



CALHOUN COUNTY PUBLIC HEALTH DEPARTMENT
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SURVEILLANCE REPORT OF OPIOID-RELATED RISKS AND OUTCOMES

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What's New?

In May 2018, the Calhoun County Public Health Department (CCPHD) released a report on the opioid epidemic in Calhoun County. This November 2019 report includes the following updated information and analysis:

- Opioid epidemic strategic framework for Calhoun County
- Retail opioid prescribing data for the year 2017
- Four year (2015-2018) trend analysis of emergency department visits for opioid overdoses by all manner of intent
- Updated opioid-related vital statistics through 2018 from the Michigan Department of Health and Human Services
- Four year (2015-2018) trend analysis of Calhoun County Medical Examiner opioid and drug-related deaths by all manners of death
- A highlight of fentanyl-related deaths
- Four year (2015-2018) trend analysis with geospatial mapping of emergency department visits for opioid and fentanyl overdoses by resident zip code and Calhoun County Medical Examiner opioid and fentanyl-related deaths
- An assessment of viral hepatitis, HIV, soft tissue, bone and heart valve infections associated with substance abuse in Calhoun County

Introduction^{1, 2, 3}

Drug overdose is a serious public health problem that now constitutes the leading cause of unintentional injury death in the United States.¹ Opioid abuse and misuse continues to drive the overdose epidemic. Although opioid prescribing has decreased, deaths related to opioids, particularly due to a synthetic opioid called fentanyl, have increased. Calhoun County, like other communities in the United States, is affected by the epidemic. This document provides an overview of the opioid epidemic in Calhoun County and briefly outlines a framework to address it from a public health perspective.

An **opioid** is a drug that eases pain and may also cause feelings of extreme pleasure. Opioids act on the brain and nerves and include both prescription medications and illegal drugs like heroin. Opioids can be addictive with regular use or misuse. An **opioid overdose** occurs when excess opioids act on the brain to decrease or stop a person's breathing.

Opioid dependence occurs when the brain adapts and only functions normally when opioids are present; when opioids are not present, a reaction known as withdrawal occurs. Opioid addiction is a long-term, relapsing disease of the brain characterized by compulsive drug seeking and use despite harmful consequences.² **Opioid addiction** affects not only the lives of addicted individuals but families and communities as well. It is possible to be opioid dependent without being addicted since dependence and addiction occur within different parts of the brain.²

Like most public health challenges, the opioid epidemic's origins are multifactorial. First, an increase in supply of both prescription opioids and illegal opioids, such as illicitly manufactured fentanyl, increased the risk for overdose in the population. Long-term use of prescription opioids, often for chronic pain, resulted in people having greater risk for overdose. Ultimately, both increased exposure and increased exposure duration to prescription opioids contributed to an increased risk of overdose. The perception of opioids being low-risk medications for developing dependence or addiction also contributed to the rationalization of increased prescription opioid supply and the outcome of overdose. It is now well established that prescription opioids can be addictive with regular use or misuse.² With respect to illicit opioids, increased potency of heroin and fentanyl analogs have made it much easier for a person to overdose as well.¹ For those who develop opioid dependence or addiction, fragmented systems of care between substance use treatment providers, healthcare systems, behavioral and mental health services, and social services continue to hinder access and coordination of treatment. Finally, the perception of addiction as a moral defect continues to be counterproductive, because research, resources, interventions, and treatment are not aligned to address addiction for what it really is – a long-term, relapsing disease of the brain that has profound implications for families and communities.³

The opioid epidemic can be quantified in several ways including unintentional fatal and nonfatal overdoses, the frequency of opioid overdose reversals with naloxone administration, substance abuse service utilization, law enforcement records, opioid prescription rates, behavioral risk factor surveys, rates of newborn opioid withdrawal, the incidence of drug-related infectious diseases, and personal testimony from community members. This report highlights the burden of opioid prescriptions, fatal and nonfatal opioid-related overdoses, and drug-related infections in Calhoun County, Michigan.

Opioid Strategic Framework for Calhoun County

A strategic framework for how Calhoun County can address the opioid epidemic is shown in the figure below. The four strategic priorities include: prevention and education, supply and control of opioids, treatment, and harm reduction. The Calhoun County Opioid Coalition aims to coordinate and integrate existing and new efforts within these strategic priorities across Calhoun County.

Prevention and education efforts include community and professional education on addiction as a long-term, relapsing disease of the brain, increased knowledge about opioids, and increased risk perception. Prevention efforts may also focus on the upstream risk factors that influence the development of opioid addiction in community members.

Supply and control efforts involve law enforcement and improving opioid prescribing practices. New partnerships to reduce the supply of illicit drugs or the unlawful distribution of legal drugs are emerging in some communities. Improving prescribing practices of opioids requires both professional education and systems-level changes within healthcare institutions.

Prioritization of treatment is essential given the nature of addiction and the progression of the fentanyl epidemic. Treatment focuses on access and improvement of referrals across a continuum of care for opioid addiction. Access to medication-assisted treatment such as buprenorphine, methadone, and naltrexone, as well as improved coordination between behavioral and mental health services and recovery services are needed. Professional education on chronic pain management, as well as screening, diagnosis, and early intervention for those at risk for opioid use disorder is needed to complement efforts focused on treatment and recovery.

Finally, harm reduction involves preventing overdose deaths and the spread of infectious disease associated with drug use. Overdose education and naloxone distribution includes efforts to prevent overdoses through education and administration of a drug called naloxone, which reverses an opioid overdose. Public health agencies can partner with healthcare institutions and social services to detect and prevent the spread of infectious diseases such as Human Immunodeficiency Virus (HIV), and Hepatitis A, B, and C, in addition to reducing blood stream and heart valve infections associated with drug use. Syringe Services Programs (SSPs), sometimes known as needle exchange programs, are critical public health interventions that reduce transmission of infectious disease and promote entry into substance abuse treatment.



The Calhoun County Opioid Coalition employs Healthy People 2020 MAP-IT (Mobilize, Assess, Plan, Implement and Track) strategy as its model for improvement to address the opioid epidemic through the coordination and integration of these four strategic priorities.

Key Points

Opioid Prescriptions

The number of retail opioid prescriptions in Calhoun County peaked in 2014 and has decreased every year since. From 2014 to 2017, the number of retail opioids prescribed decreased by 20.7%. However, the strength and dosage of the opioids prescribed in Calhoun County in 2017 was 26.8% higher than the State of Michigan and nearly double the national prescribing rate.

Emergency Department Opioid-Related Overdoses

Although opioid overdose visits comprise a very small proportion of all Calhoun County emergency department visits, opioid overdose visits increased from 147 to 311 visits from 2015 to 2018. More than half of these opioid overdose visits occurred in the combined age groups of 25-34 and 35-44 years. Nearly two times the number of males presented for a “heroin” overdose than females in 2018. Visits coded as “heroin” tripled for males from 2015 to 2018. Overdose visits coded as “heroin” nearly tripled for females from 2015 to 2018. In 2018, the top three zip codes with the highest rates of opioid overdose visits to an emergency department in Calhoun County were 49037, 49014, and 49015.

Opioid-Related Deaths

Calhoun County’s 2018 crude total opioid-related death rate of 36.4 deaths per 100,000 residents was nearly double Michigan’s 2017 rate of 20.4 deaths per 100,000 residents. Total opioid-related deaths in Calhoun County residents have increased each year from 2013 to 2018. In 2018, the average age of a Calhoun County resident who died of an accidental or indeterminate opioid-related death was 45 years. An additional 5,690 years of life would have been lived if Calhoun County residents who died of an accidental or indeterminate opioid-related death from 2015 to 2018 had not died prematurely.

The Fentanyl Epidemic

Fentanyl-related deaths in Calhoun County increased from 6 in 2015 to 38 (35 Calhoun residents) in 2018. Illicitly manufactured fentanyl poses a serious public health threat to Calhoun County.

Drug-related Infections

Calhoun County was designated an outbreak jurisdiction in 2018 as part of Michigan’s Hepatitis A outbreak; 70% of Calhoun resident Hepatitis A cases reported injection drug use. Three hundred new cases of chronic Hepatitis C were diagnosed in Calhoun County among those aged 18-39 years from 2014 to 2018; for the year 2018, 85% of these cases for which data was available reported injection drug use. From 2016 to 2018, Calhoun County cases of serious soft tissue, bone, and heart valve infections associated with drug use all increased and resulted in prolonged and expensive hospitalizations. Drug-related infections pose serious health and financial consequences for Calhoun County residents.

Future Steps

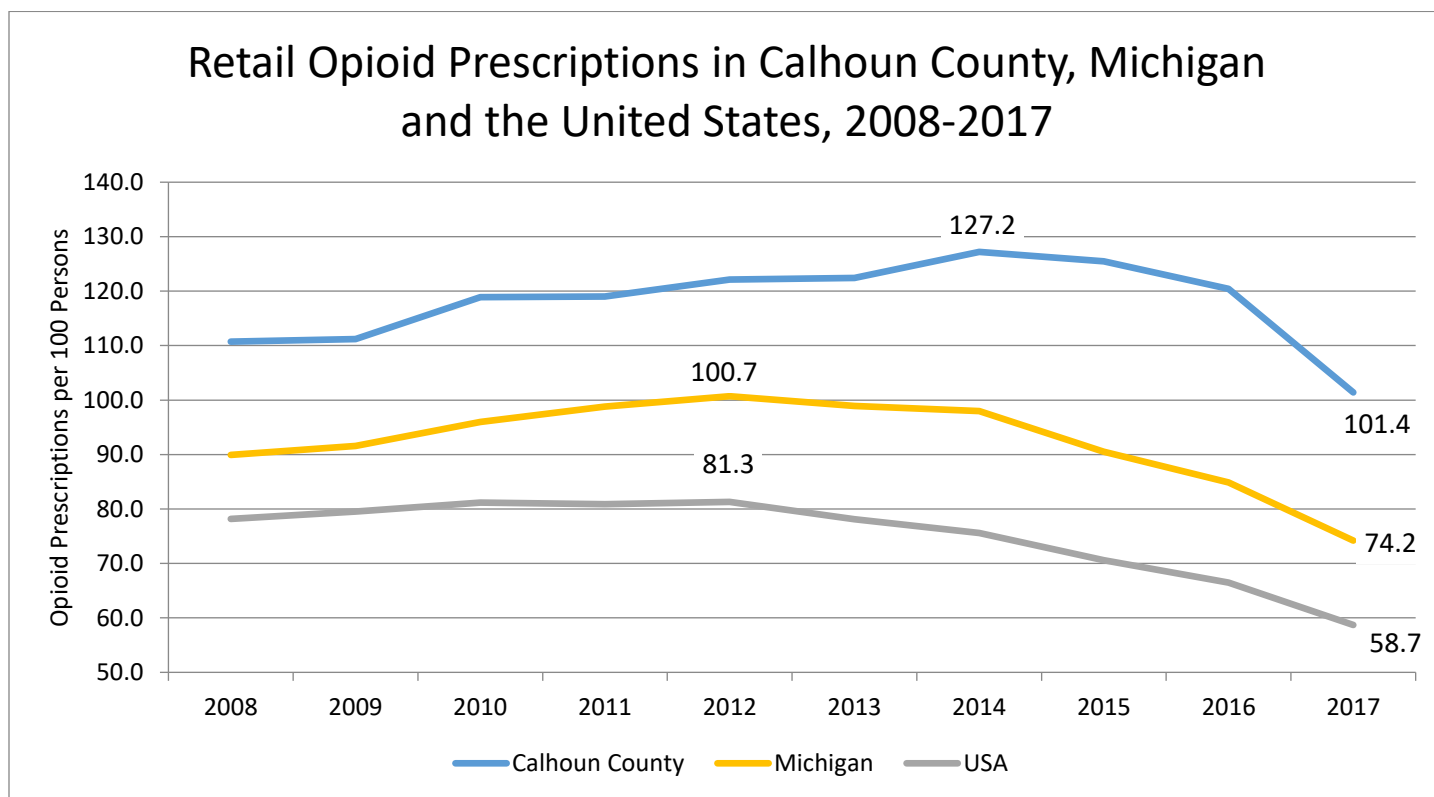
A multi-sector, collaborative approach across communities is required to confront the opioid epidemic. Key strategic priorities include prevention and education, supply and control of opioids, treatment access across a continuum of care, and the reduction of fatal overdoses and the spread of infectious disease through harm reduction efforts. The Calhoun County Opioid Coalition aims to address the opioid epidemic through the coordination and integration of these four strategic priorities.

Notes: Please refer to data sources, limitations, and definitions in this report for a more complete interpretation of these key points. References denoted by superscripts on report pages are listed at the end of the document.

Retail Opioid Prescribing⁴

The correlation between opioid prescribing practices and the current opioid epidemic has been well established. Figure 1 describes the number of opioid prescriptions dispensed at retail pharmacies per 100 persons in Calhoun County, the State of Michigan, and the United States from 2008 to 2017. Calhoun County opioid prescriptions peaked at 127.2 per 100 persons in 2014 and have decreased each year since. Michigan and the United States' opioid prescriptions peaked in 2012 at 100.7 and 81.3 per 100 persons, respectively. While opioid prescriptions in Calhoun County continue to decrease, they remain above both the state and national rates at 101.4 retail opioid prescriptions per 100 persons as of 2017. Of note, these data report the number of prescriptions, and do not capture the strengths or quantity of opioids dispensed.

Figure 1



Data Definitions

Retail outlets include commercial pharmacies but do not include locations like emergency departments or substance abuse treatment clinics. Rates do not include mail order pharmacy data.

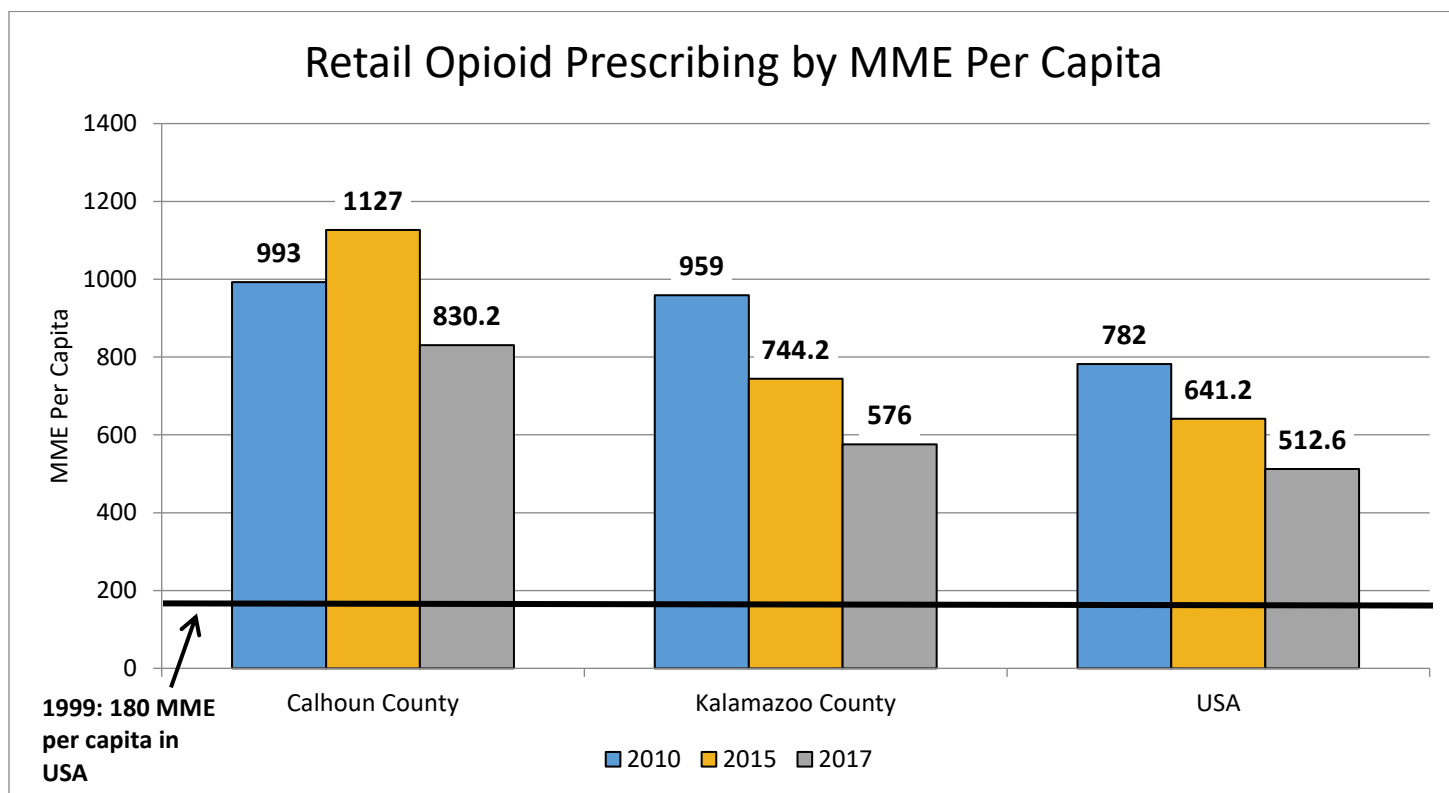
Opioid prescriptions do not include cough/cold medications, buprenorphine, or methadone dispensed through an opioid treatment program in this data set.

Resident population annual denominator estimates were obtained from the Population Estimates Program, U.S. Census Bureau.

Retail Opioid Prescribing^{5, 6}

Another way to examine the burden of opioid prescriptions is to account for the strengths and dosages of the opioids dispensed. **Milligrams of morphine equivalents (MME)** are a way to standardize and compare opioids of different strengths and dosages. MMEs add specificity to opioid prescription supply descriptions in addition to pill count or number of prescriptions alone. Figure 2 describes these MME per capita, or per person, residing in Calhoun County and the United States. From 2015 to 2017, MME per capita decreased by 26.3% in Calhoun County and by 20.1% nationally. Despite this decrease, 2017 Calhoun County retail MME per capita remains higher than the current national average and neighboring Kalamazoo County's average. The 2017 MME per capita in Calhoun County was 4.6 times higher than the national average in 1999 (a time near the onset of the opioid epidemic) of 180 MME per capita.

Figure 2



Data Limitations/Definitions:

Retail outlets include commercial pharmacies but do not include locations like emergency departments or substance abuse treatment clinics.

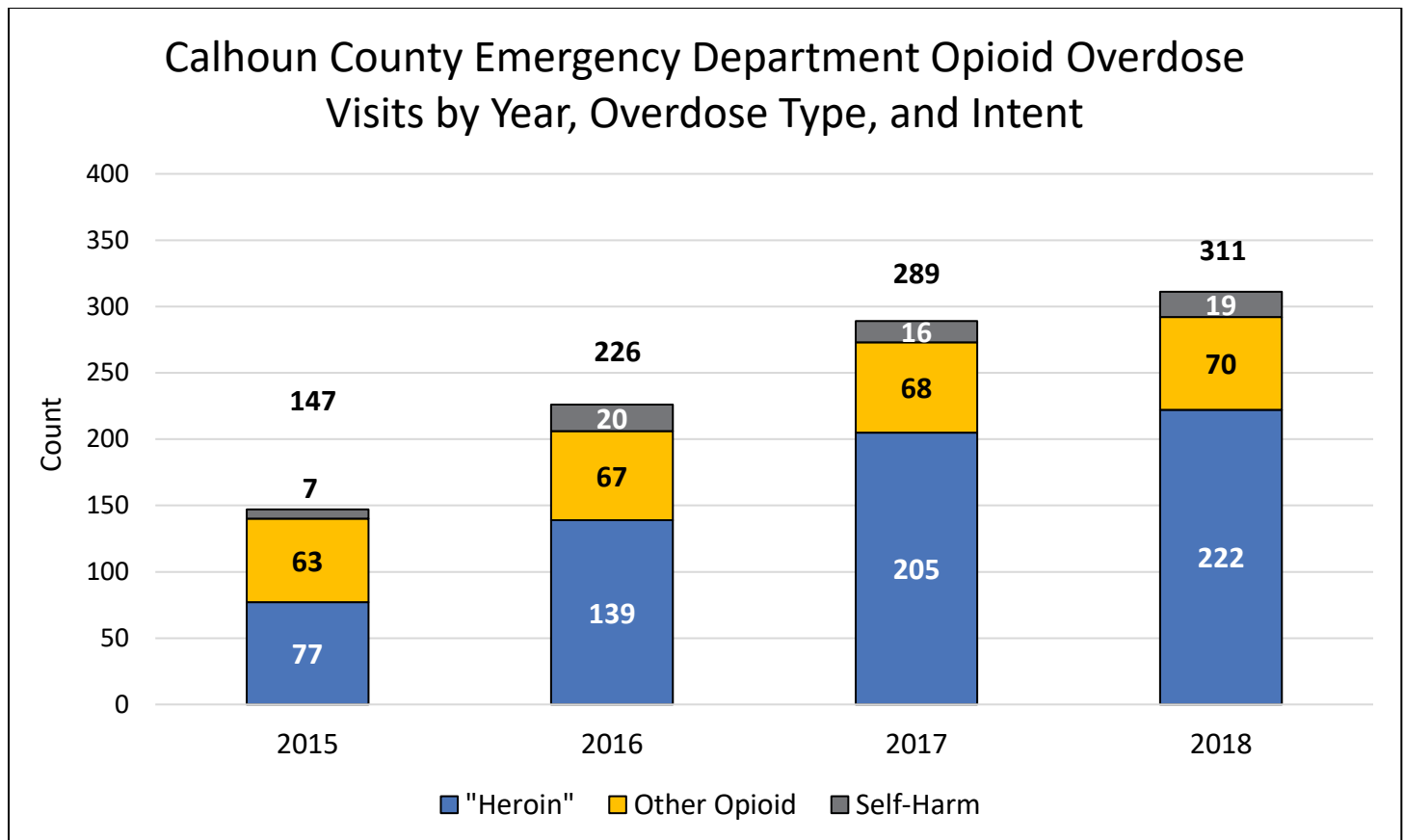
Opioid prescriptions do not include cough/cold medications, buprenorphine, or methadone dispensed through a methadone treatment program in these data sets.

Note: Source 5 provides 2010 data and Source 6 provides data for both 2015 and 2017.

Emergency Department Opioid Overdoses^{7, 8, 9}

Figure 3 illustrates the number of opioid overdoses that presented to an emergency department located within Calhoun County from 2015 to 2018. The total number of opioid overdoses increased from 147 in 2015 to 311 overdoses in 2018. Self-harm opioid overdoses varied by year. Overdoses coded as an opioid other than heroin remained stable from 2015 to 2018. Overdoses coded as “heroin” nearly tripled from 77 in 2015 to 222 in 2018. Despite the significant increase, the 311 opioid overdoses in 2018 accounted for only 0.4% of the 75,536 emergency department visits that occurred in Calhoun County.

Figure 3

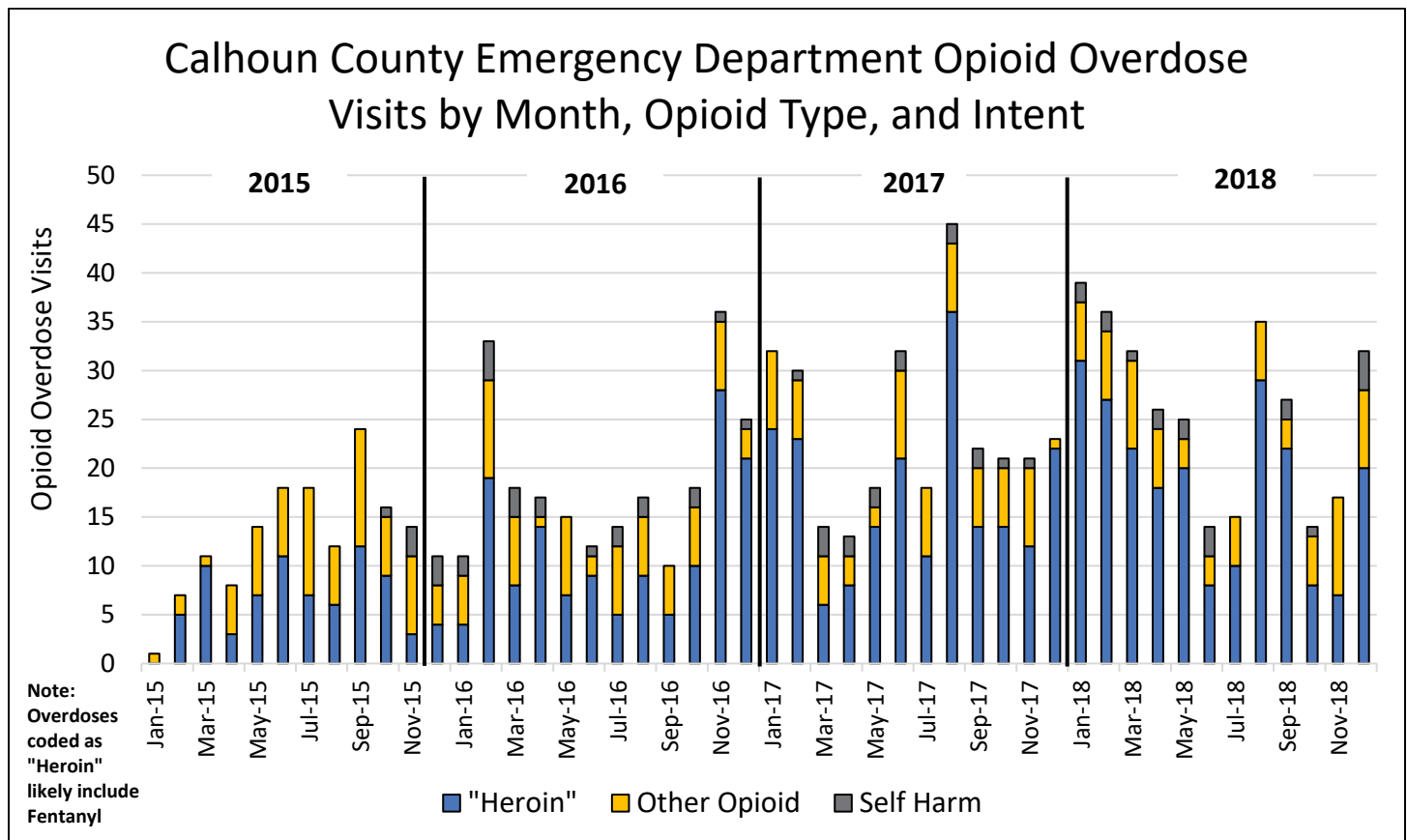


Data Limitations/Definitions: Not all opioid overdoses present to the emergency department. To be counted, a case must arrive at an emergency department in Calhoun County and be coded by a physician, provider, or biller as an opioid-related overdose. These data encompass ICD-9/10 poisoning codes selected by the CCPHD to best capture an opioid overdose. A specifications sheet standardized reporting across two hospitals and two different electronic health record systems. In October 2015, diagnostic coding updated to ICD-10, enabling more specific coding as well as intent designations of overdose as unintentional, undetermined or self-harm. “Heroin” and Other Opioid categories include unintentional, and undetermined overdoses. The self-harm category includes heroin and opioid poisoning codes with intent for suicide or self-harm. Since visit coding is based mostly on history and physical exam and not toxicology, overdoses coded as “heroin”-related in the emergency department likely include fentanyl-related overdoses. The same individual can have multiple visits.

Emergency Department Opioid Overdoses^{7, 8}

Figure 4 illustrates the number of opioid overdoses that presented to an emergency department located within Calhoun County by month from 2015 to 2018. Months with more than 30 overdoses include February 2016, November 2016, January 2017, June 2017, August 2017, January 2018, February 2018, March 2018, August 2018, and December 2018. Of note, visits coded as an opioid other than heroin have low variability by month. However, “heroin” coded visits demonstrate higher variability. This observation likely correlates to the variable potency of heroin and fentanyl present in Calhoun County at a given time.

Figure 4

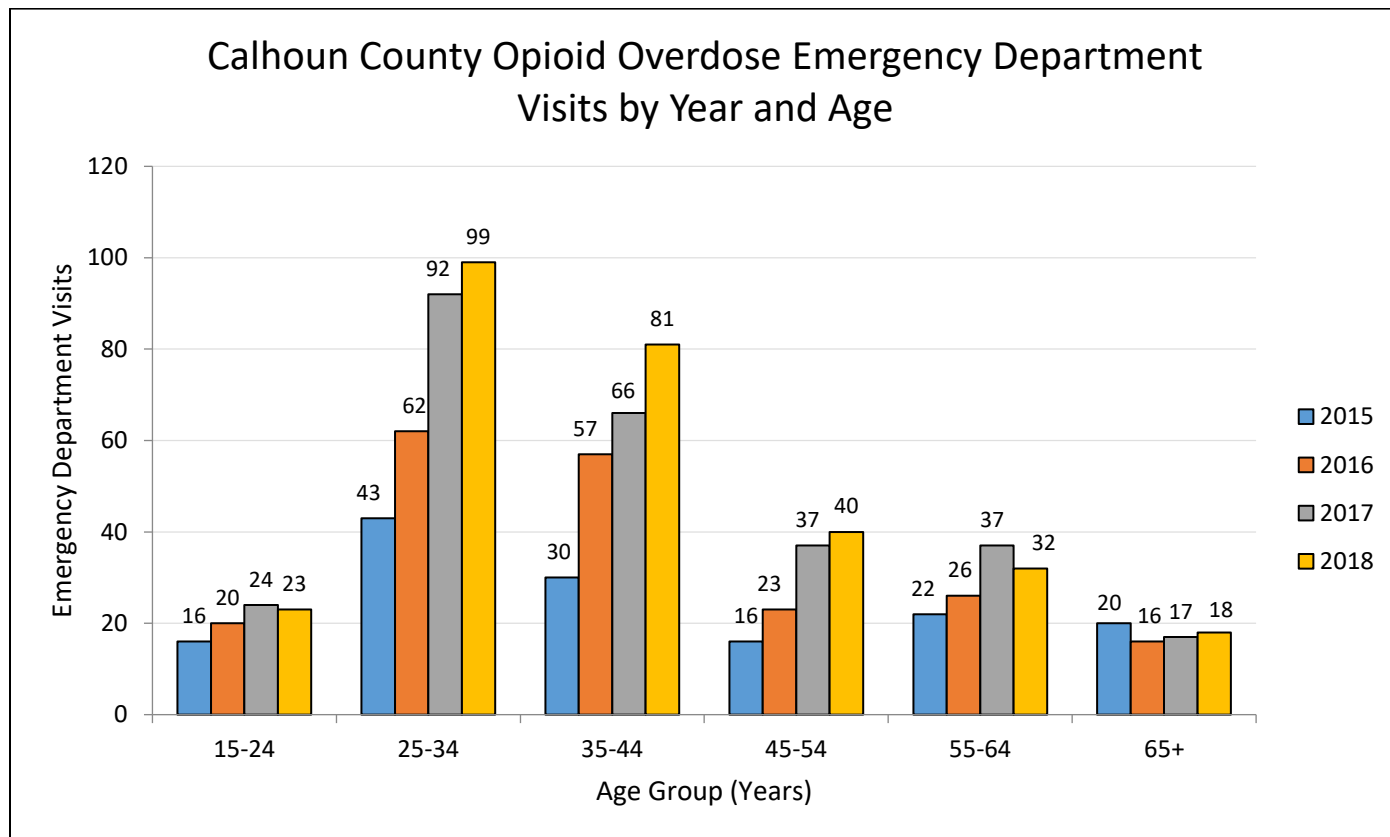


Data Limitations/Definitions: Not all opioid overdoses present to the emergency department. To be counted, a case must arrive at an emergency department in Calhoun County and be coded by a physician, provider, or biller as an opioid-related overdose. These data encompass ICD-9/10 poisoning codes selected by CCPHD to best capture an opioid overdose. A specifications sheet standardized reporting across two hospitals and two different electronic health record systems. In October 2015, diagnostic coding updated to ICD-10, enabling more specific coding and also intent designations of an overdose as unintentional, undetermined, and self-harm. “Heroin” and other opioid categories include unintentional and undetermined overdoses. The self-harm category includes heroin and opioid poisoning codes with intent for suicide or self-harm. Since visit coding is based mostly on history and physical exam and not toxicology, overdoses coded as “heroin”-related in the emergency department likely include fentanyl-related overdoses. The same individual can have multiple visits.

Emergency Department Opioid Overdoses^{7, 8}

Emergency department visits for unintentional and undetermined opioid overdose consistently increased from 2015 to 2018 in the age groups 25-34, 35-44, and 45-54. The age group of 25-34 year olds experienced the highest number of opioid overdoses from 2015 to 2018.

Figure 5



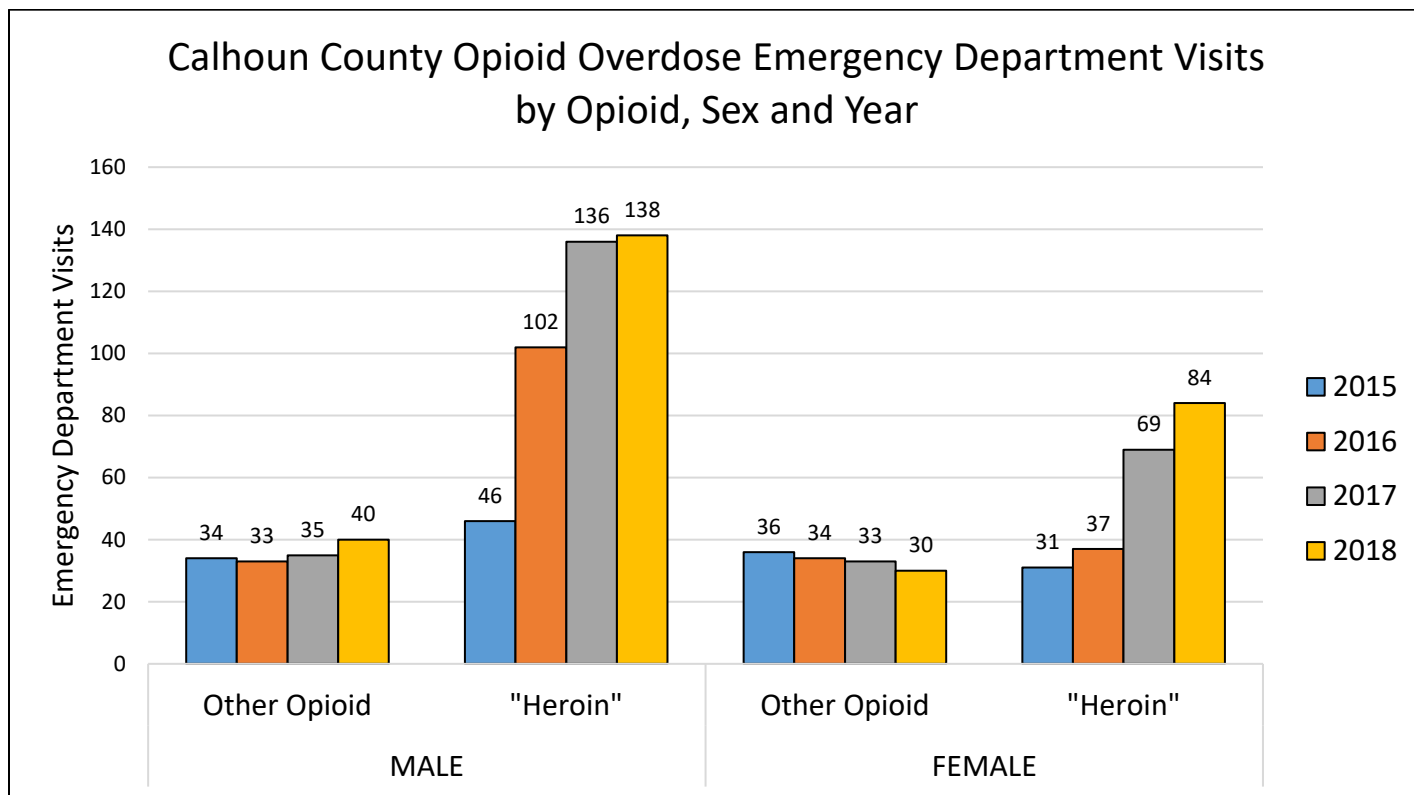
Note: Figures 5 & 6 do not include self-harm visits

Data Limitations/Definitions: Not all opioid overdoses present to the emergency department. To be counted, a case must arrive at an emergency department in Calhoun County and be coded by a physician, provider, or biller as an opioid-related overdose. These data encompass ICD-9/10 poisoning codes selected by CCPHD to best capture an opioid overdose. Since visit coding is based mostly on history and physical exam and not toxicology, overdoses coded as heroin-related in the emergency department likely include fentanyl-related overdoses.

Emergency Department Opioid Overdoses^{7, 8}

More males than females present to the emergency department for a “heroin” overdose. Emergency department visits for an opioid overdose other than heroin remained relatively unchanged for males and females from 2015 to 2018. Visits coded as “heroin” tripled for males from 2015 to 2018. Overdose visits coded as “heroin” nearly tripled for females from 2015 to 2018. Of the 919 emergency department visits for an unintentional or undetermined opioid overdose from 2015 to 2018, 82% (749 visits) were a Calhoun County resident by zip code status.

Figure 6



Note: Figures 5 & 6 do not include self-harm visits

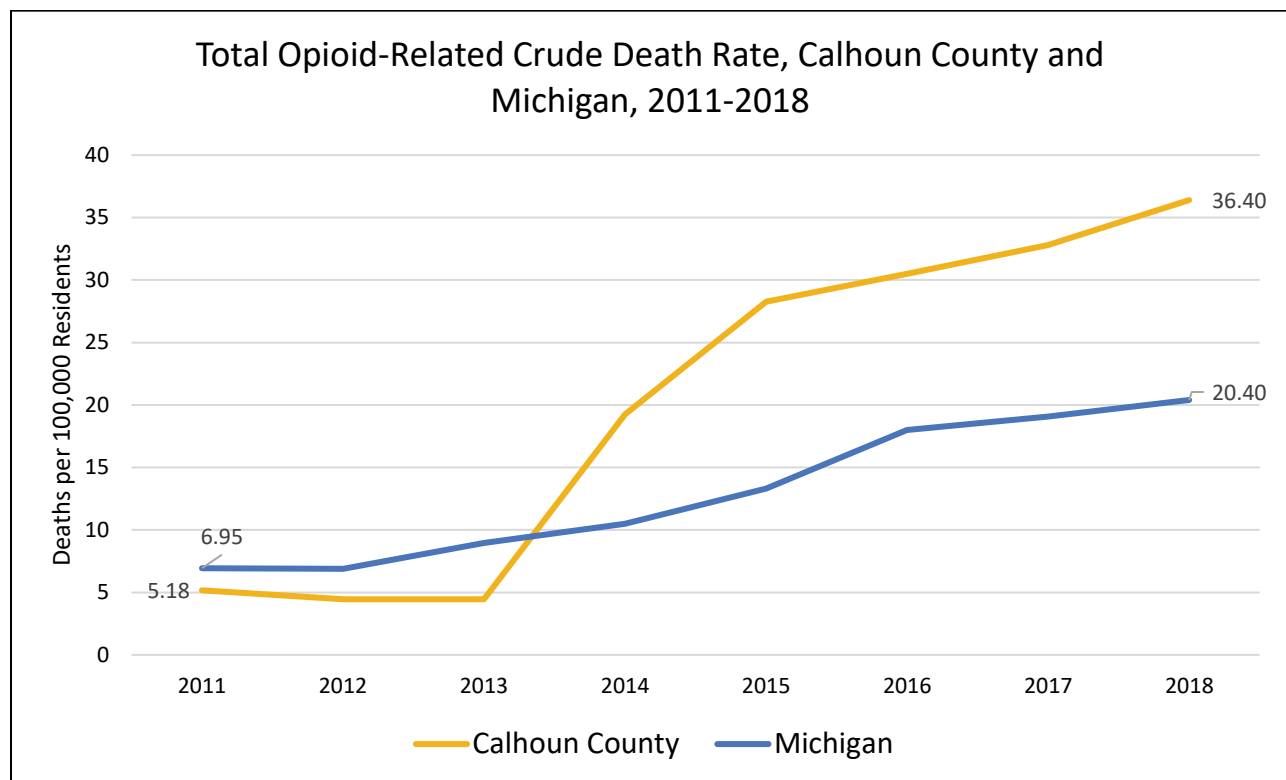
Data Limitations/Definitions: Not all opioid overdoses present to the emergency department. To be counted, a case must arrive at an emergency department in Calhoun County and be coded by a physician, provider, or biller as an opioid-related overdose. These data encompass ICD-9/10 poisoning codes selected by CCPHD to best capture an opioid overdose. Since visit coding is based mostly on history and physical exam and not toxicology, overdoses coded as “heroin”-related in the emergency department likely include fentanyl-related overdoses.

2011-2018 Opioid-Related Vital Statistics¹⁰

Vital statistics include events such as births or deaths that occur in residents of a particular geographic area, most often regardless of where the event occurred. Unlike medical examiner data, vital statistics for drug-related deaths are recorded by county of residence rather than the location of death. Documenting events by county or state of residence enables public health program planning and comparison across counties, states, and nations. In 2018, Calhoun County's crude total opioid-related death rate of 36.4 deaths per 100,000 residents was higher than Michigan's 2018 crude rate of 20.4 deaths per 100,000 residents.

Year	2011	2012	2013	2014	2015	2016	2017	2018
#	7	6	6	26	38	41	44	49

Figure 7

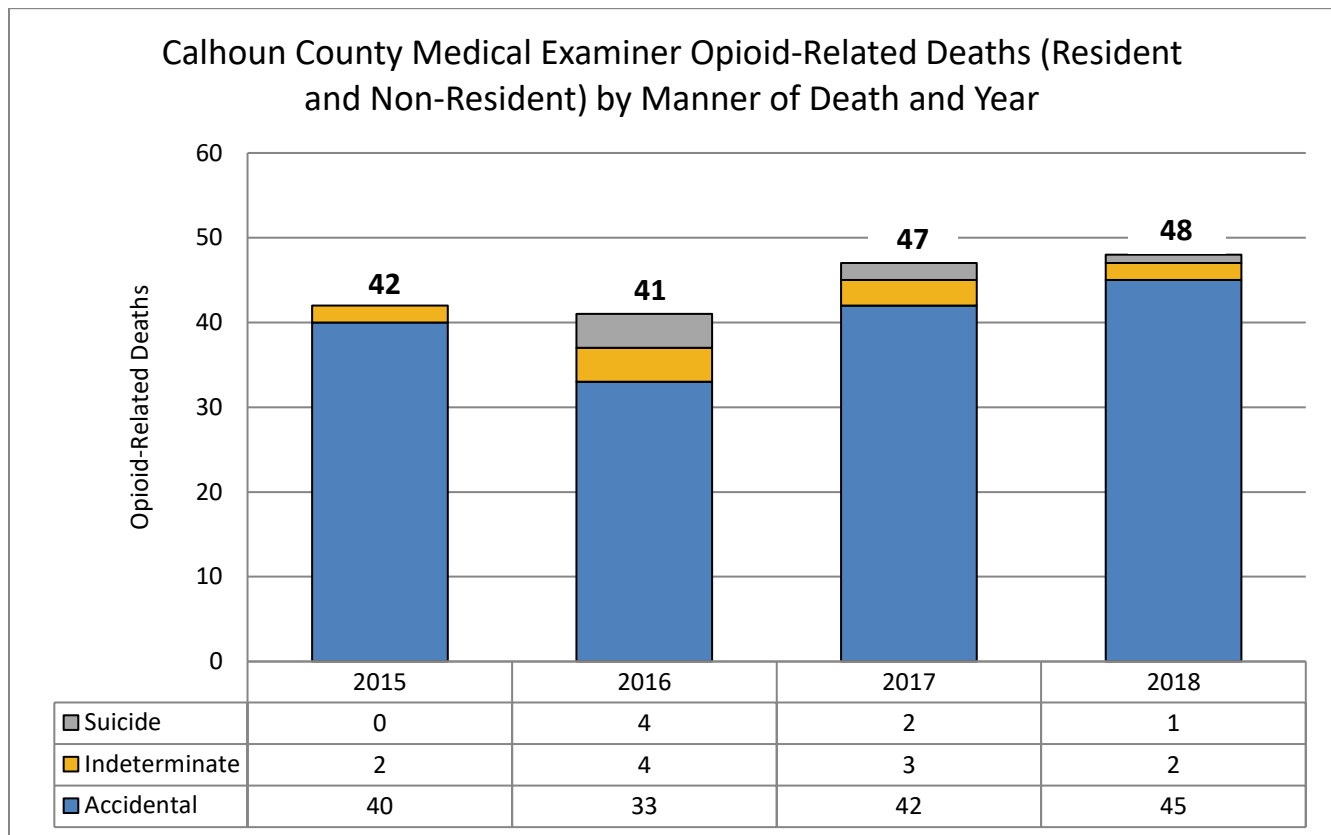


Data Limitations/Definitions: Vital statistics are recorded by county of residence, not location of death. The rates of this graph are not adjusted for age. The graph is this meant to serve as a rough comparison of opioid-related death trends between Calhoun County and Michigan, not other states. This data set comes from the Michigan Department of Health and Human Services (MDHHS). The data set includes all manners of death: underlying causes of unintentional drug poisoning (X40-X44), suicide drug poisoning (X60-X64), or undetermined intent drug poisoning (Y10-Y14). It includes ICD-10 codes for heroin (T40.1), other opioids (T40.2), methadone (T40.3), other synthetic narcotics (T40.4), opium (T40.0), and unspecified opioids (T40.6).

Medical Examiner Opioid-Related Deaths¹¹

The Western Michigan University Homer Stryker M.D. School of Medicine (WMed) Office of the Medical Examiner, through death scene investigation and evaluation by board-certified forensic pathologists, has determined both the cause and manner of death of those who die from apparent alcohol, drug, or poison intoxication in Calhoun County since 2014. CCPHD counted an opioid-related death as a death with an opioid listed on the MDHHS death certificate as an immediate cause, underlying cause, or as a significant condition contributing to the death. This differs slightly from MDHHS and CDC methodology, which is based on underlying cause of death only. Accidental and indeterminate deaths describe what is commonly referred to as an “overdose.” Figure 8 shows total opioid related deaths remain elevated in Calhoun County from 2015 to 2018.

Figure 8

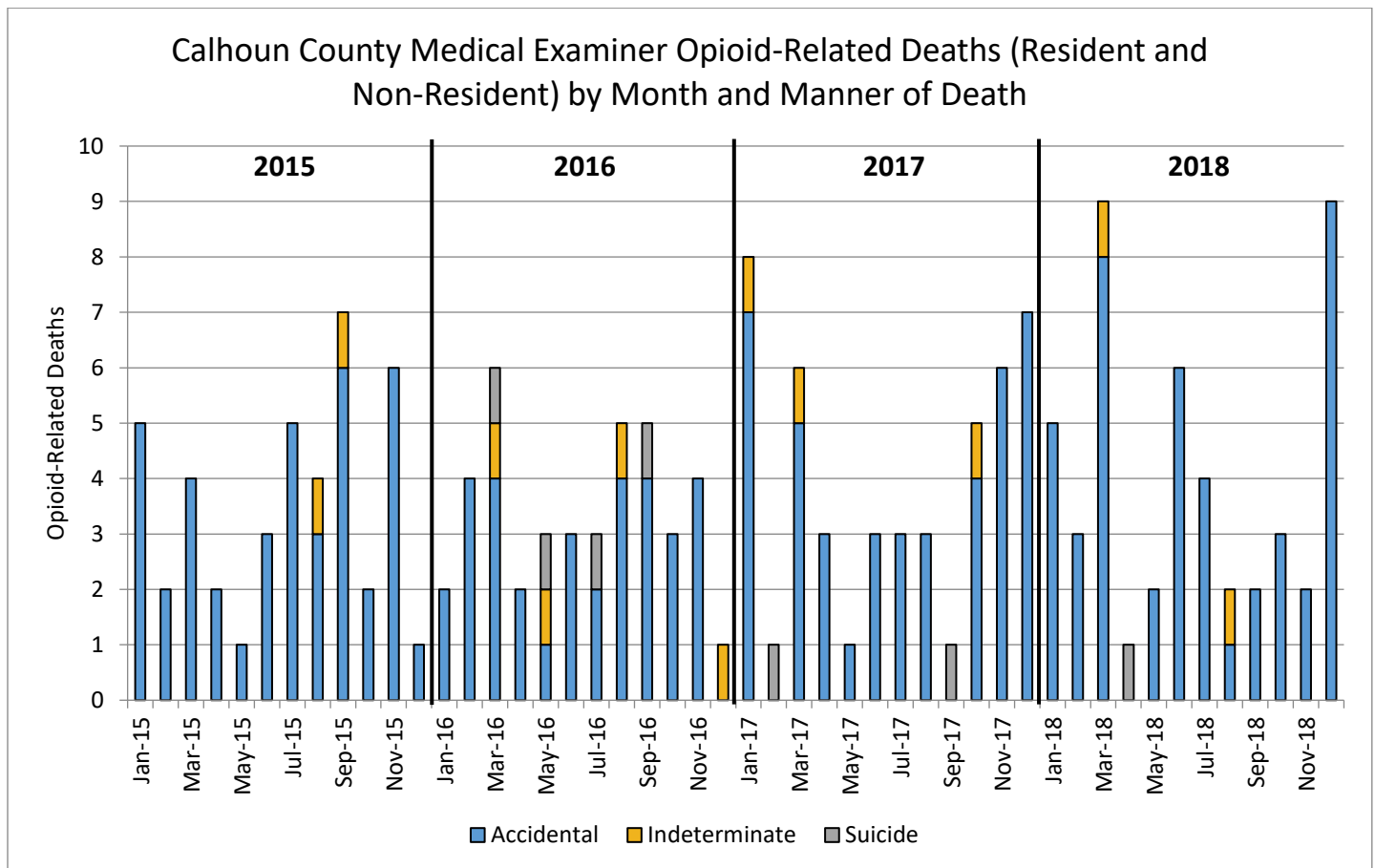


Data Limitations/Definitions: Board-certified forensic pathologists, in accordance with recommendations by the National Association of Medical Examiners, determined the cause and manner of these deaths. MDHHS death certificates include a list of the immediate cause of death and underlying cause of death (Part I) and other significant conditions contributing to death (Part II). Immediate cause of death includes the final disease or conditions that resulted in death. Underlying cause of death includes the disease or injury that initiated the events leading to death. An immediate cause can be the same as the underlying cause if only one cause is listed. Other significant conditions include conditions that contribute to death but do not result in the underlying cause of death. Manners of death include accidental, indeterminate, and suicide. Counts are by date of death rather than pronounced date of death. Medical examiner data are determined by location of death (within Calhoun County), not decedent county of residence. Vital statistics on page 13 will therefore differ from these figures.

Medical Examiner Opioid-Related Deaths¹¹

The WMed Office of the Medical Examiner, through death scene investigation and evaluation by board-certified forensic pathologists, determine both the cause and manner of death of those who die from apparent alcohol, drug, or poison intoxications in Calhoun County since 2014. CCPHD counted an opioid-related death as a death with an opioid listed on the MDHHS death certificate as an underlying cause or as a significant condition contributing to the death. This differs slightly from MDHHS and CDC methodology, which is currently based on underlying cause of death only. Accidental and indeterminate deaths describe what is commonly referred to as an “overdose.” Figure 9 shows opioid-related deaths varying by month. Peak months with at least seven accidental or indeterminate deaths include September 2015, January 2017, December 2017, March 2018, and December 2018.

Figure 9



Data Limitations/Definitions: Board-certified forensic pathologists, in accordance with recommendations by the National Association of Medical Examiners, determined the cause and manner of these deaths. MDHHS death certificates include a list of the immediate cause of death and underlying cause of death (Part I) and other significant conditions contributing to death (Part II). Immediate cause of death includes the final disease or conditions that resulted in death. Underlying cause of death includes the disease or injury that initiated the events leading to death. An immediate cause can be the same as the underlying cause if only one cause is listed. Other significant conditions include conditions that contribute to death but do not result in the underlying cause of death. Manners of death include conditions accidental, indeterminate, and suicide. Counts are by date of death rather than pronounced date of death. Medical examiner data are determined by location of death (within Calhoun County), not decedent county of residence. Vital statistics on page 13 will therefore differ from these figures.

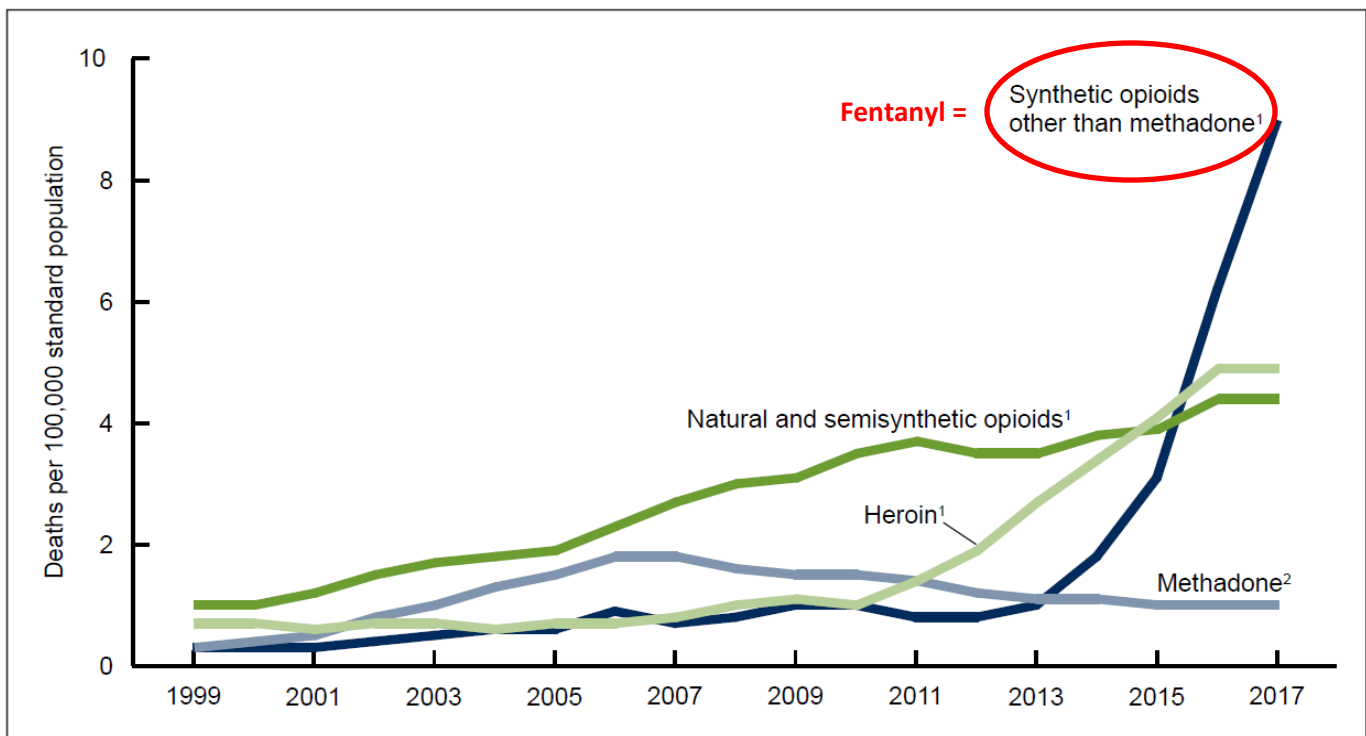
Introduction to the Fentanyl Epidemic^{12,13,14}

Fentanyl is a very powerful synthetic opioid that is 50 to 100 times more potent than morphine. Fentanyl can be prescribed by a licensed healthcare professional or produced illicitly. As a schedule II drug, it is prescribed for treatment of severe pain and in relation to surgery. Prescription forms of fentanyl include injections, skin patches, or lozenges under the brand names such as Sublimaze®, Duragesic®, and Actiq®. In contrast, illicitly manufactured fentanyl (IMF) is produced in clandestine laboratories and has emerged across the United States, predominantly in the Midwest and Northeast, as an increasing driver of the opioid overdose epidemic. IMF can be distributed as a powder, spiked on blotter paper, mixed with heroin, or formulated as tablets that mimic the appearance of other opioids. Thus, IMF can be swallowed, snorted, injected, or absorbed on the mouth's mucous membranes. IMF also includes many novel chemical variations of fentanyl called fentanyl analogs such as carfentanyl, furanylfentanyl, and acetylfentanyl. The National Institute on Drug Abuse notes street names for fentanyl or fentanyl-laced heroin include Apache, China Girl, China White, Dance Fever, Friend, Goodfella, Jackpot, Murder 8, TNT, Tango, and Cash.

IMF presents several challenges to public health surveillance. First, a person may not be aware of the presence of IMF mixed with heroin or in illicitly purchased tablets. This fact along with the high potency of IMF makes it easier to overdose. Second, the detection of fentanyl analogs requires costly, specialized testing available only at a limited number of laboratories.

Figure 10 shows age-adjusted death rates by opioid category from 1999-2017 for the United States. Prescription opioids (natural and semisynthetic opioids) contributed to the highest rate from 1999 to 2014. From 2015 to 2017, the rate for overdose attributed to synthetic opioids (mostly fentanyl and fentanyl analogs) increased from 3.1 to 9.0 per 100,000 people, nearly double the prescription and heroin-related death rates.

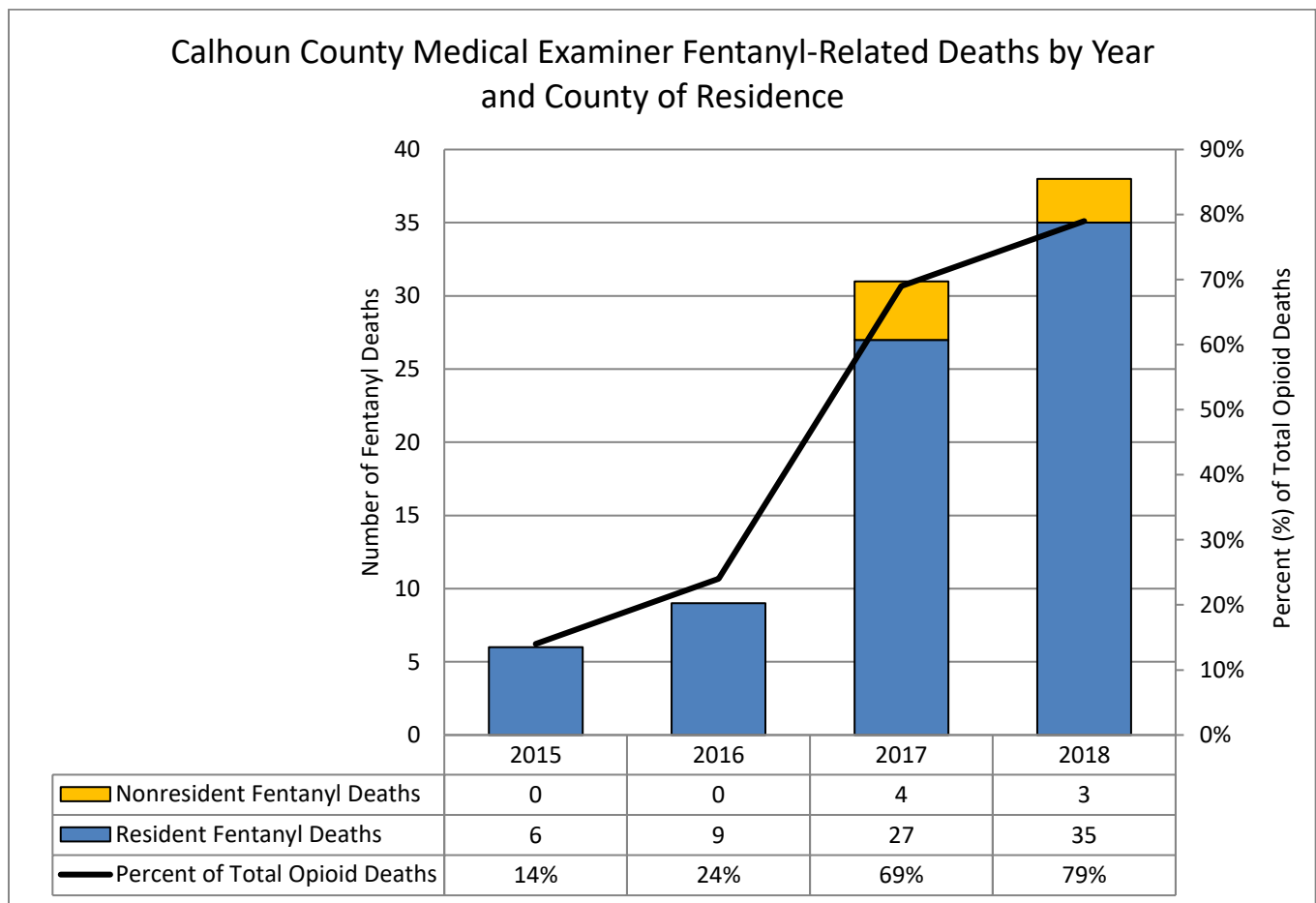
Figure 10



The Fentanyl Epidemic in Calhoun County¹¹

Figure 11 illustrates fentanyl-related deaths by year, county of residence, and percentages of total Calhoun County resident opioid-related deaths. The blue bar represents the number of Calhoun County resident fentanyl-related deaths. The yellow bar represents the number of Calhoun County nonresident fentanyl-related deaths. The black line represents the percentages of total Calhoun County resident opioid-related deaths that included fentanyl. **Illicitly manufactured fentanyl (IMF) is now driving the opioid overdose epidemic in Calhoun County and poses a serious public health threat.** Calhoun County resident fentanyl-related deaths increased from 6 deaths in 2015 to 35 in 2018. In 2018, 79% of total resident accidental and indeterminate opioid-related deaths involved fentanyl. This trend most likely reflects a true increase in the incidence of fentanyl-related deaths and the prevalence of IMF in Calhoun County as opposed to increased detection of fentanyl or fentanyl analogs. While fentanyl testing has been routine, fentanyl analog testing by the Calhoun County Medical Examiner began to increase in October 2016. From 2015 to 2018, 15 of the 84 fentanyl-related deaths that occurred in Calhoun County involved a fentanyl analog; a majority occurring in 2018.

Figure 11



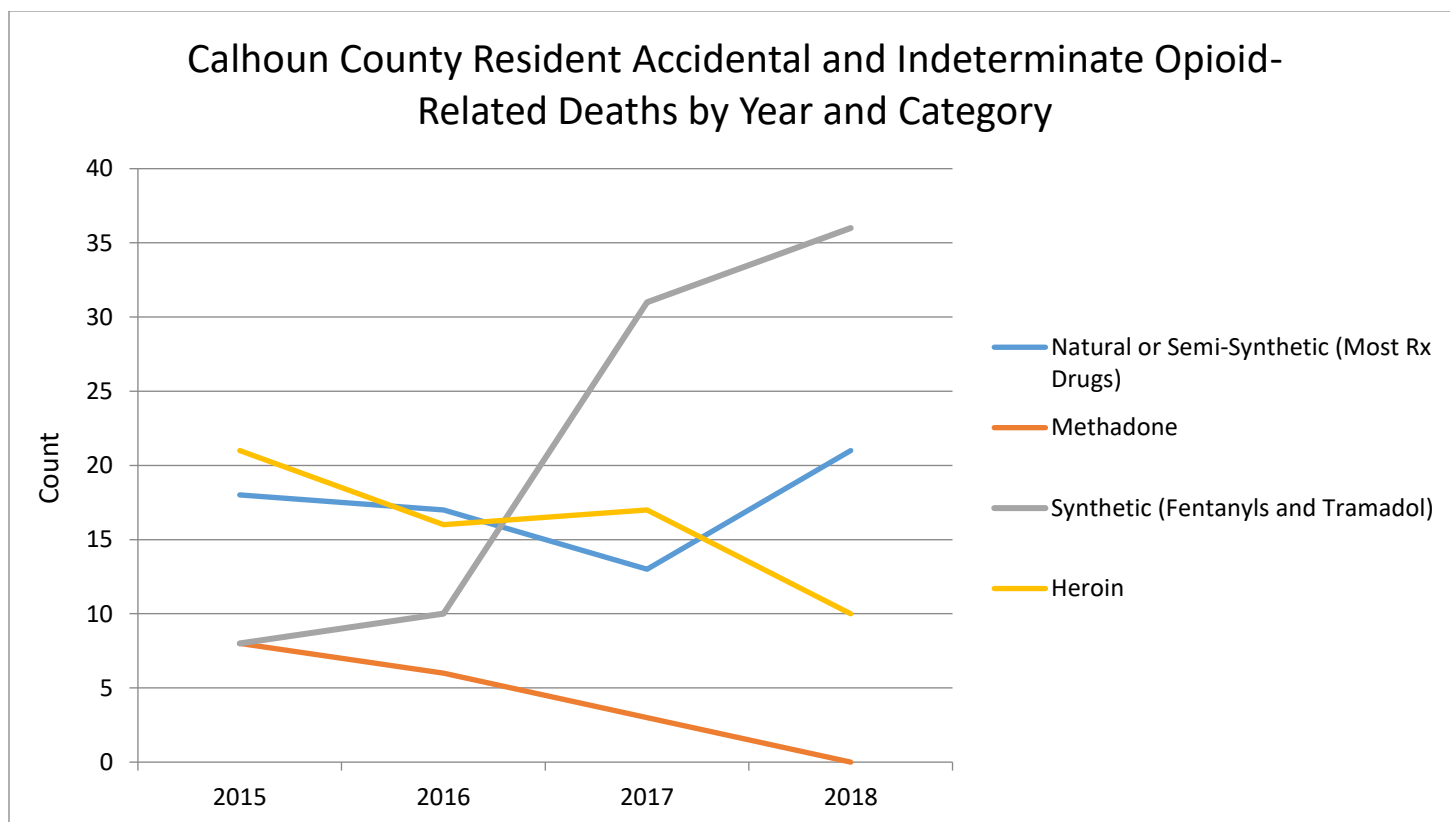
Data Limitations/Definitions: CCPHD counted a fentanyl-related death as a death with fentanyl listed on the MDHHS death certificate as an underlying cause or as a significant condition contributing to the death. These data include accidental and indeterminate deaths identified by the methods described on page 14.

Non-Exclusive Opioid-Related Deaths by Category^{11,15}

The Centers for Disease Control and Prevention (CDC) categorizes opioids into four groups: natural or semi-synthetic opioids, synthetic opioids, methadone, and heroin. Natural or semi-synthetic opioids include most prescription opioid drugs such as morphine, codeine, oxycodone (e.g., Oxycontin®), hydrocodone (e.g., Vicodin), hydromorphone (e.g., Dilaudid®), oxymorphone (e.g., Opana®) and buprenorphine (Subtex® or Suboxone®). Synthetic opioids include fentanyl, fentanyl analogs, and tramadol (Ultram®). Methadone is a separate synthetic opioid that can be prescribed for both pain and opioid dependence or addiction. Heroin is an illicit opioid that can be injected, snorted or smoked.

Natural or semi-synthetic opioid-related deaths increased from 2017 to 2018. Heroin-related deaths have decreased from 2015 to 2018. Methadone associated deaths have decreased each year since 2015. **Synthetic opioid-related deaths increased by four times from a count of 8 in 2015 to 36 in 2018.** This likely reflects a true increase in the incidence of fentanyl-related deaths and the prevalence IMF in Calhoun County. See pages 16 and 17 for additional details regarding fentanyl-related deaths.

Figure 12



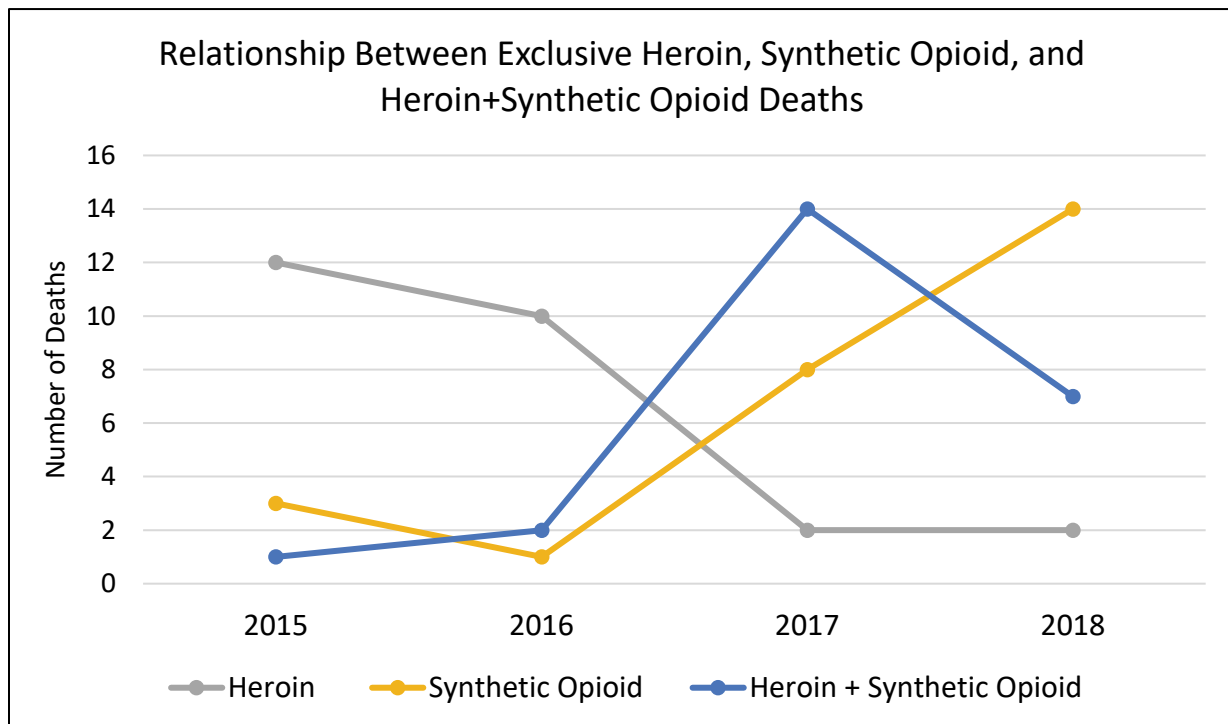
Data Limitations/Definitions: Most drug-related deaths involve more than one drug or opioid. Therefore, the listed opioid categories are not mutually exclusive and do not sum to the total opioid-related deaths. Accidental and indeterminate deaths describe what is commonly referred to as an “overdose.” Medical examiner data is by location of death, not county of residence. Vital statistics will therefore differ from these figures.

Exclusive Opioid-Related Deaths by Category Combinations¹¹

Table 2 lists all the opioid category combinations found in Calhoun County residents who died of an accidental or indeterminate opioid-related death from 2015 to 2018 within Calhoun County. Unlike Table 4 and Figure 12 of opioid category analysis, Table 2 data is mutually exclusive and sums to total resident accidental and indeterminate opioid-related deaths by year. If more than one opioid from the same category was present in the same decedent, only one count for the category was included. Table 2 does not include residents who may have died outside of Calhoun County or non-residents who died within Calhoun County. Figure 13 shows opioid-related deaths due exclusively to synthetic opioids increased every year since 2015 while exclusive heroin and heroin + synthetic opioid deaths remained stable and decreased, respectively, from 2017 to 2018.

Exclusive Category	2015	2016	2017	2018
Heroin	12	10	2	2
Methadone	5	3	0	0
Methadone, Heroin	2	0	1	0
Methadone, Synthetic Opioid	0	0	1	0
Methadone, Synthetic Opioid, Heroin	0	2	0	0
Natural Opioid Analgesics	5	0	0	6
Natural Opioid Analgesics, Heroin	1	1	1	0
Natural Opioid Analgesic, Methadone	3	3	8	0
Natural Opioid Analgesic, Synthetic Opioid	1	2	0	14
Natural Opioid Analgesics, Synthetic Opioid, Heroin	8	11	4	1
Synthetic Opioid	3	1	8	14
Synthetic Opioid, Heroin	1	2	14	7
Total	41	35	39	44

Figure 13



Drug and Opioid-Related Death Demographics¹¹

The drug and opioid demographic tables on pages 20-24 include those who died from apparent alcohol, drug, or poison intoxication within Calhoun County. Drug-related deaths were determined by CCPHD using the same method as opioid-related deaths outline on pages 14-15. An opioid-related death is a subset of drug-related deaths. This report does not include deaths due to long-term, (i.e., chronic) substance use such as alcoholic liver disease, infection or deaths due to an injury involving a substance such as a motor vehicle accident. The drug-related death tables on pages 23-24 are by Calhoun County residency and all manners of death (accidental, indeterminate, and suicide). Given the interest in deaths due to opioid overdose, the opioid-related death demographics on pages 21-22 are by Calhoun County residency and accidental and indeterminate manners of death only.

Most drug and opioid-related deaths involve more than one substance (polysubstance). In 2018, 84% of Calhoun County resident drug-related deaths involved more than one substance. For Calhoun County residents, the 4-year average sex-specific rate for opioid-related overdose was roughly 1.5 times higher in males compared to females. Although the number of whites who died from an opioid overdose from 2015 to 2018 was 7.2 times higher than blacks, the race-specific rate was not significantly different between blacks and whites. The age groups between 25-54 years comprised the majority of accidental and indeterminate opioid-related deaths with the highest age-specific rate in the 35-44 year age group.

Table 3: Years of Potential Life Lost (YPLL) Due to Opioid-Related Deaths among Calhoun County Residents by Manner of Death				
Manner of Death	2015	2016	2017	2018
Accidental + Indeterminate	1326	1170	1347	1306
Suicide	0	44	53	16
Total	1326	1214	1400	1322

Years of Potential Life Lost (YPLL) is a measure that attempts to capture the burden of premature death that occurs prior to an average lifespan of 75 years. The number of YPLL is calculated by taking the difference between the ages of a person at death and the 75 years among those who die before their 75th year. In 2018, 1,306 years of potential life were lost among Calhoun County residents who died of an accidental or indeterminate opioid-related death (Table 3).

Drug-related deaths can be characterized as an injury-related death. Regardless of county of residence, where a person uses a substance in relation to where a person dies matters, because behaviors can be targeted for prevention and treatment interventions in the environment they occur. Location of death, such as a home or hospital, may also indicate severity of injury, medical transport, and opportunity for intervention. The majority of all drug and opioid-related deaths that occur in Calhoun County occur among Calhoun County residents (93%).

Medical Examiner Opioid-Related Death Demographics¹¹

Table 4: Calhoun County Opioid-Related Deaths, 2015-2018								
Category	2015		2016		2017		2018	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Residency								
Calhoun Resident	41	98%	39	95%	41	87%	44	92%
Non-Calhoun Resident	1	2%	2	5%	6	13%	4	8%
Total	42	100%	41	100%	47	100%	48	100%
Percent of Resident Opioid-Related Deaths								
Manner of Death								
Accidental	39	95%	31	80%	37	90%	41	93%
Indeterminate	2	5%	4	10%	2	5%	2	5%
Suicide	0	0%	0	0%	2	5%	1	2%
Percent of Resident Accidental and Indeterminate Opioid-Related Deaths								
Substance								
Any alcohol	9	22%	2	6%	11	28%	8	19%
Any benzodiazepine	27	66%	14	40%	15	39%	13	30%
Any cocaine	9	22%	9	26%	11	28%	11	26%
Any methamphetamine	2	5%	2	6%	5	13%	2	5%
Any fentanyl	6	15%	9	26%	27	69%	35	81%
Any tramadol	2	5%	1	3%	4	10%	3	7%
Polysubstance	36	88%	30	86%	38	97%	40	93%
Opioid Category								
Natural or Semi-synthetic	18	45%	17	49%	13	33%	21	49%
Methadone	8	19%	6	17%	3	8%	0	0%
Synthetic	8	19%	10	29%	31	79%	36	84%
Heroin	21	52%	16	46%	17	44%	10	23%

Data Limitations/Definitions: Substances and opioid categories are not mutually exclusive and do not sum to total figures. The manner of death, substance and opioid category data in Table 4 does not include Calhoun residents who may have died outside of Calhoun County or nonresidents who died in Calhoun County.

Medical Examiner Opioid-Related Death Demographics¹¹

Table 5: 2015-2018 Combined Resident Accidental and Indeterminate Opioid-Related Death Demographics			
	N	4-Year Average Rate	95% CI
Sex			
Male	97	36.9	35.72 - 38.16
Female	62	22.6	21.61 - 23.53
Race			
White	137	31	30.43 - 31.65
Black	19	32.8	27.13 - 38.50
Other	3	---	---
Age Group			
15-24	7	9.9	2.05 - 17.73
25-34	35	54.6	52.54 - 56.65
35-44	50	78.2	74.11 - 82.37
45-54	41	57	52.37 - 61.60
55-64	18	24.2	20.73 - 27.62
65+	8	9	4.65 - 13.33

Sex, race and age-specific rates were calculated as a 4-year average given the small numbers in some groups. Rates are per 100,000 people and use 2013-2017 American Census Survey 5-Year Estimates for Calhoun County as denominators. This table does not include Calhoun County residents who may have died outside of Calhoun County or nonresidents who died within Calhoun County.

Medical Examiner Drug-Related Death Demographics¹¹

	Table 6: Calhoun County Drug-Related Deaths							
	2015		2016		2017		2018	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Residency								
Calhoun Resident	46	96%	45	96%	43	84%	50	93%
Non-Calhoun Resident	2	4%	2	4%	8	16%	4	7%
Total	48	100%	47	100%	51	100%	54	100%
Percent of Resident Drug-Related Deaths by All Manners of Death								
Manner of Death								
Accidental	43	94%	35	78%	38	88%	45	90%
Indeterminate	2	4%	5	11%	3	7%	2	4%
Suicide	1	2%	5	11%	2	5%	3	6%
Substance								
Any alcohol	10	22%	5	11%	11	26%	8	16%
Any benzodiazepine	28	61%	16	36%	16	37%	13	26%
Any cocaine	11	24%	12	27%	14	28%	14	24%
Any methamphetamine	2	4%	2	4%	5	12%	4	8%
Any opioid	41	89%	39	87%	41	95%	44	88%
Any fentanyl	6	13%	10	22%	28	65%	35	66%
Any tramadol	2	4%	1	2%	4	9%	3	6%
Polysubstance	37	80%	35	78%	40	93%	42	84%
Opioid Category								
Natural or Semi-synthetic	18	39%	20	44%	14	33%	21	42%
Methadone	8	17%	5	11%	3	7%	0	0%
Synthetic	8	17%	11	24%	32	74%	36	72%
Heroin	21	46%	16	36%	17	40%	10	20%

Data Limitations/Definitions: Substances and opioid categories are not mutually exclusive and do not sum to total figures. The manner of death, substance and opioid category data in Table 6 does not include Calhoun County residents who may have died outside of Calhoun County or nonresidents who died in Calhoun County. Both Table 4 and Table 6 use date of death and not the pronounced date of death from the MDHHS death certificate. Please note that Table 6 substance and opioid category analysis is by all manners of death, unlike Tables 4 and 5.

Medical Examiner Drug-Related Death Demographics¹¹

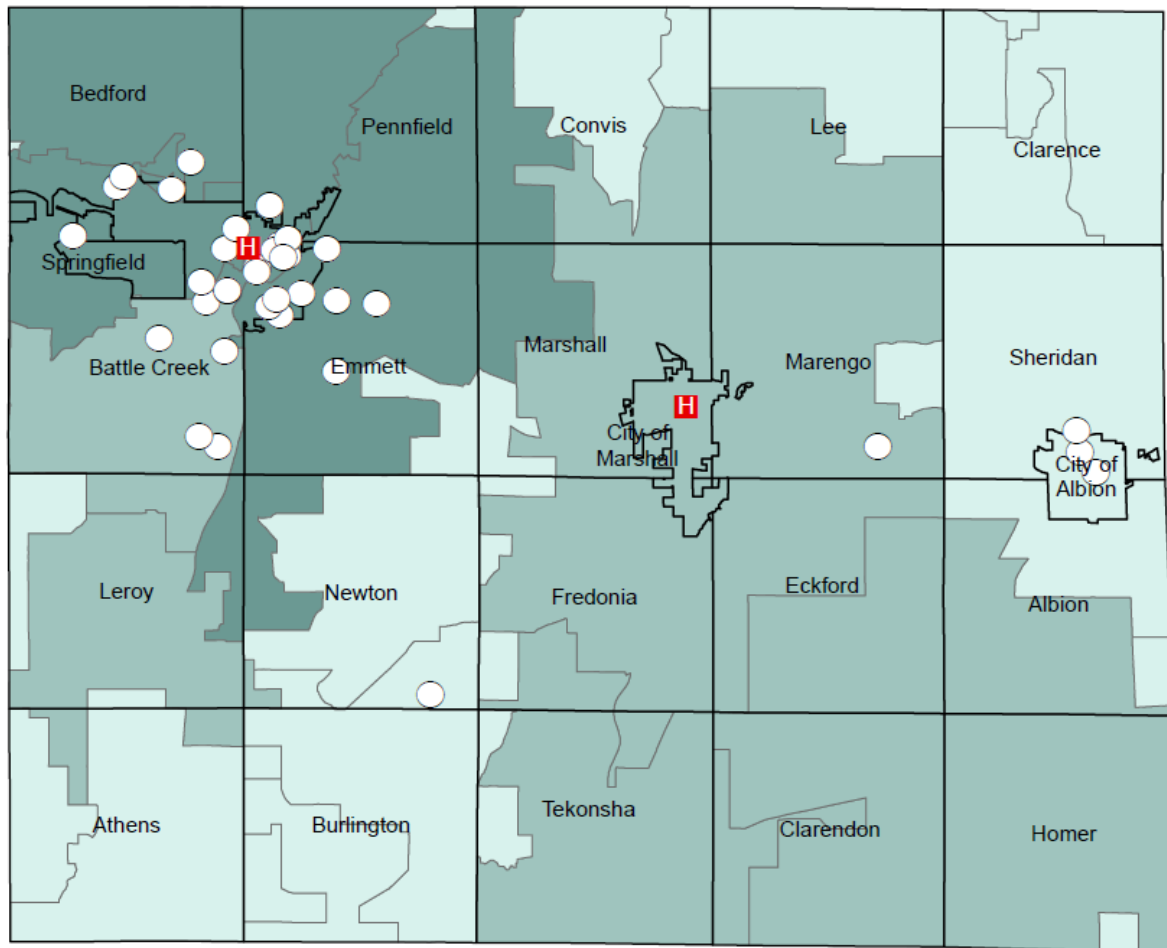
Table 7: 2015-2018 Combined Resident Drug-Related Death Demographics by All Manners of Death			
	N	4-Year Average Rate	95% CI
Sex			
Male	110	41.9	41.13 - 42.64
Female	74	26.9	25.98 - 27.90
Race			
White	159	36	35.48 - 36.57
Black	22	38	32.69 - 43.30
Other	3	---	---
Age Group			
15-24	7	9.9	2.05 - 17.73
25-34	37	57.7	55.10 - 60.33
35-44	59	92.3	88.12 - 96.52
45-54	47	65.3	60.76 - 69.89
55-64	22	29.5	23.88 - 35.22
65+	12	13.5	9.45 - 17.53

Sex, race, and age-specific rates were calculated as a 4-year average given the small numbers in some groups. Rates are per 100,000 people and use 2013-2017 American Census Survey 5-Year Estimates for Calhoun County as denominators. This table does not include Calhoun County residents who may have died outside of Calhoun County or nonresidents who died within Calhoun County.


Opioid-Related Deaths and Overdoses in 2015

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49017, and 49015. Total opioid-related deaths include heroin and fentanyl-related deaths. Total opioid overdose emergency department visits include visits coded as heroin overdoses. Opioid-related deaths include only accidental and indeterminate manners of death. Six deaths occurred at area hospitals.

Figure 14

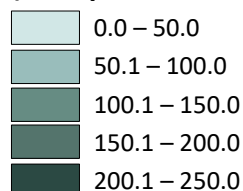


Calhoun County, 2015

○ Opioid-Related Death  Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

(Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

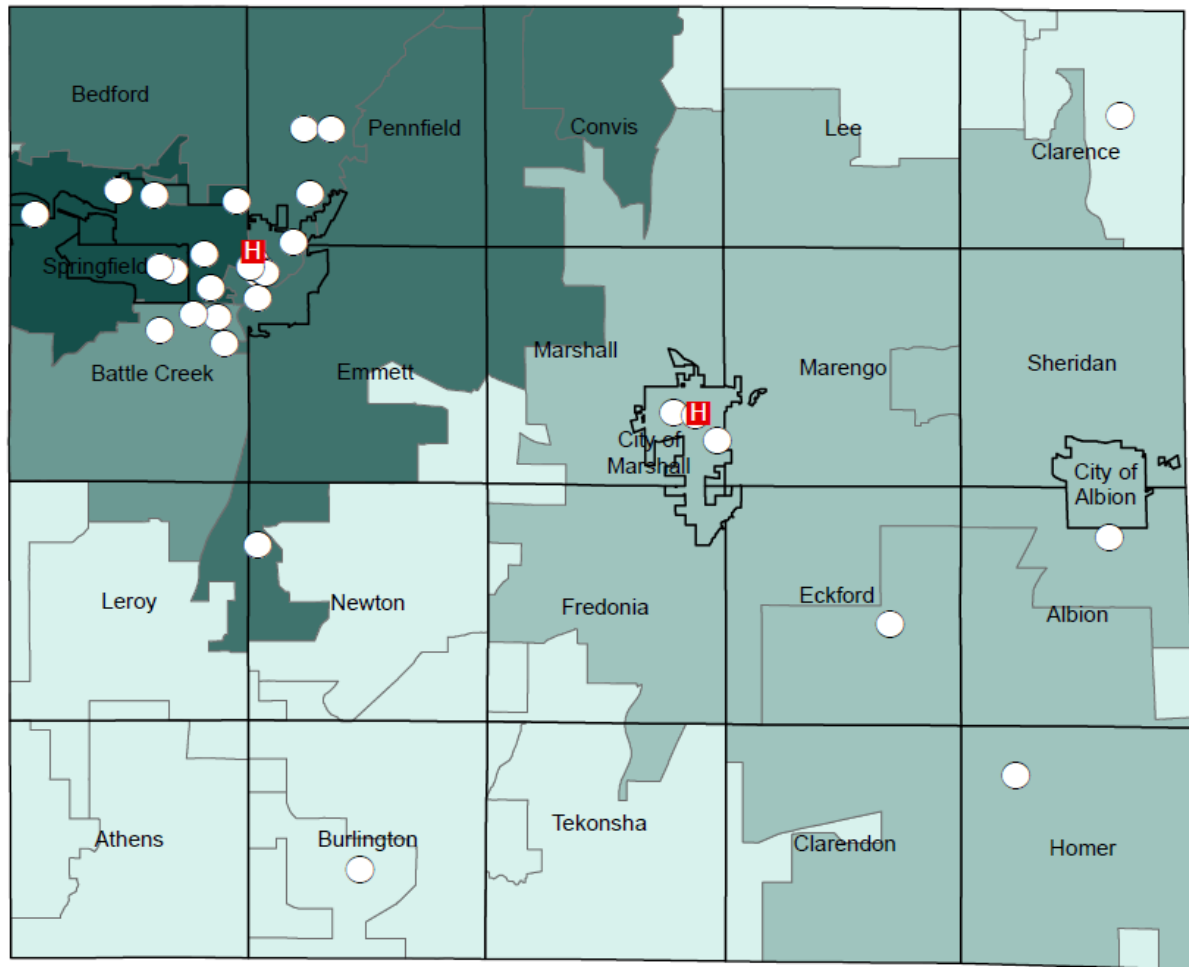
Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents

Opioid-Related Deaths and Overdoses in 2016

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49017, and 49014. Total opioid-related deaths include heroin and fentanyl-related deaths. Total opioid-related deaths include heroin and fentanyl-related deaths. Total opioid overdose emergency department visits include visits coded as heroin overdoses. Opioid-related deaths include only accidental and indeterminate manners of death. Five deaths occurred at area hospitals.

Figure 15

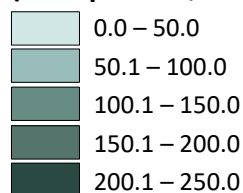


Calhoun County, 2016

○ Opioid-Related Death H Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

(Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

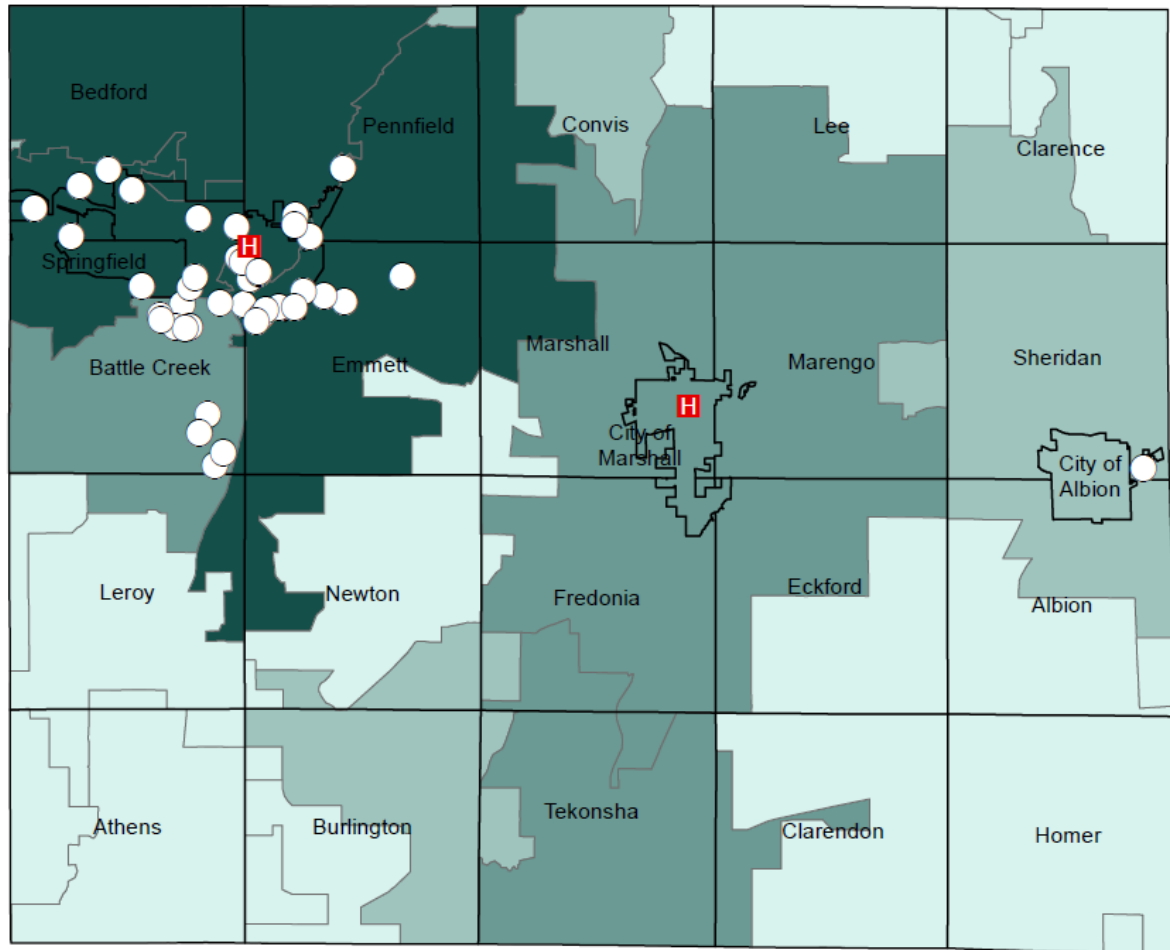
Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents


Opioid-Related Deaths and Overdoses in 2017

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49017, and 49014. Total opioid-related deaths include heroin and fentanyl-related deaths. Total opioid overdose emergency department visits include visits coded as heroin overdoses. Opioid-related deaths include only accidental and indeterminate manners of death. Three deaths occurred at area hospitals.

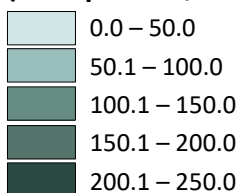
Figure 16



Calhoun County, 2017

○ Opioid-Related Death  Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits (Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

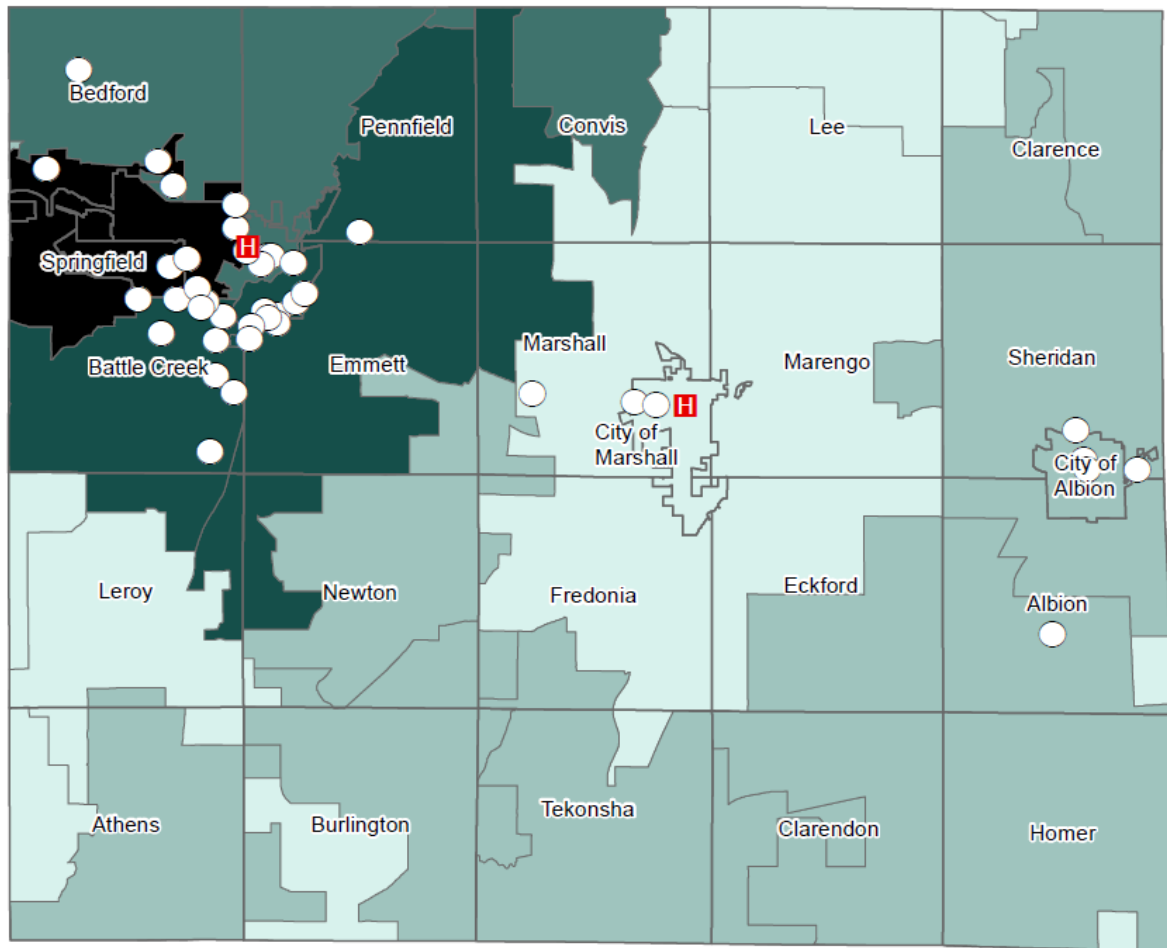
Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents

Opioid-Related Deaths and Overdoses in 2018

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49014, and 49015. Total opioid-related deaths include heroin and fentanyl-related deaths. Total opioid overdose emergency department visits include visits coded as heroin overdoses. Opioid-related deaths include only accidental and indeterminate manners of death. Five deaths occurred at area hospitals.

Figure 17

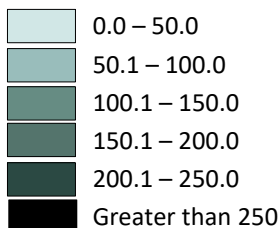


Calhoun County, 2018

○ Opioid-Related Death **H** Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

(Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

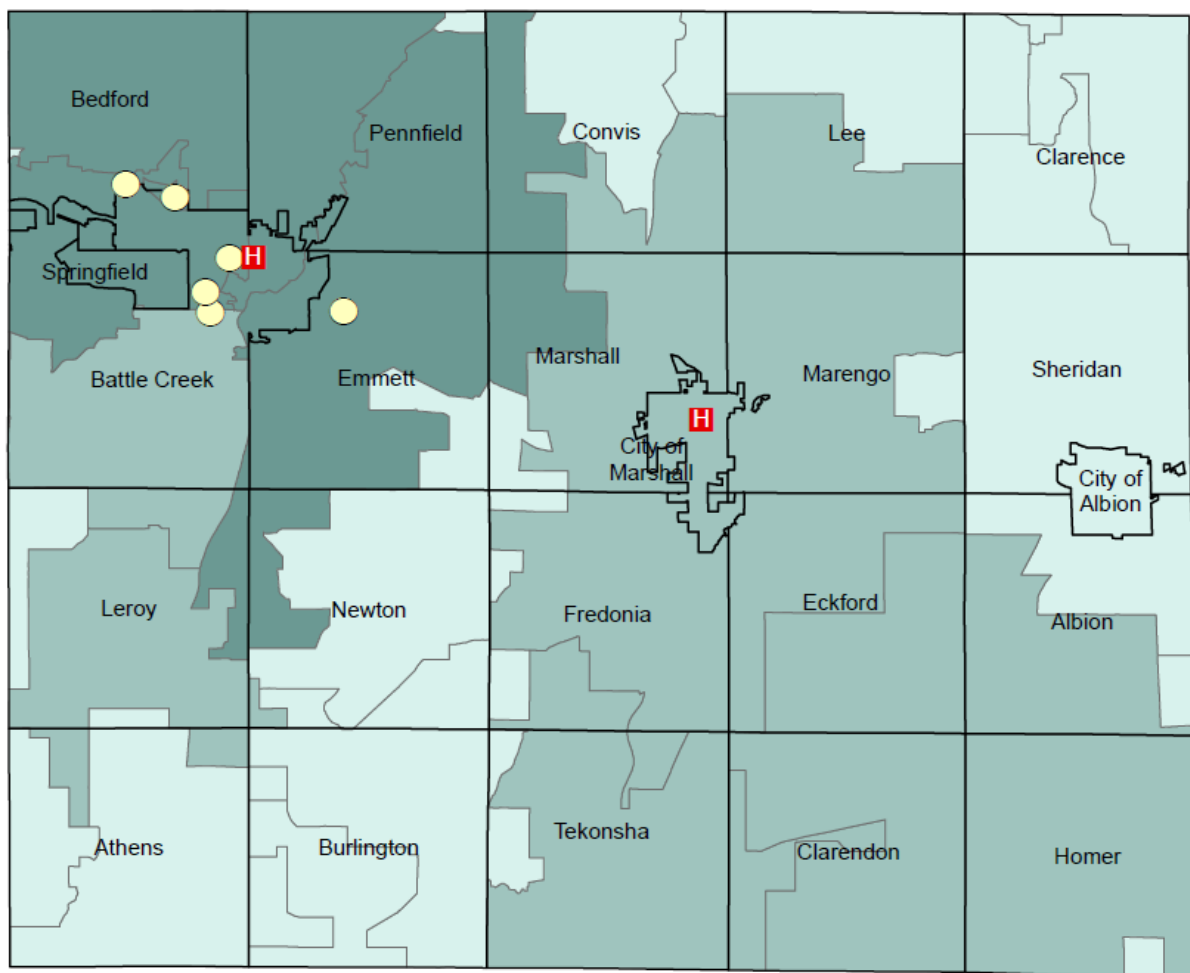
Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents

Fentanyl-Related Deaths and Opioid Overdoses in 2015

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49017, and 49015. Figures 18-21 use fentanyl-related death locations, but total opioid overdose emergency department rates as backgrounds. Fentanyl-related deaths are a proportion of total opioid-related deaths mapped in Figures 14-17. Fentanyl-related deaths include only accidental and indeterminate manners of death. Zero deaths occurred at area hospitals.

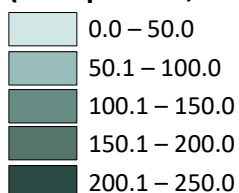
Figure 18



Calhoun County, 2015

● Fentanyl-Related Death H Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits (Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

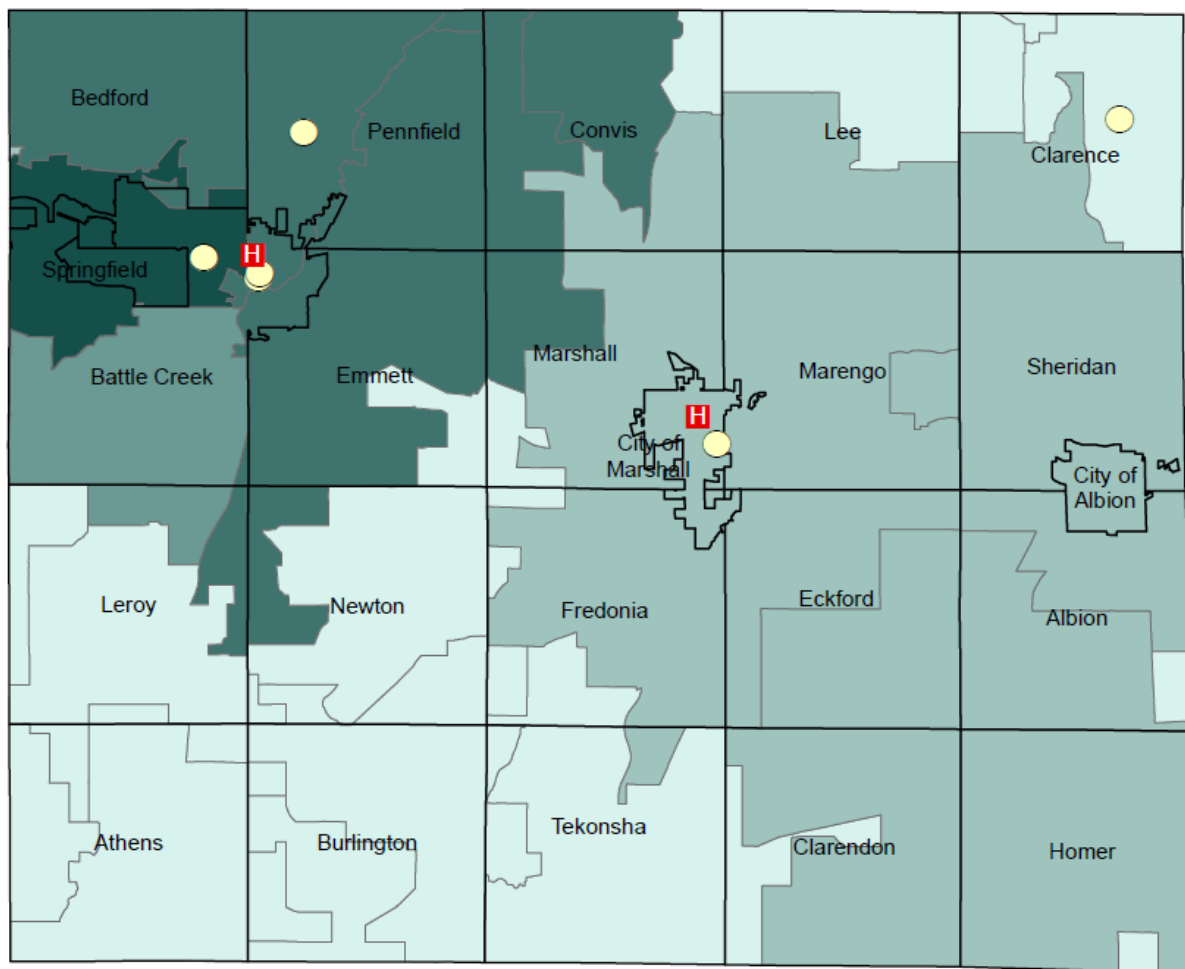
Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents

Fentanyl-Related Deaths and Opioid Overdoses in 2016

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49017, and 49014. Figures 18-21 use fentanyl-related death locations, but total opioid overdose emergency department rates as backgrounds. Fentanyl-related deaths are a proportion of total opioid-related deaths mapped in Figures 14-17. Fentanyl-related deaths include only accidental and indeterminate manners of death. Three deaths occurred at area hospitals.

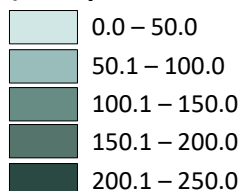
Figure 19



Calhoun County, 2016

● Fentanyl-Related Death H Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits (Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

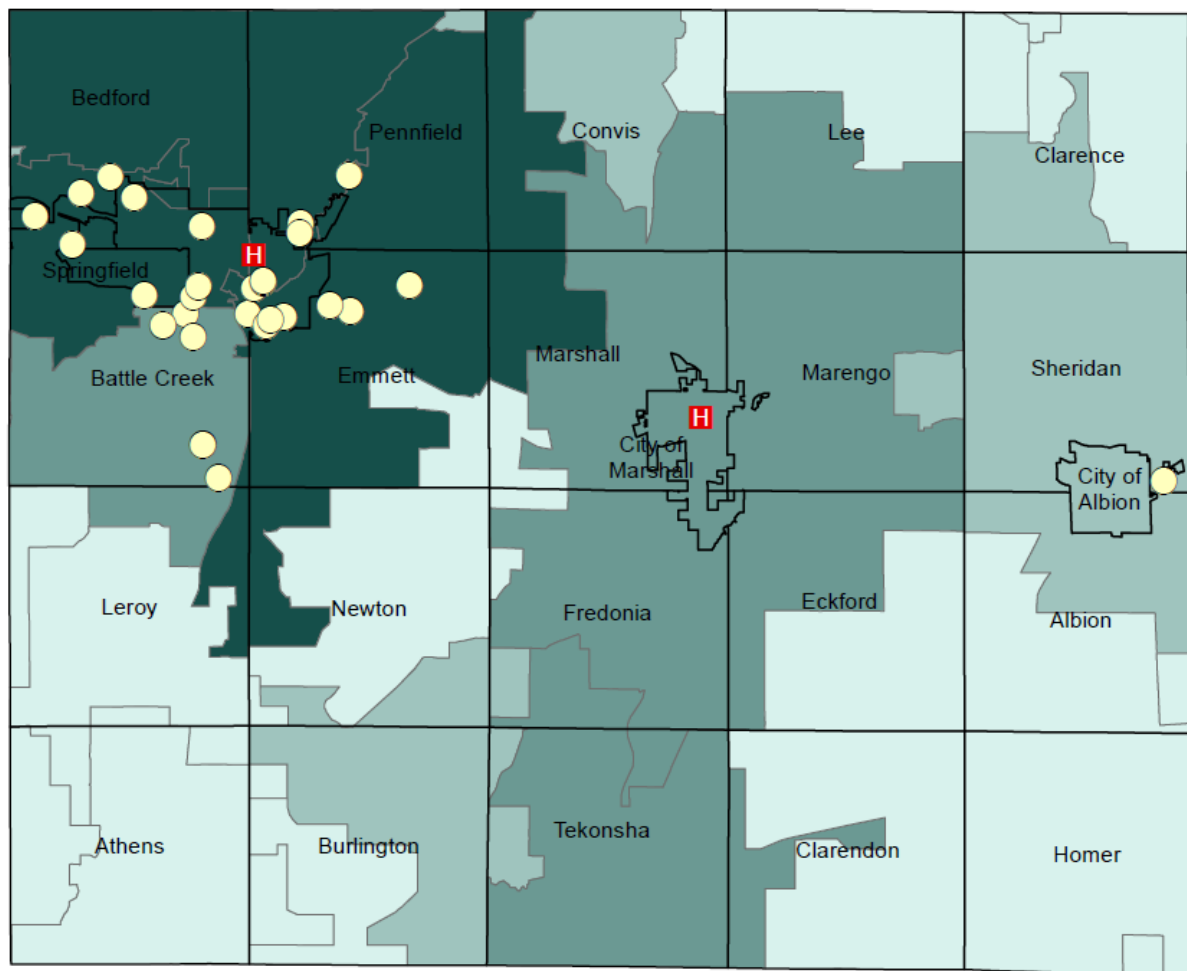
Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents

Fentanyl-Related Deaths and Opioid Overdoses in 2017

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49017, and 49014. Figures 18-21 use fentanyl-related death locations, but total opioid overdose emergency department rates as backgrounds. Fentanyl-related deaths are a proportion of total opioid-related deaths mapped in Figures 14-17. Fentanyl-related deaths include only accidental and indeterminate manners of death. Two deaths occurred at area hospitals.

Figure 20

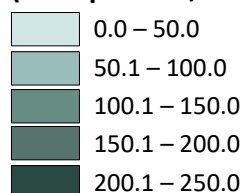


Calhoun County, 2017

● Fentanyl-Related Death H Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

(Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

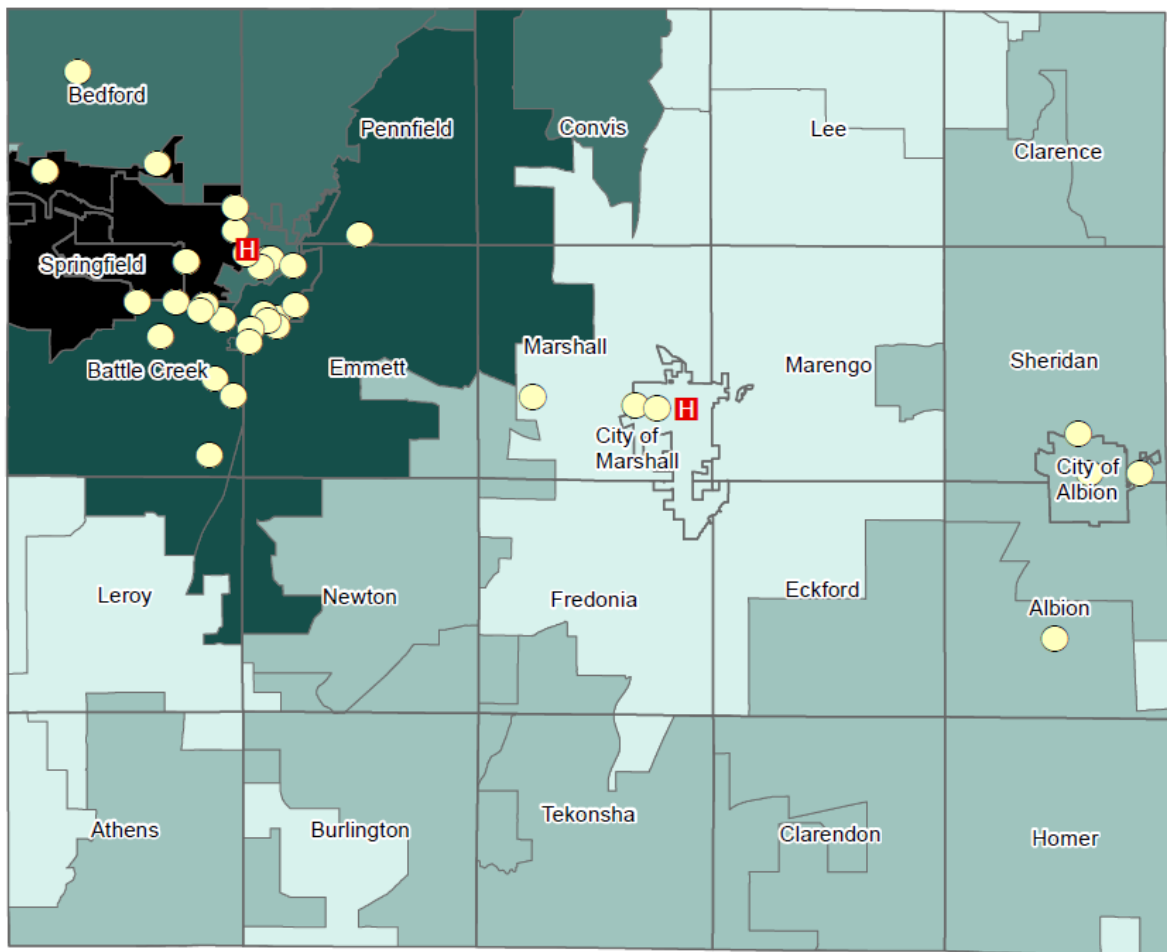
Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents

Fentanyl-Related Deaths and Opioid Overdoses in 2018

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Calhoun County were 49037, 49014, and 49015. Figures 18-21 use fentanyl-related death locations, but total opioid overdose emergency department rates as backgrounds. Fentanyl-related deaths are a proportion of total opioid-related deaths mapped in Figures 14-17. Fentanyl-related deaths include only accidental and indeterminate manners of death. Two deaths occurred at area hospitals.

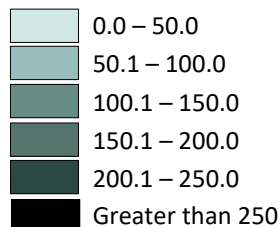
Figure 21



Calhoun County, 2018

● Fentanyl-Related Death H Area Hospitals

Unintentional and Undetermined Opioid Overdose Emergency Department Visits (Rate per 100,000 population)



Map created by Calhoun County GIS, 2019

Data Sources: Calhoun County Office of the Medical Examiner and Area Hospitals

Population rates based on 2017 American Community Survey 5-year population estimates

Note: indicated locations are address of death, not necessarily the residence of decedents

Drug-Related Infections Overview

Substance use has consequences beyond fatal and nonfatal overdose. Injection drug use, the sharing of used drug paraphernalia, and high risk sexual behaviors associated with drug use increase risk for transmission of viral, bacterial and fungal infections.

Figure 22

Behavior	Infection Risk	Healthcare Utilization and Potential Outcomes
Injecting Drugs	<p>Bacteria, viruses and fungi exist on everybody's skin. When a used or nonsterile needle breaks uncleaned skin, bacteria, viruses, and fungi can get inside the body and lead to skin, tissue, bone, and blood infections.</p> <p>Small particles can also be injected into the body with nonsterile needles through uncleaned skin. These particles, along with the injected bacteria and fungi, can lead to heart valve damage and heart valve infections.</p>	<p>Clinic visits, antibiotics, surgery, hospitalization, and death</p> <p>Months of IV antibiotics, hospitalization, open heart surgery, and death</p>
Injecting Drugs and Sharing Paraphernalia	Used needles may contain blood from another person. Hepatitis B, Hepatitis C, and HIV are transmitted through blood. Injecting with used needles may transmit these viral infections.	Hepatitis B and C infection, liver failure, liver cancer, HIV infection, hospitalization, and death
Sharing Drug Paraphernalia	Hepatitis A is spread by ingesting fecal matter in contaminated food, on objects, or through sex.	Hepatitis A infection, liver failure, hospitalization, and death
High risk sexual behavior	People who inject drugs may also engage in high risk sexual behavior. Using drugs may alter sexual behavior and increase exposure to sexually transmitted infections. Sex may also be traded for drugs.	Sexually transmitted infections such as chlamydia, gonorrhea, syphilis, and HIV, all of which require treatment, may lead to hospitalization and may have serious long term health consequences.

Hepatitis A Outbreak Related to Drug Use in Calhoun County¹⁶

Hepatitis A is a virus that causes severe inflammation of the liver and may lead to liver failure and death. Hepatitis A is spread by ingesting fecal matter in contaminated food, on objects, or during sexual contact. Calhoun County was designated an outbreak county in 2018 as part of the statewide Michigan Hepatitis A outbreak. Ten Calhoun County residents and 920 Michiganders were infected with Hepatitis A as part of the outbreak. Thirty Michiganders died and 80% of those infected during the outbreak were hospitalized. Hepatitis A is preventable with Hepatitis A vaccination. Hepatitis A outbreak response requires vaccinating many people at risk for Hepatitis A infection and those already exposed to someone with Hepatitis A infection. **Most Calhoun County Hepatitis A outbreak cases had a history of substance abuse (80%) and 70% injected drugs.**

Figure 23

Summary of Calhoun County Resident Hepatitis A Cases Linked to Statewide Outbreak 9/2017-2/2019 and Public Health Response	
Total Calhoun County Resident Cases	10
Number and percentage who reported injection drug use	7 (70%)
Number and percentage who reported any substance abuse	8 (80%)
Age range (years)	24-51
Average age of case who reported injection drug use (years)	29
Public Health Response: Number of Hepatitis A vaccinations given	1,282
Public Health Response: CCPHD working hours through 9/30/18	1,867
Public Health Response: Funds (\$) spent through 9/30/2018	105,106

Hepatitis B and HIV Infections in Calhoun County^{17,18,19}

Hepatitis B is a virus that causes severe inflammation of the liver that may lead to liver cancer, liver failure, and death. Hepatitis B can be spread through blood, semen, and other bodily fluids entering another person. People can become infected during birth, sex with infected partners, sharing needles and drug paraphernalia, sharing toothbrushes and razors, direct contact with blood or open sores of an infected person, and needlestick injuries. Hepatitis B is very infectious and can result in lifelong infection. Hepatitis B is preventable through Hepatitis B vaccination. **Five new (acute) Hepatitis B infections were reported in Calhoun County from 2016 to 2018; the acute Hepatitis B infection rate for Calhoun County is higher than the Michigan state average.**

HIV attacks a person's immune system. If untreated, HIV eventually destroys the body's immune cells, so it cannot fight off infections in a state known as Acquired Immunodeficiency Syndrome (AIDS). HIV can be treated with medications to reduce the virus in a person and keep a person healthy. If untreated, HIV can lead to many infections and death. HIV can be spread through blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids, and breast milk from a person who has HIV. These fluids must come into contact with a mucus membrane or damaged tissue or be directly injected into the blood (from a needle) for transmission to happen. HIV is most commonly spread through anal or vaginal sex and sharing needles or syringes. HIV is less commonly spread from mother to child through pregnancy or birth, breastfeeding or needlestick injury. HIV can live in a used needle up to 42 days. There is no vaccine to prevent HIV. **Of 34 newly diagnosed cases of HIV in Calhoun County from 2014 to 2018, only one had a documented risk factor of injection drug use; five had no documented risk factor.**

Although Hepatitis B and HIV morbidity related to substance abuse in Calhoun County is relatively low, Calhoun County remains at risk for increased infections. Large outbreaks of HIV related to injection drug use have occurred in Indiana and West Virginia in recent years. The sharpest increases in acute Hepatitis B cases are occurring in states most affected by the opioid epidemic.

Hepatitis C Infections Related to Injection Drug Use in Calhoun County^{17,21}

Hepatitis C is a virus that causes severe inflammation of the liver, liver failure, liver cancer, and death. Hepatitis C is transmitted by blood and sexual fluids. It is much more infectious than HIV. There is no vaccine to prevent Hepatitis C. Most people who become infected with Hepatitis C do not get sick right away. It may take years, even decades, for liver damage to occur. Most develop a long-term or chronic infection. Sometimes the body may clear the infection. However, a person does not develop immunity if infected. Thus, some individuals may become re-exposed and thus re-infected with Hepatitis C. New, often expensive, medications for Hepatitis C now exist and may rid Hepatitis C from a person's body. Baby Boomers born before 1965 have a higher rate of Hepatitis C than the general population. The predominant risk factor for more recent Hepatitis C infection is injection drug use. In Michigan, nearly 2/3 of newly diagnosed chronic Hepatitis C cases report a history of injection drug use. Hepatitis C cases diagnosed in persons aged 18-39 years identify more recent infections; this population also is more likely to report injection drug use as a risk factor of infection.

Three hundred cases of chronic Hepatitis C were diagnosed in Calhoun County residents aged 18-39 years from 2014 to 2018. The Calhoun County rate of newly diagnosed chronic Hepatitis C infections is higher than the state of Michigan's rate. Figure 24 shows nearly 85% of newly diagnosed chronic Hepatitis C cases aged 18-39 years in Calhoun County reported a history of injection drug use.

Figure 24

2018 Newly Diagnosed Chronic Hepatitis C Cases in Calhoun County Residents Aged 18-39 years	
Age in Years (n = 68)	
Average	31.68
Sex (n = 68)	
Female	30 (44.1%)
Male	38 (55.9%)
Race (n = 56)	
White	51 (91.1%)
Black	4 (7.1%)
American Indian	0 (0.0%)
Asian	1 (1.8%)
History of Injection Drug Use (n = 33)	
Yes	28 (84.8%)
No	5 (18.2%)

Note: n indicates number of records for which data were available

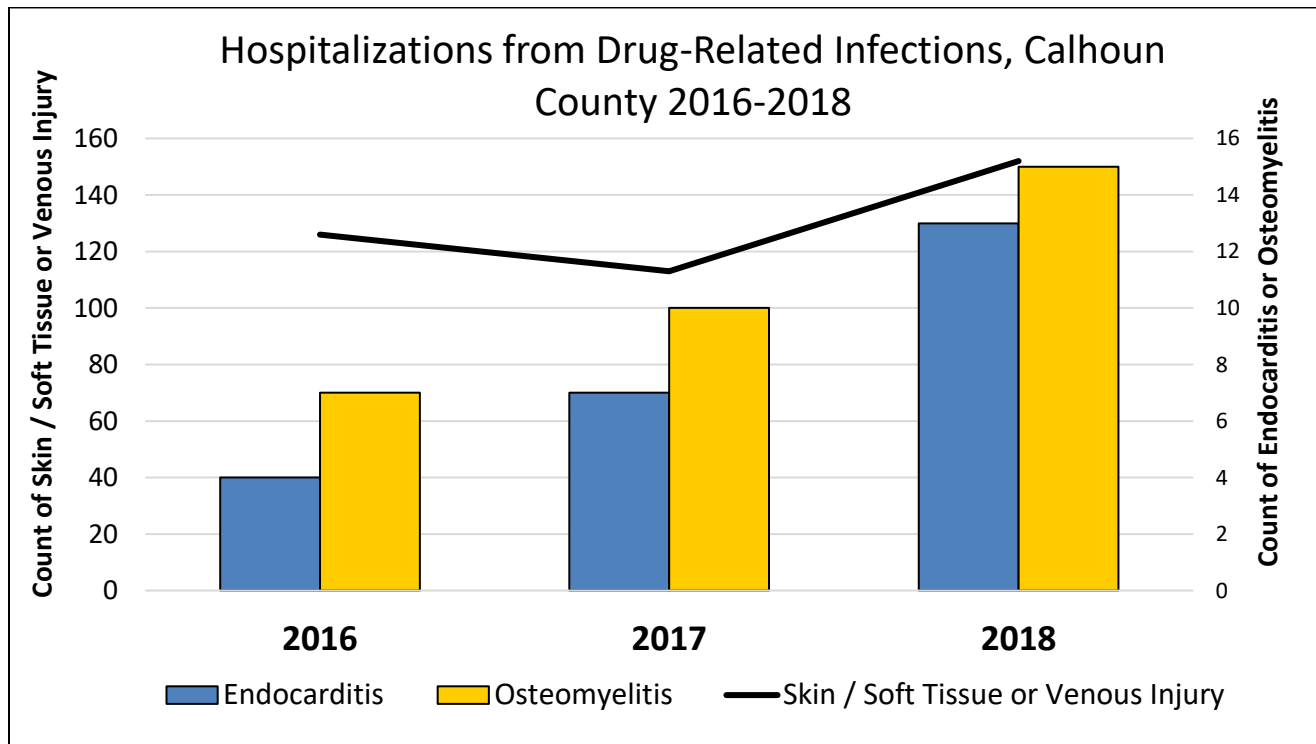
Hospitalizations and Cost of Drug-Related Infections, Calhoun County 2016-2018¹⁷

Injecting drugs can lead to serious, deadly infections that require prolonged and expensive hospitalizations. When a used or nonsterile needle breaks uncleansed skin, bacteria, viruses, and fungi can enter the body and lead to skin, tissue, bone, blood, and heart valve infections. Figure 24 shows the significant morbidity, mortality, and costs of these infections in Calhoun County. Approximately 80% of these costs were paid by public insurance. Figure 25 demonstrates increasing heart valve (endocarditis), bone (osteomyelitis) and skin/soft tissue infections from 2016 to 2018.

Figure 24

Hospitalizations and Cost of Drug-Related Infections, Calhoun County 2016-2018	
Heart Valve Infections (Endocarditis)	(n = 24)
Death / Discharge to Hospice	1
Cost	\$2,528,689
Public Insurance (%)	79.2%
Bone Infections (Osteomyelitis)	(n = 32)
Death / Discharge to Hospice	0
Cost	\$1,956,663
Public Insurance (%)	81.3%
Skin / Soft Tissue or Venous Injury	(n = 391)
Death / Discharge to Hospice	25
Cost	\$25,494,513
Public Insurance (%)	78.8%

Figure 25



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