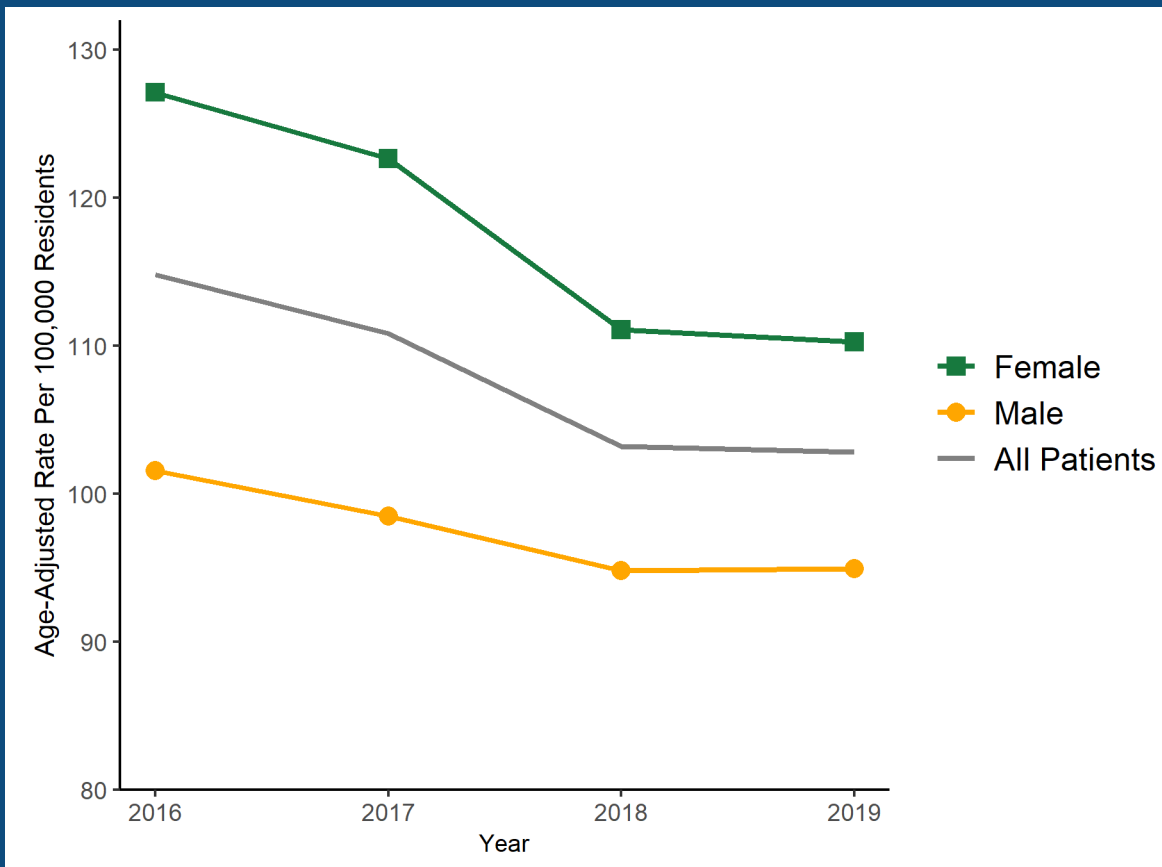
Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

### Legend

- Black
- White
- All Patients

The above graph shows age-adjusted rates for all drug overdose outpatient visits by race (Black and White) from 2016 to 2019. In TN, outpatient visits for all drug overdoses increased from 232.9 per 100,000 in 2016 to 255.5 per 100,000 in 2019. Though White Tennesseans compared to Black Tennesseans had higher age-adjusted rates for all drug overdoses, Black Tennesseans had the largest increase in age-adjusted rate over the time period (172.8 in 2016 to 227.3 in 2019).

## Age-Adjusted Rates for All Drug Overdose Inpatient Stays by Sex in TN, 2016-2019

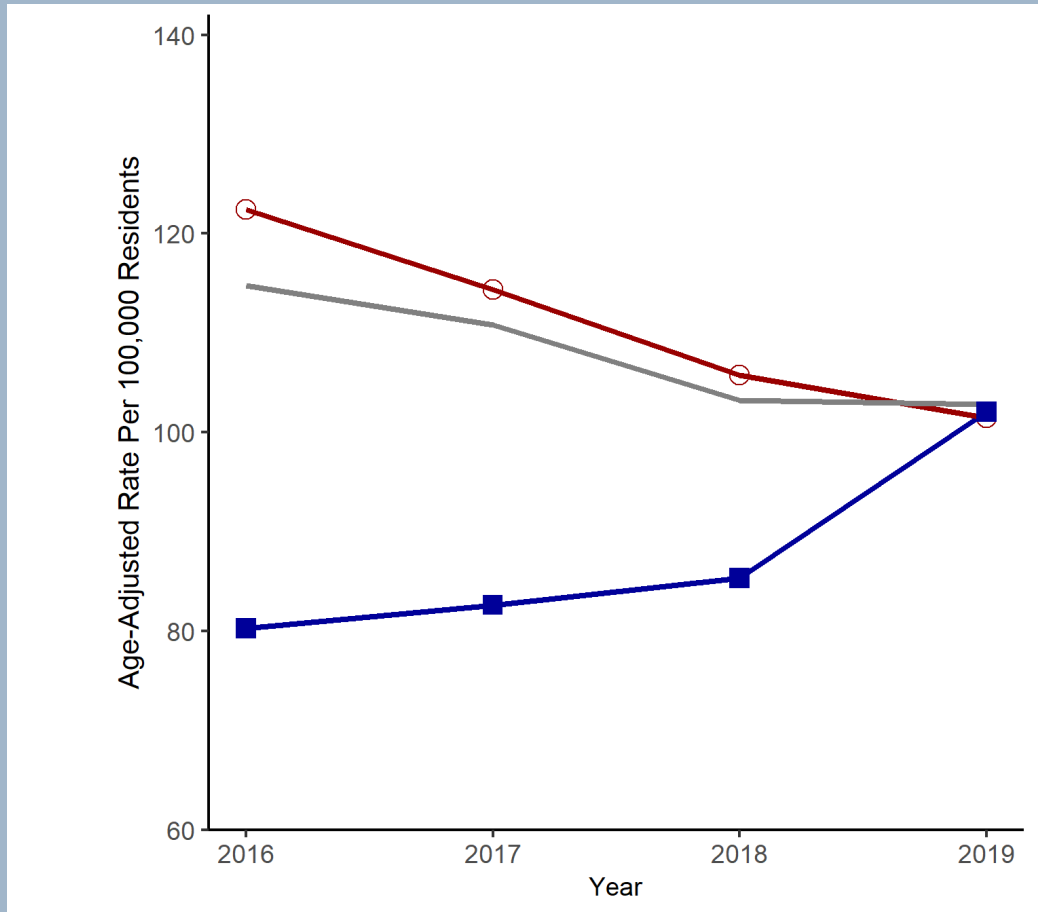


Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

Age-adjusted rates for inpatient stays for all drug overdoses by sex during 2016 to 2019 are shown above. In TN, inpatient stays for all drug overdoses decreased and ranged from 114.8 per 100,000 in 2016 to 102.8 per 100,000 in 2019. Females had higher age adjusted rates for all drug overdose inpatient stays than males, but both showed a decrease in age-adjusted rates over time. Rates for females decreased from 127.1 in 2016 to 110.3 in 2019 while rates for males decreased from 101.6 in 2016 to 94.9 in 2019.

**A nonfatal drug overdose can result in serious overdose-related side effects requiring a hospitalization and potentially life-long care.**

## Age-Adjusted Rates for All Drug Overdose Inpatient Stays by Race in TN, 2016-2019



### Legend

- Black
- White
- All Patients

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

Age-adjusted rates for inpatient stays for an all drug overdose by race (Black and White) from 2016 to 2019 are shown above. Inpatient stays for all drug overdoses decreased and ranged from 114.8 per 100,000 in 2016 to 102.8 per 100,000 in 2019 for all patients. An increase in rate was observed among Black Tennesseans from 2016 (80.3) to 2019 (102.0), while White Tennesseans showed a decrease in age-adjusted rate from 122.4 in 2016 to 101.4 in 2019.

## History of Nonfatal Overdose Outpatient Visits or Inpatient Stays in the Year before Death among 2019 Drug Overdose Decedents in TN (n= 2,089)

### Number of Patients with One or More Nonfatal Overdose in the Year Before Death, Identified in TN Hospital Discharge Data System

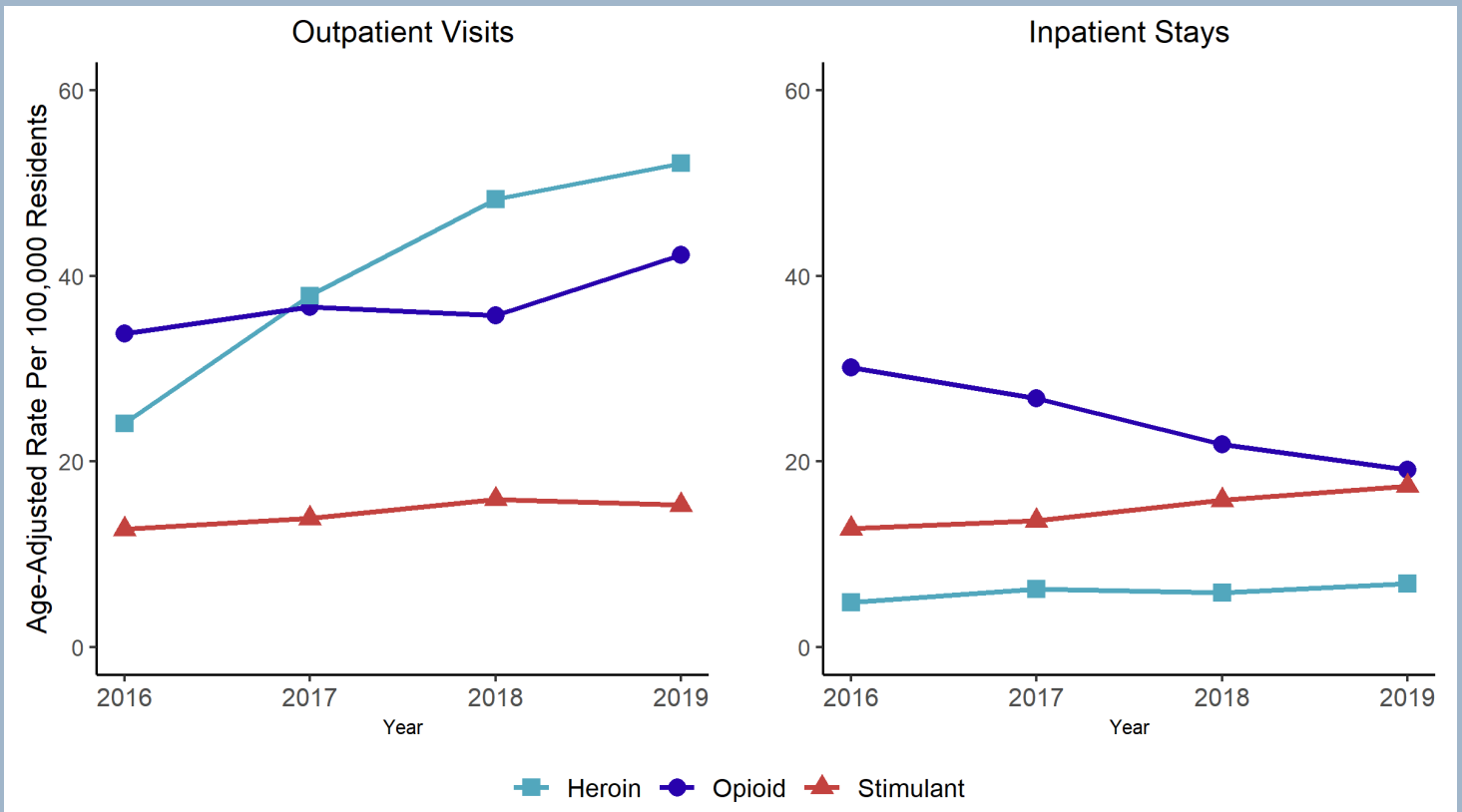
Overdose Drug Type	Outpatient Visits	Inpatient Stays
All Drug	228	192
Opioid (excluding heroin)	78	55
Heroin	107	39
Stimulant (excluding caffeine)	10	54

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

For every drug overdose death in 2019, nearly 12 nonfatal overdose discharges were identified in the HDDS. About 98% of discharges treated in the outpatient setting were from emergency departments. In the year before death (2019), at least 17.9% of 2,089 decedents had an all drug nonfatal overdose, while 6.0%, 6.4%, and 3.0% of overdose decedents had an opioid (excluding heroin), heroin, or stimulant (excluding caffeine) nonfatal overdose, respectively.

Among decedents with one or more nonfatal overdoses in the year before death, the total number of discharges was 515 for all drug outpatient visits or inpatient stays, including 295 outpatient visits and 220 inpatient stays (discharge-level data not shown). It is important to note that hospital discharge data do not include nonfatal overdoses that occurred outside of the hospital.

# Age-Adjusted Rates for Opioid (Excluding Heroin), Heroin and Stimulant (Excluding Caffeine) Overdose Outpatient Visits and Inpatient Stays in TN, 2016-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

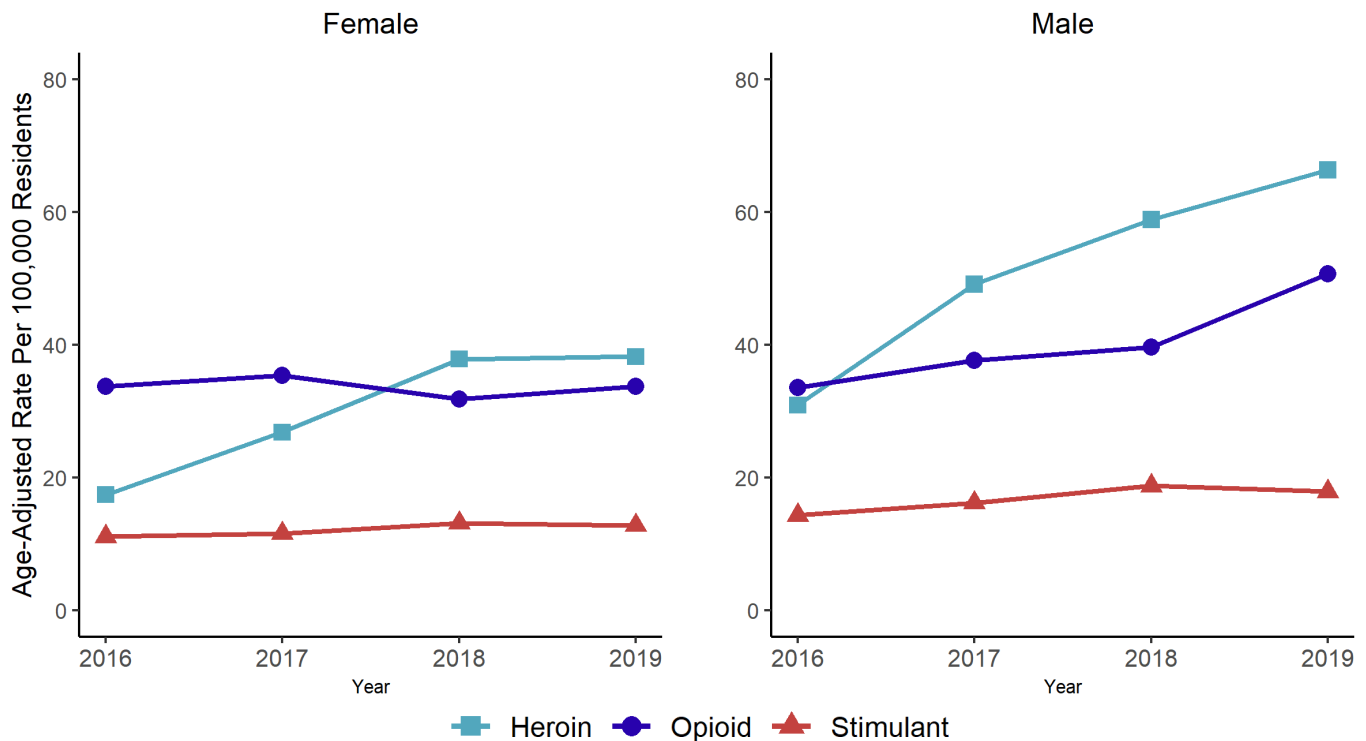
**Research shows that people who have had at least one nonfatal overdose are more likely to have another.<sup>35</sup> Learn more about Overdose Prevention.<sup>36</sup>**

In TN, opioid (excluding heroin), heroin, and stimulant (excluding caffeine) overdose visits continue to increase with a substantial increase observed for heroin overdose outpatient visits ranging from 24.1 per 100,000 in 2016 to 52.1 per 100,000 in 2019. Age-adjusted rate for inpatient stays for opioid overdose decreased from 30.1 in 2016 to 19.1 in 2019, while age-adjusted rates for stimulants (2016: 12.7; 2019: 17.4) and heroin (2016: 4.8; 2019: 6.8) inpatient stays increased.

<sup>35</sup> Suffoletto, B. & Zeigler A. (2020). [Risk and protective factors for repeated overdose after opioid overdose survival](#). Drug Alcohol Depend. DOI: 10.1016/j.drugalcdep.2020.107890

<sup>36</sup> TDMHSAS. Naloxone Training Information. Retrieved from: <https://www.tn.gov/behavioral-health/substance-abuse-services/prevention/naloxone-training-information.html>

## Age-Adjusted Rates for Overdose Outpatient Visits by Sex and Drug Type in TN, 2016-2019



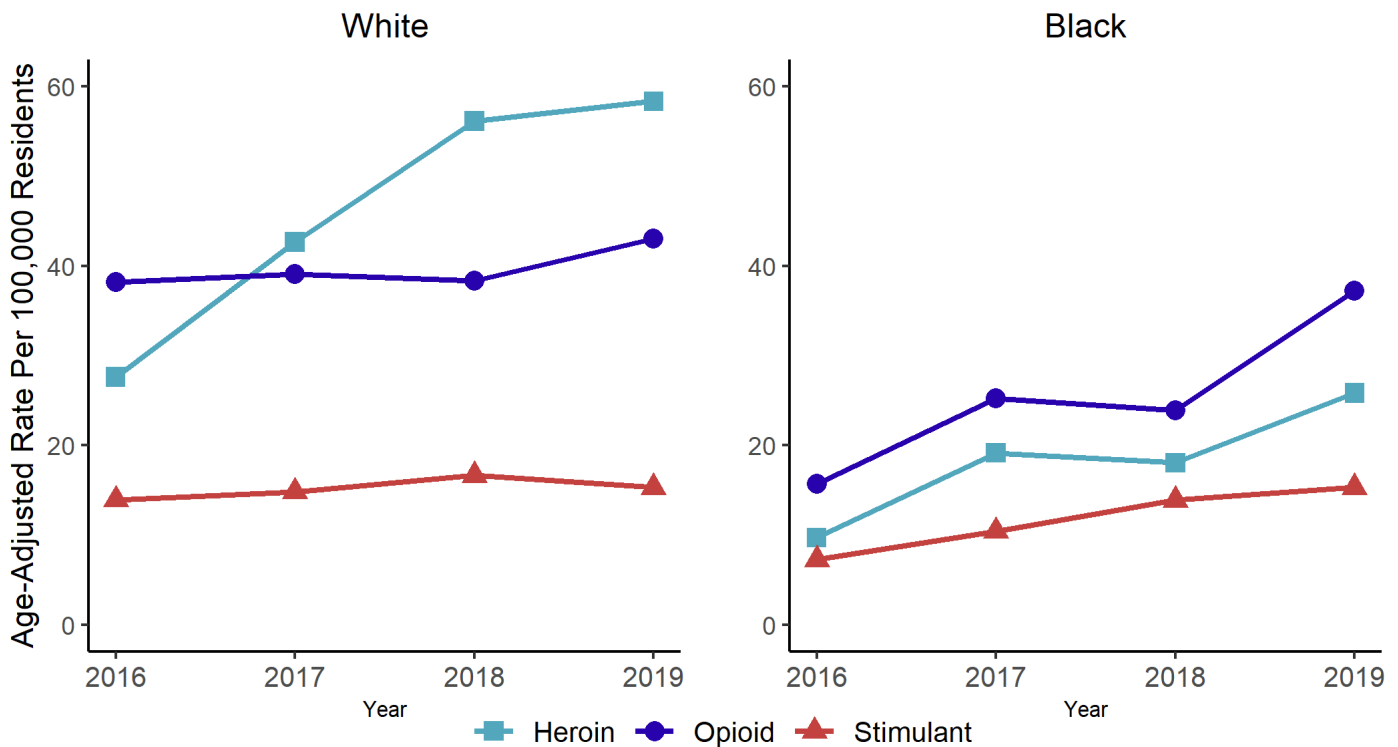
Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

Yearly age-adjusted rates for opioid (excluding heroin), heroin, and stimulant (excluding caffeine) overdose outpatient visits by sex are shown above. Independent of the drug type, males had the highest age-adjusted rates related to overdose visits compared to females. Outpatient visits for opioid overdoses remained almost the same from 33.8 per 100,000 in 2016 to 33.7 per 100,000 in 2019 among females, while the rates increased among males during the same period and ranged from 33.6 in 2016 to 50.7 in 2019.

Substantial increases in rates for heroin overdose visits were observed for both males and females since 2016. Among males, the rate increased from 30.9 in 2016 to 66.3 in 2019, while among females, the rate increased from 17.4 in 2016 to 38.2 in 2019.

Age-adjusted rates for stimulant overdose outpatient visits have continued to increase since 2016. In 2019, the age-adjusted rate for stimulant overdose was 17.9 among males compared to 12.8 among females.

# Age-Adjusted Rates for Overdose Outpatient Visits by Race and Drug Type in TN, 2016-2019



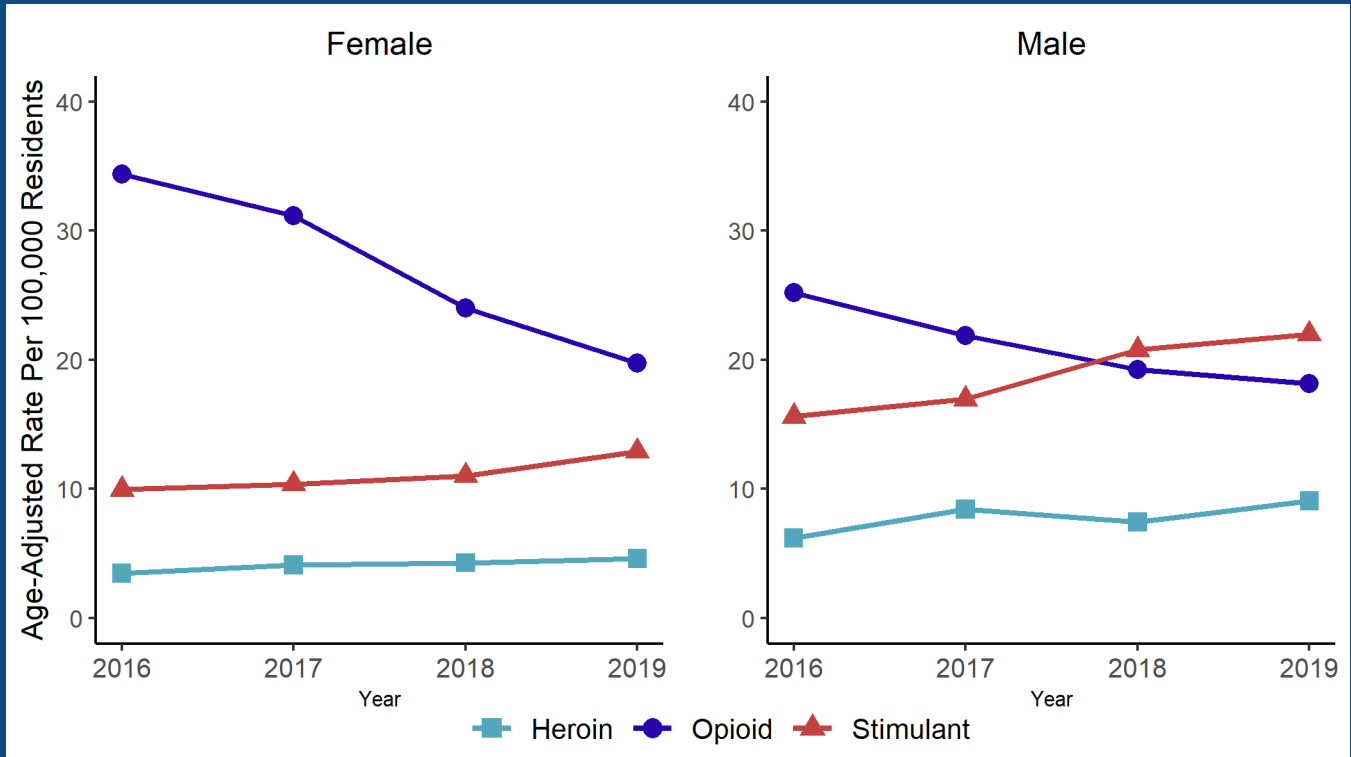
Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The age-adjusted rate for opioid overdose (excluding heroin) visits increased in both White and Black Tennesseans. For White Tennesseans, the rate increased from 38.2 per 100,000 in 2016 to 43.0 per 100,000 in 2019, while the rate for Black Tennesseans increased from 15.7 in 2016 to 37.2 by 2019.

A steep increase in heroin overdose outpatient visits was observed among White Tennesseans, ranging from 27.6 in 2016 to 58.3 in 2019, while the stimulant (excluding caffeine) overdose rate increase was modest, ranging from 13.9 in 2016 to 15.3 in 2019.

The heroin and stimulant overdose rates for outpatient visits more than doubled among Black Tennesseans by 2019. The age-adjusted rates for heroin increased from 9.7 in 2016 to 25.8 in 2019, while the stimulant overdose rates increased from 7.3 in 2016 to 15.3 in 2019.

## Age-Adjusted Rates for Overdose Inpatient Stays by Sex and Drug Type in TN, 2016-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

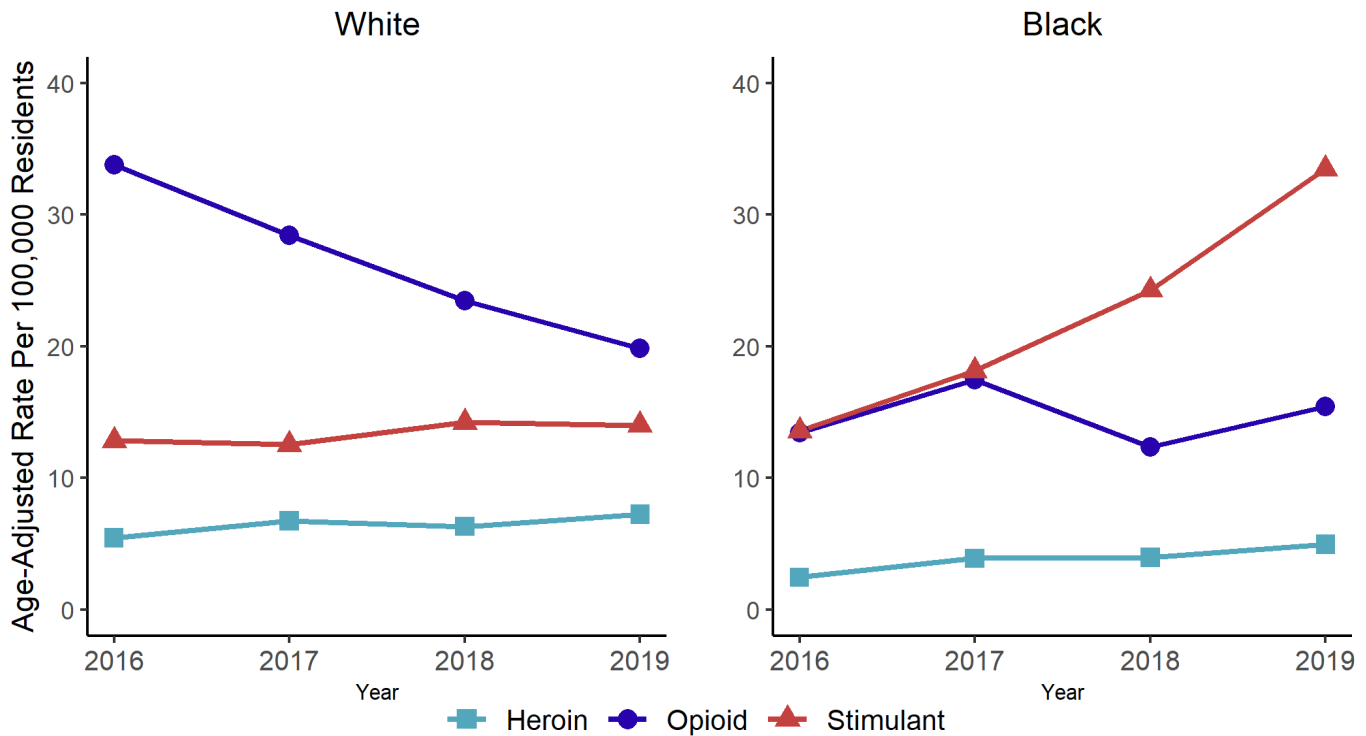
Yearly age-adjusted rates for opioid (excluding heroin), heroin, and stimulant overdose (excluding caffeine) inpatient stays by sex are shown above. In both males and females, the age-adjusted rate for opioid overdose inpatient stays decreased from 2016 to 2019 with females showing higher rates than males for opioid overdose inpatient stays for all four years.

Males had higher rates of inpatient stays for stimulant overdoses than females, and rates for males increased from 15.6 per 100,000 in 2016 to 22.0 per 100,000 in 2019, while rates for females increased from 9.9 in 2016 to 12.9 in 2019.

Compared to females, age-adjusted rates of inpatient stays for heroin overdoses were higher among males with rates ranging from 6.2 in 2016 to 9.1 in 2019.



# Age-Adjusted Rates for Overdose Inpatient Stays by Race and Drug Type in TN, 2016-2019



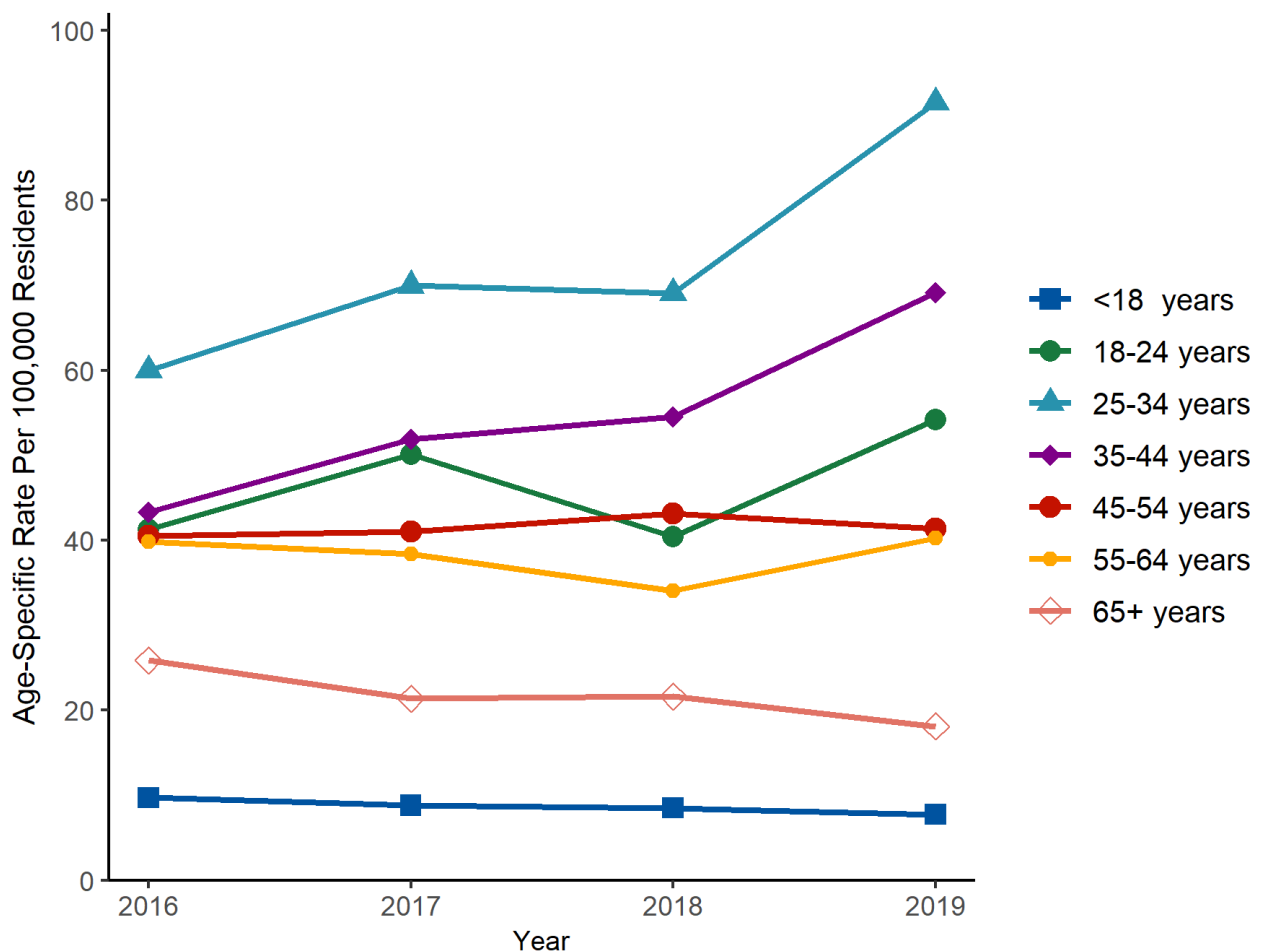
Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The above graph shows the age-adjusted rates for inpatient stays related to different drug overdose types by race. The rates for opioid overdose (excluding heroin) inpatient stays declined from 2016 to 2019 among White Tennesseans but increased among Black Tennesseans (13.4 per 100,000 in 2016 to 15.4 per 100,000). There was a marked increase in stimulant (excluding caffeine) overdose inpatient stays among Black Tennesseans (13.6 in 2016 to 33.5 in 2019) compared to White Tennesseans (12.8 in 2016 to 14.0 in 2019), while the rates for heroin overdoses continued to increase for both races.

# Opioid (Excluding Heroin) Nonfatal Overdose

The following pages will focus on nonfatal opioid overdose (excluding heroin) outpatient visits and inpatient stays in TN.

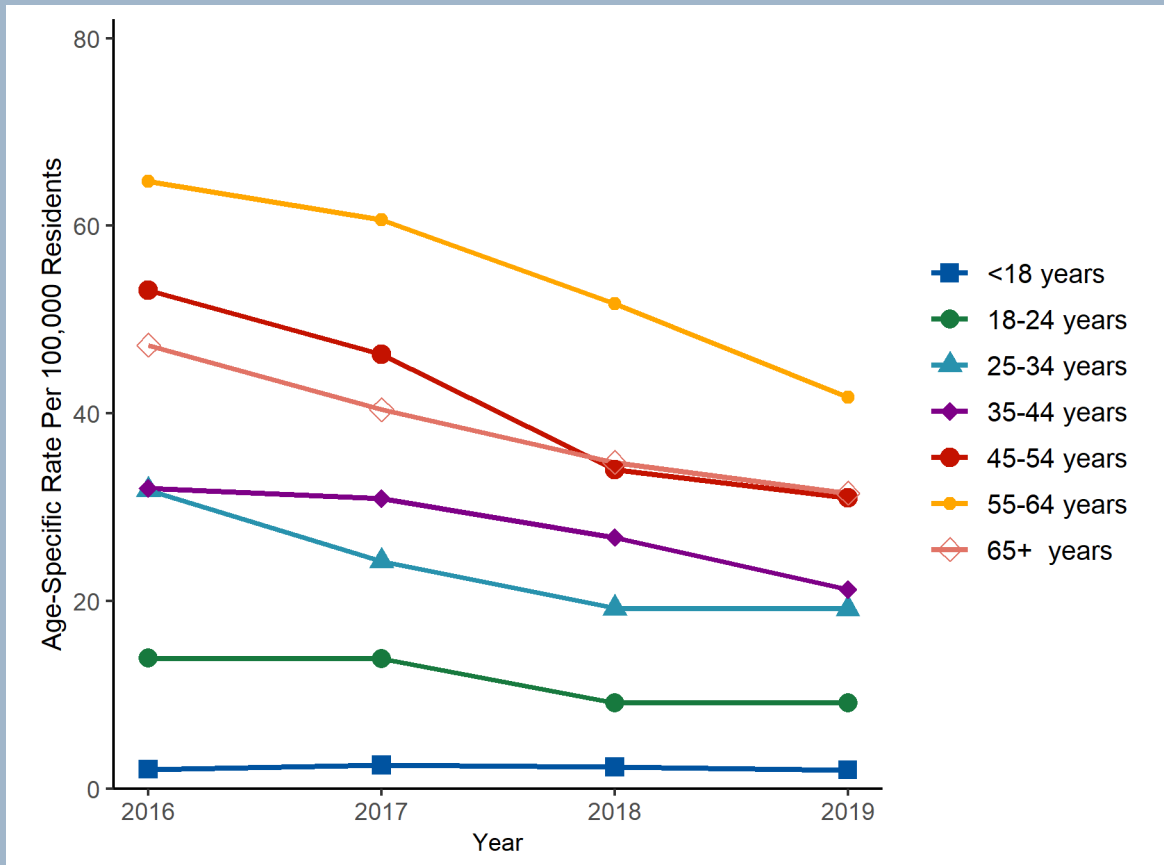
## Age-Specific Rates for Opioid Overdose (Excluding Heroin) Outpatients Visits in TN, 2016-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents.  
Data Source: Hospital Discharge Data System.

The graph above displays age-specific rates for opioid overdose (excluding heroin) outpatient visits in TN during 2016 to 2019. Persons aged 25-34 years and 35-44 years had the highest rates of outpatient overdose visits. The rates of outpatient opioid visits increased from 2016 to 2019 among those aged 18-24 years, while rates decreased from 2016 to 2019 among those aged < 18 years and 65 years or older.

## Age-Specific Rates for Opioid Overdose (Excluding Heroin) Inpatient Stays in TN, 2016-2019

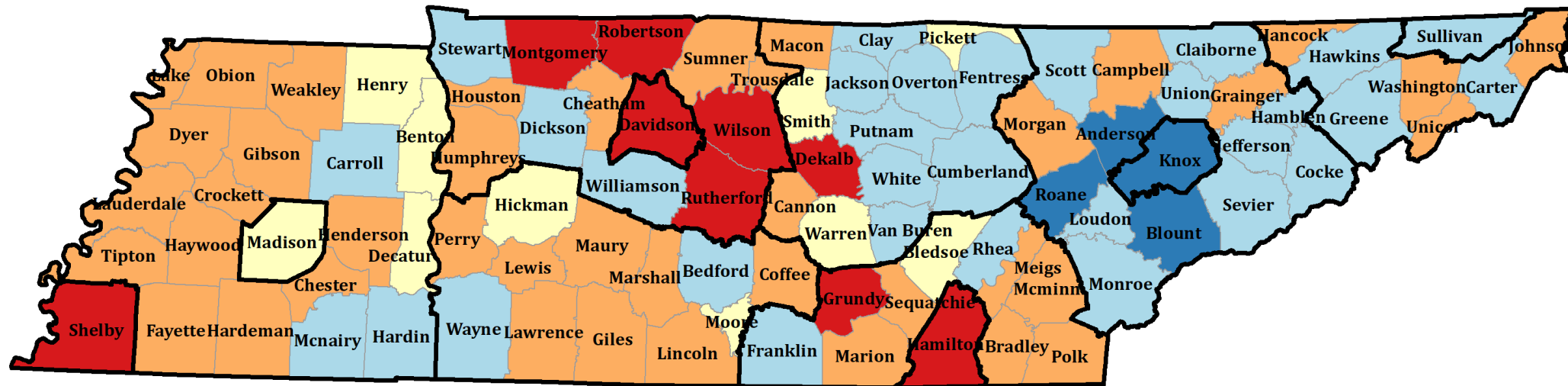


Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

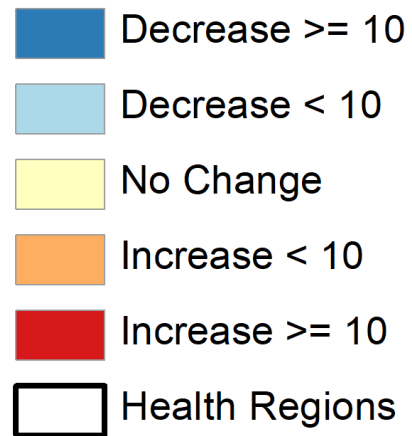
The age-specific rates for inpatient opioid overdose (excluding heroin) stays decreased in general from 2016 to 2019 with the highest drop observed among those aged 55-64 years (64.7 per 100,000 in 2016 to 41.7 per 100,000 in 2019) and those aged 45-54 years (53.1 in 2016 to 31.0 in 2019).

In 2019, the average age of opioid overdose inpatients was 52 years, 12 years older than the average age for opioid overdose outpatients for the same time period.

## Change in the Number of Opioid Overdose (Excluding Heroin) Outpatient Visits by TN County of Residence, 2018-2019



### Change in Opioid Overdose\* Outpatient Visits by TN County of Residence



\*Excluding Heroin

Total drug overdose outpatient visits in TN involving opioids increased by 18% from 2018 to 2019.

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The map on the left displays the change in number of opioid overdose (excluding heroin) outpatient visits from 2018 to 2019 by TN county of residence. The largest decrease in opioid overdose outpatient visits was observed in Roane County (31 visits in 2018 to 9 visits in 2019), while the largest increase was observed in Shelby County (260 visits in 2018 to 416 visits in 2019), followed by Davidson County (286 visits in 2018 to 412 visits in 2019). Ten counties (Benton, Bledsoe, Decatur, Henry, Hickman, Madison, Moore, Pickett, Smith, and Warren) reported no change in outpatient opioid overdose visits from 2018 to 2019.

The counties with an increase of  $\geq 10$  opioid overdose outpatient visits from 2018 to 2019 were:

- Davidson County
- DeKalb County
- Grundy County
- Hamilton County
- Montgomery County
- Robertson County
- Rutherford County
- Shelby County
- Wilson County

The counties with a decrease of  $\geq 10$  opioid overdose outpatient visits from 2018 to 2019 were:

- Anderson County
- Blount County
- Knox County
- Roane County

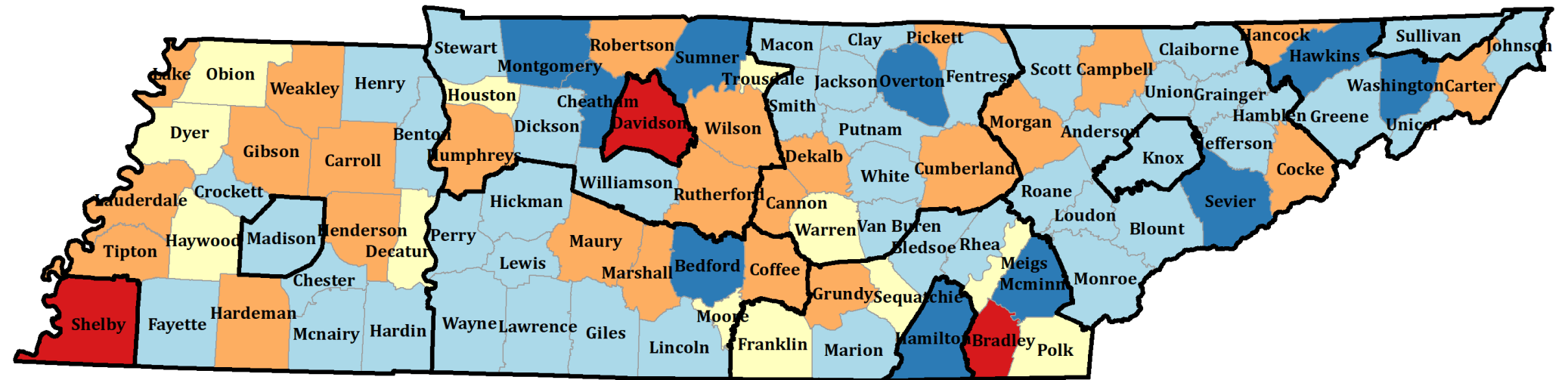
The map on the right displays the change in the number of opioid overdose (excluding heroin) inpatient stays from 2018 to 2019 by TN county of residence. Among inpatient stays for opioid overdoses, Davidson County reported the highest increase in the number of stays in 2019 (151 stays in 2018 to 162 stays in 2019), followed by Bradley County (23 stays in 2018 to 34 stays in 2019), while Hamilton County reported a decrease of more than 30 stays in 2019. Twelve counties (Decatur, Dyer, Franklin, Haywood, Houston, Meigs, Moore, Obion, Polk, Sequatchie, Trousdale, and Warren) reported no change in the number of inpatient stays for opioid overdoses. The counties with an increase of  $\geq 10$  opioid overdose inpatient stays from 2018 to 2019 were:

- Bradley County
- Davidson County
- Shelby County

The counties with a decrease of  $\geq 10$  opioid overdose inpatient stays from 2018 to 2019 were:

- Bedford County
- Cheatham County
- Hamilton County
- Hawkins County
- McMinn County
- Montgomery County
- Overton County
- Sevier County
- Sumner County
- Washington County

## Change in the Number of Opioid Overdose (Excluding Heroin) Inpatient Stays by TN County of Residence, 2018-2019



### Change in Opioid Overdose\* Inpatient Stays by TN County of Residence

- Decrease  $\geq 10$
- Decrease  $< 10$
- No Change
- Increase  $< 10$
- Increase  $\geq 10$
- Health Regions

\*Excluding Heroin

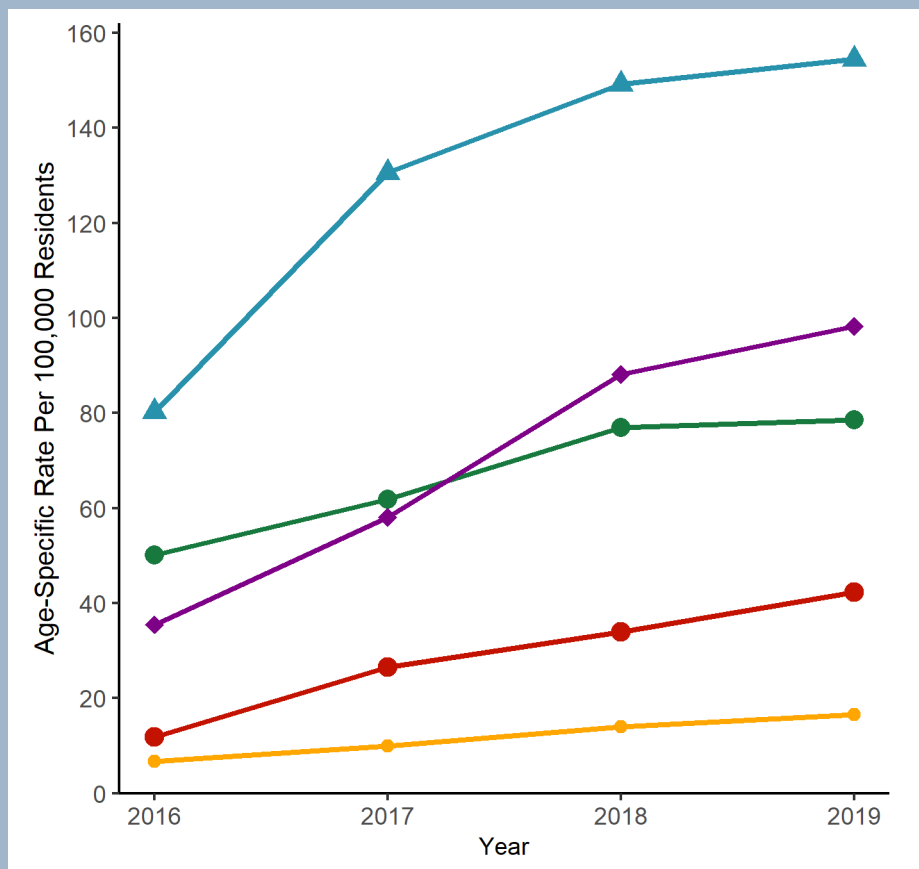
Total drug overdose inpatient stays in TN involving opioids decreased by 11.5% from 2018 to 2019.

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

# Nonfatal Heroin Overdose

The following pages will focus on nonfatal heroin overdose outpatient visits and inpatient stays in TN.

## Age-Specific Rates for Heroin Overdose Outpatient Visits in TN, 2016-2019



### Legend

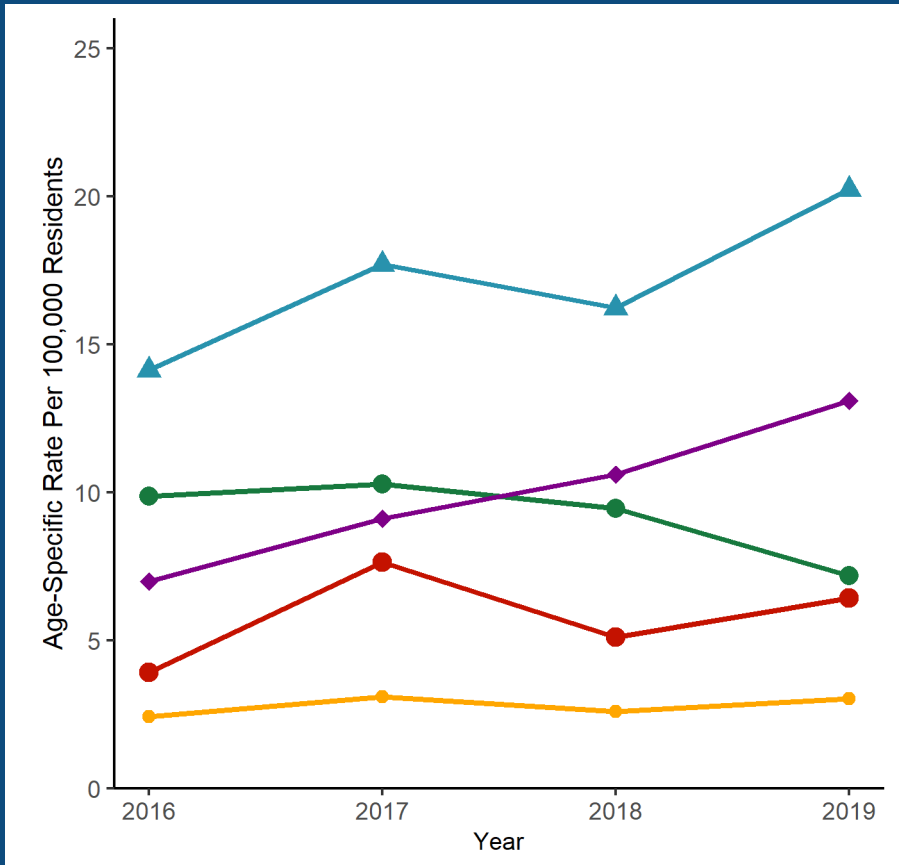
- 18-24 years
- 25-34 years
- 35-44 years
- 45-54 years
- 55-64 years

Analysis conducted by the Office of Informatics and Analytics, TDH (last updated as of February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The graph above displays age-specific rates for heroin overdose outpatient visits in TN during 2016 to 2019.<sup>37</sup> Persons aged 25-34 years (80.3 per 100,000 in 2016 to 154.5 per 100,000 in 2019) and 35-44 years (35.5 in 2016 to 98.3 in 2019) had the highest rates for outpatient overdose visits in 2019.

<sup>37</sup> Due to small numbers, rates for <18 years and 65+ years are not shown.

## Age-Specific Rates for Heroin Overdose Inpatient Stays in TN, 2016-2019



### Legend

- 18-24 years
- ▲ 25-34 years
- ◆ 35-44 years
- 45-54 years
- 55-64 years

Analysis conducted by the Office of Informatics and Analytics, TDH (last updated as of February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

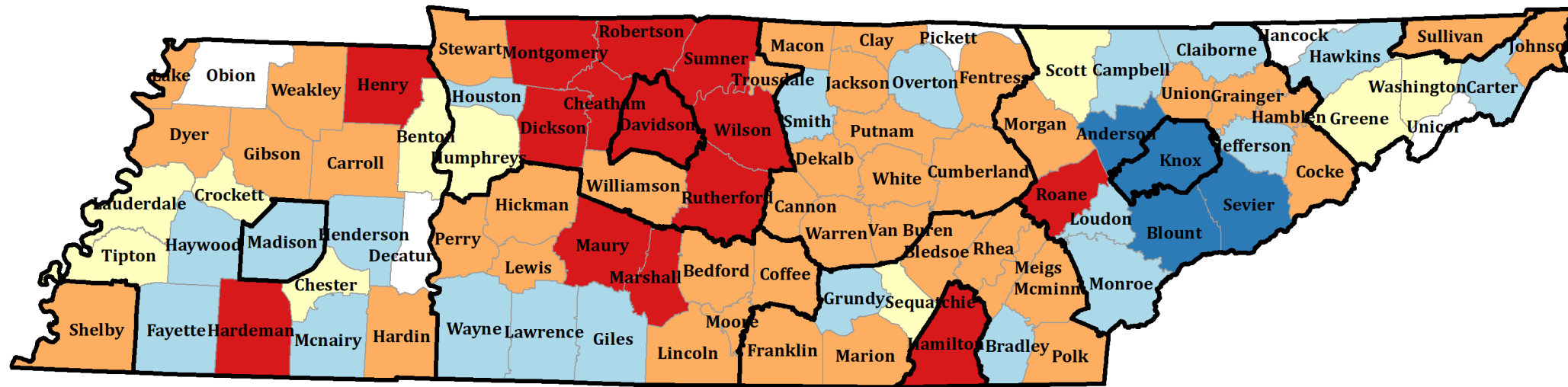
The age-specific rates for inpatient heroin overdose stays increased among all age groups except among those aged 18-24 years from 2016-2019.<sup>38</sup> The rates among those aged 25-34 years increased from 14.1 per 100,000 in 2016 to 20.2 per 100,000 in 2019, while the rates increased from 7.0 in 2016 to 13.1 in 2019 among those aged 35-44 years. The heroin overdose rates decreased from 9.9 in 2016 to 7.2 in 2019 among those aged 18-24 years.

<sup>38</sup> Due to small numbers, rates for <18 years and 65+ years are not shown.

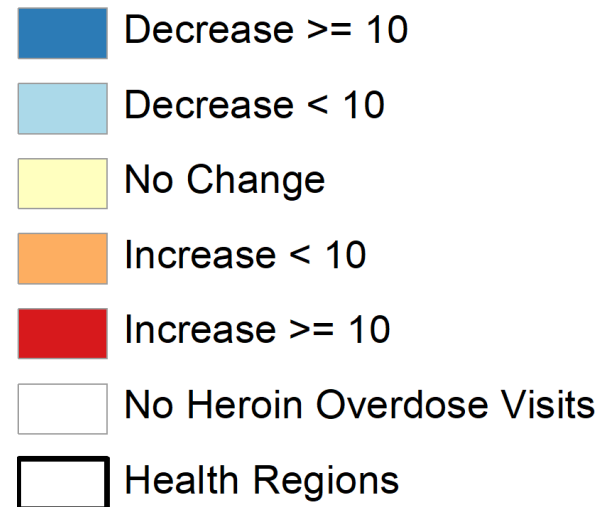
# 25-34

year olds experienced the highest rates of both fatal and nonfatal heroin overdose in TN from 2016 to 2019.

## Change in the Number of Heroin Overdose Outpatient Visits by TN County of Residence, 2018-2019



### Change in Heroin Overdose Outpatient Visits by TN County of Residence



Total drug overdose outpatient visits in TN involving heroin increased by 9% from 2018 to 2019.

Analysis by the Office of Informatics and Analytics, TDH (last updated November 26, 2019). Limited to TN residents. Data Source: TN Death Statistical File.

The map on the left shows the change in the number of heroin overdose outpatient visits from 2018 to 2019 by TN county of residence. Fourteen counties reported an increase of  $\geq$ 10 heroin overdose visits from 2018 to 2019 with Davidson (657 visits in 2018 to 743 visits in 2019) and Rutherford (234 visits in 2018 to 284 visits in 2019) Counties reporting the highest increase in the number of outpatient heroin overdose visits. Knox County reported the highest drop in heroin overdose visits in 2019 (613 visits in 2018 to 420 visits in 2019).

The counties with an increase of  $\geq$ 10 heroin overdose outpatient visits from 2018 to 2019 were:

- Cheatham County
- Davidson County
- Dickson County
- Hamilton County
- Hardeman County
- Henry County
- Marshall County
- Maury County
- Montgomery County
- Roane County
- Robertson County
- Rutherford County
- Sumner County
- Wilson County

The counties with a decrease of  $\geq$ 10 heroin overdose outpatient visits from 2018 to 2019 were:

- Anderson County
- Blount County
- Knox County
- Sevier County



The map on the right shows the change in number of heroin overdose inpatient stays from 2018 to 2019 by TN county of residence. The counties reporting the highest increase of  $\geq 10$  inpatient stays for heroin overdoses in 2019 were Montgomery and Sumner, while Knox County reported the greatest drop (41 stays in 2018 vs. 25 stays in 2019).

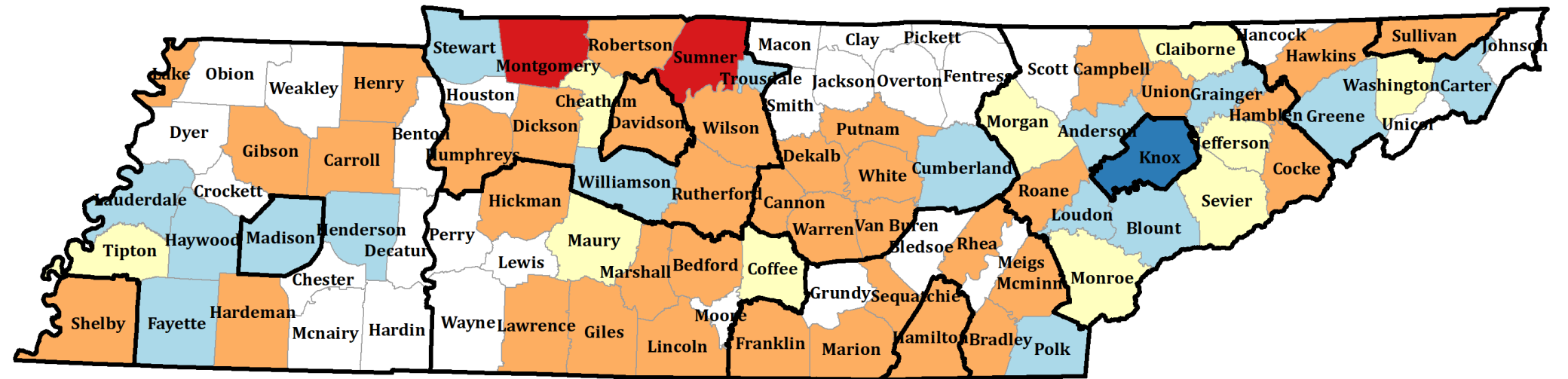
The counties with an increase of  $\geq 10$  heroin overdose inpatient stays from 2018 to 2019 were:

- Montgomery County
- Sumner County

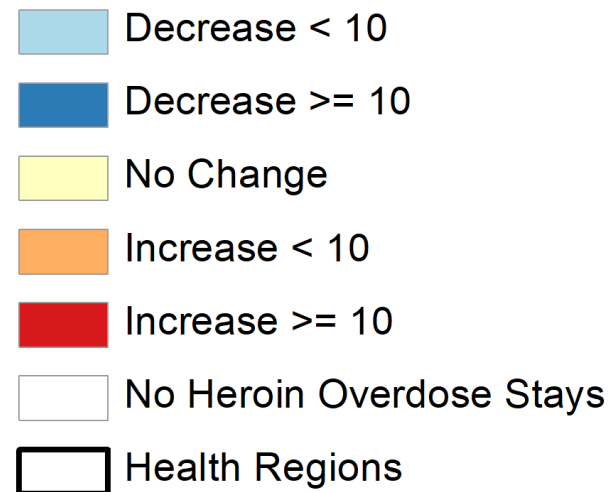
The counties with a decrease of  $\geq 10$  heroin overdose inpatient stays from 2018 to 2019 were:

- Knox County

### Change in the Number of Heroin Overdose Inpatient Stays by TN County of Residence, 2018-2019



**Change in Heroin Overdose Inpatient Stays by TN County of Residence**



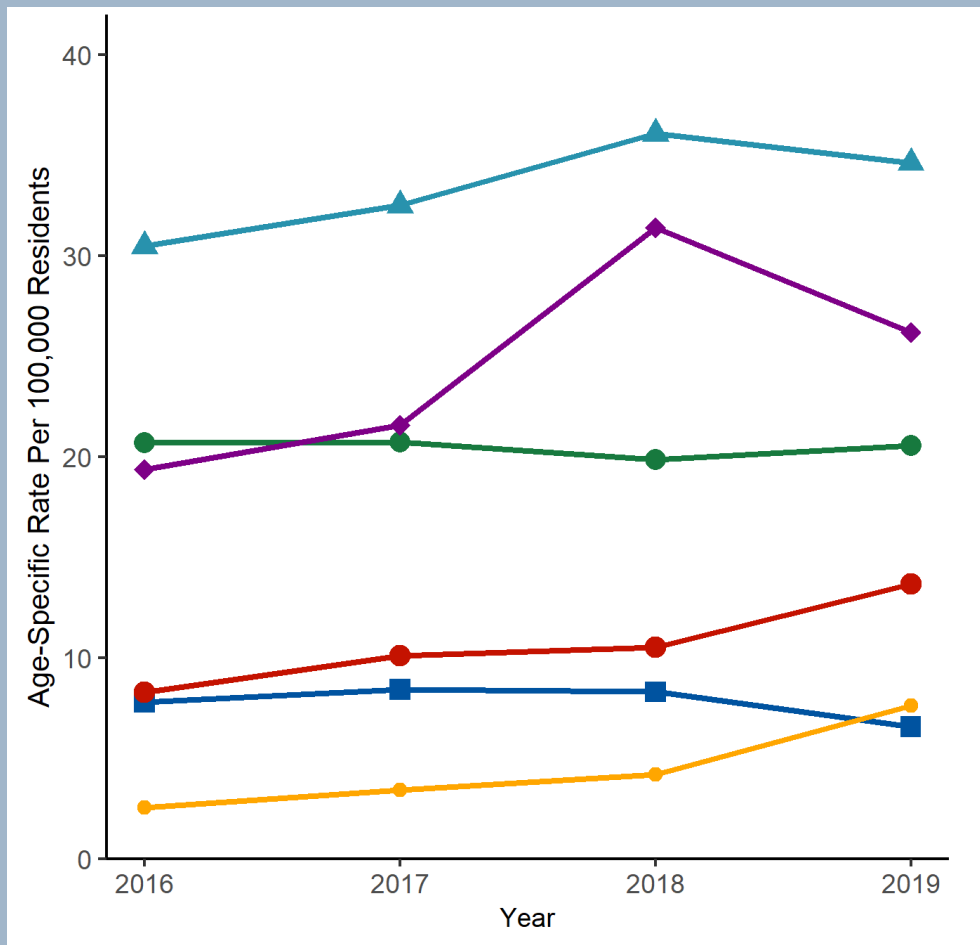
**Total drug overdose inpatient stays in TN involving heroin increased by 17.7% from 2018 to 2019.**

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

# Nonfatal Stimulant Overdose

In this section of the annual report, trends in outpatient visits and inpatient stays involving stimulants (excluding caffeine) will be presented. Nonfatal stimulant outpatient visits and inpatient stays include overdoses involving cocaine, amphetamines (including methamphetamine), ecstasy, and other psychostimulants.

## Age-Specific Rates for Stimulant Overdose (Excluding Caffeine) Outpatient Visits in TN, 2016-2019



### Legend

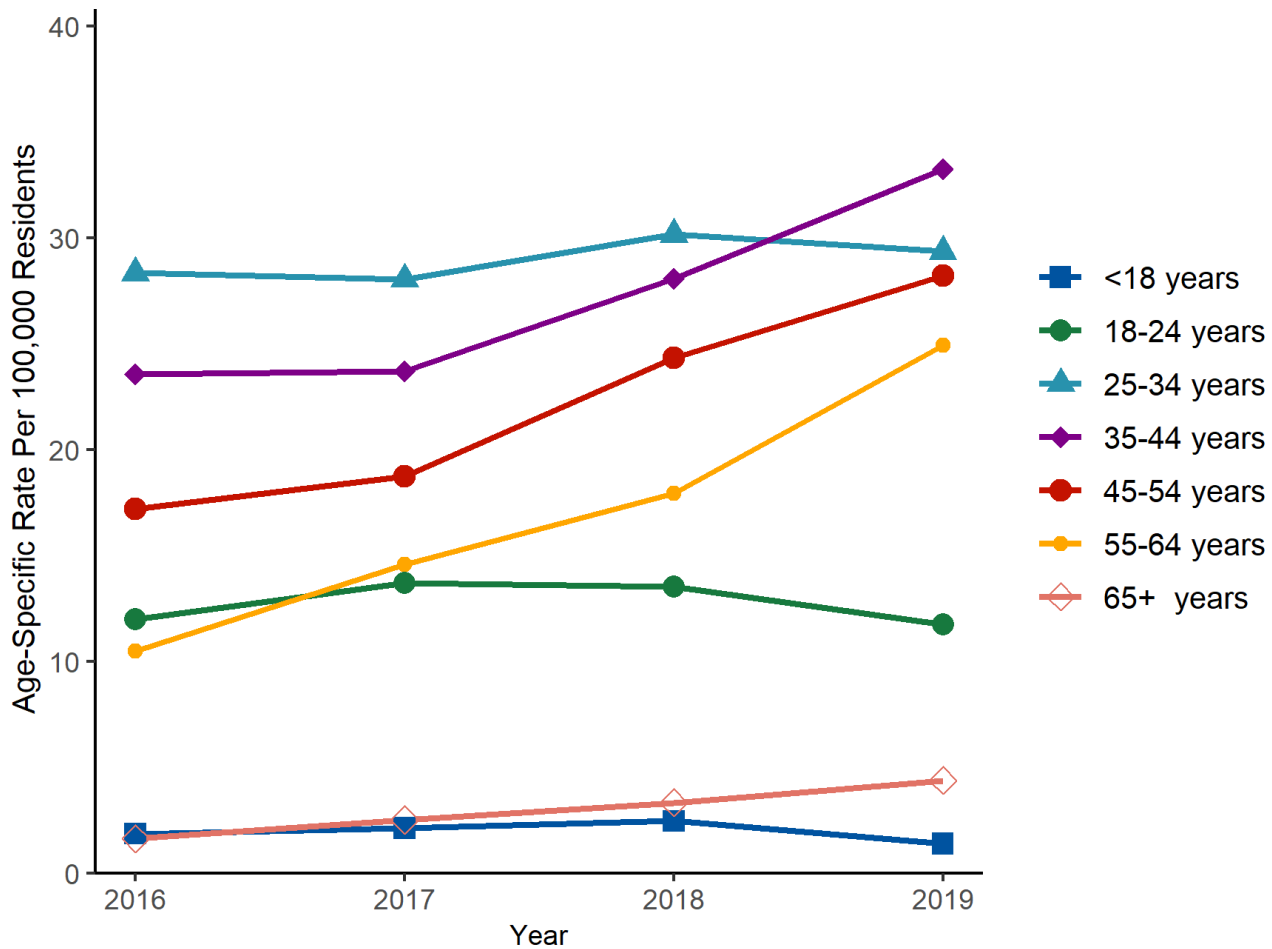
- <18 years
- 18-24 years
- 25-34 years
- 35-44 years
- 45-54 years
- 55-64 years

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The above graph shows age-specific rates for stimulant (excluding caffeine) overdose outpatient visits in TN during 2016 to 2019.<sup>39</sup> Persons aged 25-34 years (30.5 per 100,000 in 2016 to 34.6 per 100,000 in 2019) and 35-44 years (19.4 in 2016 to 26.2 in 2019) had the highest rates for outpatient overdose visits in 2019.

<sup>39</sup> Due to small numbers, rates for 65+ years are not shown.

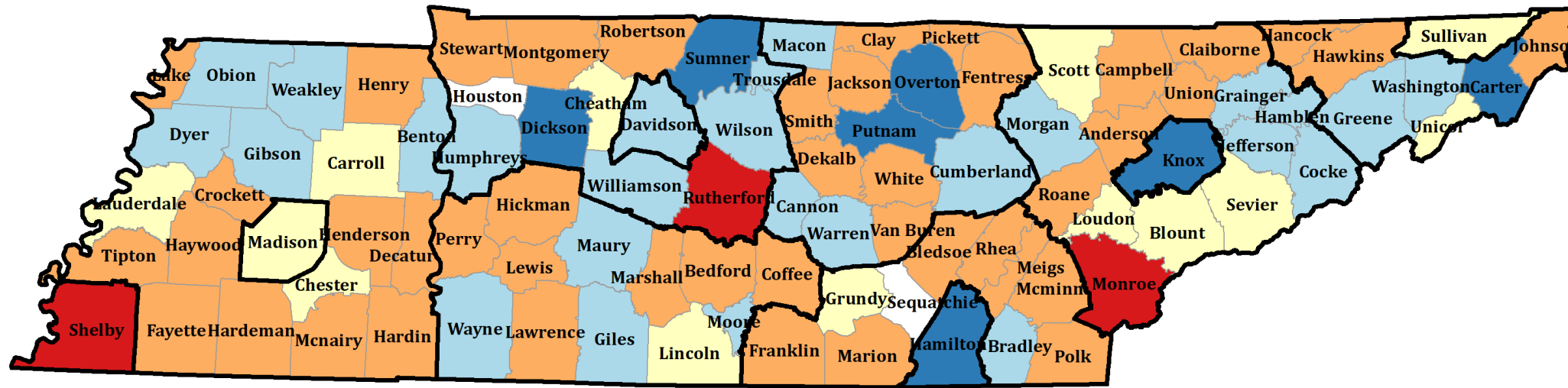
## Age-Specific Rates for Stimulant Overdose (Excluding Caffeine) Inpatient Stays in TN, 2016-2019



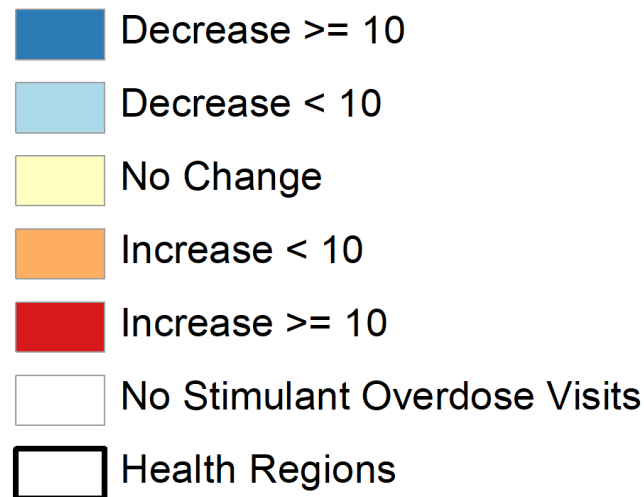
Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The age-specific rates for stimulant overdose (excluding caffeine) inpatient stays increased across all age groups from 2016 to 2019 except among those aged <25 years. The highest increase in rates was observed among those aged 55-64 years (10.5 per 100,000 in 2016 to 24.9 per 100,000 in 2019) and 45-54 years (17.2 in 2016 to 28.2 in 2019).

## Change in the Number of Stimulant Overdose (Excluding Caffeine) Outpatient Visits by TN County of Residence, 2018-2019



### Change in Stimulant Overdose\* Outpatient Visits by TN County of Residence



\*Excluding Caffeine

Total drug overdose outpatient visits in TN involving stimulants decreased by 0.4% from 2018 to 2019.

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

The map on the left displays the change in the number of stimulant overdose (excluding caffeine) outpatient visits from 2018 to 2019 by TN county of residence. The largest decrease in stimulant overdose outpatient visits was observed in Putnam County (24 visits in 2018 to 8 visits in 2019), followed by Hamilton County (36 visits in 2018 to 21 visits in 2019). Thirteen counties (Blount, Carroll, Cheatham, Chester, Grundy, Lauderdale, Lincoln, Loudon, Madison, Scott, Sevier, Sullivan, and Unicoi) reported no change in outpatient stimulant overdose visits from 2018 to 2019, while Houston and Sequatchie reported no stimulant overdose outpatient visits during 2018-2019.

The counties with an increase of  $\geq 10$  stimulant overdose outpatient visits from 2018 to 2019 were:

- Monroe County
- Rutherford County
- Shelby County

The counties with a decrease of  $\geq 10$  stimulant overdose outpatient visits from 2018 to 2019 were:

- Carter County
- Dickson County
- Hamilton County
- Knox County
- Overton County
- Putnam County
- Sumner County

The map on the right displays the change in the number of stimulant overdose (excluding caffeine) inpatient stays from 2018 to 2019 by TN county of residence. Among inpatient stays for stimulant overdoses, Davidson County reported the highest increase in the number of stays in 2019 (195 stays in 2018 to 264 stays in 2019) followed by Shelby County (132 stays in 2018 to 178 stays in 2019). Seven counties (Sullivan, Roane, Warren, Blount, Bradley, McMinn, and Scott) reported a decrease of more than five stays in 2019. Nine counties (Campbell, Cannon, Dickson, Hancock, Lincoln, Loudon, McNairy, Weakley, and White) reported no change in the number of inpatient stays for stimulant overdoses.

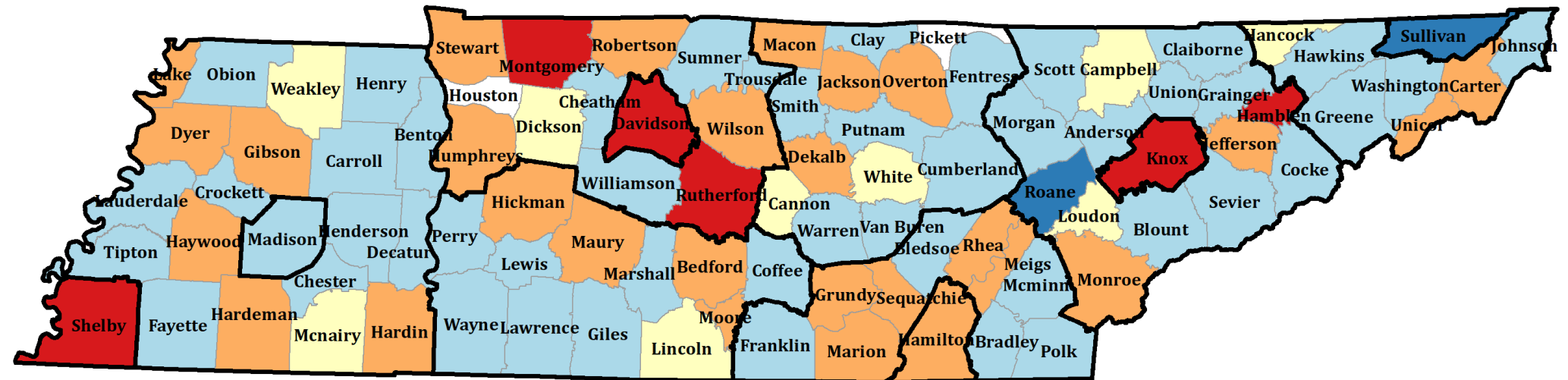
The counties with an increase of  $\geq 10$  stimulant overdose inpatient stays from 2018 to 2019 were:

- Davidson County
- Hamblen County
- Knox County
- Montgomery County
- Rutherford County
- Shelby County

The counties with a decrease of  $\geq 10$  opioid overdose inpatient stays from 2018 to 2019 were:

- Roane County
- Sullivan County

### Change in the Number of Stimulant Overdose (Excluding Caffeine) Inpatient Stays by TN County of Residence, 2018-2019



Change in Stimulant Overdose\* Inpatient Stays by TN County of Residence

- Decrease  $\geq 10$
- Decrease  $< 10$
- No Change
- Increase  $< 10$
- Increase  $\geq 10$
- No Stimulant Overdose Stays
- Health Regions

\*Excluding Caffeine

Total drug overdose inpatient stays in TN involving stimulants increased by 11.9% from 2018 to 2019.

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System.

# DOR Overdose Trends

## Drug Overdose Reporting

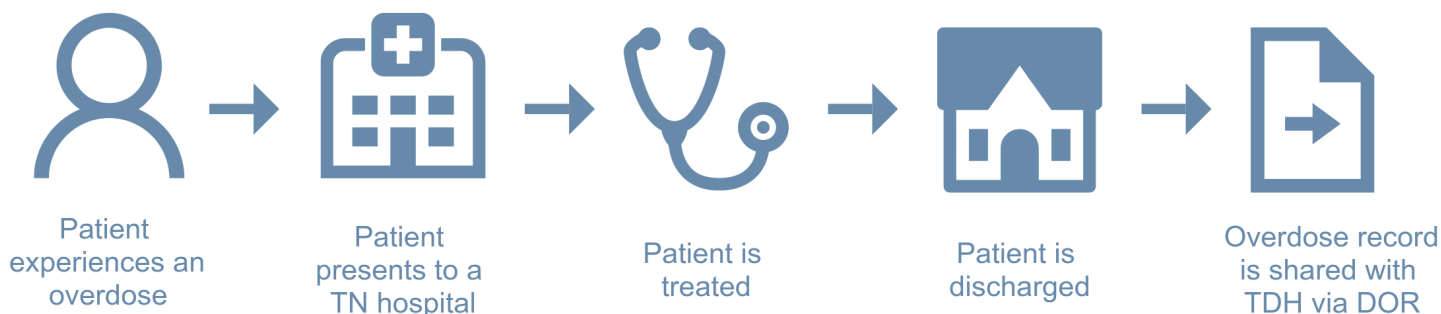
In 2016, the TN State Legislature passed amendments to Tennessee Code Annotated (TCA), Title 68, Chapter 11, Part 3 authorizing TDH to collect health records maintained by any facility to facilitate investigations regarding opioid misuse, overdose, and death. All TN hospitals licensed under TCA, Title 68, are required by law to report patient-level health information to TDH, including emergency room departments, acute care hospitals, rehabilitation facilities, and free-standing ambulatory surgical treatment centers that are a part of a hospital. However, it does not include psychiatric hospitals/units or substance abuse treatment facilities within a hospital.

In 2017, TDH implemented the DOR system to collect and summarize patient data concerning nonfatal drug overdoses reported from licensed TN facilities, as described above, dating back to October 2016. In addition to the 2016 legislative mandate, opioid drug overdose was added in 2019 to the list of [Reportable Diseases in Tennessee for Healthcare Providers](#)<sup>40</sup> and overdoses involving stimulants, benzodiazepines, and muscle relaxants were added in 2020.

## How are DOR data submitted to TDH?

TN facilities report drug overdoses to TDH on a weekly basis. Facilities report patient admission and discharge dates, sex, race, date of birth, resident address, discharge disposition, and ICD-10-CM or Systematized Nomenclature of Medicine - Clinical Terms (SNOMED CT) poisoning/overdose diagnosis codes that involve opioids, stimulants, benzodiazepines, and muscle relaxants. Starting in 2020, TN facilities had the additional option to report chief complaint, additional race values, and timestamps for patient admission and discharge dates. Beginning in January 2021, TDH added additional opioid-related ICD-10-CM codes to allow facilities to submit synthetic opioids, including overdoses involving fentanyl.

Drug overdoses are reported to the DOR data system regardless of intent (e.g. intentional self-harm or assault (intentional), undetermined, or an accidental overdose (unintentional)). DOR does not collect ICD-10-CM diagnosis codes associated with mental and behavioral disorders due to psychoactive substance use (F10-F19). Once drug overdoses are reported to the DOR system, data are loaded into TDH's **Integrated Data System (IDS)** to support public health surveillance.



<sup>40</sup> TDH. (2020). Tennessee Reportable Disease List. Retrieved from: [https://www.tn.gov/content/dam/tn/health/documents/reportable-diseases/2020\\_List\\_For\\_Healthcare\\_Providers.pdf](https://www.tn.gov/content/dam/tn/health/documents/reportable-diseases/2020_List_For_Healthcare_Providers.pdf)

# DOR in 2020

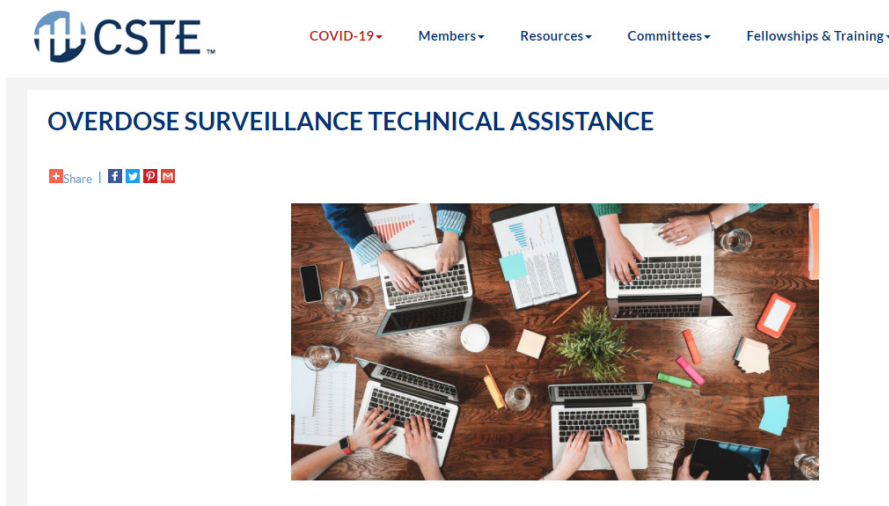
## Drug Overdose Reporting in 2020

Like HDDS, DOR data are based on ICD-10-CM billing and SNOMED CT codes. Unlike HDDS, however, DOR data are received weekly rather than quarterly. Because data from DOR are more timely, they are used primarily for rapid analyses which inform drug overdose working groups and public health programs to target resources (e.g., the distribution of naloxone) and activities for overdose prevention. For more information about the similarities and differences between drug overdose surveillance systems, please refer to the introduction of this section (**page 60**).

Overdoses reported from the DOR data system are categorized in this section by drug type -- all opioid and heroin. This section also presents a preliminary look at stimulant overdoses as reporting first became required for this drug class in 2020. These early data trends should be interpreted with caution as 24 facilities (20%) have not yet begun reporting the expanded DOR code list (stimulant, benzodiazepine, or muscle relaxant ICD-10-CM codes). Overdose trends for opioids and stimulants (excluding caffeine) are characterized by month, sex, and age. This section does not include race trends as inconsistencies in reporting race to the DOR data system make trends in race data unreliable. Characterization beyond general trends of benzodiazepine and muscle relaxant overdoses are not presented here as the data require additional review.

Counts of overdose in this section are based on patient admission date and criteria recommended by the Council for State and Territorial Epidemiologists (CSTE) that specify a nonfatal overdose should be counted as one distinct event that is at least 24 hours after a previous overdose event (and the person experienced clinical improvement or recovery between the events). To follow this recommendation as closely as possible, we use one calendar day to define a distinct person-event. OIA continues to refine reporting and analysis to better reflect national recommendations. In addition, we also apply CSTE recommendations and exclude nonfatal overdoses coded as events related to adverse effects, underdosing, subsequent encounters, and sequela (e.g. chronic or long-term organ damage). Counts of overdose are limited to only initial and missing encounters.

## Learn more about the CSTE and the Available Overdose Surveillance Technical Assistance at [www.cste.org](http://www.cste.org)



# DOR ICD-10-CM Codes

## DOR Overdose Drug Type Categories

Category	Class	ICD-10-CM Description	ICD-10-CM Code
<b>All Opioid</b>	Heroin	Poisoning by heroin	T40.1
	Synthetic Narcotics	Poisoning by methadone	T40.3
		Poisoning by other synthetic narcotics	T40.4
	Other Opioids	Poisoning by opium	T40.0
		Poisoning by other opioids	T40.2
	Unspecified Narcotics	Poisoning by unspecified narcotics	T40.6
		Poisoning by other narcotics	T40.69
	<b>Heroin</b>	Heroin	Poisoning by heroin
<b>Opioid (excluding heroin)</b>	Synthetic Narcotics	Poisoning by methadone	T40.3
		Poisoning by other synthetic narcotics	T40.4
	Other Opioids	Poisoning by opium	T40.0
		Poisoning by other opioids	T40.2
	Unspecified Narcotics	Poisoning by unspecified narcotics	T40.6
		Poisoning by other narcotics	T40.69
<b>Stimulant (excluding caffeine)</b>	Cocaine	Poisoning by cocaine	T40.5
	Other Stimulant	Poisoning by unspecified psychostimulants	T43.6
		Poisoning by amphetamines	T43.62
		Poisoning by methylphenidate	T43.63
		Poisoning by ecstasy	T43.64
		Poisoning by other psychostimulants	T43.69

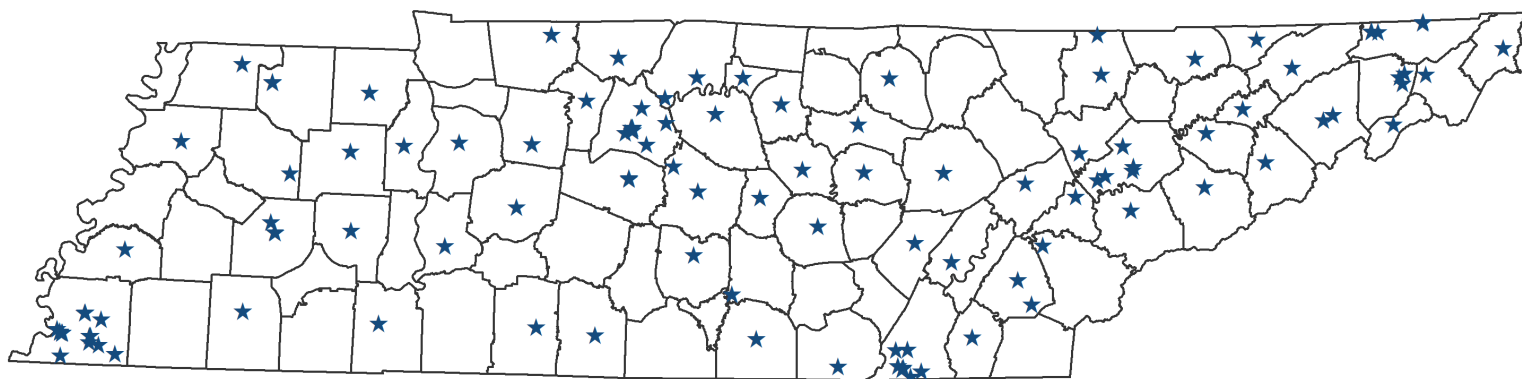


# DOR Successes in 2021

## Current Success of the DOR System

Since 2017, 118 healthcare facilities across TN have successfully submitted drug overdose data to TDH's DOR system. DOR provides weekly patient-level drug overdose data and is one of TDH's most timely sources of overdose data in use.

## Facilities Reporting to the Drug Overdose Reporting (DOR) System in TN, 2017-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities.  
Data Source: Drug Overdose Reporting (DOR) System.

## DOR Activities Anticipated for 2021

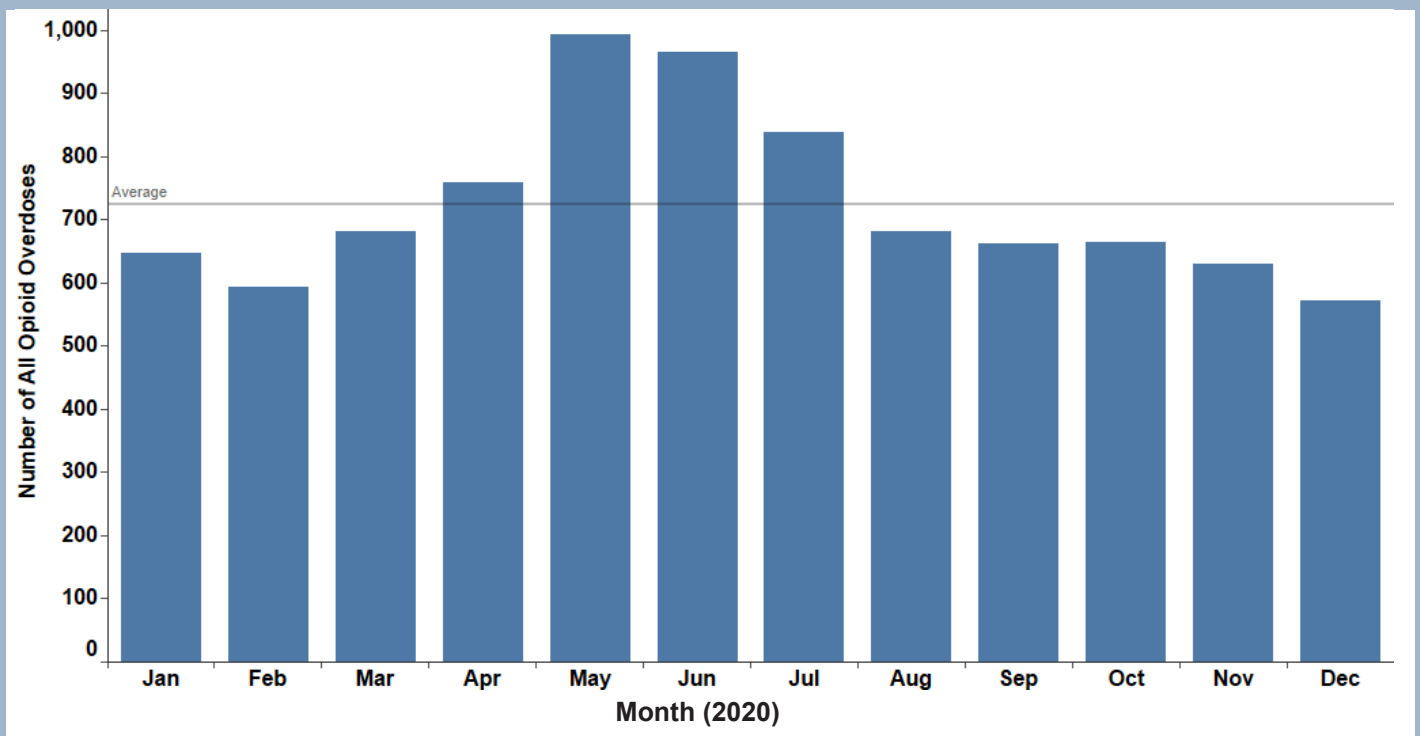
Efforts in 2021 include adding DOR data as an additional data source on the TDH Drug Overdose data dashboard. This addition will include county level information and trends on nonfatal overdoses of opioids, stimulants, benzodiazepines, and muscle relaxants as reported to the DOR data system. Additionally, TDH will be exploring electronic case reporting (eCR) for drug overdose, which will allow for the automated generation and transmission of drug overdose case reports from a facility's electronic health record (EHR) to capture critical clinical and demographic patient data. TDH will also begin developing plans for the integration of DOR data within TN's integrated disease surveillance system.

# All Opioid Nonfatal Overdose-DOR

All opioid overdoses reported to the DOR data system increased 22% from 2019 to 2020 (7,113 and 8,682 respectively). All opioid overdoses also increased markedly during the months from May to July 2020 which coincided with the initial months of COVID-19 in TN. While all opioid overdoses increased during this period, overdoses were already trending upward as indicated by 2019 trends.

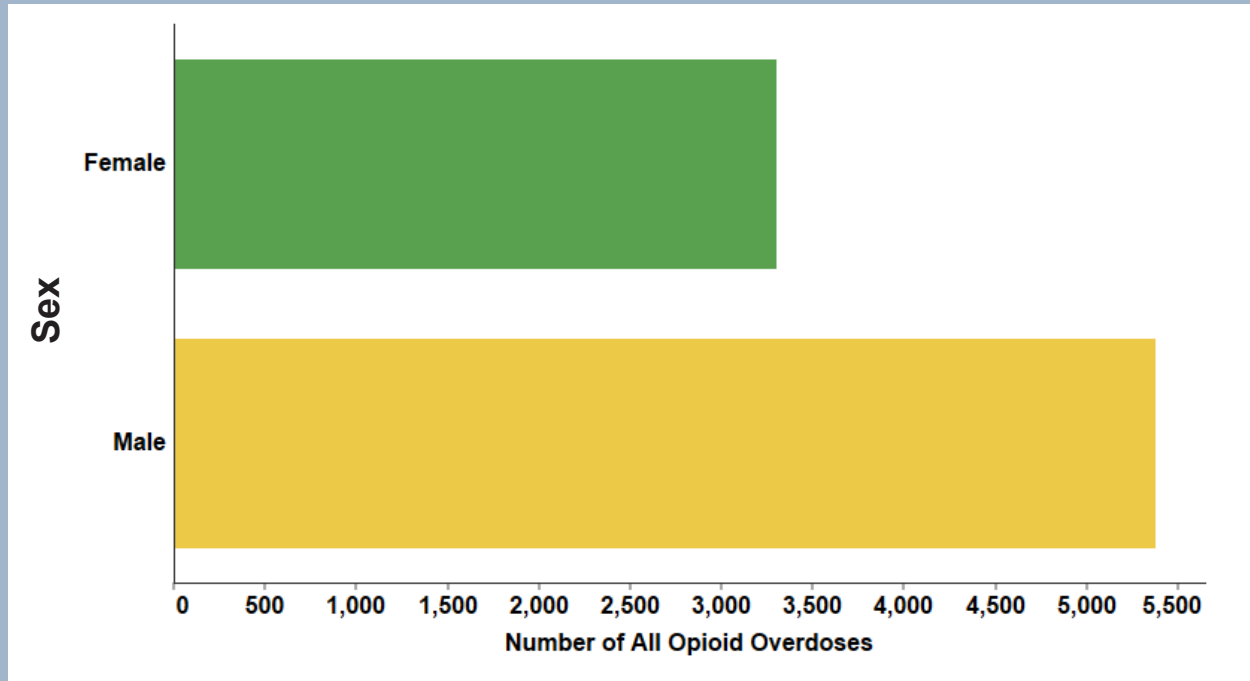
The average number of all opioid overdoses per month in 2020 was 724, while the average number per month in 2019 was 593. The month of May had the highest number of all opioid overdoses of 2020, reaching a peak of 993 overdoses for that month, approximately 37% higher than the 2020 monthly average.

## Number of All Opioid Overdoses by Month in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

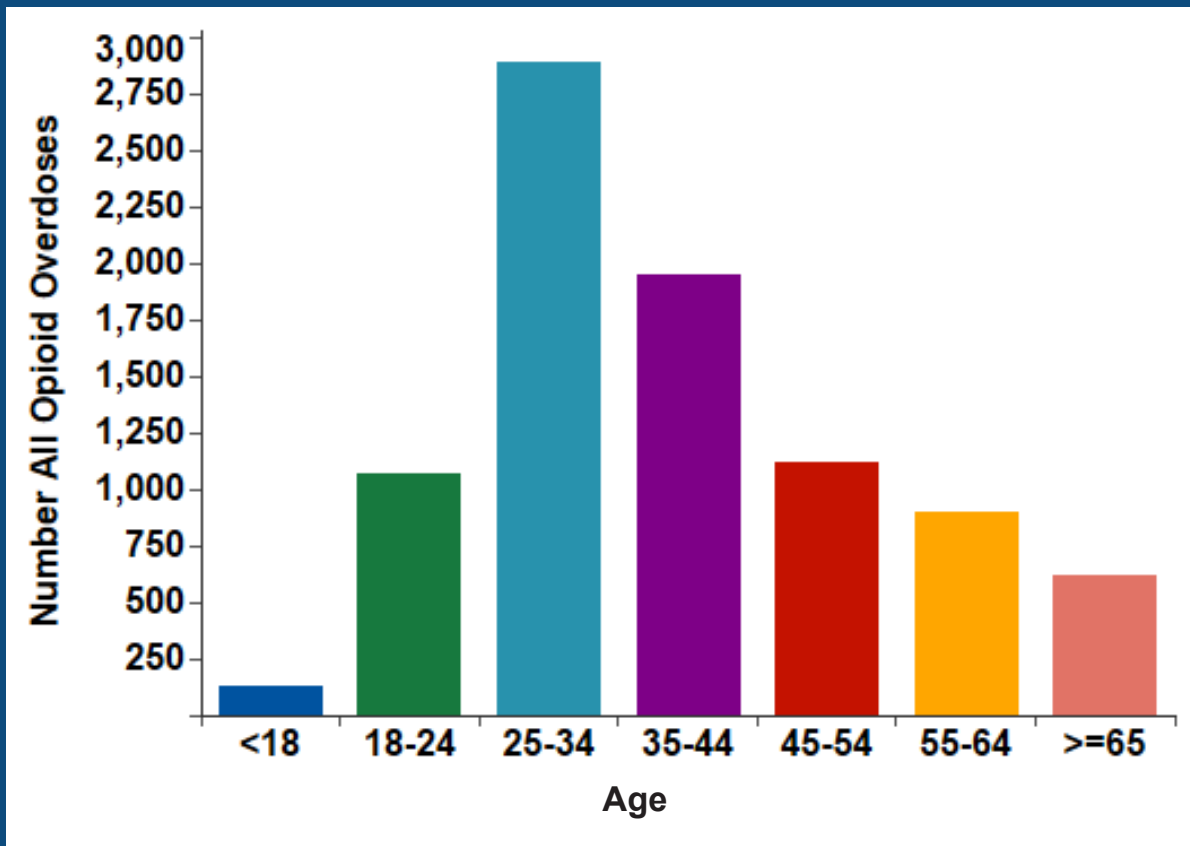
## Number of All Opioid Overdoses by Sex in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

The number of all opioid overdoses by sex in TN for 2020 is shown above. Opioid overdoses in 2020 continued to affect more males than females (5,376 and 3,301 respectively), with males accounting for 62% of the total number of opioid overdoses reported to the DOR data system.

## Number of All Opioid Overdoses by Age in TN, 2020



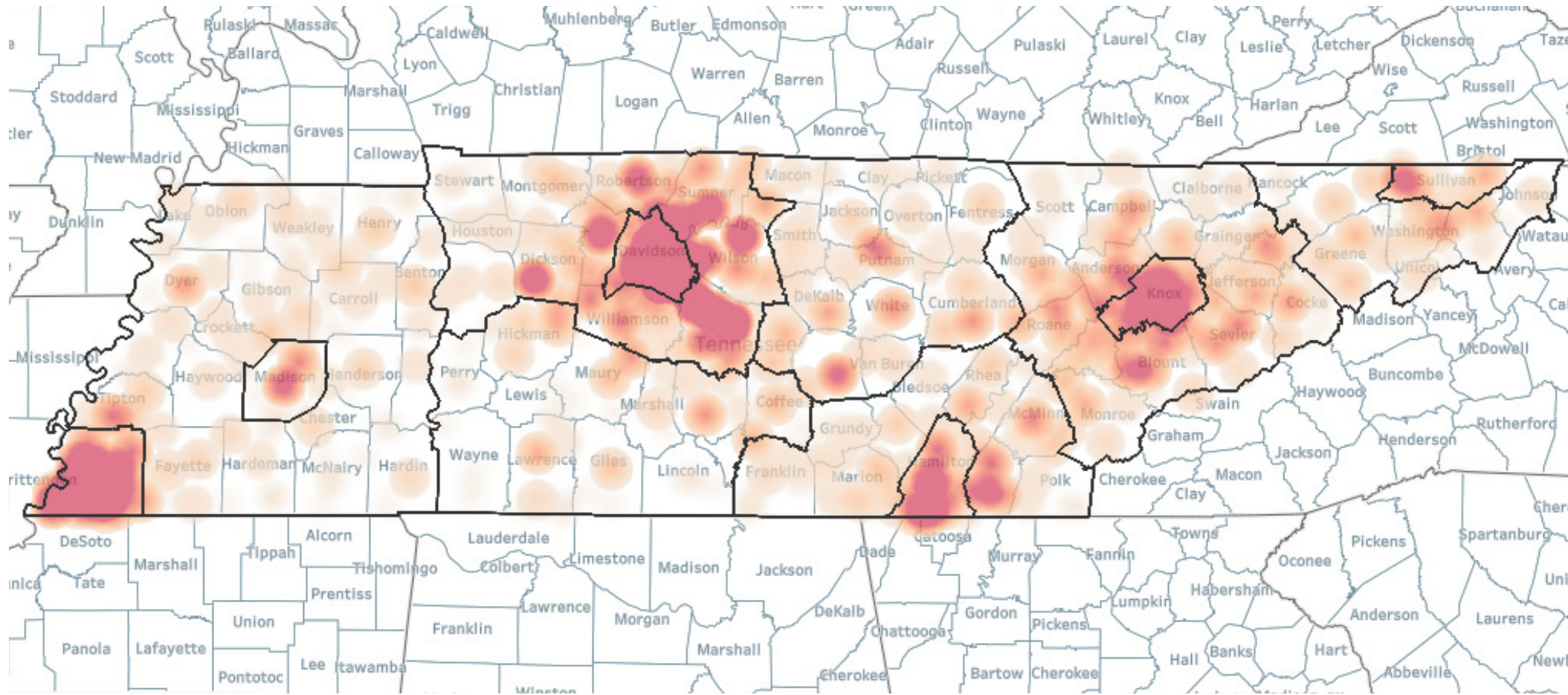
Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

The number of all opioid overdoses by age in TN for 2020 is shown above. As noted in previous sections of this report, these data corroborate that opioid overdoses most heavily impact individuals aged 25-34, followed by individuals aged 35-44. Opioid overdoses in these two age groups made up 56% of the total number of opioid overdoses reported to DOR in 2020. In other words, more than half of opioid overdoses in 2020 were among individuals between the ages of 25-44.

<sup>41</sup> Penington Institute. (2020). Opioids. Retrieved from: [https://www.overdoseday.com/wp-content/uploads/IOAD-Factsheets\\_A4-1.pdf](https://www.overdoseday.com/wp-content/uploads/IOAD-Factsheets_A4-1.pdf)

Overdose can affect anyone. Learn the signs and symptoms of an opioid overdose<sup>41</sup> from the Penington Institute—founders of International Overdose Awareness Day.

## Locations of All Opioid Overdose in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

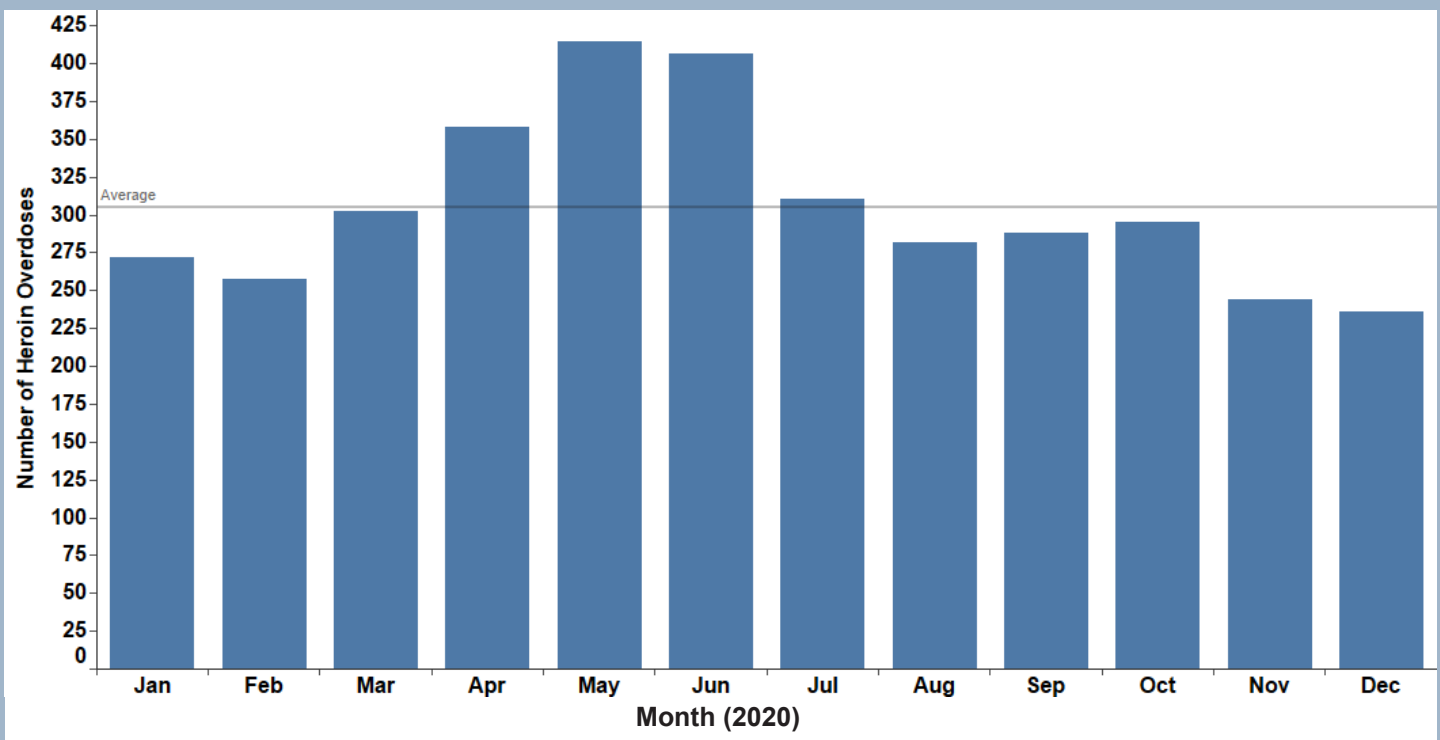
All opioid overdoses in TN are concentrated in metro counties including Shelby, Davidson, Hamilton, Jackson-Madison, Knox, and Sullivan. While it is not surprising metro areas shoulder the burden of opioid overdoses due to population density, there are also rural areas that have emerged as hot spots for opioid overdose. The counties surrounding Davidson and Knox Counties have also experienced particularly high numbers of overdose.

Although 118 hospitals across TN reported to the DOR data system in 2020, areas remain where key facilities are still being onboarded to DOR, and these facilities have not yet begun to submit data. When interpreting these maps, it is important to consider that the absence of “hot spots” does not necessarily signify an absence of overdoses in that area. Please refer to the DOR Hospital Reporting map for more information about DOR reporting facilities (page 93).

# Nonfatal Heroin Overdose-DOR

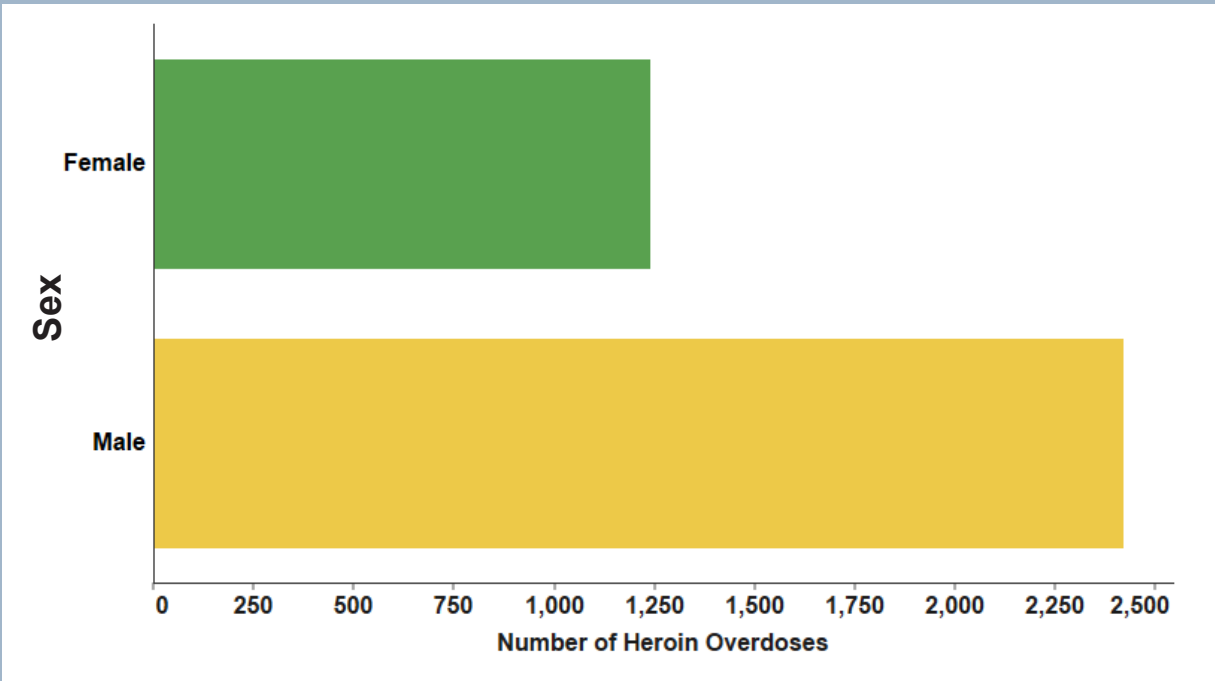
Heroin overdoses increased in 2020. The average number of heroin overdoses per month in 2019 was 278 and increased to an average of 305 per month in 2020. The months of April-June 2020 had the highest number of heroin overdoses of 2020, reaching a peak in May at 414 overdoses, approximately 36% higher than the 2020 monthly overdose average.

## Number of Heroin Overdoses by Month in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities.  
Data Source: Drug Overdose Reporting (DOR) System.

## Number of Heroin Overdoses by Sex in TN, 2020

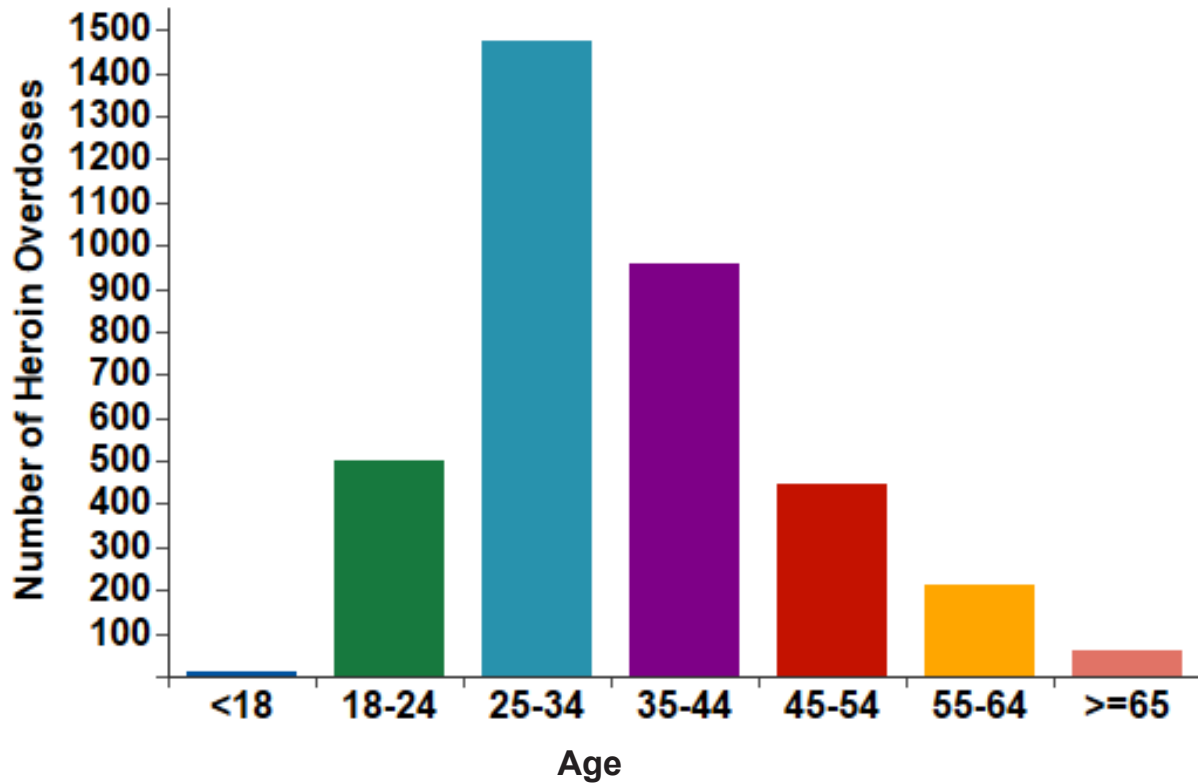


Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

The number of heroin overdoses by sex in TN for 2020 is shown above. Males experienced more heroin overdoses than females in 2020, accounting for 66% of the total number of heroin overdoses reported.

**For every female who overdosed, approximately two males experienced a heroin overdose out of the total number of heroin overdoses reported to DOR in 2020.**

## Number of Heroin Overdoses by Age in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

The number of heroin overdoses by age in TN for 2020 is shown above. Individuals aged 25-34 and 35-44 experienced more heroin overdoses in 2020 compared to other age groups, making up nearly 66% of the total number of heroin overdoses reported in 2020. This means that nearly two-thirds of all heroin overdoses reported to the DOR data system in 2020 occurred among individuals between the ages of 25-44. Heroin overdoses among those aged 25-34 made up nearly 40% of the total number of heroin overdoses reported to the DOR data system in 2020.

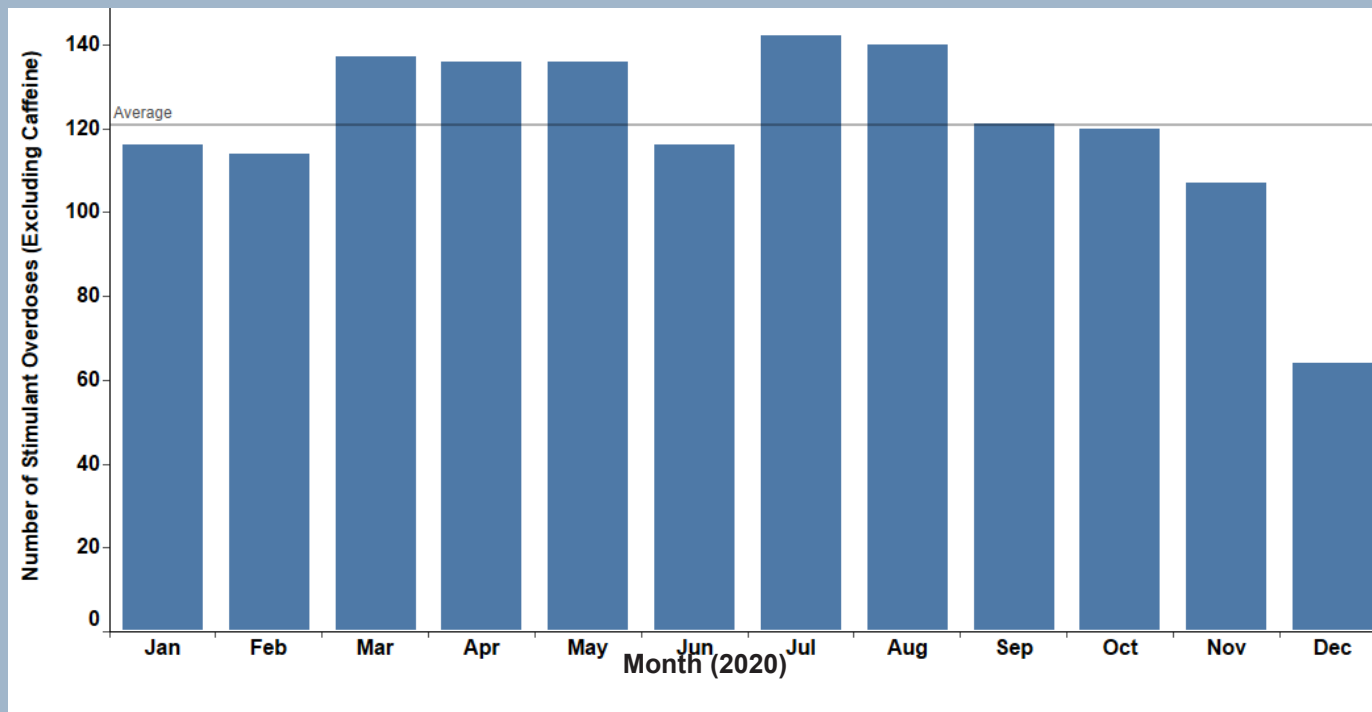


# Nonfatal Stimulant Overdose-DOR

In 2020, stimulant overdoses became reportable to the DOR data system. The data presented in this section include only facilities reporting stimulant overdose data to the DOR system. **Trends should be interpreted with caution as 20% of facilities are not reporting ICD-10-CM stimulant codes.**

From January-December 2020, there were 1,449 stimulant overdoses (excluding caffeine) reported to the DOR system. Like the trends for opioid overdose, a greater proportion of males than females experienced stimulant overdoses (excluding caffeine), and the age group most affected by stimulant overdoses were those aged 25-34. Notably, individuals aged < 18 made up 5% of the total number of stimulant overdoses, a higher percentage than those in the same age group who experienced a heroin overdose (< 1%) or an opioid (excluding heroin) overdose (2%) in 2020.

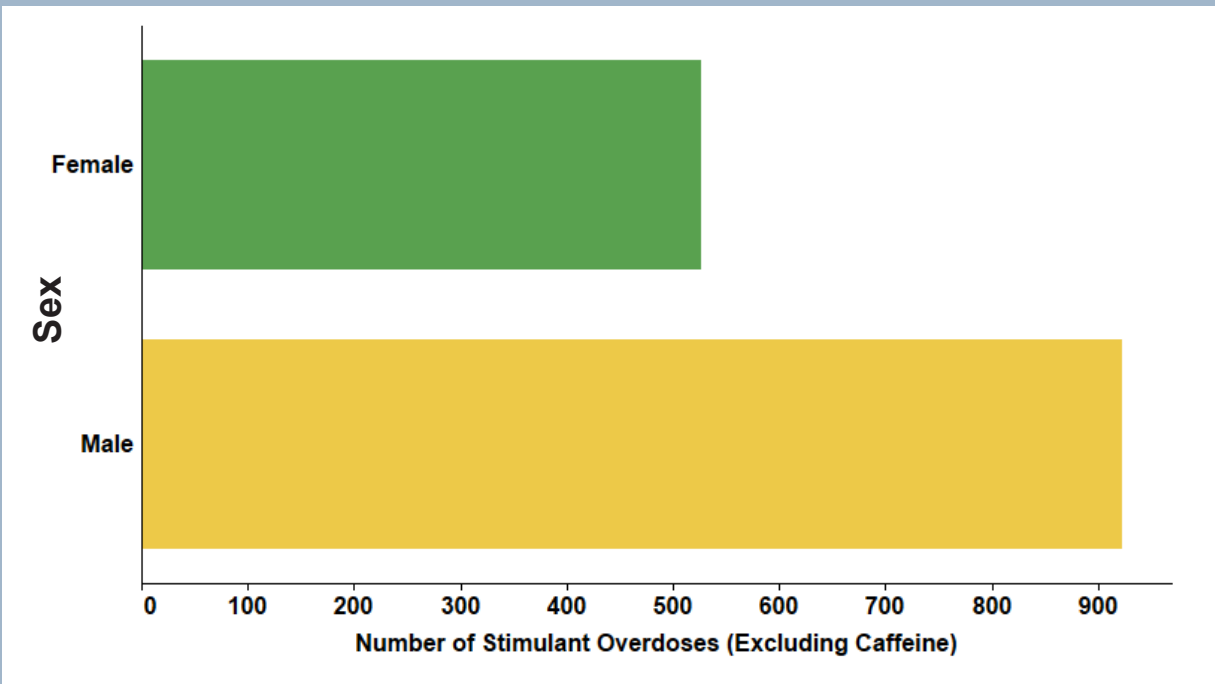
## Number of Stimulant Overdoses (Excluding Caffeine) by Month in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

The average number of stimulant overdoses per month in 2020 was 121. The month of July 2020 had the highest number of stimulant overdoses for the year, reaching a peak at 142 overdoses, approximately 17% higher than the 2020 monthly average.

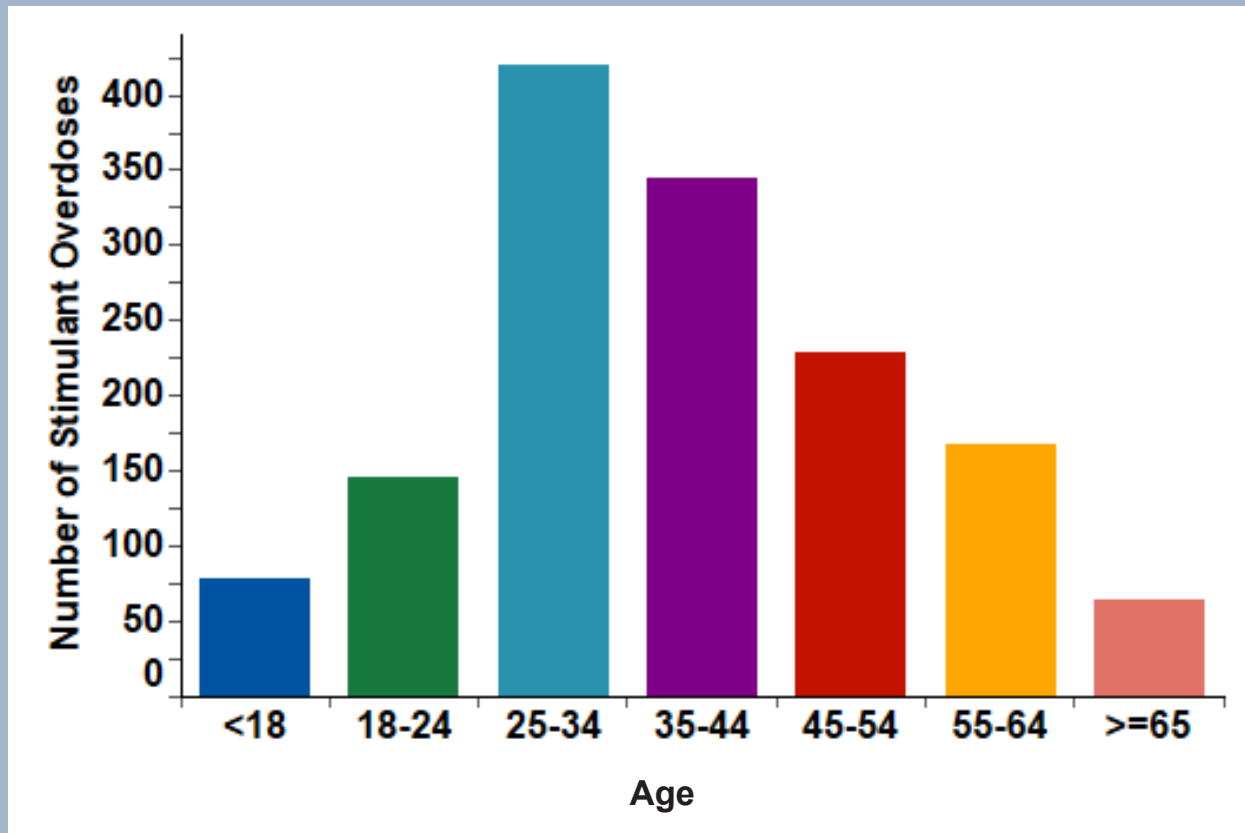
## Number of Stimulant Overdoses (Excluding Caffeine) by Sex in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities.  
Data Source: Drug Overdose Reporting (DOR) System.

The number of stimulant overdoses by sex in TN for 2020 is shown above. Stimulant overdoses (excluding caffeine) in 2020 affected males more often than females (922 and 527 respectively), with males accounting for 64% of the total number of stimulant overdoses reported in 2020.

## Number of Stimulant Overdoses (Excluding Caffeine) by Age in TN, 2020

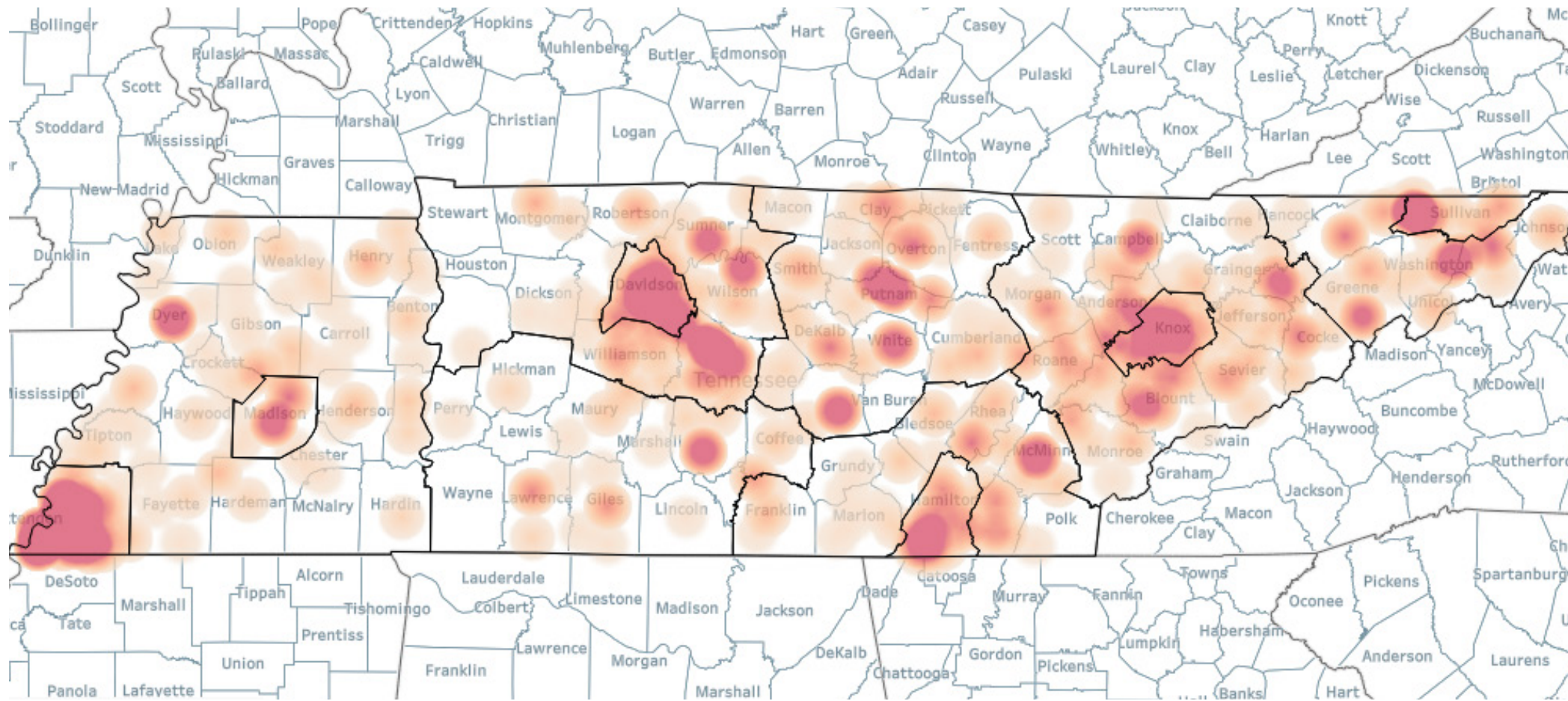


Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

The number of stimulant overdoses by age in TN for 2020 is shown above. Stimulant overdoses (excluding caffeine) occurred most frequently among individuals aged 25-34, followed by individuals aged 35-44. Those aged 25-34 made up over a quarter (29%) of the total number of all stimulant overdoses reported to the DOR data system in 2020.

Another age group that warrants attention are those aged <18. This age group made up 5% of the total number of all stimulant overdoses, a higher percentage than the same age group who experienced a heroin overdose (< 1%) or an opioid overdose (excluding heroin) (2%) in 2020.

## Locations of Stimulant Overdose (Excluding Caffeine) in TN, 2020



Stimulant overdoses (excluding caffeine) in TN appear to be concentrated heavily in metros and surrounding counties. Stimulant overdose hot spots are more apparent in rural counties, compared to opioid hot spots, particularly in the TDH Public Health regions of Upper Cumberland, West Tennessee, Northeast, and East.

Rural counties within Upper Cumberland region, including Warren, White, and Putnam, show high stimulant overdoses. South Central region's Bedford County and West region's Dyer County are also areas with high stimulant overdose counts. In comparison to opioid overdose patterns around Davidson county, the counties of Dickson and Cheatham appear to be less of a hot spot for stimulant overdoses than for all opioid overdoses.

As noted previously, areas remain where key facilities are not yet reporting to the DOR data system, so caution is warranted when interpreting these spatial trends. The absence of "hot spots" does not necessarily signify an absence of overdoses in that area.

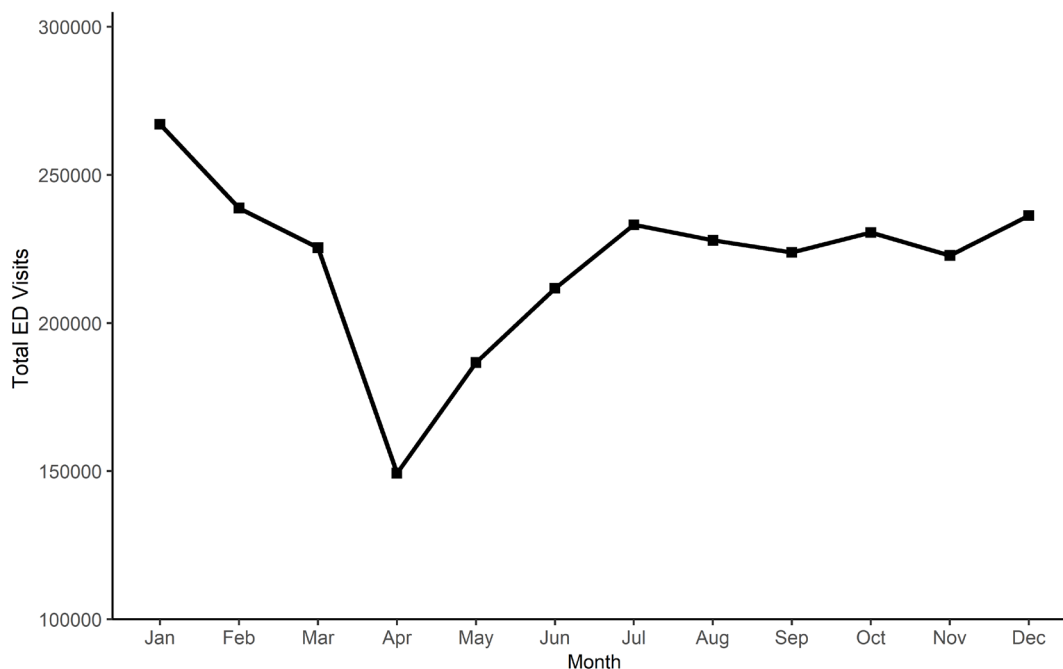
Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System.

# ESSENCE Overdose Trends

## Syndromic Surveillance (ESSENCE) Drug Overdose Trends

ESSENCE is a syndromic surveillance data system developed by CDC's BioSense and maintained by CDC's National Syndromic Surveillance Program (NSSP). Syndromic monitoring uses health data that precedes hospital diagnosis. ESSENCE relies on a CDC-developed algorithm that searches discharge diagnosis codes, SNOMED codes, and chief complaint text. Data reported to ESSENCE include data for suspected overdose cases (all drug overdose, all opioid, heroin, and stimulant). Drug overdoses of unintentional intent alone are included. Cases identified through ESSENCE are considered "suspected" because they are not clinically or laboratory confirmed; hence, caution should be taken when interpreting the data. Syndromic surveillance often identifies more suspected cases than the true confirmed number of cases. A total of 105 TN facilities were reporting to ESSENCE by December 2020. Since ESSENCE data are updated daily, the data are useful for the early detection (before confirmation) of outbreaks or pinpointing clusters.

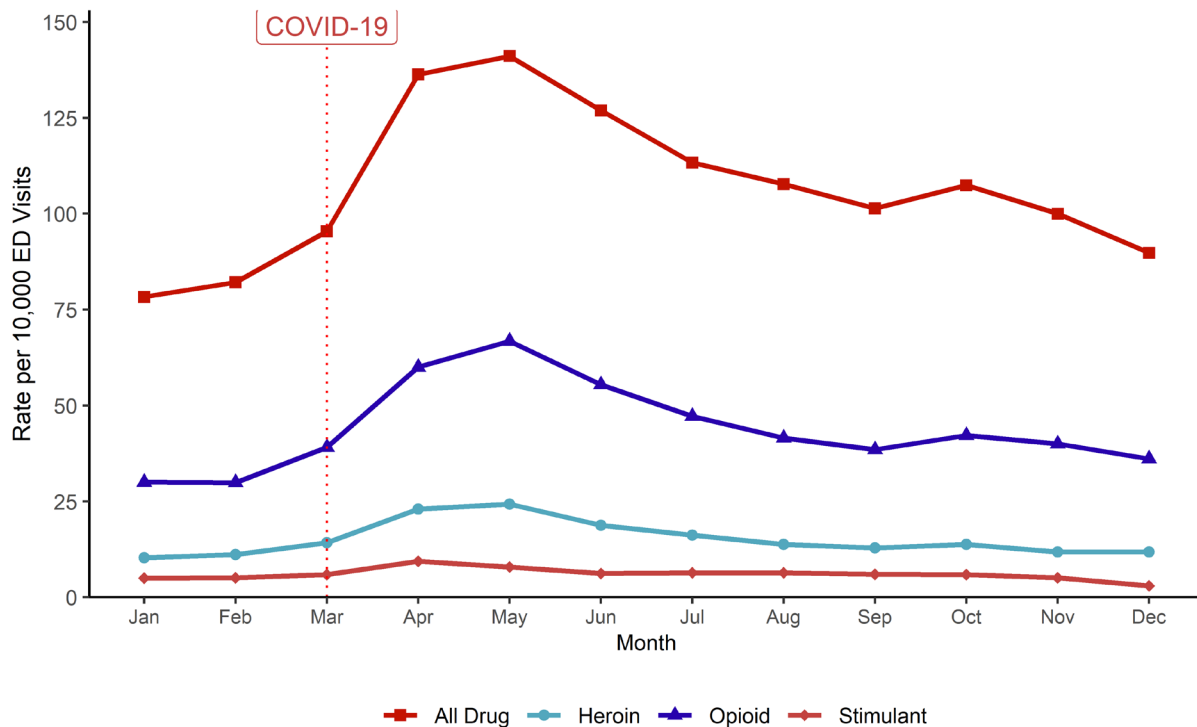
### Total Number of Emergency Department Visits in TN, January-December 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 25, 2021). Limited to TN residents.  
Data Source: ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics).

The above chart shows total emergency department (ED) visits in TN from January 2020 to December 2020. A total of 105 facilities were onboarded and provided syndromic data. There were a total of 267,119 ED visits in January, which then declined to the annual low of 149,344 visits in April. The number of ED visits began to increase in subsequent months but did not reach pre-COVID totals by the end of the year. By December, there were a total of 236,302 visits (a decrease of 11.5% from January).

## Monthly Suspected Nonfatal Drug Overdose Rates per 10,000 Emergency Department (ED) Visits in TN, January-December 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 25, 2021). Limited to TN residents. Data Source: ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics).

The above chart shows 2020 monthly rates of suspected nonfatal drug overdoses per 10,000 ED visits by drug category. The red dotted line represents the month with the first reported COVID-19 case in TN. Rates for nonfatal suspected all drug overdoses increased from 78.3 per 10,000 ED visits in January to 89.8 per 10,000 ED visits in December. The rates for suspected opioid overdoses also increased from January (30.0 per 10,000 ED visits) to December (40.0 per 10,000 ED visits), while the rates for stimulant overdoses decreased from January (5.0 per 10,000 ED visits) to December (3.0 per 10,000 ED visits). From January to December, rates for suspected heroin overdoses also increased from 10.3 per 10,000 ED visits to 11.8 per 10,000 ED visits.

In 2020, suspected overdose rates involving all drugs, opioids, heroin, and stimulants were higher during April-June, with the highest rates per 10,000 ED visits observed in May (all drug: 141.1; opioid: 66.8; heroin: 24.3), while the rates for stimulant overdoses were highest in April (9.4 per 10,000 ED visits). The counts of suspected nonfatal drug overdoses showed a similar pattern.

Due to the increased magnitude of ED visits following the onset of the COVID-19 pandemic and variations in number of reporting facilities, we encourage caution while interpreting these data.

# Section Spotlight

## Annual Costs by Overdose Visit Type in TN, 2016-2019

An overdose, even if the patient survives, can have many costs that linger for years after the event itself, both physical and emotional. Further, overdoses and associated substance use disorder have been shown to have large, long-term financial costs at the societal level due to costs of treatment, lost wages and productivity, many lost years of life, and more.<sup>42</sup> When the overdose is treated in a hospital, however, many patients face a particularly substantial and immediate financial cost. Healthcare resources that are used to save a patient experiencing an overdose are expensive, and either the patient or a third party payer, such as the government or an insurer, must cover those costs. Calculating this cost can be done in a variety of ways, but it is generally impossible to calculate the precise final cost for each patient due to the complexity of healthcare billing and reporting.

A standard method for calculating costs called a Cost to Charge Ratio (CCR) was used for this brief analysis.<sup>43</sup> To do this, OIA used the Joint Annual Report (JAR), a comprehensive financial survey completed each year by every hospital in the state and validated by state analysts. All non-federal general acute care hospitals in the state of TN are required to submit their financial data to the state, and therefore there is minimal missing data. Of the facilities that treated a nonfatal overdose case from any drug between 2016 and 2019 (n = 135), two hospitals were missing financial data in 2016, and one hospital was missing data in 2018. The small number of records from these facilities (less than 70 in each year) was excluded from this cost analysis. To obtain each hospital's CCR the total annual costs reported by the hospital is divided by the total revenue reported over the same period.

On the patient side, the HDDS is used to obtain the total reported charges for their visit, which is usually the only financial information available for each record. These charges reflect the maximum bill that the patient will receive and include room and board, nursing services, treatments, and resources used but often do not include doctor fees if the physician that treated the patient was not a direct employee of the hospital. Hospital-level CCRs are matched with patient-level charges using the hospital's JAR ID, a proprietary TN tracking number assigned to all hospitals. To then arrive at an estimated "cost" for that visit (how much the hospital actually spent on their care), multiply the CCR by each patient's total charges. Calculating costs allows a standardized method of comparing across hospitals, patient types, and insurance companies, so that we can get a base estimate of the cost of an overdose in TN.

JAR Reports information can be accessed at: <https://www.tn.gov/health/health-program-areas/statistics/health-data/jar.html>

### Joint Annual Reports (JAR)

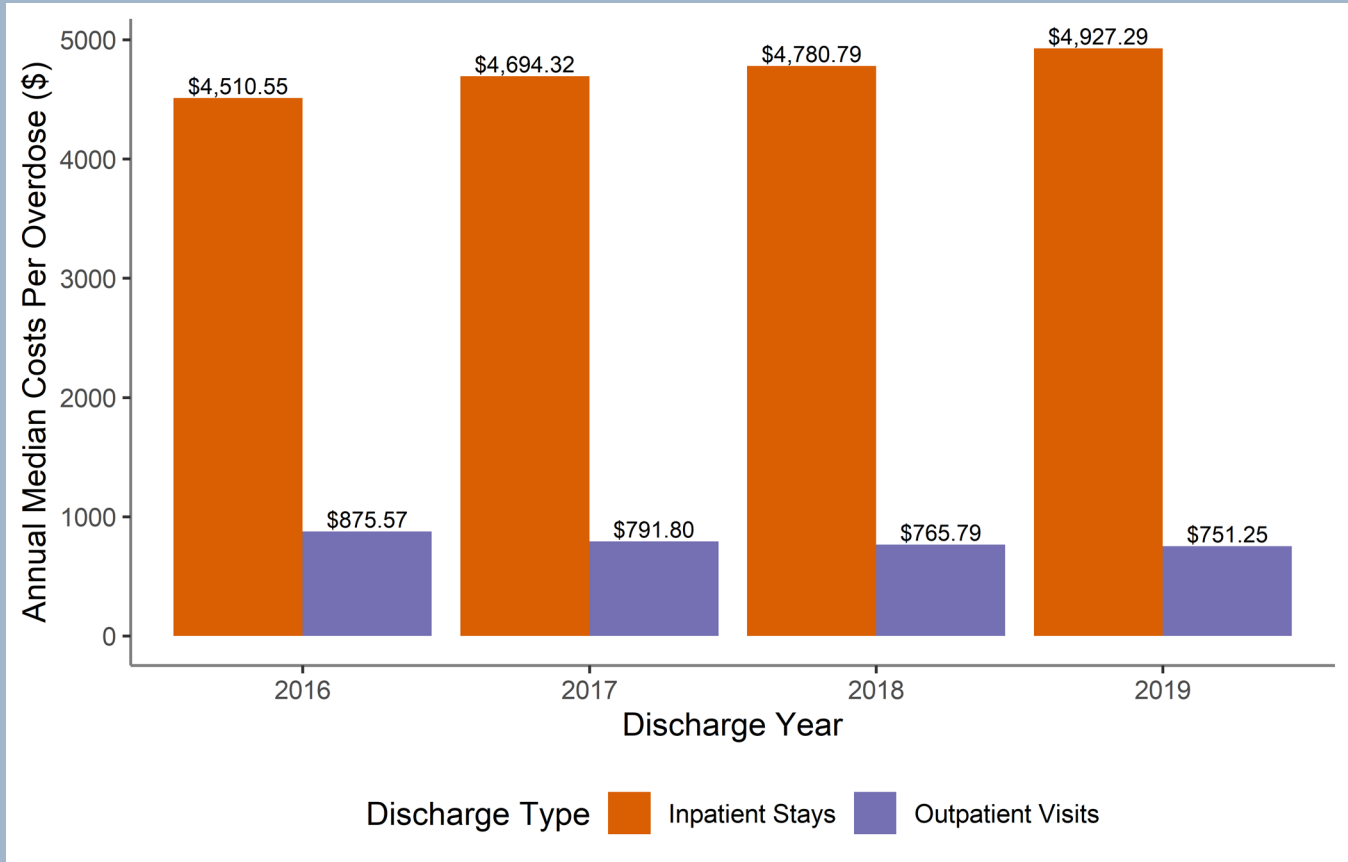
The Health Statistics Facilities unit collects data from a variety of licensed health facilities through annual reports known as Joint Annual Reports (JARs). Data collected include facility locations, services provided, patient origin by county, and financial indicators. The blank forms show the data requested by facility type.



<sup>42</sup> Florence, Curtis, Feijun Luo, and Ketra Rice. 2021. "The Economic Burden of Opioid Use Disorder and Fatal Opioid Overdose in the United States, 2017." *Drug and Alcohol Dependence* 218:108350. doi: 10.1016/j.drugalcdep.2020.108350.

<sup>43</sup> Hsu, Douglas J., Ellen P. McCarthy, Jennifer P. Stevens, and Kenneth J. Mukamal. 2017. "Hospitalizations, Costs and Outcomes Associated with Heroin and Prescription Opioid Overdoses in the United States 2001-12." *Addiction (Abingdon, England)* 112(9):1558–64. doi: 10.1111/add.13795.

## Median Annual Cost of Hospital-Treated All-Drug Overdoses in TN, 2016-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated February 10, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System, Joint Annual Report.

The graph above presents the annual median cost of an overdose treatment in a hospital where the patient survived. Cost can be interpreted as the average estimated amount spent by the hospital on each overdose event. It includes all resources utilized for a patient during their visit, not just those used specifically on treating the overdose. Between 2016 and 2019, the median cost of overdose changed very gradually. Inpatient overdose stays became more expensive, increasing from \$4,511 [IQR<sup>44</sup>: \$2,793.09-\$7,742.92] in 2016 to \$4,927 in 2019 [IQR: \$3,074.52-\$8,169.66]. At the same time, the cost of outpatient overdose visits—which are primarily treated in emergency departments—has steadily declined from \$876 [IQR: \$483.52-\$1,535.08] to \$751 [IQR: \$384.25-\$1,331.06] over the time period.

**Note:** It should be noted that these costs are estimates and should not be interpreted as real values that any party (patient, hospital, insurance company) actually paid for the care received. Due to health insurance negotiation rates, copays, deductibles, and other factors, the patient and their insurer are unlikely to pay either the full amount charged, or the amount we calculated as the cost of a visit. Charges, in particular, are often dependent on an individual hospital's pricing scheme, and can change dramatically based on a patient's insurance company.

<sup>44</sup> IQR= InterQuartile Range



# 5,029,476

The total number of  
opioid for pain  
prescriptions filled  
in TN in 2020

## PRESCRIPTION TRENDS

Despite increases in fatal and nonfatal overdoses in Tennessee (TN), the type of prescribing behaviors that increase risk of overdose have decreased tremendously over the last five years. The number of patients filling opioid for pain prescriptions in TN has fallen 33.6% since 2016. From 2019 to 2020, the rate of filled opioid prescriptions for pain decreased in every TN county. In this section, prescription trends for opioids for pain, benzodiazepines, and gabapentin will be highlighted. As a returning addition this year, this section will also characterize prescription trends for buprenorphine, a Medication-Assisted Treatment (MAT) drug. This section also highlights a number of ongoing projects, led by OIA, to enhance TDH's understanding and use of controlled substance prescribing data.



# Introduction

In this section of the 2021 TN Annual Overdose Report, we describe prescription trends in TN from 2016-2020 based on data available in TN's Controlled Substance Monitoring Database (CSMD). The CSMD, TN's prescription drug monitoring program, provides information about controlled substance prescribing patterns for patients, dispensers, and healthcare providers.<sup>45</sup> Schedule II, III, IV, and V controlled substance<sup>46</sup> prescriptions filled in TN are required to be reported to the CSMD. Dispensers are required to report all controlled substances dispensed within one business day of dispensation with the exception of veterinary dispensers who report within 14 days. Healthcare providers in TN are required to use the CSMD to query a patient's prescription history prior to beginning a new course of treatment and every six months thereafter or when they have concerns. Data are transmitted by dispensers to Apriss, the state vendor that maintains the CSMD. Daily updates are provided to the Tennessee Department of Health's (TDH) Office of Informatics and Analytics (OIA). TDH uses these data for analytic and public health surveillance purposes, and the data are part of OIA's Integrated Data System (IDS) described on **page 11** of this report.

**A controlled substance is a medication, drug, or substance that can cause physical or mental dependence, and have restrictions on how they are prescribed and dispensed (or filled).<sup>47</sup> The Drug Enforcement Agency (DEA) classifies these drugs into Schedules (I-V) based on their abuse potential.<sup>48</sup>**

**Schedule I drugs have the highest abuse and dependence potential. These are substances the DEA has determined to have no current acceptable medical use such as heroin or methamphetamine.**

**Schedule II, III, and IV drugs have a high, moderate to low, and low potential of abuse and dependence, respectively. These substances can be obtained by prescription. Examples include Opioids for Pain (Schedule II), Buprenorphine (Schedule III), and Benzodiazepines (Schedule IV). Prescription trends for these drugs will be the focus of this section.**

**Schedule V drugs have the lowest abuse and dependence potential. These are substances that contain limited quantities of certain narcotics such as prescription cough syrup. In this section, trends for the Schedule V drug Gabapentin will be highlighted.**

**In this section...**

Trends for  
Opioids for Pain,  
**pg 117-132**

Trends for  
Benzodiazepines,  
**pg 133-140**

Trends for  
Buprenorphine,  
**pg 145-153**

<sup>45</sup> CSMD FAQ: <https://www.tn.gov/health/health-program-areas/health-professional-boards/csmd-board/csmd-board/faq.html>

<sup>46</sup> Tennessee Drug Control Act, [TCA § 39-17-401](#)

<sup>47</sup> Drug Enforcement Agency. Drug Scheduling. Retrieved from: <https://www.dea.gov/drug-scheduling>

<sup>48</sup> In TN, drug scheduling is determined at the state level and follows the DEA drug classifications with some exceptions. [Learn more about drug scheduling specific to TN](#)

# Data Source & Methods

## What is in the CSMD?

CSMD data contain information about each filled prescription for a controlled substance, including quantity, days' supply, and the National Drug Code (NDC) number.<sup>49</sup> The NDC encodes information about the drug, manufacturer, form, and strength. In order to monitor the prescription histories of individuals, the data contains identifying information about patients including full name, date of birth, sex, and street address. Information about the prescriber and dispenser is also collected, including the prescriber's and dispenser's Drug Enforcement Agency (DEA) number. Prescriber and dispenser DEA numbers are linked to DEA registration data, which include addresses, registration dates, and other pertinent details.

## How is the CSMD used to determine prescription trends?

OIA uses the CSMD to create indicators of TN prescribing patterns at the prescription, patient, prescriber, and dispenser levels. OIA uses a number of data quality measures to ensure accurate reporting of prescription indicators. For example, prescriptions with implausible values and prescriptions for out-of-state residents are removed.<sup>50,51</sup> Additional drug information is added to the existing data by joining it to drug classification tables provided by the CDC and IBM Micromedex RED BOOK data, including major classes of drugs in the CSMD (i.e., opioids, benzodiazepines, stimulants, muscle relaxants), type of drugs (e.g., hydrocodone, oxycodone), strength, and oral morphine milligram equivalent (MME) conversion factors.<sup>52</sup> Due to the nature of data collection, a single individual may have a number of separate patient records in the CSMD—each of which may be associated with one or more prescriptions—that must be resolved into a single entity in a process referred to as “entity management” or “entity resolution.” Our current approach to patient entity management in the IDS utilizes full names and dates of birth for primary matches. Likewise, healthcare providers may have multiple records in the CSMD as a result of having multiple DEA numbers, among other factors. The provider entity management process involves cross-referencing multiple sources of information including DEA registrations, National Provider Identifier (NPI) information, and state licensing data to ensure that a single provider's prescriptions are adequately identified. OIA is constantly monitoring and improving these processes, and additional information and updates on our entity management processes can be found at the end of this section of the report (see **Ongoing and Future Work, page 154-155**).

After implementing measures to assure data quality, prescription-based indicators are calculated according to CDC guidelines<sup>53</sup> and TDH departmental needs (see **Appendix A** for list of available indicators and **Appendix B** for technical notes for additional information about indicator calculations). Prescription indicators that are frequently used are incorporated into the IDS to aid in quick analytics and visualization for public health surveillance. CSMD data and indicators also enhance and inform many of OIA's analytic reports and papers (see **Data Dashboard** in the **OIA Partnerships** section of this report). OIA has also worked closely with other state agencies, such as the TN Department of Mental Health and Substance Abuse Services (TDMHSAS), to provide CSMD data where appropriate and allowed by law (see **BJA Grant** and **TDMHSAS ROPS** sections for additional information on these partnerships). For instance, OIA has worked closely with TDMHSAS to provide a biannual report of patient and prescription trends for physicians with DATA 2000 Waivers<sup>54</sup> that allow them to prescribe buprenorphine for medication-assisted treatment (MAT) to patients with opioid use disorder (OUD).<sup>55</sup>

<sup>49</sup> CSMD Data Collection Manual: <https://www.tn.gov/health/health-program-areas/health-professional-boards/csmd-board/csmd-board/csmd-data-collection-manual.html>

<sup>50</sup> See Technical Notes in **Appendix B7** for additional methods details for prescription-related risk measures.

<sup>51</sup> CSMD analyses presented in this report include prescriptions reported by any dispenser including those reported by Veterans Affairs hospitals.

<sup>52</sup> CDC Opioid Overdose Data Resources: <https://www.cdc.gov/drugoverdose/resources/data.html>

<sup>53</sup> CDC's Opioid Overdose Indicator Support Toolkit. Version 3.0. Release Date: 3/23/2018.

<sup>54</sup> DATA 2000: <https://www.deadiversion.usdoj.gov/pubs/docs/mat.htm>

<sup>55</sup> For more information on medication-assisted treatment, see: <https://www.samhsa.gov/medication-assisted-treatment>

# Data Source & Methods

## CSMD Limitations

There are a few limitations inherent with the CSMD data:

- Information on indication of use or medical history is not included for all prescriptions in the CSMD. Although 2018's TN Together<sup>56</sup> legislation does require the submission of diagnosis codes for some prescriptions, these data have limited usefulness for describing population-level trends. Thus, when calculating opioid indicators used for pain or medication-assisted treatment, we must rely on the FDA-label indication.
- Much of the drug information used for analysis is not reported to the CSMD and must be added by linking CSMD prescription records to drug information from another source (such as the CDC table or RED BOOK) through the NDC number. We have done extensive work to include and validate this added drug information, but some data remain missing, and new drugs may not be identified until our sources of drug information are updated.
- The CSMD only tracks prescriptions that have been filled by a dispenser, not those written but never filled, so it more accurately reflects trends in prescription dispensation rather than prescription writing.
- The CSMD is also not a reliable indicator of drug use. Patients may fill prescriptions and never use them, or they may acquire and use prescription medications through illicit means.
- Some prescriptions written for veterinary patients will be included in the numbers presented here. OIA estimates that veterinary prescriptions make up around 1% of all prescriptions reported to the CSMD.
- Finally, the CSMD does not include information on patient race or ethnicity, and we are unable to monitor differences in prescription trends by these demographic characteristics.

Despite these limitations, the CSMD provides important information on prescribing practices and allows for useful estimates of the overall amount of prescribed controlled substances available in TN. These data points have proven extraordinarily valuable in the department's overdose prevention and regulatory efforts.

## In this Section

The following section provides a snapshot of quarterly and yearly trends identified in commonly used indicators calculated from CSMD data. Many of the indicators focus on opioids that are typically prescribed for the treatment of pain as prescription opioid misuse has been of great concern in the current overdose epidemic. Due to the heightened risk associated with concurrent opioid and benzodiazepine use, this section also includes a number of indicators of benzodiazepine prescribing trends. A brief snapshot of gabapentin prescribing is included as well. Gabapentin was recently classified as a controlled substance in TN and required to be reported to the CSMD beginning on July 1, 2018. This section also includes trends for buprenorphine for MAT, which is an increasingly popular and evidence-based treatment for opioid use disorder.<sup>57</sup> The first part of the prescribing section compares statewide opioid, benzodiazepine, and gabapentin patient and prescription trends.

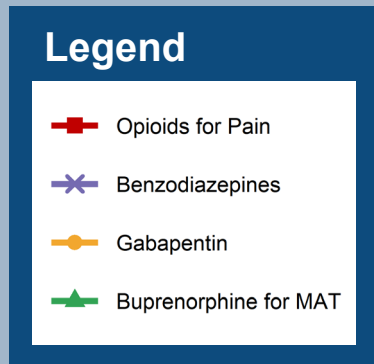
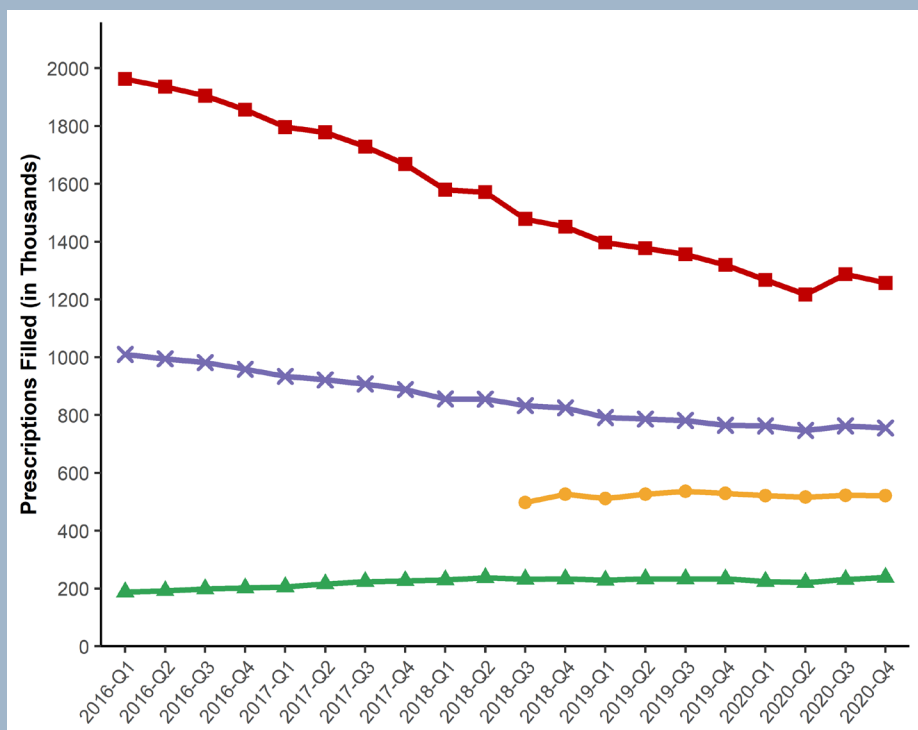
**NOTE:** OIA has implemented several data updates and improvements that allow us to better classify drugs that have been reported to the CSMD for analysis (see **Ongoing and Future Work, page 153-154**). As a result, some numbers in this year's report may appear higher during the same period of time reported in the 2020 Annual Overdose Report. This improvement has particularly affected counts for benzodiazepine drugs. Additionally, these updates have allowed for trends on buprenorphine for MAT to be reincorporated into this report.

<sup>56</sup> TN Together: <https://www.tn.gov/opioids/about-tn-together.html>

<sup>57</sup> Other drugs used for MAT, like the opioid methadone and the opioid antagonist naltrexone, are not reported to the CSMD.

# Statewide Prescription Trends

## Number of Controlled Substance Prescriptions by Selected Drug Class in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

Above are the number of prescriptions filled for opioids for pain, benzodiazepine, gabapentin, and buprenorphine for MAT in TN from 2016 to 2020. These four drug classes are the focus of this section of the annual report.

The number of opioid prescriptions for pain has declined between 2016 and 2020. In Q1 2016, 1.96 million prescriptions of opioids for pain were filled (representing a rate of 295 prescriptions per 1,000 residents<sup>58</sup>). Since this quarter, opioid prescriptions for pain have fallen to 1.26 million filled prescriptions in Q4 2020 (a rate of 184 per 1,000 residents), representing a decrease of 35.7%. While prescriptions declined quarter over quarter for most of this period, they increased from Q2 2020 to Q3 2020. This unusual trend is likely a result of the COVID-19 pandemic’s effects on prescribing patterns.

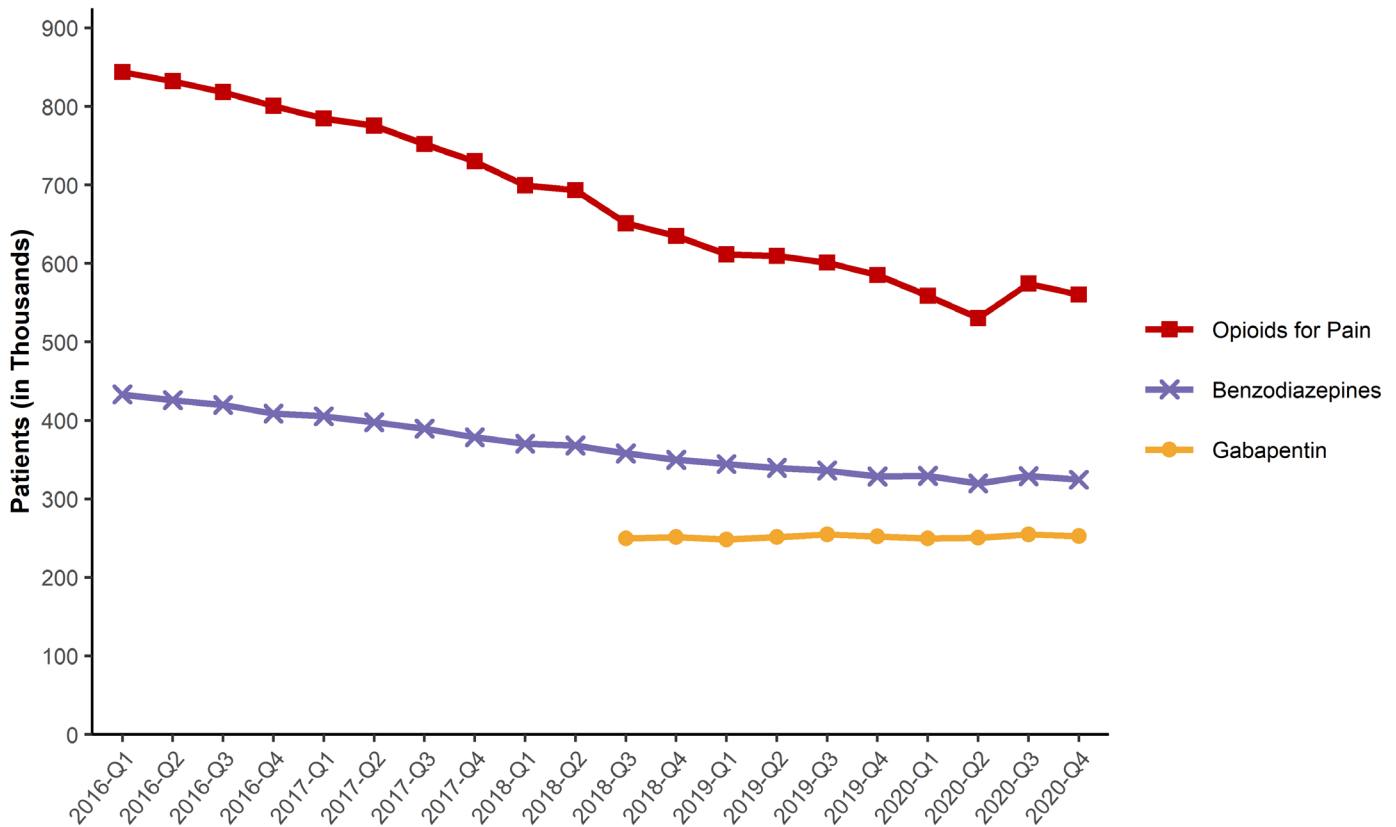
Benzodiazepines are prescribed about half as often as opioids for pain and have steadily decreased over most of the last five years. In Q1 2016, 1.01 million benzodiazepine prescriptions were filled (152 per 1,000 residents) decreasing to 750,000 filled prescriptions in Q4 2020 (111 per 1,000 residents), a 24.8% reduction. Like opioids, benzodiazepine prescriptions increased slightly from Q2 to Q3 in 2020.

Gabapentin prescriptions were first required to be reported to the CSMD on July 1, 2018, so gabapentin data are only presented from Q3 2018 forward. Over this period, just over 500,000 gabapentin prescriptions were filled in most quarters. In Q4 2020, there were 521,000 gabapentin prescriptions filled (79 per 1,000 residents).

The number of prescriptions of buprenorphine for MAT has risen steadily over the five-year period presented here. In Q1 2016, there were 187,900 filled prescriptions (28 per 1,000 residents). By Q4 2020, there were 238,500 filled prescriptions (35 per 1,000 residents), representing a 26.9% increase.

<sup>58</sup> Rates not otherwise indicated as “age-adjusted” are calculated as crude rates.

## Patients Receiving Opioid, Benzodiazepine, and Gabapentin Prescriptions in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents.  
Data Source: Controlled Substance Monitoring Database.

Above are the number of patients who have filled prescriptions for opioids for pain, benzodiazepine, and gabapentin in TN from 2016 to 2020. The number of patients who have filled prescriptions for buprenorphine for MAT will be highlighted along with the visualizations centered on buprenorphine in TN (page 145-153).

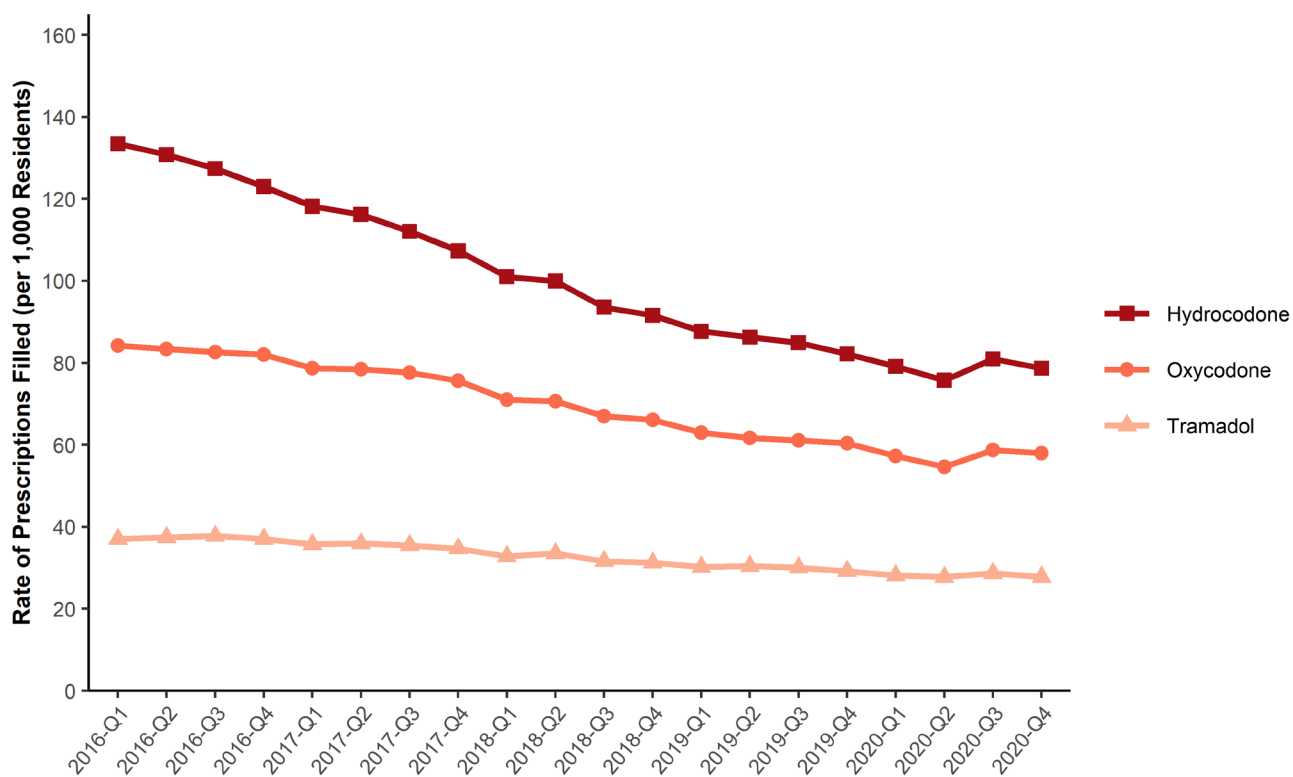
The number of patients filling opioid prescriptions for pain has fallen from 844,000 in Q1 2016 to 560,000 in Q4 2020, a reduction of 33.6%. While the number of patients filling opioid for pain prescriptions declined quarter over quarter for most of this period, they increased from Q2 2020 to Q3 2020. This unusual trend is likely a result of the COVID-19 pandemic's effects on prescribing patterns.

Patients filling benzodiazepine prescriptions have also declined during most of this period from 433,000 in Q1 2016 to 325,000 in Q4 2020, a reduction of 25.1%. The number of patients filling gabapentin prescriptions has remained steady at around 250,000 patients since reporting began in Q3 2018. In Q4 2020, the number of patients filling gabapentin prescriptions was 253,000.

# Opioids for Pain Prescription Trends

The three most commonly prescribed opioids for pain in TN are hydrocodone, oxycodone, and tramadol, respectively. These three types of opioids accounted for about 89% of all opioid prescriptions for pain in 2020.

## Prescription Rate of Top 3 Most Prescribed Opioids for Pain in TN, 2016-2020

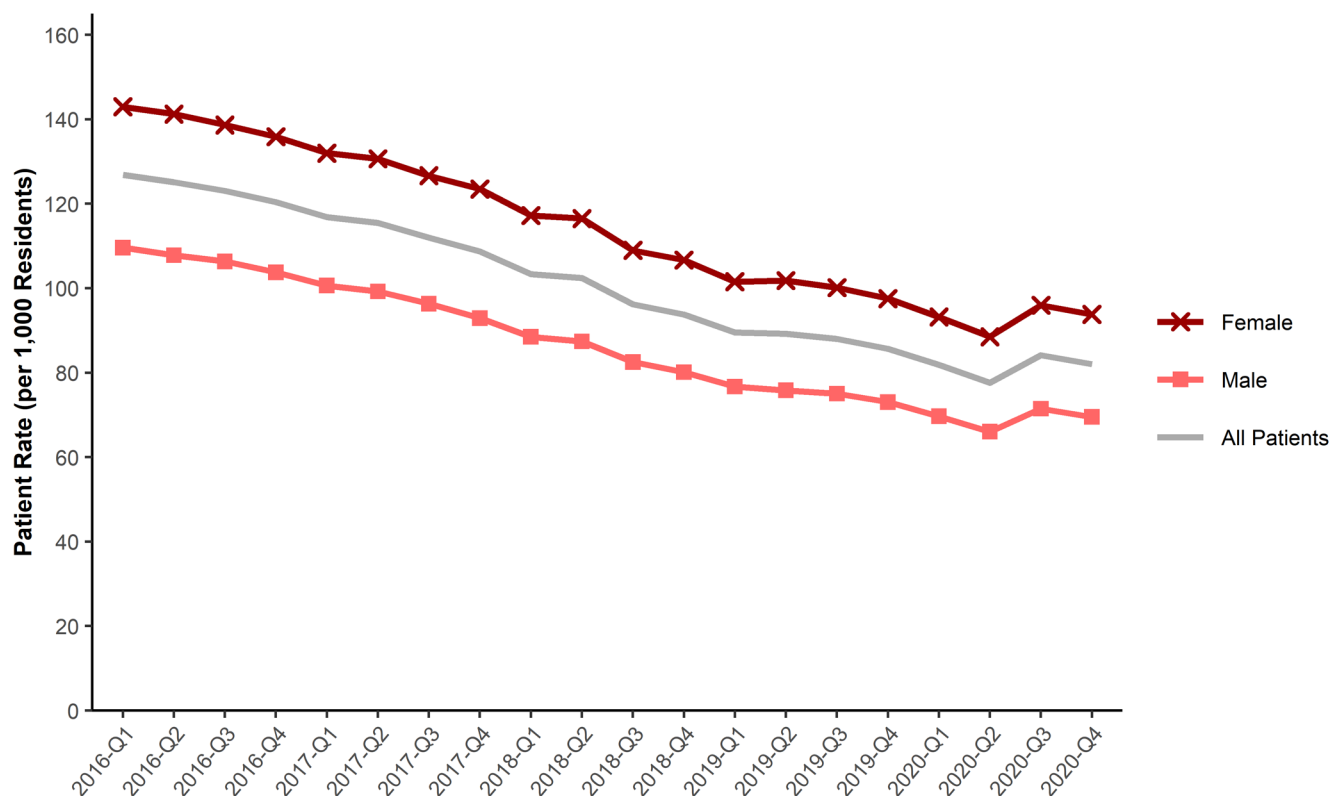


Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

As seen in the plot above, the prescription rate for the top three most prescribed opioid for pain prescriptions in TN has generally declined from 2016 to 2020. Hydrocodone prescribing rates have dropped steadily for most of the period from a high of 133 per 1,000 residents in Q1 2016 to 79 per 1,000 residents in Q4 2020. Prescription rates for oxycodone decreased from 84 per 1,000 residents in Q1 2016 to 58 per 1,000 residents in Q4 2020. Tramadol prescriptions decreased from a rate of 37 per 1,000 residents in Q1 2016 to 28 per 1,000 residents in Q4 2020.

Each of the top prescribed opioids had an increase in rate from Q2 2020 to Q3 2020, likely due to the effects of the COVID-19 pandemic.

## Rate of Patients Receiving Opioids for Pain by Sex in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

The plot above presents the rate of patients filling opioid prescriptions for pain per 1,000 TN residents by sex. The rate for all patients is included for comparison. Across the entire period from 2016 to 2020, female patients filled opioid prescriptions for pain at a higher rate than male patients. Both groups have experienced declining rates at roughly the same pace.

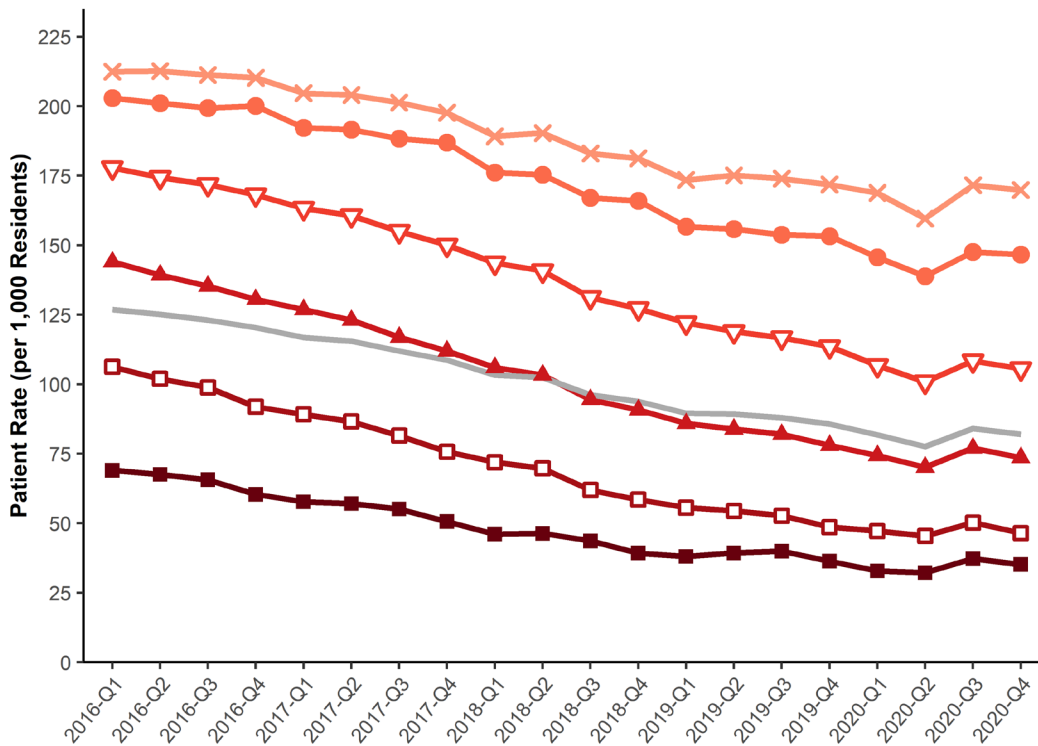
Rates for female patients decreased from 143 per 1,000 residents in Q1 2016 (a total of 487,000 female patients) to 94 per 1,000 residents in Q4 2020 (328,000 female patients). Rates for male patients decreased from 110 per 1,000 residents in Q1 2016 (a total of 355,000 male patients) to 70 per 1,000 residents in Q4 2020 (232,000 male patients).

Both female and male patients filled at a higher rate in Q3 2020 compared to Q2 2020, likely due to the effects of the COVID-19 pandemic.

**Although females filled opioid for pain prescriptions at a higher rate than males from 2016 to 2019, males died of overdoses involving prescription opioids at higher rate than females for the same time period.**



# Rate of Patients Receiving Opioids for Pain by Age in TN, 2014-2018



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

## Legend

- 18-24
- 25-34
- ▲ 35-44
- ▼ 45-54
- 55-64
- ✕ 65+
- All Patients

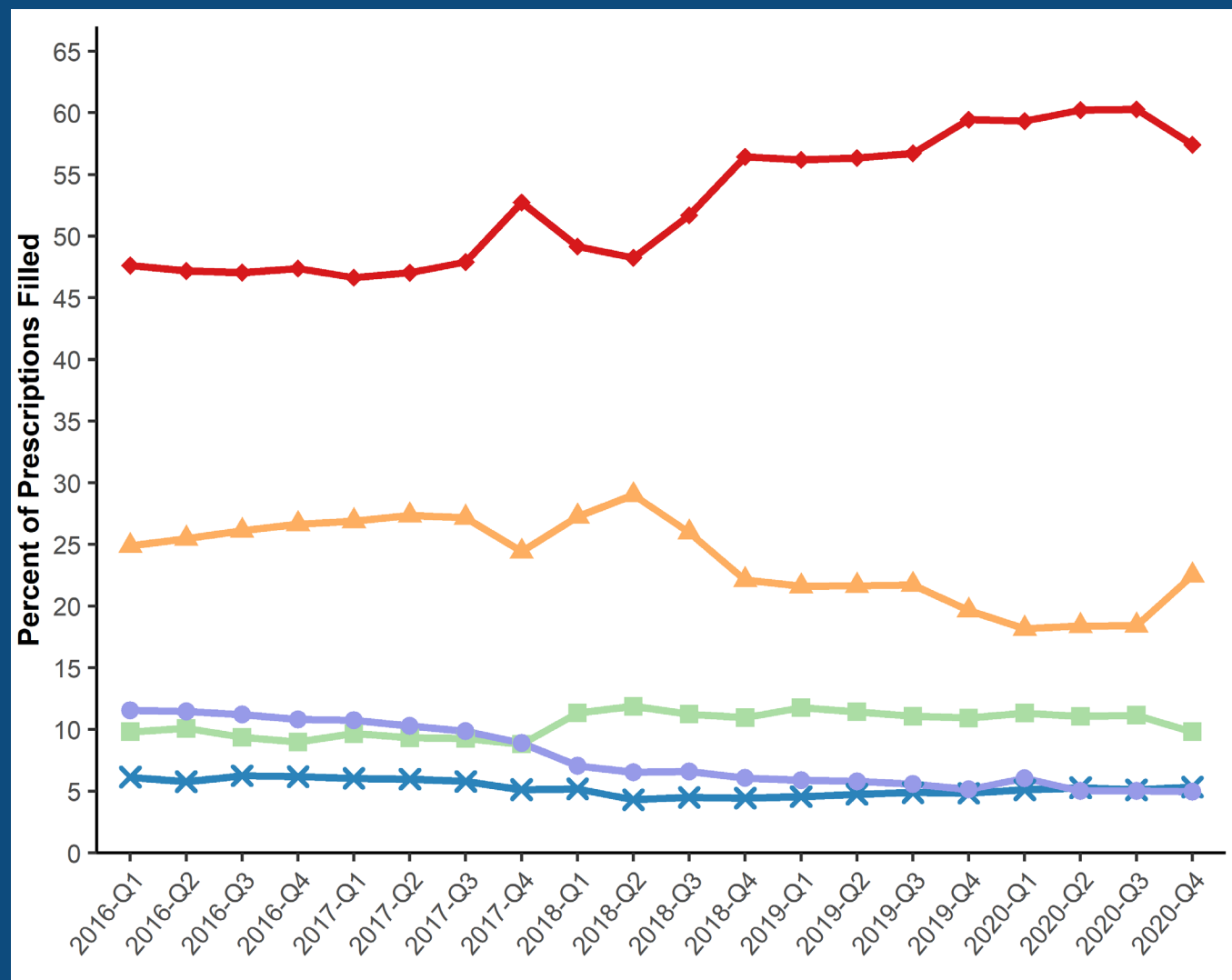
The plot above presents the rate of patients filling opioid prescriptions for pain per 1,000 TN residents by age group.<sup>59</sup> The rate for all patients is included for comparison.

Across the entire time period from 2016 to 2020, older age groups filled opioid prescriptions for pain at a higher rate than younger age groups. The oldest age group (patients 65 years and older) filled opioid prescriptions for pain at a much higher rate (170 per 1,000 residents in Q4 2020) than the rate for all patients (82 per 1,000 residents in Q4 2020). All age groups experienced decreasing rates across this time period, but the age groups between 25-54 had the sharpest rate decrease while oldest and youngest groups had more modest declines. All age groups also had an increase in prescriptions between Q2 2020 and Q3 2020, likely related to changes in prescribing caused by the COVID-19 pandemic.

<sup>59</sup> Prescriptions for patients less than 18 years of age are not included.

# Payment Type for Opioid for Pain Prescriptions

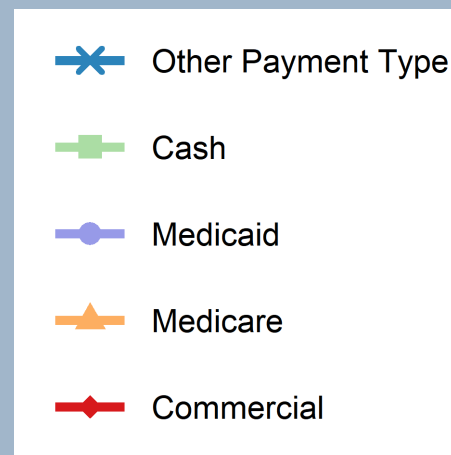
From 2016 through 2020, the most common payment type for opioid prescriptions for pain in TN was commercial insurance, followed by Medicare. From 2016 through 2017, the percent of opioid prescriptions paid through cash and Medicaid were roughly equal, but the number of prescriptions paid for by Medicaid shrank in 2018 and through most of 2020.<sup>60</sup> Likewise, the percent paid by Medicare decreased as well. Across all of 2020, commercial insurance accounted for about 59.3% of all opioid prescriptions for pain, followed by Medicare (19.4%), cash (10.8%), Medicaid (5.3%), and finally other payment types (5.2%).



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

## Understanding Payment Information for Prescriptions in Tennessee

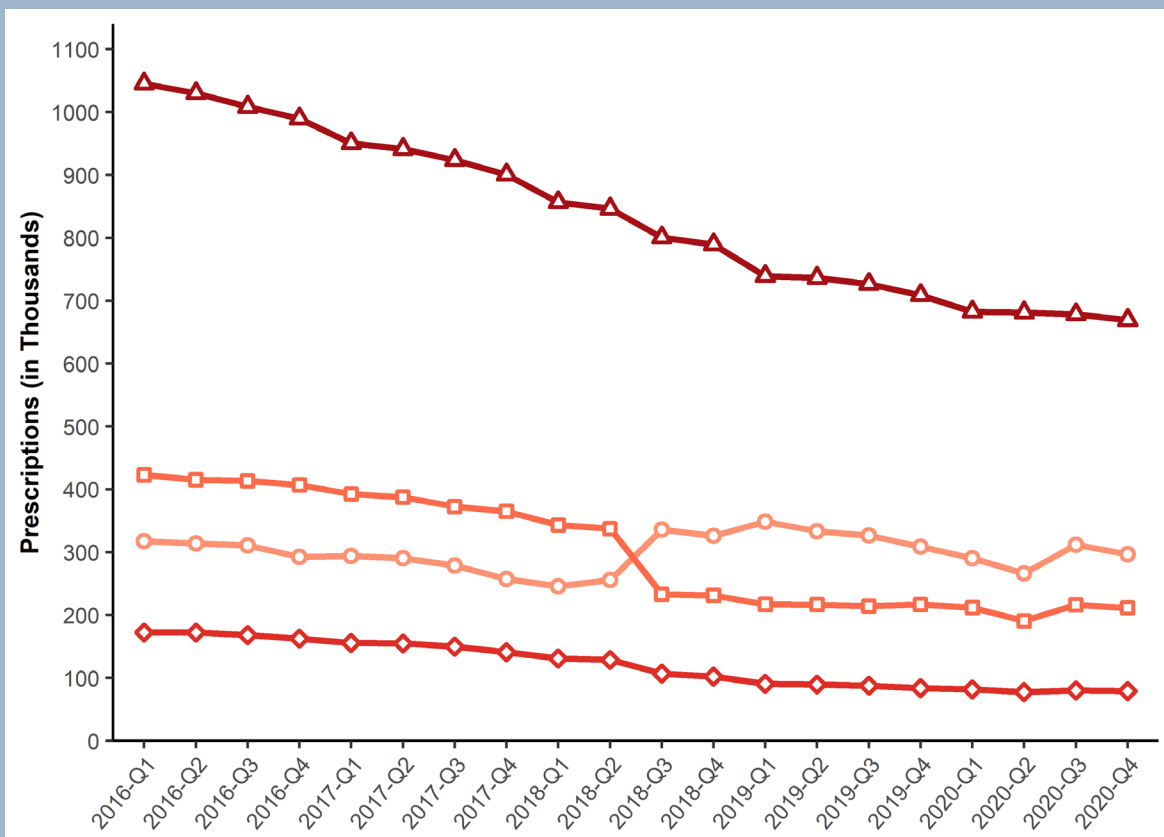
Payment information for each prescription filled is reported as one of several categories, including commercial insurance, Medicare, Medicaid, cash, and other payment types.<sup>61</sup> In the plot to the left, we show the percentage of prescriptions filled for opioids for pain in each of these payment categories. Each line in the plot is mutually exclusive and represents percentages of the total. When one payment type decreases, one or more of the other payment types must increase, although the absolute number of prescriptions may not have changed. For example, in the plot to the left, although the percentage of opioid prescriptions for pain that were paid for through commercial insurance increased in 2018 through 2020, the total number of prescriptions paid for through commercial insurance did not change appreciably.



<sup>61</sup> Other payment types include military/VA, workers compensation, and discount cards

<sup>60</sup> This shift aligns with new policies for opioid prescriptions enacted by TennCare that began in 2018: <https://www.tn.gov/tenncare/tenncare-s-opioid-strategy.html>

## Number of Opioid for Pain Prescriptions by Days' Supply in TN, 2016-2020



### Legend

- 1-3 Days
- 4-10 Days
- ◇ 11-20 Days
- △ 21-30 Days

Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

In the plot above, the number of opioid for pain prescriptions is categorized by days' supply in TN from 2016 to 2020. During this period, the most common length of opioid prescriptions for pain was 21-30 days. On July 1, 2018, new opioid prescribing laws went into effect as part of the TN Together legislation.<sup>62</sup> These laws limit the length of prescriptions for patients on new opioid prescriptions. Prior to this date, 4-10 day prescriptions were more common than 1-3 day prescriptions. After the legislation went into effect, 1-3 day prescriptions became more common than 4-10 day prescriptions. The least common length for opioid prescriptions is 11-20 days.

In Q4 2020, 669,000 opioid prescriptions for pain were filled with a 21 to 30 days' supply (53.2% of all opioid prescriptions for pain filled that quarter). In the same quarter, 297,000 1-3 day opioid prescriptions for pain were filled (23.6%), 211,000 4-10 day opioid prescriptions for pain were filled (16.8%), and 79,000 11-20 day opioid prescriptions for pain were filled (6.3%).

The increase in opioid prescriptions between Q2 2020 and Q3 2020 was largest for prescriptions filled between 1-3 days (17% increase) followed by 4-10 days (13.5% increase). There was a small increase for 11-20 day prescriptions (3.4%) and no increase in the number of 21-30 day prescriptions. This suggests that the increase in opioid prescriptions and patients across this period was largely driven by short duration prescriptions.

<sup>62</sup> TN Together Infographic: <https://www.tn.gov/content/dam/tn/governorsoffice-documents/governorsoffice-documents/OpioidInfographic.pdf>

## Active Prescription Days for Patients Filling Opioid for Pain Prescriptions in TN, 2016-2020

The table below shows the percent of patients who filled prescriptions of opioids for pain by the amount of their total prescription days throughout the year.<sup>63</sup> Unlike the days' supply plot shown earlier in this section, which is a count of the number of prescriptions written for a certain length, active days is a measure of patient behavior. This measure counts all of the days on which a patient was believed to have had a prescription throughout the year and sums them for each patient. Patients are then categorized based on the total number of days, and the percentage of patients in each group for each year is presented below.

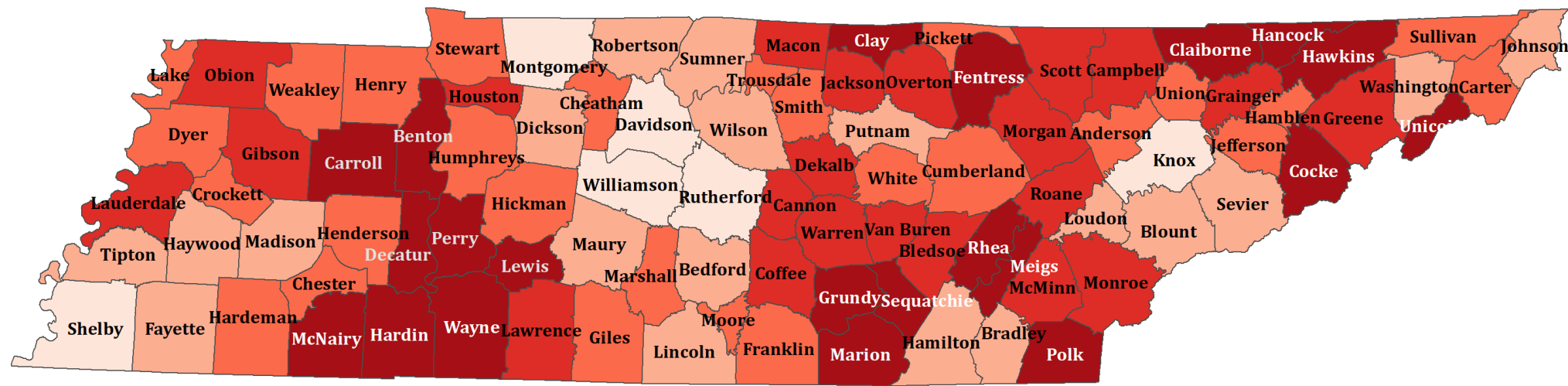
### Percentage of Patients Filling Opioids for Pain by Number of Active Prescription Days

Prescription Days	2016	2017	2018	2019	2020
1-7 days	47.9	49.3	53.0	57.9	57.6
8-30 days	21.8	21.0	18.4	15.5	15.8
31-90 days	8.8	8.4	7.5	6.2	6.2
91-180 days	5.3	5.0	4.7	4.2	4.0
181-270 days	4.0	3.8	3.8	3.4	3.3
> 270 days	12.2	12.4	12.6	12.8	13.2

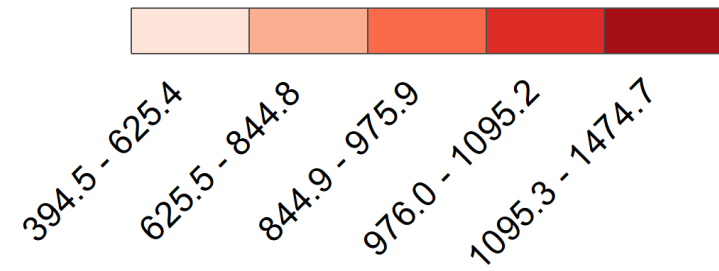
The majority of opioid for pain patients generally filled short term prescriptions amounting to no more than a month for the entire year. In 2020, 57.6% of opioid for pain patients received prescriptions for a week or less during the entire year, while 15.8% received between a week and a month's worth of opioids for pain. Fewer than 15% had prescriptions for opioids between one to nine months (31-270 days) in 2020. From 2016 to 2020, the percent of patients receiving a week or less of opioids for pain has generally increased across this period while the percent decreased for most other active prescription days categories. Over the same period, however, the percentage of opioid for pain patients who filled more than 270 days of opioids in a year has slightly increased from 12.2% in 2016 to 13.2% in 2020.

<sup>63</sup> Inclusive of all prescriptions in the drug class for each patient during the year. This measure assumes patients take their entire prescription as directed. See **Appendix B7** for more information.

## Rate of Opioid for Pain Prescriptions Filled by TN County of Residence, 2020



Rate of Opioid Prescriptions for Pain\* Per 1,000 Population in 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents.  
Data Source: Controlled Substance Monitoring Database.

The map on the left shows the number of prescriptions dispensed for opioids for pain per 1,000 residents in each TN county in 2020. Rates were lower in 2020 compared to 2019 (not shown<sup>64</sup>) across all counties. Despite reductions in the number of prescriptions filled, 40 of TN's 95 counties continue to have a rate higher than 1,000 prescriptions per 1,000 residents (this is equivalent to 1 prescription filled per resident). This is also much higher than the statewide rate of 736 per 1,000 residents. Of TN's 95 counties, 82 have a rate that exceeds the statewide rate. Prescription rates for opioids for pain tend to be lowest in the most populous counties in the state and highest in rural areas.

<sup>64</sup> See the 2020 Tennessee Annual Overdose Report (pg 93) for the 2019 map.

# Understanding Opioid Prescription Risk

## Metrics Capturing High Risk Opioid Prescribing Behaviors in Tennessee

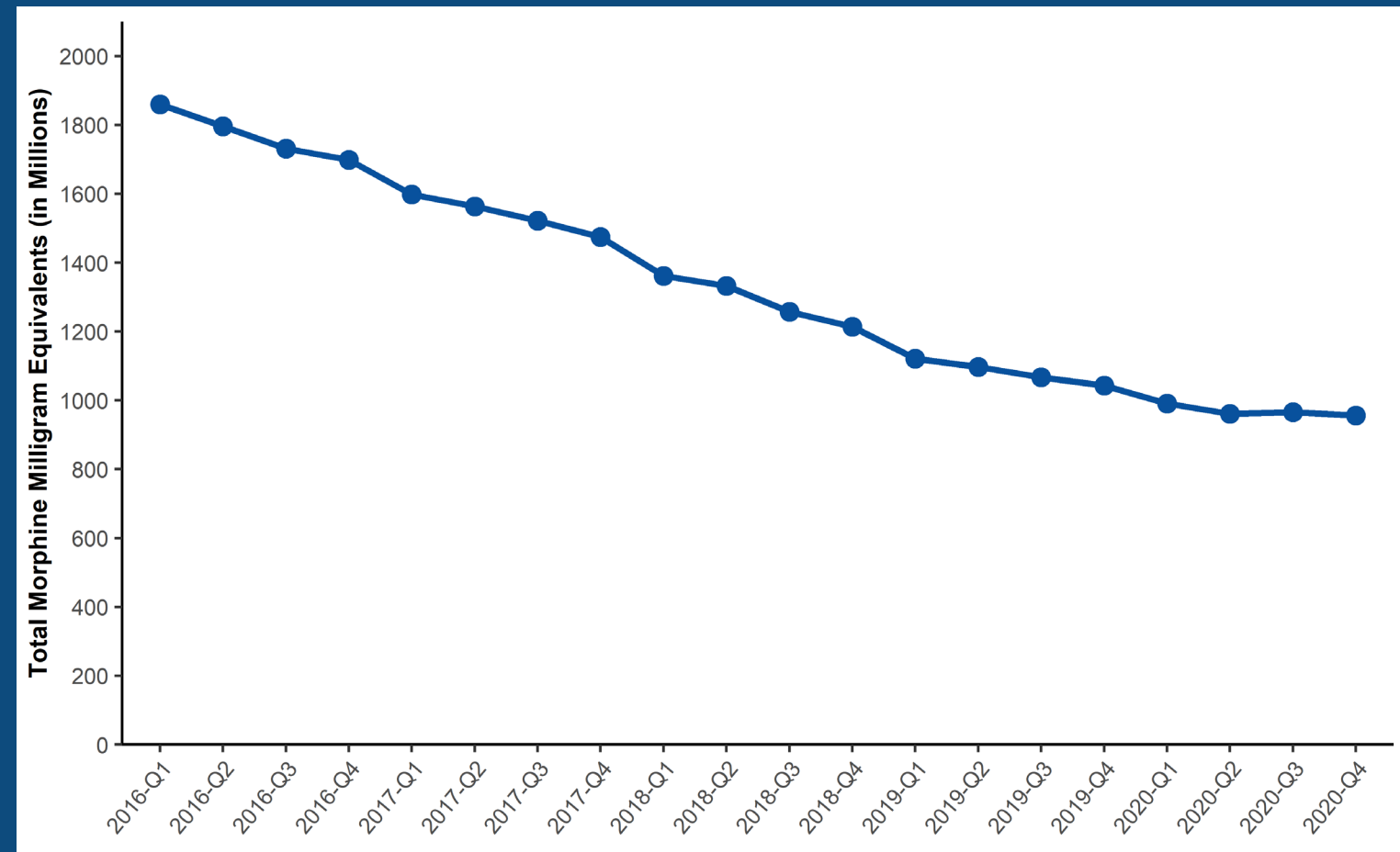
In 2016, the CDC published the Guidelines for Prescribing Opioids for Chronic Pain<sup>65</sup> which provided clinicians and state public health agencies recommendations for appropriate and safe practices when prescribing opioids for pain. These evidence-based recommendations<sup>66</sup> give guidance on medication selection, proper dosage, duration, and discussion points to help clinicians and patients assess the benefits and risks of prescription opioid use together. They also provide recommendations on prescribing behaviors that warrant caution, as these behaviors are associated with higher risk of opioid use disorder and overdose.

The following pages (127-132), display trends and visualizations describing TN's high risk prescribing behaviors, such as high dose prescribing (measured by the daily dose of MME), concurrent opioid and benzodiazepine prescribing, and multiple provider episodes (MPEs). TN has reduced its high risk prescribing patterns, successfully decreasing daily MMEs, and other risky prescribing behaviors to their lowest levels since the peak of the prescription opioid epidemic. A number of state laws have been enacted to reduce high risk prescribing in the last decade. OIA is analyzing the impact of those policies, and we offer a preliminary look at these analyses in the **Section Spotlight (page 156)**.

<sup>65</sup> CDC. (2016). Guidelines for Prescribing Opioids for Chronic Pain. Retrieved from: [https://www.cdc.gov/drugoverdose/pdf/Guidelines\\_At-A-Glance-508.pdf](https://www.cdc.gov/drugoverdose/pdf/Guidelines_At-A-Glance-508.pdf).

<sup>66</sup> These guidelines were developed for primary care clinicians and are not intended for patients receiving care from a pain management specialist for reasons such as active cancer treatment, palliative care, or end-of-life care.

## Total Morphine Milligram Equivalents (MME) for Opioids for Pain in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

MME are a way to measure the strength of opioids for pain that accounts for differences in the active opioid ingredient, dosage, and form of the drug. By using a standardized method of comparing, for example, prescription fentanyl, which is a relatively “strong” opioid, to tramadol, which is relatively “weak,” MME goes beyond simple counts of prescriptions to better characterize the total strength of opioids dispensed in TN. To arrive at the quarterly total MME, we calculate total MME for each opioid for pain prescription<sup>67</sup> and sum these prescription totals for each quarter.

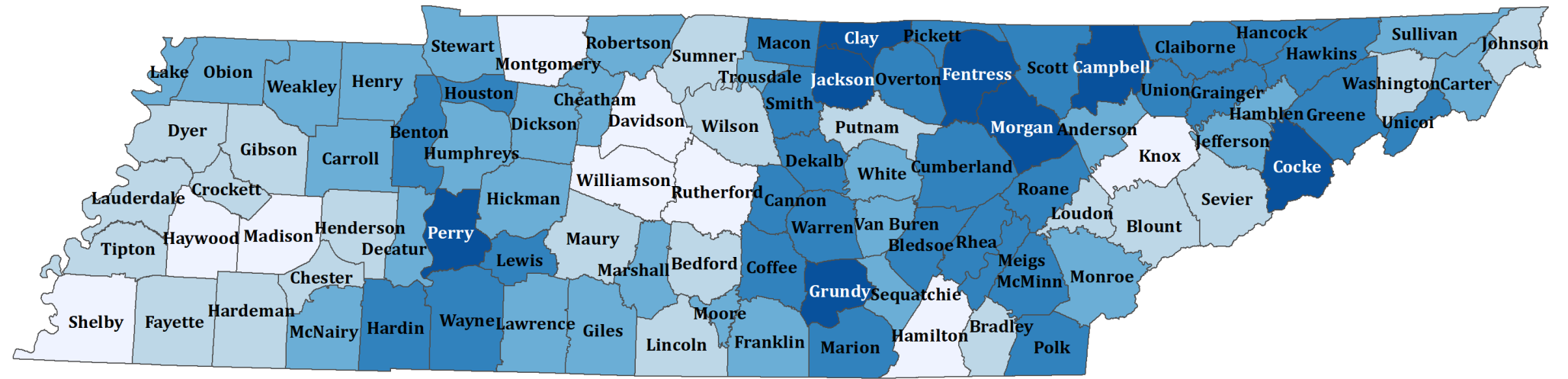
The total MME dispensed in TN has decreased significantly for a number of years. As shown above, in Q1 2016, 1,859 million MME were dispensed. By Q4 2020, the total MME had dropped to 956 million, a 48.6% decrease.

<sup>67</sup> MME values are derived from the CDC MME table which does not assign an MME value for any buprenorphine drug. Therefore, some buprenorphine drugs which are FDA-indicated for the treatment of pain are included in prescription and patient counts but are not included in MME-based measures. As with other opioid for pain measures in this report, schedule V opioids and opioids typically administered in inpatient settings are also not included in MME-based measures.

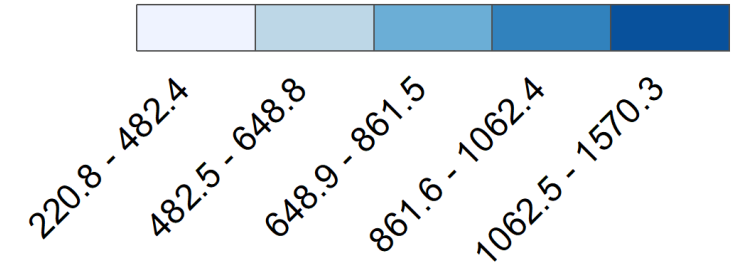
Morphine Milligram Equivalents per Capita for Opioid for Pain Prescriptions Filled by TN County of Residence, 2020

The map on the right shows the MME for Opioids for Pain per capita by county. The total MME per capita for each county is calculated as the total MME for the year filled by county residents divided by the county population. This measure estimates the total amount of opioids for pain that would be available to all county residents if the opioid prescriptions had been divided up evenly. Rates were lower across all 95 counties in 2020 compared to 2019 (not shown<sup>68</sup>).

One hydrocodone 10mg pill (one of the most commonly prescribed opioids in TN) is 10 MME. In the county with the lowest rate, there were enough opioids dispensed for every resident to have 22 hydrocodone 10mg pills for the year. In the county with the highest rate, there were enough opioids dispensed for each resident to have 157 hydrocodone 10mg pills for the year.



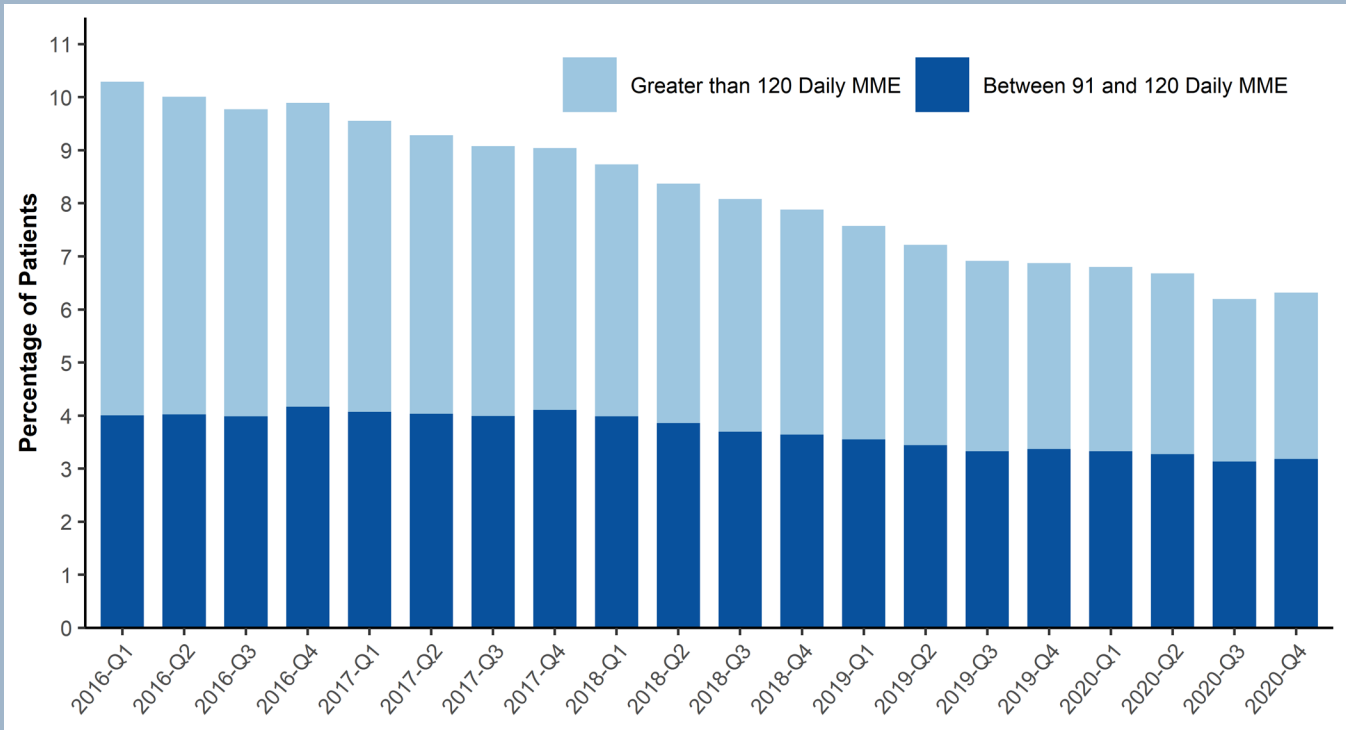
MME of Opioid Prescribed for Pain\* Per Capita in 2020



<sup>68</sup> See the 2020 Tennessee Annual Overdose Report (pg 156) for the 2019 map.

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

# Percentage of Patients Dispensed More than 90 Daily MME for Opioids for Pain in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

**Higher opioid doses are associated with higher risk of opioid use disorder and overdose. CDC recommends opioid dosages not exceed  $\geq$  90 Daily MME without justification<sup>69</sup> and TN recommends those receiving  $\geq$  120 Daily MME consult a pain specialist.<sup>70</sup>**

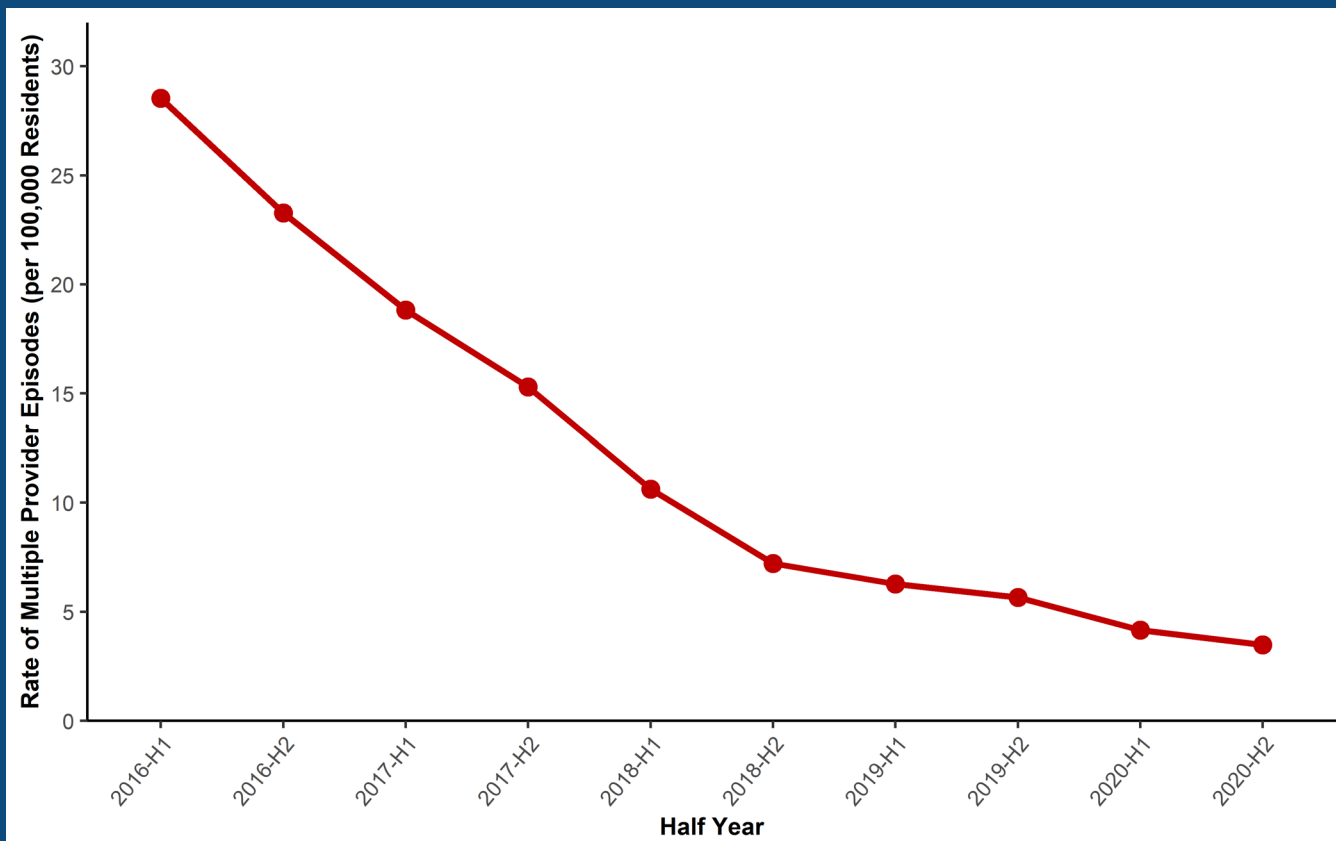
The percentage of patients who received opioid prescriptions for pain that exceed 90 MME per day has declined from 2016 to 2020. In Q1 2016, 10.3% of all opioid for pain patients received a prescription with a daily MME greater than 90 (the total height of the bar) but only 4% of all patients were between 91 to 120 MME (the height of the dark blue portion) while the other 6.3% were above 120 MME (the height of the light blue portion). In Q4 2020, 6.3% of patients received a prescription of more than 90 daily MME. As the lighter shaded bars show above, however, the decline in patients receiving high daily MME opioids was larger for those filling prescriptions of greater than 120 daily MME. Among this group, the percentage declined from 6.3% in Q1 2016 to 3.1% in Q4 2020. The percent of patients receiving 91 to 120 daily MME has decreased as well, from 4% in Q1 2016 to 3.2% in Q4 2020.

<sup>69</sup> CDC. [2016 Guidelines for Prescribing Opioids for Chronic Pain](#).

<sup>70</sup> TDH. [Tennessee Chronic Pain Guidelines](#). January 2020.



## Rate of Multiple Provider Episodes of Opioid for Pain Prescriptions by Half-Year in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

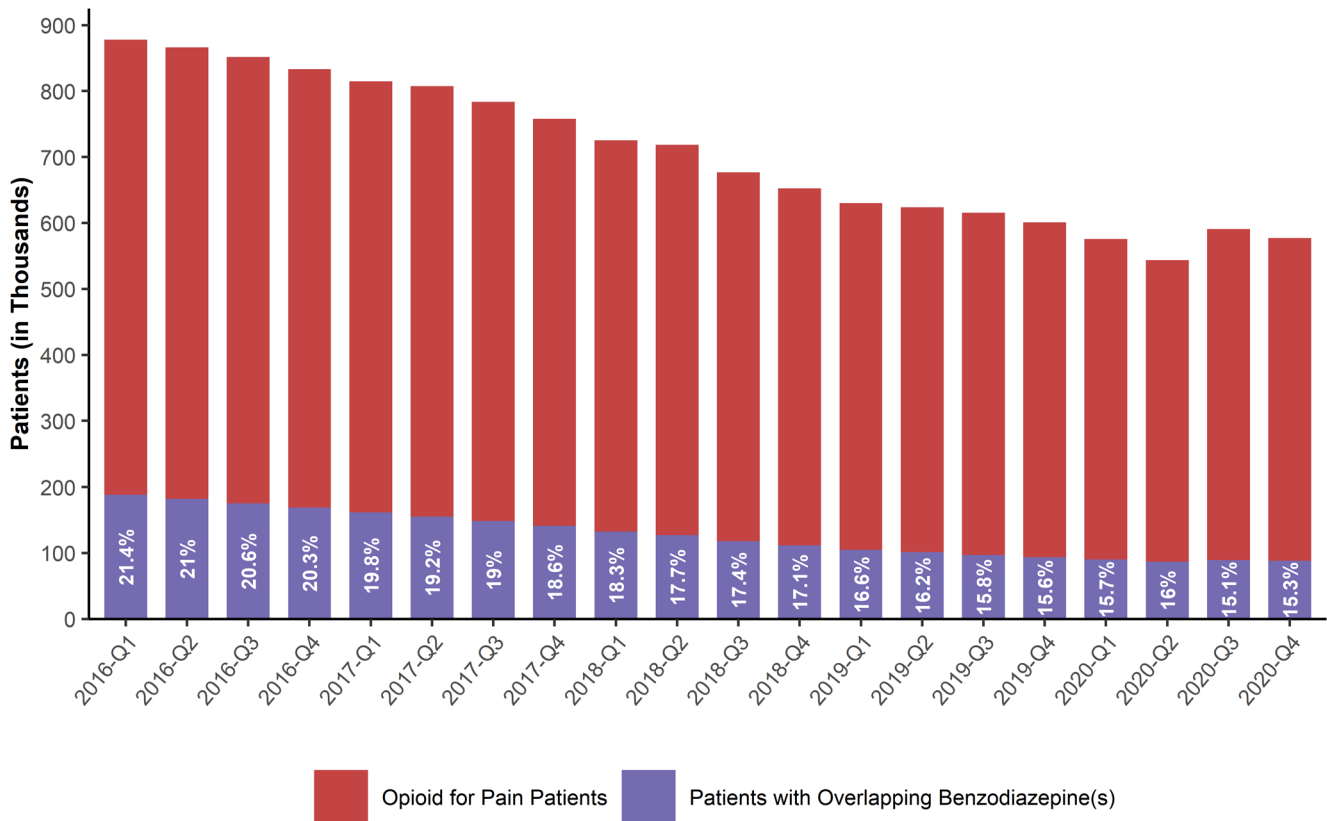
In TN, the rate of MPEs for opioid prescriptions for pain has declined rapidly over the last five years from 28.5 per 100,000 residents in the first half of 2016 to 3.5 per 100,000 residents in the last half of 2020.

<sup>71</sup> CDC's Opioid Overdose Indicator Support Toolkit. Version 3.0. Release Date: 3/23/2018.

<sup>72</sup> Defined as the first or second half of the calendar year (i.e., Half 1 January 1- June 30 and Half 2 is July 1- December 31)

According to the CDC definition,<sup>71</sup> a multiple provider episode (MPE) occurs when a patient fills prescriptions from at least five prescribers and at least five dispensers in a six month period.<sup>72</sup>

# Patients with Overlapping Opioid and Benzodiazepine Prescriptions in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

In the plot above, the total height of the bars represents counts of patients filling opioid for pain prescriptions. The height of the overlapping purple bar represents the number of patients with overlapping opioid and benzodiazepine prescriptions. The percentage displayed is the percent of patients in each quarter with overlapping prescriptions.

The percentage of patients filling opioid prescriptions for pain who have overlapping benzodiazepine prescriptions<sup>73</sup> in each quarter has decreased steadily during this period, from 21.4% in Q1 2016 to 15.3% in Q4 2020.

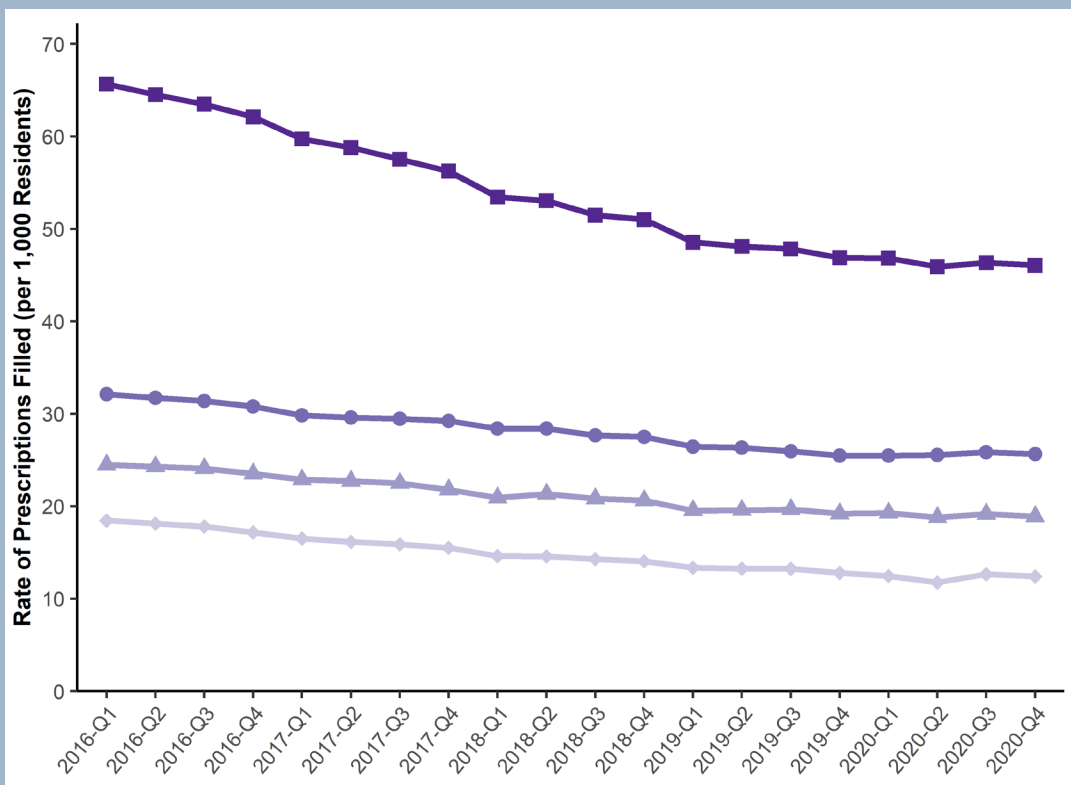
**The combination of opioids for pain and benzodiazepines has an increased risk of overdose, as both types of drugs suppress breathing and sedate users.**

<sup>73</sup> Overlapping for more than a single day

# Benzodiazepine Prescription Trends

The four most commonly prescribed benzodiazepines<sup>74</sup> in TN are alprazolam, clonazepam, lorazepam, and diazepam, respectively, and they accounted for about 93% of all benzodiazepine prescriptions in 2020.

## Prescription Rate of Top 4 Most Prescribed Benzodiazepines in TN, 2016-2020



### Legend

- Alprazolam
- Clonazepam
- Lorazepam
- Diazepam

Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

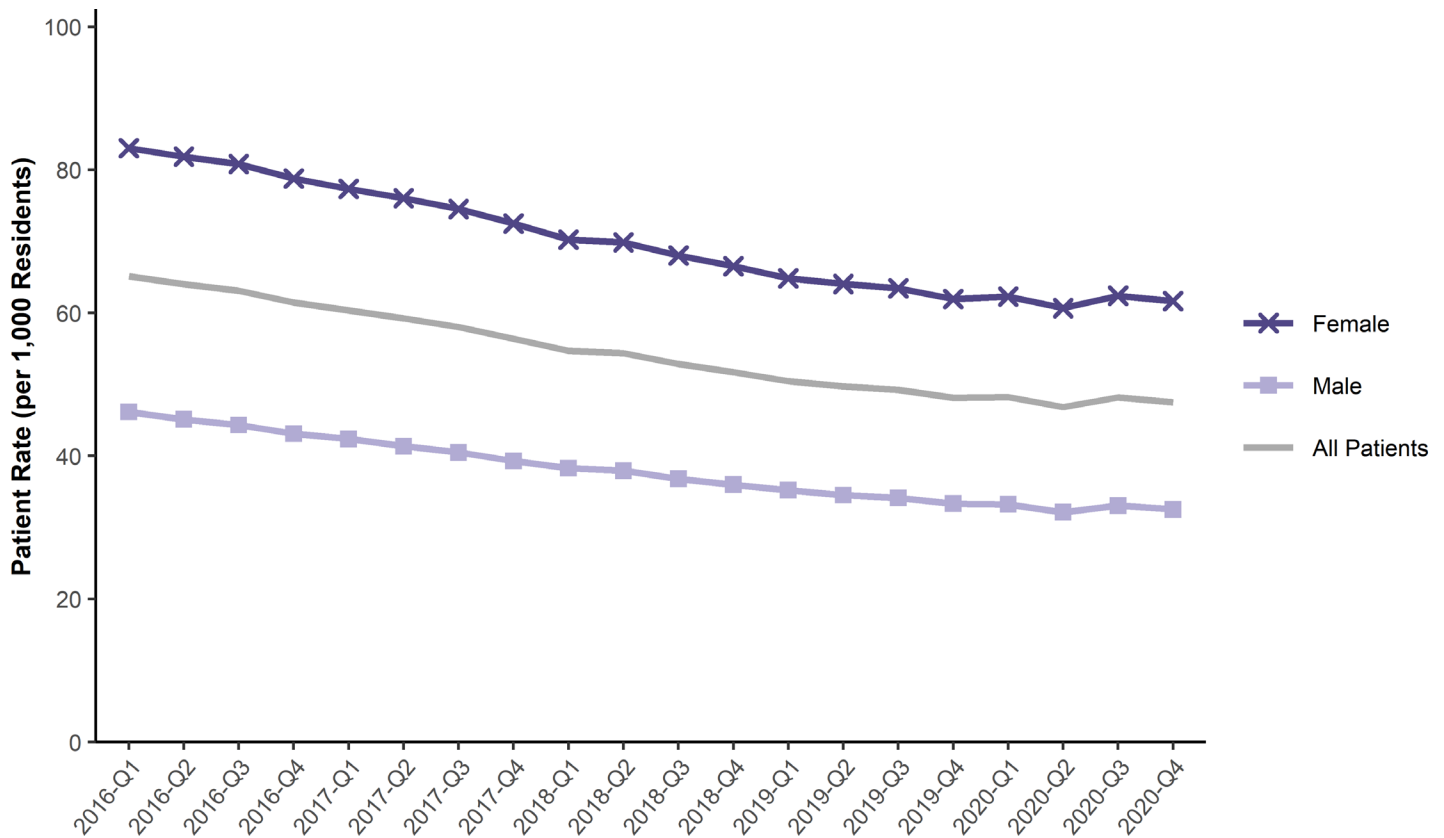
As seen in the visualization above, alprazolam is prescribed at nearly 2 to 3 times the rate of the other most common benzodiazepines. Alprazolam prescribing rates have dropped for most of the period from 66 per 1,000 residents in Q1 2016 to 46 per 1,000 residents in Q4 2020.

Prescription rates for Clonazepam decreased from 32 per 1,000 residents in Q1 2016 to 26 per 1,000 residents in Q4 2020. Lorazepam followed a similar pattern, decreasing from 24 per 1,000 residents in Q1 2016 to 19 per 1,000 residents in Q4 2020. Diazepam likewise decreased from 18 per 1,000 residents in Q1 2016 to 12 per 1,000 residents in Q4 2020.

As with opioid prescriptions, benzodiazepine prescriptions also increased slightly between Q2 2020 and Q3 2020, likely influenced by the COVID-19 pandemic.

<sup>74</sup> Common brand names for top benzodiazepines: Xanax (alprazolam), Klonopin (clonazepam), Ativan (lorazepam), and Valium (diazepam).

## Rate of Patients Receiving Benzodiazepines by Sex in TN, 2016-2020



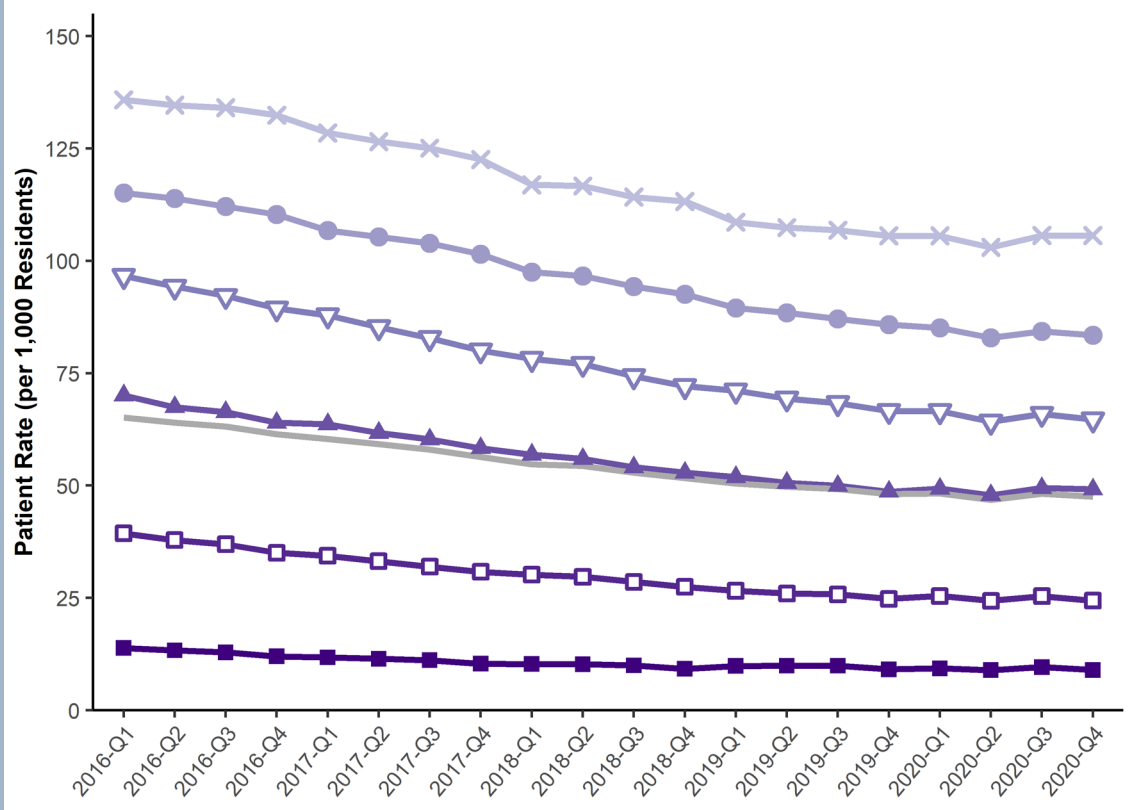
Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

The plot above presents the rate of patients filling benzodiazepine prescriptions per 1,000 TN residents by sex. The rate for all patients is included for comparison.

Across the entire period, from 2016 to 2020, female patients filled benzodiazepine prescriptions at a higher rate than male patients. Both groups have experienced declining rates at roughly the same pace. Rates for female patients decreased from 83 per 1,000 residents in Q1 2016 (a total of 283,000 female patients) to 61 per 1,000 residents in Q2 2020 (212,000 female patients). Rates for male patients decreased from 46 per 1,000 residents in Q1 2016 (a total of 150,000 male patients) to 32 per 1,000 residents in Q2 2020 (107,000 male patients).

There was a slight increase in the rate from Q2 to Q3 2020 for both male and female patients, likely a result of changes caused by the COVID-19 pandemic.

# Rate of Patients Receiving Benzodiazepines by Age in TN, 2016-2020



## Legend

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+
- All Patients

Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

According to the DEA, benzodiazepines are commonly prescribed for their sedative, anti-anxiety, muscle relaxant, and anti-convulsant effects.<sup>76</sup>

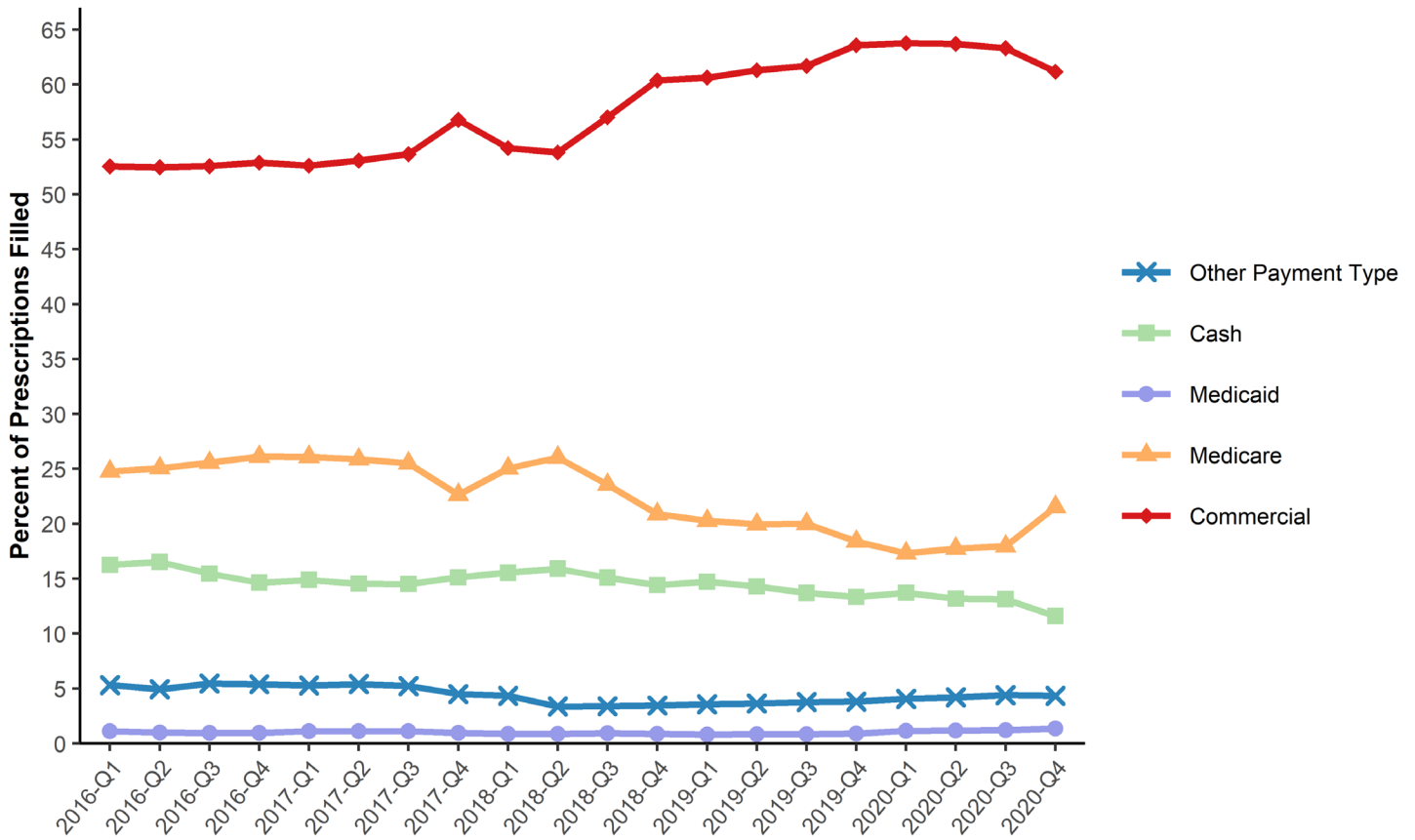
The plot above presents the rate of patients filling benzodiazepine prescriptions per 1,000 TN residents by age group.<sup>75</sup> The rate for all patients is included for comparison.

Throughout 2016 to 2020, older age groups filled benzodiazepine prescriptions at a higher rate than younger age groups. The oldest age group (patients 65 years and older) filled benzodiazepine prescriptions at a much higher rate (106 per 1,000 residents in Q4 2020) than the rate for all patients (48 per 1,000 residents in Q4 2020). All age groups experienced decreasing rates across this time period, but older age groups decreased somewhat faster than younger groups.

<sup>75</sup> Prescriptions for patients less than 18 years of age are not included.

<sup>76</sup> Drug Enforcement Agency (DEA). Benzodiazepines. Retrieved from: [https://www.deadiversion.usdoj.gov/drug\\_chem\\_info/benzo.pdf](https://www.deadiversion.usdoj.gov/drug_chem_info/benzo.pdf)

## Payment Type for Benzodiazepine Prescriptions in TN, 2016-2020

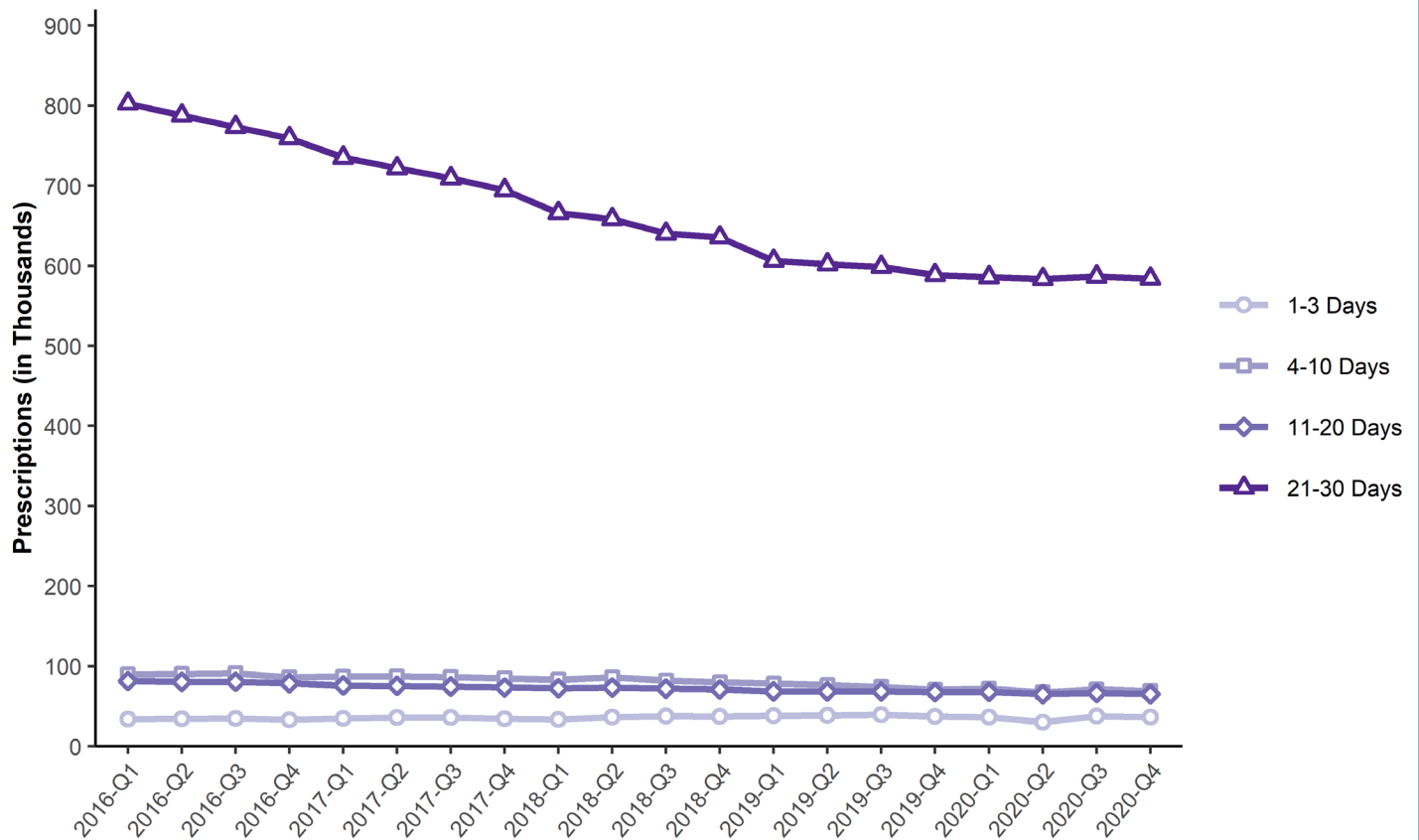


Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents.  
Data Source: Controlled Substance Monitoring Database.

During most of the period from 2016 to 2018, the distribution of payment types remained somewhat steady. Beginning in late 2018, the percentage of benzodiazepine prescriptions paid through commercial insurance increased as the share paid through Medicare decreased. Across this period, the most common payment type for benzodiazepine prescriptions in TN was commercial insurance, followed by Medicare, cash, other payment types, then Medicaid. In 2020, commercial insurance accounted for about 63.0% of all benzodiazepine prescriptions, followed by Medicare (18.6%), cash (12.9%), other payment types (4.2%), and finally Medicaid (1.2%).

Reminder: Because these lines represent percentages of the total and are mutually exclusive, when the line for one payment type decreases, one or more other lines must necessarily increase, although the absolute number of prescriptions may not have changed.

## Number of Benzodiazepine Prescriptions by Days' Supply in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

During the period from 2016 to 2020, the most common length of benzodiazepine prescriptions was 21-30 days. In Q4 2020, 584,000 benzodiazepine prescriptions were filled with a 21-30 days' supply (77.3% of all benzodiazepine prescriptions filled that quarter). By contrast, benzodiazepine prescriptions for shorter lengths were filled in much lower numbers. For example, in Q4 2020, only 36,000 1-3 day benzodiazepine prescriptions were filled, accounting for just 4.8% of all benzodiazepine prescriptions filled that quarter.

Research suggests benzodiazepines should be prescribed for short-term durations (2-4 weeks).<sup>77</sup>

<sup>77</sup> Guina, J. and Merrill, B. (2018). Benzodiazepines I: upping the care on downers: the evidence of risks, benefits and alternatives. Journal of Clinical Medicine. DOI: 10.3390/jcm7020017

## Active Prescription Days for Patients Filling Benzodiazepine Prescriptions in TN, 2016-2020

The table below shows the percent of patients who filled prescriptions for benzodiazepines by the amount of their total prescription days throughout the year.<sup>78</sup>

### Percentage of Patients Filling Benzodiazepines by Number of Active Prescription Days

Prescription Days	2016	2017	2018	2019	2020
1-7 days	15.2	16.0	17.4	19.1	18.7
8-30 days	20.3	20.5	20.4	20.2	20.1
31-90 days	15.7	15.4	15.1	14.7	14.4
91-180 days	13.4	13.1	12.8	12.3	12.1
181-270 days	11.4	11.1	10.9	10.5	10.4
> 270 days	24.0	23.8	23.3	23.2	24.2

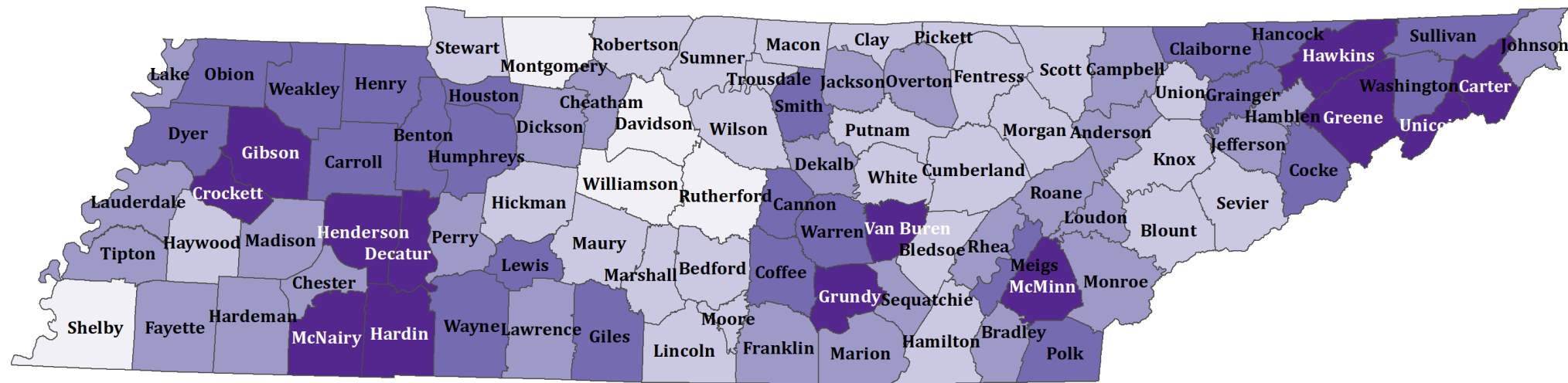
In 2020, 18.7% of benzodiazepine patients received prescriptions for a week or less during the entire year, while 20.1% received between a week and a month's worth of benzodiazepines. As the number of active prescription days increases, there are fewer patients in each category. However, 24.2% of benzodiazepine patients filled prescriptions over 9 months in the year.

From 2016 to 2020, the percent of patients receiving a week or less of benzodiazepines generally increased while the percent remained largely unchanged for those receiving over a week to a month. The percentage decreased for all periods longer than a month. The percentage of benzodiazepine patients who filled more than 270 days of benzodiazepines in a year decreased somewhat from 24% in 2016 to 23.2% in 2019, but it increased slightly in 2020 to 24.2%.

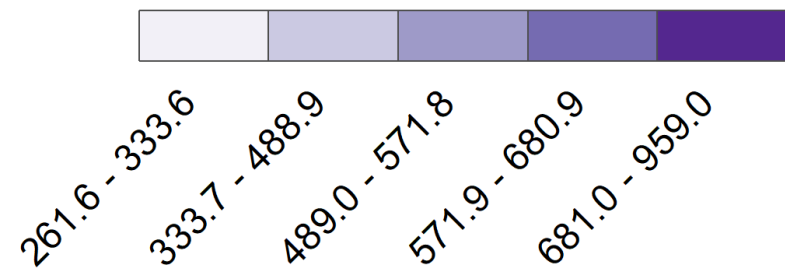
<sup>78</sup> Inclusive of all prescriptions in the drug class for each patient during the year. This measure assumes patients take their entire prescription as directed. See **Appendix B7** for more information.



## Rate of Benzodiazepine Prescriptions Filled by TN County of Residence, 2020



Rate of Benzodiazepine Prescriptions Per 1,000 Population in 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents.  
Data Source: Controlled Substance Monitoring Database.

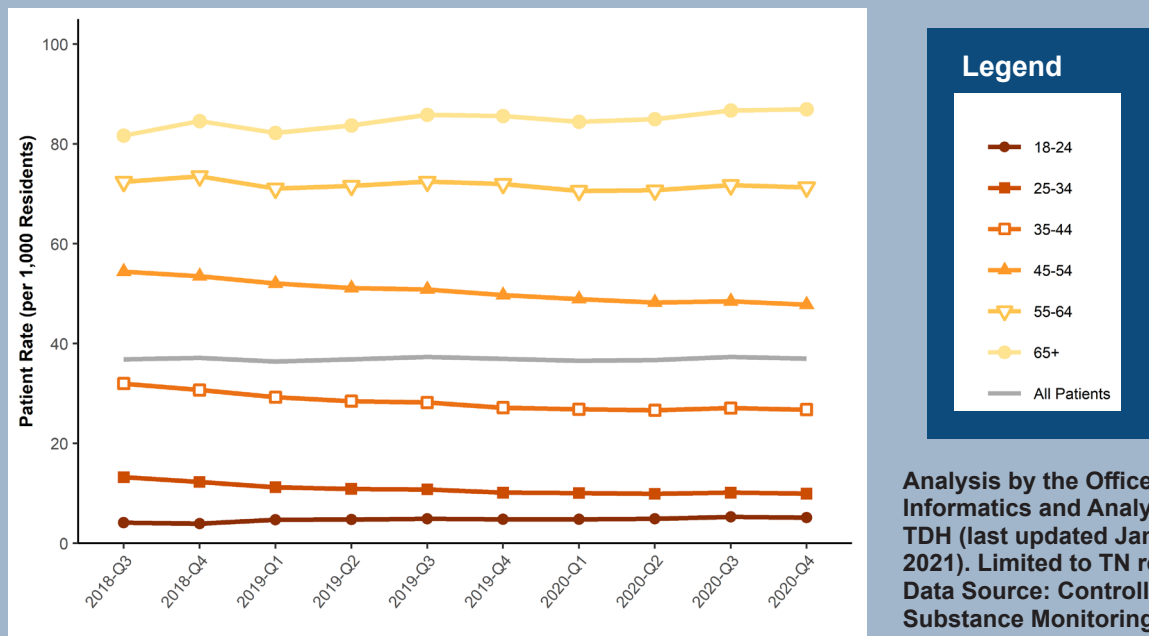
<sup>79</sup> See the 2020 Tennessee Annual Overdose Report (pg106-107) for the 2019 map.

The map on the left shows the number of prescriptions dispensed for benzodiazepines per 1,000 residents in each county in 2020. The rates for benzodiazepine prescriptions were lower in 2020 compared to 2019 in 86 of 95 counties.<sup>79</sup> Large portions of West TN and Northeast TN have some of the highest benzodiazepine rates in the state. Eight counties (Bradley, Fayette, Grundy, Humphreys, Jefferson, Monroe, Tipton, and Unicoi) had slightly higher rates of benzodiazepine prescribing in 2020 compared to 2019. Similar to the trend for opioids, the rate of benzodiazepine prescriptions dispensed tends to be lower in counties with larger populations and higher in rural areas.

# Gabapentin Prescription Trends

In 2018, gabapentin was added to the list of Schedule V controlled substances in TN<sup>80</sup> and required to be reported to the CSMD beginning on July 1, 2018. Gabapentin, an anticonvulsant drug, can also be used to treat neuropathic pain and has been used as an alternative to opioids for pain management. Although generally believed to be safe, gabapentin can be misused, and the rate of gabapentin misuse in the U.S. has increased in recent years.<sup>81</sup>

## Rate of Patients Filling Gabapentin Prescriptions by Age in TN, 2018-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

The plot above presents the rate of patients filling gabapentin prescriptions per 1,000 TN residents by age group.<sup>82</sup> The rate for all patients is included for comparison.

Across the period from Q3 2018 to 2020, older age groups have had higher rates of gabapentin patients than younger age groups. There is a stark difference between the patient rate for the oldest and youngest groups. In Q4 2020, there were 87 patients per 1,000 residents age 65+ who filled gabapentin prescriptions compared to just 5 per 1,000 residents aged 18 to 24.

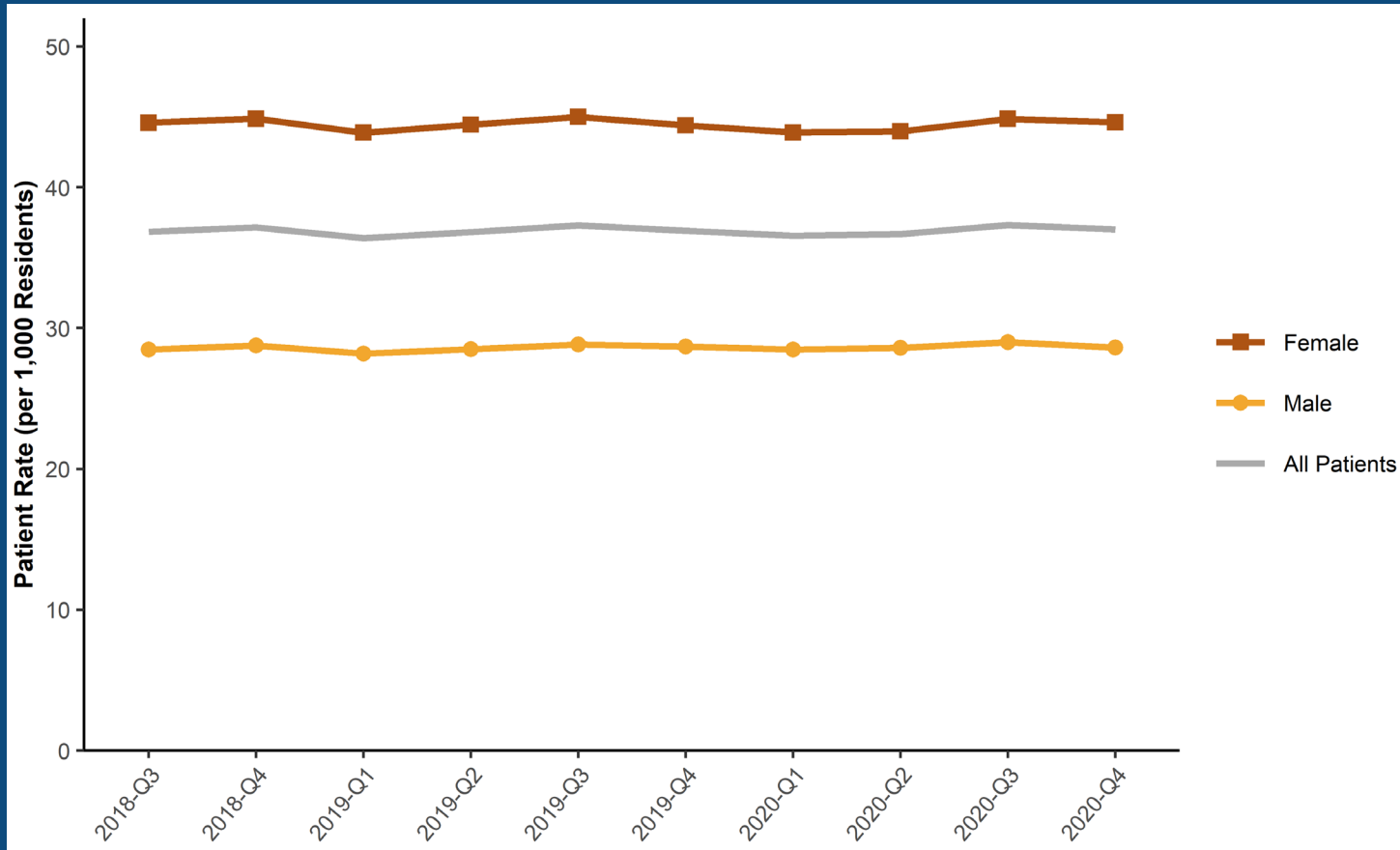
The rate of patients filling gabapentin prescriptions has remained steady or decreased slightly for age groups between 25 and 54. Rates for the oldest age groups, those aged 55-64 and 65 and older, have been relatively steady.

<sup>80</sup> Controlled substances in Schedule V, [TCA § 39-17-414](#)

<sup>81</sup> Reynolds, K., Kaufman, R., Korenoski, A., Fennimore, L., Shulman, J. and Lynch, M. (2019). Trends in gabapentin and baclofen exposures reported to U.S. poison centers. *Clinical Toxicology*. DOI: 10.1080/15563650.2019.1687902

<sup>82</sup> Prescriptions for patients less than 18 years of age are not included.

## Rate of Patients Filling Gabapentin Prescriptions by Sex in TN, 2018-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

The plot above presents the rate of patients filling gabapentin prescriptions per 1,000 TN residents by sex. The rate for all patients is included for comparison.

Across the entire period from Q3 2018 through 2020, female patients filled gabapentin prescriptions at a higher rate than male patients. The rates for both groups have held relatively steady across this period. Rates for female patients have averaged around 44 per 1,000 residents per quarter (about 155,000 female patients per quarter). Rates for male patients have averaged around 29 per 1,000 residents per quarter (about 95,000 male patients per quarter).

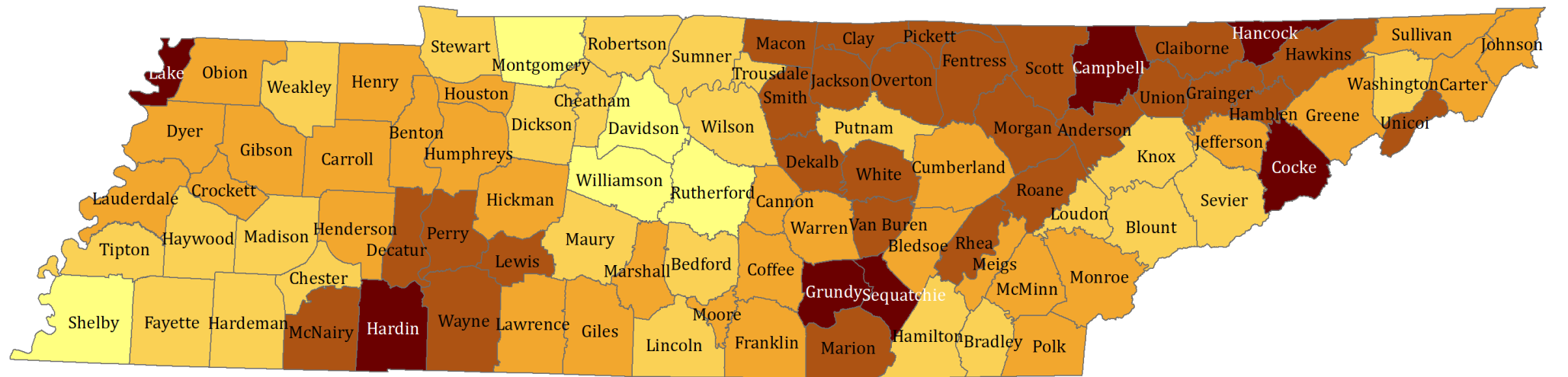
<sup>83</sup> Drug Enforcement Agency (DEA). Gabapentin. Retrieved from: [https://www.dea diversion.usdoj.gov/drug\\_chem\\_info/gabapentin.pdf](https://www.dea diversion.usdoj.gov/drug_chem_info/gabapentin.pdf)

The DEA reports that nationwide, gabapentin prescriptions nearly doubled between 2011 and 2017.<sup>83</sup>

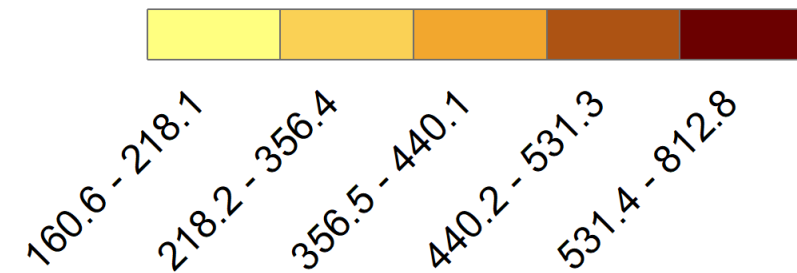
The map on the right shows the rate of gabapentin prescriptions filled by TN county of residence in 2020. Gabapentin prescription rates are highest in the areas around the northern part of East TN and the southern part of Middle TN. Much like opioid and benzodiazepine rates, gabapentin prescription rates tend to be lower in the more populous counties and higher in rural areas. Compared to 2019 (not shown<sup>84</sup>) rates have remained relatively stable across the state.

<sup>84</sup> See the 2020 Tennessee Annual Overdose Report (pg112-1013 for the 2019 map).

### Rate of Gabapentin Prescriptions Filled by TN County of Residence, 2020



Rate of Gabapentin Prescriptions Per 1,000 Population in 2020



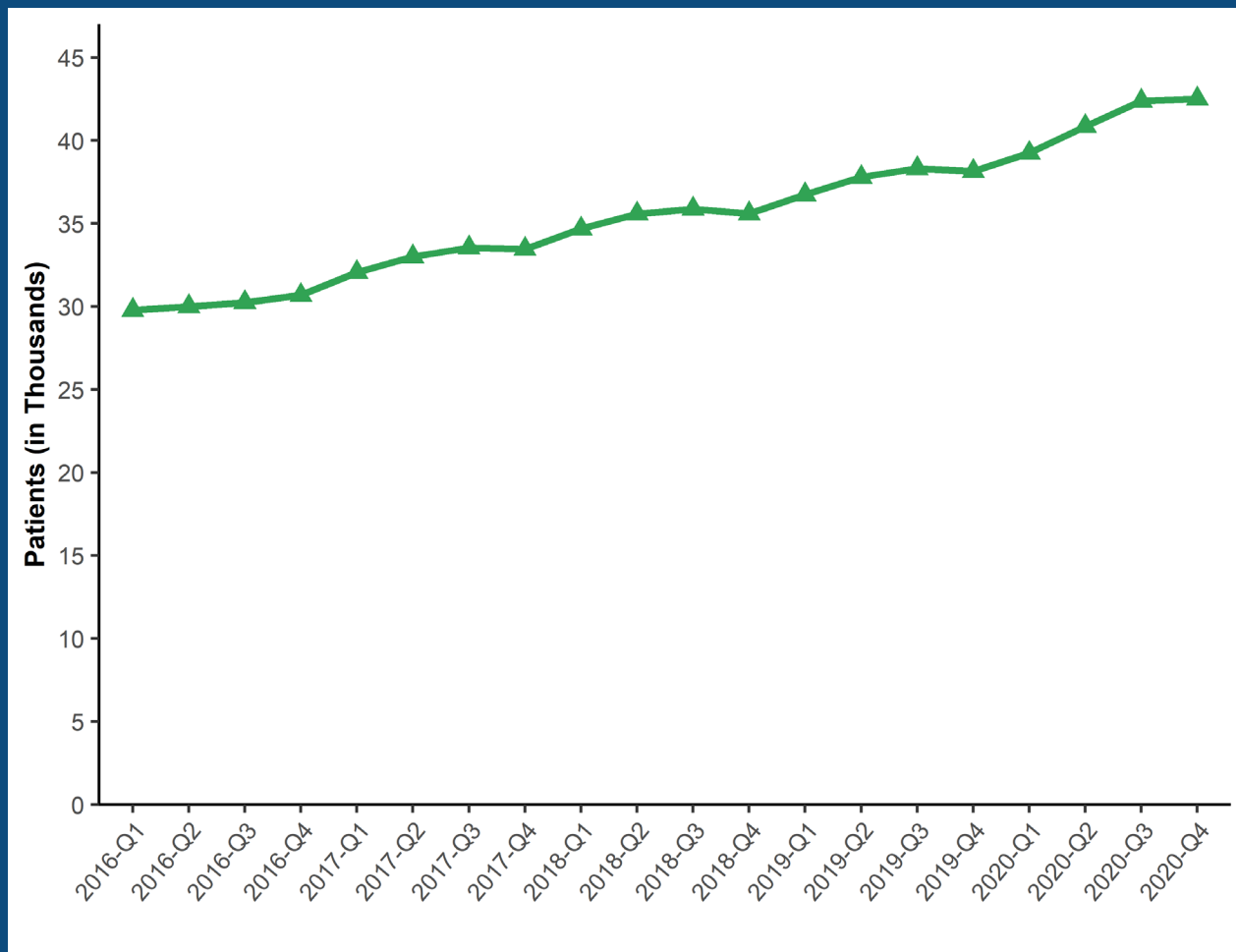
Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

# Buprenorphine for MAT Prescription Trends

Buprenorphine is a medication approved to treat opioid use disorder as a medication-assisted treatment (MAT). Although there are three MAT options available to Tennesseans (Buprenorphine, Methadone, Naltrexone), Buprenorphine is the only MAT drug required to be reported to the CSMD. Buprenorphine has become an increasingly popular option in the treatment of OUD due to its safety, its effectiveness, and its ability to be taken at-home.<sup>85</sup>

In TN, patients filling buprenorphine prescriptions for MAT have steadily increased from 2016 through 2020. In Q1 2016, there were about 30,000 patients filling buprenorphine prescriptions. By Q4 2020, that number had risen to about 43,000 patients, an increase of 42.7%.

**Patients Receiving Buprenorphine for MAT Prescriptions in TN, 2016-2020**



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

## The Importance of MAT & Buprenorphine

In the United States in 2018, approximately 20.3 million people aged 12 or older had a substance use disorder (SUD) related to their use of alcohol or illicit drugs in the past year.<sup>86</sup> Nationally, this trend continues to increase, including in states like TN. Over the last five years, deaths due to drug overdose in TN have steadily increased, particularly overdose deaths due to drugs like the potent illicit drug fentanyl. Opioid use disorder (OUD) is a subset of SUD that refers to dependence on prescription or illicit opioids. In TN, 1,543 fatal overdoses involved opioids, representing an almost 50% increase since 2015.

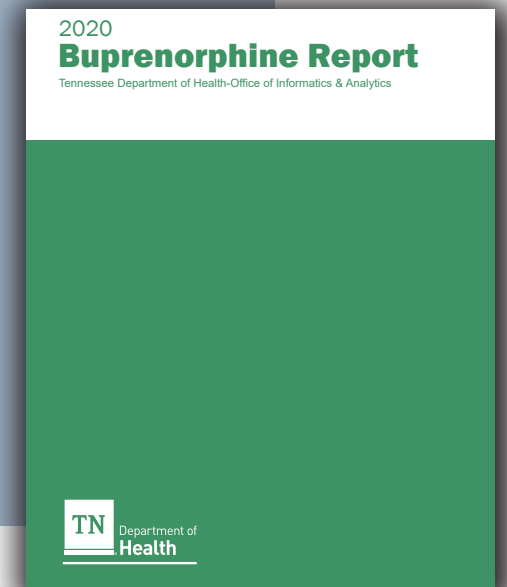
The Food and Drug Administration (FDA) has approved medications to treat OUDs. MAT medications have proven effective in the treatment of OUD by reducing the withdrawal symptoms and psychological cravings that cause chemical imbalances in the body. Medications used for MAT are evidence-based treatment options that are paired with counseling and case management. MAT medications can help individuals break the cycle of OUD to return to a healthy and productive lifestyle.<sup>87</sup> MAT medications are safe to use for months, years, or even a lifetime.

This section of the annual report and its analyses focus on buprenorphine prescribing in TN. To learn more about buprenorphine in TN, read TDH's [2020 Buprenorphine Report!](#)

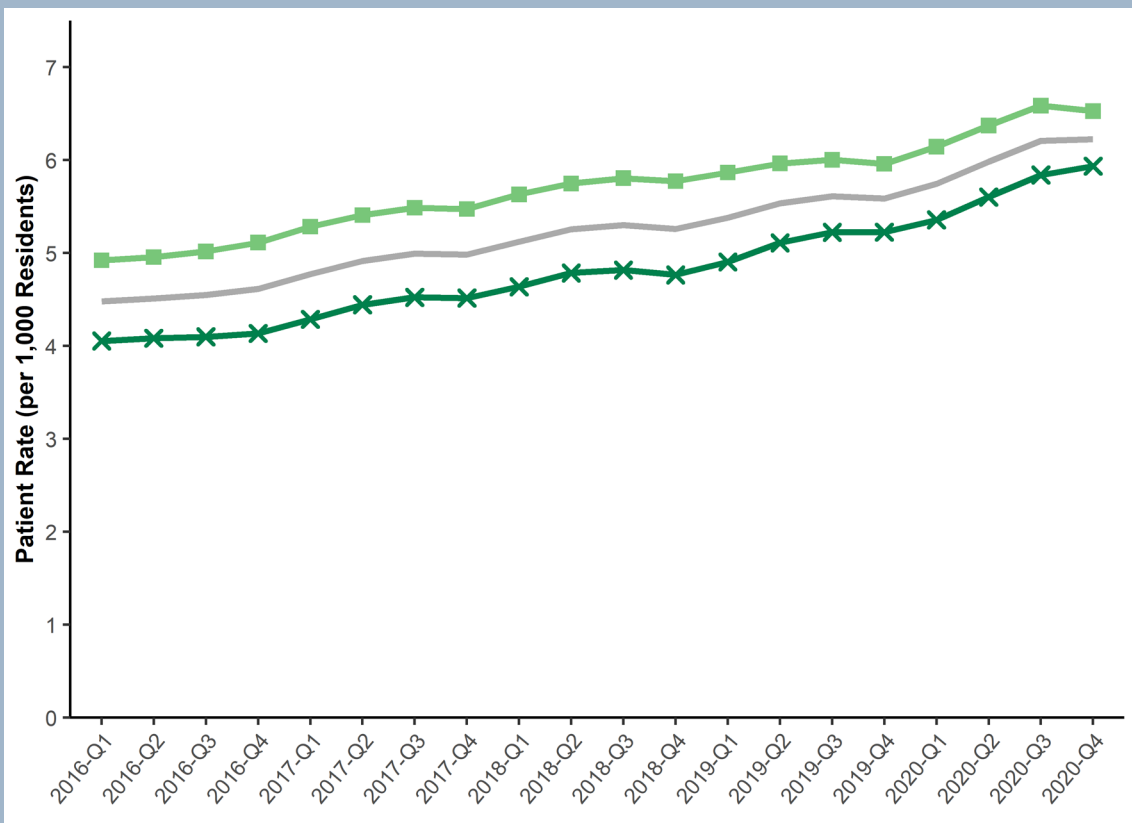
<sup>85</sup> SAMHSA. (2014). The facts about buprenorphine for treatment of opioid addiction. Retrieved from: <https://store.samhsa.gov/product/The-Facts-about-Buprenorphine-for-Treatment-of-Opioid-Addiction/SMA15-4442>.

<sup>86</sup> SAMHSA. (2019). Key substance use and mental health indicators in the United States: results from the 2018 national survey on drug use and health. Retrieved from: <https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUHNationalFindingsReport2018/NSDUHNationalFindingsReport2018.pdf>.

<sup>87</sup> SAMHSA (2021). Medication- Assisted Treatment (MAT). Retrieved from: <https://www.samhsa.gov/medication-assisted-treatment>



## Rate of Patients Receiving Buprenorphine for MAT by Sex in TN, 2016-2020



### Legend

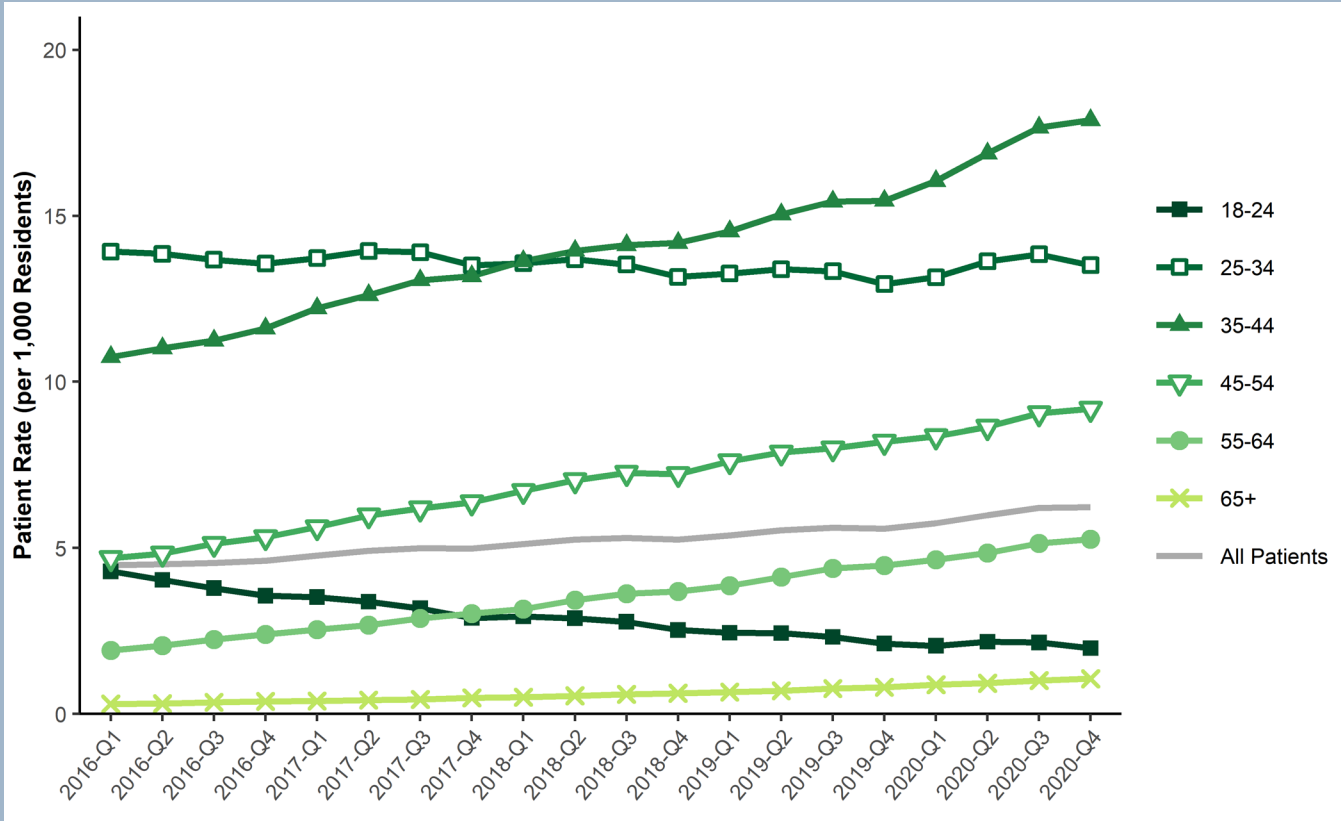
- ✕ Female
- Male
- All Patients

Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

The plot above presents the rate of patients filling buprenorphine prescriptions for MAT per 1,000 TN residents by sex. The rate for all patients is included for comparison. Across the entire period from 2016 to 2020, male patients filled buprenorphine prescriptions for MAT at a higher rate than female patients. Both groups have experienced increasing rates at roughly the same pace, though the gap in rates has been converging slowly.

Rates for female patients increased from 4.1 per 1,000 residents in Q1 2016 (a total of 13,800 female patients) to 5.9 per 1,000 residents in Q4 2020 (20,800 female patients). Rates for male patients increased from 4.9 per 1,000 residents in Q1 2016 (a total of 16,000 male patients) to 6.5 per 1,000 residents in Q4 2020 (21,700 male patients).

## Rate of Patients Receiving Buprenorphine for MAT by Age in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

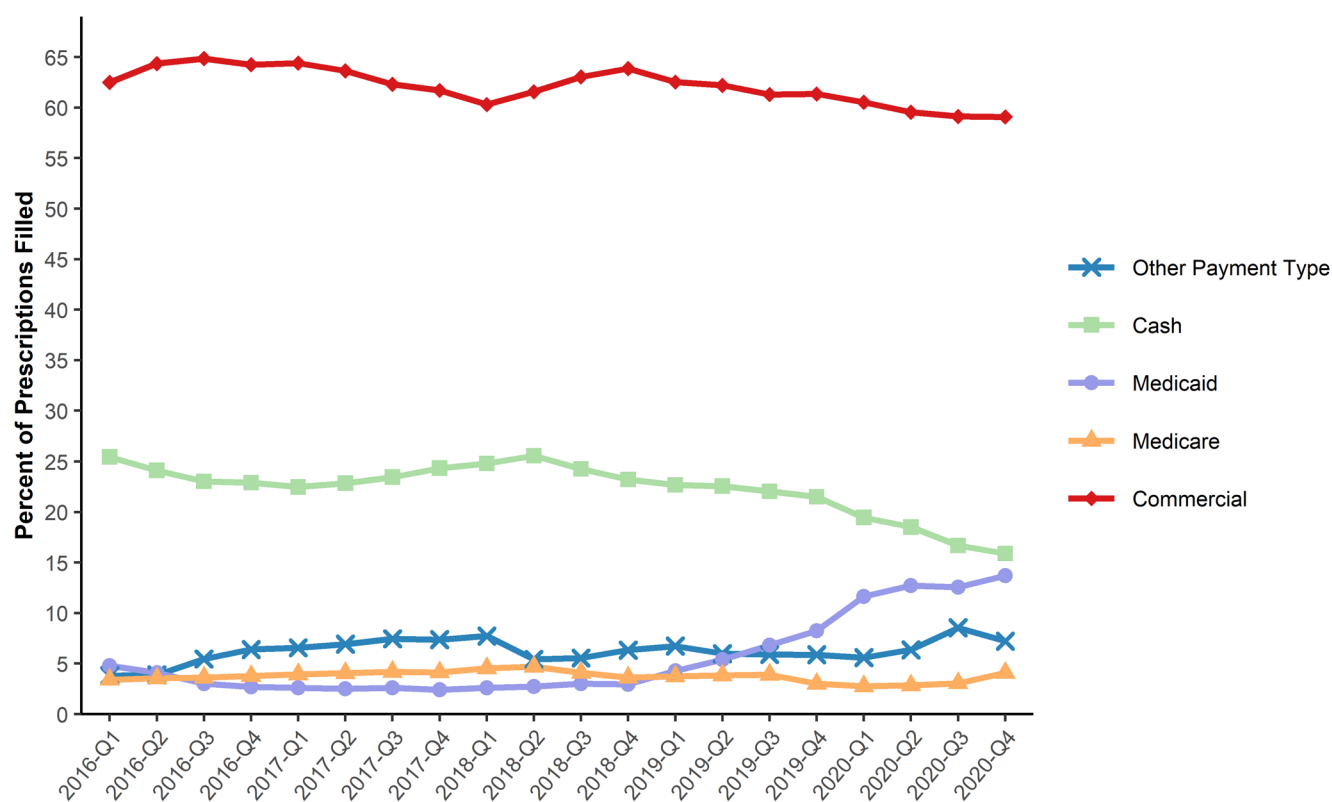
The plot above presents the rate of patients filling buprenorphine prescriptions for MAT per 1,000 TN residents by age group.<sup>88</sup> The rate for all patients is included for comparison.

Across the entire time period from 2016 to 2020, patients aged 35 and older have filled buprenorphine prescriptions at increasingly higher rates than those aged 18-34. The 25-34 year old age group has remained somewhat steady while the rate of 18-24 year olds has decreased. Beginning in 2018, 35-44 year olds have filled buprenorphine prescriptions at the highest rate (18 per 1,000 residents in Q4 2020), followed by 25-34 year olds (14 per 1,000 residents in Q4 2020), and 45-54 year olds (9 per 1,000 residents in Q4 2020).

<sup>88</sup> Prescriptions for patients less than 18 years of age are not included.

**25-44**  
years olds have  
experienced the  
highest number of  
opioid overdose deaths  
in TN in 2019

## Payment Type for Buprenorphine for MAT Prescriptions in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents. Data Source: Controlled Substance Monitoring Database.

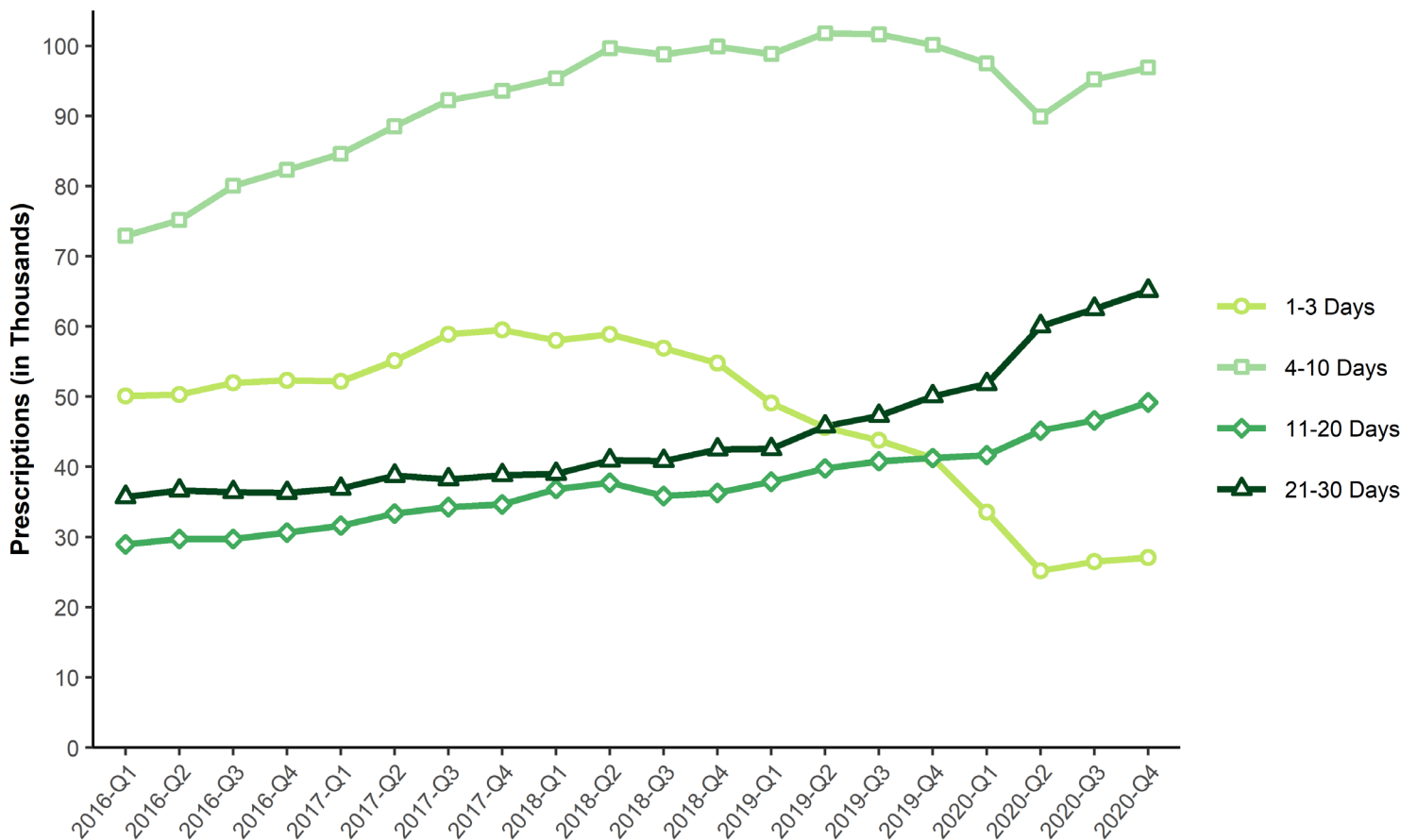
The vast majority of prescriptions for buprenorphine for MAT from 2016 to 2020 have been paid for through commercial insurance followed by cash. Beginning in late 2019, the percentage of buprenorphine prescriptions paid through Medicaid increased as the share paid with cash decreased. Medicaid has risen from one of the least used payment types for buprenorphine to the third most common, followed by other payment types<sup>89</sup>, then Medicare. In 2020, commercial insurance accounted for about 59.6% of all benzodiazepine prescriptions, followed by cash (17.6%), Medicaid (12.7%), other payment types (7.0%), and finally Medicare (3.2%).

**Reminder:** Because these lines represent percentages of the total and are mutually exclusive, when the line for one payment type decreases, one or more other lines must necessarily increase, although the absolute number of prescriptions may not have changed.

<sup>89</sup> Other payment types include military/VA, workers compensation, and discount cards.



## Number of Buprenorphine for MAT Prescriptions by Days' Supply in TN, 2016-2020



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents.  
Data Source: Controlled Substance Monitoring Database.

The plot above shows the most commonly filled buprenorphine prescription for MAT is for a 4-10 day supply. From 2016 through 2018, 1-3 day prescriptions were the next most common duration. However, in 2019, 21-30 day prescriptions have become the second most commonly filled for buprenorphine. Prescriptions of 1-3 days' supply are now the least commonly filled, falling behind even 11-20 day prescriptions.

In Q4 2020, 97,000 opioid prescriptions for pain were filled with a 4 to 10 days' supply (40.6% of all buprenorphine prescriptions for MAT filled that quarter). In the same quarter, 65,000 21-30 day buprenorphine prescriptions for MAT were filled (27.3%), 49,000 11-20 day buprenorphine prescriptions for MAT were filled (20.6%), and 27,000 1-3 day buprenorphine prescriptions for MAT were filled (11.4%).

In 2020, shorter duration prescriptions (1-3 and 4-10 days) dropped from Q1 to Q2 before increasing through Q3 and Q4. This change is likely related to the effects of the COVID-19 pandemic.

## Active Prescription Days for Patients Filling Buprenorphine for MAT Prescriptions in TN, 2016-2020

The table below shows the percent of patients who filled prescriptions for buprenorphine for MAT by the amount of their total prescription days throughout the year.<sup>90</sup>

**Percentage of Patients Filling Buprenorphine for MAT by Number of Active Prescription Days**

Prescription Days	2016	2017	2018	2019	2020
1-7 days	6.6	5.7	6.5	6.6	6.0
8-30 days	15.0	14.4	13.6	12.7	11.2
31-90 days	18.4	17.2	16.2	15.3	13.3
91-180 days	16.5	16.2	15.6	15.1	13.7
181-270 days	13.8	14.1	13.9	14.0	13.1
> 270 days	29.6	32.4	34.1	36.4	42.7

Buprenorphine, which tends to be used for long term treatment<sup>91</sup> of opioid use disorder, has many more patients who have active prescriptions for the majority of the year than do other controlled substances presented in this section.

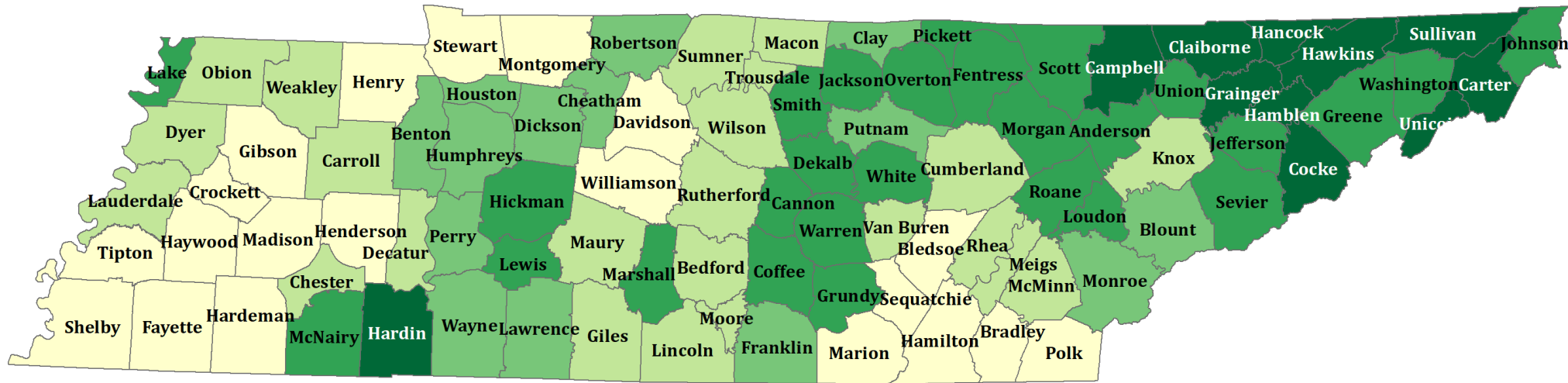
In 2020, 42.7% of buprenorphine patients received prescriptions for 9 months or more (270+ days) during the entire year, while only 6% received prescriptions for a week or less (1-7 days). There was a roughly even distribution of people who filled in each of the longer periods of time between 8 and 270 days.

From 2016 to 2020, the percent of patients with active buprenorphine prescriptions for 270 days or more in the year increased 29.6% in 2016 to 42.7% in 2020. At the same time, the percent with active buprenorphine prescriptions for shorter periods of time decreased somewhat across all categories.

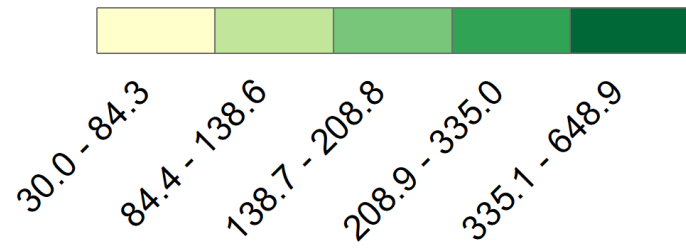
<sup>90</sup> Inclusive of all prescriptions in the drug class for each patient during the year. This measure assumes patients take their entire prescription as directed. See **Appendix B7** for more information.

<sup>91</sup> To learn more about long term buprenorphine use, see the [2020 Buprenorphine Report](#) (pg 25).

## Rate of Buprenorphine for MAT Prescriptions Filled by TN County of Residence, 2020



Rate of Buprenorphine Prescriptions for MAT Per 1,000 Population in 2020



The map on the left shows the rate of buprenorphine prescription fills for MAT per 1,000 residents in 2020. In 2020, 55 of TN's 95 counties had a rate higher than the statewide. Across the state, the counties with the highest rates are mostly located in northeast TN.

Compared to 2019 (not shown<sup>92</sup>), 48 of TN's 95 counties experienced an increase in the rate of buprenorphine for MAT prescriptions filled for 2020. Grundy County experienced the greatest increase in buprenorphine for MAT prescriptions filled per 1,000 residents.

Although roughly half of TN's counties experienced an increase in the rate of buprenorphine for MAT prescriptions filled, the statewide rate decreased from 2019 to 2020. However, it should be noted that the number of patients filling buprenorphine for MAT prescriptions has increased statewide.

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents.  
Data Source: Controlled Substance Monitoring Database.

<sup>92</sup> See the [2020 Buprenorphine Report](#) (pg15-16) for the 2019 map.

# Ongoing and Future Work

OIA continues its efforts to maximize the use of CSMD data to promote and improve the health of Tennesseans. The CSMD is one of the core data sources in OIA's Integrated Data System (IDS) and we are able to quickly link CSMD patients to their death certificate records, hospital discharges, and overdoses reported to the drug overdose reporting system, among other data. The ability to use these linked datasets has allowed TDH to rapidly respond to changes in the opioid epidemic.

## Enhanced Prescriber Reports

One of our major projects in 2021 will be the implementation of enhanced prescriber reports for TN's opioid prescribers registered with the CSMD. These reports are designed to show a provider, at a glance, how key metrics of their opioid prescribing have changed over time. The report will also allow prescribers to compare their trends to selected peer groups. We will be leveraging OIA's IDS data linkage capabilities to show prescribers information about patients reported to the Drug Overdose Reporting System who have overdosed in the period surrounding their prescriptions as well. The design of the reports is currently being refined and adjusted according to feedback from practicing TN physicians about the ease of understanding and utility of the data provided. OIA is working with partners in the state's Strategic Technology Solutions division to develop a user-friendly and secure method of accessing these reports. Once live, they will be updated on a regular basis.

## Drug Identification Improvements

Another major project for 2021 will be the enhancement of the drug information available to CSMD data analysts. OIA has procured IBM's Micromedex® RED BOOK® data for better identification and analysis of drugs reported to the CSMD. The RED BOOK data, in combination with data provided by CDC, will allow us to better understand trends for a wider range of controlled substances and adds drug information that was not previously available to the department for analyses.

## Special Reports, Publications, and Other Data Products

In order to provide deeper looks at data of interest to the public, OIA has begun to produce special topics reports. In Fall of 2020, we released a report<sup>93</sup> on buprenorphine prescribing and other related trends that provides greater detail than is available in the Annual Report. In 2021, OIA plans to release a report on stimulant prescribing and overdoses. Our analytics team regularly produces manuscripts for peer-review that often include CSMD data linked to other sources (see **Appendix C: OIA Publications**). Additional CSMD data and visualizations are also planned to be included in our internal dashboards that support planning and prevention activities and in our public Overdose Data Dashboard.<sup>94</sup>

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<sup>93</sup> Buprenorphine Report: [https://www.tn.gov/content/dam/tn/health/documents/pdo/2020%20Buprenorphine%20Report\\_11.30.pdf](https://www.tn.gov/content/dam/tn/health/documents/pdo/2020%20Buprenorphine%20Report_11.30.pdf)

<sup>94</sup> Overdose Data Dashboard: <https://www.tn.gov/health/health-program-areas/pdo/pdo/data-dashboard.html>

# Ongoing and Future Work

## Entity Resolution

Although we are confident in our linkage strategies to support epidemiological surveillance activities, we continually strive to improve the accuracy of our methods. To that end, OIA's analytics team has spent a great deal of time investigating and implementing advanced entity resolution software to provide better linkages between datasets. More advanced patient entity management techniques improve our ability to capture a patient's complete record of prescriptions and other health outcomes to better inform TDH's response to the opioid epidemic. In addition to patient entity resolution, we have been hard at work developing and implementing a system for provider entity resolution. A single provider may have a number of distinct identifiers across our available datasets. When producing reports about provider level metrics, such as our Enhanced Prescriber Reports or prescriber lists (see below), we aim to fully capture all of a provider's prescriptions. The provider entity management process developed in the IDS uses data from the DEA, the Centers for Medicare and Medicaid Services, and Tennessee's Licensing and Regulatory System (LARS) to ensure that a single provider can be identified regardless of the identifier associated with each record. Identifiers associated with a single provider are assigned a unique identifier which is included in all relevant datasets throughout the IDS for fast, consistent linkage. In addition to patient and provider entity management, OIA is also developing a facility index to provide more accurate information about the facilities participating in treatment, diagnosis, and communication of related information to TDH.

## Investigations and Prescribing Lists

OIA maintains a close relationship with the TDH Office of General Counsel (OGC) to assist with overprescribing investigations. We provide the legislatively mandated top prescribing lists, and we continue to work with OGC to develop useful measures of high risk prescribing. High risk prescribing can be defined many ways, and OIA works with investigators and prescribing experts at TDH to determine the most relevant metrics to guide provider education and investigation efforts. OIA also provides selected information on DATA-waivered providers and buprenorphine prescribing to the State Opioid Treatment Authority in the Tennessee Department of Mental Health and Substance Abuse Services.

## Overdose Risk Predictive Modeling

Work on statistical models to identify patients at high risk of overdose has recently been completed by the Walsh Lab at Vanderbilt University Medical Center (see **VUMC Project** in the **OIA Partnerships section**). These models make extensive use of CSMD data to predict patient risk of overdose at each prescription. In the coming year, we plan to integrate these models into the IDS to expand the scope of data available for planning and investigations and help TDH better assess the controlled substance prescribing landscape statewide.

# Section Spotlight

## Using Policy to Address High Prescribing: Evaluating the Top 50 Prescribers List

Since 2012, the TN state legislature has passed numerous laws designed to address the opioid epidemic and drug overdoses in the state. These measures have included limiting the amount and strength of drugs prescribed, regulating and banning pill mills, and implementing stronger requirements for reporting and checking the CSMD, among many others. The CSMD is particularly important for the work in OIA, as it is used to monitor prescribing patterns for a variety of controlled substances across the state, and it forms the basis of many of the analyses on prescriptions that are presented in this annual report. A timeline of the major policies that have been enacted is available in **Appendix D**, along with brief descriptions of their intended effects.

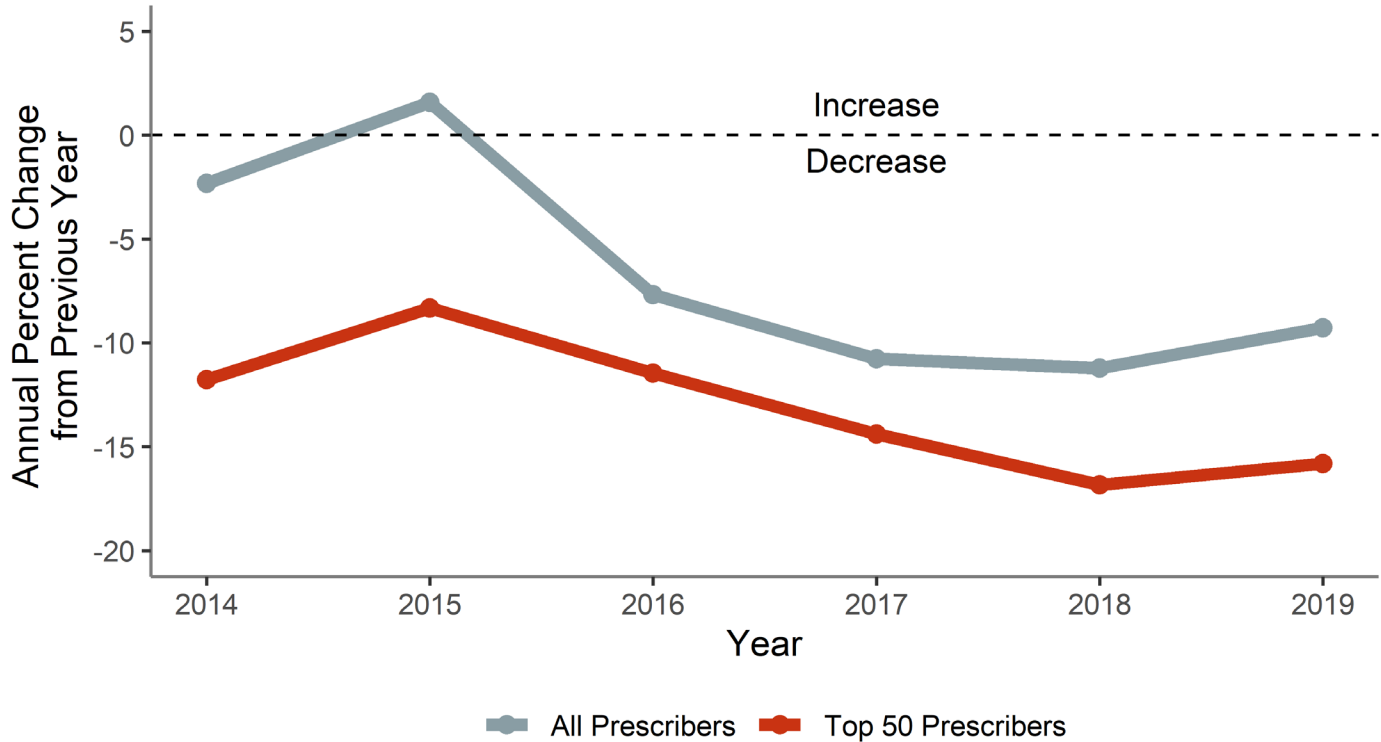
Beginning in 2013, TN capitalized on its implementation of the CSMD to enact a policy directly targeting high-prescribing physicians. It required that the state produce an annual list of the top 50 opioid prescribers in the state. Each year, the CSMD is used to identify the 50 prescribers who have prescribed the most total Morphine Milligram Equivalents (MMEs) over the previous year, adding up every MME prescribed to each of their patients. The state Division of Health Licensure and Regulation (HLR) is sent the finalized list, along with other key metrics about the prescribers (such as number of patients and specialty). HLR then sends a notice to the prescribers about their inclusion on the list, and requires that they respond with a justification of their prescribing practices. It should be noted that there are many valid reasons for a physician to be a high prescriber: a high patient load, treatment of chronic pain or cancer patients, or treatment of many surgical patients. Physicians without a sufficient explanation, however, have been subject to additional investigations and disciplinary actions.

Currently, OIA is working to evaluate the full impact of this list on prescription behavior, but preliminary research has found that high prescribing has decreased over the period (presented on the following page). While much more work is needed to determine whether this decrease is due to the high prescribing lists, other policy changes, or other societal changes, it is an encouraging sign.



**Read P.C. 396, 108th G.A., the act that established the Top 50 Prescribers List in TN [here](#).**

## Percent Change in Total Annual MMEs Prescribed in TN, 2014-2019



Analysis by the Office of Informatics and Analytics, TDH (last updated January 15, 2021). Limited to TN residents.  
Data Source: Controlled Substance Monitoring Database.

This graph displays the annual percent change in the average total MME prescribed by prescribers identified by the Top 50 Prescribers list, and the population average of all prescribers in the state of TN.<sup>95</sup> The percent change indicates how much the group average increased (positive number) or decreased (negative number) from the previous year. A lower negative number indicates a larger decrease. This estimate begins in 2014, because the first Top 50 list was created in 2013. For the entire time period, prescribers in each year's Top 50 list had a decreasing average total MME compared to the prior year, and the percent of this decrease was always larger than the percent change in the population, indicating that their average total annual MME was dropping faster than the general population of TN opioid prescribers. The largest percent decrease among the Top 50 Prescribers occurred between 2017 and 2018, where the average total MME per Top 50 prescriber dropped by nearly 17%. In the general population, total rates of MME primarily decreased, but increased slightly from 2014 to 2015. After this small rise, MMEs steadily decreased, with the largest decrease of 11% occurring from 2017 to 2018. While it is important to note that these changes cannot be directly attributed to any one policy, as there were many legal and social changes over the time period presented here, these results suggest that prescribers who end up on the Top 50 list may have had greater changes in their prescription patterns than the general population of prescribers.

<sup>95</sup> Only prescribers who prescribed at least one opioid during each calendar year were included. The population average includes the Top 50 prescribers.

**OIA values cross-sector collaboration.**

*We intend to mindfully leverage synergy, collective knowledge, and diversity of stakeholder ideas.*

## **OIA PARTNERSHIPS**

Timely information reporting, sharing of resources, and developing relationships with partners both in and out of TDH have been, and remain, important priorities for OIA. During 2020, OIA worked to further this mission, creating a strong data and analytic infrastructure for several projects and programs to support the Department of Health in addressing drug use, misuse, and abuse in Tennessee. This section highlights OIA's partnerships and collaborative projects with federal, state, and community partners focused on ending the overdose crisis.





# Introduction

In this unpredictable and unprecedented year, OIA is grateful for the many exceptional partners who were able to adapt their projects and services to continue the work dedicated to the overdose epidemic during the COVID-19 pandemic. These partnerships have been supported both directly and indirectly through multiple grants funded by the Department of Justice-Bureau of Justice Assistance (BJA) and the CDC. In addition to highlighting OIA's grant funding, this section describes OIA's partnerships and ongoing collaborative projects and the progress we made in 2020.

## This section includes:

- **2020 OIA Grant Funding**
  - **Department of Justice-Bureau of Justice Assistance (BJA) Grants**
  - **Centers for Disease Control and Prevention (CDC) Grants**
- **OIA Partnerships & Collaborative Projects**
  - **Partnership with Opioid Response Coordination Office (ORCO)**
    - Prevention Activities in High-Impact Areas (HIAs)
    - Development of Find Help Now
    - Medication-Assisted Treatment (MAT) Program in Correctional Settings
    - Standardizing Overdose Treatment Protocols in the Emergency Department
    - Academic Detailing Across TN
    - Expanding Syringe Services Programs (SSPs) in Memphis and Cocke County
  - **Partnership with Vanderbilt University Medical Center (VUMC)**
    - Development of Quiztime Application
    - Predictive Modeling for Drug Overdose
  - **Partnership with TN Department of Mental Health & Substance Abuse Services (TDMHSAS)**
    - Regional Overdose Prevention Specialists (ROPS)
    - 2020 International Overdose Awareness Day
    - 2020 ResilienTN Social Media Campaign
  - **Partnership with YOU**
    - New Data Dashboard
    - New Hospital Nonfatal Opioid Overdose Monthly Briefs
    - Infographics

# Grant Funding

TDH's response to the drug overdose epidemic continues to be data driven. With federal award funding from the United States Department of Justice (DOJ) Bureau of Justice Assistance (BJA) and the Centers for Disease Control and Prevention (CDC), TDH-OIA has built a robust data infrastructure that is increasingly being leveraged to drive insightful public health decision making.

TDH has been awarded four BJA grants within the last 5 years, totaling nearly \$5 million dollars beginning in 2016 with a Harold "Hal" Rogers Prescription Drug Monitoring Program, in 2018 with two Comprehensive Opioid Abuse and Stimulant Site-based Programs (COSSAP) grants, and in 2020 with a new Harold "Hal" Rogers Prescription Drug Monitoring Program award. In 2019, TDH was awarded \$6.7 million dollars through a cooperative agreement with the CDC. The funding supports the Overdose Data to Action program (OD2A), which rolls up the work of prior CDC grants into a single source of funding.

## Department of Justice- Bureau of Justice Assistance

### Harold "Hal" Rogers Prescription Drug Monitoring Program (PDMP) Implementation (2016-2020)

TDH was awarded the Harold "Hal" Rogers Prescription Drug Monitoring Program Data-Driven Responses to Prescription Drug Abuse grant in 2016. With opioid overdoses rising in TN, largely driven by prescription opioids at that time, TDH was interested in using a data-driven approach to help combat the epidemic. In an effort to get salient data and information to the right people, TDH worked across state departments coalescing Department of Mental Health and Substance Abuse Services (TDMHSAS) and the Tennessee Bureau of Investigation (TBI) as primary partners to establish and implement new data sharing opportunities.

Outcomes from this grant, that ended in September 2020, included: new electronic access of Controlled Substance Monitoring Database (CSMD) data to authorized law enforcement and drug courts; development of predictive modeling methods to integrate into the clinical setting assessing patients' risk for opioid overdose, and the creation and development of a rich and robust data driven working group whose membership has grown exponentially since it was first established in 2016.



In March 2020, Sanura Latham (pictured above) and Charlotte Cherry presented their work on using linked data for data-driven decision making at the 2020 National Comprehensive Opioid Abuse Program (COAP) forum.

# Grant Funding

Department of Justice- Bureau of Justice Assistance

## Prescription Drug Monitoring Program Enhancements- RxCheck Implementation (COSSAP Category 5; 2018-2021)

The CSMD has been an essential tool driving and tracking TN's steady decline in opioid and benzodiazepine prescribing. It has even more potential to benefit TN residents and healthcare providers through its ability for interstate data sharing and integration into electronic health records (EHR) and clinical workflows that allow providers to make more informed clinical decisions.

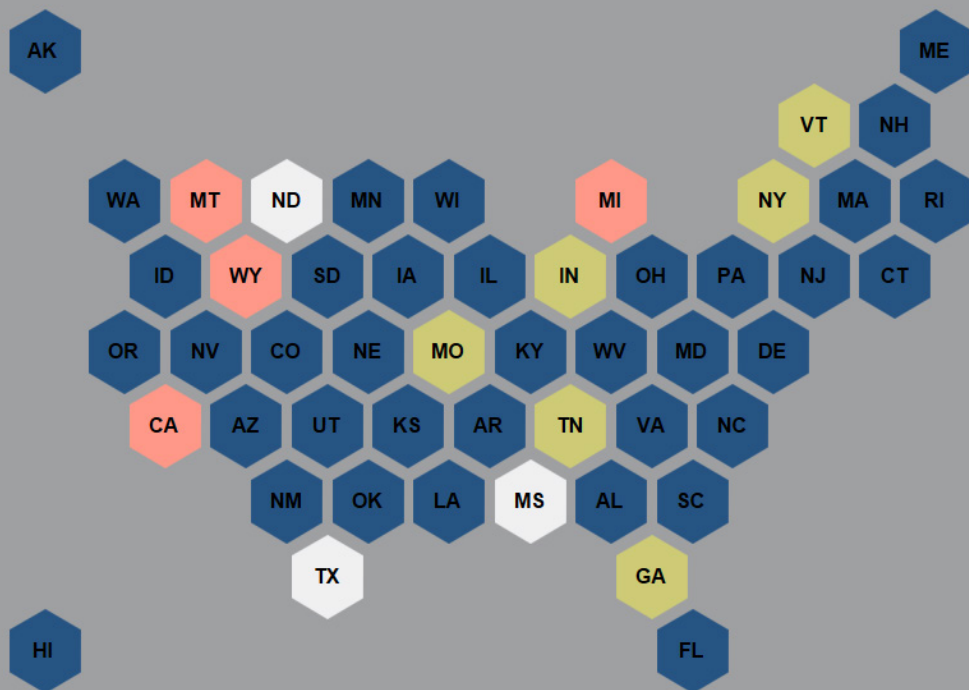
With funding from BJA, along with state support from the TN Board of Pharmacy, TDH has worked over the past several years to provide more options to make controlled substance prescribing data more accessible for interstate data sharing and for TN providers. In 2019, TDH endorsed the federally supported PDMP data hub RxCheck. RxCheck enables interstate data sharing between states and Health Information Exchanges (HIE) in addition to integration into EHRs enabling an additional platform choice, in addition to PMP Interconnect (PMPi) and Gateway, for TN providers and clinical facilities.

During 2020, TDH worked to onboard to the RxCheck hub and anticipates connecting to RxCheck in 2021. TDH is eager to connect with a first pilot state for PDMP interstate data sharing by the end of 2021. In addition, TDH has formalized a relationship with a first pilot facility to test EHR integration using RxCheck. Currently, the pilot phases for both interstate data sharing and EHR integration are in pre-development, with plans to move to testing and production during 2021.

## PDMP Interstate Data Sharing Status via RxCheck Hub

Learn more about PDMP Interstate Sharing and the RxCheck Hub [here](#).

-  Live Connection
-  MOU Complete & Onboarding
-  MOU in Process
-  No Activity



RxCheck Hub Status Graphic Adapted from [https://www.pdmpassist.org/pdf/RxCheck\\_states\\_map.pdf](https://www.pdmpassist.org/pdf/RxCheck_states_map.pdf)

# Grant Funding

Department of Justice- Bureau of Justice Assistance

## Multidisciplinary Collaboration and Data Infrastructure to Fight the Opioid Epidemic (COSSAP Category 6; 2018-2021)

This grant supports the continued work of the data driven multidisciplinary action group that began with Hal Rogers funding in 2016. It also supports the work of the development of data analytics and data dashboards that are used to inform crucial drug overdose prevention activities and resource planning for TDH and its partners.

The data driven multidisciplinary action group (Hal Rogers working group) is run by OIA and includes the Department of Mental Health and Substance Abuse Services (TDMHSAS), the TN Bureau of Investigation (TBI), Department of Children's Services (DCS) and internal offices within TDH including the CSMD office, the State Chief Medical Examiner, the Overdose Response Coordination Office (ORCO), and members from the Communicable and Environmental Disease and Emergency Preparedness (CEDEP) team (including Viral Hepatitis Program; HIV Prevention and Surveillance Program) among others.

Members of the Hal Rogers working group receive two regular data briefs: the first is a monthly brief that contains up to date nonfatal overdose trends for the state, and the second brief is released biweekly and includes fatal and nonfatal overdose data, key opioid prescribing trends, and narcotic arrest trends. Data are analyzed at the zip-code level so working group members have the agility to make programmatic decisions regarding response and resource planning. The working group also utilizes a dynamic Tableau dashboard to show near real time trends during the biweekly meetings. While these data are not publicly available, OIA has developed a special public-facing monthly report that characterizes nonfatal opioid overdose trends for the previous month ([Hospital Reported Nonfatal Opioid Overdose](#)).

The Hal Rogers working group has had several notable successes: the group has continued growing with commitment from its members and more new partnerships, the group has facilitated data sharing discussions with partners and established data-sharing agreements between agencies, and members of the working group collaborate as part of TDH's Strategic Planning response to the drug overdose epidemic.

During 2020, new data dashboards were also developed, each with a specific purpose for TDH Leadership use and for the Hal Rogers working group. These dashboards informed a specific activity like monitoring drug overdose during COVID-19 or monitoring public health regions and counties when overdoses exceeded thresholds. Dashboards use opioid overdose data from the Drug Overdose Reporting System and we anticipate in 2021 to integrate new drug overdose data including those involving stimulant, benzodiazepine, and muscle relaxants. In addition, we anticipate that in 2021 we will be able to pilot linking EMS data into the TDH integrated data system (IDS) which will allow OIA the ability to create an additional suite of analytics and data dashboards utilizing these new sources.

*“The building of relationships among these offices/ departments has allowed each to break down silos and learn from one another’s programs, approaches, and data....The multi-disciplinary nature of the group has also encouraged new ways of thought.”*

- Urban Institute, 2020 site review of TDH's COSSAP activities and grant progress

# Grant Funding

## Department of Justice- Bureau of Justice Assistance Harold “Hal” Rogers Prescription Drug Monitoring Program (2020-2023)



Above, OIA’s Charlotte Cherry, MS, MPH, participates in the panel *Evolution of Drugs of Abuse: How to Keep Up with the Changing Landscape* at the Comprehensive Opioid Abuse Program (COAP) national forum in early March 2020.

To continue the progress TN has made in tracking drug overdose and prescription misuse and abuse in our state, TDH was awarded funding for four major activities under a new Hal Rogers PDMP grant: 1) Continue RxCheck interstate data sharing onboarding and pilot an additional facility for CSMD EHR integration; 2) Provide an additional year of PMP Gateway Electronic Health Record/Pharmacy Management System workflow free of charge for TN Providers; 3) Replace an end of life application with an enhanced application for submission of TN controlled substance shipment data; and 4) Expand our partnership with TBI through the integration of drug-related arrest data for surveillance and analysis.

The first and second grant activities include expanding options for querying interstate data using RxCheck, and better integrating the CSMD into EHR utilizing RxCheck and Gateway. These efforts will expand CSMD access and enhance provider workflows, so they are able to make better clinical decisions.

The third activity will enhance reporting of controlled substance shipment data. The current system is approaching end of life, and a new one is needed to securely collect high quality controlled substance shipment data. A new application will improve data that will be used for surveillance and tracking of shipment outliers to prevent and investigate inappropriate drug orders.

The fourth activity builds on the existing relationship between TDH and TBI. We plan to expand our partnership with TBI through the integration of stimulant (e.g., methamphetamine and cocaine) arrest data. Drug shipment and new TBI data will be valuable as we continue to improve our data infrastructure to rapidly identify changing trends in the drug overdose epidemic and provide data to key stakeholders.

# Grant Funding

Centers for Disease Control and Prevention (CDC)

## Overdose Data to Action (OD2A) Cooperative Agreement (2019-2022)

In September 2019, TDH was awarded \$6.7 million through a cooperative agreement with the CDC for their Overdose Data to Action (OD2A) program. CDC provides OD2A funds to support the collection of high quality and timely data on overdoses in TN and to use those data to inform and evaluate prevention activities. OIA and TDH's Opioid Response Coordinating Office (ORCO) coordinate together on the Surveillance and Prevention pillars of the OD2A program.

The OD2A grant leverages and enhances existing public health surveillance activities to allow OIA to provide more accurate and timely data to inform public health prevention activities. The surveillance component of the grant has three major components:

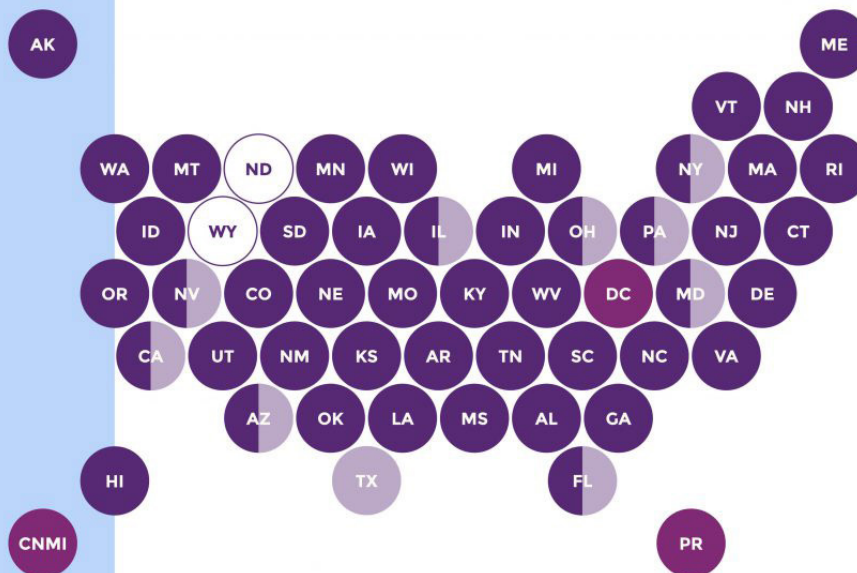
- Collect and disseminate emergency department data on suspected overdoses through the state's syndromic surveillance system (known as ESSENCE).
- Collect and disseminate descriptions of drug overdose death circumstances using death certificates, toxicology reports, and medical examiner reports and provide these data to CDC's State Unintentional Drug Overdose Reporting System (SUDORS).
- Implement innovative surveillance activities to support interventions.

The prevention component of this grant provides funding support to enhance the usage of CSMD data, improve state-local integration for overdose prevention activities, establish linkages to care, and improve provider and health system support aimed at combating overdoses and overprescribing.

### Overdose Data to Action (OD2A)

#### TYPE OF JURISDICTION

- State
- City/County
- District/Territory



The OD2A grant provides funding for activities in 66 states, local communities, and tribes with the aim to increase timeliness and comprehensiveness of data used inform public health response and enhance overdose prevention capacity.

The map above was created by the CDC and can be found at: <https://www.cdc.gov/drugoverdose/od2a/index.html>

# Grant Funding

Centers for Disease Control and Prevention (CDC)

## Overdose Data to Action (OD2A) Cooperative Agreement (2019-2022)

TDH's OD2A activities fall under seven strategies:

### Surveillance

1. Morbidity Surveillance
  - Participation in DOSE (see DOSE section, **page 107**)
2. Mortality Surveillance
  - Participation in SUDORS (see SUDORS section, **page 51**)
  - Rapid Identification of opioid overdose deaths (see RODD, **page 56**)
3. Innovative Overdose Surveillance
  - Expansion of data linkages in the IDS (see Learn about OIA's Data, **pg 11**) to identify injection drug use-associated health outcomes and to better identify risk and protective factors and other social outcomes of overdose:
    - i. Workers Compensation data
    - ii. Drug Overdose Reporting (DOR) data
    - iii. Blood-borne Infections data
    - iv. Child and family welfare data
    - v. Community risk and protective factor data
  - Incorporation of new data sources into surveillance and visualization tools

### Prevention

4. Improved PDMP Functionality
  - Development of prescriber report cards for clinical decision-making support (see Prescription section: Ongoing and Future Works, **page 154**)
  - Support overprescribing investigations
  - Analysis of the effects of recent opioid legislation on prescribing trends
5. State and Local Integration
  - Fund and oversee mini grants to High Impact Areas (see Prevention Activities in the High Impact Areas, **page 166**)
6. Linkages to Care
  - Pilot linkage to care protocols in emergency departments (see Standardizing ED Protocols, **page 172**)
  - Fund resource navigators
  - Develop statewide treatment resources mapping tools (see Find Help Now, **page 170**)
7. Providers & Health Systems Support
  - Expand and enhance academic detailing throughout the state (see Academic Detailing, **page 173**)
  - Provide continuing education on overdose and treatment to prescribers through a mobile learning application (see Quiztime Application, **page 175**)

# Partnership with ORCO

TDH's Opioid Response Coordination Office (ORCO) was established in 2018 in an effort to combat the changing and complex overdose epidemic in the state of Tennessee, as our state consistently reports drug overdoses that exceed the US national average. In September 2019, TDH received \$6,696,000 in funding from CDC as part of their OD2A grant that funds both surveillance (\$1.5 million) and prevention (\$5.2 million) activities. Surveillance activities include morbidity and mortality surveillance, innovative surveillance methods, enhancements to the state's Prescription Drug Monitoring Program, and expansion of toxicology testing. The foundation for prevention activities lies in the integration of state and local overdose response, linkage to care, and provision of provider and health systems support. ORCO works in collaboration with OIA for the successful implementation of these surveillance and prevention activities that are interdependent.

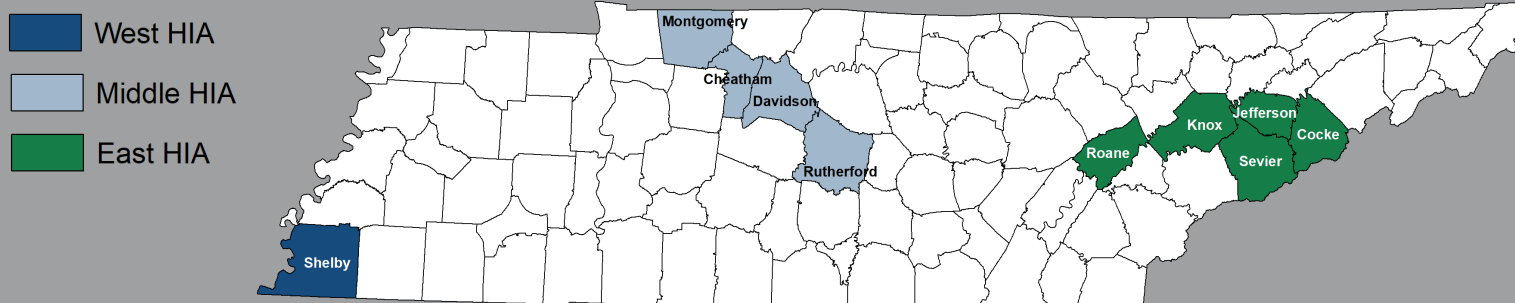
## Projects led by the Opioid Response Coordination Office

### Prevention Activities in High-Impact Areas

In 2020, ORCO continued to lead the department's response to the drug overdose epidemic in TN. TDH is currently undertaking several activities aimed at utilizing data to target drug overdose efforts. One major activity led by ORCO is identifying the areas within TN that have been the most highly impacted by overdose and enhancing local capacity for prevention and response. ORCO and OIA worked together to use 2018 overdose data and information to identify three areas in the state considered "high-impact" (see below). The High Impact areas (HIAs) include 1) West: Shelby County, 2) Middle: Davidson, Rutherford, Cheatham and Montgomery counties, and 3) East: Knox, Roane, Jefferson, Sevier and Cocke counties.

Local, regional and metro health departments and other community-based partners within the HIAs receive funding to implement interventions aimed at reducing overdose and other adverse consequences of the epidemic in their region. Interventions with the HIAs were selected among CDC approved evidenced-based activities by multi-sector workgroups in each HIA based on issues identified through local data. Each HIA is required to develop a multi-sector Task Force and develop and implement an acute response plan as part of their award. HIAs may also choose other interventions for funding. Interventions will be evaluated over-time to allow for testing and revision during the grant period. Additional HIAs are being added during the grant cycle dependent upon availability of funding and on-going analysis of state overdose data. Learn more about the funded prevention activities in the three HIA regions on the following page.

## HIAs Receiving Funding for Prevention Activities



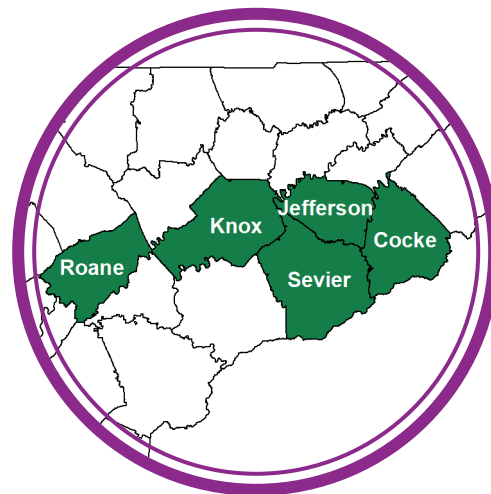


## Projects led by the Opioid Response Coordination Office

### Prevention Activities in the East TN HIA

The HIA program in East TN was launched in 2019 and includes five counties: Sevier, Roane, Cocke, Knox, and Jefferson.

Although COVID-19 impacted many of the prevention activities during 2020 (see table below), the East TN HIA had notable accomplishments including establishing new Substance Use Task Force partnerships with local hospitals, EMS, and community based organizations; progress collaborating on and drafting an acute overdose outbreak response plan; and starting the first state project that provides MAT to justice-involved individuals in Jefferson County. Additionally, the East TN HIA collaborated with Metro Drug Coalition (Knox County) and their partners to create a mentoring toolkit that will be essential in the foundation of three new county prevention coalitions in Campbell, Cocke, and Morgan Counties.

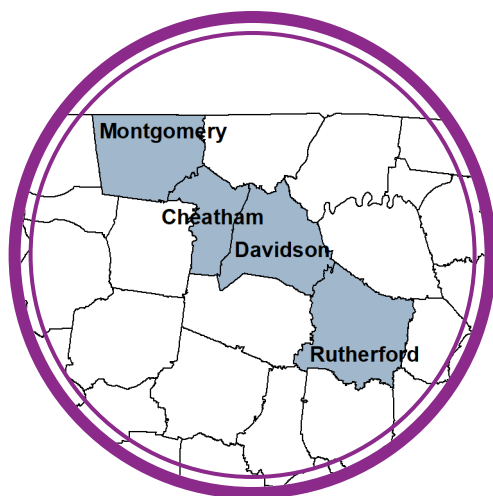


### East TN HIA OD2A Prevention Activities

Project	Synopsis
Partnership/Taskforce	Formation of a joint Substance Use Task Force and host regular joint taskforce meetings for all projects to enhance collaboration.
Opioid Overdose Acute Response Planning	Develop a joint regional and metro acute overdose response plan using the existing state template.
Prevention Education	Development and distribution of a coalition mentoring toolkit.
Medication-Assisted Treatment (MAT) Program in Correctional Settings	Initiate MAT in a correctional setting including enhanced screening of inmates for Substance Use Disorder (SUD) and training of jail staff and law enforcement.
ED Protocol	Partner with Covenant Health Systems to improve patient navigation directives following discharge from hospital, targeted screening, access to naloxone, and initiation and referral to MAT.
Linkage to Care Activities	<ol style="list-style-type: none"> <li>1. Linking Knox Metro Surveillance contacts to care</li> <li>2. Linking Knox Metro Health Department contacts to care</li> <li>3. Linking Regional EMS contacts to care</li> </ol>

## Prevention Activities in the Middle TN HIA

The HIA program in Middle TN was launched in 2019 and encompasses four counties: Rutherford, Montgomery, Cheatham, and Davidson.



Despite limited resources and challenges (i.e. in-person gatherings) due to COVID-19, the Middle TN HIA was able to advance its prevention activities during 2020 (see table below). Middle TN HIA successes include: Davidson county formalizing a response plan to address acute overdose outbreaks, establishing a relationship between Nashville-Davidson EMS and the Mental Health Cooperative Crisis Treatment Center to link individuals who experienced an overdose to care and treatment, and engaging additional key stakeholders to participate in the Mid-Cumberland Multidisciplinary Taskforce (anticipated launch for April 2021). In addition, HIA coordinators have been working with staff from St. Thomas Rutherford to identify best practices for emergency department discharge protocol that could be adopted by all area hospitals. While activities planned as in-person events such as the Life Skills Trainings were postponed due to COVID-19, many important prevention activities moved forward, including brainstorming and strategic planning for 2021 activities.

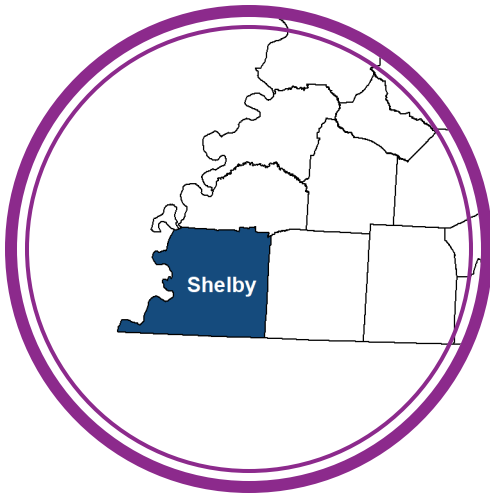
### Middle TN HIA OD2A Prevention Activities

Project	Synopsis
Partnership/Taskforce (Region and Metro)	Formation of a joint Substance Use Task Force and host regular joint taskforce meetings for all projects to enhance collaboration.
Opioid Overdose Acute Response Planning (Region and Metro)	Expansion of the Opioid Overdose Acute Response Plan to cover the region (including spike identification, communication trees, state and local data availability etc.).
Prevention Education (region)	<ol style="list-style-type: none"> <li>Partnership with Rutherford County schools for Life Skills training.</li> <li>Participation in TN Teen Summit.</li> </ol>
ED Discharge Protocol (region)	Development of ED Protocol for ED patients with SUD [including partnership with Tennessee Hospital Association (THA), several area EDs and national consultants].
Linkage to care (Metro)	<ol style="list-style-type: none"> <li>Link Metro HD clinic SUD screening and navigation to care.</li> <li>Partnership with Mental Health Co-Op for navigation from EMS.</li> </ol>

## Prevention Activities in the West TN HIA

The HIA program in West TN was launched in 2019 and includes only Shelby County.

Even prior to receiving HIA-funding, Shelby County has been a leader in drug overdose prevention and response. Currently, Shelby County has an active drug overdose task force and the county utilizes ODMAP (Overdose Detection Mapping Application Program: <http://www.odmap.org/>) software to track real-time trends in drug overdose. In 2020, the West TN HIA continued their prevention activities funded by the OD2A grant (information below) with notable success, including the expansion of two syringe service programs in Shelby County—A Betor Way and Memphis Area Prevention Coalition. The SSPs currently serve in multiple locations across the county ([learn more about them on page 174](#)). However, due to the COVID-19 pandemic, West TN HIA activities have also suffered delays, including postponements in staffing positions and the developing a post alert action plan for acute drug overdose. Work on the post alert action plan for acute drug overdose is anticipated to continue into 2021.



### West TN HIA OD2A Prevention Activities

Project	Synopsis
Partnership/Taskforce	Enhancement of participation/membership in 5 substance use related work groups and development of a work group assessment and training plan, including hosting task force meetings for all projects.
Opioid Overdose Acute Response Planning	Development of a <i>post alert action plan</i> for existing acute overdose reporting and disseminate to stakeholders and provide assistance as needed to other areas interested in algorithm development.
Expand Syringe Services	A Betor Way and Memphis Area Prevention Coalition expanding SSP services including new locations and expansion of operational hours.
Prevention Education	Participation in SUD related events- sponsorship and speakers (30 events).
Linkage to Care (Metro)	<ol style="list-style-type: none"> <li>1. Partnership with CAAP (Cocaine and Alcohol Awareness Program) for peer navigation &amp; adolescent education.</li> <li>2. Conducting motivational interviews with individuals who experience nonfatal overdoses and family/friends of fatal overdose cases.</li> </ol>

## Start Here to Find Addiction Treatment Openings

Use this website to find an addiction treatment facility that is taking new clients right now. We work with hundreds of facilities across the state to bring you up-to-date and accurate information about their treatment offerings and availability.

Need help finding treatment? Have questions about treatment or recovery? Contact our partners at the KY Help Statewide Call Center to speak with a screening and referral specialist Monday through Friday from 8:00am to 5:30pm EST/EDT at 1-877-318-1871.

After hours and need assistance? Call The Kentucky Opioid and Assistance Resources Hotline (KY-OAR) at 1-800-854-6813.

**Who Needs Help?**

Not Sure ▼

Pregnant     Under 18     Mental Health Diagnosis

**Gender**

----- ▼

**Location** [Use My Location](#)

City, county or zip code

**Type of Treatment** [help](#)

Not Sure ▼

**Payment** [help](#)

Not Sure ▼

[🔍 Start Search](#)



**Find Help Now is a national platform where individuals can locate substance abuse treatment options in their communities and will be available soon to Tennesseans.**

### Projects led by the Opioid Response Coordination Office

## Development of Find Help Now

Find Help Now is a website where individuals, family members, providers, and navigators can locate substance abuse treatment in their communities including near real-time information on providers and facilities that are currently accepting patients. Tennesseans will be able to search for treatment by location, type of treatment needed, payment type as well as search for facilities accepting special populations such as pregnant women and those with co-occurring mental health disorders. Find Help Now was developed by the Kentucky Injury Prevention and Research Center (KIPRC) in collaboration with the KY Department of Health and the University of KY College of Public Health.<sup>96</sup> Through an OD2A funded peer-to-peer learning collaborative, TN is working with KIPRC, along with the TN Department of Mental Health and Substance Abuse Services and the TN Association of Alcohol, Drug and other Addiction Services (TAADAS) to customize a site for TN. Tennessee is the first state after KY to join the Find Help Now national platform. TN's process of onboarding substance use disorder treatment providers began in December 2020 and will continue throughout 2021. Find Help Now-TN will launch publicly when 250+ facilities are on-boarded to the site and geographic distribution is ensured.

<sup>96</sup> KY's Find Help Now: <https://findhelpnowky.org/ky>

## Projects led by the Opioid Response Coordination Office

# Medication-Assisted Treatment (MAT) Program in Correctional Settings

TDH is helping to develop the first of its kind in the state Medication-Assisted Treatment program in a correctional setting in Jefferson County, TN. The program will provide treatment continuity for patient inmates being treated for Opioid Use Disorder (OUD) prior to incarceration as well as induction for patient inmates diagnosed with OUD upon incarceration at the Jefferson County Detention Center. All three FDA approved medications for OUD (Buprenorphine, Naltrexone, Methadone) will be administered in the program overseen by an opioid treatment program (OTP) in collaboration with the correctional medical provider. As part of the program, TDH is funding a Corrections Navigator who will develop the MAT treatment protocol in collaboration with corrections and medical professionals and work directly with patient inmates to ensure continuity of care prior to release. TDH's goals include reduction of opioid withdrawal and diversion of contraband substances, reduction in recidivism in the criminal justice system, and reduction in overdose for patient inmates released into the community. This program is currently in the planning phase with a goal to transition to implementation during the ongoing year 2 of the grant period. TDH plans to evaluate and replicate the program in other TN counties prior to the conclusion of OD2A. As a large number of people who use drugs (PWUD) visit

## Benefits of Providing MAT to Justice-Involved Individuals

According to SAMHSA, providing MAT across the criminal justice system has been found to reduce criminal activity, arrests, and re-incarcerations. Learn more [here](#).

## FDA-Approved MAT Options

There are currently three medications that are FDA-approved to treat individuals with OUD: **buprenorphine**, **methadone**, and **naltrexone**. Each of these medications have different mechanisms of action, as well as different regulations as to how and who prescribes them. Visit <https://www.samhsa.gov/> or click to learn more.

**Buprenorphine**

**Methadone**

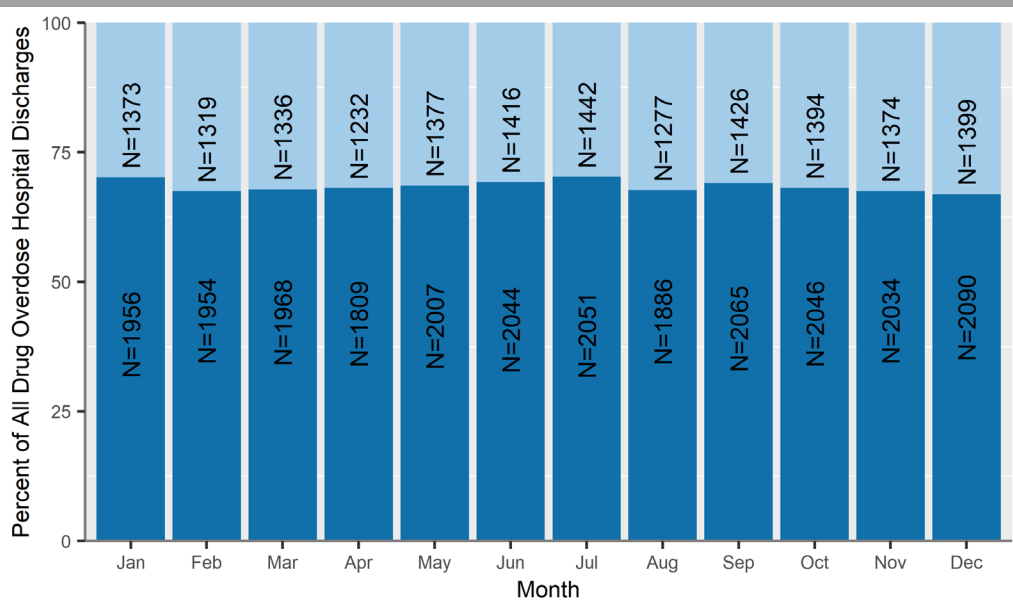
**Naltrexone**

## Projects led by the Opioid Response Coordination Office

# Standardizing OD Treatment Protocol in the Emergency Department including the Provision of Recovery Navigators

Emergency Departments (EDs), it is important to have protocols that are standardized and integrated with ED processes. TDH is working with hospital partners in the East and Middle TN HIAs to create ED discharge protocols for PWUDs and their families with a focus on preventing drug overdose deaths. This program will implement guidelines aimed at increasing the utilization of medications for opioid use disorder in the emergency setting. The participating hospitals will develop a standard response protocol for all nonfatal overdose ED patients. To support these efforts, TDH will provide medical personnel throughout the region with guidance and education on the science of addiction, as well as best practices for supporting PWUD. This training includes post overdose discharge planning to include linkage to in/out-patient drug treatment, harm reduction services, Medication-Assisted Treatment (MAT), mental health care, and other resources. Additionally, the participating hospital is also provided funding to support the hiring of Certified Peer Recovery Specialists or other identified credentialed personnel as deemed appropriate by the hospital. These individuals will be available to provide immediate evidence-based personalized linkage to care services to those who have overdosed and other PWUD.

In 2019, there were 23,910 drug overdose-related hospital discharges identified in TN's Hospital Discharge Data System (HDDS). The majority of drug overdose related discharges (68% in 2019) were treated in an Emergency Department (ED) setting. Programs that link Tennesseans who experience a nonfatal drug overdose to care and local resources from the ED could have a positive impact reducing overdose in TN.



## Percent of Drug Overdoses Treated in the Emergency Department (ED) in TN, 2019

Light blue: Percent of Non-ED Drug Overdose Visits  
Dark blue: Percent of ED Drug Overdose Visits

Analysis by the Office of Informatics and Analytics, TDH (last updated February 2, 2021). Limited to TN residents. Data Source: Hospital Discharge Data System (HDDS).

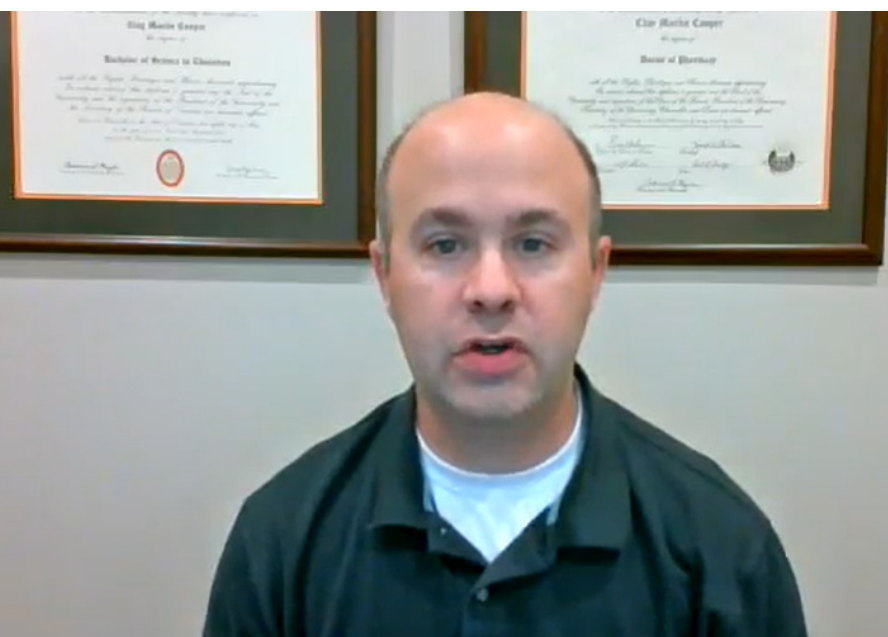
## Academic Detailing Across TN

Academic Detailing (AD) is a process that involves peer-to-peer education where prescribers are trained by other health care professionals, referred to as academic detailers, to improve their prescribing behaviors. TDH collaborates with ONE Tennessee to reduce risky prescribing behaviors by developing an AD implementation protocol to train academic detailers. This program targets high-risk prescribers as well as prescribers in areas highly impacted by drug overdoses. Learn more about Academic Detailing at <https://onetnhealth.org/what-we-do/> or by clicking on the icon below.



*“Communicating well with prescribers is key to improving pain management and appropriate prescribing. Academic Detailing is an evidence-based approach which can facilitate educational information and ongoing relationships between members of the healthcare delivery team. I am convinced that the vast majority of prescribers want to deliver safe and effective pain management, and real change that benefits patients and clinicians can start with a one-on-one conversation..”*

- David Reagan, MD, PhD,  
Former CMO of TDH and ONE  
TN Board Member



Clay Cooper, Pharm.D., is a community pharmacist in Jackson, TN who volunteers on the Academic Detailing Advisory Committee for One Tennessee. During COVID-19 detailers were unable to meet in person and Cooper helped put together online training materials for new academic detailers across the state of TN.

## Expanding Syringe Services Programs in Memphis and Cocke County

Syringe Service Programs provide comprehensive harm reduction services including:

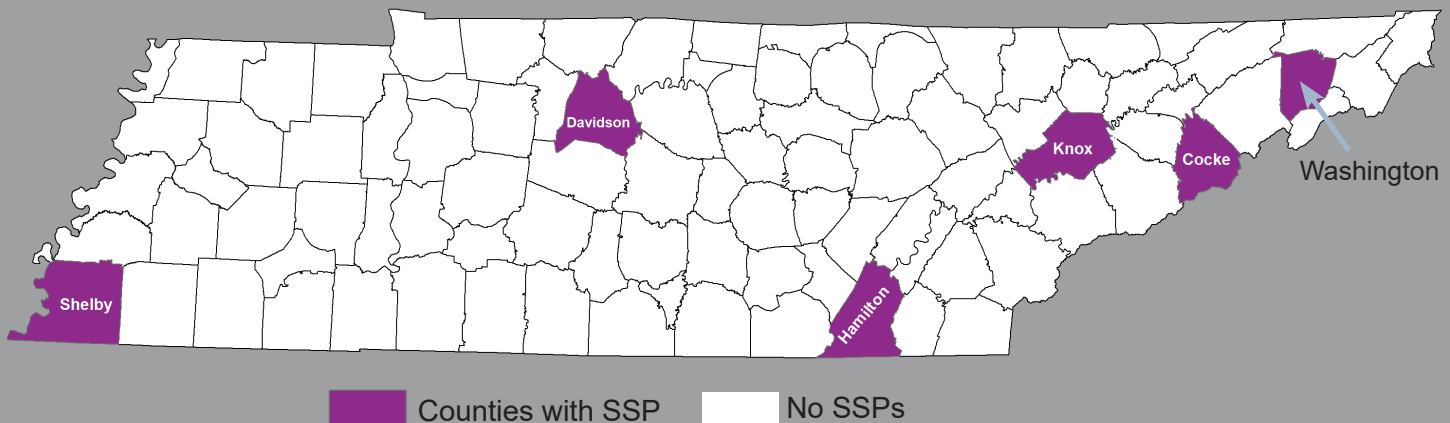
- Free sterile needles, syringes, and other injection equipment
- Safe disposal containers
- HIV and Viral Hepatitis testing and linkage to care
- Overdose prevention and education
- Referrals to SUD treatment, medical providers, and social services
- HIV/STD/Viral Hepatitis prevention education

Learn more about SSPs in TN by clicking the link [here](#), or scanning the QR code below.



The purpose of syringe service programs (SSPs) is to reduce the spread of blood-borne infections such as HIV and Hepatitis C among persons who inject drugs and provide consistent engagement with clients which have been demonstrated to decrease risky behaviors and increase likelihood of engaging in treatment. TDH partnered with Choice Health Network to pilot a Syringe Service Program to Cocke County, a high-risk county in the East Region. The program provides syringe exchange, counseling, testing, referral, and linkage to care services. In the West TN region, a Betor Way and Memphis Area Prevention Coalition have expanded services in Shelby County, another high-need area. These organizations provide services to persons who inject drugs, such as distribution and exchange of syringes, proper disposal of needles, Naloxone distribution, condoms, and screening for blood-borne pathogens, including HIV, hepatitis A, B, and C. These programs have been successful in serving their participants. The average number of syringes collected and distributed greatly exceed their set goals during each reporting period. Since the expansion of these 3 programs, 93,986 syringes have been distributed and 62,952 collected.

### TN Counties with SSPs





# Partnership with VUMC

Projects developed with Vanderbilt University Medical Center

## Development of Quiztime Application

In partnership with Vanderbilt University Medical Center (VUMC), TDH is working to increase provider participation in novel web-based education opportunities related to opioid misuse and opioid use disorder by expanding the Quiztime application. Quiztime is a quiz-based learning application for medical providers. Participating providers/learners receive a daily question by email or text and upon successfully completing the quiz can receive continuing medical education credits. The partnership with Quiztime targets prescribers and dispensers of opioids. Aimed at engaging healthcare providers to improve the quality of care and patient safety while minimizing unintended consequences in caring for people with acute and chronic pain in Tennessee, this program has been building new content and reaching out to the medical providers who prescribe opioid medication, especially in the most highly impacted areas of the state. During the October and November 2020, period in which the quiz focused on overdose risk, about 1,600 providers completed the web-based quiz pilot. In Winter of 2021, two new quizzes will be launched focusing on prescribing to geriatric and adolescent populations.

## Predictive Modeling for Drug Overdose

TDH partnered with VUMC to develop a predictive model that assigns probability of risk of nonfatal and fatal drug overdose. Colin Walsh, MD, MA, Assistant Professor of Biomedical Informatics, Medicine, and Psychiatry along with his team in the Walsh Lab (<https://walshscience.com/>) have an established research core that uses machine learning and natural language processing methods for predictive analytics. During 2020, TDH and the Walsh Lab collaborated to apply the Lab's modeling methods to evaluate the relationship between patient opioid prescription history and fatal and nonfatal drug overdose. Data in this study included historical TN statewide prescription drug monitoring program (PDMP) data, hospital discharge data, and vital records death certificate data. Socioeconomic indicators (e.g. American Community Survey data) were also included in the model to evaluate opioid overdose risk.

Results from the model include predicting opioid-related overdose thirty-days after a filled opioid prescription. Next steps for this collaboration include publishing results and knowledge transfer from the Walsh Lab to OIA's epidemiologists. OIA will be collaborating with Walsh Lab to integrate the risk models into state-level public health systems, including the **Integrated Data System (page 11)**. Once integrated, risk predictions will be deployed to support physicians' clinical decision making for better prevention and timelier intervention efforts. In addition, this work will improve public health surveillance of drug overdose and better inform the prioritization of resources to high risk populations and geographic areas, and for interventions to improve patient care and reduce overprescribing. With the ability to develop and refine predictive models that indicate risk of drug overdose, TDH will be better equipped to protect the health of patients and areas of the state at the highest risk of overdose.

Learn more about the ongoing research at VUMC's Walsh Lab!



# Partnership with TDMHSAS

## Partnerships with the Tennessee Department of Mental Health and Substance Abuse Services Regional Overdose Specialists

TDH OIA and the Tennessee Department of Mental Health and Substance Abuse Services -Office of Prevention (TDMHSAS) have continued to work together to leverage data to better hone drug overdose prevention and outreach activities.

Starting in 2020, TDH and TDMHSAS formalized a data sharing agreement to allow the sharing of weekly hospital reported opioid overdose data aggregated at zip code level. These data provide TDMHSAS colleagues and regional overdose prevention specialists (ROPS) with more timely information that allow them to target areas for increased naloxone distribution and directs their focus of trainings/education on drug overdose. Outcomes from this data sharing partnership include TDMHSAS and ROPS gaining a better understanding of surveillance data and having the opportunity to provide feedback and express specific data needs that assist them in better targeting geographies for overdose prevention. Activities in 2021 include developing a drug overdose data dashboard for ROPS to provide timelier data in an easy to use format and collaborating to further understand where there are still gaps in data and information.

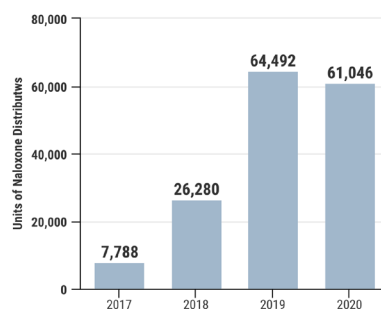
OIA also works with TDMHSAS to report on trends and statistics for buprenorphine use and outcomes in Tennessee. Information from these analyses helps TDMHSAS better understand buprenorphine prescribing trends and see where upticks in the utilization of buprenorphine for treatment occur in the state, as well as the trends for long-term use. For more information about buprenorphine prescribing trends in TN, see the 2020 Buprenorphine Report: [https://www.tn.gov/content/dam/tn/health/documents/pdo/2020%20Buprenorphine%20Report\\_11.30.pdf](https://www.tn.gov/content/dam/tn/health/documents/pdo/2020%20Buprenorphine%20Report_11.30.pdf)

This fruitful collaboration has been possible in part from grant funding from TDMHSAS to TDH-OIA for an epidemiologist role that is specifically tasked to liaise between the two agencies, and to lead efforts that enhance the rapid turnaround of data analytics related to drug overdose.

Learn more about the TDMHSAS Regional Overdose Prevention Specialists (ROPS) on the next page and at:

<https://www.tn.gov/behavioral-health/substance-abuse-services/prevention/rops.html>

### TDMHSAS Naloxone Distribution in TN

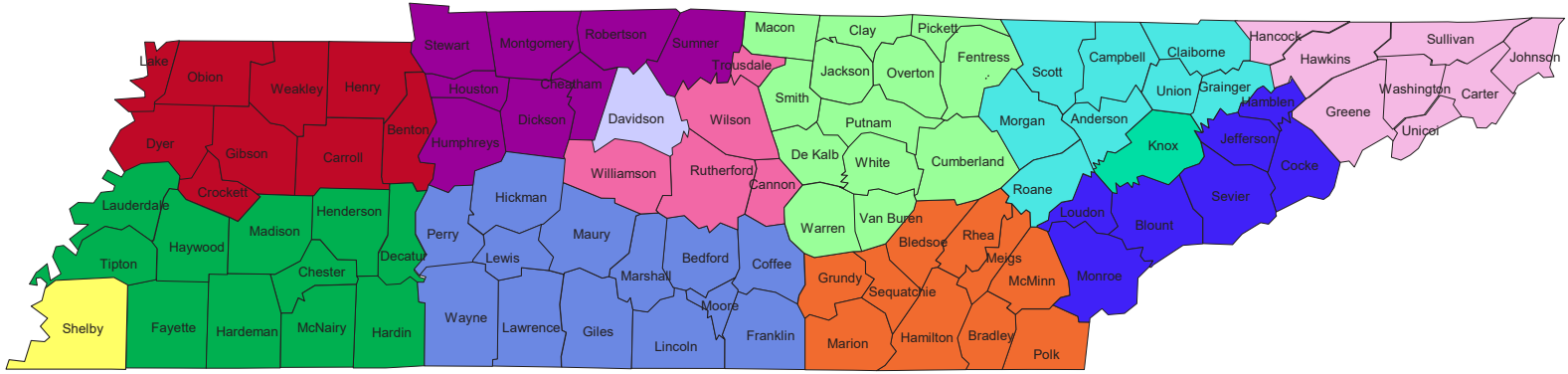


The number of individuals trained to use Naloxone by ROPS is **112,351**.



**TDMHSAS has documented at least 18,551 lives saved because of naloxone distribution.**

## REGIONAL OVERDOSE PREVENTION SPECIALISTS R.O.P.S.



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This pdf can be found online at:

[https://www.tn.gov/content/dam/tn/mentalhealth/documents/ROPS\\_MAP\\_12.1.20.pdf](https://www.tn.gov/content/dam/tn/mentalhealth/documents/ROPS_MAP_12.1.20.pdf)

## Projects with the Tennessee Department of Mental Health and Substance Abuse Services International Overdose Awareness Day (IOAD)

In honor and support of IOAD 2020, OIA collaborated with TDMHSAS and TN Together to release overdose information and community resources the week leading up to IOAD on August 31st. IOAD is recognized around the globe each year with the aim of raising awareness about drug overdose, substance misuse, and to remember those lost to drug overdose. For TDH, TDMHSAS, and TN Together, IOAD provides an opportunity to engage the TN community about overdose prevention and spotlight local organizations and substance abuse prevention coalitions who work within TN communities promoting drug overdose awareness and harm reduction.

On IOAD 2020, several virtual events were held across TN. At the state-level, leaders in TDH (including OIA, ORCO, and the End the Syndemic working group) and TDMHSAS, collaborated to host an online panel discussion focused on the complexity of drug overdose in TN (<https://www.youtube.com/watch?v=kxEx0YxtmkY>). The panel was followed by a statewide virtual Overdose Prevention Training that covered topics including harm reduction strategies, stigma related to substance use disorders, and the administration of naloxone (the opioid overdose reversal medication). In addition to activities on IOAD, OIA worked with TN Together partners to create a webpage dedicated to IOAD content ([www.tntogether.com/ioad/](http://www.tntogether.com/ioad/)).

Challenges due to the COVID-19 pandemic required many IOAD activities to be held virtually or socially distanced, including online candlelight vigils, education fairs, and overdose prevention trainings hosted by the TDMHSAS Regional Overdose Prevention Specialists (ROPS). Many county substance abuse prevention coalitions were creative in coming up with ways to honor the day safely, including the Hamilton County Coalition who used social media and interactive events to raise awareness. One of the coalition's activities included having community members participate in the Purple Sand Challenge (inspired by the Red Sand Project honoring human trafficking victims). In this challenge, community members filled gaps in the sidewalk across Chattanooga with purple sand with each grain of sand representing one of the millions of individuals around the world lost to overdose. Learn more about the Hamilton County Coalition and other local IOAD activities at [www.tntogether.com/success-stories](http://www.tntogether.com/success-stories).

Hamilton County Coalition raised awareness for IOAD 2020 by asking community members to participate in the Purple Sand Challenge. Each grain of sand represents one of the millions of individuals lost to drug overdose across the world.



# Projects with the Tennessee Department of Mental Health and Substance Abuse Services

## 2020 ResilienTN Social Media Campaign

TDMHSAS, TDH, and TN Together (Tennessee Tech University) collaborated to kick off a campaign in December 2020 centered around the risk of drug overdose and suicide during the winter holidays.

### Becoming RESILIENTTN

Preventing Deaths by Suicide and Overdose in Tennessee

#### Know the risks.

Behavioral health experts worry the climate around the COVID-19 pandemic may worsen the rise in overdose traditionally associated with the winter holidays and could also result in increased deaths from suicide.

Learn about the risks by visiting [tntogether.com/resources](http://tntogether.com/resources)



#### Build resiliency through training.

The ResilienTN campaign seeks to empower Tennesseans with tools and knowledge to overcome the personal challenges they face.

Attend trainings and webinars that cover topics like overdose reversal, suicide prevention, and addiction recovery efforts on college campuses.

Find events across the state: [tntogether.com/events](http://tntogether.com/events).

#### Share stories of resilience with others.

What does resiliency mean to you? How have you found ways to cope during these stressful times? Inspire others by sharing your story on social media and using the hashtag #ResilienTN.

Find out how others are combating addiction and reducing stigma by browsing success stories on [tntogether.com](http://tntogether.com).

TN TOGETHER  
ENDING THE CRISIS

TN Department of Mental Health & Substance Abuse Services

TN Department of Health

The campaign, ResilienTN, focused on building resilience and strengthening community connections to prevent the loss of life to overdose and suicide. Through media messaging around overdose and suicide prevention, social media outreach, and virtual trainings and events, the ResilienTN campaign intent was to empower Tennesseans with the tools and knowledge to overcome to the personal challenges they face, watch out for and help those around them, and emerge on the other side stronger than ever.

#### Did You Know?

- In Tennessee (TN) we lose 3 people to suicide each day. #KnowTheSigns
- Suicide is the 3rd leading cause of death in children and youth age 10-24 in TN. #KnowTheSigns
- Parents have the most influence in helping their children learn to cope well in difficult life situations. Even in difficult circumstances, a strong bond between children and parents can mean less risky behaviors.
- From 2017 to 2019, overdose deaths involving prescription pain relievers have decreased while deaths involving illicit drugs (fentanyl, heroin, methamphetamine) have continued to rise.

## Follow Our ResilienTN Partners on social media and learn more about substance abuse and suicide prevention in TN



[tn.gov/behavior-health.html](http://tn.gov/behavior-health.html)  
[Tntogether.com](http://Tntogether.com)



@TNMentalHealthSubstanceAbuseServices  
@TNtogether



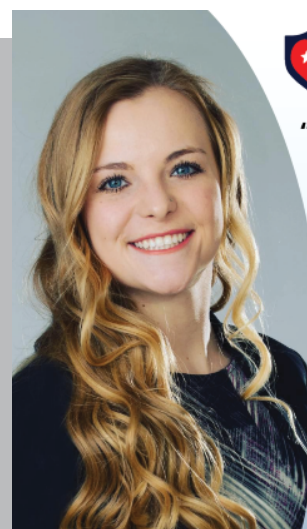
@TDMHSAS  
@Tennesseetogether



**“The beautiful thing about data is it provides that initial talking point.**

It allows people to understand their risk and where they are in a data set, and it provides a really easy opening to turn to a loved one, maybe someone you don't traditionally talk about these things with, and **start that conversation.”**

Kate Durst  
Office of Informatics and Analytics  
TN Department of Health



Connect to resources, trainings, and information at [Tntogether.com](http://Tntogether.com)

# Partnership with You!

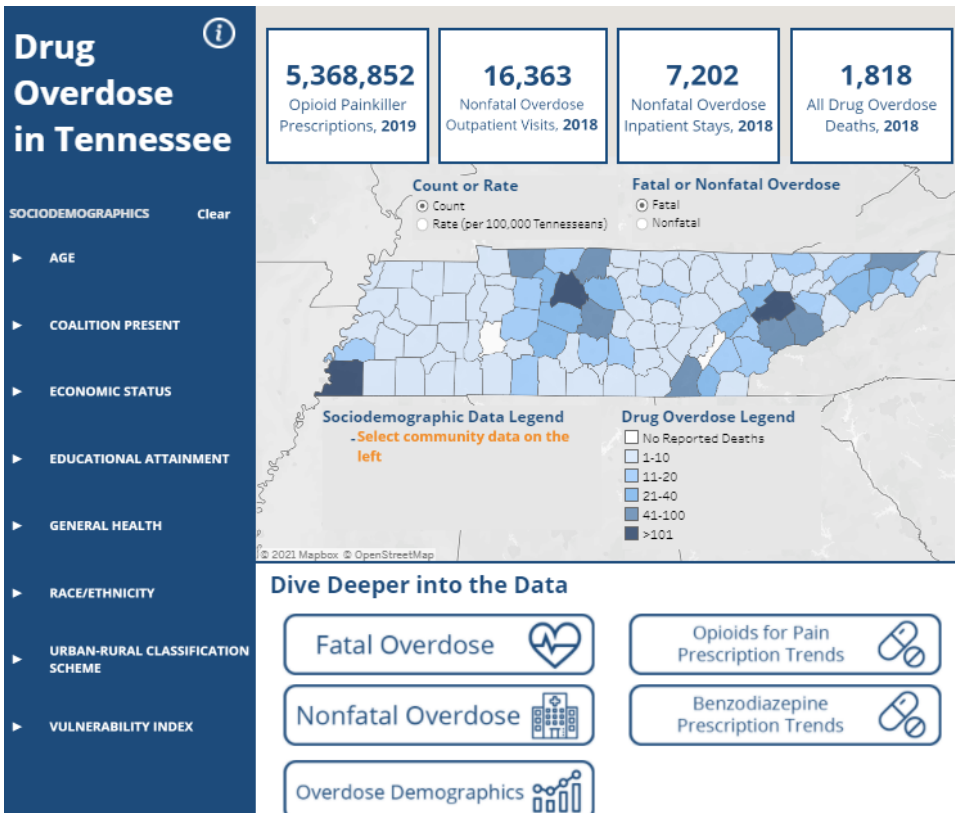
**Numbers count. Every number is a story. Every story is a person.**

One of the key goals in OIA is to translate timely and reliable data to information for a range of audiences, especially YOU, the Tennessean. Drug overdose data and information can be accessed via the TDH website <https://www.tn.gov/health/health-program-areas/pdo.html> with options to access overdose data slide sets, a dynamic drug overdose data dashboard, infographics, and various reports and publications about drug overdose, prescription and illicit drug use, misuse, and abuse in Tennessee.

## Data Dashboard

The Drug Overdose Data Dashboard provides Tennessee county and state level data on fatal and nonfatal drug overdose as well as opioid and benzodiazepine prescribing trends in TN. There have been approximately 13,761 page views of the dashboard's main landing page (January 1, 2020 - December 31, 2020).

The Drug Overdose Data Dashboard was enhanced in 2020 to a savvier and more dynamic user interface. A new landing page was developed to not only illuminate current overdose data but provide additional socio-demographic context about the data to boost user experience and understanding. The 2020 dashboard enhancements have received praise from colleagues in ORCO and other state agencies including TDMHSAS.



The Drug Overdose Data Dashboard is a vital resource for stakeholders and the public who are looking to understand drug overdose and prescribing trends in their county. The information from the dashboard also is used by local communities and coalitions for grant-writing, policy making, and program planning. TN Substance Use Prevention Coalitions (Anti-Drug Coalitions) also receive technical assistance from OIA to learn how to use the dashboard data to drive targeted prevention efforts.

Continued expansion of the Drug Overdose Data Dashboard with new indicators and data visualizations is planned for 2021, including adding buprenorphine prescribing trends, high-risk prescribing behaviors, and more timely nonfatal overdose data reported from the Drug Overdose Reporting (DOR) data system.

# New Hospital Nonfatal Opioid Overdose Monthly Reports

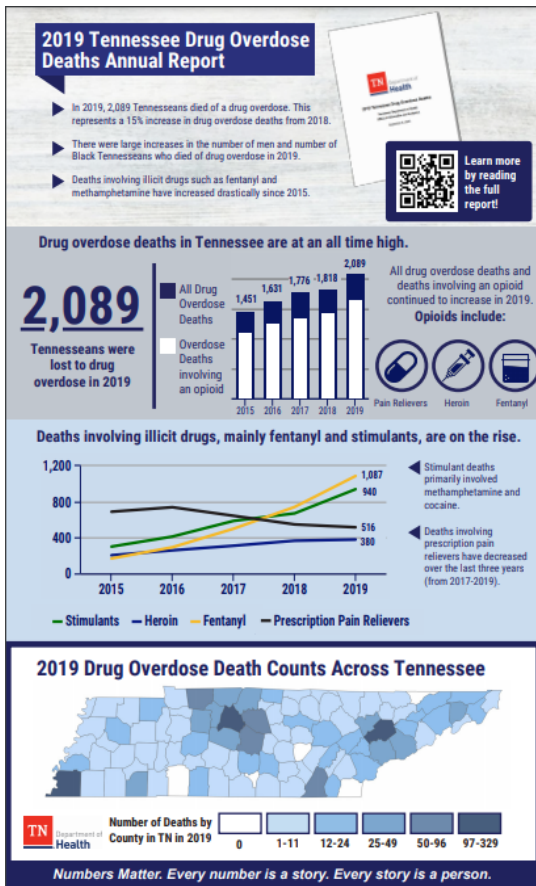
Starting in July 2020, OIA began posting monthly nonfatal opioid overdose reports containing near real time data on opioid overdoses from the preceding month: <https://www.tn.gov/health/health-program-areas/pdo/pdo/facts-figures.html>. Data for this report are from the TDH DOR system. The report includes an opioid overdose timeseries showing monthly trends, the distribution of ages that experienced an opioid overdose, the proportion of heroin to opioid (excluding heroin) overdoses, and maps depicting regional trends. For more information about DOR, please refer to **page 90**.

## Infographics

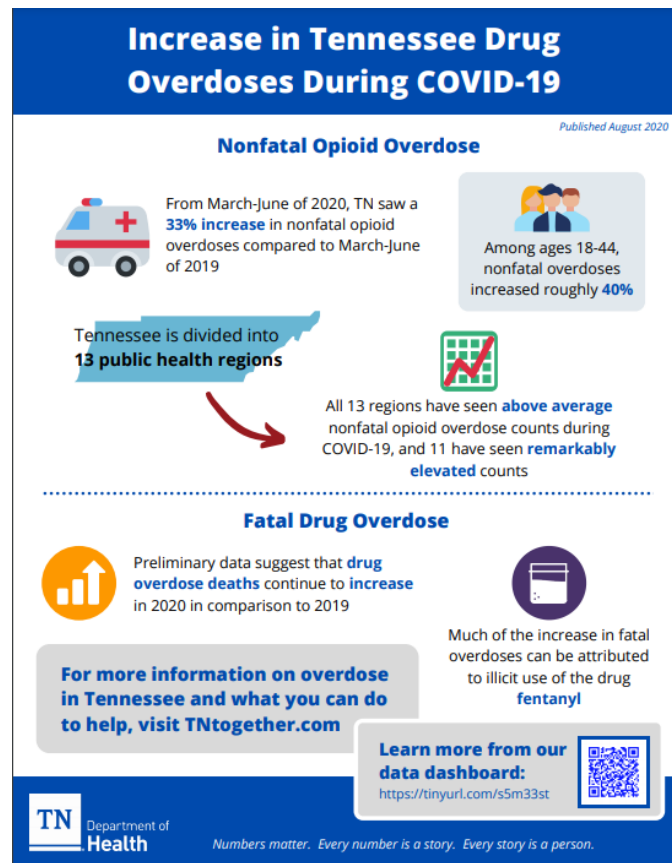
Infographics help break down large amounts of data or information in a way that is easy to comprehend. OIA values developing clear and consumable information for a range of audiences and infographics allow us to reach more people by showing and explaining data simply.

OIA's infographics have been shared with the TDH Office of Communication & Media Relations and disseminated through the official TDH Facebook feed <https://www.facebook.com/TNDeptofHealth/>. It is estimated that the Office of Communication reaches over 130,000 people through their various social media platforms. TDH recognizes and values that providing data and information through various outlets helps people better understand public health issues.

2019 TN Mortality Report Infographic



COVID-19 and Impacts on Drug Overdose in TN Infographic



***“The disruption to daily life due to the COVID-19 pandemic has hit those with substance use disorder hard.”***

**- Dr. Robert Redfield**  
*Former CDC Director (2018-2021)*

# IMPACTS OF COVID-19

This section focuses on overdose trends during the months since the first novel coronavirus disease (COVID-19) was reported by the Tennessee Department of Health (TDH) in Tennessee on March 5, 2020. In addition to highlighting 2020 overdose trends during COVID-19, this section also highlights what TDH is doing to support drug overdose surveillance and prevention efforts. Highlights of this section include:

- In the period from March-December of 2020, nonfatal opioid overdose increased over 23% compared to the same time period in 2019
- Emergency department visits decreased nationwide during the period of COVID-19 likely *underestimating* true number of nonfatal overdoses
- Provisional data suggest drug overdose deaths in 2020 surpassed the total number of drug overdose deaths in 2019





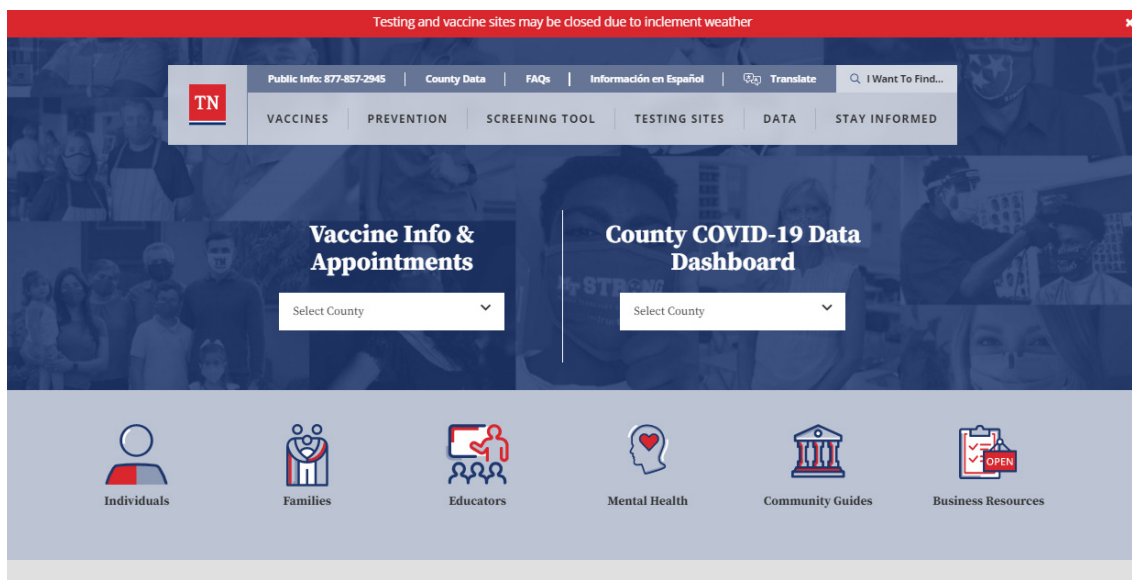
# Introduction

The Centers for Disease Control and Prevention (CDC) published [a news release on December 17, 2020](#) confirming that overdoses across the nation had accelerated during the COVID-19 pandemic. Unfortunately, TN was not exempt from this national trend and also experienced large increases in drug overdoses following the introduction of COVID-19 in the state.

TN experienced increases in drug overdose even before the COVID-19 pandemic. From 2015 to 2019 all drug overdose deaths increased 44%. Drugs like synthetic opioids, including the powerful drug fentanyl, have driven the rise in fatal overdoses, as have psychostimulants (a category that includes methamphetamine). Fentanyl overdose deaths increased over 500% during this five-year period. Additionally, now more than ever, an increasing number of both fatal and nonfatal overdoses are involve polydrug or polysubstance use (exposure to multiple drugs).

Public health surveillance data from TDH show both fatal and nonfatal drug overdoses have increased markedly during the pandemic. Provisional fatal drug overdose data indicate that fatal overdoses in 2020 exceeded those in 2019. Over 1,500 more nonfatal opioid overdoses were reported to TDH's Drug Overdose Reporting (DOR) system in 2020 than in 2019. Notably, data indicate ED visits have decreased nationwide during COVID-19 thus our nonfatal overdose surveillance data likely underestimate the number of nonfatal overdoses.<sup>97</sup>

## Learn more about COVID-19 through TN's COVID-19 website



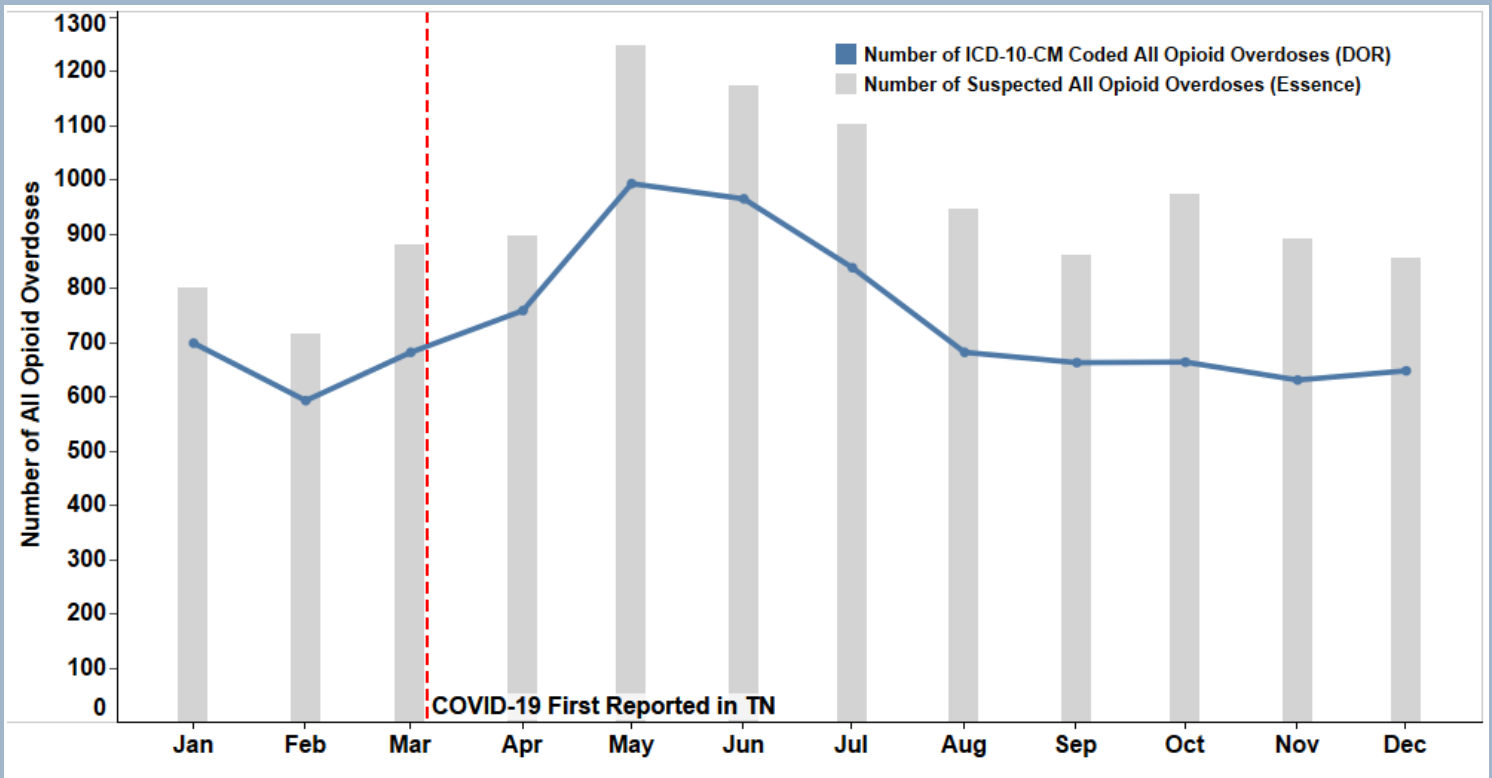
<sup>97</sup> CDC. (2020). Suspected Nonfatal Drug Overdoses during COVID-19. Retrieved from: <https://www.cdc.gov/drugoverdose/data/nonfatal/states/covid-19.html>

# Impact on Nonfatal Overdose

Opioid overdoses reported to the DOR data system that captures hospital reported IDC-10-CM coded nonfatal opioid overdoses from 118 facilities across TN showed a 22% increase in opioid overdoses from 2019 to 2020. Nonfatal drug overdoses reported to ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics), a system that captures suspected nonfatal overdoses from 105 emergency departments across TN, showed a similar trend. All opioid overdoses increased markedly during the months of May, June, and July coinciding with the initial months of COVID-19 in TN.

For more information about DOR hospital reported nonfatal opioid overdose reports (posted monthly) see <https://www.tn.gov/health/health-program-areas/pdo/pdo/facts-figures.html>. For more information on the similarities and differences between TDH's drug overdose surveillance systems refer to page 60 of the report).

## Number of Hospital Reported ICD-10-CM coded All Opioid Overdoses (from DOR) and Suspected All Opioid Overdoses (from ESSENCE) by Month in TN, 2020

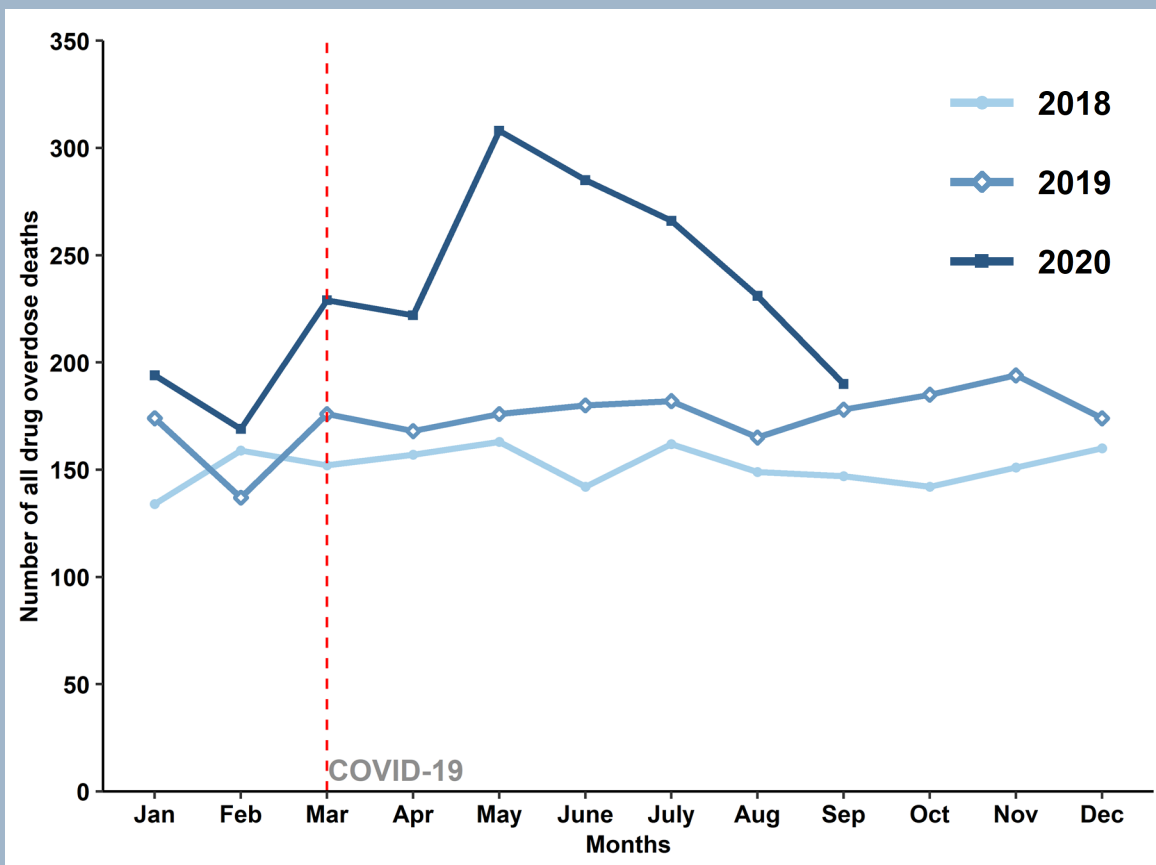


Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities. Data Source: Drug Overdose Reporting (DOR) System, ESSENCE (Electronic Surveillance System for the Early Notification of Community based Epidemics).

# Impact on Fatal Overdose

TN has experienced an increasing overall trend in fatal overdoses in 2020 compared to 2019 and 2018. The number of overdose deaths from January to September 2020 had already surpassed the total number in 2019. Fatal overdoses follow the same trend as non-fatal overdoses with a peak in May. **Please note in the plot below 2020 data are provisional and may change in the finalized version. Data for October through December 2020 were not available at the time of writing this report.**

## Number of Provisional All Drug Overdose Deaths by Months in TN, 2020



Analysis by the Office of Informatics and Analytics, TDH (last updated February 18, 2021). Limited to TN hospitals/facilities.  
Data Source: TN Death Statistical File.

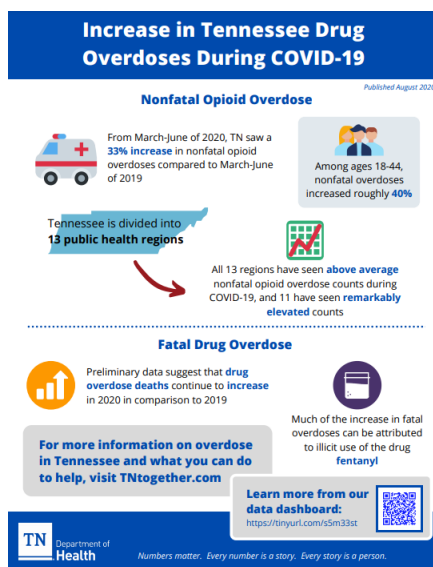
# TDH Responds to COVID-19

## What the Tennessee Department of Health is Doing

- Using data from TDH public health surveillance systems to monitor overdose trends and detect increases
- Coordinating with state and local agency partners to disseminate data and information on local overdose trends
- Collaborating to reduce harms associated with illicit opioids including scaling up of HIV and hepatitis C virus testing within community-based organizations as well approval of additional syringe service programs in areas that are currently underserved.
- Strengthening relationships within TDH and the Department of Mental Health and Substance Abuse Services to use data that informs drug overdose prevention and public health messaging

## TDH Recommendations for What You Can Do

- Learn about [naloxone](#) and how to use it (learn about the [ROPS](#), page 176)
- [Join an Anti-Drug Coalition](#) in your community to help expand overdose prevention and education
- Call or text the [Tennessee REDLINE](#) at 1-800-889-9789 if you or someone you care for is in need of substance use treatment
- Stay up to date with the latest from TDH-OIA
  - Read the [DOR hospital reported nonfatal opioid overdose](#) reports for the latest data
  - Check out the infographic focused on the Increase in TN Drug Overdoses During COVID-19 (the link is below and the infographic is also on the following page)



[Check out the latest TDH-OIA Infographic](#)

# Increase in Tennessee Drug Overdoses During COVID-19

Published August 2020

## Nonfatal Opioid Overdose



From March-June of 2020, TN saw a **33% increase** in nonfatal opioid overdoses compared to March-June of 2019



Among ages 18-44, nonfatal overdoses increased roughly **40%**

Tennessee is divided into **13 public health regions**



All 13 regions have seen **above average** nonfatal opioid overdose counts during COVID-19, and 11 have seen **remarkably elevated** counts

## Fatal Drug Overdose



Preliminary data suggest that **drug overdose deaths** continue to **increase** in 2020 in comparison to 2019



Much of the increase in fatal overdoses can be attributed to illicit use of the drug **fentanyl**

**For more information on overdose in Tennessee and what you can do to help, visit [TNtogether.com](https://tntogether.com)**

**Learn more from our data dashboard:**

<https://tinyurl.com/s5m33st>



**Learn more about  
OIA's Overdose  
Indicators,  
Technical Notes,  
and Publications**

# APPENDIX

**Appendix A: Data Requests and Available Health Indicators for Overdose Mortality, Morbidity, and Opioid-Related Prescribing (pg 189)**

**Appendix B: Technical Notes**

**B1: TN Drug Overdose Deaths (pg 192)**

**B2: State Unintentional Drug Overdose Reporting System (SUDORS) (pg 196)**

**B3: TN Nonfatal Drug Overdose Hospital Discharge (pg 198)**

**B4: TN Drug Overdose Reporting System (DOR) (pg 202)**

**B5: TN Drug Overdose Surveillance and Epidemiology (DOSE) (pg 205)**

**B6: Cost of Hospital-Treated Nonfatal Overdose (pg 206)**

**B7: TN Opioid Prescriptions (pg 208)**

**Appendix C: List of OIA Journal Publications (pg 213)**

**Appendix D: Supplemental Materials (pg 214)**



## Appendix A: Data Requests and Available Health Indicators for Overdose Mortality, Morbidity and Opioid-Related Prescribing

The Office of Informatics and Analytics provides a number of overdose and prescription data resources for official, public, and research use. In addition to this report, we host a number of reports on our facts and figures page at <https://www.tn.gov/health/health-program-areas/pdo/pdo/facts-figures.html>. Additional data can be found on the TDH Overdose Data Dashboard: <https://www.tn.gov/health/health-program-areas/pdo/pdo/data-dashboard.html>.

If the data you are looking for is not available at one of these locations, here is the link for the TDH data request form: <https://www.surveygizmo.com/s3/5819792/TDH-Data-Request-Form>. The TDH data request system is a service of the Data Governance unit of the Office of Informatics and Analytics. Once a request is submitted, it is routed to the appropriate data steward or committee for approval. Once approved, most data requests can be fulfilled within a month, but many requests for preexisting data can be fulfilled faster. The following tables list overdose mortality, overdose morbidity, and prescription indicators that are readily available and can generally be released quickly. Requests for other data will be considered, but may be subject to federal law, state law, or department policy that restricts their use. These requests may also take longer to fulfill.

Mortality Indicators
Data Source: TN Death Statistical File
Availability: Annually
Latest Available Data: 2019
Stratification: Age, Race, Sex
Geographic Level: TN, Region, County
Types: Count, Crude and Age-Adjusted Rates per 100,000 TN residents
Indicator
1. All Drug Overdose Deaths
2. Overdose Deaths Involving All Opioids
3. Overdose Deaths Involving Natural, Semi-synthetic and Synthetic Opioids
4. Overdose Deaths Involving Natural and Semi-synthetic Opioids and methadone
5. Overdose Deaths Involving Natural and Semi-synthetic Opioids
6. Overdose Deaths Involving Synthetic Opioids Other than Methadone
7. Overdose Deaths Involving Methadone
8. Overdose Deaths Involving Heroin
9. Overdose Deaths Involving Fentanyl
10. Overdose Deaths Involving Buprenorphine
11. Overdose Deaths Involving Polysubstance Use
12. Overdose Deaths Involving Cocaine
13. Overdose Deaths Involving Stimulants (Other than Cocaine)
14. Overdose Deaths Involving Any Stimulant (Cocaine and other stimulants)
15. Overdose Deaths Involving Benzodiazepines
16. Overdose Deaths Involving Opioids and Benzodiazepines
17. Overdose Deaths Involving All Opioids and All Stimulants
18. Overdose Deaths Involving All Opioids and Stimulants (Other than Cocaine)
19. Overdose Deaths involving All Opioids and Cocaine

**Morbidity Indicators**

Data Source: TN Hospital Discharge Data System

Availability: Annually

Latest Available Data: 2019

Stratification: Age, Race, Sex

Geographic Level: TN, Region, County

Types: Count, Crude and Age-Adjusted Rates per 100,000 TN residents

**Indicator**

1. Emergency Department Visits for All Drug Overdoses
2. Emergency Department Visits Involving All Opioid Overdoses Excluding Heroin
3. Emergency Department Visits Involving Heroin Overdose
4. Emergency Department Visits Involving Synthetic Opioid Overdose
5. Emergency Department Visits Involving All Stimulant Overdoses (Excluding Caffeine)
6. Emergency Department Visits Involving Cocaine Overdose
7. Emergency Department Visits Involving Amphetamine Overdose
8. Emergency Department Visits Involving Benzodiazepine Overdose
9. Inpatient Hospitalizations for All Drug Overdose
10. Inpatient Hospitalizations Involving All Opioid Overdoses, Excluding Heroin
11. Inpatient Hospitalizations Involving Heroin Overdose
12. Inpatient Hospitalizations Involving Synthetic Opioid Overdose
13. Inpatient Hospitalizations Involving All Stimulant Overdoses (Excluding Caffeine)
14. Inpatient Hospitalizations Involving Cocaine Overdose
15. Inpatient Hospitalizations Involving Amphetamine Overdose
16. Inpatient Hospitalizations Involving Benzodiazepine Overdose
17. Outpatient Visits for All Drug Overdoses
18. Outpatient Visits Involving All Opioid Overdoses Excluding Heroin
19. Outpatient Visits Involving Heroin Overdose
20. Outpatient Visits Involving Synthetic Opioid Overdose
21. Outpatient Visits Involving All Stimulant Overdoses (Excluding Caffeine)
22. Outpatient Visits Involving Cocaine Overdose
23. Outpatient Visits Involving Amphetamine Overdose
24. Outpatient Visits Involving Benzodiazepine Overdose



Prescription Indicators

Data Source: TN Controlled Substances Monitoring Database

Availability: Daily

Latest Available Data: 2020

Stratification: Age, Sex

Geographic Level: TN, Region, County

**Indicator**

1. Opioid Prescriptions for Pain Filled Overall and by Drug, number and crude rate per 1,000 TN residents
2. Patients Filling Opioid Prescriptions for Pain, number and crude rate per 1,000 TN residents
3. Buprenorphine Prescriptions for Medication-Assisted Treatment, number and crude rate per 1,000 TN residents
4. Patients Filling Buprenorphine Prescriptions for Medication-Assisted Treatment, number and crude rate per 1,000 TN residents
5. Benzodiazepine Prescriptions Filled Overall and by Drug, number and crude rate per 1,000 TN residents
6. Patients Filling Benzodiazepine Prescriptions, number and crude rate per 1,000 TN residents
7. Gabapentin Prescriptions Filled Overall and by Drug, number and crude rate per 1,000 TN residents
8. Patients Filling Gabapentin Prescriptions, number and crude rate per 1,000 TN residents
9. Percent of Patients Filling Prescriptions of Opioids for Pain of More than 90 or 120 Daily Morphine Milligram Equivalents (MME)
10. Multiple Provider Episodes, number and rate per 100,000 residents
11. Total MME for Opioids for Pain, number and crude rate per capita
12. Percent of Patients Prescribed Long-Acting/Extended Release Opioids who Were Opioid-Naïve for at Least 60 Days
13. Percent of Patient Prescription Days with Overlapping Opioid Prescriptions
14. Percent of Patients with Concurrent Opioid and Benzodiazepine Prescriptions Overlapping at Least 2 Days

## Appendix B: Technical Notes

### B1. Technical Notes: Tennessee Drug Overdose Deaths Indicator

Indicators	Drug Overdose Deaths in Tennessee, 2015-2019
<b>Measures</b>	<ol style="list-style-type: none"> <li>1. [Table] Death Certificate Quality Indicators for Cause of Death Information, page 20</li> <li>2. [Table] Drug Overdose Deaths by Intentionality, page 22</li> <li>3. Age-Adjusted Rates for All Drug Overdose Deaths by Sex and Race in TN, page 23</li> <li>4. Opioids, Benzodiazepines, and Stimulants Present in All Drug Overdoses in TN, page 24</li> <li>5. [Table] Polysubstance Overdose Counts by Class Type, page 25-26</li> <li>6. [Table] Poly Substance Overdose Counts by Common Drug Type in TN, page 27</li> <li>7. Age-Adjusted Rates for Opioid Overdose Deaths in TN, page 29</li> <li>8. Age-specific Rates of All Opioid Overdose Deaths in TN, page 30</li> <li>9. Age-Adjusted Rates for All Opioid Overdose Deaths by Race and Sex in TN, page 31</li> <li>10. [Map] Change in Number of Opioid Drug Overdose Deaths by TN County of Residence, 2018-2019, page 32-33</li> <li>11. Age-specific Rates of Prescription Opioid Overdose Deaths in TN, page 34</li> <li>12. Age-Adjusted Rates for Prescription Opioid Overdose Deaths by Race and Sex in TN, page 35</li> <li>13. [Map] Change in the Number of Prescription Opioid Overdose Deaths by TN County of Residence, 2018-2019, page 36-37</li> <li>14. Age-specific Rates of Heroin Overdose Deaths in TN, page 38</li> <li>15. Age-Adjusted Rates for Heroin Overdose Deaths by Race and Sex in TN, page 39</li> <li>16. [Map] Change in Number of Heroin Overdose Deaths by TN County of Residence, 2018-2019, page 40-41</li> <li>17. Age-specific Rates of Fentanyl Overdose Deaths in TN, page 42</li> <li>18. Age-Adjusted Rates for Fentanyl Overdose Deaths by Race and Sex in TN, page 43</li> <li>19. [Map] Change in Number of Fentanyl Overdose Deaths by TN County of Residence, 2018-2019, page 44-45</li> <li>20. Age-Adjusted Rates for Stimulant Overdose Deaths in TN, page 46</li> <li>21. Age-Specific Rates for All Stimulant Overdose Deaths in TN, page 47</li> <li>22. Age-Adjusted Rates for Stimulant Overdose Deaths by Race and Sex in TN, page 48</li> <li>23. [Map] Change in Number of Stimulant Overdose Deaths by TN County of Residence, 2018-2019, page 49-50</li> </ol>
<b>Definition of Measures</b>	<p>Overdose deaths are determined by International Classification of Disease, 10th Revision (ICD10) codes listed as the underlying cause of death in the Death Statistical File. These codes are created by the National Center for Health Statistics from the cause of death text fields on death certificates. Contributing substances are generally determined by ICD10 codes in the multiple cause of death fields in the statistical file. Some causes of death cannot be determined by these codes and instead are derived from the cause of death text entered on the death certificate. Relevant ICD10 codes or literal text searches are listed below.</p>

## Definition of Measures

**All Drug Overdose** – underlying cause of death code falls in one of the following ranges:

- X40-X44 (Accidental poisoning by drugs)
- X60-X64 (Intentional self-poisoning by drugs)
- X85 (Assault by drug poisoning)
- Y10-Y14 (Drug poisoning of undetermined intent)

**All Opioid Overdose** – Meets all drug overdose criteria and contains at least one of the following codes as a contributing cause of death:

- T40.0 (Acute poisoning by opium)
- T40.1 (Acute poisoning by heroin)
- T40.2 (Acute poisoning by natural or semi-synthetic opioids)
- T40.3 (Acute poisoning by methadone)
- T40.4 (Acute poisoning by synthetic opioids other than methadone)
- T40.6 (Acute poisoning by other or unspecified narcotics)

**Prescription Opioid Overdose** – Meets all drug overdose criteria and contains at least one of the following codes as a contributing cause of death:

- T40.2 (Acute poisoning by natural or semi-synthetic opioids)
- T40.3 (Acute poisoning by methadone)

**Heroin** – Meets all drug overdose criteria and contains the following code as a contributing cause of death:

- T40.1 (Acute poisoning by heroin)

**Fentanyl** – Meets all drug overdose criteria and contains text 'FENTAN' OR 'FANTAN' OR 'FENTA' in written cause of death on certificate

**Buprenorphine** – Meets all drug overdose criteria and contains text 'BUPRE' OR 'NORPH' OR 'BIPRE' OR 'SUBOXONE' in written cause of death on certificate

**Opioids and Benzodiazepines** – Meets all opioid overdose criteria and contains the following code as a contributing cause of death:

- T42.4 (Acute poisoning by benzodiazepines)

**Cocaine** – Meets all drug overdose criteria and

- T40.5 (Acute poisoning by cocaine)

**Other stimulant** – Meets all drug overdose criteria and

- T43.6 (Acute poisoning by psychostimulants)

**Polydrug Overdose Deaths** – Meets all drug overdose criteria and contains codes in more than one drug overdose class (opioid, benzodiazepine, muscle relaxant, other stimulant including methamphetamine, cocaine). Numbers are mutually exclusive.

<b>Definition of Measures</b>	<p><b>Opioid:</b></p> <ul style="list-style-type: none"> <li>• T40.0 (Acute poisoning by opium)</li> <li>• T40.1 (Acute poisoning by heroin)</li> <li>• T40.2 (Acute poisoning by natural or semi-synthetic opioids)</li> <li>• T40.3 (Acute poisoning by methadone)</li> <li>• T40.4 (Acute poisoning by synthetic opioids other than methadone)</li> <li>• T40.6 (Acute poisoning by other or unspecified narcotics)</li> <li>• text 'FENTAN' OR 'FANTAN' OR 'FENTA' in written cause of death on certificate</li> <li>• text 'BUPRE' OR 'NORPH' OR 'BIPRE' OR 'SUBOXONE' in written cause of death on certificate</li> </ul> <p><b>Benzodiazepine</b></p> <ul style="list-style-type: none"> <li>• T42.4 (Acute poisoning by benzodiazepines)</li> </ul> <p><b>Muscle Relaxant</b></p> <ul style="list-style-type: none"> <li>• T48.1 (Acute poisoning by muscle relaxant)</li> </ul> <p><b>Any Stimulant</b></p> <ul style="list-style-type: none"> <li>• T43.6 (Acute poisoning by stimulant) OR</li> <li>• T40.5 (Acute poisoning by cocaine)</li> </ul> <p><b>Age/Race/Sex stratification</b></p> <ul style="list-style-type: none"> <li>• Age is determined according to date of birth and date of death.</li> <li>• Race and sex are reported on the death certificate.</li> <li>• Due to low numbers, decedents of unknown race, Native American, Alaskan Native, Asian or Pacific Islander or listed as unknown are not included in figures.</li> </ul> <p>The denominator for all rates is the state or county population in 100,000s. Age-adjustment is used for all fatal overdose rates except for those stratified by age. Age-adjusted rates were calculated using 2000 US standard population for age-adjustment. The rate for a specific age group in a given population was multiplied by the proportion of people in the same age group in the 2000 U.S. standard population; adding across age groups yields the final age-adjusted rate.</p> <p>Percent change is calculated using the following formula: (most recent number - earliest number)/earliest number) X 100. Percent change values should be interpreted with the caveat that the absolute change may be small, but the percent change value may be large. For example, a change from 1 death to 2 deaths is an absolute change of 1 overdose death, but a percent change of 100%. Alternatively, a change from 130 overdose deaths to 197 is an absolute change of 67 overdose deaths, but only a percent change of 51.5%.</p>
<b>Geographic Scale</b>	Tennessee — Statewide, County
<b>Time Period</b>	2015-2019

<b>Inclusion/ Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• Only Tennessee residents were considered</li> <li>• Tennessee residents who died of an overdose out of state are included</li> <li>• Includes only deaths determined to have been caused by acute poisonings</li> </ul>
<b>Data Sources</b>	<ul style="list-style-type: none"> <li>• Tennessee Death Statistical File, 2015-2019</li> <li>• Population data for 2015-2019 was obtained from CDC Wonder bridged race populations estimates. The vintage year of the populations corresponds to the year of the indicator. (See <a href="http://wonder.cdc.gov/bridged-race-population.html">http://wonder.cdc.gov/bridged-race-population.html</a> for more details).</li> </ul>
<b>General Limitations of the Measures</b>	<ul style="list-style-type: none"> <li>• Any indicator that relies on literal text for calculation is limited in cases where drug types are not reported on the certificate. In particular, death records of TN residents that occur out-of-state may not include cause of death text; literal text indicators cannot be determined for these deaths.</li> <li>• Determination of overdose deaths often requires autopsies and toxicology testing that is dependent on a county's resources and ability to conduct such investigations. Although a drug death may be suspected, it may not be entered as such on the death certificate and therefore cannot be coded with certainty by NCHS. Drug deaths that are coded with ICD10 code R99 (other ill-defined and unspecified causes of mortality) do not contribute to the counts. Deaths involving drugs that are not given the underlying cause of death codes for drug overdose by NCHS also do not contribute to overdose counts.</li> </ul>

## B2. Technical Notes: State Unintentional Drug Overdose Reporting System (SUDORS)

Indicators	State Unintentional Drug Overdose Reporting System (SUDORS) Drug Overdose Deaths in Tennessee, 2019
<b>Measures</b>	<ol style="list-style-type: none"> <li>1. [Table] Demographic Characteristics of SUDORS Drug Overdose Deaths in TN, 2019, page 53</li> <li>2. Major Drug Classes Involved in SUDORS Drug Overdose Deaths in TN, 2019, page 54</li> <li>3. [Table] Substances Identified in Toxicology Report or Cause of Death of SUDORS Cases in TN, 2019, page 55</li> </ol>
<b>Definition of Measures</b>	<p>SUDORS cases include all drug-related overdose deaths of an unintentional or undetermined intent. Initially, cases are identified using combined cause of death ICD-10 codes as well as text search of cause of death drug terms to generate a list of potential drug overdose deaths from the Vital Records Information System Management (VRISM) database. Relevant underlying cause of death ICD-10 codes are listed below.</p> <ul style="list-style-type: none"> <li>• AX40-X44 (Accidental poisoning by drugs)</li> <li>• Y10-Y14 (Drug poisoning of undetermined intent)</li> <li>• T36-T50 (Poisoning by drugs, medications, and biologic substances)</li> </ul> <p>Autopsy and reports of investigation (ROI) are requested from the Office of the State Chief Medical Examiner (OSCME) and used along with ICD-10 codes to verify the fatal cases meet the SUDORS case definition:</p> <p>A drug overdose of any age, where the death certificate and/or the coroner or medical examiner report indicates that acute drug toxicity directly caused the death OR below.</p> <ul style="list-style-type: none"> <li>• In the absence of coroner/medical examiner (CME) report, death certificate ICD-10 codes and/or literal cause of death text, and/or law enforcement reports can be used to determine if a case meets the definition AND</li> <li>• The drug meets the Council of State and Territorial Epidemiologists (CSTE) definition of a drug which specifically excludes inhalants, tobacco, and deaths where only alcohol caused the death AND</li> <li>• The manner of death is unintentional/accidental or undetermined AND</li> <li>• Jurisdictions are responsible for all deaths that occurred (in this case TN) in that regardless of decedent residence or injury location</li> </ul> <p>Demographic characteristics include decedent's age, sex, race, marital status, education, and state of residence.</p> <ul style="list-style-type: none"> <li>• Age is determined according to date of birth and date of death.</li> <li>• Race, sex, marital status, education, and state of residence are reported on the death certificate.</li> <li>• Due to low numbers, decedents of unknown race, Native American, Alaskan Native, Asian or Pacific Islander or listed as unknown are not included in figures.</li> </ul>

<b>Definition of Measures</b>	<p>Major drug classes involved in SUDORS drug overdose deaths include classes of substances identified in toxicology reports. More than one substance can appear in a single toxicology report, and each of these substances may or may not be identified as having contributed to cause of death.</p> <p>SUDORS information is reported to Centers for Disease Control and Prevention (CDC) through the National Violent Death Reporting System (NVDRS).</p>
<b>Geographic Scale</b>	<p>Tennessee — Statewide</p>
<b>Time Period</b>	<p>2019</p>
<b>Inclusion/ Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• SUDORS includes deaths that occurred in Tennessee regardless of the decedent’s residence.</li> <li>• Only overdose deaths of unintentional (accidental) or undetermined intent are included in SUDORS.</li> </ul>
<b>Data Sources</b>	<ul style="list-style-type: none"> <li>• Vital Records Information System Management (VRISM)</li> <li>• Reports of investigation</li> <li>• Autopsy reports</li> <li>• Toxicology reports</li> <li>• Controlled Substance Monitoring Database (CSMD)</li> </ul>
<b>General Limitations of the Measures</b>	<ul style="list-style-type: none"> <li>• Determination of overdose deaths often requires autopsies and toxicology testing that is dependent on a county’s resources and ability to conduct such investigations. Although a drug death may be suspected, it may not be entered as such on the death certificate.</li> <li>• Because toxicology reports are not available for all SUDORS cases, some decedents are not included in analyses of toxicology data.</li> </ul>

## B3. Technical Notes: Tennessee Nonfatal Drug Overdose Hospital Discharge Indicators

Indicators	Drug Overdose Outpatient Visits and Inpatient Stays Rates in TN, 2016-2019
<b>Measures</b>	<ol style="list-style-type: none"> <li>1. Age-Adjusted Rates for All Drug Overdose Outpatient Visits by Sex and Race in TN during 2016-2019, page 62-63</li> <li>2. Age-Adjusted Rates for All Drug Overdose Inpatient Stays by Sex and Race in TN during 2016-2019, page 64-65</li> <li>3. [Table] History of Nonfatal Overdose Outpatient Visits or Inpatient Stays in the Year before Death among 2019 Drug Overdose Decedents in TN, page 66</li> <li>4. Age-Adjusted Rates for Heroin, Opioid Excluding Heroin, and Stimulant Overdose Outpatient Visits and Inpatient Stays in TN, during 2016-2019, page 67</li> <li>5. Age-Adjusted Rates for Overdose related Outpatient Visits by Sex and Drug in TN, during 2016-2019, page 68</li> <li>6. Age-Adjusted Rates of Overdose Related Outpatient Stays by Race and Drug Type in TN, during 2016-2019, page 69</li> <li>7. Age-Adjusted Rates of Overdose Related Inpatient Visits by Sex and Type of Drug in TN, during 2016-2019, page 70</li> <li>8. Age-Adjusted Rates of Overdose Related Inpatient Stays by Race and Drug in TN, during 2016-2019, page 71</li> <li>9. Age-Specific Rates for Opioid (Excluding Heroin) Overdose Outpatient Visits and Inpatient Stays by Age Groups in TN by Year, 2016-2019, page 72-73</li> <li>10. [Map] Change in Number of Opioid Overdoses Excluding Heroin Outpatient Visits from 2018 to 2019 by TN County of Residence, page 74-75</li> <li>11. [Map] Change in Number of Opioid Overdose Excluding Heroin Inpatient Stays from 2018 to 2019 by TN County of Residence, page 76-77</li> <li>12. Age-Specific Rates for Heroin Overdose Outpatient Visits and Inpatient Stays by Age Groups in TN by Year, 2016-2019, page 78-79</li> <li>13. [Map] Change in Number of Heroin Overdose Outpatient Visits from 2018 to 2019 by TN County of Residence, page 80-81</li> <li>14. [Map] Change in Number of Heroin Overdose Inpatient Stays from 2018 to 2019 by TN County of Residence, page 82-83</li> <li>15. Age-Specific Rates for Stimulant Overdose Outpatient Visits and Inpatient Stays by Age Groups in TN by Year, 2016-2019, page 84-85</li> <li>16. [Map] Change in Number of Stimulant Overdose (excluding caffeine) Outpatient Visits from 2018 to 2019 by TN County of Residence, page 86-87</li> <li>17. [Map] Change in Number of Stimulant Overdose (excluding caffeine) Inpatient Stays from 2018 to 2019 by TN County of Residence, page 88-89</li> </ol>
<b>Definition of Measures</b>	<p>Inpatient stays are inpatient hospitalizations generally lasting longer than 24 hours while outpatient visits are those less than 24 hours. Outpatient visits include primarily emergency department visits, but also include any observation 23 hours or less, ambulatory surgeries or certain diagnostic services (such as MRIs or CT scans).</p>



<b>Definition of Measures</b>	<p>Overdose is determined by the International Classification of Disease 10th Revision, Clinical Modification (ICD-10-CM) codes. Tennessee’s Hospital Discharge Data System (HDDS) includes up to 18 diagnosis fields and three fields for external causes of injury codes (abbreviated as e-codes). Relevant codes for each revision are listed for each drug indicator definition below.</p> <p><b>Counts (numerator) or age-adjusted rates (numerator/denominator) definitions for all drug overdose outpatient visits and inpatient stays</b></p> <ul style="list-style-type: none"> <li>• <i>Numerator</i> – count of outpatient visits or inpatient stays caused by acute poisonings due to the effects of drugs, regardless of intent: <ul style="list-style-type: none"> <li>○ Identified as records including the following ICD-10-CM codes: <ul style="list-style-type: none"> <li>▪ T36-T50 (poisoning by drugs, medicaments, and biological substances) with intent codes 1-4 (accidental, intentional, assault, or undetermined) and encounter code A (initial encounter) or missing (not subsequent encounter or a sequela)</li> </ul> </li> </ul> </li> <li>• For rates: <ul style="list-style-type: none"> <li>○ <i>Denominator</i>- Yearly state/region/county population in 100,000s</li> </ul> </li> </ul> <p><b>Counts (numerator) or age-adjusted rates (numerator/denominator) definitions for opioid overdose excluding heroin outpatient visits and inpatient stays</b></p> <ul style="list-style-type: none"> <li>• <i>Numerator</i>- count of outpatient visits or inpatient stays caused by acute poisonings due to the effects of all opioids excluding heroin, regardless of intent <ul style="list-style-type: none"> <li>○ Identified as records including the following ICD-10-CM codes: <ul style="list-style-type: none"> <li>▪ Inclusions: Any mention of diagnosis codes: <ul style="list-style-type: none"> <li>– T40.0X (poisoning by opium)</li> <li>– T40.2X (poisoning by other opioids)</li> <li>– T40.3X (poisoning by methadone)</li> <li>– T40.4X (poisoning by synthetic narcotics)</li> <li>– T40.60 (poisoning by unspecified narcotics)</li> <li>– or T40.69 (poisoning by other narcotics) with intent codes 1-4 (accidental, intentional, assault, or undetermined) and encounter code A (initial encounter) or missing (not subsequent encounter or a sequela)</li> </ul> </li> <li>▪ Exclusions: T40.1X (poisoning by heroin), any intent/any encounter type</li> </ul> </li> </ul> </li> <li>• For Rates: <ul style="list-style-type: none"> <li>○ <i>Denominator</i>- Yearly state/region/county population in 100,000s</li> </ul> </li> </ul> <p><b>Counts (numerator) or age-adjusted rates (numerator/denominator) definitions for heroin overdose outpatient visits and inpatient stays</b></p> <ul style="list-style-type: none"> <li>• <i>Numerator</i>- count of outpatient visits or inpatient stays caused by acute poisonings due to the effects of heroin, regardless of intent <ul style="list-style-type: none"> <li>○ Identified as records including the following ICD-10-CM codes: <ul style="list-style-type: none"> <li>▪ T40.1X(poisoning by heroin) with intent codes 1-4 (accidental, intentional, assault, or undetermined) and encounter code A (initial encounter) or missing (not subsequent encounter or a sequela)</li> </ul> </li> </ul> </li> <li>• For rates: <ul style="list-style-type: none"> <li>○ <i>Denominator</i>- Yearly state/region/county population in 100,000s</li> </ul> </li> </ul>
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<b>Definition of Measures</b>	<p><b>Counts (numerator) or age-adjusted rates (numerator/denominator) definitions for all stimulant overdose (excluding caffeine) outpatient visits and inpatient stays</b></p> <ul style="list-style-type: none"> <li>• <i>Numerator</i>- count of outpatient visits or inpatient stays caused by acute poisonings due to the effects of stimulants (excluding caffeine), regardless of intent. <ul style="list-style-type: none"> <li>○ identified as records including the following ICD-10-CM codes: <ul style="list-style-type: none"> <li>▪ T40.5X (Poisoning by cocaine)</li> <li>▪ T43.60 (Poisoning by unspecified psychostimulants)</li> <li>▪ T43.62 (Poisoning by amphetamines)</li> <li>▪ T43.63 (Poisoning by methylphenidate)</li> <li>▪ T43.64 (Poisoning by ecstasy)</li> <li>▪ T43.69 (Poisoning by other psychostimulants)</li> </ul> </li> <li>○ AND the intent is accidental/unintentional, intentional self-harm, assault, or undetermined intent (not adverse effects or underdosing) AND it is the initial or missing encounter ( not subsequent encounter or sequela)</li> </ul> </li> </ul> <p><b>Age/Race/Sex Stratification</b></p> <ul style="list-style-type: none"> <li>• Age is determined according to date of birth and at date of admission to hospital.</li> <li>• Race and sex are reported by the hospital to the hospital discharge data system.</li> <li>• Due to low numbers, patients of unknown race, Native American, Alaskan Native, Asian Pacific Islander or listed as unknown are not included in figures</li> </ul> <p>Age-adjustment is used for all nonfatal overdose rates except for those stratified by age. Age-adjusted rates were calculated using 2000 US standard population. The rate for a specific age group in a given population was multiplied by the proportion of people in the same age group in the 2000 U.S. standard population; adding across age groups yields the final age-adjusted rate.</p>
<b>Geographic Scale</b>	Tennessee — Statewide, County
<b>Time Period</b>	2016-2019
<b>Inclusion/ Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• Only Tennessee residents were considered</li> <li>• Only discharges from non-federal, acute care hospitals were included</li> <li>• Excludes patients discharged as dead/deceased</li> <li>• Late effects, adverse effects, and chronic poisonings due the effects of drugs were excluded</li> </ul>
<b>Data Sources</b>	<ul style="list-style-type: none"> <li>• Tennessee Department of Health, Hospital Discharge Data System, 2016 to 2019.</li> <li>• Yearly population data for calculation of rates was obtained from CDC Wonder bridged race population estimates. See (<a href="https://wonder.cdc.gov/bridged-race-population.html">https://wonder.cdc.gov/bridged-race-population.html</a>) for more details.</li> </ul>

<b>General Limitations of the Measures</b>	<ul style="list-style-type: none"><li>• Nonfatal overdoses are only captured as hospital discharges and do not include those nonfatal overdoses that do not end up at an acute-care facility.</li><li>• Overdoses may be missed in discharge records with more than 18 diagnosis codes reported if the overdose diagnosis was not reported in one of the 18 reported fields. Most overdose ICD-10-CM codes are reported in earlier diagnosis fields and OIA does not expect this to be a significant problem.</li><li>• Limited to non-federal acute care-affiliated facilities. Excludes VA and other federal hospitals, rehabilitation centers, and psychiatric hospitals.</li></ul>
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## B4. Technical Notes: Drug Overdose Reporting (DOR) System

	<b>Drug Overdose Reporting (DOR) System-identified Nonfatal Drug Overdoses in Tennessee, 2020</b>
<b>Measures</b>	<ol style="list-style-type: none"> <li>1. Facilities Reporting to the DOR System in TN, 2017-2020, page 93</li> <li>2. Number of All Opioid Overdoses by Month in TN, 2020, page 94</li> <li>3. Number of All Opioid Overdoses by Sex in TN, 2020, page 95</li> <li>4. Number of All Opioid Overdoses by Age in TN, 2020, page 96</li> <li>5. [Map] Locations of All Opioid Overdose in TN, 2020, page 97-98</li> <li>6. Number of Heroin Overdoses by Month in TN, 2020, page 99</li> <li>7. Number of Heroin Overdoses by Sex in TN, 2020, page 100</li> <li>8. Number of Heroin Overdoses by Age in TN, 2020, page 101</li> <li>9. Number of Stimulant Overdoses (Excluding Caffeine) by Month in TN, 2020, page 102</li> <li>10. Number of Stimulant Overdoses (Excluding Caffeine) by Sex in TN, 2020, page 103</li> <li>11. Number of Stimulant Overdoses (Excluding Caffeine) by Age in TN, 2020, page 104</li> <li>12. [Map] Locations of Stimulant Overdose (Excluding Caffeine) in TN, 2020, page 105-106</li> </ol>
<b>Definition of Measures</b>	<p>Overdose counts are based on patient admission date and criteria recommended by the Council for State and Territorial Epidemiologists (CSTE) that specify a nonfatal overdose should be counted as one distinct event that is at least 24 hours after a previous overdose event (and the person experienced clinical improvement or recovery between the events). To follow this recommendation as closely as possible, one calendar day defines a distinct person-event.</p> <p><b>All opioid overdoses</b></p> <ul style="list-style-type: none"> <li>• Count of nonfatal overdoses caused by acute poisonings due to the effects of any opioid <ul style="list-style-type: none"> <li>○ ICD-10-CM diagnosis codes: <ul style="list-style-type: none"> <li>▪ Inclusions: Any mention of diagnosis codes: <ul style="list-style-type: none"> <li>– T40.0X (poisoning by opium)</li> <li>– T40.1X (poisoning by heroin)</li> <li>– T40.2X (poisoning by other opioids)</li> <li>– T40.3X (poisoning by methadone)</li> <li>– T40.4X (poisoning by synthetic narcotics)</li> <li>– T40.60 (poisoning by unspecified narcotics)</li> <li>– T40.69 (poisoning by other narcotics)</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p><b>Heroin overdoses</b></p> <ul style="list-style-type: none"> <li>• Count of nonfatal overdoses caused by acute poisonings due to the effects of heroin <ul style="list-style-type: none"> <li>○ ICD-10-CM diagnosis codes: <ul style="list-style-type: none"> <li>▪ Inclusions: Any mention of diagnosis codes: <ul style="list-style-type: none"> <li>– T40.1X (poisoning by heroin)</li> </ul> </li> </ul> </li> </ul> </li> </ul>

<p><b>Definition of Measures</b></p>	<p><b>Opioid (excluding heroin) overdoses</b></p> <ul style="list-style-type: none"> <li>• Count of nonfatal overdoses caused by acute poisonings due to the effects of any opioid (excluding heroin) <ul style="list-style-type: none"> <li>○ ICD-10-CM diagnosis codes: <ul style="list-style-type: none"> <li>▪ Inclusions: Any mention of diagnosis codes: <ul style="list-style-type: none"> <li>– T40.0X (poisoning by opium)</li> <li>– T40.2X (poisoning by other opioids)</li> <li>– T40.3X (poisoning by methadone)</li> <li>– T40.4X (poisoning by synthetic narcotics)</li> <li>– T40.60 (poisoning by unspecified narcotics)</li> <li>– T40.69 (poisoning by other narcotics)</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p><b>Stimulant overdoses (excluding caffeine)</b></p> <ul style="list-style-type: none"> <li>• Count of nonfatal overdoses caused by acute poisonings due to the effects of stimulants (excluding caffeine) <ul style="list-style-type: none"> <li>○ ICD-10-CM diagnosis codes: <ul style="list-style-type: none"> <li>▪ Inclusions: Any mention of diagnosis codes: <ul style="list-style-type: none"> <li>– T40.5X (poisoning by cocaine)</li> <li>– T40.5X (poisoning by cocaine)</li> <li>– T43.60 (poisoning by unspecified psychostimulants)</li> <li>– T43.62 (poisoning by amphetamines)</li> <li>– T43.63 (poisoning by methylphenidate)</li> <li>– T43.64 (poisoning by ecstasy)</li> <li>– T43.69 (poisoning by other psychostimulants)</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p><b>Benzodiazepine overdoses</b></p> <ul style="list-style-type: none"> <li>• Count of nonfatal overdoses caused by acute poisonings due to the effects of benzodiazepines <ul style="list-style-type: none"> <li>○ ICD-10-CM diagnosis codes: <ul style="list-style-type: none"> <li>▪ Inclusions: Any mention of diagnosis codes: <ul style="list-style-type: none"> <li>– T42.4 (Acute poisoning by benzodiazepines)</li> </ul> </li> </ul> </li> </ul> </li> </ul> <p><b>Muscle relaxant overdoses</b></p> <ul style="list-style-type: none"> <li>• Count of nonfatal overdoses caused by acute poisonings due to the effects of muscle relaxants <ul style="list-style-type: none"> <li>○ ICD-10-CM diagnosis codes: <ul style="list-style-type: none"> <li>▪ Inclusions: Any mention of diagnosis codes: <ul style="list-style-type: none"> <li>– T48.1 (Acute poisoning by muscle relaxant)</li> </ul> </li> </ul> </li> </ul> </li> </ul>
<p><b>Geographic Scale</b></p>	<p>Tennessee — Statewide, region, county</p>

<b>Time Period</b>	2020
<b>Inclusion/ Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• All TN hospitals licensed under TCA, Title 68, Chapter 11, Part 3 are required by law to report patient-level health information. This includes emergency room departments, acute care hospitals, rehabilitation facilities, and free-standing ambulatory surgical treatment centers that are a part of a hospital.</li> <li>• Psychiatric hospitals/units or substance abuse treatment facilities within a hospital are not required to report overdose information to the DOR data system.</li> <li>• Drug overdoses are reported to the DOR data system regardless of intent.</li> <li>• DOR does not collect ICD-10-CM diagnosis codes associated with mental and behavioral disorders due to psychoactive substance use (F10-F19).</li> <li>• Nonfatal overdoses coded as events related to adverse effects, underdosing, subsequent encounters, and sequela (e.g. chronic or long-term organ damage) are excluded.</li> <li>• Counts of overdose are limited to only initial and missing encounters.</li> <li>• Counts of overdose are based on TN patient residence addresses only.</li> </ul>
<b>Data Sources</b>	<ul style="list-style-type: none"> <li>• Submission by healthcare facilities</li> </ul>
<b>General Limitations of the Measures</b>	<ul style="list-style-type: none"> <li>• As of publication, 118 TN facilities report to DOR. Some key facilities throughout the state are still being onboarded to DOR and have not yet begun to submit data.</li> <li>• Areas remain where key facilities are not reporting to the DOR data system so caution is warranted when interpreting the spatial trends presented in this report. The absence of “hot spots” on maps does not necessarily signify an absence of overdoses in that area.</li> <li>• Drug overdoses are reported weekly and as such, DOR data presented in this report should not be considered final. Records reported to DOR are triggered by hospital billing systems, which have lags or updates that impact counts for previously reported data.</li> <li>• Inconsistencies in reporting race to the DOR data system have been observed.</li> <li>• The reporting of stimulant (excluding caffeine), benzodiazepine, and muscle relaxant overdoses became required in 2020, but 24 facilities have not yet begun reporting these measures (out of 118 DOR reporting facilities)</li> <li>• CSTE recommendations for the identification of nonfatal overdose events specify a 24-hour period between events with clinical improvement between events. DOR data do not currently allow for this precise definition to be used. As of publication, a calendar day is used to define a single overdose event for a person and no clinical confirmation of recovery between events is possible. Though back to back overdose events for a person are rare, it is possible that multiple distinct events in a calendar day may be counted as a single event or for one event that spans two calendar days and reported separately to be counted as two events.</li> </ul>

## B5. Technical Notes: Drug Overdose Surveillance and Epidemiology (DOSE)

	<b>Drug Overdose Surveillance and Epidemiology (DOSE) of Nonfatal Overdose Emergency Department Visits in Tennessee, 2020</b>
<b>Measures</b>	<ol style="list-style-type: none"> <li>1. Total Number of Emergency Department Visits in TN, January-December 2020, page 107</li> <li>2. Monthly Suspected Nonfatal Drug Overdose Rates per 10,000 Emergency Department (ED) Visits in TN, January-December 2020, page 108</li> </ol>
<b>Definition of Measures</b>	<p>Approximately 105 emergency department (ED) facilities report information to the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE).</p> <p>Suspected overdose cases are identified using a CDC-algorithm that searches discharge diagnosis codes or SNOMED (Systemized Nomenclature of Medicine) codes and chief complaint text. Syndromic data include all drugs, all opioid, heroin, and all stimulants.</p> <p>Total counts of ED visits in TN by month in 2020</p> <p>Rates of suspected nonfatal drug overdose per 10,000 ED visits</p> <p><i>Numerator</i> – monthly count of suspected nonfatal drug overdose by drug category</p> <p>For a full explanation of how nonfatal drug overdoses are identified, please see <i>Technical Guidance for the Drug Overdose Surveillance and Epidemiology (DOSE) System Version 1.2 (November 2019)</i>.</p> <p><i>Denominator</i> – Total number of ED visits in a month</p>
<b>Geographic Scale</b>	Tennessee-Statewide
<b>Time Period</b>	2020
<b>Inclusion/Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• Suspected drug overdoses (all drugs, all opioid, heroin, and all stimulants) of unintentional intent are included.</li> </ul>
<b>Data Sources</b>	<ul style="list-style-type: none"> <li>• Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)</li> </ul>
<b>General Limitations of the Measures</b>	<ul style="list-style-type: none"> <li>• Cases are suspected overdoses reported prior to clinical or laboratory confirmation. Syndromic surveillance often identifies more suspected cases than the true confirmed number of cases.</li> <li>• Large changes in ED visit volume occurred in 2020 following the onset of the COVID-19 pandemic.</li> <li>• While data for the majority of TN ED visits are reported to ESSENCE, several facilities are not yet reporting data.</li> <li>• Throughout 2020, the number of facilities reporting overdoses to ESSENCE varied.</li> </ul>

## B6. Technical Notes: Cost of Hospital-Treated Nonfatal Overdose

<b>Indicators</b>	<b>Cost of Hospital-Treated Nonfatal Overdose in TN, 2016-2019</b>
<b>Measures</b>	1. Median Annual Cost of Hospital-Treated All-Drug Overdoses in TN, 2016-2019, page 110
<b>Definition of Measures</b>	<p>Cost of care is the estimated total amount spent by the hospital on a patient during an overdose event (includes all resources utilized, even for treatments not directly related to the overdose). In this report, it is presented as a median—the cost of care value that occurs in the precise middle of the data (50% of observations fall below and above this value).</p> <p>The cost of care calculation requires two values: the total patient charges for an overdose event and a hospital’s Cost-to-Charge Ratio (CCR). The CCR is calculated by dividing the total annual cost reported by each hospital by the total revenue reported over the same time period. These CCRs are calculated annually, as a hospital’s circumstances and pricing may change over time. Patient charges are matched with the appropriate hospital’s CCR using the hospital’s JAR ID, a TN-specific hospital ID code, and the year of care. Total charges are multiplied by the CCR to arrive at an estimated cost for that visit (how much the hospital may have actually spent on their care). Below, each measure is explicitly defined.</p> <p><b>Total charges</b></p> <ul style="list-style-type: none"> <li>• A patient-level measure that is the total amount billed by the hospital to the patient for care provided during the overdose event, before any deductions are applied due to insurance, copays, or other factors.</li> </ul> <p><b>Total revenue</b></p> <ul style="list-style-type: none"> <li>• A hospital-level measure that is the total (gross) amount that a hospital earned in a year, including all patient payments for all services</li> </ul> <p><b>Cost-to-Charge Ratio (CCR)</b></p> <ul style="list-style-type: none"> <li>• A hospital-level calculated measure that is Total Cost divided by Total Revenue. Represents the ratio of a hospital’s revenue that was spent and is almost always less than 1 (hospitals generally earn more than they spend).</li> </ul> <p><b>Cost of care</b></p> <ul style="list-style-type: none"> <li>• A patient-level calculated measure that is Total Charges multiplied by CCR. This estimates the total amount of money that the hospital spent on a patient’s care. This adjustment corrects for the portion of a patient’s charges that were really contributing to a hospital’s revenue, not the cost of care.</li> </ul>
<b>Geographic Scale</b>	Tennessee — Statewide
<b>Time Period</b>	2016-2019



<b>Inclusion/ Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• Only overdose events with valid charge data, which occurred in a hospital with valid cost and revenue data, were included</li> </ul>
<b>Data Sources</b>	<ul style="list-style-type: none"> <li>• HDDS</li> <li>• Hospital Cost-to-Charge Ratios were determined using their total revenue and total cost as reported in the Joint Annual Reports from 2015 to 2019, a comprehensive financial survey completed each year by every non-federal general acute care hospital in the state, available here: <a href="https://www.tn.gov/health/health-program-areas/statistics/health-data/jar.html">https://www.tn.gov/health/health-program-areas/statistics/health-data/jar.html</a>.</li> </ul>
<b>General Limitations of the Measures</b>	<ul style="list-style-type: none"> <li>• Cost of care data is an estimate, not an actual measure of any amount that any party (insurer, patient, government, or facility) paid. Due to the complexity of healthcare billing, it is not possible to generate more precise cost estimates with the available data. It should be interpreted with caution, and most likely underestimates the true financial burden of overdose.</li> </ul>

## B7. Technical Notes: Tennessee Opioid Prescription Indicators

Indicators	Tennessee Prescription Trends, 2016-2020
<b>Measures<sup>1</sup></b>	<ol style="list-style-type: none"> <li>1. Number of Controlled Substance Prescriptions by Selected Drug Classes in TN, page 115</li> <li>2. Patients Receiving Opioids, Benzodiazepine, and Gabapentin Prescriptions in TN, page 116</li> <li>3. Prescription Rate per 1,000 residents of Top 3 Most Prescribed Opioids for Pain in TN, page 117</li> <li>4. Patient Rate per 1,000 Residents Receiving Opioids for Pain by Sex in TN, page 118</li> <li>5. Patient Rate per 1,000 Residents Receiving Opioids for Pain by Age in TN, page 119</li> <li>6. Payment Type for Opioid Prescriptions for Pain in TN, page 120-121</li> <li>7. Number of Opioid Prescriptions for Pain by Days' Supply in TN, page 122</li> <li>8. [Table] Percentage of Patients Filling Opioids for Pain by Number of Active Prescription Days, page 123</li> <li>9. [Map] Rate of Opioid for Pain Prescriptions Filled (per 1,000 residents) by TN County of Residence, 2020, page 124-125</li> <li>10. Total Morphine Milligram Equivalents for Opioids for Pain, page 127</li> <li>11. [Map] Morphine Milligram Equivalents per Capita for Opioid for Pain Prescriptions Filled by TN County of Residence, 2020, page 128-129</li> <li>12. Percentage of Patients Dispensed More than 90 Daily MME in TN, page 130</li> <li>13. Rate of Multiple Provider Episodes (per 100,000 Residents) in TN by Half Year, page 131</li> <li>14. Percent of Patients with Overlapping Opioid and Benzodiazepine Prescriptions in TN, page 132</li> <li>15. Prescription Rate per 1,000 Residents of Top 4 Most Prescribed Benzodiazepines in TN, page 133</li> <li>16. Patient Rate per 1,000 Residents Receiving Benzodiazepines by Sex in TN, page 134</li> <li>17. Patient Rate per 1,000 Residents Receiving Benzodiazepines by Age in TN, page 135</li> <li>18. Payment Type for Benzodiazepine Prescriptions in TN, page 136</li> <li>19. Number of Benzodiazepine Prescriptions by Days' Supply in TN, page 137</li> <li>20. [Table] Percentage of Patients Filling Benzodiazepines by Number of Active Prescription Days, page 138</li> <li>21. [Map] Benzodiazepine Prescription Rate per 1,000 Residents by TN County of Residence, 2020, page 139-140</li> <li>22. Patient Rate per 1,000 residents receiving Gabapentin by Sex in TN, page 141</li> <li>23. Patient Rate per 1,000 residents receiving Gabapentin by Age in TN, page 142</li> </ol>

<sup>1</sup> All measures are presented by quarter year unless otherwise indicated.

<p><b>Measures</b></p>	<p>24. [Map] Gabapentin Prescription Rate per 1,000 Residents by TN County of Residence, 2020, page 143-144</p> <p>25. Patients receiving Buprenorphine for MAT prescriptions in TN, page 145-146</p> <p>26. Patient Rate per 1,000 Residents Receiving Buprenorphine for MAT by Sex in TN, page 147</p> <p>27. Patient Rate per 1,000 Residents Receiving Buprenorphine for MAT by Age in TN, page 148</p> <p>28. Payment Type for Buprenorphine for MAT Prescriptions in TN, page 149</p> <p>29. Number of Buprenorphine for MAT Prescriptions by Days' Supply in TN, page 150</p> <p>30. [Table] Percentage of Patients Filling Buprenorphine for MAT by Number of Active Prescription Days, page 151</p> <p>31. [Map] Buprenorphine for MAT Prescription Rate per 1,000 Residents by TN County of Residence, 2020, page 152-153</p>
<p><b>Definition of Measures</b></p>	<p>Number of opioid for pain, buprenorphine for MAT, benzodiazepine, and gabapentin prescriptions in TN</p> <ul style="list-style-type: none"> <li>• After exclusions, a count of all prescriptions filled in each category as identified by the CDC's MME Conversion Table or IBM Micromedex RED BOOK data.</li> </ul> <p>Number of patients receiving opioid for pain, buprenorphine for MAT, benzodiazepine, and gabapentin prescriptions in TN</p> <ul style="list-style-type: none"> <li>• Count of unique patients (after patient entity management) who filled at least one prescription for opioids for pain, buprenorphine for MAT, benzodiazepines, or gabapentin</li> </ul> <p>Prescription rate per 1,000 residents of top 3 most prescribed short-acting opioids for pain in TN by quarter</p> <ul style="list-style-type: none"> <li>• <i>Numerator</i> – Number of prescriptions filled for top 3 most filled types of opioid analgesics</li> <li>• <i>Denominator</i> – Yearly state population in 1,000s</li> </ul> <p>Prescription rate per 1,000 residents of top 4 most prescribed benzodiazepines in TN by quarter</p> <ul style="list-style-type: none"> <li>• <i>Numerator</i> – Number of prescriptions filled for top 4 most filled types of benzodiazepines</li> <li>• <i>Denominator</i> – Yearly state population in 1,000s</li> </ul> <p>Prescription rate per 1,000 residents for opioid for pain, buprenorphine for MAT, benzodiazepine, and gabapentin in TN by county, 2020</p> <ul style="list-style-type: none"> <li>• <i>Numerator</i> – Number of prescriptions filled</li> <li>• <i>Denominator</i> – 2019 county population in 1,000s</li> </ul>

**Definition of Measures**

Percentage of opioid for pain, buprenorphine for MAT, and benzodiazepine prescriptions filled by payment type

- *Numerator* – Number of prescriptions filled by specified payment type
- *Denominator* – All opioid for pain, buprenorphine for MAT, or benzodiazepine prescriptions filled

Number of opioid for pain, buprenorphine for MAT, or benzodiazepine prescriptions filled by days' supply

- After exclusions, a count of all prescriptions for opioids for pain, buprenorphine for MAT, or benzodiazepines filled, categorized by the days' supply reported to the CSMD (excluding prescriptions reported as longer than 30 days)

Rate of patients receiving opioid for pain, buprenorphine for MAT, benzodiazepine, and gabapentin prescriptions per 1,000 in TN by sex

- *Numerator* – Count of unique patients (after patient entity management) who filled at least one prescription for opioids for pain, buprenorphine for MAT, benzodiazepines, or gabapentin who were reported to the CSMD as either male or female (excluding those with unknown or missing sex)
- *Denominator* – Yearly state population by sex in 1,000s

Rate of patients receiving opioid for pain, buprenorphine for MAT, benzodiazepine, and gabapentin prescriptions per 1,000 in TN by age group

- *Numerator*: Count of unique patients (after patient entity management) who filled at least one prescription for opioids for pain, buprenorphine for MAT, benzodiazepines, or gabapentin, classified into age groups based on age at date filled (excluding less than 18 years of age)
- *Denominator*: Yearly state population by age group in 1,000s

Active opioid for pain, buprenorphine for MAT, and benzodiazepine prescription days by year for patients in the CSMD

- For each patient in the CSMD, a count of the days in each year with an active prescription (based on the date filled and the days' supply), separated into 6 categories of duration. For example, if a patient had two opioid for pain prescriptions of 10 days each but those prescriptions overlapped for a single day, they would be classified as having 19 active days for the year. A patient who had one 10 day opioid for pain prescription in February and one 10 day prescription in April would be classified as having 20 active days for the year. Active days are only counted for the year in which they were expected to occur.

Percent of patients dispensed more than 90 daily morphine milligram equivalents in TN

- *Numerator* – Number of unique patients with filled prescriptions for opioid analgesics of more than 90 or 120 daily MME for all days prescribed in a quarter (may include single >90 or >120 prescriptions or multiple overlapping prescriptions)
- *Denominator* – Number of unique patients with filled prescriptions for any opioid analgesics

<b>Definition of Measures</b>	<p>Rate of multiple provider episodes per 100,000 residents in TN</p> <ul style="list-style-type: none"> <li>• <i>Numerator</i> – Number of unique patients who filled prescriptions from 5 distinct prescribers and at 5 distinct dispensers within one half of the year (Jan 1 – June 30 or July 1 – Dec 31)</li> <li>• <i>Denominator</i> – Yearly state population in 100,000s</li> </ul> <p>Percent of patients with overlapping opioid and benzodiazepine prescriptions</p> <ul style="list-style-type: none"> <li>• <i>Numerator</i> – Number of unique patients who have a benzodiazepine prescription that overlaps an opioid prescription for pain</li> <li>• <i>Denominator</i> – Number of unique patients with filled prescriptions for any opioids for pain</li> <li>• <i>Note:</i> Prescription dates, based on date of prescription fill and days' supply, are used to determine which prescriptions overlap</li> </ul>
<b>Geographic Scale</b>	<p>Tennessee — Statewide, County</p>
<b>Time Period</b>	<p>2016-2020</p>
<b>Inclusion/Exclusion Criteria</b>	<ul style="list-style-type: none"> <li>• Only Tennessee residents were considered</li> <li>• Only opioids and benzodiazepines in DEA schedules II, III, and IV were included, all gabapentin was included</li> <li>• Only opioids identified in the CDC's 2019 MME Conversion Table or benzodiazepines and gabapentin in IBM Micromedex RED BOOK data were considered <ul style="list-style-type: none"> <li>○ Specific opioid drugs (e.g., oxycodone, hydrocodone) were identified in CDC's 2019 MME Conversion Table</li> <li>○ Specific benzodiazepine drugs (e.g., alprazolam, diazepam) were identified in RED BOOK data</li> <li>○ Opioid prescriptions were separated into two categories: opioids FDA label indicated for pain (analgesics) and opioids FDA label indicated for medication assisted treatment (MAT)</li> <li>○ Gabapentin information was collected from RED BOOK and prepared for analysis</li> </ul> </li> <li>• Prescriptions with zero or implausibly high quantities were excluded</li> <li>• Prescriptions with zero or implausibly high days' supply were excluded</li> </ul>
<b>Data Sources</b>	<ul style="list-style-type: none"> <li>• Tennessee Controlled Substance Monitoring Database (CSMD)</li> <li>• CDC's 2019 MME Conversion Table, IBM Micromedex RED BOOK</li> <li>• Population data for 2016-2019 was obtained from CDC Wonder bridged race populations estimates. The vintage year of the populations corresponds to the year of the indicator. (See <a href="http://wonder.cdc.gov/bridged-race-population.html">http://wonder.cdc.gov/bridged-race-population.html</a> for more details). <b>Estimated rates for 2020 use the 2019 population because 2020 estimates were not available at the time of publication.</b></li> </ul>

**General  
Limitations of  
the Measures**

- Prescriptions that were written but not filled by the patient are not tracked in the CSMD. The CSMD provides a reasonably accurate measure of the amount of controlled substances dispensed in TN, but may not capture the full extent of prescribing practices.
- The CSMD does not have information on patient behavior beyond filling prescriptions. Measures are calculated with the assumption patients take their medications as prescribed. Patients may choose not to take their medication or may share medications with others.
- The CSMD does not include information about diagnoses or the indicated use for all prescriptions. Measures are calculated with the assumption medications are prescribed for their FDA-label indicated uses (e.g., pain treatment or medication-assisted treatment for opioid use disorders). Off-label use cannot be determined.
- Prescriptions were identified in the CSMD through the use of the CDC's MME Conversion Table and IBM Micromedex RED BOOK data which may not capture all opioid, benzodiazepine, or gabapentin prescriptions. Other classes of controlled substance reported to the CSMD (e.g., prescription stimulants) are not considered in this report.
- The CSMD does not include all controlled substances provided as treatment to patients. Notable exceptions include methadone used for treatment, buprenorphine for medication-assisted treatment provided in office based outpatient treatment settings, and drugs used in inpatient settings which are not monitored by the CSMD.
- The CSMD's patient records contain numerous duplicate patients that must be consolidated using a unique patient identifier across records identified as belonging to a single person. Analyses for this report used a deterministic approach to identify unique patients that involved matching first name, last name, and date of birth. This data linkage approach results in a small overestimate of the number unique patients, and we are continually improving patient identification techniques to improve indicator calculation.
- A small proportion of prescriptions reported to the CSMD are for veterinary patients. These patients are not explicitly excluded from calculations and may have small impacts on the data presented here. OIA estimates that around 1% of all prescriptions reported to the CSMD are written for veterinary patients.
- TN residence and county of residence were determined by patient address listed in the CSMD's patient records. Patient addresses may not be accurate when pharmacy patient records are not updated or if patients give inaccurate information. If valid street address information was unavailable, counties were assigned according to city and zip code. TN patients whose county could not be identified were given assigned county "Unknown".

**General  
Limitations of  
the Measures**

## Appendix C: List of OIA Journal Publications

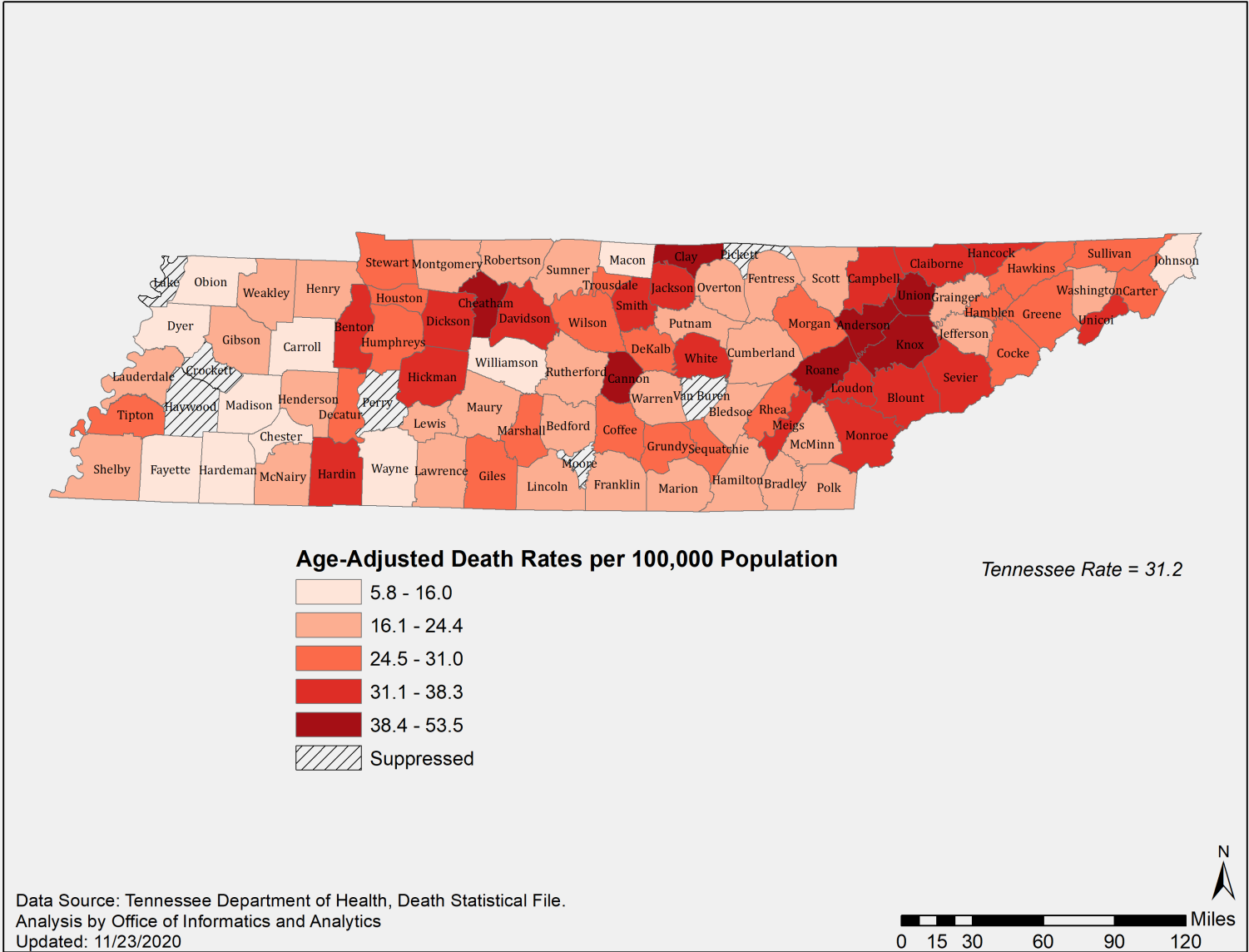
The following are journal publications written by staff in OIA. The top three publications (in bold) were released recently in 2020 and 2021.

- 1. Impact of benzodiazepines and polysubstance status on repeat non-fatal drug overdoses. Sarah Mayberry, Sarah Nechuta, Shanthi Krishnaswami. Journal of Substance Abuse Treatment, Volume 123, 2021, 108285, ISSN 0740-5472, <https://doi.org/10.1016/j.jsat.2021.108285>.**
- 2. Prescriber responses to a pain clinic law: Cease or modify? Yenerall J, Buntin MB. Drug Alcohol Depend. 2020 Jan 1; 206:107591. doi: 10.1016/j.drugalcdep.2019.107591. Epub 2019 Sep 27. PMID: 31765860.**
- 3. Using statewide death certificate data to understand trends and characteristics of polydrug overdose deaths in Tennessee, 2013-2017. Molly Golladay, Kayle Donner, Sarah Nechuta. Annals of Epidemiology, Volume 41, 2020. <https://doi.org/10.1016/j.annepidem.2019.12.001>**
4. Prescribing patterns before and after a non-fatal drug overdose using Tennessee's controlled substance monitoring database linked to hospital discharge data. S. Krishnaswami, Sutapa Mukhopadhyay, Melissa McPheeters, Sarah J. Nechuta, Preventive Medicine 130 (2020) 105883
5. Record linkage approaches using prescription drug monitoring program and mortality data for public health analyses and epidemiologic studies. Sarah Nechuta, Sutapa Mukhopadhyay, Shanthi Krishnaswami, Molly Golladay, Melissa McPheeters, Epidemiology, 2019, Ahead of publication, DOI: 10.1097/EDE.0000000000001110
6. Prevalence and Risk Factors Associated with Long-term Opioid Use after Injury among previously Opioid-free Workers. Zoe Durand, Sarah Nechuta, Shanthi Krishnaswami, Eric L. Hurwitz, Melissa McPheeters, PhD., JAMA Network Open. 2019; 2(7):e197222. doi:10.1001/jamanetworkopen.2019.7222 (
7. Prescription opioid use by injured workers in Tennessee: a descriptive study using linked statewide databases. Zoe Durand, Sarah Nechuta, Shanthi Krishnaswami, Eric L. Hurwitz, Melissa McPheeters, Annals of Epidemiology 32 (2019) 7-13
8. Sociodemographic factors, prescription history and opioid overdose deaths: a statewide analysis using linked PDMP and mortality data. Sarah J. Nechuta, Benjamin D. Tyndall, Sutapa Mukhopadhyay, Melissa L. McPheeters, Drug and Alcohol Dependence 190 (2018) 62-71

# Appendix D: Supplemental Materials

The following are supplemental maps from the Tennessee Drug Overdose Deaths section (page 18).

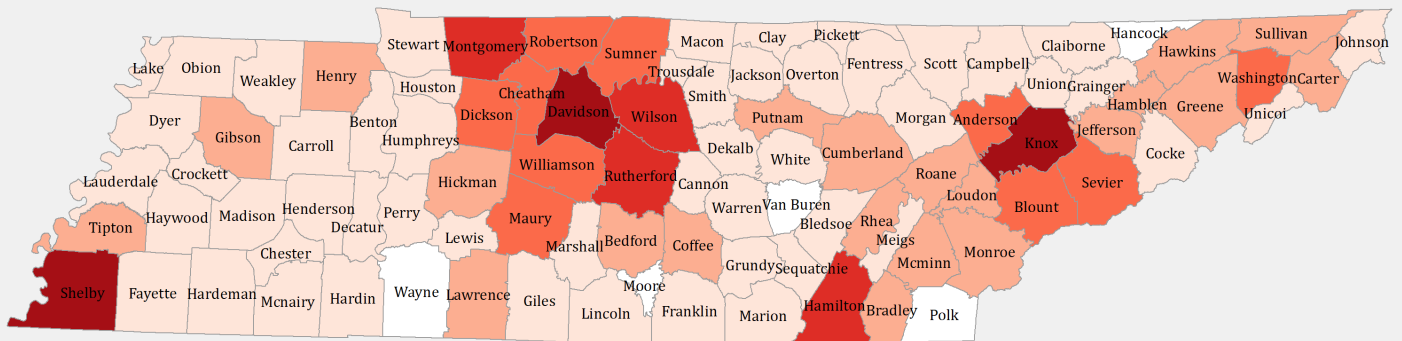
## Age-Adjusted Death Rates for All Drug Overdose by TN County of Residence, 2015-2019\*



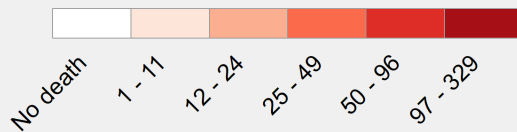
\*Rates for counties with fewer than 11 deaths have been suppressed



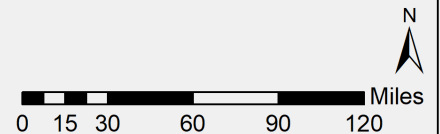
# Number of All Drug Overdose Deaths by TN County of Residence, 2019



Number of All Drug Overdose Deaths by TN County of Residence (2019)



Data Source: Tennessee Department of Health, Death Statistical File.  
 Analysis by Office of Informatics and Analytics  
 Updated: 11/23/2020

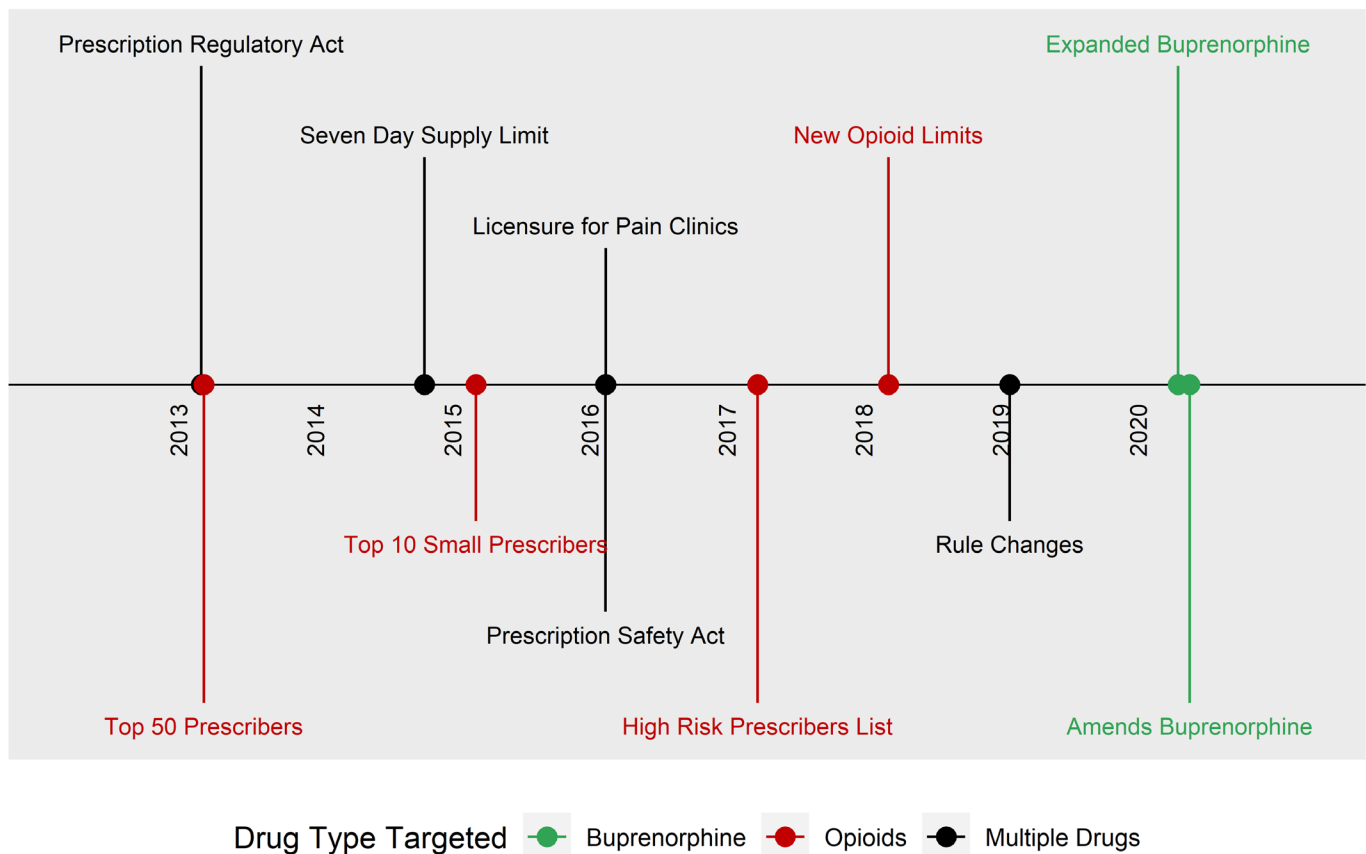


In 2019, 5 TN counties reported no drug overdose deaths: Hancock, Moore, Polk, Van Buren, and Wayne.

The following are supplemental materials from the Prescription Trends Section Spotlight (page 156).

## Timeline of Drug-Related Public Acts in Tennessee

The following bills were passed to strengthen Tennessee’s response to the opioid crisis, and to better manage overall prescription practices in the state. Below, we briefly outline the major components of each bill. Click on the act name to get more information about each bill, including amendments and supporting legislators.



Act	Policy Description	Effective On
<b><u>P.C. 430,</u></b> <b><u>108th G.A.</u></b>	The Addison Sharp Prescription Regulatory Act: Revises laws regarding pain management clinics and the manufacturing, distributing, and dispensing of controlled substances	2013-05-16

<p><b><u>P.C. 396,</u></b> <b><u>108th G.A.</u></b></p>	<p>This act establishes a required annual list of the Top 50 Prescribers of Controlled (Opioid) Substances. It revises various provisions governing controlled substance prescribers. It prohibits nurse practitioners and physician assistants from prescribing Schedule II, III, and IV controlled substances unless specifically authorized.</p> <p>Further, a nurse practitioner or physician assistant who has authority to prescribe controlled substances may only prescribe or issue a schedule II or III opioid listed on the formulary for a maximum of a non-refillable, 30-day course of treatment unless specifically approved</p>	<p>2013-05-23</p>
<p><b><u>P.C. 983,</u></b> <b><u>108th G.A.</u></b></p>	<p>This act makes various changes to the regulation of prescription drugs, and particularly prohibits healthcare prescribers from dispensing opioids and benzodiazepines concurrently.</p>	<p>2015-01-01</p>
<p><b><u>P.C. 476,</u></b> <b><u>109th G.A.</u></b></p>	<p>This act expands the list of Top Prescribers to include a separate list of the Top 10 Small County Prescribers. Revises requirement that certain prescribers submit explanations justifying the amount of controlled substances prescribed. It also changes rules regarding home medical equipment</p>	<p>2015-05-18</p>
<p><b><u>P.C. 1002,</u></b> <b><u>109th G.A.</u></b></p>	<p>The Tennessee Prescription Safety Act of 2016: makes permanent most of the changes made under the Tennessee Prescription Safety Act of 2012, and implements a few other provisions.</p>	<p>2016-04-27</p>
<p><b><u>P.C. 1033,</u></b> <b><u>109th G.A.</u></b></p>	<p>Imposes licensure and other requirements on pain management clinics (they previously only needed to obtain a certificate).</p>	<p>2016-04-28</p>

<p><b><u>P.C. 483,</u></b> <b><u>110th G.A.</u></b></p>	<p>Requires the Department of Health to identify high risk prescribers (using more complex methodologies than the original Top 50 list). This bill also addressed neonatal and birth laws.</p>	<p>2017-06-06</p>
<p><b><u>P.C. 1039,</u></b> <b><u>110th G.A.</u></b></p>	<p>Lowers the allowable maximum prescription of opioids, removes certain exceptions to the limit, and strengthens requirements that a prescriber check the CSMD prior to prescribing a controlled substance.</p>	<p>2018-05-21</p>
<p><b><u>P.C. 124,</u></b> <b><u>111th G.A.</u></b></p>	<p>Makes various changes concerning the prescription of several Scheduled controlled substances.</p>	<p>2019-04-09</p>
<p><b><u>P.C. 761,</u></b> <b><u>111th G.A.</u></b></p>	<p>It authorizes non-physician healthcare providers who are otherwise permitted to prescribe Schedule II or III drugs to also prescribe buprenorphine for the treatment of opioid use disorder.</p>	<p>2020-07-01</p>
<p><b><u>P.C. 771,</u></b> <b><u>111th G.A.</u></b></p>	<p>Creates additional provisions related to prescribing buprenorphine.</p>	<p>2020-08-01</p>



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# TENNESSEE'S DRUG OVERDOSE ANNUAL REPORT

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[www.tn.gov/health/health-program-areas/pdo.html](http://www.tn.gov/health/health-program-areas/pdo.html)



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