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Drug and Opioid Epidemic Report

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KALAMAZOO COUNTY GOVERNMENT

In the Pursuit of Extraordinary Governance

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Kalamazoo County Health & Community Services is committed to providing equitable, culturally competent care to all individuals served, regardless of race, age, sex, color, national origin, religion, height, weight, marital status, political affiliation, sexual orientation, gender identity, or disability.

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In January 2018, Kalamazoo County Health and Community Services Department (KCHCSD) released a report on the opioid epidemic in Kalamazoo County. This February 2019 report includes the following updated information and analysis:

- Retail opioid prescribing data for the year 2017
- Three year (2015-2017) trend analysis of emergency department visits for opioid overdoses by all manners of intent
- Updated opioid-related vital statistics from the Michigan Department of Health and Human Services
- Three year (2015-2017) trend analysis of Kalamazoo County Medical Examiner opioid and drug-related deaths by all manners of death
- A highlight of fentanyl-related deaths
- Three year (2015-2017) trend analysis with geospatial mapping of emergency department visits for opioid, heroin and fentanyl overdoses by resident zip code and Kalamazoo County Medical Examiner opioid, heroin and fentanyl-related deaths
- Opioid epidemic strategic framework for Kalamazoo County

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.¹ Kalamazoo County, like other communities in the United States, is affected by the epidemic. This document provides an overview of the opioid epidemic in Kalamazoo 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 given 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 illicit opioids increased the risk for overdose in the population. Long term use of prescription opioids, often for chronic pain, resulted in people spending more time at 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 and fatal and nonfatal opioid-related overdoses in Kalamazoo County, Michigan.

Sources: Centers for Disease Control and Prevention¹, The National Institute on Drug Abuse², The United States Surgeon General³

Opioid Prescriptions

The number of retail opioid prescriptions in Kalamazoo County peaked in 2011 and has decreased every year since. From 2015 to 2017, the quantity and strength of retail opioids prescribed decreased by 22.6%. However, the quantity and strength of opioids prescribed in Kalamazoo County in 2017 was 3.2 times higher than the 1999 national average.

Emergency Department Opioid-Related Overdoses

Although opioid overdose visits comprise a very small proportion of all Kalamazoo County emergency department visits, opioid overdose visits increased by more than 55% from 218 to 342 visits between 2015-2017. More than half of these opioid overdoses 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 2017. Visits coded as “heroin” nearly tripled for males between 2015-2017. Overdose visits coded as “heroin” more than doubled for females from 2015 to 2016 but remained stable in 2017. In 2017, the top three zip codes with the highest rates of opioid overdose visits to an emergency department in Kalamazoo County were 49001, 49007 and 49012*.

Opioid-Related Deaths

Following a sharp increase in deaths from 2016, Kalamazoo County’s 2017 crude total opioid-related death rate of 16.7 deaths per 100,000 residents was lower than Michigan’s 2017 crude rate of 19.1 deaths per 100,000 residents. In 2017, the average age of a person who died of an accidental or indeterminate opioid-related death was 38 years. An additional 1,865 years of life would have been lived if Kalamazoo County residents who died of an accidental or indeterminate opioid-related death in 2017 had not died prematurely.

The Fentanyl Epidemic

Fentanyl-related deaths in Kalamazoo County increased from 6 (3 Kalamazoo residents) in 2015 to 35 (26 Kalamazoo residents) in 2017. Illicitly manufactured fentanyl poses a serious public health threat to Kalamazoo County.

Methamphetamine-Related Deaths

Drug-related deaths involving methamphetamine among Kalamazoo County residents increased from 3 in 2015 to 16 deaths in 2017. Although in the midst of an opioid overdose epidemic, this significant change highlights the need to prevent all types of drug-related deaths.

Future Steps

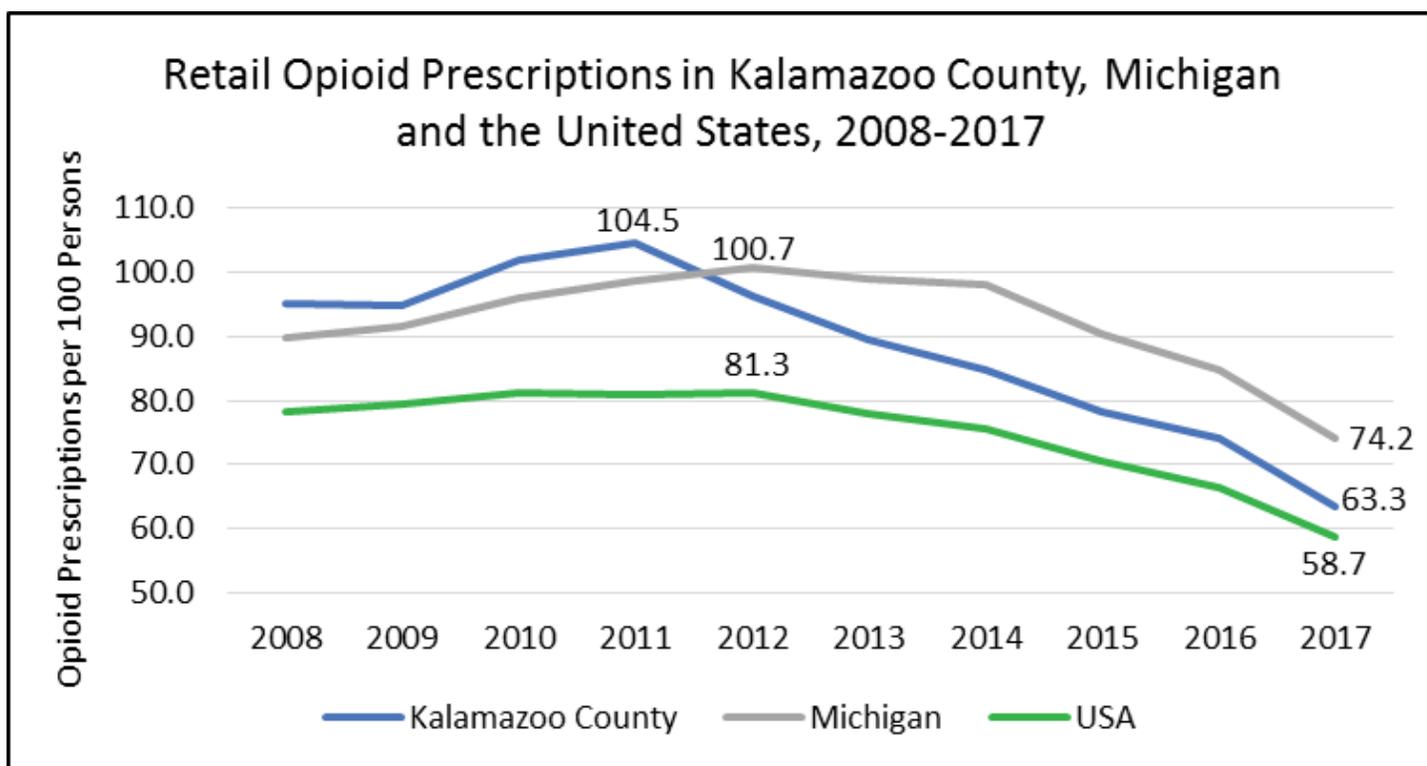
A multi-sector, collaborative approach across communities is required to confront the opioid epidemic. Key strategic priorities include prevention and education, supply and control of opioids, treatment across a continuum of care and the reduction of fatal overdoses and the spread of infectious disease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

Notes: Please refer to the data sources, limitations, and definitions in this report for a more complete interpretation of these key points.

*Historically the zip code 49012 has not seen high rates of opioid overdose; however, an increase in opioid overdose visits was seen in 2017. Given the small population of 49012, the zip code specific rate increased significantly.

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 Kalamazoo County, the State of Michigan and the United States from 2008 to 2017. Kalamazoo County opioid prescriptions peaked at 104.5 per 100 persons in 2011 and have decreased annually. Michigan and the United States' opioid prescriptions peaked in 2012, at 100.7 and 81.3 per 100 persons, respectively. While opioid prescriptions in Kalamazoo County remain below the Michigan rate, they remain above the national rate at 63.3 retail opioid prescriptions per 100 persons as of 2017. Of note, these data only report the number of prescriptions, but do not capture the strength 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.

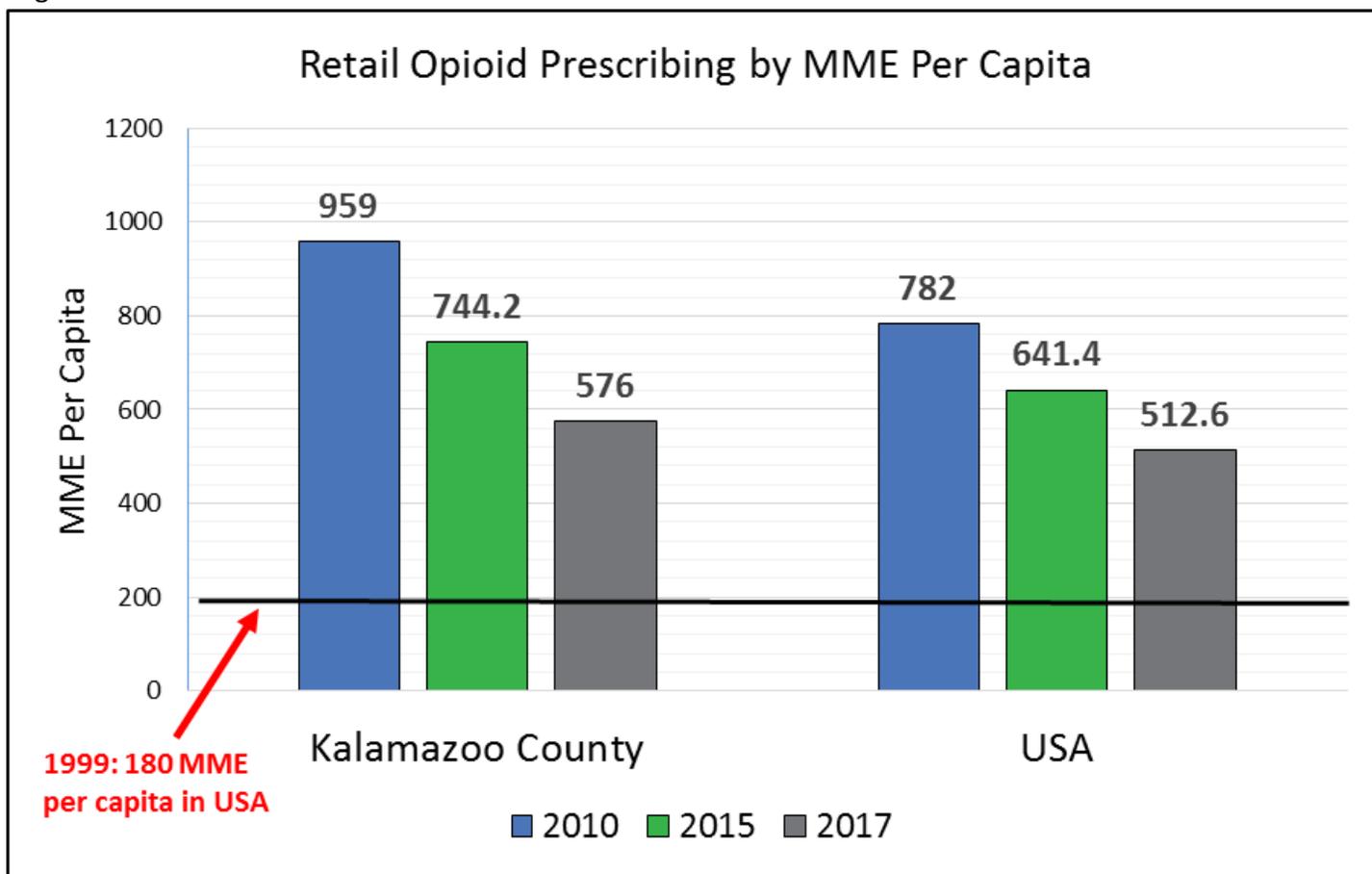
Opioid prescriptions do not include cough/cold medications, buprenorphine or methadone dispensed through a methadone treatment program in this data set.

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

Source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Division of Unintentional Injury Prevention. <https://www.cdc.gov/drugoverdose/maps/rxrate-maps.html>.

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 Kalamazoo County or the United States. From 2015 to 2017, MME per capita decreased by 22.6% in Kalamazoo County and by 20% nationally. Despite this decrease, 2017 Kalamazoo County retail MME per capita remains higher than the current national average, and is 3.2 times higher than the 1999 national average of 180 MME per capita—a time near the onset of the opioid epidemic.

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.

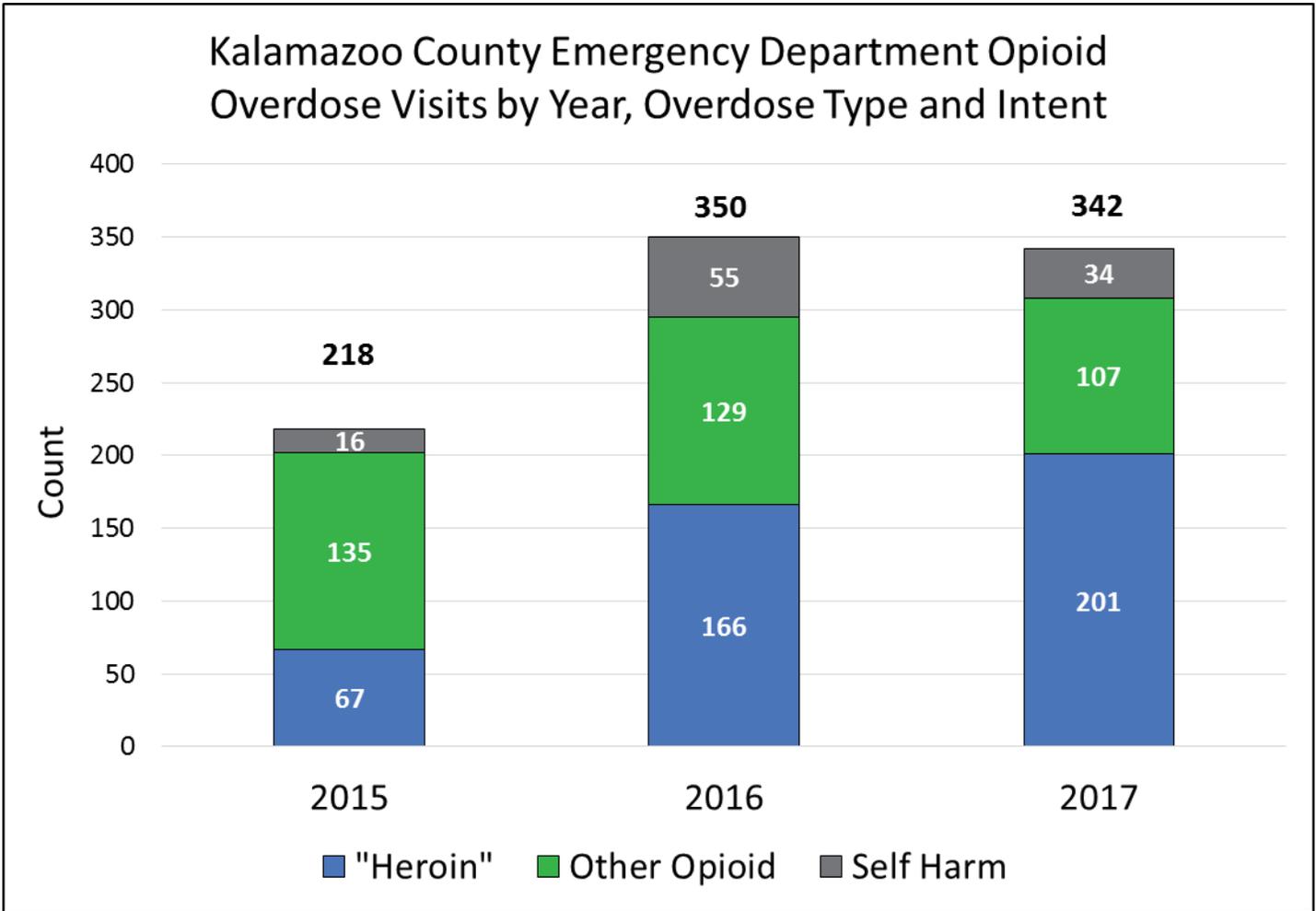
Note: Source 1 provides 2010 data and Source 2 provides data for both 2015 and 2017.

Sources:

- Guy GP Jr., Zhang K, Bohm MK, et al. Vital Signs: Changes in Opioid Prescribing in the United States, 2006–2015. *MMWR Morb Mortal Wkly Rep* 2017;66:697–704.
- Guy, GP Jr., Zhang, K, Schieber LZ, et al. County-Level Opioid Prescribing in the United States, 2015 and 2017. *JAMA Internal Medicine*. Published online February 11, 2019. doi:10.1001/jamainternmed.2018.6989.

Figure 3 illustrates the number of opioid overdoses that presented to an emergency department located within Kalamazoo County from 2015-2017. The total number of opioid overdoses increased from 218 in 2015 to 342 overdoses in 2017. Self harm opioid overdoses varied by year. Overdoses coded as an opioid other than heroin trended downward from 2015-2017. However, overdoses coded as “heroin” tripled from 67 in 2015 to 201 in 2017. Despite the significant increase, the 350 opioid overdoses in 2016 accounted for only 0.2% of the 151,698 emergency department visits that occurred in Kalamazoo County.

Figure 3

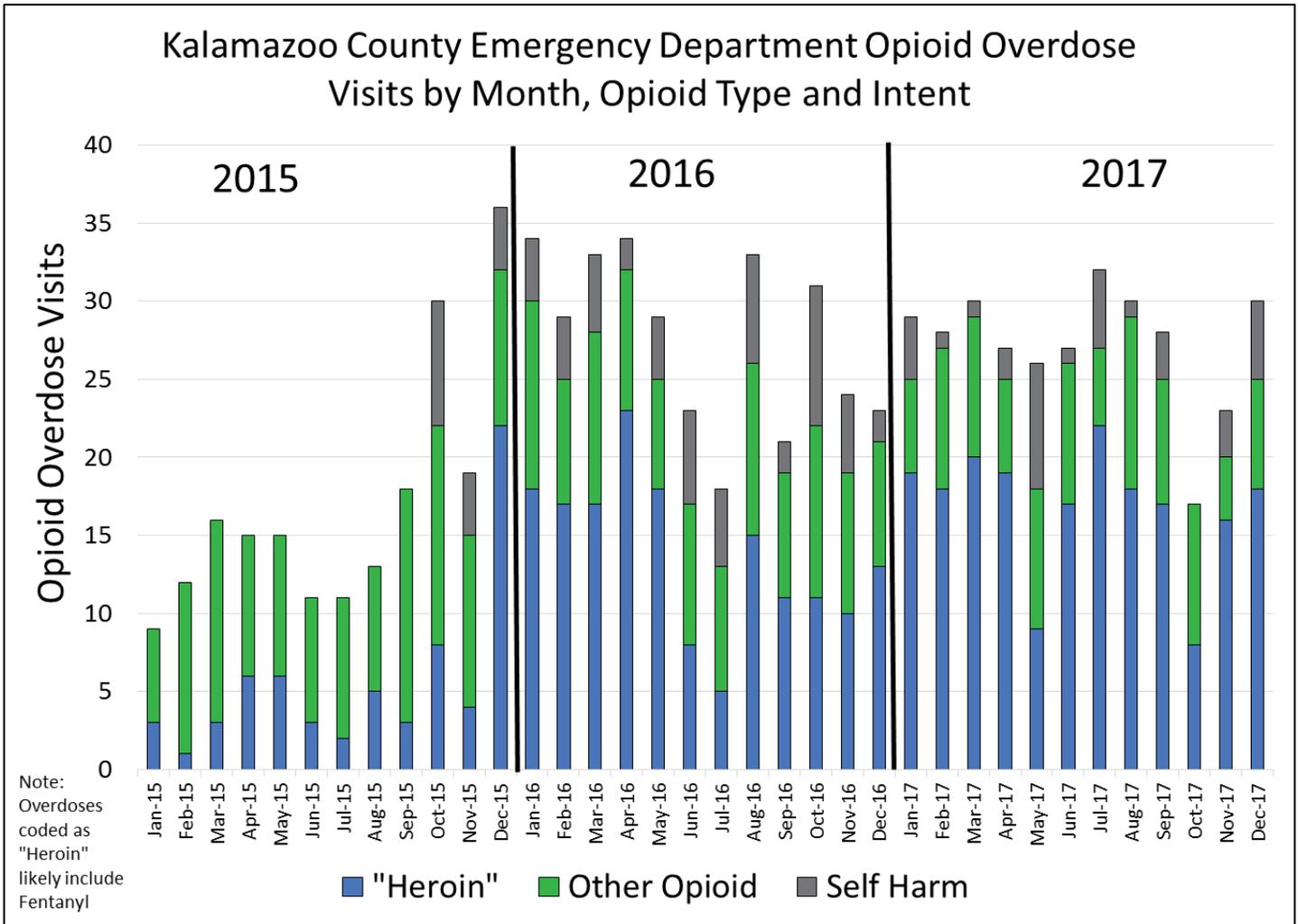


Data Limitations/Definitions: Not all opioid overdoses present to the emergency department. To be counted, a case must arrive at an emergency department in Kalamazoo County and be coded by a physician, provider or biller as an opioid-related overdose. These data encompass ICD-9/10 poisoning codes selected by Kalamazoo County Health and Community Services Department (KCHCSD) 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 an 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.

Sources: Bronson Methodist Hospital and Ascension Borgess Hospital

Figure 4 illustrates the number of opioid overdoses that presented to an emergency department located within Kalamazoo County by month from 2015-2017. Months with more than 30 overdoses include December 2015, January 2016, March 2016, April 2016, August 2016, October 2016 and July 2017. 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 Kalamazoo 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 Kalamazoo 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 KCHCSD 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.

Sources: Bronson Methodist Hospital and Ascension Borgess Hospital

Emergency department visits for unintentional and undetermined* opioid overdose consistently increased from 2015-2017 in age groups 25-34, 35-44 and 65+.

The age group of 25-34 year olds experienced the highest number of opioid overdoses from 2015-2017.

Nearly three times the number of males presented to the emergency department for a "heroin" overdose compared to females in 2017.

Emergency department visits for an opioid overdose other than heroin decreased by a third for females from 2015 to 2017 but remained relatively unchanged for males.

Visits coded as "heroin" tripled for males between 2015-2017. Overdose visits coded as "heroin" more than doubled for females from 2015-2016.

Of the 805 emergency department visits for an unintentional or undetermined* opioid overdose between 2015-2017, 74.2% (597 visits) were a Kalamazoo County resident by zip code status.

***Figures 5 and 6 do not include self harm visits for 2016-2017.**

Figure 5

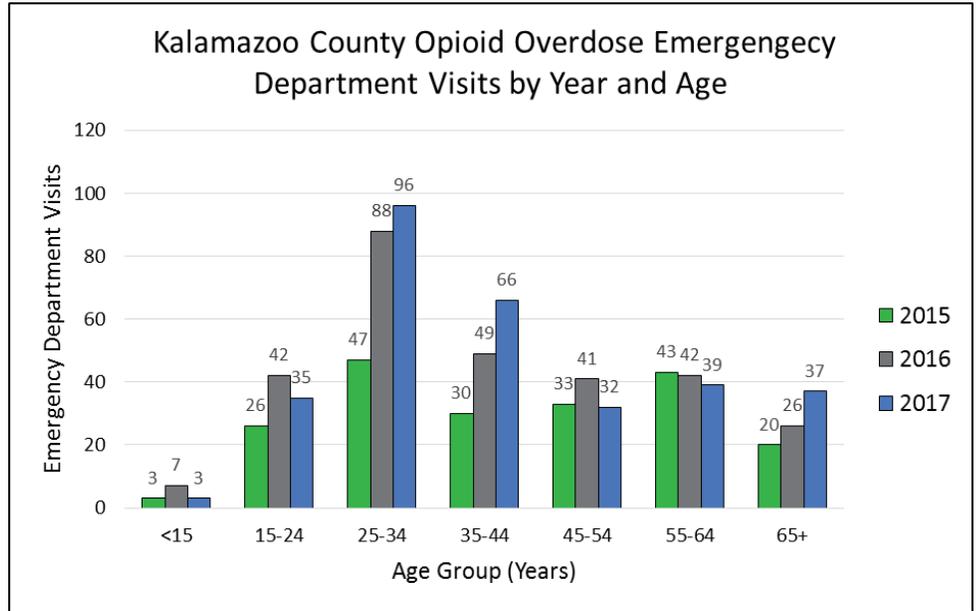
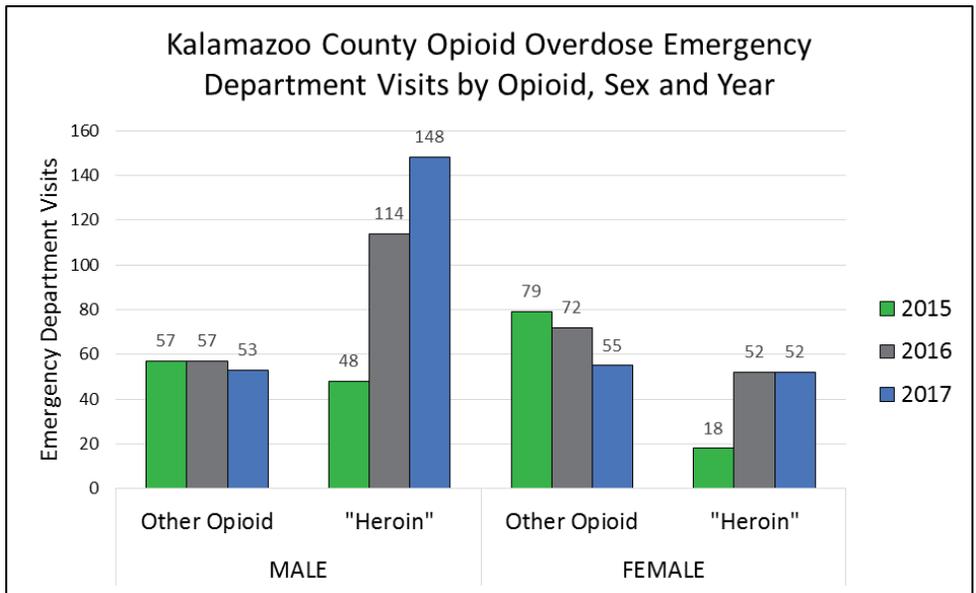


Figure 6

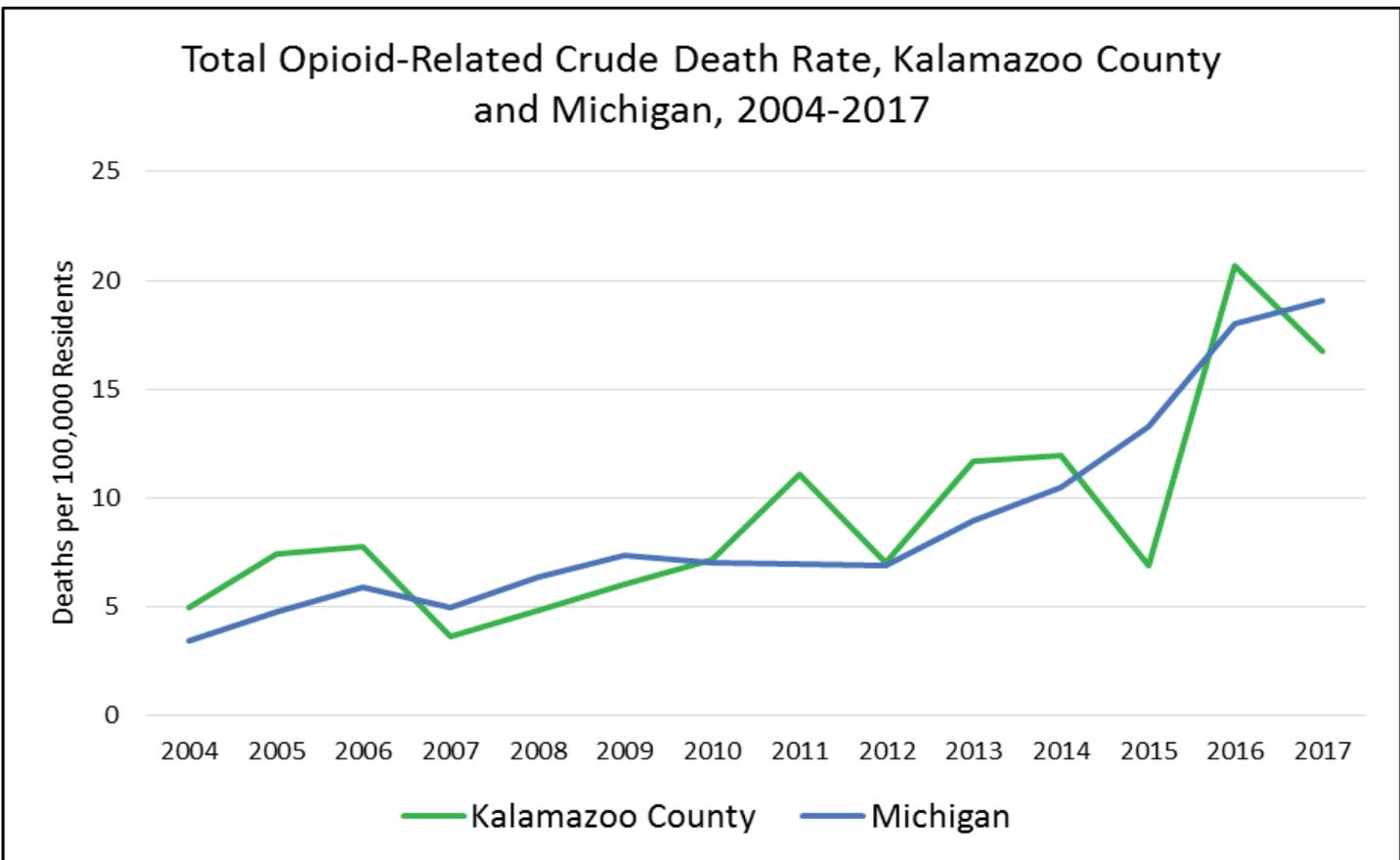


Data Limitations/Definitions: Not all opioid overdoses present to the emergency department. To be counted, a case must arrive at an emergency department in Kalamazoo County and be coded by a physician, provider or biller as an opioid-related overdose. These data encompass ICD-9/10 poisoning codes selected by KCHCS 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.

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. Following a sharp increase in deaths from 2016, Kalamazoo County’s 2017 crude total opioid-related death rate of 16.7 deaths per 100,000 residents was lower than Michigan’s 2017 crude rate of 19.1 deaths per 100,000 residents.

Yr	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
#	12	18	18	9	10	13	17	26	17	30	31	18	54	44

Figure 7

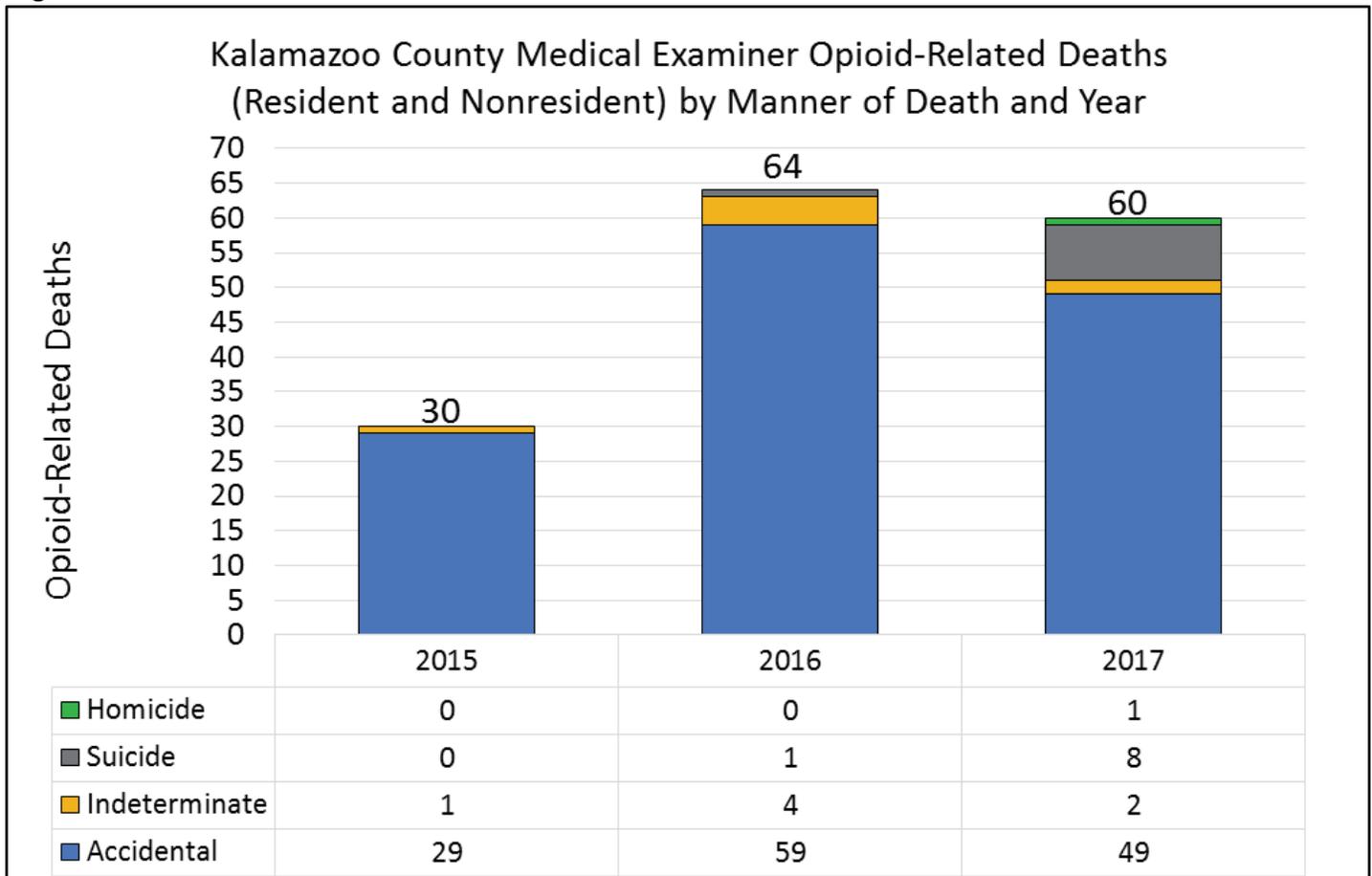


Data Limitations/Definitions: Vital statistics are recorded by county of residence, not location of death. The rates of this graph are not adjusted for age. The graph is thus meant to serve as a rough comparison of opioid-related death trends between Kalamazoo County and Michigan, not other states. This 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), homicide drug poisoning (X85), or undetermined intent drug poisoning (Y10-Y14). It includes ICD-10 codes for heroin (T40.1), other opioids (T40.2), methadone (T40.3) and other synthetic narcotics (T40.4), opium (T40.0) and unspecified opioids (T40.6).

Source: Michigan Department of Health and Human Services

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 Kalamazoo County since 2014. KCHCSD 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 accidental opioid-related deaths more than doubled between 2015 and 2016. 2017 accidental opioid-related deaths remain elevated despite a decrease from 2016.

Figure 8

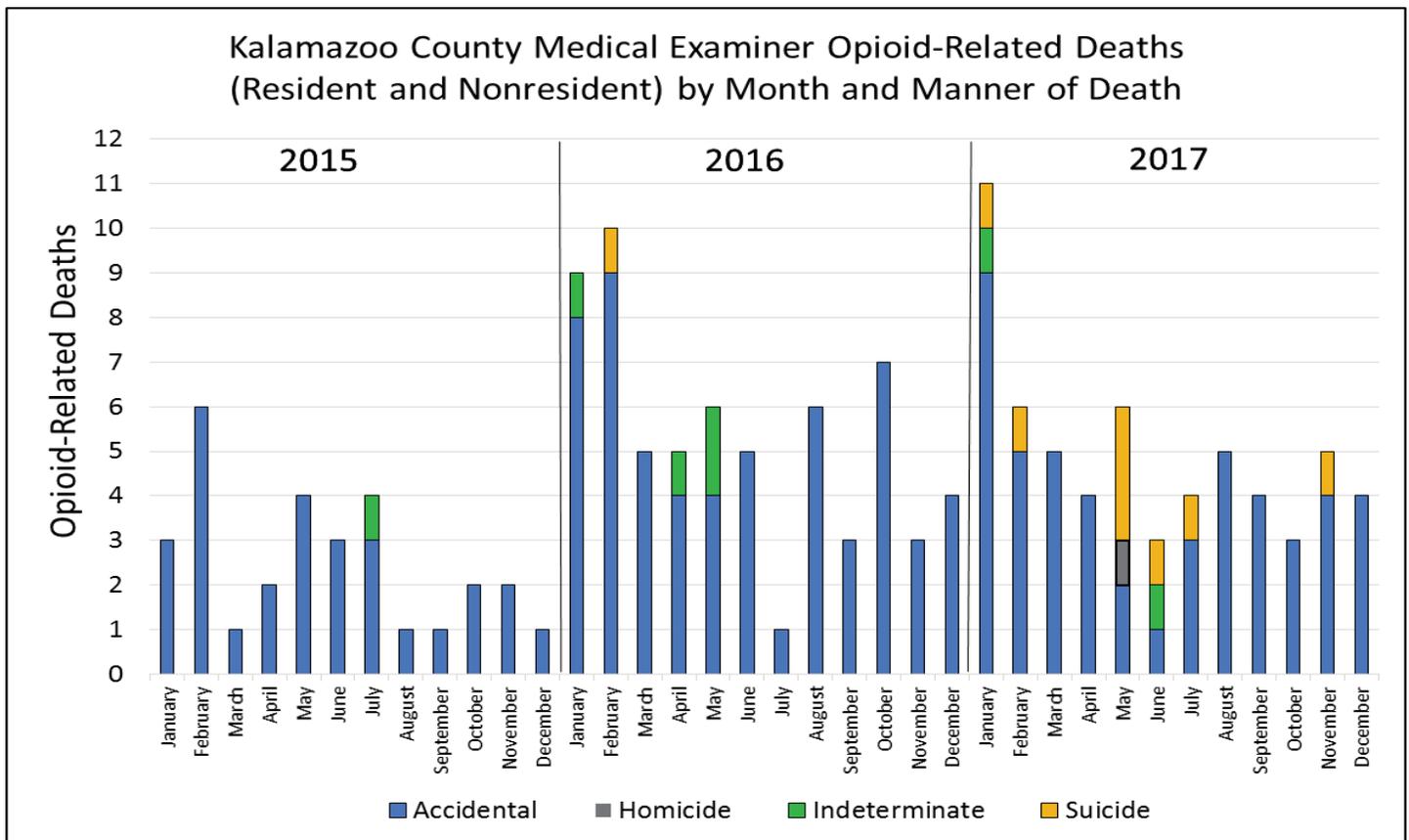


Data Limitations/Definitions: Board-certified forensic pathologists, in accordance with recommendations by the National Association of Medical Examiners, determined the cause and manner of these deaths. MDHHS death certificates include a list of the immediate cause of death and underlying cause of death (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, suicide and homicide. Counts are by date of death rather than pronounced date of death. Medical examiner data are determined by location of death (within Kalamazoo County), not county of residence of the decedent. Vital statistics on page 9 will therefore differ from these figures.

Source: Dr. Joyce deJong, Kalamazoo County Medical Examiner

The 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 intoxications in Kalamazoo County since 2014. KCHCSD 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 January 2016, February 2016, October 2016 and January 2017.

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 or death include accidental, indeterminate, suicide and homicide. Counts are by date of death rather than pronounced date of death. Medical examiner data are determined by location of death (within Kalamazoo County), not county of residence of the decedent. Vital statistics on page 9 will therefore differ from these figures.

Source: Dr. Joyce deJong, Kalamazoo County Medical Examiner

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 scheduled II drug, it is prescribed to treat 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, predominately in the Midwest and Northeast, as an increasing driver of the opioid overdose epidemic. IMF can be distributed as 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 carfentanil, furanylfentanyl, and acetylfentanyl. The National Institute on Drug Abuse notes street names for fentanyl or for fentanyl-laced heroin include Apache, China Girl, China White, Dance Fever, Friend, Goodfella, Jackpot, Murder 8, TNT and Tango and Cash.

IMF presents several challenges to public health and 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

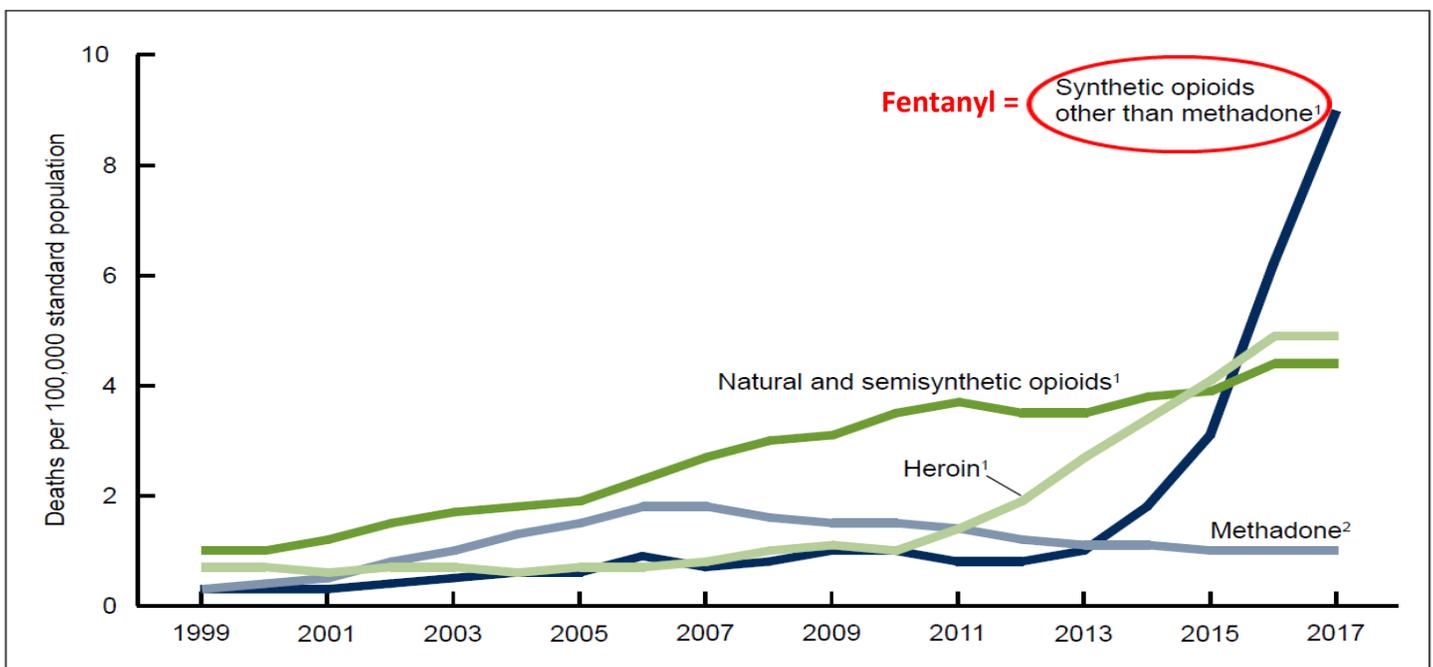
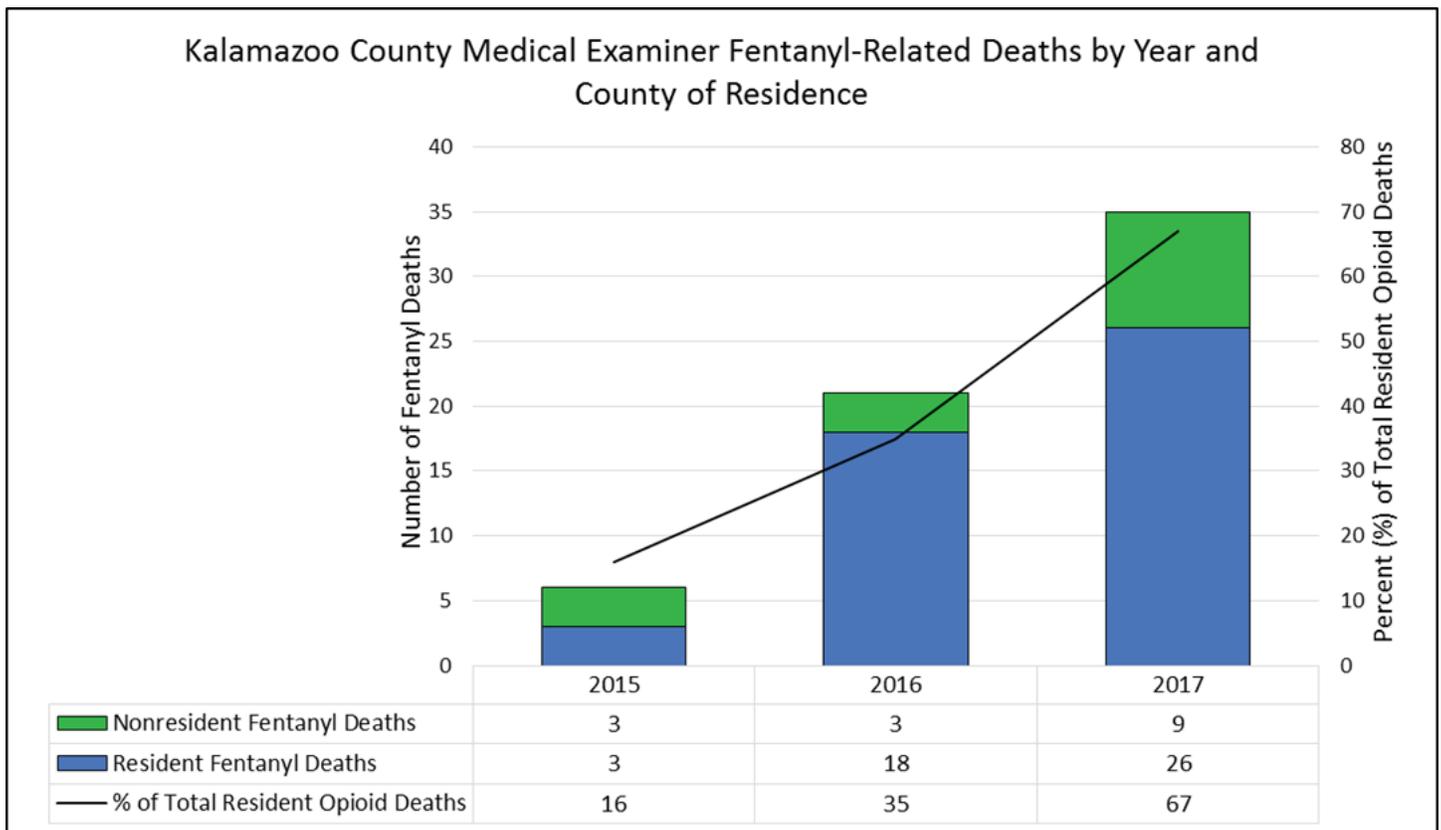


Image Source: Hedegaard H, Minino AM, Warner M. Drug overdose deaths in the United States, 1999-2017. NCHS Data Brief, no 329. Hyattsville, MD: National Center for Health Statistics, November 2018.

Figure 11 illustrates fentanyl-related deaths by year, county of residence and percentages of total Kalamazoo County resident opioid-related deaths. The blue bar represents the number of Kalamazoo County resident fentanyl-related deaths. The green bar represents the number of Kalamazoo County nonresident fentanyl-related deaths. The black line represents the percentages of total Kalamazoo County resident opioid-related deaths that included fentanyl. Illicitly manufactured fentanyl (IMF) is now driving the opioid overdose epidemic in Kalamazoo County and poses a serious public health threat. Kalamazoo County resident fentanyl-related deaths increased from 3 deaths in 2015 to 26 in 2017. In 2017, 67% 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 Kalamazoo County as opposed to increased detection of fentanyl or fentanyl analogs. While fentanyl testing has been routine, fentanyl analog testing by the Kalamazoo County Medical Examiner began to increase in October 2016. From 2015 to 2017, two of the 62 fentanyl-related deaths that occurred in Kalamazoo County involved a fentanyl analog; both occurred in 2017.

Figure 11



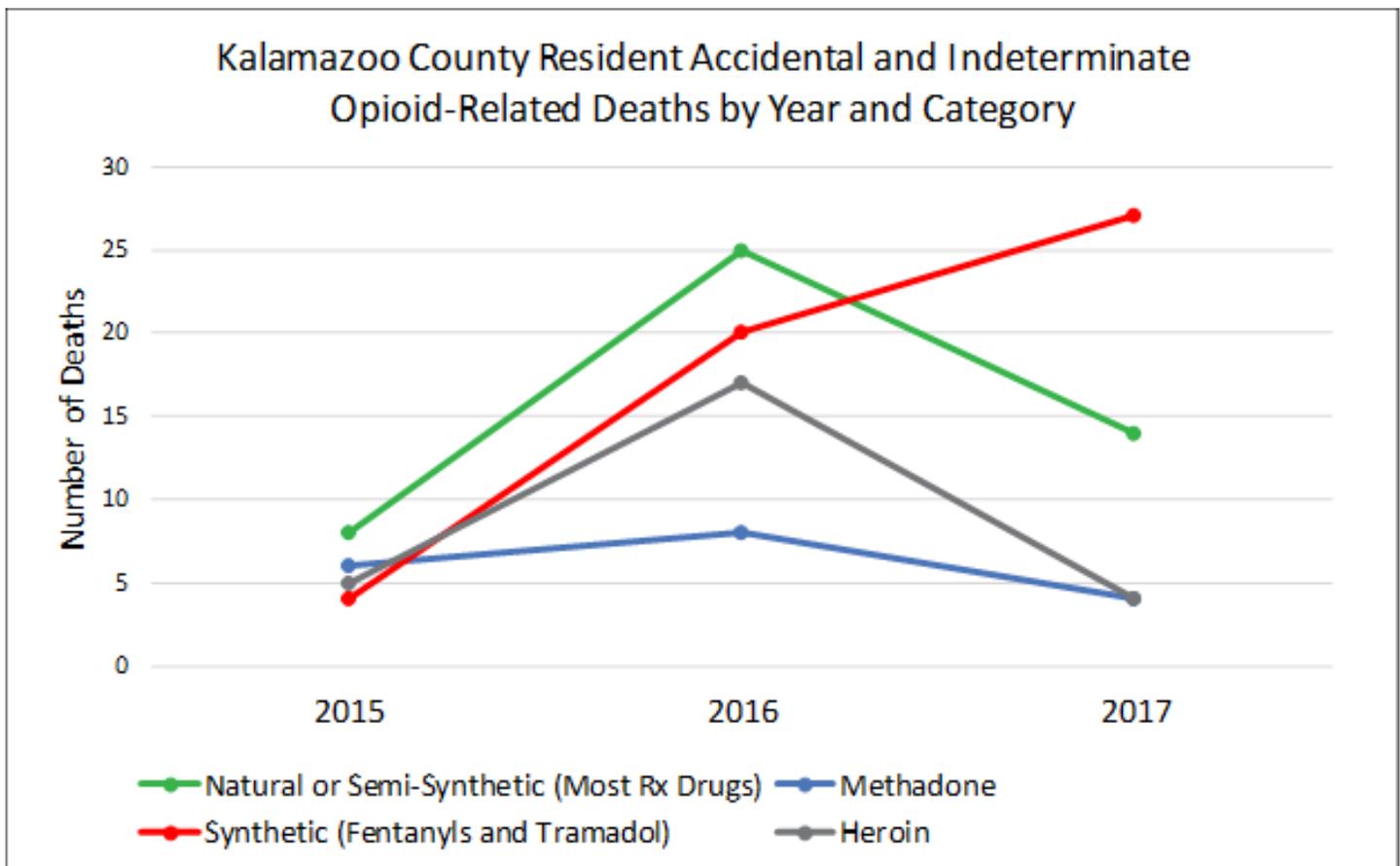
Data Limitations/Definitions: Six of the nine nonresident fentanyl-related deaths in 2017 occurred at a hospital, which may suggest these nonresidents overdosed on fentanyl outside Kalamazoo County and were transported to Kalamazoo County for medical attention. KCHCSD counted a fentanyl-related death 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 16.

Source: Dr. Joyce deJong, Kalamazoo County Medical Examiner

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 (Subutex® 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.

Opioid-related accidental and indeterminate deaths increased across all opioid categories from 2015 to 2016 with the largest increase seen in natural or semi-synthetic opioids. Deaths associated with heroin, natural or semisynthetic opioids, and methadone categories all decreased from 2016 to 2017. However, synthetic opioid associated deaths increased by 6.75 times from a count of 4 in 2015 to 27 in 2017. This trend most likely reflects a true increase in the incidence of fentanyl-related deaths and the prevalence of IMF in Kalamazoo County. See pages 12 and 13 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.

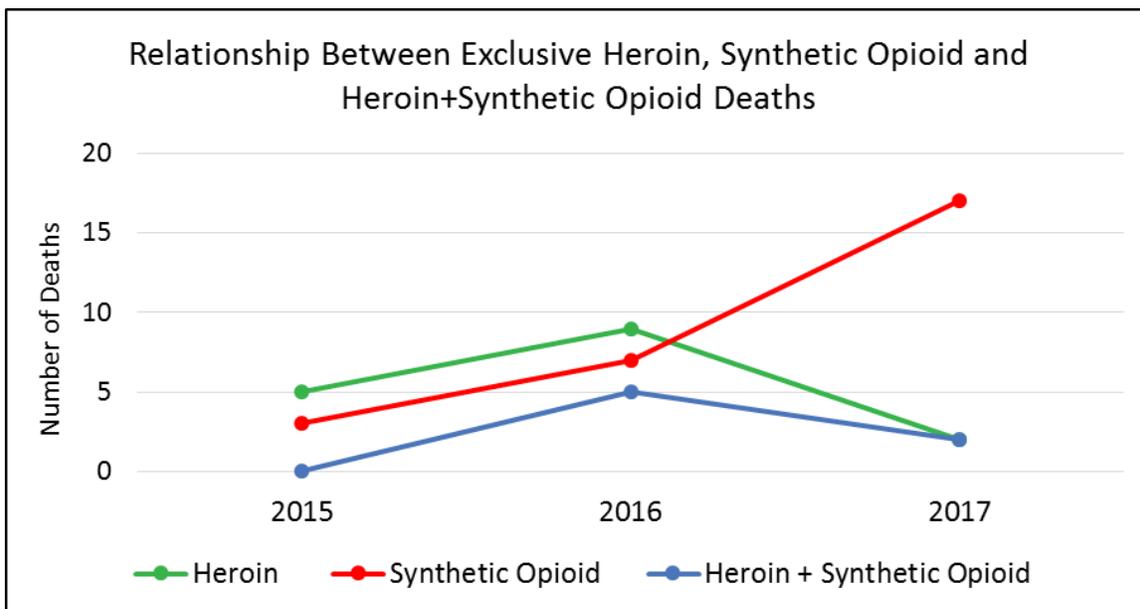
Source: Dr. Joyce deJong, Kalamazoo County Medical Examiner

Table 2 lists all the opioid category combinations found in Kalamazoo County residents who died of an accidental or indeterminate opioid-related death between 2015-2017 within Kalamazoo 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 Kalamazoo County or non-residents who died within Kalamazoo 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 decreased from 2016 to 2017. This may suggest illicitly manufactured fentanyl is less commonly mixed or concomitantly used with heroin in Kalamazoo than other areas—a trend, for example, seen in neighboring Calhoun County.

Table 2: Exclusive Opioid Category Combinations Among Accidental and Indeterminate Opioid-Related Deaths, Kalamazoo County Residents, 2015-2017

	2015	2016	2017
Heroin	5	9	2
Methadone	3	5	3
Methadone, Heroin	0	1	0
Methadone, Synthetic Opioid	0	0	1
Natural Opioid Analgesics	4	12	7
Natural Opioid Analgesics, Heroin	0	2	0
Natural Opioid Analgesic, Methadone	3	2	0
Natural Opioid Analgesic, Synthetic Opioid	1	8	7
Natural Opioid Analgesics, Synthetic Opioid, Heroin	0	1	0
Synthetic Opioid	3	7	17
Synthetic Opioid, Heroin	0	4	2
Total	19	51	39

Figure 13



Source: Dr. Joyce deJong, Kalamazoo County Medical Examiner

The drug and opioid demographic tables on pages 16-20 include those who died from apparent alcohol, drug or poison intoxication within Kalamazoo County. Drug-related deaths were determined by KCHCSD using the same method as opioid-related deaths outlined on pages 10-11. 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 19-20 are by Kalamazoo County residency and all manners of death (accidental, indeterminate, suicide and homicide). Given the interest in deaths due to opioid overdose, the opioid-related death demographics on pages 17-18 are by Kalamazoo County residency and accidental and indeterminate manners of death only.

Most drug and opioid-related deaths involve more than one substance (polysubstance). In 2017, 72% of Kalamazoo County resident drug-related deaths involved an opioid. The 3-year average sex-specific rate for opioid-related overdose was 2.2 times higher in males compared to females. Although the number of whites (n=92) who died from an opioid overdose from 2015 to 2017 was 6.5 times higher than blacks (n=14), the race-specific rates are similar. 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 25-34 year age group.

<p>Years of Potential Life Lost</p> <p>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 75 years among those who die before their 75th year. In 2017, 1865 years of potential life were lost among Kalamazoo County residents who died of an accidental or indeterminate opioid-related death (Table 3).</p>	<p>Table 3: YPLL Due to Opioid-Related Deaths among Kalamazoo County Residents by Manner of Death 2015-2017</p>			
	<p>Manner of Death</p>	<p>2015</p>	<p>2016</p>	<p>2017</p>
	<p>Accidental + Indeterminate</p>	<p>1169</p>	<p>2558</p>	<p>1865</p>
	<p>Suicide</p>	<p>0</p>	<p>72</p>	<p>178</p>
	<p>Total</p>	<p>1169</p>	<p>2630</p>	<p>2043</p>
<p>Table 3 does not include nonresidents or Kalamazoo County residents who may have died outside of Kalamazoo County.</p>				

Injury-Related Deaths

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 Kalamazoo County occur among Kalamazoo County residents (74.0% and 75.3%, respectively).

Table 4: Kalamazoo County Opioid-Related Deaths

	2015			2016			2017		
	Number	Percent	Rate	Number	Percent	Rate	Number	Percent	Rate
Residency									
Kalamazoo Resident	19	63%	7.3	52	81%	20.1	45	75%	17.4
Non-Kalamazoo Resident	11	37%		12	19%		15	25%	
Total	30	100%		64	100%		60	100%	
% of Resident Opioid-Related Deaths									
Manner of Death									
Accidental	18	95%		48	92%		37	82%	
Indeterminate	1	5%		3	6%		2	4%	
Suicide	0	0%		1	2%		5	11%	
Homicide	0	0%		0	0%		1	2%	
% of Resident Accidental and Indeterminate Opioid-Related Deaths									
Substance									
Any alcohol	1	5%	0.4	5	10%	1.9	6	15%	2.3
Any benzodiazepine	10	53%	3.9	21	41%	8.1	9	23%	3.5
Any cocaine	4	21%	1.5	5	10%	1.9	2	5%	0.8
Any methamphetamine	1	5%	0.4	6	12%	2.3	11	28%	4.3
Any opioid	19	100%	7.3	51	100%	19.7	39	100%	15.1
Any fentanyl	3	16%	1.2	18	35%	7.0	26	67%	10.1
Any tramadol	2	11%	0.8	2	4%	0.8	1	3%	0.4
Polysubstance	17	89%	6.6	43	84%	16.6	30	77%	11.6
Opioid Category									
Natural or Semi-Synthetic	8	42%	3.1	25	49%	9.7	14	36%	5.4
Methadone	6	32%	2.3	8	16%	3.1	4	10%	1.5
Synthetic	4	21%	1.5	20	39%	7.7	27	69%	10.4
Heroin	5	26%	1.9	17	33%	6.6	4	10%	1.5

Data Limitations/Definitions: Crude rates are per 100,000 population and use 2012-2016 American Census Survey 5-year estimates for Kalamazoo County as denominators. Smaller counts have more unreliable rates. 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 Kalamazoo residents who may have died outside of Kalamazoo County or nonresidents who died within Kalamazoo County.

One disadvantage of the four CDC opioid categories (pages 14-15) is the categorization of tramadol, a synthetic prescription opioid, along with fentanyl. Table 5 shows counts if tramadol is removed from the synthetic category and placed with natural or semisynthetic opioids to form a prescription (Rx Drugs) group. Tramadol increased the count in the Rx group only if another opioid from the natural and semi-synthetic category was not present in the same decedent.	Table 5: Opioid Categories			
		2015	2016	2017
	Rx	9	27	15
	Methadone	6	8	4
	Fentanyl	3	18	26
Heroin	5	17	4	

Source: Dr. Joyce deJong, Kalamazoo County Medical Examiner

Table 6: 2015-2017 Combined Resident Accidental and Indeterminate Opioid-Related Death Demographics

	N	3-Year Average Rate	95% CI
Sex			
Male	74	19.5	17.6-21.4
Female	35	8.8	7.4-10.3
Race			
White	92	14.5	13.2-15.9
Black	14	16.6	13.8-19.5
Other	3	6.7	—
Age Group			
15-24 Years	12	7.8	4.9-10.8
25-34 Years	30	29.5	27.7-31.3
35-44 Years	23	26.0	18.1-33.8
45-54 Years	27	29.2	22.4-36.0
55-64 Years	14	15.1	11.5-18.6
65+ Years	3	2.9	—

Data Limitations/Definitions: Sex, race and age-specific rates were calculated as a 3-year average given the small number of deaths in certain categories. Rates are per 100,000 population and use 2012-2016 American Census Survey 5-year estimates for Kalamazoo County as denominators. Table 6 includes accidental and indeterminate manners of death. Table 6 does not include Kalamazoo County residents who may have died outside of Kalamazoo County or nonresidents who died within Kalamazoo County.

Table 7: Kalamazoo County Drug-Related Deaths

	2015			2016			2017		
	Number	Percent	Rate	Number	Percent	Rate	Number	Percent	Rate
Residency									
Kalamazoo Resident	30	68%	11.6	63	79%	24.4	58	73%	22.4
Non-Kalamazoo Resident	14	32%		17	21%		22	28%	
Total	44	100%		80	100%		80	100%	
% of Resident Drug-Related Deaths by All Manners of Death									
Manner of Deaths									
Accidental	22	73%		58	92%		48	83%	
Indeterminate	2	7%		4	6%		2	3%	
Suicide	6	20%		1	2%		7	12%	
Homicide	0	0%		0	0%		1	2%	
Substance									
Any alcohol	3	10%	1.2	10	16%	3.9	11	19%	4.3
Any benzodiazepine	14	47%	5.4	22	35%	8.5	13	22%	5.0
Any cocaine	4	13%	1.5	8	13%	3.1	4	7%	1.5
Any methamphetamine	3	10%	1.2	9	14%	3.5	16	28%	6.2
Any opioid	19	63%	7.3	52	83%	20.1	45	78%	17.4
Any fentanyl	3	10%	1.2	18	29%	7.0	26	45%	10.1
Any tramadol	2	7%	0.8	2	3%	0.8	4	7%	1.5
Polysubstance	23	77%	8.9	47	75%	18.2	42	72%	16.2
Opioid Category									
Natural or Semi-Synthetic	8	27%	3.1	26	41%	10.1	17	29%	6.6
Methadone	6	20%	2.3	8	13%	3.1	4	7%	1.5
Synthetic	4	13%	1.5	20	32%	7.7	30	52%	11.6
Heroin	5	17%	1.9	17	27%	6.6	4	7%	1.5

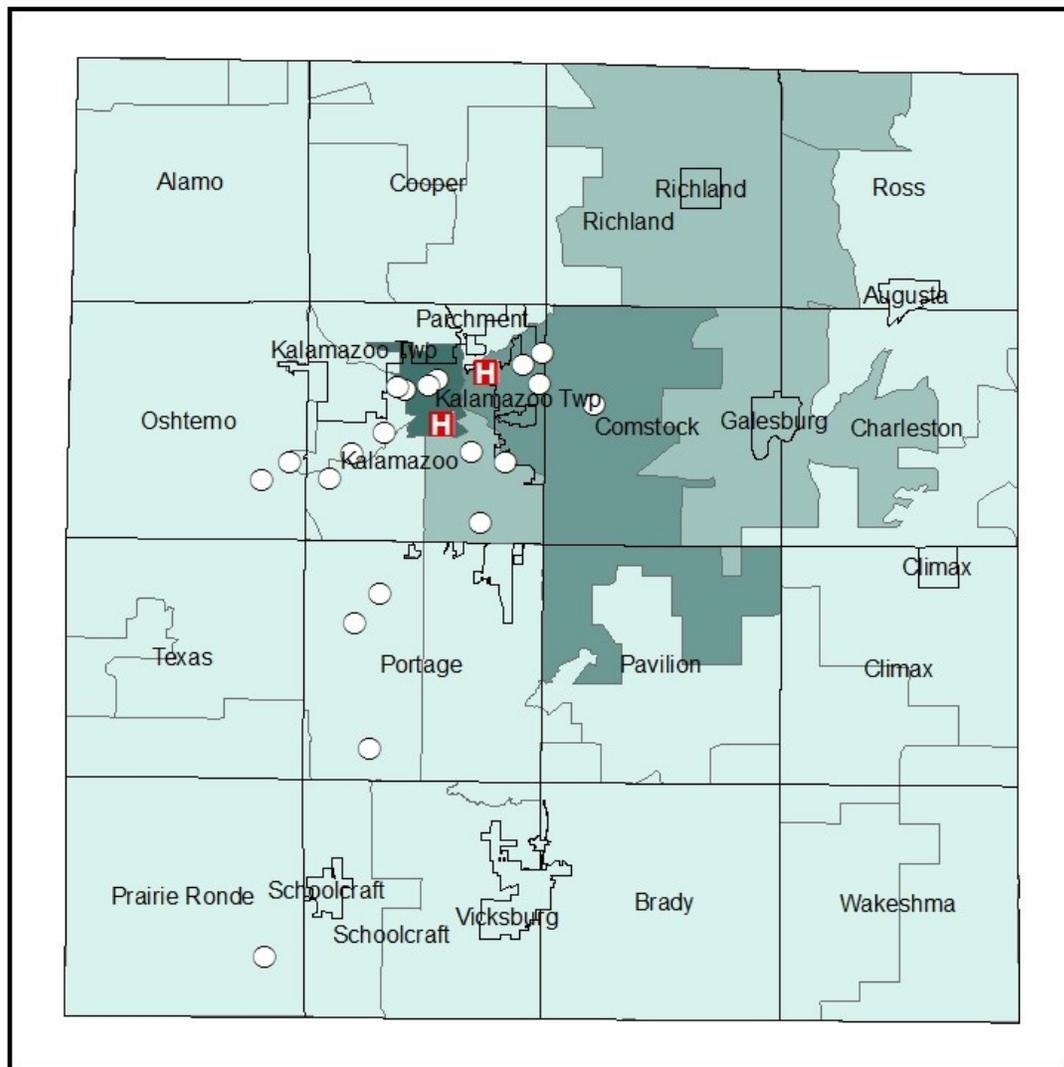
Data Limitations/Definitions: Crude rates are per 100,000 population and use 2012-2016 American Census Survey 5-year estimates for Kalamazoo County as denominators. Smaller counts have more unreliable rates. Substances and opioid categories are not mutually exclusive and do not sum to total figures. The manner of death, substance and opioid category data in Table 7 do not include Kalamazoo County residents who may have died outside of Kalamazoo County or nonresidents who died within Kalamazoo County. Both Table 4 and Table 7 use date of death and not the pronounced date of death from the MDHHS death certificate. Please note that Table 7 substance and opioid category analysis is by all manners of death, unlike Tables 2 and 4.

Table 8: 2015-2017 Combined Resident Drug-Related Death Demographics by All Manners of Death			
	N	3-Year Average Rate	95% CI
Sex			
Male	98	25.8	24.4-27.3
Female	53	13.4	11.4-15.3
Race			
White	129	20.4	19.2-21.6
Black	17	20.2	15.9-24.5
Other	5	11.2	—
Age Group			
15-24 Years	12	7.8	4.9-10.8
25-34 Years	35	34.4	32.1-36.7
35-44 Years	31	35.0	26.6-43.4
45-54 Years	38	41.1	36.2-46.0
55-64 Years	25	26.9	22.5-31.4
65+ Years	10	9.6	6.8-12.3

Data Limitations/Definitions: Sex, race and age-specific rates were calculated as a 3-year average given the small number of deaths in certain categories. Rates are per 100,000 population and use 2012-2016 American Census Survey 5-year estimates for Kalamazoo County as denominators. Table 8 includes all manners of death. Table 8 does not include Kalamazoo County residents who may have died outside of Kalamazoo County or nonresidents who died within Kalamazoo County.

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Kalamazoo County were 49007, 49048 and 49083. 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.

Figure 14



Kalamazoo County, 2015

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

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

Rate per 100,000 population

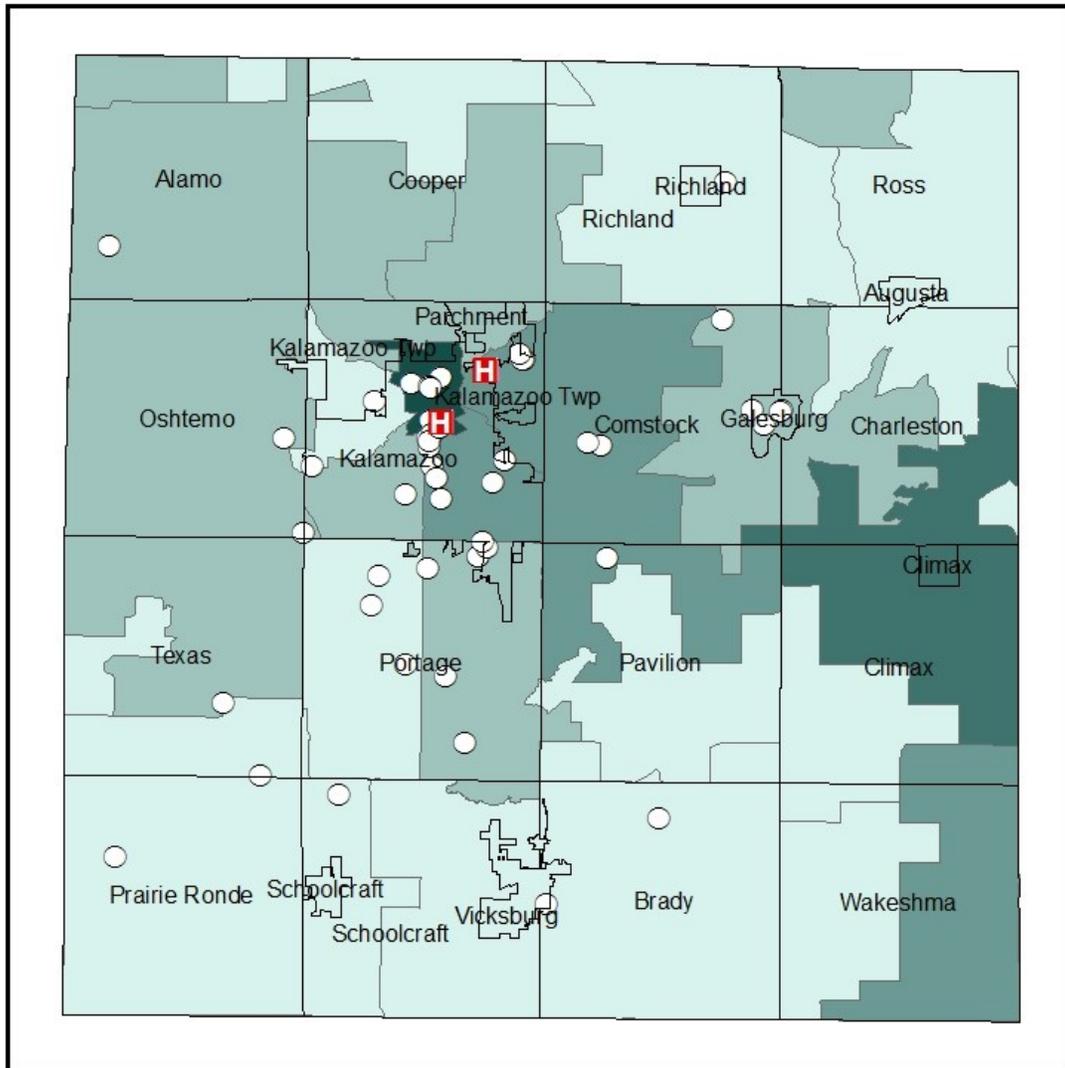
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 250.0

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Ten (10) deaths occurred at Area Hospitals. Four (4) of the ten (10) decedents were Kalamazoo County residents.



The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Kalamazoo County were 49007, 49034 and 49048. 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.

Figure 15



Kalamazoo County, 2016

Area Hospitals Opioid-Related Death

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

Rate per 100,000 population

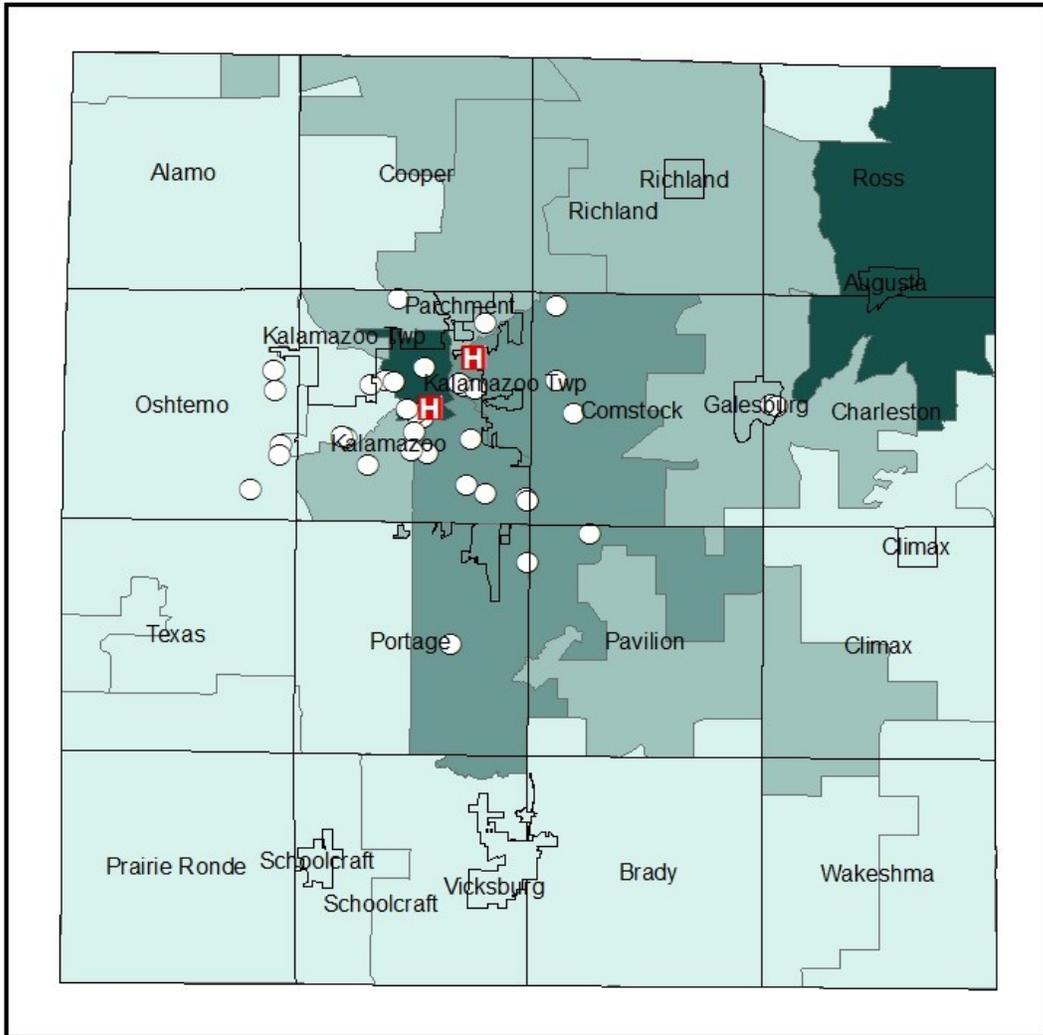
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 297.0

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Fourteen (14) deaths occurred at Area Hospitals. Seven (7) of the fourteen (14) decedents were Kalamazoo County residents.



The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Kalamazoo County were 49001, 49007 and 49012. Historically, zip code 49012 has not seen high rates of opioid overdose; however, an increase in opioid overdose visits was seen in 2017. Given the small population of 49012, the zip code specific rate increased significantly. 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.

Figure 16



Kalamazoo County, 2017

Area Hospitals Opioid-Related Death

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

Rate per 100,000 population

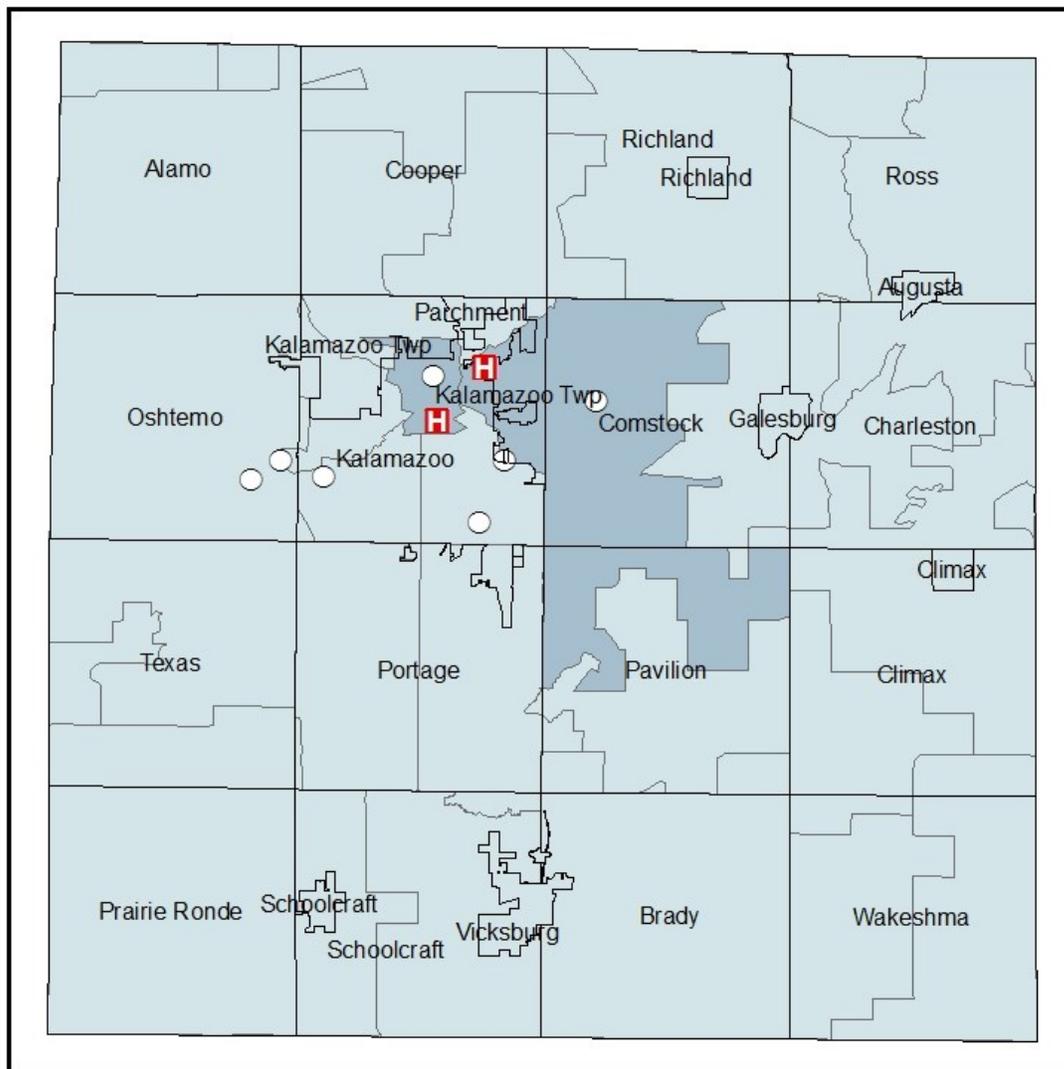
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 450.1

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Fourteen (14) deaths occurred at Area Hospitals. Six (6) of the fourteen (14) decedents were Kalamazoo County residents.



The top three zip codes with the highest rates of unintentional and undetermined heroin overdose visits to an emergency department in Kalamazoo County were 49007, 49048 and 49087. Heroin-related deaths are a proportion of total opioid-related deaths mapped in Figures 14-16 by year. Heroin-related deaths include only accidental and indeterminate manners of death.

Figure 17



Kalamazoo County, 2015

Area Hospitals Heroin-Related Death

Unintentional and Undetermined Heroin Overdose Emergency Department Visits

Rate per 100,000 population

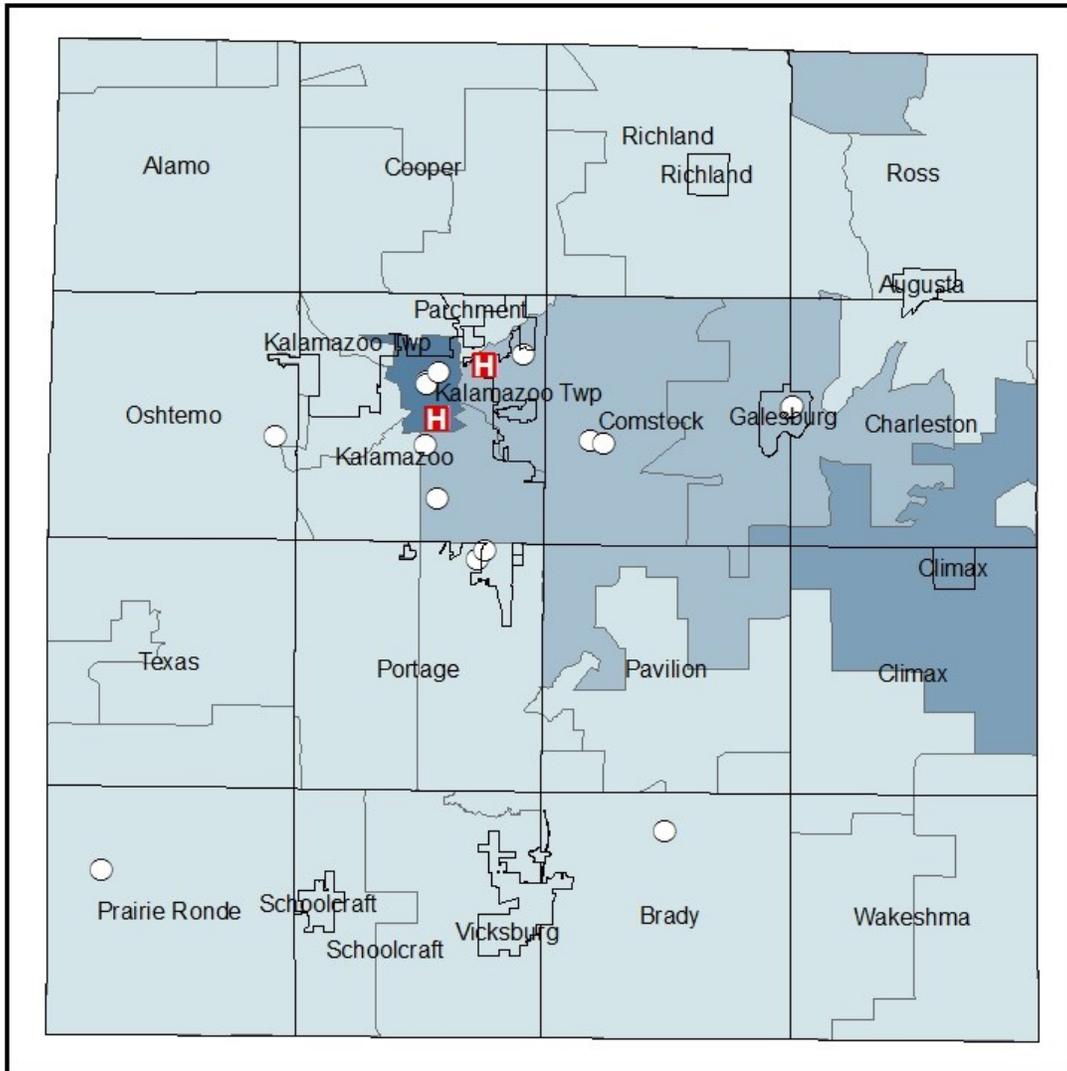
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 250.0

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Two (2) deaths occurred at Area Hospitals. One (1) of the two (2) decedents were Kalamazoo County residents.



The top three zip codes with the highest rates of unintentional and undetermined heroin overdose visits to an emergency department in Kalamazoo County were 49007, 49034 and 49048. Heroin-related deaths are a proportion of total opioid-related deaths mapped in Figures 14-16 by year. Heroin-related deaths include only accidental and indeterminate manners of death.

Figure 18



Kalamazoo County, 2016

H Area Hospitals ○ Heroin-Related Death

Unintentional and Undetermined Heroin Overdose Emergency Department Visits

Rate per 100,000 population

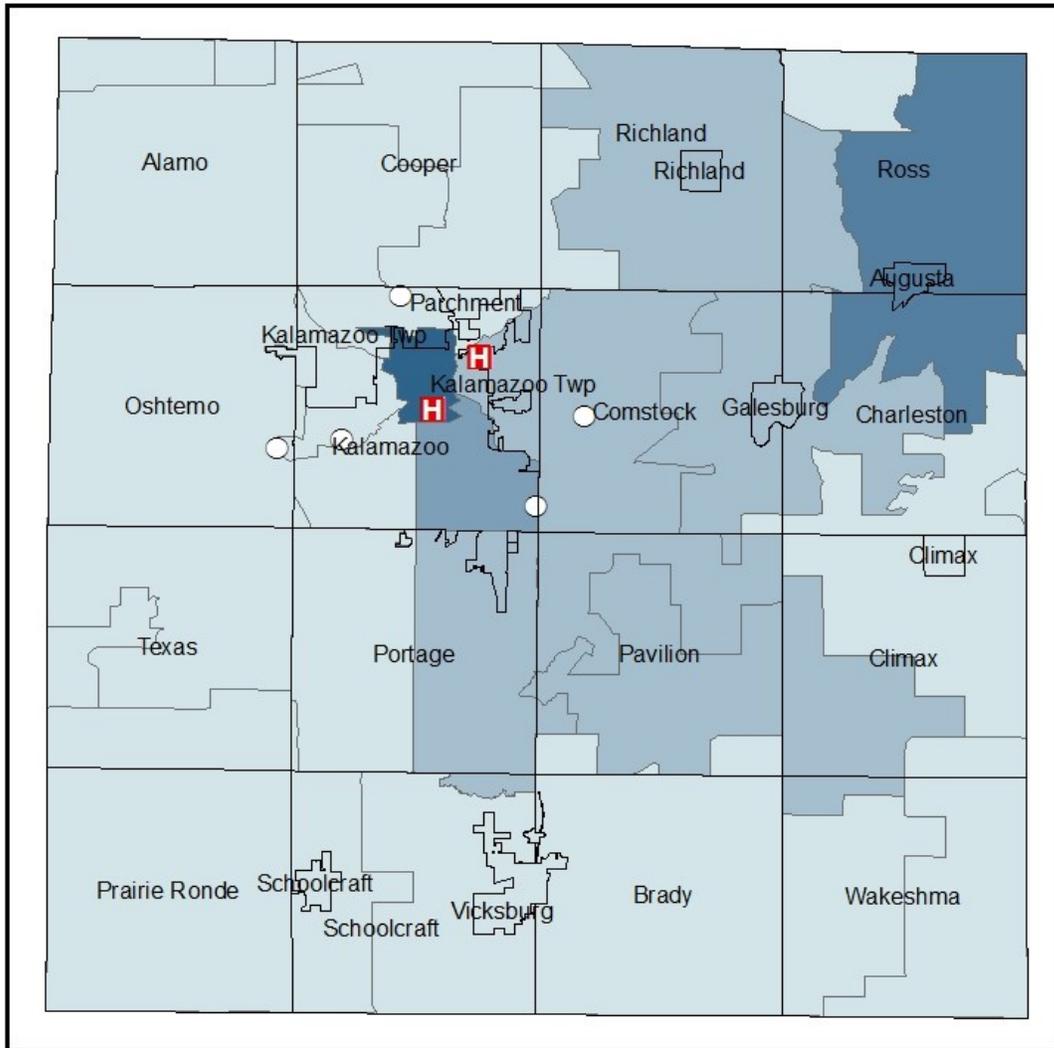
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 250.0

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Four (4) deaths occurred at Area Hospitals. Two (2) of the four (4) decedents were Kalamazoo County residents.



The top three zip codes with the highest rates of unintentional and undetermined heroin overdose visits to an emergency department in Kalamazoo County were 49001, 49007 and 49012. Historically, zip code 49012 has not seen high rates of opioid overdose; however, an increase in opioid overdose visits was seen in 2017. Given the small population of 49012, the zip code specific rate increased significantly. Heroin-related deaths are a proportion of total opioid-related deaths mapped in Figures 14-16 by year. Heroin-related deaths include only accidental and indeterminate manners of death.

Figure 19



Kalamazoo County, 2017

H Area Hospitals ○ Heroin-Related Death

Unintentional and Undetermined Heroin Overdose Emergency Department Visits

Rate per 100,000 population

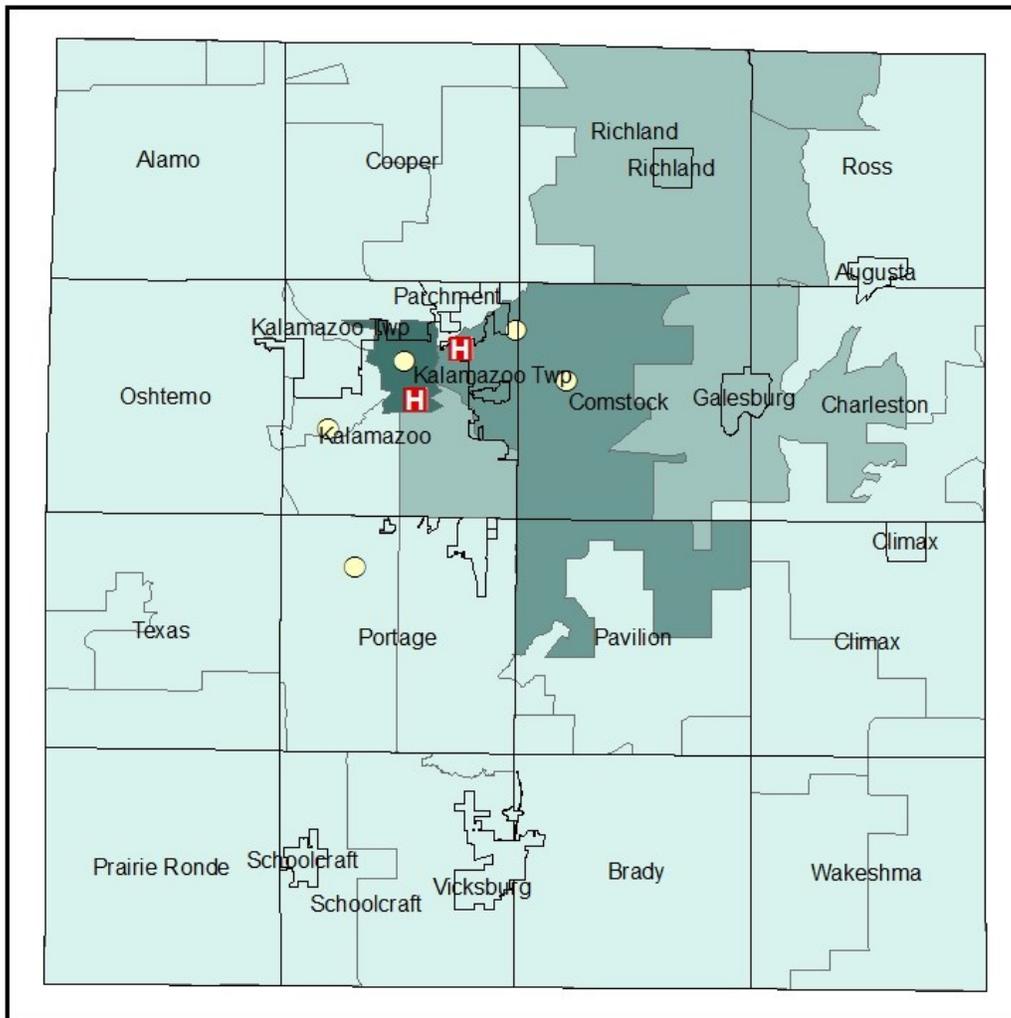
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 400.0



Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Three (3) deaths occurred at Area Hospitals. All hospital deaths were nonresidents of Kalamazoo County.

The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Kalamazoo County were 49007, 49048 and 49083. Figures 20-22 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 14-16 by year. Fentanyl-related deaths include only accidental and indeterminate manners of death.

Figure 20



Kalamazoo County, 2015

Area Hospitals Fentanyl-Related Death

Unintentional and Undetermined Opioid Overdose Emergency Department Visits

Rate per 100,000 population

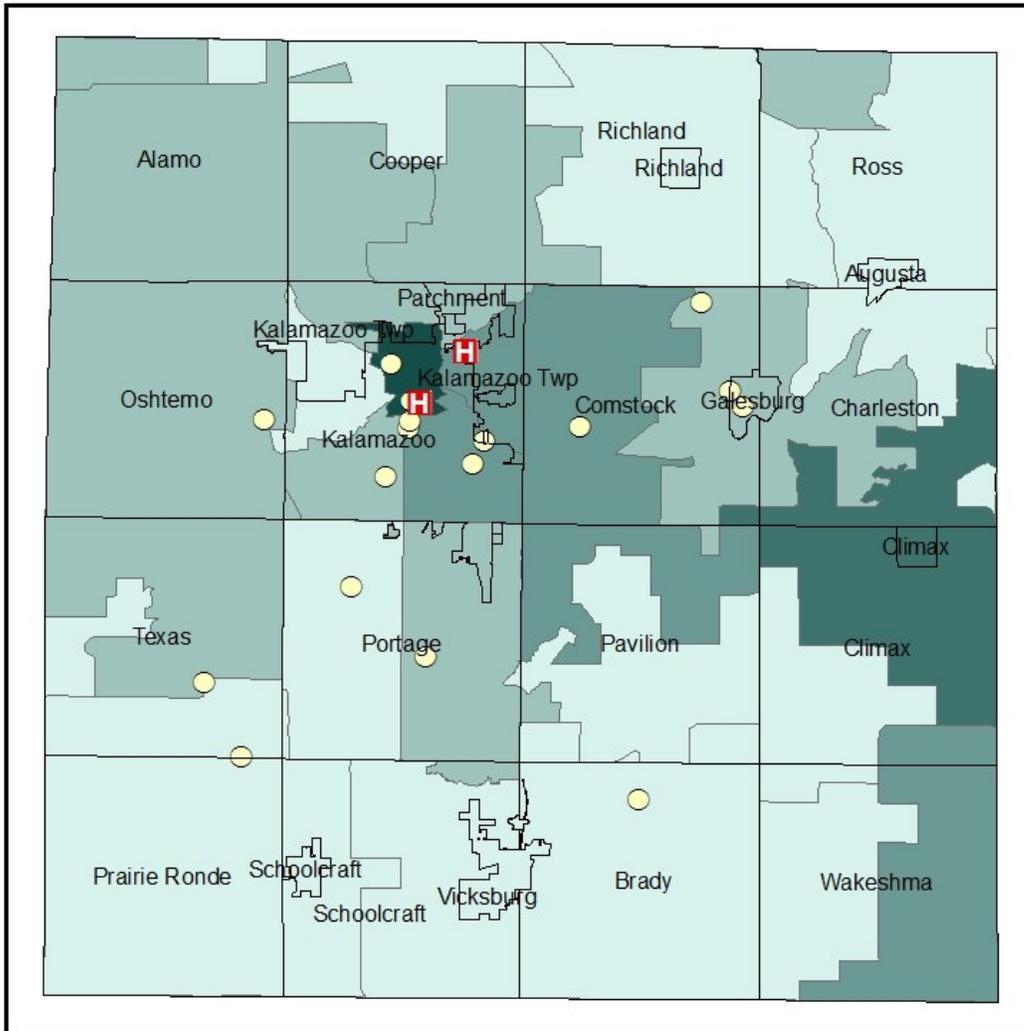
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 250.0

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 One (1) nonresident death occurred at an Area Hospital.



The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Kalamazoo County were 49007, 49034 and 49048. Figures 20-22 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 14-16 by year. Fentanyl-related deaths include only accidental and indeterminate manners of death.

Figure 21



Kalamazoo County, 2016

Area Hospitals Fentanyl-Related Death
Unintentional and Undetermined Opioid Overdose Emergency Department Visits

Rate per 100,000 population

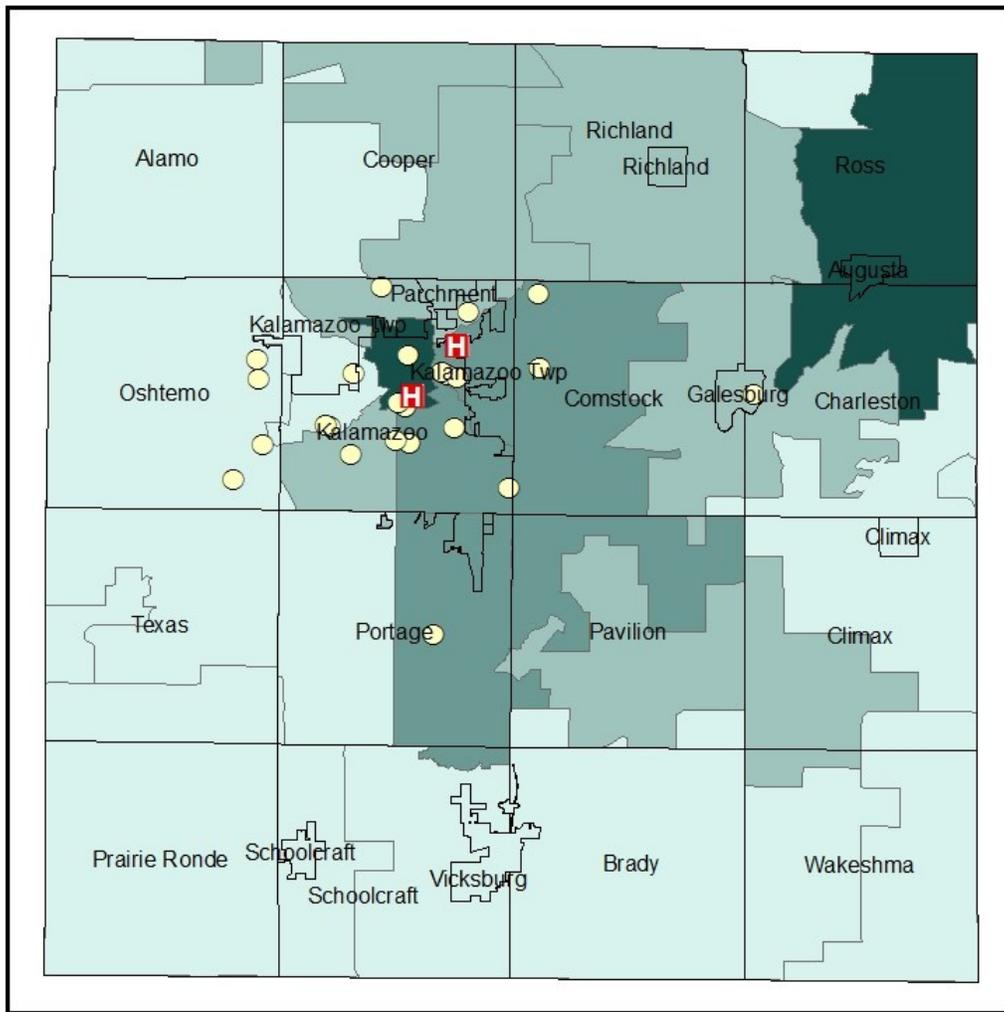
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 297.0

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Four (4) deaths occurred at Area Hospitals. Four (4) of the four (4) decedents were Kalamazoo County residents.



The top three zip codes with the highest rates of unintentional and undetermined opioid overdose visits to an emergency department in Kalamazoo County were 49001, 49007 and 49012. Historically, zip code 49012 has not seen high rates of opioid overdose; however, an increase in opioid overdose visits was seen in 2017. Given the small population of 49012, the zip code specific rate increased significantly. Figures 20-22 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 14-16 by year. Fentanyl-related deaths include only accidental and indeterminate manners of death.

Figure 22



Kalamazoo County, 2017

Area Hospitals Fentanyl-Related Death
Unintentional and Undetermined Opioid Overdose Emergency Department Visits
Rate per 100,000 population

- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 150.0
- 150.1 - 200.0
- 200.1 - 450.1

Map Created by Kalamazoo County Health and Community Services Department.
 Data Sources: Kalamazoo County Office of the Medical Examiner and Area Hospitals.
 Population rates based on 2016 American Community Survey population estimates.
 Note: Indicated locations are address of death, not necessarily the residence of decedents.
 Eleven (11) deaths occurred at Area Hospitals. Five (5) of the eleven (11) decedents were Kalamazoo County residents.



A strategic framework for how Kalamazoo 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. Given the transition to a fentanyl-driven overdose epidemic, special focus on treatment and harm reduction is needed. The Kalamazoo County Opioid Coalition aims to coordinate and integrate existing and new efforts within these strategic priorities across Kalamazoo County.

Prevention and education efforts could 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 are 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 HIV, and Hepatitis A, B, and C, in addition to reducing blood stream and heart valve infections associated with drug use. The Kalamazoo County Opioid Coalition will employ Healthy People 2020's 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.

