MDHHS

Michigan Department of Health & Human Services

2019 Hepatitis B and C Annual Surveillance Report

Viral Hepatitis Surveillance and Prevention Unit

Updated October 22, 2020

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Viral Hepatitis Data Summary

Table 1. Summary of Demographic Information by Type of Hepatitis, Michigan, 2019

	Acute Hepatitis B	% Acute Hepatitis B	Chronic Hepatitis B	% Chronic Hepatitis B	Acute Hepatitis C	% Acute Hepatitis C	Chronic Hepatitis C	% Chronic Hepatitis C	MI Population	% MI Population
n	65	100%	1,024	100%	133	100%	6,036	100%	9,995,915	100%
Sex										
Male	50	77%	597	58%	74	56%	3,641	60%	4,926,816	49%
Female	15	23%	425	42%	59	44%	2,380	39%	5,069,099	51%
Unknown	0	0%	2	0%	0	0%	15	0%	0	0%
Race and Ethnicity										
White or Caucasian	47	72%	286	36%	105	85%	3,235	69%	7,476,047	75%
Black or African American	15	23%	227	29%	5	4%	1,027	22%	1,363,183	14%
Hispanic	1	2%	18	2%	9	7%	122	3%	517,381	5%
Asian	2	3%	193	24%	0	0%	27	1%	324,358	3%
American Indian or Alaskan Native	0	0%	4	1%	1	1%	45	1%	46,417	0%
Other	0	0%	67	8%	4	3%	236	5%	268,529	3%
Unknown	0	-	229	-	9	-	1,344	-	0	-
Age										
Mean	49	-	48	-	37	-	47	-	n/a	-
Median	48	-	48	-	35	-	47	-	40	-
Range	17-84	-	6-98	-	18-77	-	6-94	-	n/a	-
0-19 years	1	2%	20	2%	3	2%	52	1%	2,435,777	24%
20-29 years	5	8%	128	13%	39	29%	1,033	17%	1,379,573	14%
30-39 years	9	14%	232	23%	45	34%	1,409	23%	1,204,044	12%
40-49 years	19	29%	160	16%	23	17%	687	11%	1,193,666	12%
50-59 years	15	23%	201	20%	11	8%	949	16%	1,361,439	14%
60+ years	16	25%	283	28%	12	9%	1,903	32%	2,421,416	24%
Unknown	0	0%	0	0%	0	0%	3	0%	0	0%

*Other MI population Includes 2018 census estimates of "some other race" and "two or more races"

The summary table above was created to illustrate the differences in the demographic make-up between the various viral hepatitis classifications. For instance, males were more likely to have had a diagnosis of all viral hepatitis classifications in 2019. There are some notable racial differences among reported hepatitis cases. Asians had a higher proportion of hepatitis B diagnosis when compared to hepatitis C. White/Caucasians comprise a large majority of the acute hepatitis C cases, accounting for approximately 85% of cases reported with a known race. While they make up a minority of all cases, it should be noted that American Indians and Alaskan Natives are more likely to have a hepatitis C diagnosis than a hepatitis B diagnosis. The mean age for cases of acute hepatitis C is lower in comparison to the other viral hepatitis case classifications. More detailed information on each viral hepatitis case classification can be found in subsequent sections of this report.

This report presents hepatitis B and C data collected from case reports submitted to the Michigan Disease Surveillance System (MDSS) for calendar year 2019. Performing surveillance for viral hepatitis infections is important for identifying trends in rates of infection, characterizing high-risk groups, evaluating prevention programs, and identifying outbreaks. Below is a summary of the key findings from this year's report for the various hepatitis B and C case classifications, focus populations, and hepatitis-related health outcomes.

Acute Hepatitis B

- There were 65 cases of acute hepatitis B infection reported in Michigan in 2019 for a rate of 0.65 cases per 100,000 people. This is below the most recent national rate of acute HBV infection (1.00 per 100,000).
- Case follow-up and completion of epidemiological risk factors was completed for 95% of acute hepatitis B cases in 2019.
- Use of street drugs in the six months prior to diagnosis was the most commonly reported risk factor among 2019 acute hepatitis B cases.

Chronic Hepatitis B

- There were 1,024 new chronic hepatitis B diagnoses reported in Michigan in 2019 for a rate of 10.24 cases per 100,000 people.
- Males have shown higher rates of chronic hepatitis B than females since 2004.
- Asians are disproportionately affected by chronic hepatitis B with an infection rate of 59.50 per 100,000, compared to the state average of 10.24.
- For the third consecutive year the proportion of chronic hepatitis B cases that are foreign-born was over 60%.

Acute Hepatitis C

- There were 133 cases of acute hepatitis C reported in Michigan in 2019 for a rate of 1.33 cases per 100,000 people. This is a decrease from rates reported in Michigan in 2018 (1.80), but still higher than the national acute HCV rate of 1.20 cases per 100,000 reported in 2018.
- The median age of acute hepatitis C cases, 35 years old, was at least 12 years younger than that of other hepatitis case classifications.
- Case follow-up and completion of epidemiological risk factors was completed for about 92% of acute hepatitis C cases in 2019.
    - Where data were available, injection drug use was reported by 70% of acute hepatitis C cases.

Chronic Hepatitis C

- There were 6,036 new chronic hepatitis C diagnoses reported in Michigan in 2019 for a rate of 60.40 cases per 100,000 people.
- The rate of chronic hepatitis C is higher in Michigan males (73.90 per 100,000) versus females (46.95 per 100,000).
- American Indians and Alaskan Natives (96.95 per 100,000) have a higher rate of chronic hepatitis C infection than the general Michigan population.
- Case follow-up and completion of epidemiological risk factors was completed for about 64% of chronic hepatitis C cases in 2019.
    - Where data were available, injection drug use was a factor shared by 69% of cases. Incarceration was a risk factor in 66% of cases. Responses that were unknown or missing were excluded from these proportions.
- Where data were available, 75.77% of chronic hepatitis C cases were reported with genotype 1 infection, 15.12% with genotype 3, and 8.00% with genotype 2.
- A marked decrease in chronic hepatitis C cases was seen in 2019. This can be attributed mostly to the implementation of electronic lab reporting of negative HCV RNA lab reports, which has allowed for a more accurate assessment of active HCV infection. This creates a reduction in reported cases with missing HCV RNA lab results and, consequently, a reduction in the number of cases that meet the probable chronic case definition.

Perinatal Hepatitis C

- There were 11 cases of perinatal hepatitis C reported in Michigan in 2019.
- The average age of infants reported for perinatal hepatitis C was 17 months.
- The majority of infants with perinatal hepatitis C were female (72.7%).
- 72.7% of perinatal hepatitis C cases were White/Caucasian.
- Six out of the 11 reported cases (54.5%) were documented to be born to a hepatitis C-infected mother.

Focus Populations

Hepatitis C in Adults Under 40 Years of Age

- From 2010 through 2019, the proportion of all chronic hepatitis C cases by year in adults under 40 years old has nearly doubled (from 22% in 2010 to 41% in 2019).
- A concurrent increase in heroin use has been evident within the same timeframe.
    - History of injection drug use in 18-39 year old's was reported in 83.6% of hepatitis C patients.
    - Between 2000 and 2019 there has been a 183% increase in Michigan heroin substance use treatment admissions.
    - From 2000 through 2018 heroin overdose deaths in Michigan have increased by 618%.
- The opioid epidemic has impacted both young males and females. As a result, we have seen 26 cases of perinatal hepatitis C due to mother-to-child transmission over the last 6 years, and a rate of 721.2 instances of treated neonatal abstinence syndrome (NAS) per 100,000 live births in 2018.
    - Due to underreporting of chronic HCV cases, the number of perinatal HCV cases linked to infected mothers is likely underestimated. The estimated total perinatal HCV cases in Michigan between 2012-2018 ranges from 252 to 756 infants.

Viral Hepatitis and Human Immunodeficiency Virus (HIV) Co-infection

- From 2004-2019, there were 876 persons in Michigan reported with hepatitis B/HIV co-infection.
    - 89.0% of these persons are male.
    - In 2019 the primary modes of HIV transmission in the HIV/HBV co-infection group were men who have sex with men (MSM) at 53.3%.
- From 2004-2019, there were 1,754 persons in Michigan reported with hepatitis C/HIV co-infection.
    - 73.4% of these persons are male.
    - In 2019 the primary modes of HIV transmission in the HIV/HCV co-infection group were IDU at 28.4% and MSM at 43.3%.
- Incidence of HBV/HIV co-infections has continued to decline. As a result of better HIV linkage to care and treatment, co-infected individuals are living longer lives and thus prevalence of both HBV/HIV co-infection and HCV/HIV co-infection are increasing.
- Incidence of HIV/HCV co-infection has steadily declined, likely due in part to access of HCV direct-acting antivirals that can cure people living with hepatitis C in just 8-12 weeks.

Viral Hepatitis Outcomes

Hospitalization Data

- Hospitalizations attributed to hepatitis C increased by nearly 48% from 2005 through 2016, while total hospitalizations due to hepatitis B and HIV have remained steady.

Transplant Data

- Trends in liver transplantation may be indicative of increasing disease progression and morbidity associated with long-term HBV and/or HCV infection. The total of liver transplants and individuals on the waitlist has remained fairly stable for the past 10 years, with 240 transplants in 2019 and 285 patients on the waitlist.
- 240 liver transplants in 2019 was the most on record for a calendar year in Michigan

Viral Hepatitis and Liver Cancer

- The overall incidence for liver cancer in Michigan has increased by 46% between 2004 and 2017.
- The liver cancer rate among Black/African American males (16.3 cases per 100,000) remains high, and the gap in rates compared to White/Caucasian males (9.3 cases per 100,000) widened in 2017.
- The overall liver cancer mortality has increased by 69.5% between 2009 and 2018 in Michigan.
- In 2018, the Michigan liver cancer mortality rate was higher in Black/African American males (10.5 per 100,000) than it was in White/Caucasian males (5.7 per 100,000).

Viral Hepatitis-Related Mortality

- There were 96 deaths attributed to chronic hepatitis C in Michigan in 2019, which continues the downward trend that has been documented the past 10 years.

Background and Technical Notes

INTRODUCTION

The Michigan Department of Health and Human Services (MDHHS) requires medical providers and laboratories to report cases of communicable diseases, including viral hepatitis, in accordance with Michigan's Communicable Disease Rules. Cases are reported to MDHHS via the Michigan Disease Surveillance System (MDSS), a web-based communicable disease reporting system developed for the state of Michigan. Providers and laboratories can enter cases manually or send cases via HL7 electronic laboratory report (ELR). The MDSS is compliant with CDC's National Notifiable Disease Surveillance System (NNDSS) and has been in use in Michigan since 2004. Case reporting is accomplished in MDSS via standard HTML demographic data collection fields with an enhanced viral hepatitis reporting form for disease-specific data. This report will primarily highlight acute, chronic, and perinatal hepatitis B and C surveillance, along with updates regarding populations of higher risk. MDHHS follows the current CDC Guidelines for Viral Hepatitis Surveillance and Case Management for reporting, investigating, and maintaining quality assurance in viral hepatitis surveillance. Viral hepatitis surveillance data is submitted to CDC weekly in accordance with Morbidity and Mortality Weekly Report (MMWR) notification standards. Cases are classified according to the most recently published CDC/CSTE case definitions.

BACKGROUND

"Hepatitis" means inflammation of the liver and can stem from both infectious and non-infectious causes. The most common types of viral hepatitis are hepatitis A (HAV), hepatitis B (HBV), and hepatitis C (HCV). These viruses can produce an acute illness characterized by nausea, malaise, abdominal pain, and jaundice, although many of these acute infections are asymptomatic or cause only mild disease. HAV is transmitted from person to person via ingestion of food and water contaminated with human waste while HBV and HCV are both blood-borne pathogens. Many persons infected with HBV or HCV are unaware they are infected. Unlike HAV, both HBV and HCV can produce chronic infections that often remain clinically silent for decades while increasing the risk for liver disease and hepatocellular carcinoma. Viral hepatitis is the leading cause of liver cancer and the most common reason for liver transplantation in the United States. The CDC estimates that up to 5.7 million Americans are living with chronic hepatitis; most do not know they are infected due to the often asymptomatic nature of chronic infections.

Hepatitis B Virus

HBV is transmitted through contact with the blood or body fluids of an infected person, most often through sharing infected injection drug use equipment, from sexual contact with an infected person, or from an infected mother to her newborn during childbirth. Transmission of HBV also can occur among persons who have prolonged contact with someone who is HBV-infected (e.g., household contacts). Most people do not experience any symptoms during the acute infection phase. However, some people have acute illness with symptoms that last several weeks, including jaundice, dark urine, extreme fatigue, nausea, vomiting and abdominal pain. In some people, the hepatitis B virus can also cause a chronic liver infection that can later develop into cirrhosis of the liver or liver cancer.

The risk for chronic HBV infection decreases with increasing age at infection. Among infants who acquire HBV infection from their mothers at birth, as many as 90% become chronically infected, whereas 30%–50% of children infected at age 1–5 years become chronically infected. This percentage is smaller among adults, in whom approximately 5% of all acute HBV infections progress to chronic infection.

In the United States, 850,000-2.2 million persons are estimated to be infected with the virus, most of whom are unaware of their infection status. Worldwide, approximately 257 million people have chronic HBV infection and about 887,000 died in 2015 due to the acute or chronic consequences.

Effective hepatitis B vaccines have been available in the United States since 1981 and the CDC recommends vaccination of all infants at birth. Several oral drugs are now available, leading to viral suppression in 90% of patients taking one of these new oral medications.

Hepatitis C Virus

HCV is transmitted primarily through exposure to infected blood, which can result from sharing infected injection drug use equipment, needlestick injuries involving contaminated blood, receipt of blood or blood products before the availability of a standard screening test in 1992 and inadequate infection control in healthcare settings. Much less often, HCV transmission occurs among infants born to HCV-infected mothers or during sexual contact. HCV is not spread by sneezing, coughing, or kissing. The best way to prevent HCV infection is by avoiding behaviors that can spread the virus, especially sharing injection drug use equipment.

The incubation period for HCV is 2 weeks to 6 months. Following initial infection, approximately 80% of people do not exhibit any symptoms. Those who are symptomatic may experience fever, fatigue, decreased appetite, nausea, vomiting, abdominal pain, dark urine, and jaundice. No laboratory distinction can be made between acute and chronic HCV infection. Diagnosis of chronic infection is made on the basis of anti-HCV positive results upon repeat testing and the presence of HCV in the blood. About 75–85 % of newly infected persons develop chronic infection and 60–70% of chronically infected people develop chronic liver disease; 5–20% of chronically infected people develop cirrhosis and 1–5% die from cirrhosis or liver cancer.

With an estimate of up to 5.5 million chronically infected persons nationwide, HCV infection is the most common blood-borne infection in the United States. Worldwide, about 71 million people are chronically infected with HCV, and approximately 399,000 people die every year from HCV-related liver diseases.

Since no vaccine is available for preventing HCV infection, other prevention activities, such as not sharing injection drug equipment and consistently implementing and practicing infection control in healthcare settings, are vital. Linkage to care and treatment is critical to improving health outcomes for persons found to be infected with HCV. Such linkage is particularly important in light of the major advancements that have been made in treatment of hepatitis C. HCV direct-acting antivirals have few side effects or contraindications and can clear HCV infection in 8-24 weeks with a success rate of 90-95%.

TECHNICAL NOTES

Michigan Communicable Disease Reporting Requirements

Michigan's communicable disease rules are promulgated under the authority conferred on the Department of Health and Human Services by Section 5111 of Act No. 368 of the Public Health Acts 1978, as amended, being 333.5111 of the Michigan Compiled Laws. MDHHS maintains a list of conditions, including viral hepatitis, which must be reported by physicians, other authorized health care professionals and laboratories to the local health department in which the patient resides.

Michigan is a "home rule state," in which local governments have direct control over local health departments (LHD). Therefore, LHDs function as administratively autonomous units, separate from MDHHS. MDHHS provides administration of MDSS, expert consultation and other support as needed to LHDs. Physicians and laboratories report diseases to LHDs, who have authority to investigate and follow-up on the case in accordance with their own priorities and available resources.

Michigan has adopted standardized case definitions for HAV, HIV, perinatal HBV, and acute and chronic hepatitis B and C, which were developed and approved by the Council of State and Territorial Epidemiologists and CDC (see Page 10). Cases of acute and chronic hepatitis B and C are reported via MDSS using standardized CDC case report forms (see page 10).

Michigan Disease Surveillance System

Mandatory reporting of communicable diseases can be accomplished via the Michigan Disease Surveillance System (MDSS). The MDSS is a web-based communicable disease reporting system developed for the State of Michigan. The MDSS facilitates coordination among local health departments, MDHHS and federal public health agencies. MDSS provides for the secure transfer, maintenance and analysis of communicable disease surveillance information. MDSS has the capability to receive electronic laboratory reports directly from laboratories via HL7 messaging. Alternatively, cases can be manually entered into MDSS via the web portal by medical providers, laboratories or local health department staff. Cases that have been previously entered in MDSS are matched with incoming cases by a process known as deduplication. The MDSS deduplicates both the client and the disease event based on an algorithm of name, sex, and date of birth. Case reporting is accomplished in MDSS via standard HTML demographic data collection fields with an enhanced viral hepatitis reporting form for disease-specific data. MDHHS submits weekly de-identified individual case reports to CDC via the National Notifiable Disease Surveillance System Modernization Initiative, a computerized public health surveillance information system.

The data in this report includes all cases which meet the CDC/CSTE case definitions referenced in "Web Links to Case Definitions and Case Report Forms" on page 11. Data includes cases with referral dates between January 1, 2019 and December 31, 2019 in MDSS.

The marked reduction in HCV cases for 2019 when compared with 2018 comes as a result of electronic lab reporting for nonreactive HCV RNA tests, which began January 1, 2019. Prior to implementation, many cases lacking a known RNA status were classified as probable cases in accordance with the CDC case classification rules.

Local Health Jurisdiction Structure

The state of Michigan is divided into eight public health preparedness regions that are serviced by 45 health jurisdictions comprised of 84 counties. These local health departments, functioning as administratively autonomous units, provide basic public health services, including communicable disease-related services, to all Michigan citizens and health care providers. The MDHHS provides expert consultation, reference level diagnostic laboratory services, and support to local health departments. MDHHS's public health laboratory performs hepatitis serologic and molecular testing for public health partners.

Determination of Rates

When calculating rates for years prior to 2010, 2000 Michigan Census data was used. 2010 Census data was used for rates in the years 2010 - 2015. The U.S. Census Bureau's American Communities Survey (ACS) 1-year population estimates for 2018 was used to calculate rates in 2019. All rates were calculated per 100,000 persons in the Michigan population. Michigan Census data used in the annual report can be found at:

https://data.census.gov/cedsci/

National Benchmarks

References to national benchmarks come from CDC Division of Viral Hepatitis statistics via the National Notifiable Disease Surveillance System (NNDSS). National statistics used in the annual report can be found at: http://www.cdc.gov/hepatitis/Statistics/index.htm

Data Limitations

There are several limitations to the data presented in this report. As a result, conclusions drawn from the data in this report should be interpreted with caution and with the appropriate recognition of these limitations. As described earlier, this report compiles data on new viral hepatitis diagnoses, which meet CDC/CSTE case definitions, reported to the MDSS in the year 2019. In general, this is not necessarily reflective of the true number of new infections that occurred in 2019 nor the total number of individuals infected with viral hepatitis currently living in Michigan. Rather, these numbers are a rough approximation of the number of new viral hepatitis diagnoses for the year. This should not, however, imply that these infections were contracted in the year 2019. Since the majority of newly diagnosed viral hepatitis infections are chronic in nature, our data has limited utility in deciphering the date of exposure or infection acquisition for these cases.

New case definitions and changes in reporting capacity for acute and chronic hepatitis C cases have been implemented since 2016. The 2016 case definition change lowered the threshold for inclusion as a case. As a result, increases in HCV case counts and rates since 2015 may be, at least in part, indicative of the change in case counting methodology. The marked reduction in HCV cases for 2019 when compared with 2018 comes as a result of electronic lab reporting for nonreactive HCV RNA tests, which began January 1, 2019. Prior to implementation, many cases lacking a known RNA status were classified as probable cases in accordance with the CDC case classification rules.

Like many reportable diseases, cases of viral hepatitis are largely under-reported. CDC estimates suggest that only about 8-10% of acute HBV and 15-17% of acute HCV cases are reported each year. This is mainly due to the infections resulting in subclinical disease in the majority of individuals. Most viral hepatitis infections are asymptomatic and thus the infected person never seeks medical care and is not aware of their infection status until symptoms of the chronic infection develop later on in life. Indeed, it is estimated that up to 75% of individuals infected with HCV do not know they are infected. CDC data approximates that, nationwide, 850,000 to 2.2 million individuals (about 0.3-0.7% of the U.S. population) and 3.5 million (about 1% of the U.S. population) are infected with HBV and HCV respectively. Extrapolating that to the Michigan population, we would then expect approximately 30,000-70,000 Michiganders to be infected and living with HBV and 107,000 with HCV.

It should be noted that individuals who clear their HCV infection spontaneously (in about 25% of those exposed to the virus) or via antiviral treatment are still counted as cases in our disease surveillance system and are not removed from our case counts. Also, individuals who are repeatedly infected with HCV are only counted once in their lifetime in our surveillance system.

The Michigan Department of Corrections (MDOC) conducts HCV screening for new inmates and they report cases to the MDSS as with any provider. Inmates who are positive for HCV are entered into MDSS under the county where their correctional facility is located. All MDOC cases are removed from LHD case counts.

Enhanced Viral Hepatitis Surveillance, 2013-current

Starting in 2013 the Viral Hepatitis Unit initiated a plan to improve viral hepatitis surveillance in Michigan. New surveillance activities in this plan included: additional deduplication of cases in MDSS, active surveillance of cases of public health importance, recruitment of laboratories to report into MDSS electronically, and enhanced auditing and quality assurance of acute and chronic viral hepatitis cases. These enhancements to routine surveillance activities resulted in more reliable and complete information on viral hepatitis diagnoses. Large discrepancies in the data between 2013 and prior years may be a result of these enhanced surveillance efforts and not necessarily indicative of true disease trends.

Web Links to Case Definitions and Case Report Forms

National Notifiable Disease Surveillance System Case Definitions

- Hepatitis A
- Perinatal Hepatitis B
- Acute Hepatitis B
- Chronic Hepatitis B
- Acute Hepatitis C
- Chronic Hepatitis C

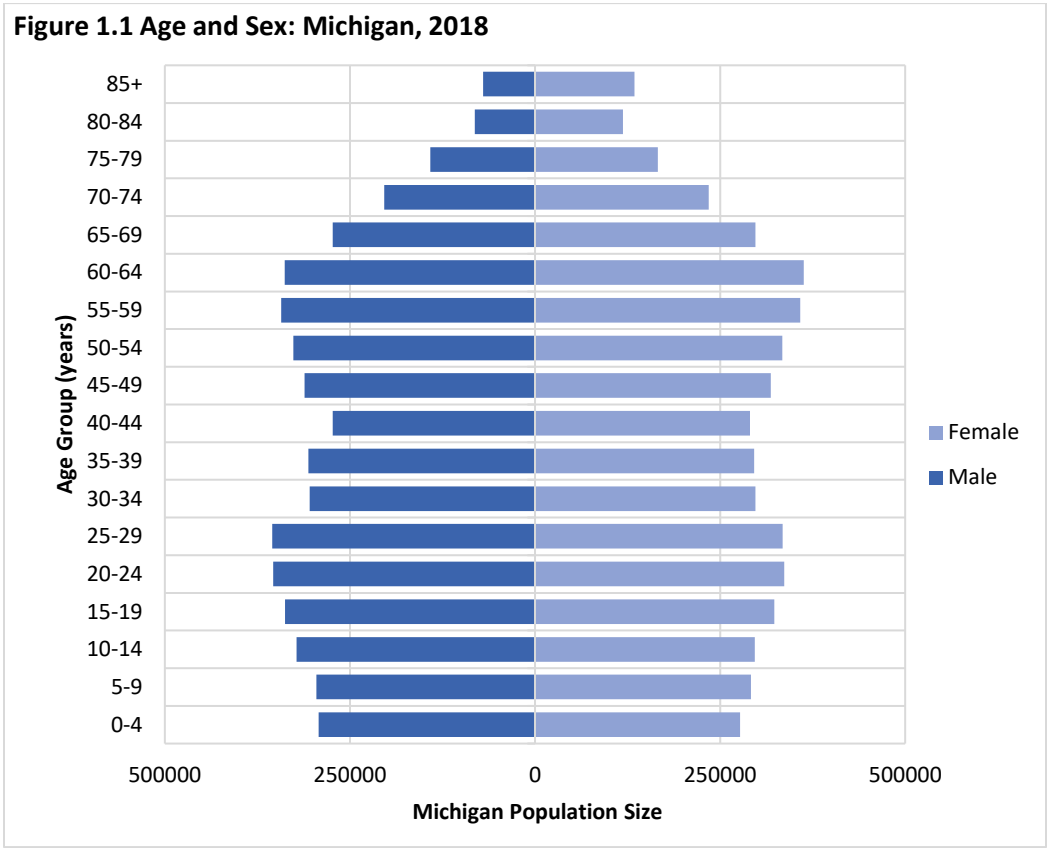
Michigan Viral Hepatitis Case Report Forms

- Hepatitis A
- Perinatal Hepatitis B
- Acute Hepatitis B
- Chronic Hepatitis B
- Perinatal Hepatitis C
- Acute Hepatitis C
- Chronic Hepatitis C

Michigan Census and Demographics

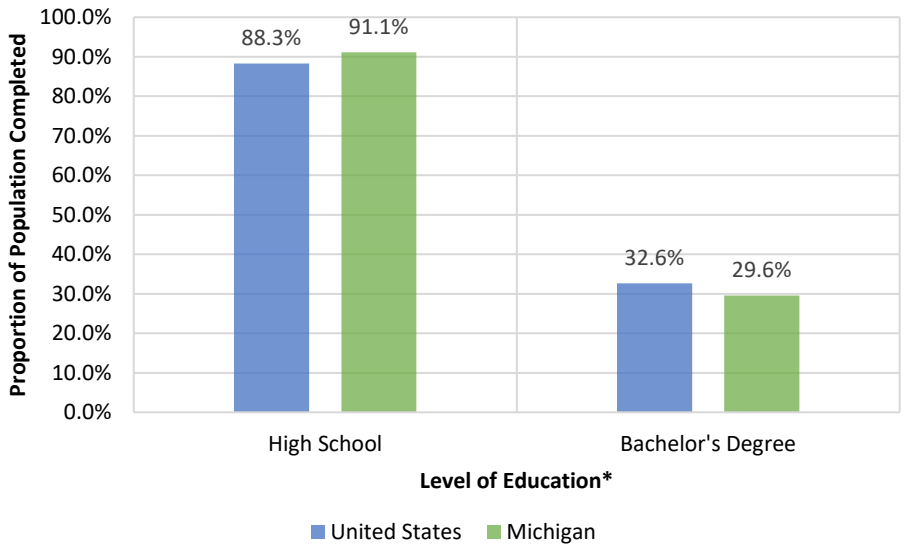
Population by Age, Sex & Education

Figure 1.1 Age and Sex: Michigan, 2018



In 2018, the Michigan population was 9,995,915; the 10th most populous state in the United States. Persons born between 1945 through 1965 amounted to 2,548,681 persons, or 25.5%, of the total population. Females and males made up approximately the same proportion, but there was a notably higher percentage of females than males among the older population (75+ years old). About 78% of the total population was eighteen years old or greater, and residents aged sixty-five and older comprised 17.2% of the total population. The median age was forty years old.

Figure 1.2 Level of Education: Michigan and the U.S., 2018



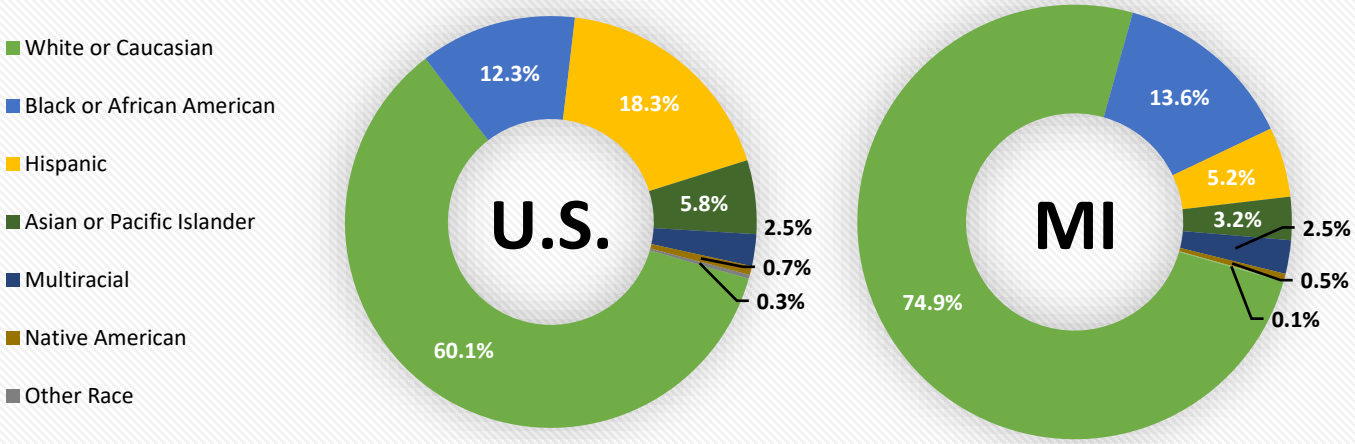
Looking at those aged 25 years and older, 91.1% of Michigan's population completed high school, which is greater than the national benchmark of 88.3%. A higher percentage of the national population, however, completed a bachelor's degree than did those from the state of Michigan (32.6% vs 29.6%).

*Individuals who completed some college but did not finish a degree are still noted as high school graduates. Those considered to have completed a bachelor's degree include persons who finished any type of education higher than a bachelor's degree.

Source: The United States Census Bureau

Population by Race & Ethnicity

Figure 1.3 Race and Ethnicity: Michigan and U.S., 2018



According to the 2018 ACS estimates, the racial and ethnic composition of Michigan is 74.9% non-Hispanic White/Caucasian; 13.6% Black/African American; 5.2% Hispanic; 3.2% non-Hispanic Asian alone; 2.5% multiracial or other race. Nationally, non-Hispanic White/Caucasian persons make up 60.1% of the total, and the Hispanic population is 18.3%. The proportion of male and females within each racial/ethnic group is similar. Between 2010 and 2018, there was a 37.29% rise in Michigan's Asian/Pacific Islander population and a 46.39% rise in Michiganders whom classify as "other" race.

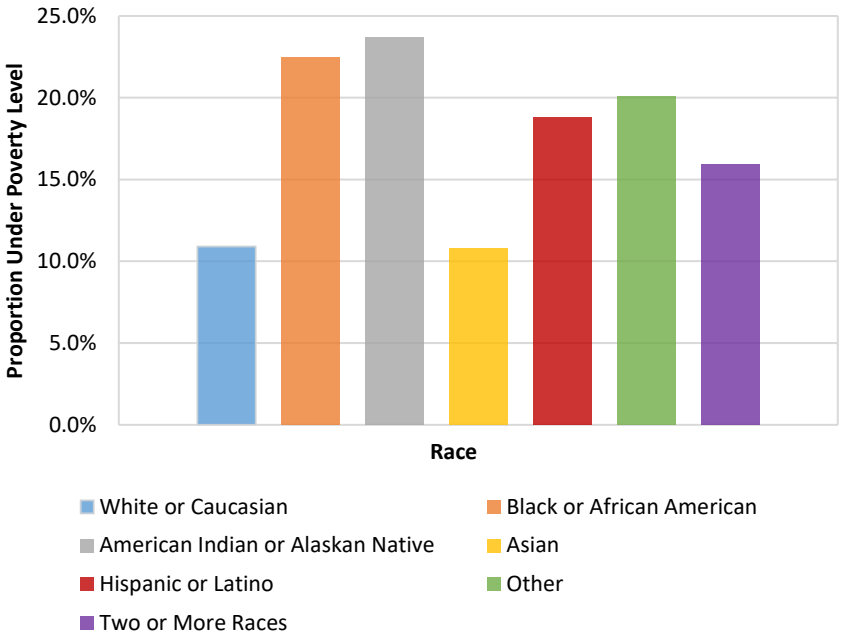
Table 1.1 Population by Race: Michigan, 2010-2018

	2010 Census		2018 ACS		2010-2018	
Race	**Population Count**	**Percent of Total**	**Population Count**	**Percent of Total**	**Change**	**Percent Change**
Total Population	9,883,640	100.00%	9,995,915	100.00%	112,275	1.14%
White or Caucasian	7,569,939	76.59%	7,476,047	74.79%	-93,892	-1.24%
Black or African American	1,383,756	14.00%	1,363,183	13.64%	-20,573	-1.49%
Hispanic	436,358	4.41%	517,381	5.18%	81,023	18.57%
Asian or Pacific Islander	238,660	2.41%	327,648	3.28%	88,988	37.29%
Multiracial	190,396	1.93%	250,796	2.51%	60,400	31.72%
Native American	54,665	0.55%	46,417	0.46%	-8,248	-15.09%
Other Race	9,866	0.10%	14,443	0.14%	4,577	46.39%

Source: The United States Census Bureau

Poverty, Income & Health Insurance

Figure 1.4 Population Under the Poverty Line by Race: Michigan, 2018



The poverty line is determined at a national level each year. In 2018 a family of four would be considered in poverty if the household income in the past 12 months was under $25,701. The American Indian/Alaskan Native community in Michigan had the highest rate of poverty in 2018 (23.7%), while the Asian population (10.8%) and White/Caucasian population (10.9%) had the lowest rates of poverty. The Black/African American and Hispanic/Latino populations, along with the multiracial population, showed similar percentages under the poverty line (approximately 16-23%).

In 2018, about 95% of Michigan's population was covered by public or private insurance, which was slightly higher than the U.S. population (91%). Consequently, the uninsured proportion of Michigan's population was smaller than the national proportion (5.4% vs 8.9%).

Figure 1.5 Health Insurance Coverage, Michigan and the U.S., 2018

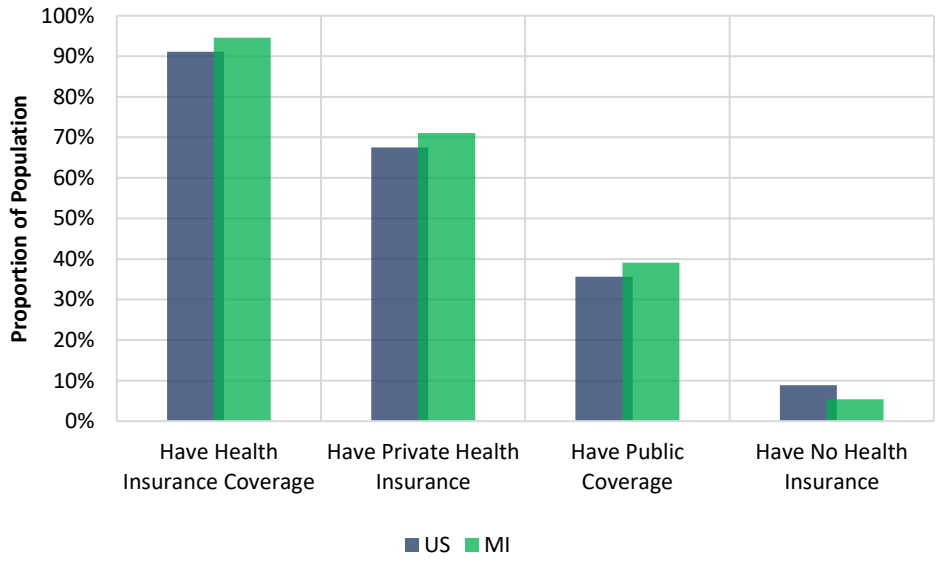
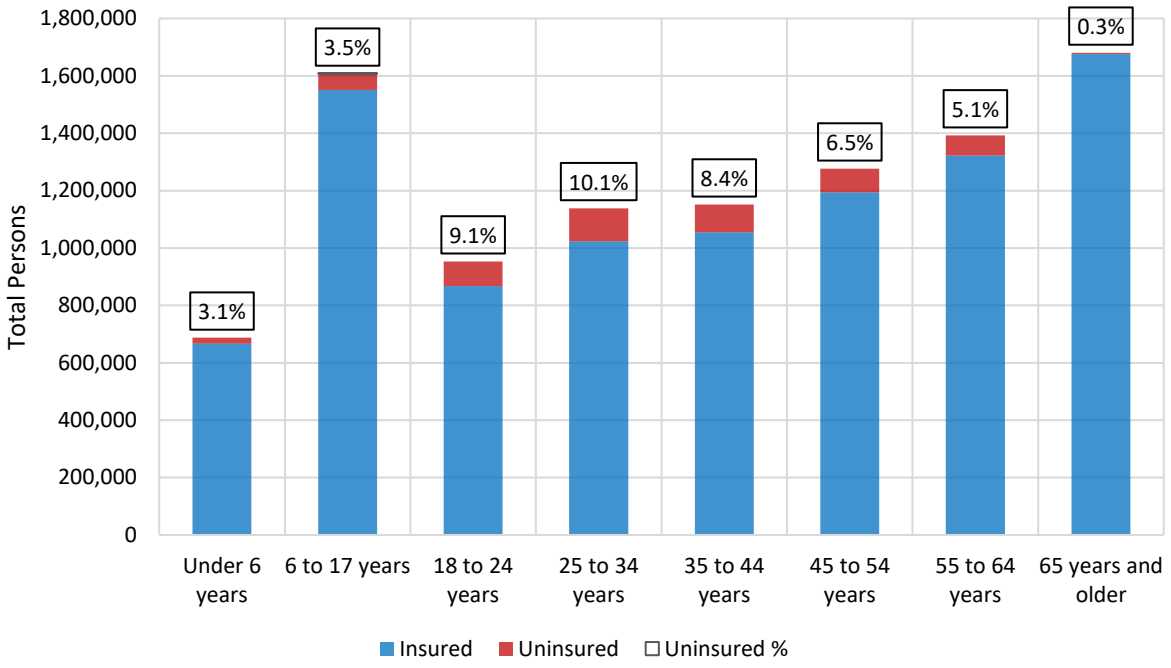
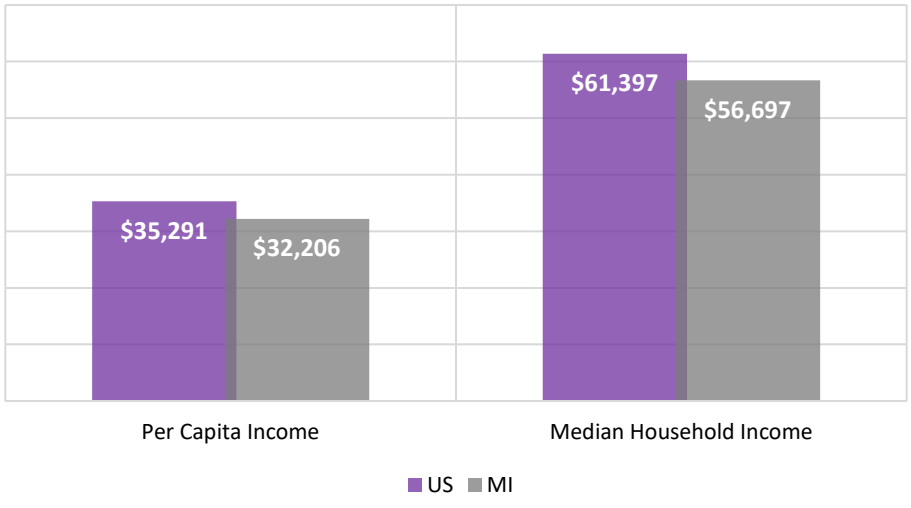


Figure 1.6 Michigan Population by Age Group, Proportion Insured, and Percent Uninsured, 2018



As estimated by the U.S. Census, the most populous age group in Michigan is aged 65 years and older, with approximately 1.71 million individuals. That group, along with the 6 to 17 year old population, are estimated to have insurance coverage of 97% or higher. In contrast, the young adult and middle-aged Michiganders are more likely to be uninsured. The 25 to 34-year-old population was estimated to have the largest proportion of uninsured individuals (10.1%), followed by the 18 to 24-year-old (9.1%) and 35 to 44-year-old (8.4%) cohorts.

Figure 1.7 Income: Michigan and the U.S., 2018



The Michigan population had lower levels of income than that of the U.S. population. The average per capita income for Michigan ($32,206) was 9% lower than the U.S. average ($32,397), and the median household income for Michigan ($56,697) was approximately 7.7% below the national median ($61,397).

Acute Hepatitis B

Acute Hepatitis B—Incidence and Sex

Figure 2.1 Incidence of Acute Hepatitis B in Michigan and United States, 2012-2019

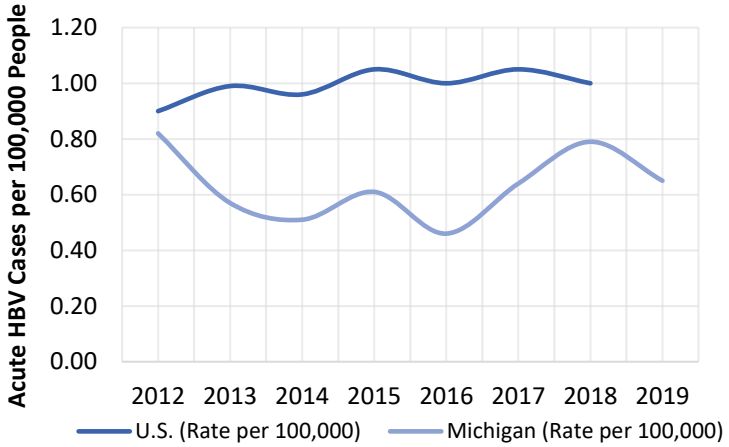


Table 2.1 Incidence of Acute Hepatitis B, Michigan and United States, 2015-2019

Year	Michigan Cases	Michigan (Rate per 100,000)	U.S. (Rate per 100,000)
2015	61	0.61	1.05
2016	46	0.46	1.00
2017	64	0.64	1.05
2018	79	0.79	1.00
2019	65	0.65	N/A

Acute HBV infections in Michigan decreased in 2019, following a two-year period of increased case numbers between 2016 and 2018. The Michigan acute hepatitis B incidence rate has been historically lower than the U.S. incidence rate. National hepatitis B data is not yet available for 2019.

Figure 2.2 Number of Acute Hepatitis B Cases by Sex in Michigan, 2012-2019

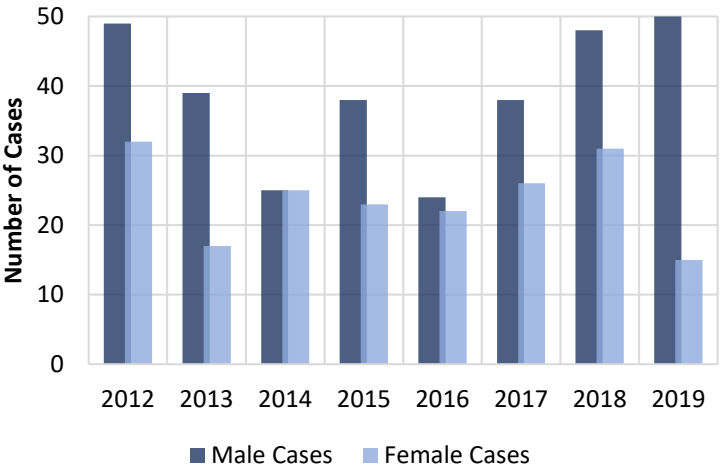


Table 2.2 Acute Hepatitis B Total Cases and Incidence Rate by Sex in Michigan, 2015-2019

Year	Male Cases	Male Incidence	Female Cases	Female Incidence
2015	38	0.78	23	0.46
2016	24	0.49	22	0.44
2017	38	0.78	26	0.52
2018	48	0.98	31	0.61
2019	50	1.01	15	0.30

Acute hepatitis B incidence has been increasing in males since 2016. Males have traditionally had a higher rate of acute HBV infections when compared to females, and that trend continues. In 2019, however, the number of acute hepatitis B cases in females reached a low when cases decreased by over 50 percent from 2018.

Acute Hepatitis B—Race and Ethnicity

Figure 2.3 Incidence of Acute Hepatitis B by Race in Michigan, 2012-2019

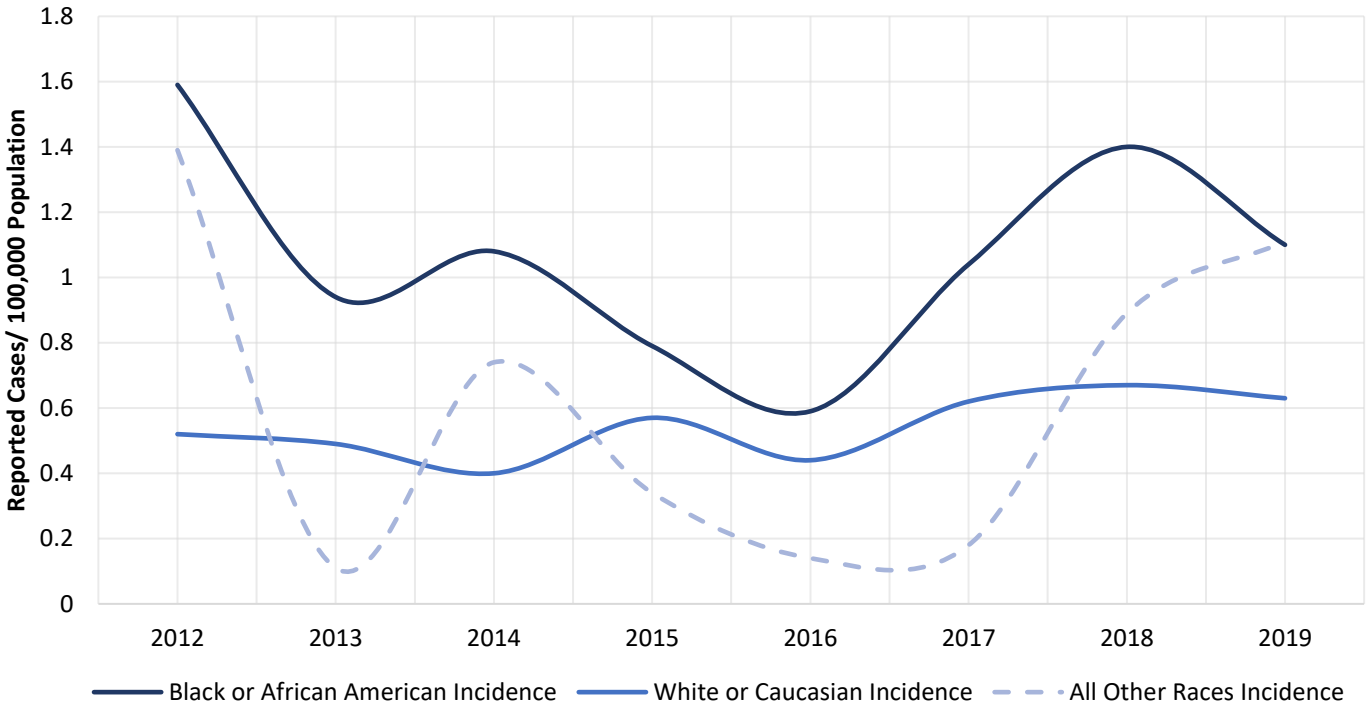


Table 2.3 Incidence of Acute Hepatitis B by Race and Ethnicity in Michigan, 2015-2019

Year	Black or African American Cases	Black or African American Incidence	American Indian or Alaskan Native Cases	American Indian or Alaskan Native Incidence	Asian Cases	Asian Incidence	White or Caucasian Cases	White or Caucasian Incidence	Hispanic Cases	Hispanic Incidence	Other Cases	Other Incidence
2015	11	0.79	0	0.00	2	0.85	43	0.57	0	0.00	1	0.49
2016	8	0.59	0	0.00	1	0.34	33	0.44	1	0.21	0	0.00
2017	14	1.04	0	0.00	1	0.34	45	0.62	1	0.20	1	0.36
2018	19	1.4	0	0.00	3	0.98	50	0.67	2	0.40	2	0.04
2019	15	1.1	0	0.00	2	0.95	47	0.63	1	0.19	0	0.00

In 2019, Blacks/African Americans had the greatest incidence of acute HBV in Michigan, followed by Asians, Whites/Caucasians and Hispanics. Black/African American incidence decreased in 2019 after peaking in 2018. White/Caucasian incidence has remained relatively steady since 2017. “All Other Races” incidence, which includes American Indian/Alaskan Native, Asian, Hispanic and Other races/ethnicities, has increased since 2017. In 2016 we switched from using the 2010 Census to using 2015 Census estimates for calculation of infection rates, thus explaining disproportionate changes in incidence rates relative to changes in case counts that may occur throughout this report.

Acute Hepatitis B—Risk Behaviors

Table 2.4a Completeness of Acute Hepatitis B Reports by Risk Behavior in Michigan, 2019 (n = 65)

Risk Behavior	Completed
Injection Drug User	94%
Used Street Drugs	89%
Hemodialysis	95%
Received Blood Products	94%
Received a Tattoo	92%
Accidental Needle Stick	88%
Contact of Person with Hepatitis B	95%
Other Surgery	88%
Oral Surgery or Dental Work	91%
Employed in Medical Field	94%
Employed as Public Safety Officer	94%
Incarceration Longer than 6 Months	94%
Any Part of Body Pierced (other than ear)	94%

Table 2.4a shows the percentage of acute HBV risk behavior questions that were completed by local health department disease investigators in the MDSS case report form. A risk behavior was considered completed if the question was marked as 'Yes,' 'No,' or 'Unknown.' Acute HBV epidemiologic information questions were completed for approximately 95% of case reports. This is an increase from the 70% of acute HBV questions completed in the year 2012 before enhanced viral hepatitis surveillance funding and similar to case follow-up rates reported in 2018 (96%). According to the CDC, the national average for completeness of acute HBV case report forms was 58% in 2014.

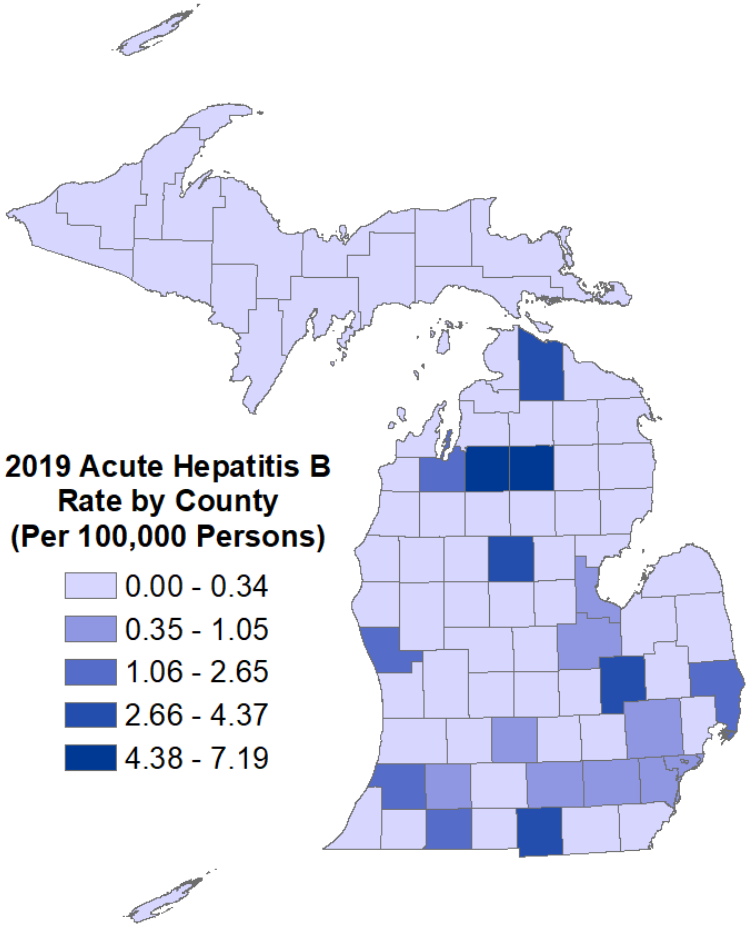
Table 2.4b Response of Completed Acute Hepatitis B Reports* by Risk Behavior in Michigan, 2019

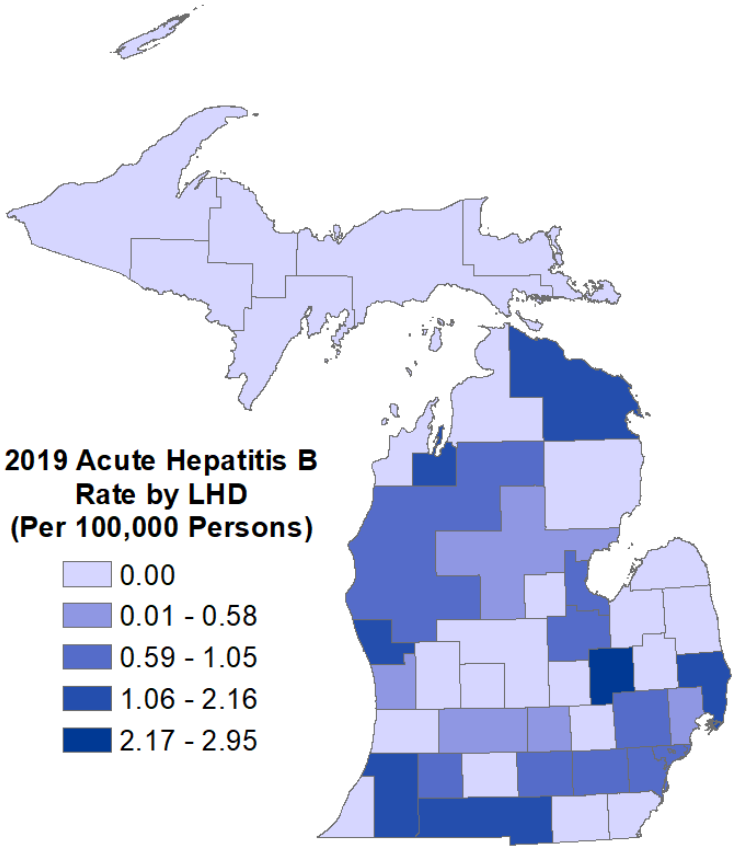
Risk Behavior	Yes*	No*	Unknown*	Yes Responses U.S. Wide 2014
Injection Drug User	13%	74%	13%	25.80%
Used Street Drugs	16%	69%	16%	
Hemodialysis	3%	81%	16%	0.20%
Received Blood Products	5%	74%	21%	0.10%
Received a Tattoo	15%	53%	32%	
Accidental Needle Stick	2%	70%	28%	4.90%
Contact of Person with Hepatitis B	10%	55%	35%	3.90%
Other Surgery	18%	61%	21%	10.80%
Oral Surgery or Dental Work	30%	41%	29%	
Employed in Medical Field	2%	74%	25%	0.30%
Employed as Public Safety Officer	0%	77%	23%	
Incarceration Longer than 6 Months	15%	54%	31%	
Any Part of Body Pierced (other than ear)	7%	61%	33%	

* Percentages calculated based upon those who completed the field; excludes missing data

Table 2.4b shows the HBV acquisition risk factors reported by clients in the 6 weeks to 6 months prior to onset of symptoms. "Oral Surgery or Dental Work" was the most common potential exposure, with 'Yes' being selected in 30% of cases with completed risk behavior questions. "Employed as Public Safety Officer" is the least likely risk exposure in 2019 with zero acute HBV cases reporting this risk. In 2017, 37% of cases reported "Used Street Drugs" in comparison to only 13% in 2019.

Acute Hepatitis B Rate Maps by County and Local Health Jurisdiction





Chronic Hepatitis B

Chronic Hepatitis B—Incidence and Sex

Figure 3.1 Chronic Hepatitis B Cases per 100,000 Persons, Michigan, 2012-2019

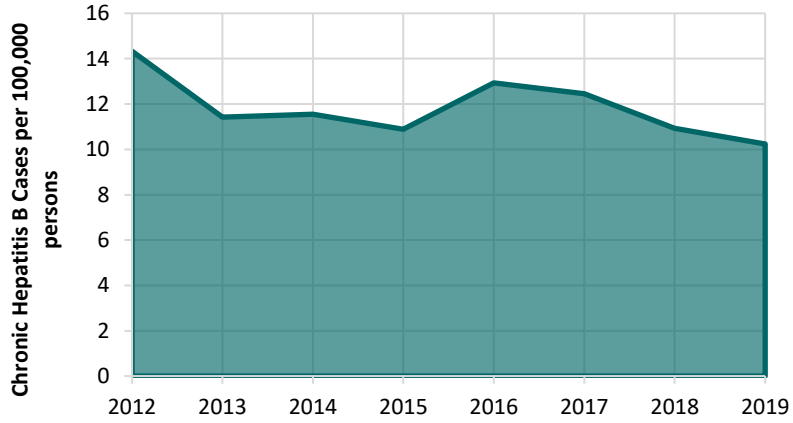


Table 3.1 Chronic Hepatitis B Cases per 100,000 Persons, Michigan, 2015-2019

Year	Michigan Cases	Michigan (Rate per 100,000)
2015	1076	10.89
2016	1283	12.93
2017	1237	12.46
2018	1089	10.93
2019	1024	10.24

Following an increase in cases in 2016, cases have decreased through 2019. There is no national benchmark for comparing rates of chronic HBV infection. Decreases in cases after 2012 may be due, in part, to increased deduplication efforts and removal of redundant cases by MDHHS staff. Increases in the number of cases reported in 2016 may be explained by improved laboratory reporting from some Michigan health systems and/or more frequent ordering of hepatitis panels as a result of a hepatitis A outbreak occurring at that time.

Figure 3.2 Chronic Hepatitis B Cases per 100,000 Population by Sex, Michigan, 2012-2019

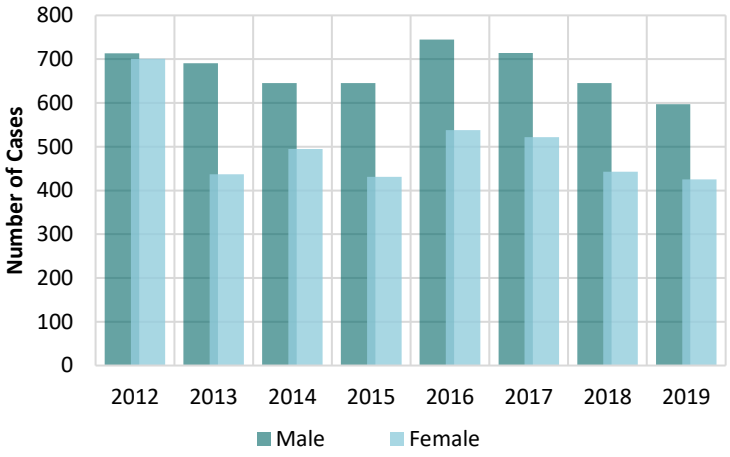


Table 3.2 Chronic Hepatitis B Cases per 100,000 Population by Sex in Michigan, 2015-2019

Year	Male	Male Incidence	Female	Female Incidence
2015	645	13.3	431	8.56
2016	745	15.28	538	10.66
2017	714	14.62	522	10.33
2018	645	13.14	443	8.76
2019	597	12.12	425	8.38

The rate of chronic HBV in males in Michigan has remained higher than the rate in females between the years of 2012 and 2019. The rate for males and females is at its lowest point in recent years. That decrease is largely due to increased emphasis on the removal of duplicate chronic HBV cases in MDSS, particularly among women of childbearing age.

Chronic Hepatitis B—Race and Ethnicity

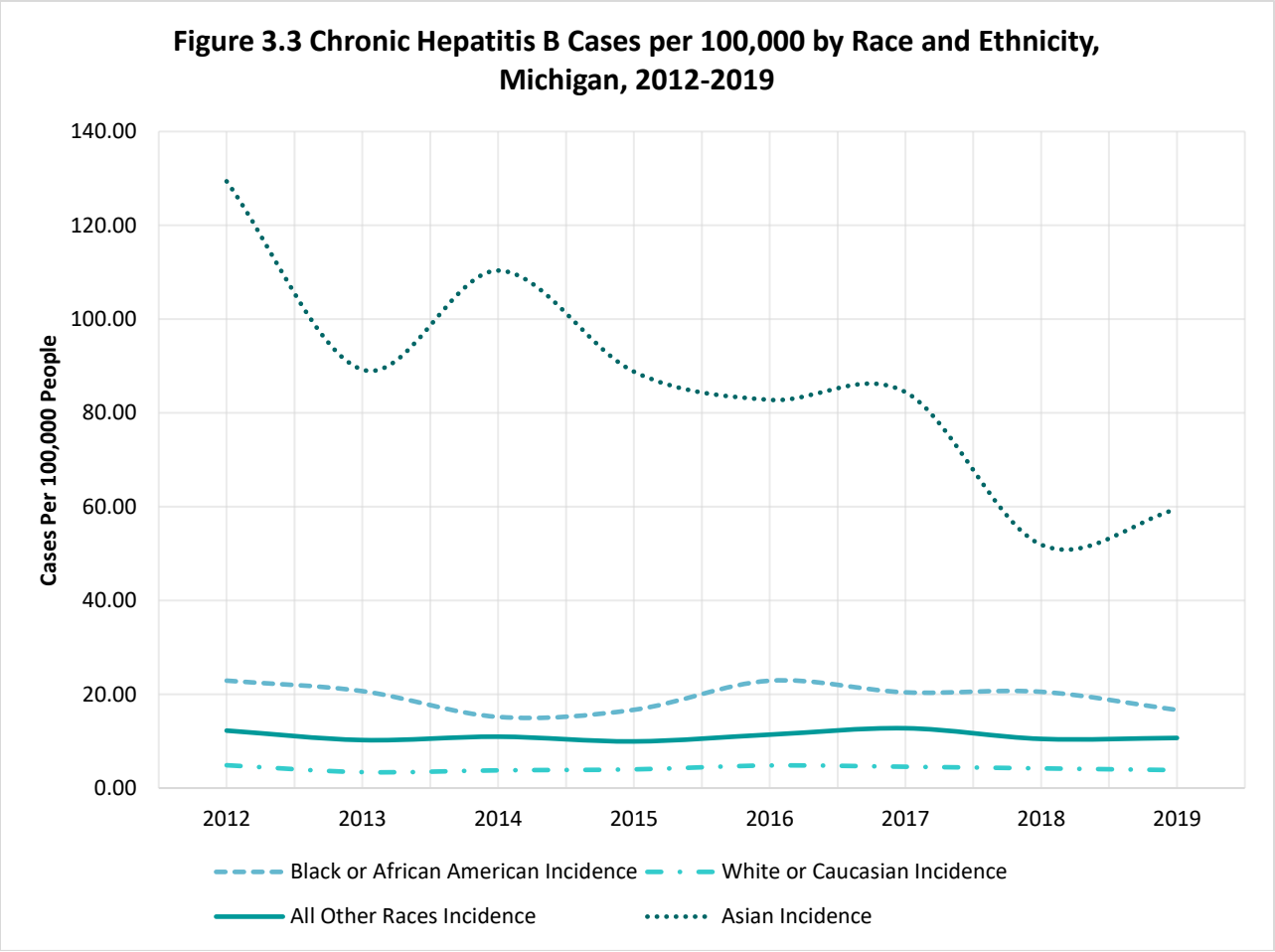
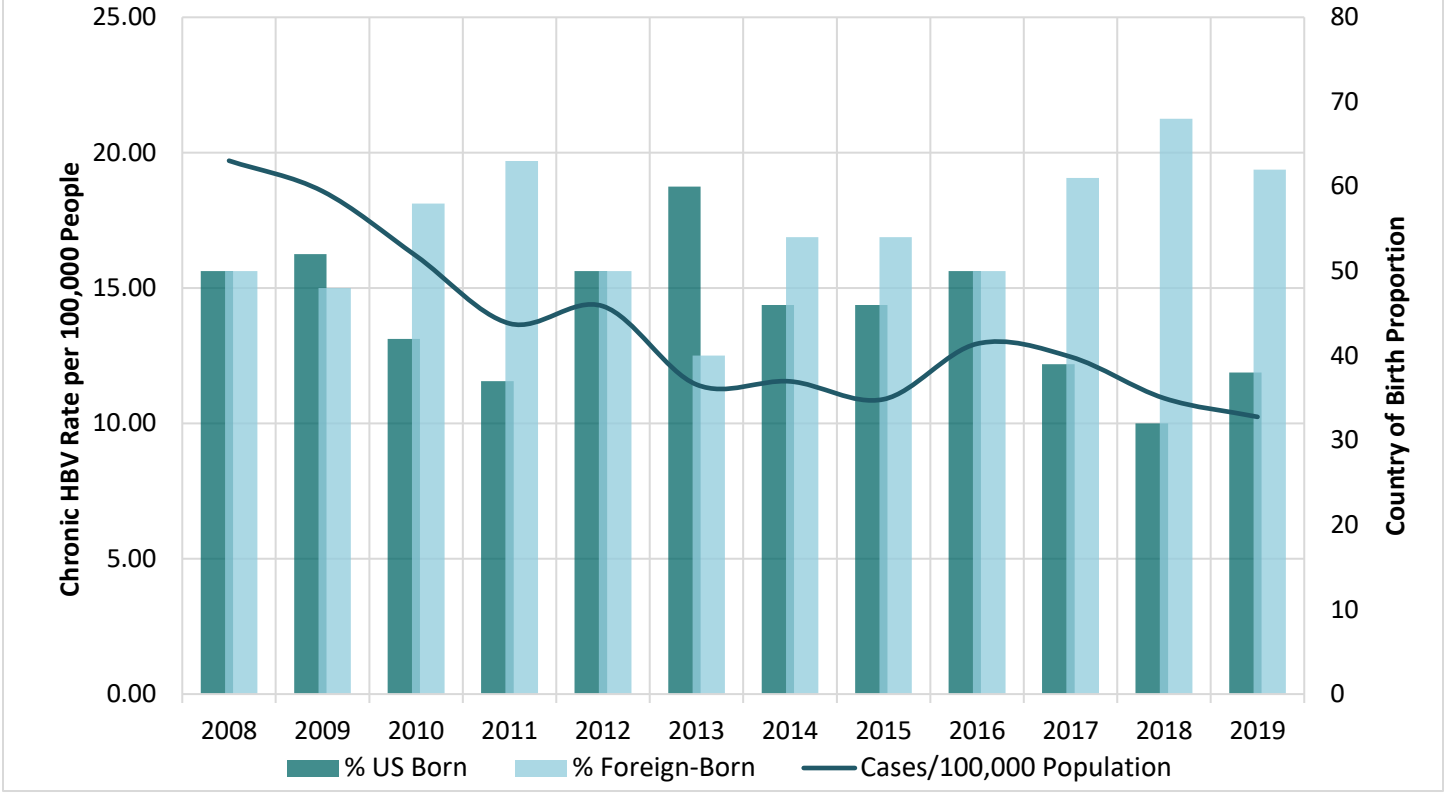


Table 3.3 Chronic Hepatitis B Cases per 100,000 by Race and Ethnicity, Michigan, 2015-2019

Year	Black or African American Cases	Black or African American Incidence	American Indian or Alaskan Native Cases	American Indian or Alaskan Native Incidence	Asian Cases	Asian Incidence	White or Caucasian Cases	White or Caucasian Incidence	Hispanic Cases	Hispanic Incidence	Other Cases	Other Incidence
2015	231	16.69	8	14.63	210	88.80	302	3.99	13	2.98	48	23.71
2016	312	22.89	2	4.34	242	82.79	361	4.82	24	4.94	63	25.33
2017	275	20.41	2	4.66	246	84.44	340	4.55	18	3.66	84	30.56
2018	279	20.53	1	2.20	159	51.90	314	4.20	13	2.58	72	25.53
2019	227	16.65	4	8.62	193	59.50	286	3.83	18	3.48	67	24.95

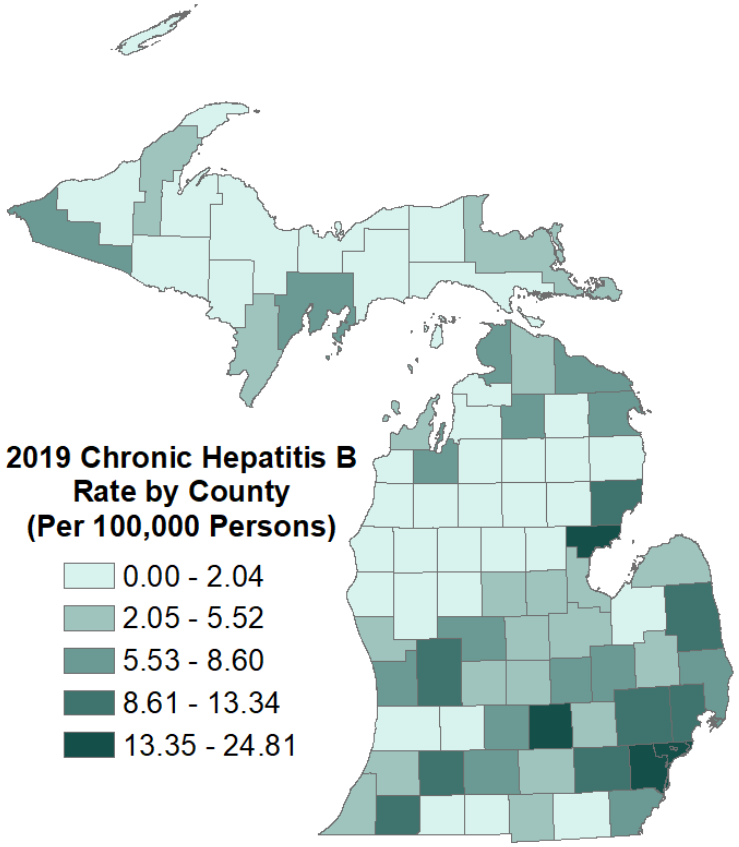
In 2019, Asians had the highest rate (59.50 per 100,000) of chronic HBV infection in Michigan, followed by Black/African Americans (16.65 per 100,000). The Asian infection rate of 59.50 is 15.5 times higher than the White/Caucasian rate (3.83 cases per 100,000). Asian-Americans are the target of CDC's KNOW HEPATITIS B campaign due to that disparity.

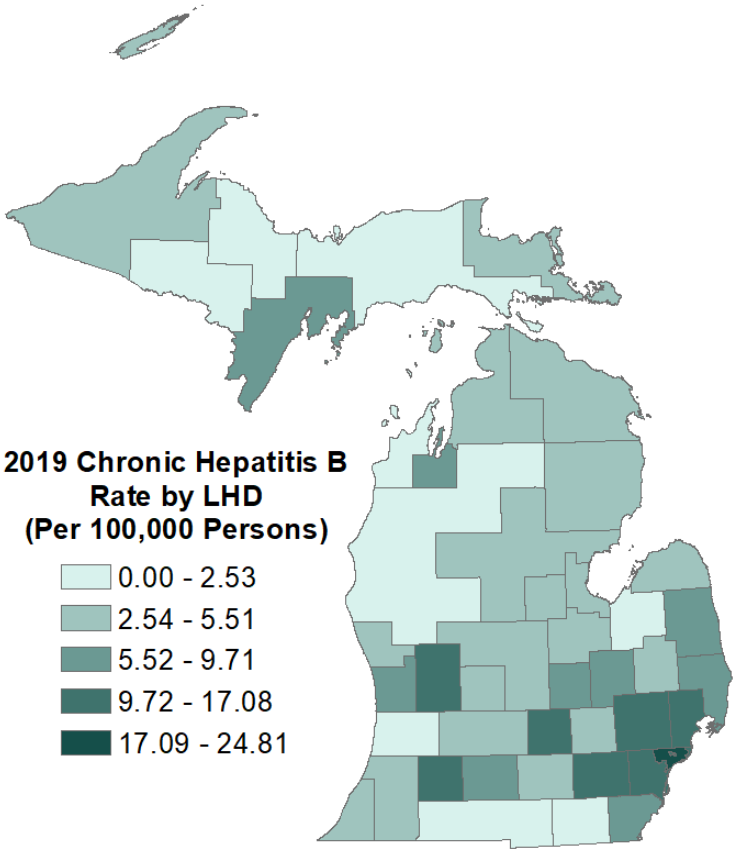
Figure 3.4 Chronic Hepatitis B Cases per 100,000 Population and Country of Birth in Michigan, 2008-2019



Hepatitis B is a vaccine preventable disease. While decreases in HBV have been observed in the U.S., foreign countries are still greatly impacted by HBV infection. To better understand the Michigan HBV population, we have categorized the proportion of cases that were born in the U.S. versus foreign countries. When comparing the original country of birth among HBV-infected individuals in Michigan, more people were born outside the United States than in the United States.

[Chronic Hepatitis B Rate Maps by County and Local Health Jurisdiction]





Acute Hepatitis C

Acute Hepatitis C—Incidence and Sex

Figure 4.1 Incidence of Acute Hepatitis C, Michigan and U.S., 2012-2019

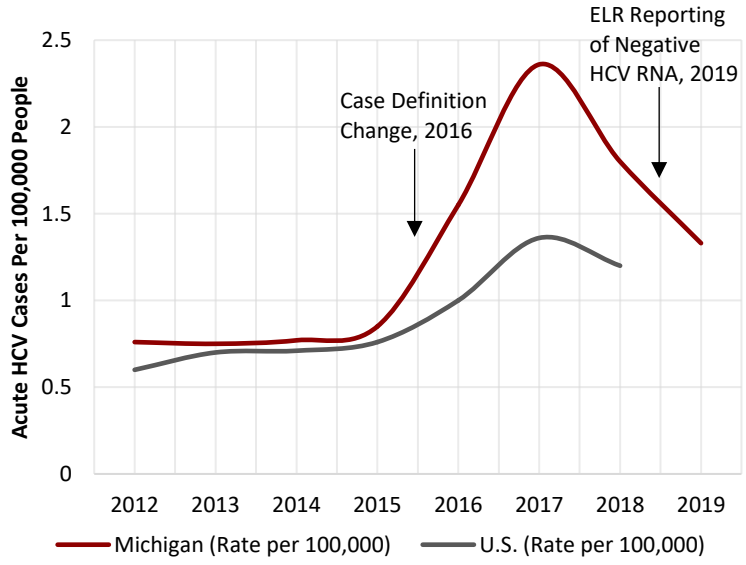


Table 4.1 Incidence of Acute Hepatitis C, Michigan and U.S., 2015-2019

Year	Michigan Cases	Michigan (Rate per 100,000)	U.S. (Rate per 100,000)
2015	84	0.85	0.76
2016	154	1.55	1.00
2017	234	2.36	1.36
2018	179	1.80	1.20
2019	133	1.33	N/A

The number of acute HCV cases in Michigan remained relatively stable from 2012 to 2014 but increased slightly in 2015 before nearly doubling in 2016, increasing rapidly in 2017, and decreasing in 2018 and 2019. A CDC/CSTE acute HCV case definition change in January 2016 is at least partially responsible for this sharp increase, along with the concurrent HAV outbreak resulting in an increased ordering of hepatitis panels and, in turn, increased HCV detection. The reduction of cases in 2019 is likely attributed to the introduction of negative HCV RNA electronic lab reporting, which reduced the number of probable acute cases. Michigan acute HCV infection rates have closely followed published national benchmarks. There are incidence maps of acute HCV by county and local health jurisdiction for 2019 located on page 34.

Figure 4.2 Incidence of Acute Hepatitis C by Sex, Michigan, 2012-2019

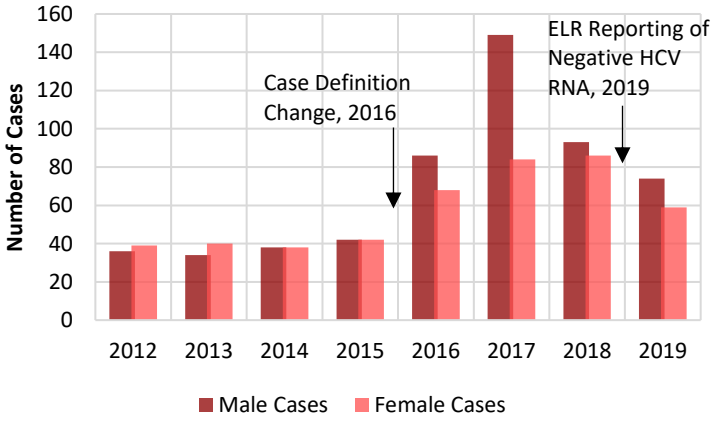


Table 4.2 Incidence of Acute Hepatitis C by Sex in Michigan, 2015-2019

Year	Male Cases	Male Incidence	Female Cases	Female Incidence
2015	42	0.87	42	0.83
2016	86	1.76	68	1.35
2017	149	3.05	84	1.66
2018	93	1.90	86	1.7
2019	74	1.50	59	1.16

Historically, the difference in acute HCV diagnoses between males and females was minimal in 2014 and 2015 but became more substantial from 2016 through 2017. In 2019 the difference in acute HCV diagnoses in males and females decreased from previous years, where males totaled approximately 1.3 more acute HCV diagnoses than females. Again, increases in case counts in 2016-2017 may be related to case counting methodology as a result of the change in case definition, as well as heightened awareness and testing due to the concurrent HAV outbreak in Michigan.

Acute Hepatitis C—Race and Ethnicity

Figure 4.3 Incidence of Acute Hepatitis C by Race and Ethnicity, Michigan, 2012-2019

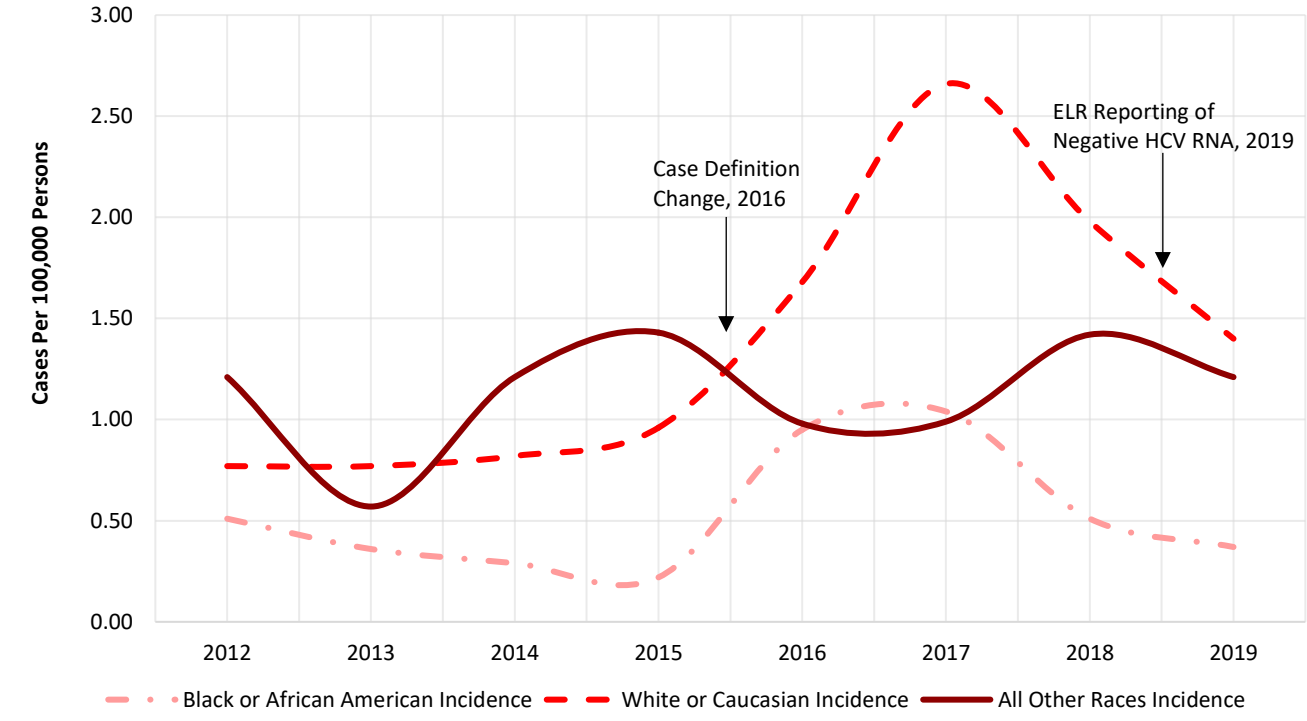


Table 4.3 Incidence of Acute Hepatitis C by Race and Ethnicity, Michigan, 2015-2019

Year	Black or African American Cases	Black or African American Incidence	American Indian or Alaskan Native Cases	American Indian or Alaskan Native Incidence	Asian Cases	Asian Incidence	White or Caucasian Cases	White or Caucasian Incidence	Hispanic Cases	Hispanic Incidence	Other Cases	Other Incidence
2015	3	0.22	2	3.66	1	0.42	73	0.96	5	1.15	1	0.49
2016	13	0.95	1	2.17	1	0.34	126	1.68	1	0.21	3	1.21
2017	14	1.04	1	2.33	1	0.34	199	2.66	8	1.63	1	0.36
2018	7	0.51	2	4.40	3	0.98	148	1.98	9	1.78	2	0.74
2019	5	0.37	1	2.15	0	0.00	105	1.40	9	1.74	4	1.49

Just over 85% of all the acute HCV cases in 2019 were among White/Caucasians. White/Caucasians saw an increase from 0.96 cases per 100,000 in 2015 to 1.68 cases per 100,000 in 2016, to 2.66 cases per 100,000 in 2017. There was a decrease in 2018 to 1.98 cases per 100,000, followed by a further decrease to 1.40 cases per 100,000 in 2019 . Though Native Americans and Alaskan Natives comprise only a few cases of acute HCV each year, the relatively small population of this group in Michigan results in an incidence rate that is disproportionately high at 2.15 cases per 100,000. It should be noted that increases in case counts in these populations may be a result of the 2016 case definition change and hepatitis A outbreak. In addition, the decrease in case counts in 2019 may be a result of the introduction of negative HCV RNA electronic lab reporting.

Table 4.4a Completeness of Acute Hepatitis C Reports by Risk Behavior, Michigan, 2019 (n= 133)

Risk Behavior	Completed
Injection Drug User	92%
Used Street Drugs	92%
Hemodialysis	88%
Received Blood Products	90%
Received a Tattoo	90%
Accidental Needle Stick	87%
Contact of Person with Hepatitis C	91%
Other Surgery	84%
Oral Surgery or Dental Work	87%
Employed in Medical Field	89%
Employed as Public Safety Officer	88%
Incarceration Longer than 6 Months	90%
Any Part of Body Pierced (other than ear)	87%

Table 4.4a shows the percentage of acute HCV risk behavior questions that were completed by local health department staff in 2019. A risk behavior was considered completed if the question was marked as 'Yes', 'No', or 'Unknown.' Most questions were answered with a response rate of 87% or higher. This proportion has decreased when compared to the 90% completion percentage from 2017, however it is a significant increase from the 83% of case report questions completed in 2015, and 75% in 2012 (before viral hepatitis surveillance funding). According to the CDC, the national proportion for completeness of acute HCV case report forms was 47.5% in 2016.

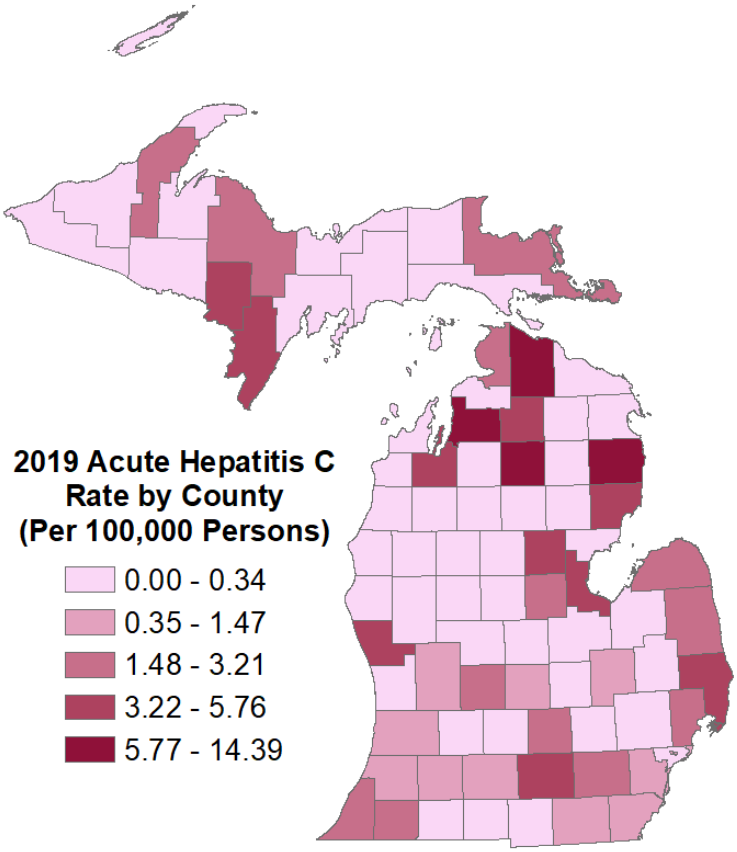
Table 4.4b Response of Completed Acute Hepatitis C Reports* by Risk Behavior, Michigan, 2019

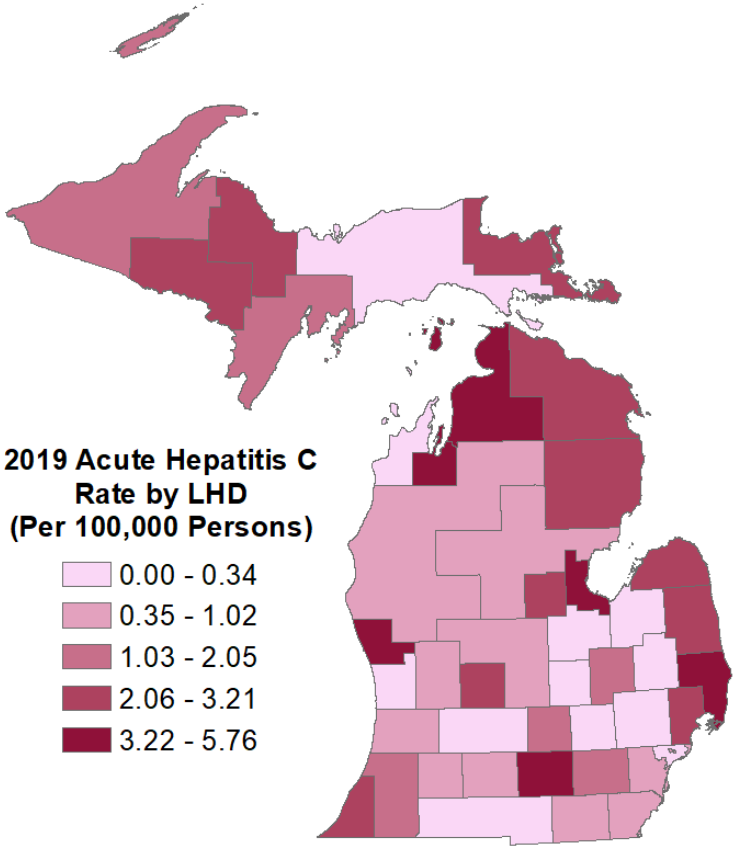
Risk Behavior	Yes*	No*	Unknown*	Yes Responses U.S. Wide 2014
Injection Drug User	70%	18%	12%	68.20%
Used Street Drugs	56%	21%	23%	-
Hemodialysis	1%	81%	18%	0.20%
Received Blood Products	3%	67%	26%	-
Received a Tattoo	38%	26%	36%	-
Accidental Needle Stick	8%	55%	37%	7.70%
Contact of Person with Hepatitis C	35%	22%	43%	-
Other Surgery	23%	49%	29%	12.20%
Oral Surgery or Dental Work	24%	37%	40%	-
Employed in Medical Field	5%	70%	25%	1.00%
Employed as Public Safety Officer	1%	73%	27%	-
Incarceration Longer than 6 Months	40%	29%	30%	-
Any Part of Body Pierced (other than ear)	18%	41%	41%	-

* Percentages calculated based upon those who completed the field; excludes missing data

Table 4.4b shows the responses among the completed questions by risk behavior. Injection drug use stands out as the predominant risk for acquiring HCV infection, as is reported in the literature, and similar to reports from previous years.

Acute Hepatitis C Rate Maps by County and Local Health Jurisdiction





Chronic Hepatitis C

Chronic Hepatitis C—Incidence and Sex

Figure 5.1 Chronic Hepatitis C Cases per 100,000 Persons in Michigan 2012-2019

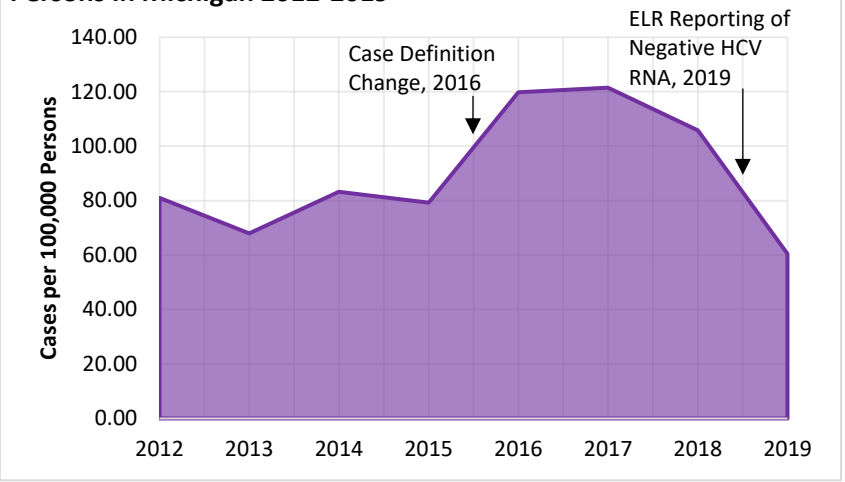


Table 5.1 Chronic Hepatitis C Cases per 100,000 Population in Michigan, 2015-2019

Year	Michigan Cases	Rate per 100,000
2015	7,833	79.25
2016	11,883	119.76
2017	12,062	121.49
2018	10,545	105.85
2019	6,036	60.40

In 2019 the rate of incident chronic HCV infections decreased 42.9% from 2018. The trend of newly reported chronic HCV infections remained relatively stable through 2015 but underwent a notable 51.1% increase in 2016 before stabilizing again in 2017, then decreasing in both 2018 and 2019. A slight decrease in 2013 cases may be due to increased deduplication efforts and removal of redundant cases by MDHHS Viral Hepatitis Surveillance staff. The 2016 increase may be due to the change in the chronic hepatitis C case definition. The 2019 decrease may be due to the introduction of negative electronic lab reporting of HCV RNA results. This resulted in a more complete diagnostic assessment and ultimately reduced the number of probable chronic HCV cases drastically. There is no nationally available benchmark for comparing rates of chronic hepatitis.

Figure 5.2 Chronic Hepatitis C Cases per 100,000 Population by Sex in Michigan, 2012-2019

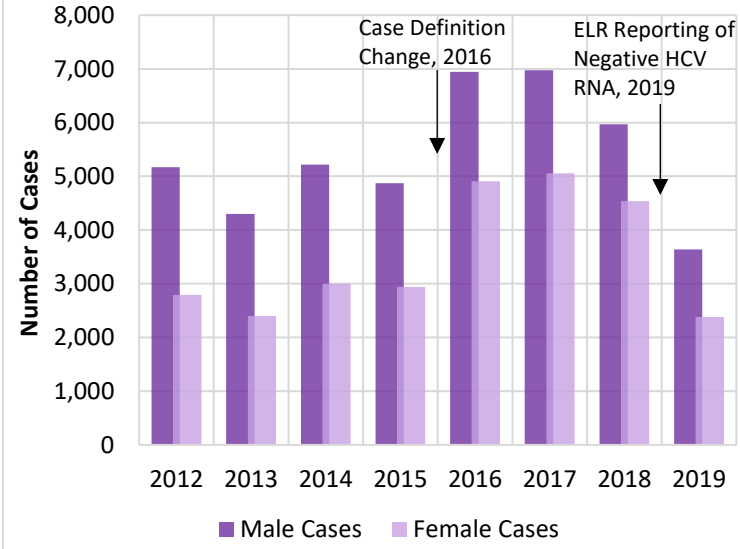


Table 5.2 Chronic Hepatitis C Cases per 100,000 Population by Sex in Michigan 2015-2019

Year	Male Cases	Male Incidence	Female Cases	Female Incidence
2015	4,873	100.51	2,943	58.44
2016	6,946	142.42	4,906	97.23
2017	6,973	142.80	5,054	100.18
2018	5,969	121.64	4,540	89.81
2019	3,641	73.90	2,380	46.95

Males account for the majority of chronic hepatitis C cases reported each year since 2012. In 2019, the rate of chronic hepatitis C reports was over 1.57 times higher in males than females. The marked increase in chronic cases reported in 2016 is likely representative of the change in the national HCV surveillance case definition, while the decrease in cases reported in 2019 is likely due to the introduction of negative HCV RNA electronic lab reporting.

Chronic Hepatitis C—Race and Ethnicity

Figure 5.3 Chronic Hepatitis C Cases per 100,000 by Race and Ethnicity in Michigan, 2012-2019

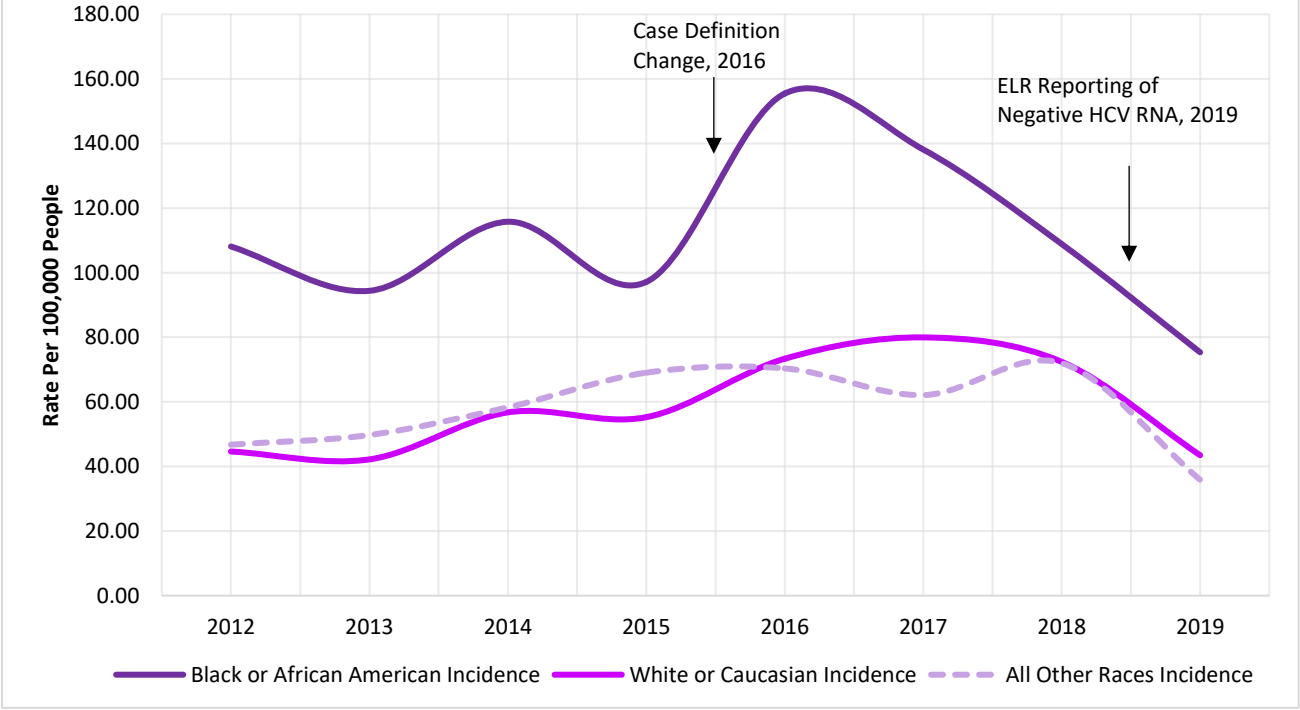


Table 5.3 Chronic Hepatitis C Cases per 100,000 by Race and Ethnicity in Michigan, 2015-2019

Year	Black or African American Cases	Black or African American Incidence	American Indian or Alaskan Native Cases	American Indian or Alaskan Native Incidence	Asian Cases	Asian Incidence	White or Caucasian Cases	White or Caucasian Incidence	Hispanic Cases	Hispanic Incidence	Other Cases	Other Incidence
2015	1,344	97.13	86	157.32	44	18.61	4,183	55.26	144	33.00	136	67.18
2016	2,119	155.46	69	149.82	51	17.45	5,492	73.36	213	43.83	175	70.35
2017	1,861	138.15	99	230.67	62	21.28	5,977	79.96	231	47.01	295	105.12
2018	1,480	108.88	100	220.16	50	16.32	5,413	72.40	202	40.05	459	169.80
2019	1,027	75.34	45	96.95	27	8.32	3,250	43.47	122	23.58	221	82.30

In 2019, American Indian/Alaskan Natives had the highest rate of chronic HCV infection (96.95 per 100,000) and are disproportionately affected compared to other racial groups. Increases in case counts and rates between 2015 and 2016-2018 may be the result of the change in the national HCV case definition. The decrease in case counts in 2019 may be the result of negative HCV RNA electronic lab reporting.

Chronic Hepatitis C—Risk Behaviors

Table 5.4a Completeness of Chronic Hepatitis C Reports by Risk Behavior, Michigan, 2019 (n = 6,036)

Risk Behavior	Completed
Received Blood Transfusion Prior to 1992	64%
Received an Organ Transplant Prior to 1992	64%
Received Clotting Factor Concentrates Prior to 1992	64%
Hemodialysis	63%
Injection Drug User	66%
Incarcerated in Lifetime	64%
Treated for a Sexually Transmitted Disease in Lifetime	62%
Contact of Person with Hepatitis C	64%
Employed in Medical Field	63%

Table 5.4a shows the percentage of chronic hepatitis C risk behavior questions completed by local health department staff in 2019. A risk behavior was considered completed if the question was marked as 'Yes', 'No', or 'Unknown.' Chronic hepatitis C epidemiologic information questions were completed on 64% of case reports. This proportion has decreased when compared with recent years. In 2012, before viral hepatitis surveillance funding, the chronic HCV risk factor completeness was less than 30%. There is no national comparison for completion of chronic hepatitis C case report forms.

Table 5.4b shows the responses among the completed questions by risk behavior. Injection drug use, incarceration, and being a contact of a person with hepatitis C were the most common risk behaviors associated with chronic hepatitis C.

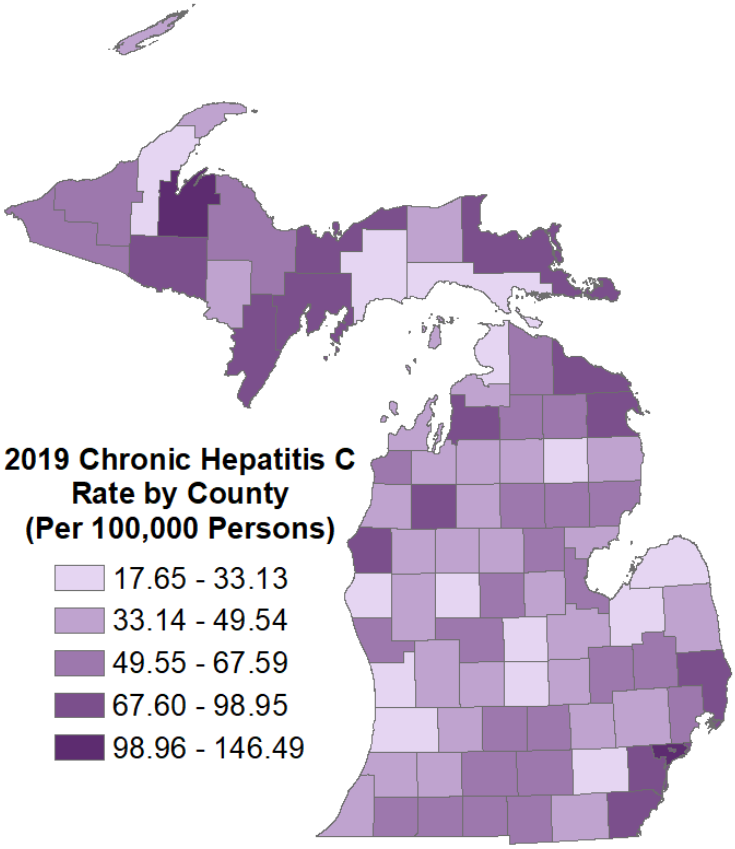
Table 5.4b Response of Completed Chronic Hepatitis C Reports* by Risk Behavior, Michigan, 2019

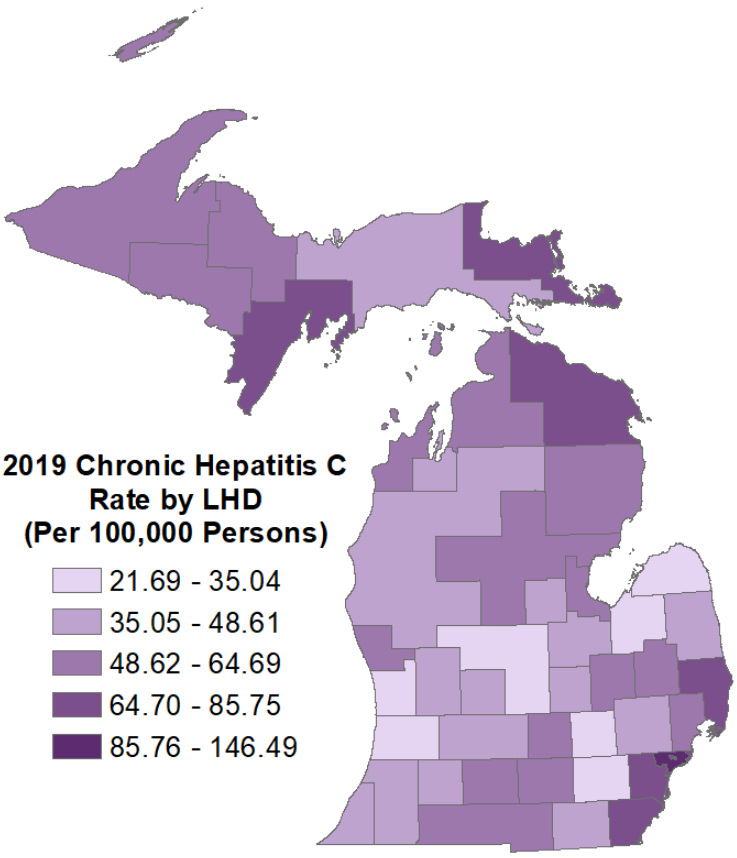
Risk Behavior	Yes*	No*
Received Blood Transfusion Prior to 1992	7%	93%
Received an Organ Transplant Prior to 1992	0%	100%
Received Clotting Factor Concentrates Prior to 1992	1%	99%
Hemodialysis	2%	98%
Injection Drug User	69%	31%
Incarcerated in Lifetime	66%	34%
Treated for a Sexually Transmitted Disease in Lifetime	31%	69%
Contact of Person with Hepatitis C	55%	45%
Employed in Medical Field	8%	92%

* Percentages calculated based upon those who completed the field; excludes missing/unknown data

Note: Multiple risk behaviors can be present for an individual

[Chronic Hepatitis C Rate Maps by County and Local Health Jurisdiction]





Hepatitis C Testing & Treatment

Hepatitis C—Testing and Genotype Data

Figure 6.1 CDC Recommended Testing Algorithm for Hepatitis C Virus Infection

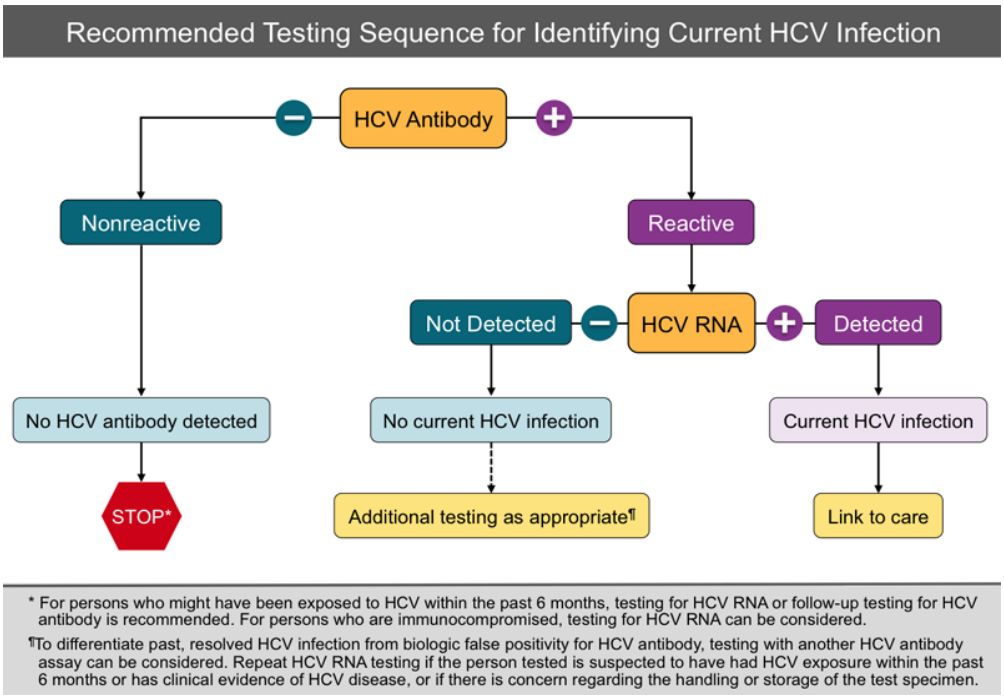
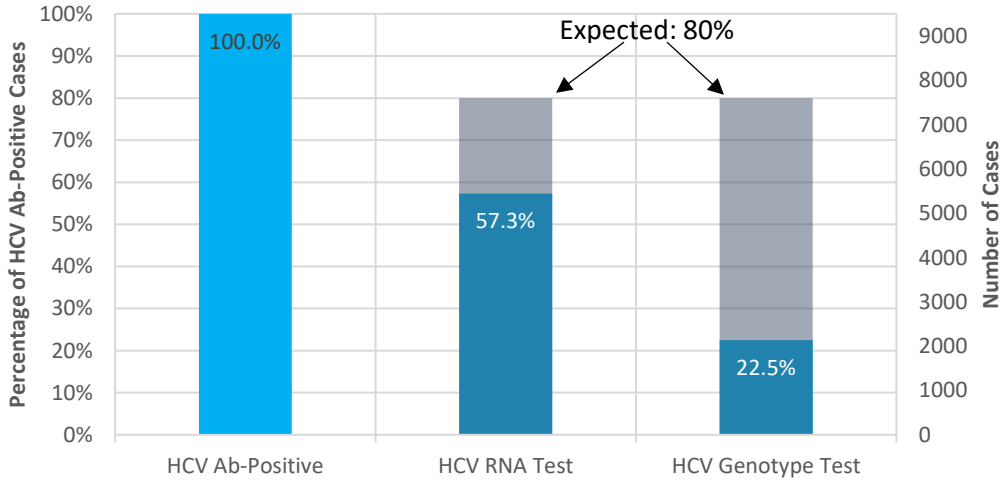


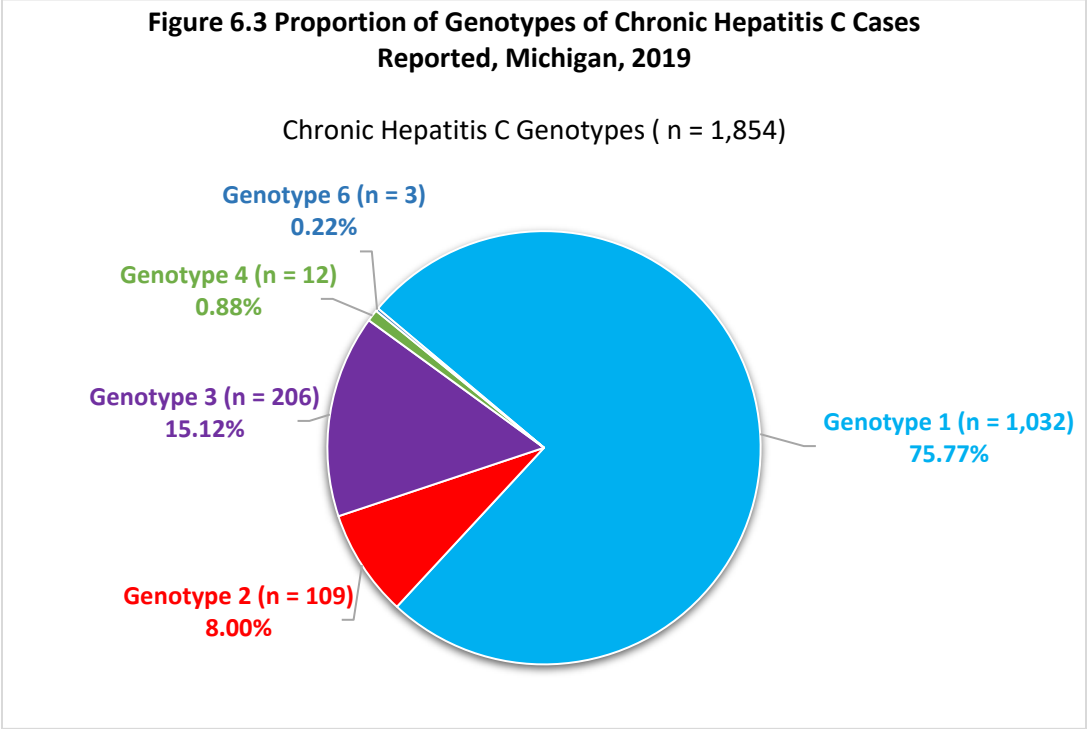
Figure 6.2 Number and Percentage of HCV Antibody-Positive Cases with an HCV RNA or HCV Genotype Test, 2019



Of the 6,180 cases of acute, chronic, and perinatal HCV reported in Michigan in 2019, 5,537 (90%) cases were reported with a positive HCV antibody result. Of those cases, 57% were reported with positive HCV RNA test and even fewer (23%) were reported with genotype results. Starting in 2019, negative HCV RNA lab results became reportable through electronic lab messages. Since 20-25% of persons exposed to HCV clear infection, we would expect 75-80% of those with a positive HCV antibody to have a positive HCV RNA test, if the testing algorithm is being followed by all providers. These data suggest a gap in getting HCV antibody-positive patients confirmatory testing and genotype testing which indicates engagement in follow-up for treatment.

With the advent of pangenotypic HCV treatment regimens, HCV genotyping is no longer required prior to treatment initiation for all individuals. In those with evidence of cirrhosis and/or past unsuccessful HCV treatment, treatment regimens may differ by genotype and thus pretreatment genotyping is recommended. For noncirrhotic treatment-naive patients, although genotyping may impact the preferred treatment approach, it is not required if a pangenotypic regimen is used. Of the patients reported to MDSS with a positive HCV antibody, there was evidence of only 23% receiving an HCV genotype test, suggesting that many patients are not yet being evaluated for HCV therapy.

Figure 6.3 Proportion of Genotypes of Chronic Hepatitis C Cases Reported, Michigan, 2019



A total of 1,854 chronic HCV patients had a genotype result reported to MDHHS in 2019. Of these, 75.77% were reported with genotype 1 infection. Genotypes 3 and 2 made up the majority of non-genotype 1 specimens. The remaining specimens were either genotype 4 or 6, which made up just over 1% of all genotyped specimens in 2019.

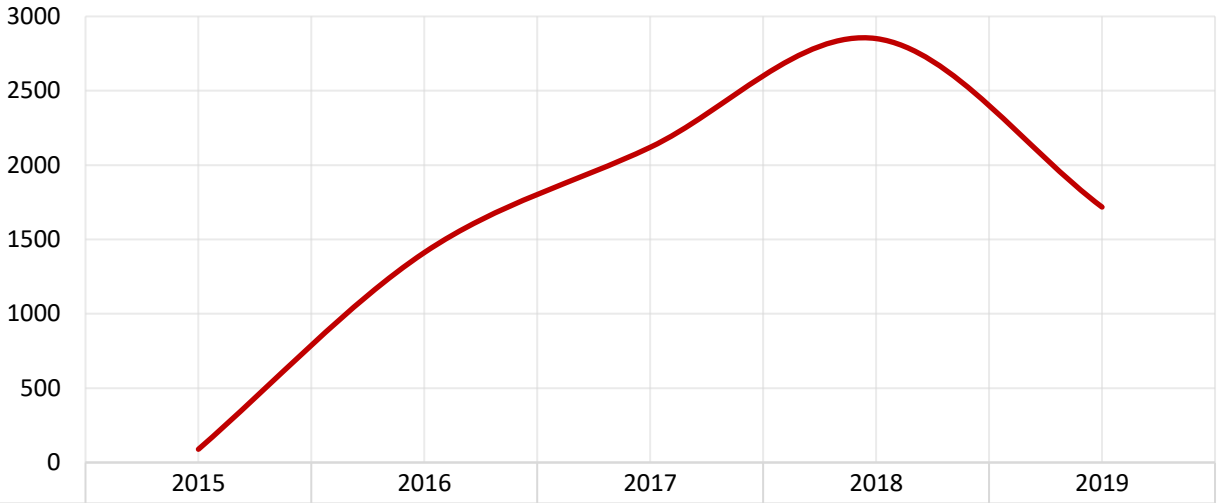
This pattern of genotypes is consistent with the expected annual proportions in Michigan. The data is also consistent with the national distribution, as the predominant genotypes nationwide are 1a, 1b, 2a, 2b, and 3a.

Viral Hepatitis Medicaid Data

With the expansion of newly approved HCV treatments in recent years we now see many instances in which these direct-acting antivirals can effectively cure a patient of their HCV infection, greatly reducing the risk of cirrhosis, hepatocellular carcinoma, and death. However, as previously described, patients often need to go through a cascade of testing in order to have a HCV medication prescribed.

Figure 6.4 looks at the number of Michigan Medicaid patients that were prescribed various HCV treatments from 2015 to 2019. Recent data shows that Michigan Medicaid/Child Health Insurance Program covers approximately 2.3 million persons. With an estimated 1-2% HCV infection rate in the population, there would be 23,000-46,000 Medicaid-insured persons with HCV infection. According to these data, with 5,800 unique persons treated for HCV, approximately 12-25% of the HCV-infected Medicaid population has been prescribed a HCV direct-acting antiviral. Again, the data suggest that increased efforts to test and treat HCV infection are needed to help reduce risk of future morbidity and mortality associated with chronic HCV infection. It is encouraging to see a significant number of patients being prescribed HCV medications but the decrease in 2019, even with reduced restrictions on HCV prior authorizations, may indicate the need for additional awareness of qualification for treatment.

Figure 6.4 Total Number of Medicaid Members with Prescriptions, by Medication, 2015-2019



	2015	2016	2017	2018	2019
Victrelis					
Incivek					
Sovaldi	24	111	4	3	1
Harvoni	60	1019	1418	1032	164
Olysio	1	1			
Daklinza	2	84	4		
Viekira Pak	2	13	12		
Epclusa		151	417	726	773
Technivie		2	4		
Zepatier		31	170	63	29
Mavyret			64	972	716
Vosevi			27	54	27
Ledipasvir-Sofosbuvir					3
Sofosbuvir-Velpatasvir					5
TOTAL	89	1412	2120	2851	1718

MDHHS Bureau of Laboratories Hepatitis C Testing

The MDHHS Bureau of Laboratories (BOL) has historically performed testing for HCV antibody. In 2014, the virology lab began performing HCV RNA testing for all specimens testing positive for HCV antibody in recognition of CDC's HCV testing algorithm. The data below look at the number of tests conducted by the BOL, positivity rates, and the demographic characteristics of patients tested.

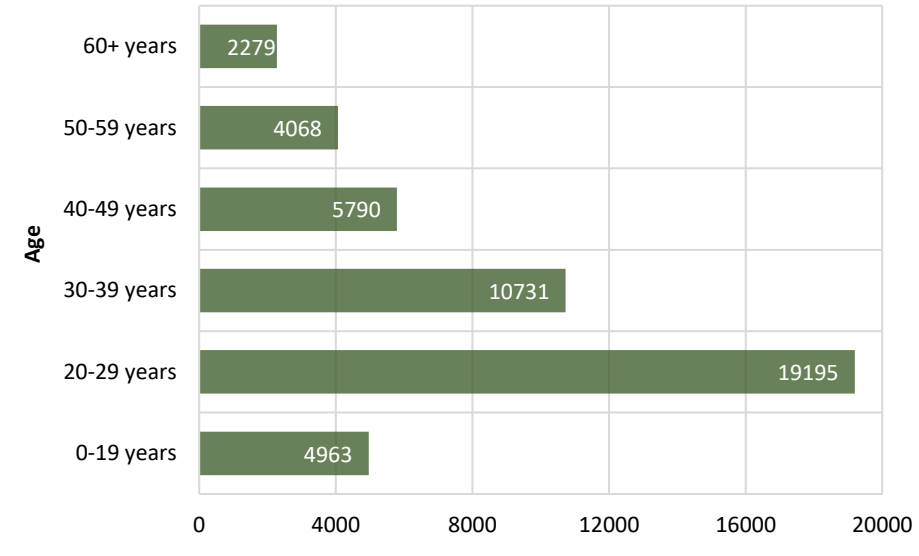
Some samples were deemed "unsatisfactory" because of poor shipping, packaging, or labeling, and therefore not tested.

Table 6.1 BOL HCV Antibody Tests, 2015-2019

Year	# of Samples Tested	# of Unsatisfactory or Not Tested	# Negative	# Positive	% Positive
2015	3,351	25	3,156	195	5.82%
2016	6,252	33	5,975	277	4.43%
2017	7,130	46	6,849	281	3.94%
2018	8,054	51	7,683	320	3.97%
2019	11,507	63	10,980	527	4.60%

In 2016, the number of HCV antibody tests conducted by the MDHHS BOL were approximately twice as many as previous years. Testing continued to increase in 2017-2019, as MDHHS has continually engaged in efforts to increase HCV testing through BOL. HCV Ab positivity rates have continued to hover around 4-5%.

Figure 6.5 All HCV Antibody Tests by Age, 2012-2019



Of the 47,177 HCV Ab tests ran from 2012-2019, the majority of individuals tested were between 20-29 years old. The smallest proportion of tests were found amongst those 60 years of age and older, making up only 5% of all individuals tested for HCV Ab.

Table 6.2 BOL HCV PCR Testing, 2015-2019

Year	# of Samples Tested	# of Unsatisfactory or Not Tested	# Negative	# Positive	% Positive
2015	168	27	65	103	61.31%
2016	378	15	222	154	40.96%
2017	270	13	127	143	52.96%
2018	320	16	147	157	49.06%
2019	511	19	231	280	54.80%

Figure 6.6 BOL HCV PCR Testing by Year, 2014-2019

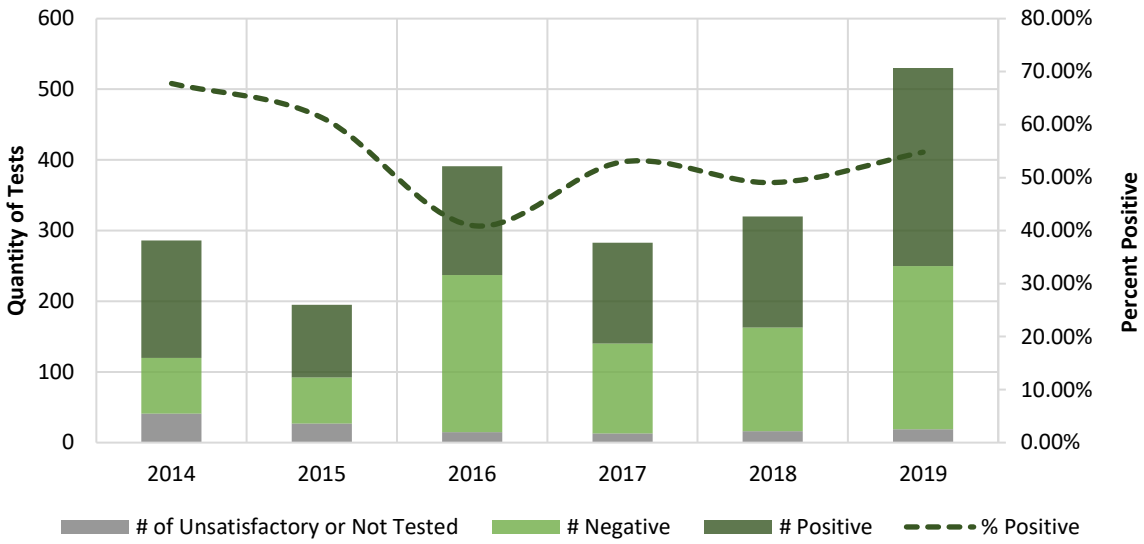
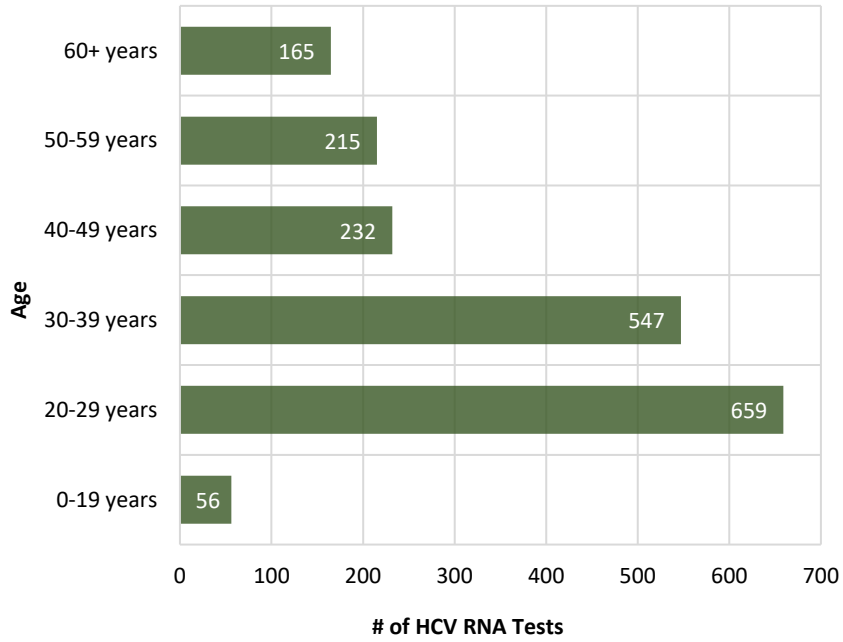


Figure 6.7 All HCV RNA Tests Stratified by Age, 2014-2019



The number of PCR tests conducted by the BOL has fluctuated from 2015 through 2019, with numbers in 2019 increasing to a total of 511 tests analyzed. The percentage of tests that yielded positive results decreased from 61.3% in 2015 to 54.8% in 2019.

The number of HCV RNA tests and the positivity rate in 2016 as well as 2018 is likely the result of an increase in specimen submission from lower risk groups.

Of the 1,647 HCV RNA tests ran by BOL from 2015-2019, 40% of individuals were 20-29 years old. The smallest proportion of tests were found amongst those 0-19 years old (3.4%) and those 60 years of age and older (10%).

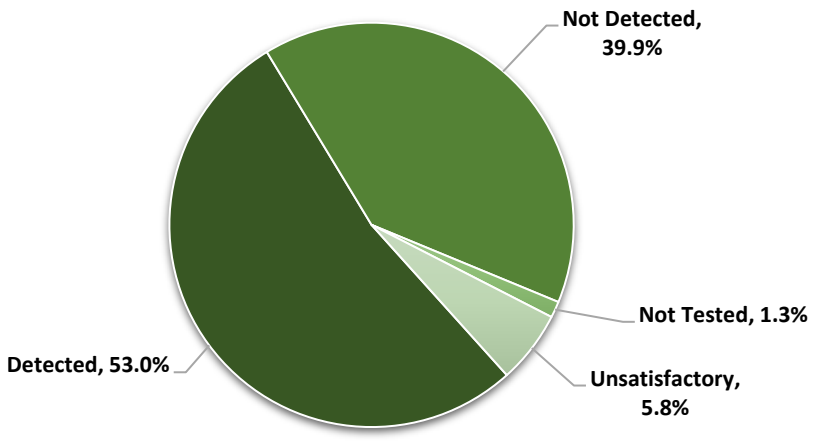
Table 6.3 BOL Patient Demographics for Patients Testing HCV Antibody/RNA Positive 2014-2019

Variable	n	%
N	1,621	
Sex		
Male	977	60.3%
Female	621	38.3%
Unknown	23	1.4%
Race		
American Indian or Alaskan Native	9	0.6%
Asian	4	0.2%
Black or African American	239	14.7%
Native Hawaiian or Pacific Islander	1	0.1%
White or Caucasian	1,193	73.6%
Multiracial	6	0.4%
Other	25	1.5%
Unknown	146	9.0%
Age		
0-19	46	2.8%
20-29	587	36.2%
30-39	481	29.7%
40-49	191	11.8%
50-59	184	11.4%
60+	132	8.1%

There were 1,621 patients who tested positive for both HCV antibody and RNA at BOL between 2014-2019. Just over half (60.3%) of individuals who tested positive were male. The majority (73.6%) of those who were positive were White/Caucasian, which was much higher than Black/African Americans who only made up 14.7% of positive test results. In addition, 36.2% of individuals who tested positive were 20-29 years old. This is much higher than the baby boomer population, which only accounted for about 11.4% of positive test results.

Many of our specimen submitters are local health department health clinics. These data may be indicative of the patient population who often utilizes local health departments for health services.

Figure 6.8 PCR Test Results following a Positive HCV Antibody Test 2014-2019



Of the 1,869 positive HCV screen tests, just over half (53.0%) had a positive PCR test result. About one-third of positive HCV screen tests were negative by PCR (39.9%). These numbers reflect all BOL HCV RNA results that were preceded by a reactive HCV antibody test through BOL.

Focus Populations

Adults Under Forty (18-39 years of age)

Figure 7.1 Number of Chronic Hepatitis C Cases Reported to MDHHS by Year of Birth, 2019

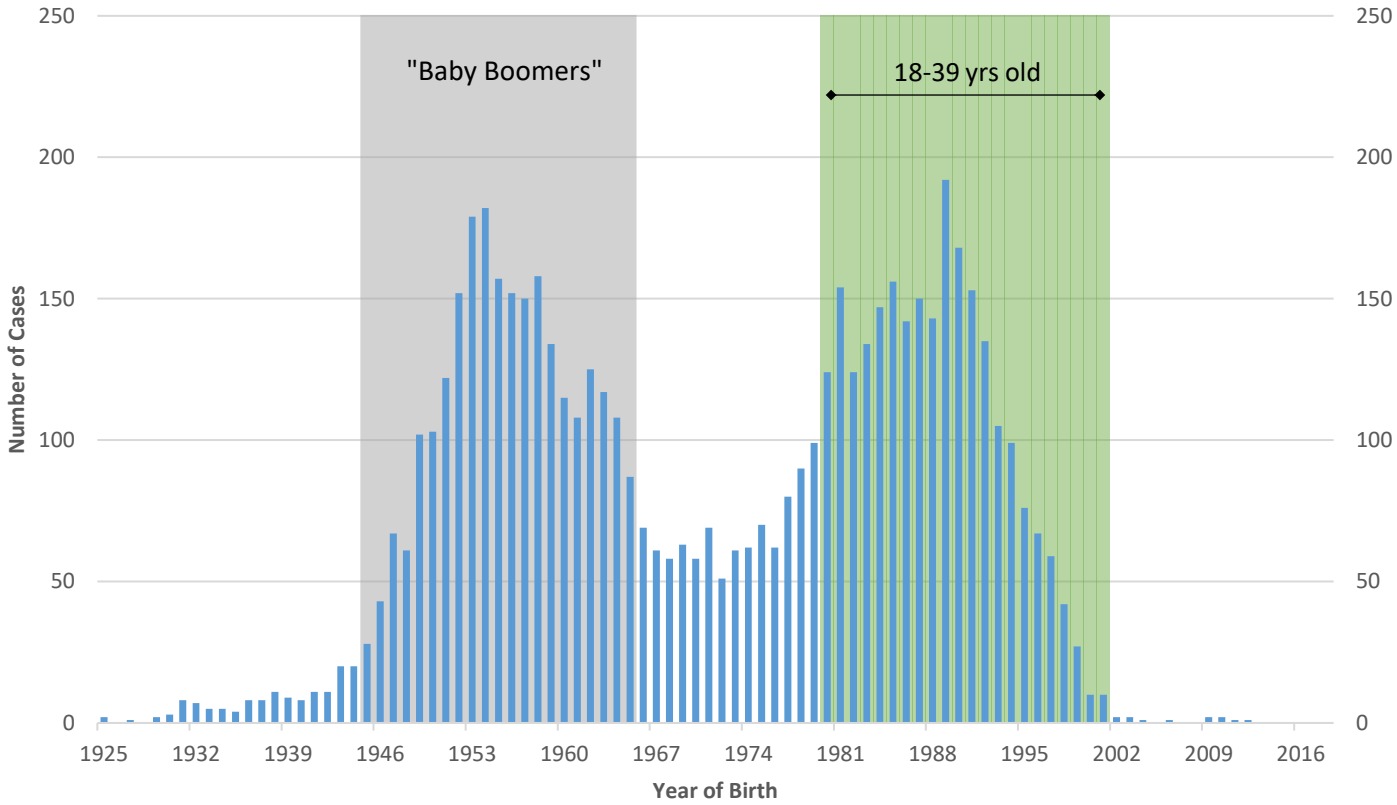


Figure 7.1 depicts the number of chronic HCV cases reported to MDHHS by birth year in 2019. Since 1998 CDC has recommended HCV testing for persons with elevated risk of HCV infection, and then in 2012 those guidelines were expanded to recommend one time HCV testing for all persons born from 1945 through 1965 (regardless of risk factors). That birth cohort, commonly known as "Baby Boomers," are five times more likely than other adults to be infected with HCV according to national statistics. MDHHS data shows that the number of new chronic HCV diagnoses in Baby Boomers is the largest of any other birth cohort.

In recent years a second 'peak' of new chronic HCV diagnoses has developed in adults aged approximately 18-39. An emerging epidemic of HCV in adults under forty has been identified in areas across the U.S. and in Michigan. The primary driver of this increase in HCV cases is sharing of injection drug equipment and works related to the opioid epidemic. This will likely cause the 18-39 year old group to eclipse the new case count of baby boomers in the near future. In response to the rapid increase of HCV cases in younger populations CDC began recommending one-time hepatitis C testing of all adults (18 years and older) and all pregnant women during every pregnancy in 2020.

Figure 7.2 Number of Chronic Hepatitis C Cases Reported to MDHHS by Year, 18-39 Years of Age, 2000-2019

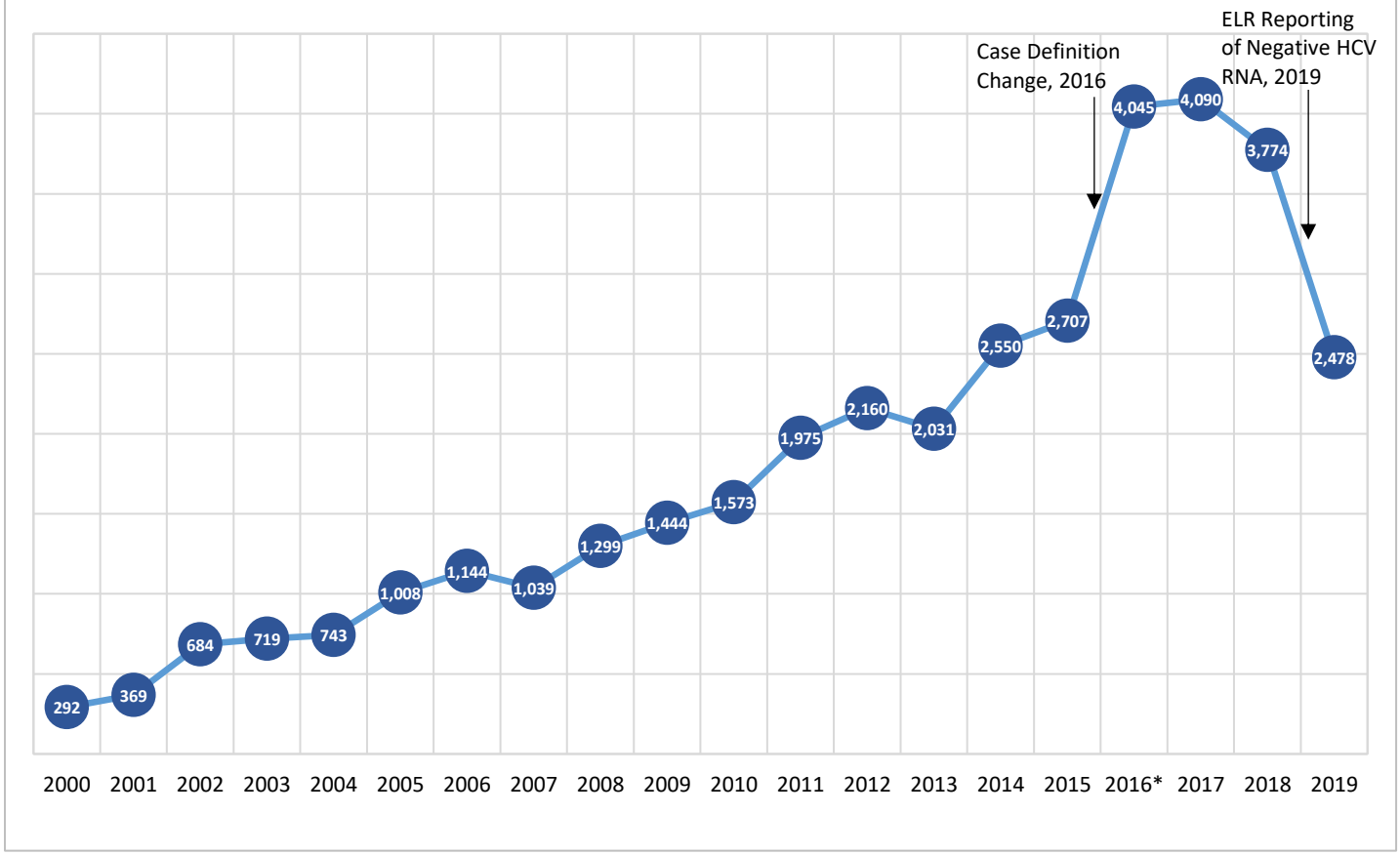


Table 7.1 Number and Percentage of Chronic Hepatitis C cases reported to MDHHS aged 18-39, 2010-2019

	2010	2011	2012	2013	2014	2015	2016*	2017	2018	2019
Total Cases	7,214	8,006	7,967	6,703	8,233	7,833	11,883	12,062	10,545	6,036
Number of Cases 18-39 Years Old	1,573	1,975	2,160	2,031	2,550	2,707	4,045	4,090	3,774	2,478
Percentage of Total Cases	22%	25%	27%	30%	31%	35%	34%	34%	36%	41%

From 2000 through 2017, the number of new HCV diagnoses among persons 18 to 39 years of age have increased year over year, with the exception of 2013, before decreasing in 2018 and 2019 (Figure 7.2). Even so, the number of cases has increased almost 750% between 2000 and 2019. The dramatic rise in new HCV diagnoses in this population from 2015 to 2016 can be largely explained by a change in the case definition. While a sharp decrease in 2019 can be attributed to the expanded capacity to receive negative HCV RNA lab results electronically. Table 7.1 shows that the proportion of all reported cases that were between the ages of 18 and 39 has been increasing over the past decade.

Table 7.2 Epidemiologic Summary of 2019 Chronic HCV Cases Aged 18-39 Years Old

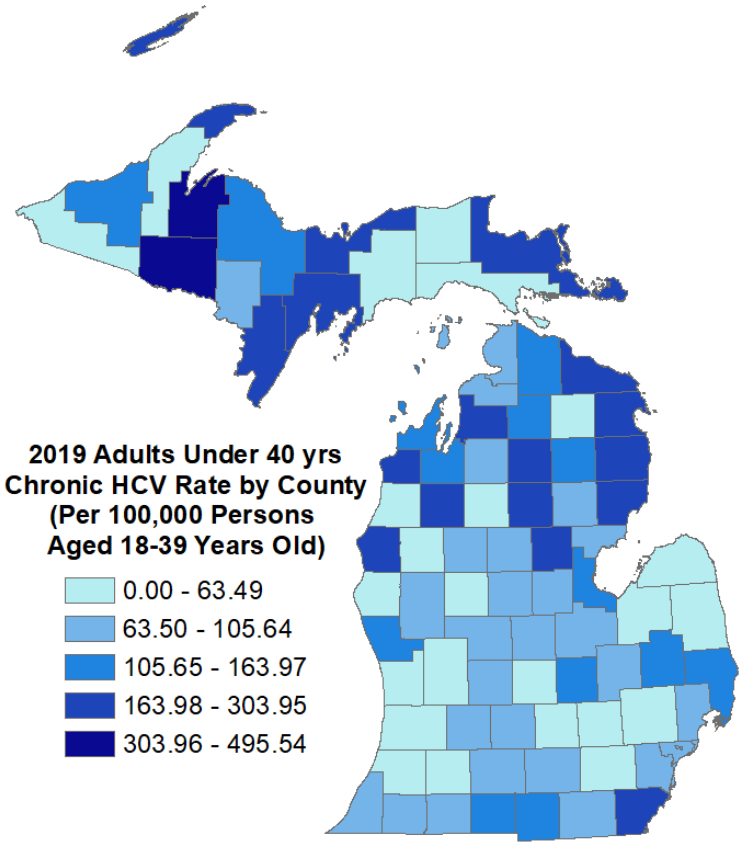
Age (n = 2,478)		
Median	30	
Mean	30.02	
Range	18 - 39	
Sex (n = 2,470)		**Rate per 100,000**
Female	1,066 (43.2%)	75.71
Male	1,404 (56.8%)	96.81
Race (n = 2,008)		**Rate per 100,000**
White or Caucasian	1,699 (82.8%)	76.94
Black or African American	108 (8.8%)	37.72
American Indian or Alaskan Native	29 (1.4%)	97.95
Asian	6 (0.3%)	4.19
Other	94 (4.6%)	Not Available
Hispanic Ethnicity (n = 1,632)		**Rate per 100,000**
Hispanic or Latinx	59 (3.6%)	32.36
Not Hispanic or Latinx	1,573 (96.4%)	58.78
Arab Ethnicity (n = 1,053)		**Rate per 100,000**
Arab Ethnicity	7 (0.7%)	Not Available
Non-Arab	1,046 (99.3%)	Not Available
History of IVDU (n = 1,218)		
Yes	1,018 (83.6%)	
No	200 (16.4%)	

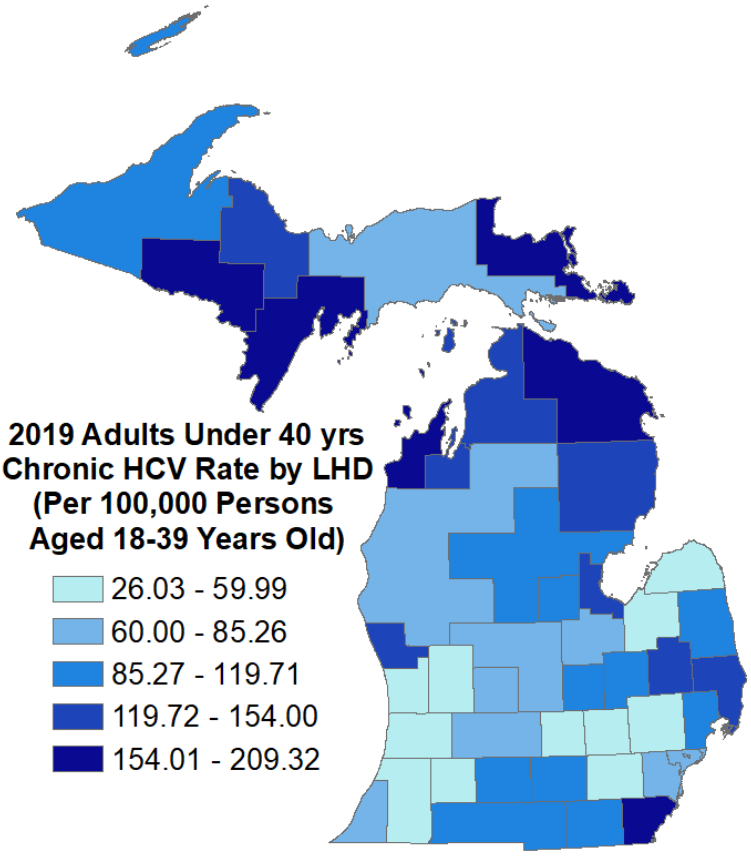
Previous studies conducted by MDHHS have shown injection drug use as the primary risk factor for HCV acquisition among those aged 18-39 years old. In many instances these clients reported sharing needles, syringes, and other injection drug works (such as cookers and cotton) which could have acted as vectors for HCV transmission. Increases in indicators of heroin and opioid use (see subsequent pages) are correlated with the rise in HCV cases in the 18-39 year old population (i.e. more substance use leading to more HCV transmission).

A demographic breakdown of the chronic HCV cases aged 18-39 years old who were diagnosed in 2019 (Table 7.2) shows that the vast majority were White/Caucasian, non-Hispanic, and non-Arab with a distribution skewed towards males. Where injection drug use information was available on these patients, 83.6% reported a history of IVDU.

Maps of the rates of 2019 chronic HCV cases among 18-39 year olds, 2019 heroin treatment admissions, and 2018 opioid overdose deaths and heroin overdose deaths by county and local health jurisdiction can be found on the subsequent pages.

Adults Under Forty (18-39 years old) HCV Case Rate Maps by County and Local Health Jurisdiction





Drug Poisoning and Drug Treatment Data

Figure 8.1 Number Heroin Substance Abuse Treatments Admissions and Deaths in Michigan, 2004-2019

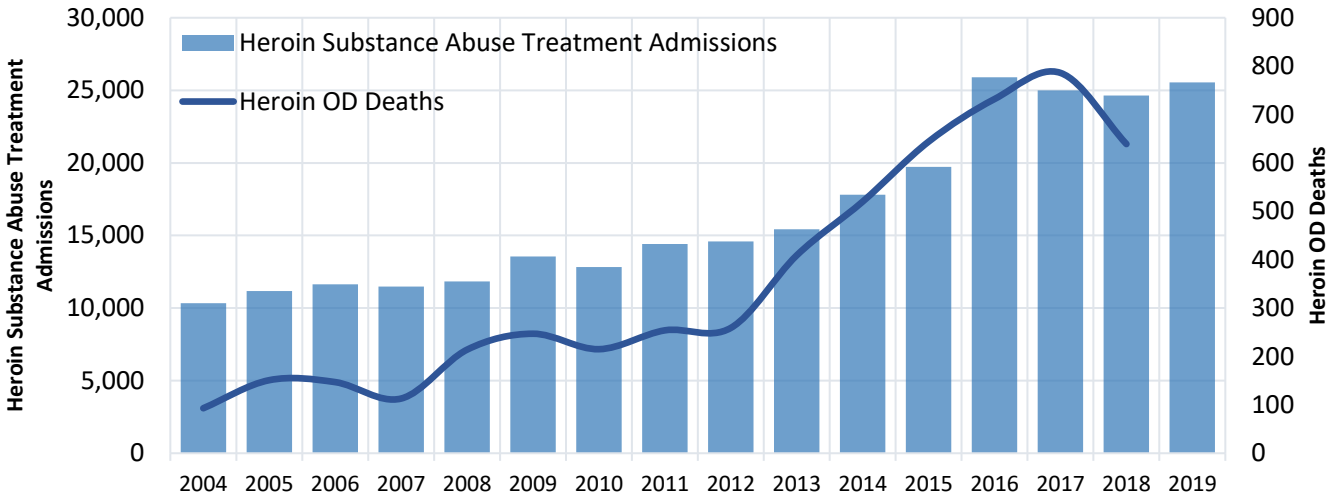


Table 8.1 Drug Overdose Deaths, Treatment Admissions and HCV in Michigan, 2010-2019

Year	All Drug Poisoning Deaths	Opioid OD Deaths	Heroin OD Deaths	Heroin Substance Abuse Treatment Admissions	Number of Chronic HepC Cases 18-39 Years Old
2010	1,392	424	215	12,836	1,573
2011	1,359	368	254	14,413	1,975
2012	1,300	389	259	14,596	2,160
2013	1,535	432	409	15,419	2,031
2014	1,745	481	520	17,800	2,550
2015	1,991	634	644	19,728	2,707
2016	2,376	1,001	732	25,910	4,045
2017	2,686	1,229	786	24,994	4,090
2018	2,599	1,361	639	24,650	3,774
2019	-	-	-	25,538	2,478

Table 8.1 depicts that Michigan has seen a parallel increase in the number of heroin overdose deaths and heroin substance abuse treatment admissions from 2000-2016. While overdose deaths continue to increase, number of treatment admissions decreased slightly from 2016 to 2018 before rising slightly again in 2019. Despite the temporary decrease, treatment admissions still grew 183% from 9,023 in 2000 to 25,538 in 2019, while the number of heroin overdose deaths increased 783% from 89 in 2000 to 786 in 2017 before decreasing to 639 in 2018. Similarly, non-heroin opioid deaths have risen nearly every year from 74 in 2000 up by 1,739% to 1,361 in 2018. Total drug poisoning deaths rose 347% from 581 in 2000 to 2,599 in 2018.

Heroin overdose death data is obtained from Michigan death records. Drug poisoning deaths include those with ICD-10 primary or underlying cause code X40-44, X60-64, X85 and Y10-14. The drug causing the poisoning can be specified or unspecified. Heroin deaths are those that specify a related ICD-10 cause code of T40.1. Opioid deaths are those with specified ICD-10 codes T40.2-T40.4, with no mention of T40.1 (heroin). All deaths may have other underlying or related causes.

Heroin substance abuse treatment admissions are obtained from the Treatment Episode Dataset (TEDS). A heroin admission is defined as any admission where heroin is self-identified as one of the top five substances responsible for the admission. These numbers represent unique admissions and not unique patients as patients can be admitted multiple times at different facilities.

Note: Marked increase in 2016 HCV cases and decrease in 2019 HCV cases were due to case definition changes and electronic reporting of negative HCV RNA lab results, respectively.

Emergency Department Syndromic Surveillance Data

Emergency department (ED) syndromic surveillance system data can also be used as an indicator for injection drug and substance use in the population.

Emergency Department visit data potentially related to injection drug use are obtained through the Michigan Syndromic Surveillance System (MSSS). MSSS reporting is voluntary and not all hospitals participate in submitting ED data. This system captures chief complaints and diagnoses from emergency department (ED) visits in Michigan but does not have universal coverage across the state. Certain EDs submit with enhanced feeds, which can report ICD-10-CM diagnosis codes. Diagnosis codes result in more accurate overdose identification than chief complaint mentions of overdose. The MSSS has been estimated to cover 84% of Michigan's emergency departments.

It is important to note that MSSS data are subject to several data quality issues, such as intermittent data feed drops, transitioning systems, and incomplete statewide coverage. These technical difficulties make these data difficult to interpret and should be taken into consideration. This report cannot definitively state the frequency of overdoses in Michigan. It is certainly possible that ED-related injection drug use complaints may be missed by the query and/or that we may be counting some ED complaints that are unrelated to injection drug use. With these limitations in mind, MSSS data can be an effective tool for monitoring ED-trends in a population over time.

The data in Figure 9.1 indicate that rates of ED visits that mention drug overdose have remained relatively stable in 2018 and 2019.

Figure 9.1 Emergency Department Substance Abuse Encounters, Syndromic Surveillance System, Jan 2018-Dec 2019

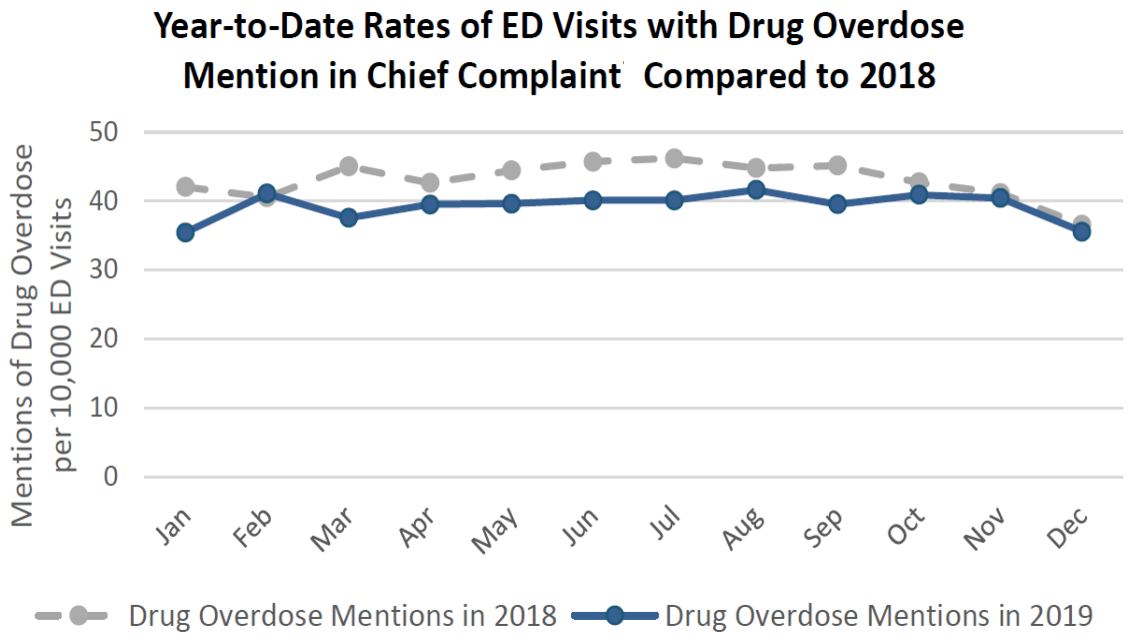
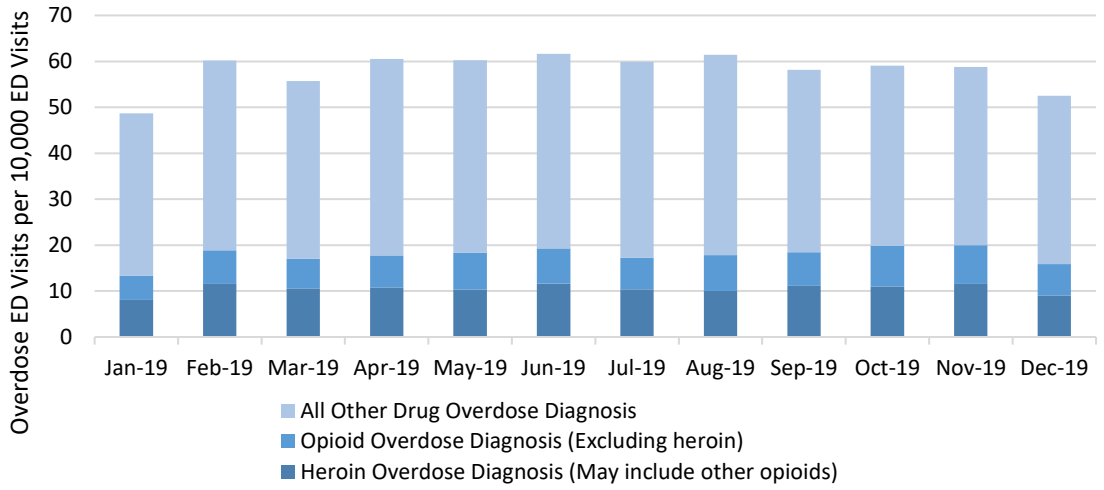


Figure 9.2 Rates of ED Visits with Overdose Diagnosis or Overdose Mentioned in the Chief Complaint over Prior 12 Months by Drug Type



When stratifying by specific drug, the ED encounters experienced only a slight fluctuation in rate month-by-month and maintained a consistent proportion in terms of specific drug mentioned, with about 18% of reported ED mentioning heroin, while 13% mention other opioids, and 69% with mention of other drugs.

Figure 9.3 ED Overdose Visits by Age and Sex with Mention of Any Drug, 2019

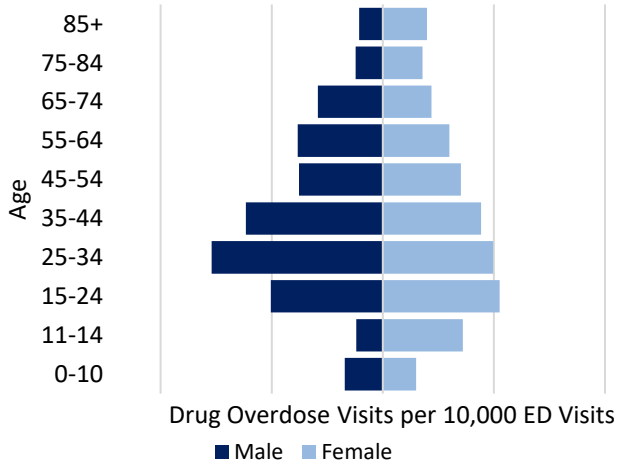
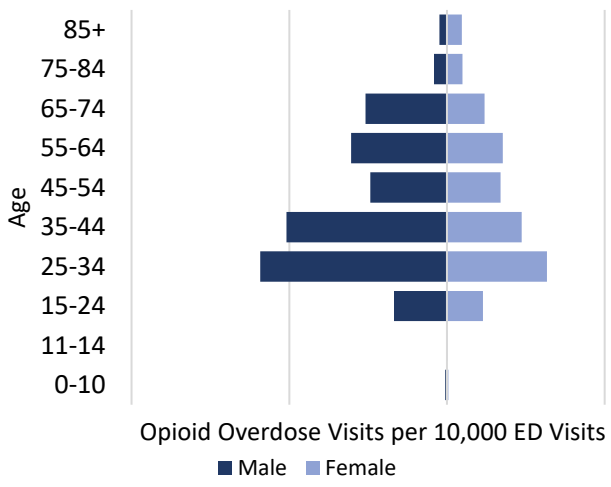


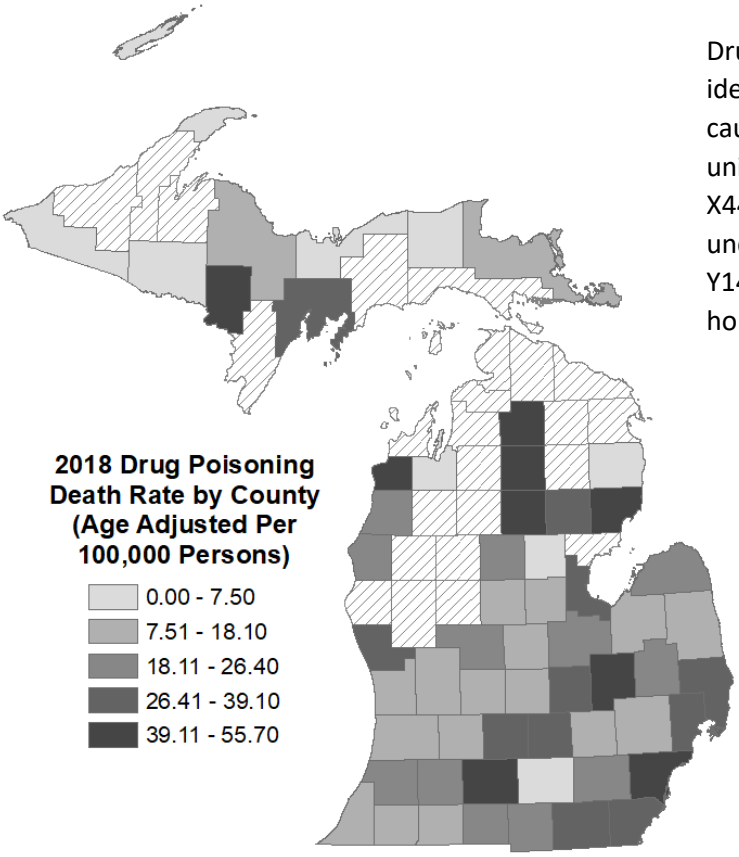
Figure 9.4 ED Overdose Visits by Age and Sex with Mention of Opioid, 2019



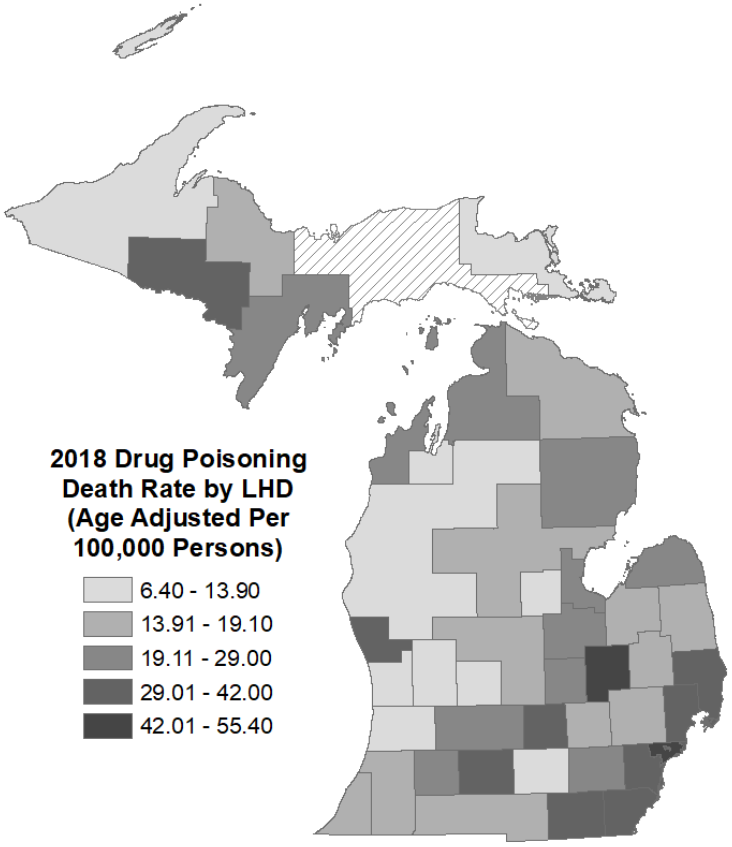
When stratifying by age and sex, the ED encounters appear to occur most frequently in the male adults under 40 (18-39 yr old) population than other age groups in 2019. This observation is consistent with trends and patterns of injection drug and opioid abuse in Michigan and subsequent risk for viral pathogens like HCV.

Total Drug Poisoning Death Rate Maps by County and Local Health Jurisdiction

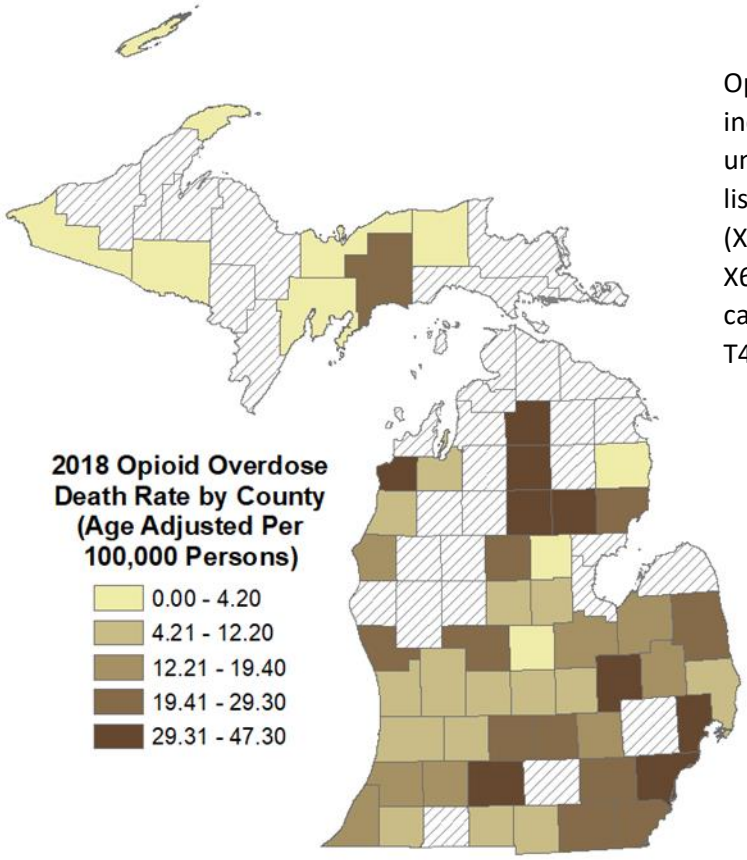
Drug overdose deaths are identified using underlying cause of death codes for unintentional poisoning (X40-X44), poisonings of undetermined intent (Y10-Y14), suicides (X60-X64), and homicides (X85).



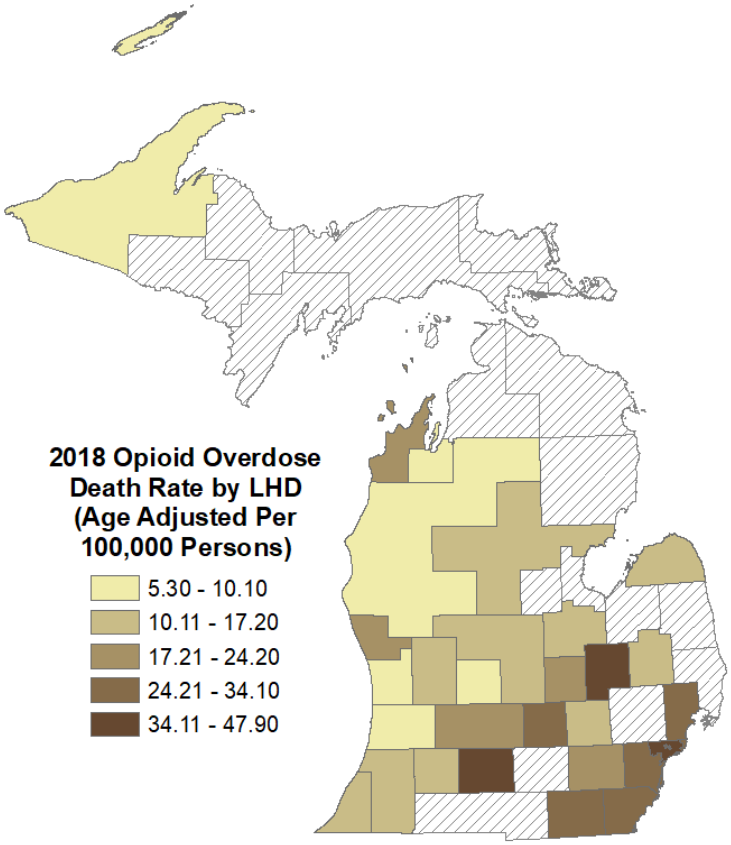
Data are suppressed if a drug is not specified in ≥90% of overdose death certificates or a jurisdiction reported less than 5 deaths



Opioid Overdose Death Rate Maps by County and Local Health Jurisdiction



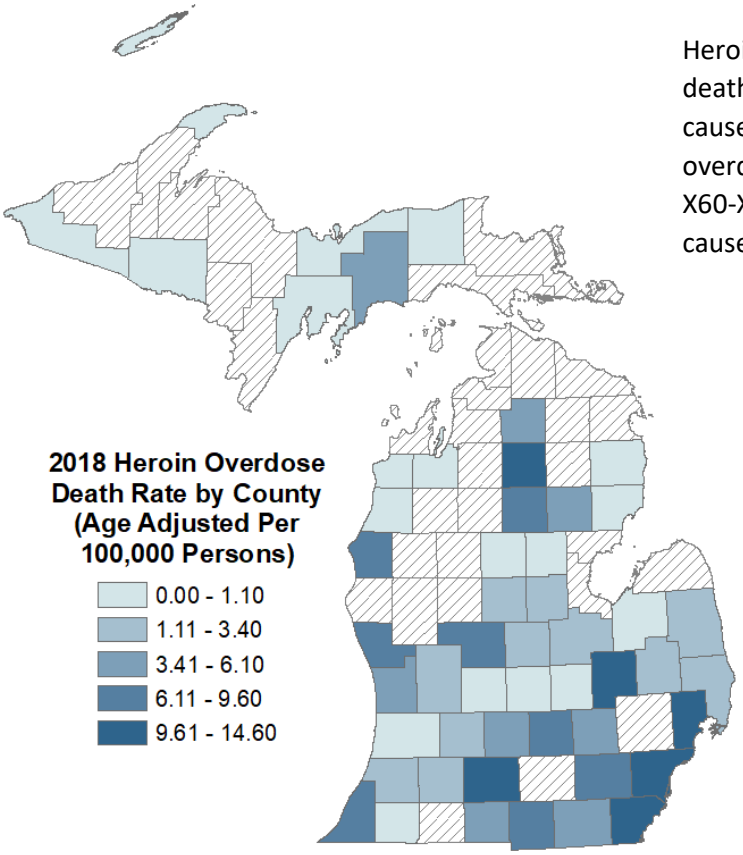
Opioid overdose deaths include deaths with an underlying cause of death listed as drug overdose (X40-X44, Y10-Y14, X60-X64, X85) and a related cause of death of T40.0-T40.4 or T40.6



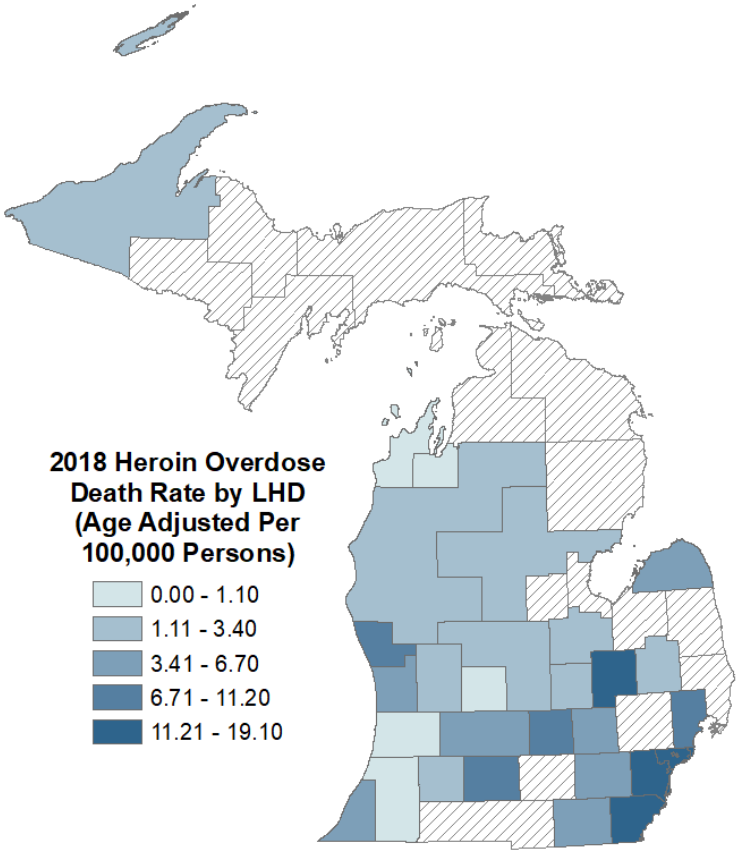
Data are suppressed if a drug is not specified in ≥90% of overdose death certificates or a jurisdiction reported less than 5 deaths

Heroin Overdose Death Rate Maps by County and Local Health Jurisdiction

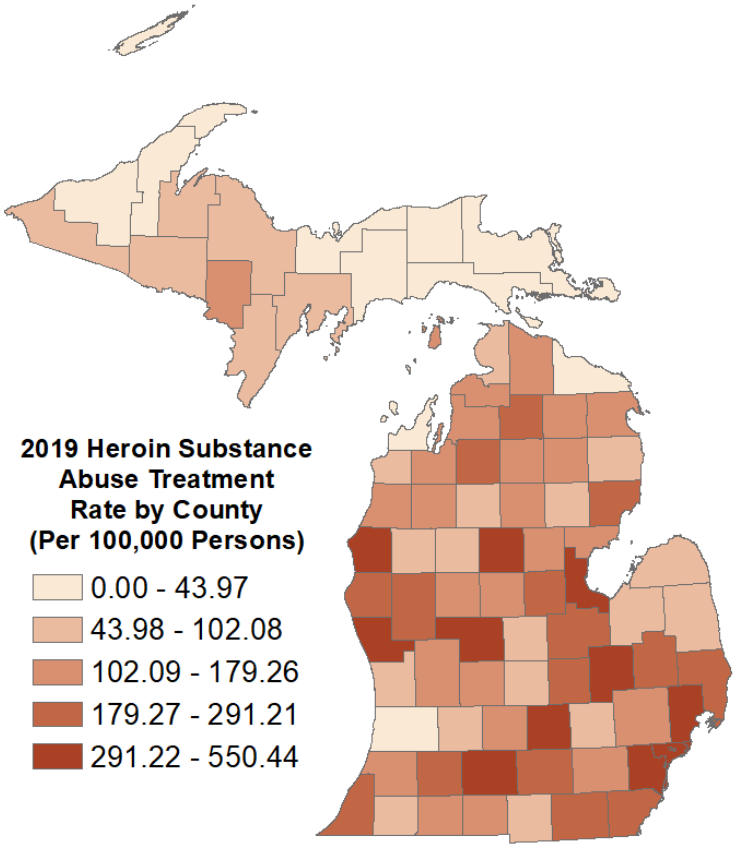
Heroin overdose deaths include deaths with an underlying cause of death listed as drug overdose (X40-X44, Y10-Y14, X60-X64, X85) and a related cause of death of T40.1

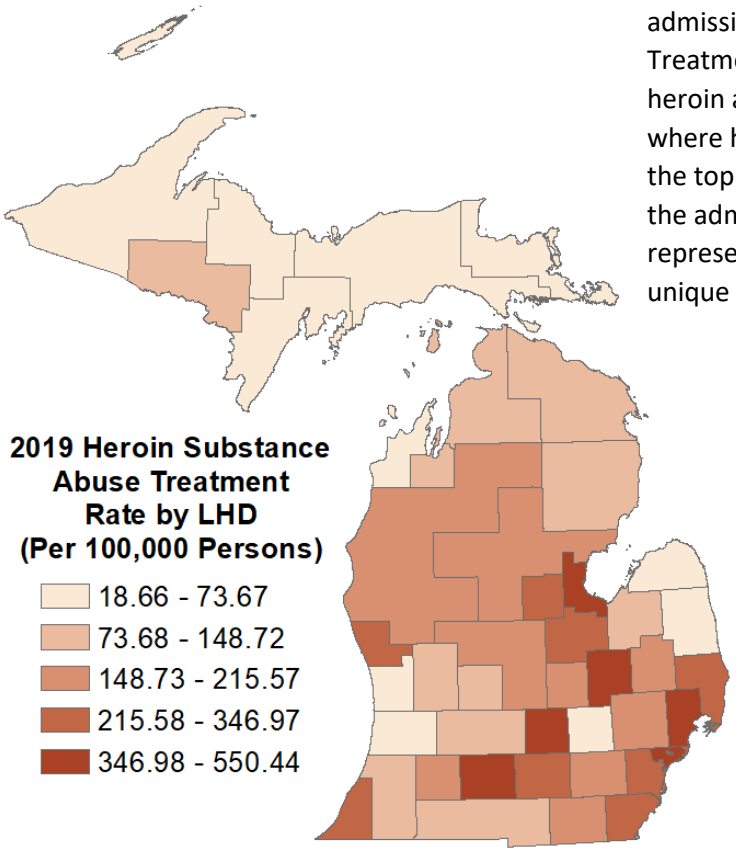


Data are suppressed if a drug is not specified in ≥90% of overdose death certificates or a jurisdiction reported less than 5 deaths



Treatment Episode Data Sets (TEDS) Rate Maps by County and Local Health Jurisdiction



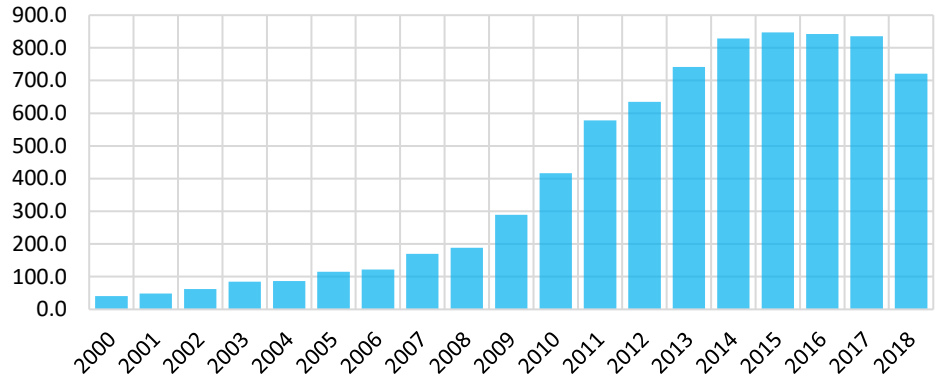


Heroin substance abuse treatment admissions are obtained from the Treatment Episode Dataset (TEDS). A heroin admission is any admission where heroin is self-identified as one of the top five substances responsible for the admission. These numbers represent unique admissions and not unique patients.

Neonatal Abstinence Syndrome (NAS)

Neonatal Abstinence Syndrome (NAS) occurs in infants who are exposed to opioids in the womb, before birth. These infants are born addicted to opioids and experience withdrawal symptoms after delivery. NAS typically occurs 48-72 hours after birth and symptoms include tremors, high-pitched crying, seizures, feeding difficulties and temperature instability. Babies born with NAS may have additional health problems such as birth defects, low birth weight, small head circumference and developmental and behavioral disorders. Infants born with NAS often face extended stays in the hospital after birth. Trends in NAS and areas in which NAS is common may indicate heightened risks, especially among reproductive-age women, for things like HIV, HCV, and subsequent perinatal HCV transmission.

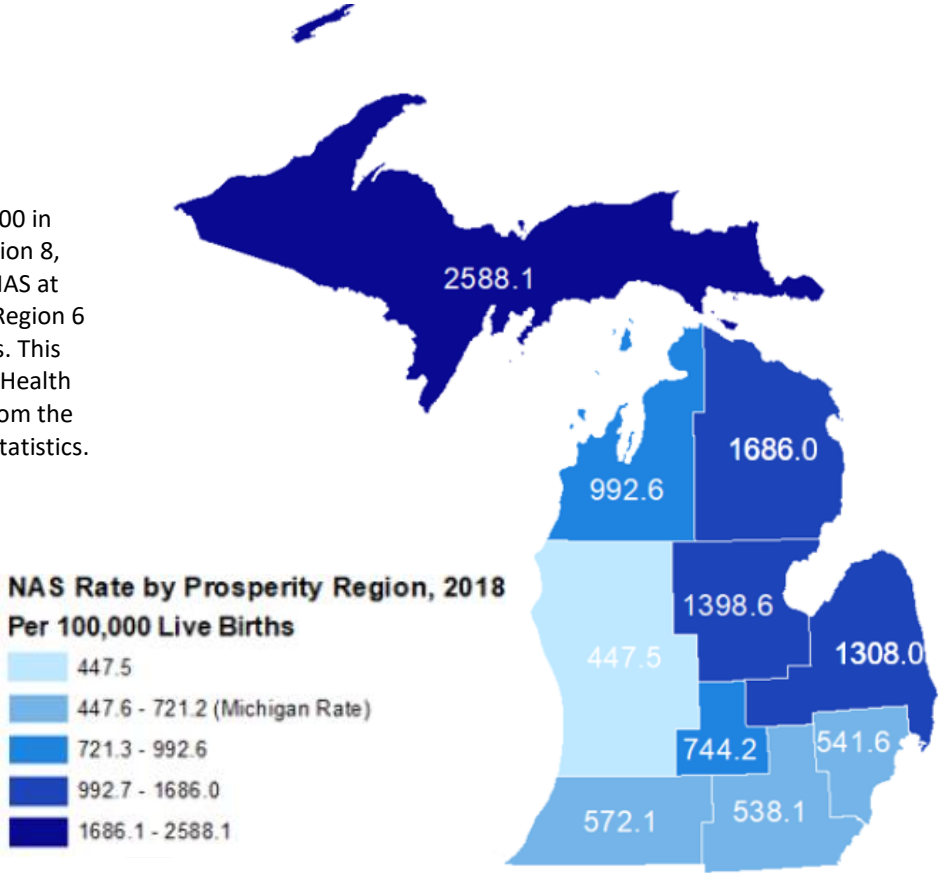
Figure 10.1 Rate of Treated Neonatal Abstinence Syndrome among Michigan Infants by Year, 2000-2018



NAS incidence has mirrored the increase in opioid abuse in Michigan (Figure 10.1). In 2000, the rate of treated NAS in Michigan infants (from the Michigan Inpatient Database) was 41.2 per 100,000 live births. The rate has increased steadily, peaking at a rate of 761.2 treated NAS cases per 100,000 live births in 2015, a 1747% increase.

Figure 10.2 NAS Rate per 100,000 Live Births by Michigan Perinatal Quality Collaborative Prosperity Region, 2018

This map depicts the 2018 NAS rate per 100,000 in each of the perinatal regions in Michigan. Region 8, the Upper Peninsula, has the highest rate of NAS at 2,588.1 infants per 100,000 live births, while Region 6 has the lowest at 447.7 per 100,000 live births. This map was prepared by the Maternal and Child Health Epidemiology Section at MDHHS using data from the MDHHS Division of Vital Records and Health Statistics.

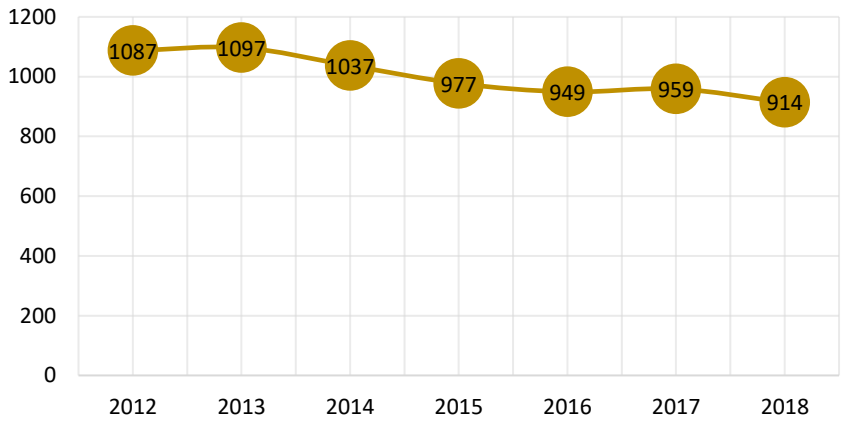


Perinatal Hepatitis C

MDHHS conducted a review of birth records matched with HCV-infected women in Michigan, based on mother's name, from 2012-2018. This review provided insight on trends in the rate of infants born to HCV-infected mothers and allowed for comparison of demographics and risk factors between HCV-infected mothers vs. non-infected mothers.

Although national data indicates an upward trend in birth to HCV-infected mothers, statewide data shows a 16% decrease from 2012 through 2018 (Figure 11.1).

Figure 11.1 Number of Babies Born to HCV-Infected Women in Michigan, 2012-2018



A review of birth records indicates that women who give birth and were reported to be HCV-infected are generally more likely than the non-infected population to:

- Be 20-29 years old
- Be White/Caucasian, American Indian or Multiracial
- Seek less prenatal care
- Be less educated
- Use Medicaid as payment for care
- Smoke
- Drink alcohol
- Be single
- Be tested for HIV
- Self-report HCV
- Be infected with hepatitis B virus
- Have previous sexually transmitted disease(s)

Table 11.1 Demographics from Michigan Birth Records, 2012-2018

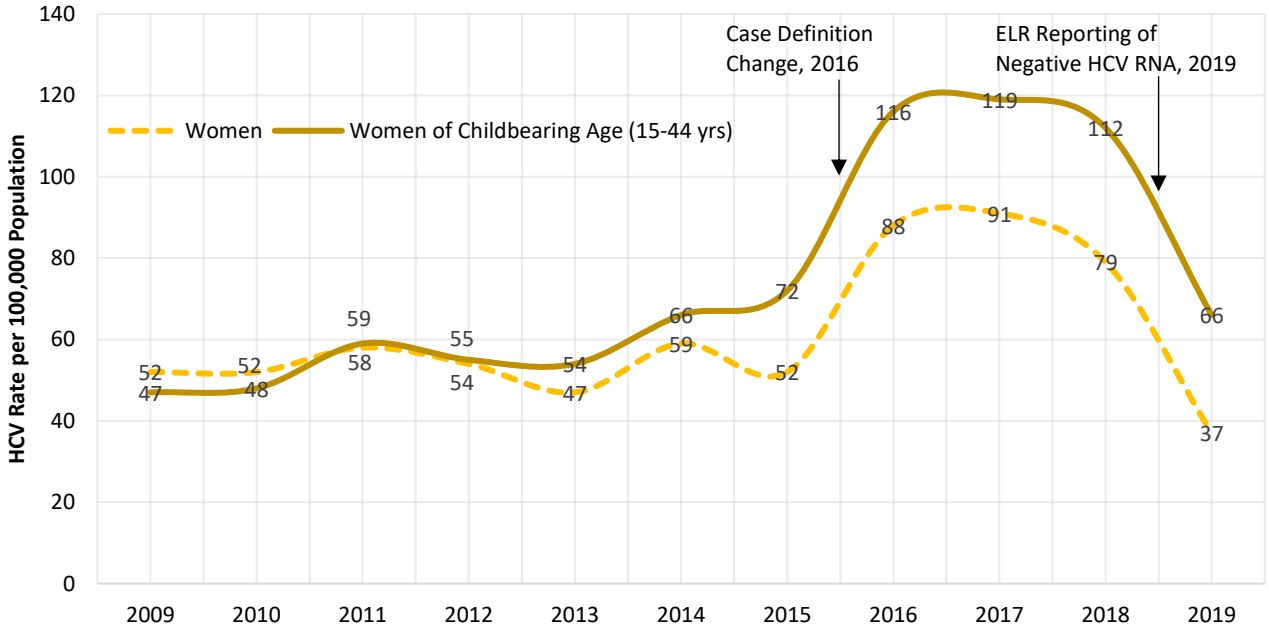
	Mother Reported for HCV in MDSS?			
Maternal Characteristic	**Yes (n= 7,020)**		**No (n=782,065)**	
Age Group (in Years)				
<20	389	*5.54%*	46,289	*5.92%*
20-29	4,430	*63.12%*	416,260	*53.23%*
30-39	2,072	*29.52%*	300,112	*38.37%*
40-49	128	*1.82%*	19,265	*2.46%*
>50	1	*0.01%*	90	*0.01%*
Race				
American Indian	150	*2.14%*	3,029	*0.39%*
Asian	59	*0.84%*	25,121	*3.21%*
Black or African American	728	*10.37%*	145,001	*18.54%*
White or Caucasian	5,861	*83.49%*	567,976	*72.63%*
Other	172	*2.45%*	36,868	*4.71%*
Unknown	38	*0.54%*	3,121	*0.40%*
Prenatal Care Visits				
Less than 8 or no care	1,771	*25.23%*	82,962	*10.61%*
8 or greater	4,987	*71.04%*	678,151	*86.71%*
Education				
High school graduate or lower	6,315	*89.96%*	479,884	*61.36%*
Higher degree	594	*8.46%*	296,187	*37.87%*
Paysource				
Medicaid	5,484	*78.12%*	334,078	*42.72%*
Private Insurance	1,358	*19.34%*	427,550	*54.67%*
Smoking				
Yes	4,690	*66.81%*	149,186	*19.08%*
No	2,248	*32.02%*	629,261	*80.46%*
Married				
Yes	1,496	*21.31%*	453,564	*58.00%*
No	5,506	*78.43%*	328,255	*41.97%*
Self-Reported HCV				
Yes	1,935	*27.56%*	399	*0.05%*
No	4,956	*70.60%*	772,371	*98.76%*

It is estimated that perinatal HCV infection occurs in 5 to 15% of babies born to HCV-infected women. The number of women of childbearing age infected with HCV continues to rise as a result of the opioid and heroin epidemics. In fact, the rate of HCV in women aged 15-44 has surpassed that of the rest of Michigan's female population (Figure 11.2). Perinatal HCV, therefore, is becoming an increasingly important public health issue. There is no intervention to reduce the risk of vertical transmission of HCV as there is with perinatal HBV. It is not recommended to treat pregnant women for HCV infection. However, HCV direct-acting antivirals are now approved to treat children as young as 12 years old.

From 2009-2014 the US has experienced an 89% increase in present HCV infections in women at the time of birth, increasing from 1.8 to 3.4 instances per 1,000 births. Michigan was estimated to have a rate of 2.6-5.0 HCV infections among pregnant women for every 1,000 live births in 2014. Using that estimate, the number of incident perinatal HCV cases in Michigan in 2014 ranged between 15 and 85 cases per year.

The new case definition for perinatal hepatitis C established in 2018 states that a perinatal hepatitis C case is between the ages of 2 months and 36 months old and must have record of a positive HCV nucleic acid test (qualitative, quantitative, or genotype). Under this case definition, there were 45 instances of reported perinatal hepatitis C between 2012 and 2019, which is more than twice the number of perinatal HIV and HBV infections combined. The 45 perinatal HCV cases are likely an underestimation because approximately 50-75% of the HCV-infected population is undiagnosed, and infants are often not tested or tested inaccurately.

Figure 11.2 Number of Hepatitis C Cases per 100,000 Population, Women of Childbearing Age compared to Total Women, 2009-2019



Perinatal Hepatitis B

Perinatal HBV infection in a pregnant woman poses inherent risk to the infant at birth, as perinatal transmission is a known risk factor for HBV infection. CDC estimates the number of births to hepatitis B surface antigen (HBsAg) positive women by using prevalence of HBV infection by race/ethnicity as well as country of birth for mothers of infants. The current CDC estimation of expected birth to HBsAg positive women nationwide is 21,281 per year, and in the range of 317-468 per year in Michigan. However, less than half of the lower level of these estimated births are being identified.

Since 2016, Michigan has required physicians, health care providers and laboratories to report pregnancy status for all women of childbearing age (10 – 60 years of age). Identifying HBsAg-positive pregnant women prenatally is key to protecting babies from getting HBV. More than 98% of all babies, if treated appropriately, will be protected from getting HBV from their mothers. Hepatitis B (hepB) vaccine has been available in the U.S. since 1981 and has been proven to be safe and effective in preventing HBV transmission. CDC now recommends vaccination within 24 hours of birth for all medically stable babies, weighing more than 2,000 grams and born to HBsAg-negative women. CDC also recommends hepB vaccine and hepatitis B immune globulin (HBIG) within 12 hours of birth for all babies born to HBsAg-positive women.

The MDHHS Immunization Division Perinatal Hepatitis B Prevention Program (PHBPP)'s mission is to identify HBV-infected pregnant women and coordinate proper care and treatment of the babies born to them. Even with our efforts to provide the appropriate prophylaxis, five babies born since 2010 were identified as being perinatally infected with HBV. From 2008 through 2011, the foreign-born proportion of women who were both infected and pregnant was 59% and increased to 74% in 2013-2014 before decreasing to 56% in 2015-2016. Furthermore, 43% of those women were identified as Asian/Pacific Islander in 2008-2011, increasing to 60% in 2013-2014 before decreasing to 41% in 2015-2016.

Infants who acquire HBV infection from their mothers at birth are 90% more likely to become chronically infected and 25% of these infants will have liver cancer or even die from the effects of having HBV. It is extremely important to identify all HBsAg-positive pregnant women prior to delivery so that their infants can receive HBIG and hepB vaccine within 12 hours of life for immediate protection against HBV. For life-long protection, these infants need at least two additional doses of hepB vaccine and a post-vaccination serologic test (PVST) at nine to twelve months of age. For more information, go to www.mi.gov/hepatitisB or call 517-335-9443.

Figure 12.1 Michigan's Perinatal Hepatitis B Prevention Program (PHBPP), 2014-2018

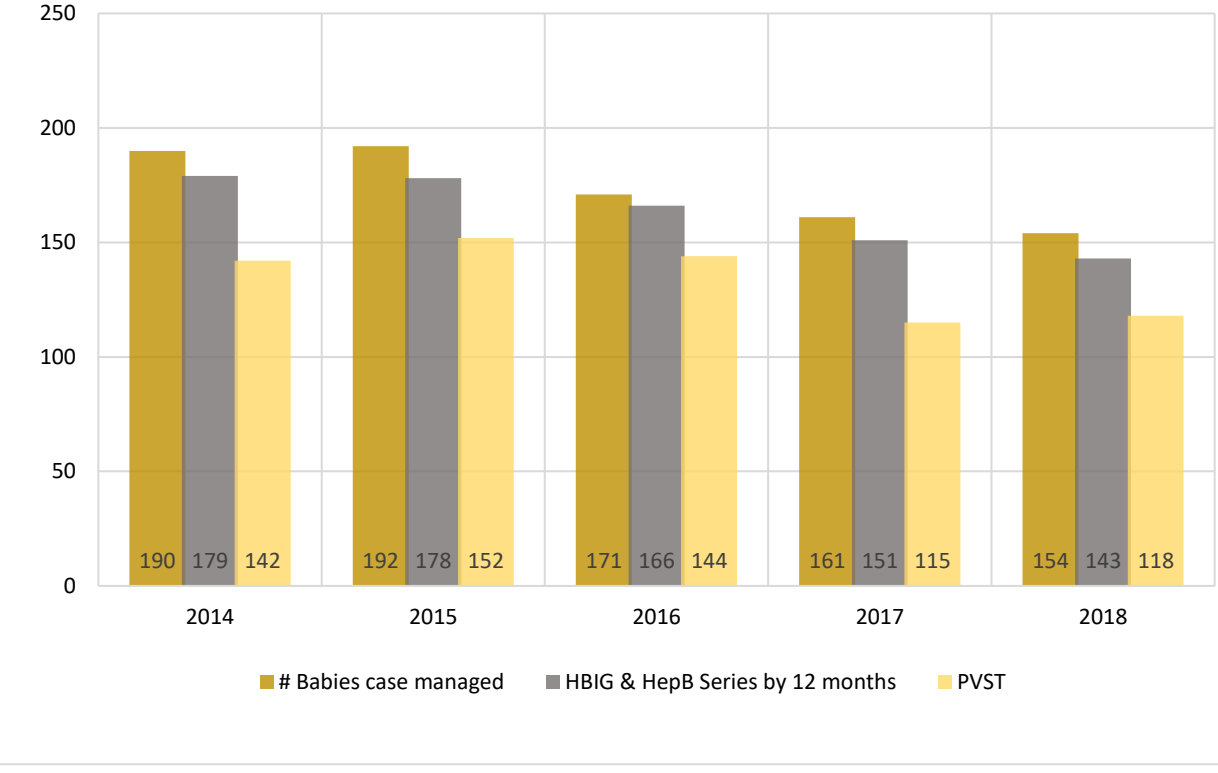


Table 12.1 Proportion of Infants Receiving HBV Treatment, Michigan and the United States, 2014-2018

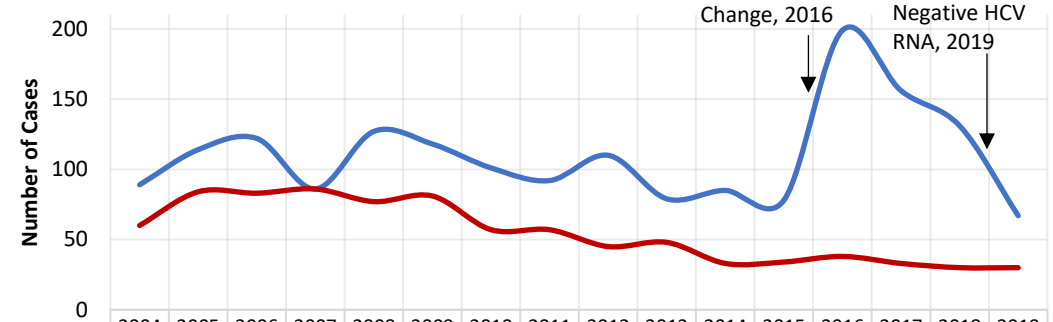
	2014		2015		2016		2017		2018	
	MI	U.S.	MI	U.S.	MI	U.S.	MI	U.S.	MI	U.S.
Percent of Infants Receiving PEP at Birth	100%	97%	99%	96%	99%	97%	100%	-	99%	-
Percent of Infants with HBIG & Complete HepB Series by 12 Months	94%	82%	93%	83%	97%	82%	94%	-	93%	-
Percent of Infants with PVST by End of Reporting Period 1	75%	64%	79%	63%	84%	64%	71%	-	77%	-

The Michigan PHBPP consistently performs above the national average in care and treatment of infants born to HBV-infected mothers; however, there is room for improvement. It is extremely important to continue providing the appropriate prophylaxis to all infants, especially those born to HBsAg-positive women.

Hepatitis and HIV Co-infections

Positive health outcomes for individuals with HIV/HBV or HIV/HCV co-infections are significantly lower than individuals who are mono-infected with either of the viruses. In order to assess the burden of viral hepatitis and HIV co-infection in Michigan, MDHHS staff performed a match between HIV cases reported in the Enhanced HIV/AIDS Reporting System (eHARS) and viral hepatitis cases reported in the MDSS.

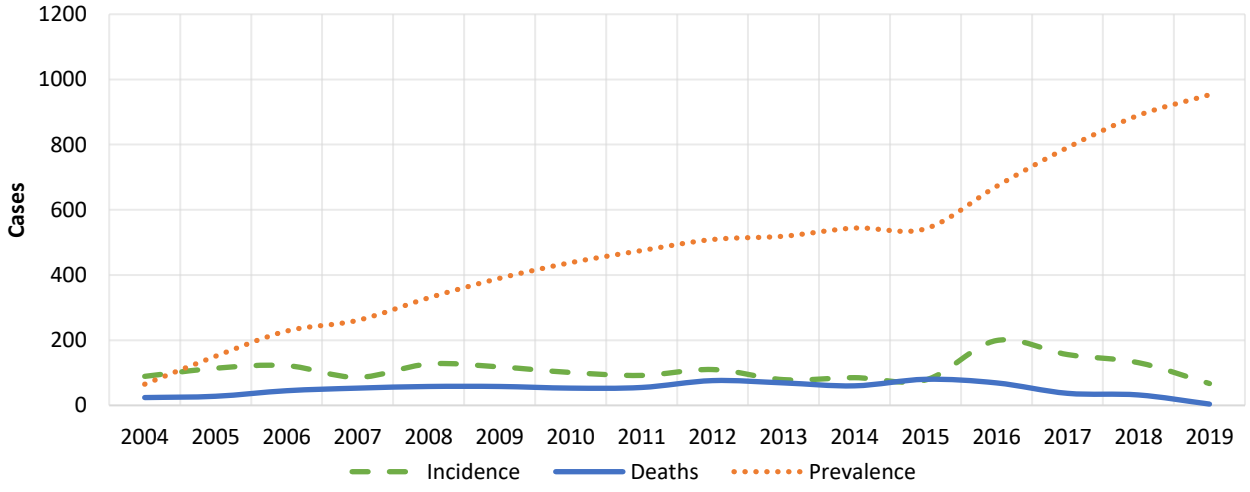
Figure 13.1 Count of Hepatitis B and Hepatitis C Cases Co-infected with HIV in Michigan, 2004-2019



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
HCV	89	114	122	86	127	118	101	92	110	79	85	78	199	156	131	67
HBV	60	84	83	86	77	81	57	57	45	48	33	34	38	33	30	30

In general, the number of new HBV/HIV matches has trended downward in recent years. HIV/HCV matches also trended downward until 2016 when a new HCV case definition was instituted. This change is largely responsible for the increase in matches in 2016 and 2017. Individuals who are co-infected are living longer, largely because of improvements in linkage to care and highly effective therapies, resulting in increased prevalence of both co-infections (Figure 13.2). Tables 13.1 and 13.2 look at the demographic breakdown of both HBV/HIV and HCV/HIV co-infections. As one might suspect, HBV/HIV co-infection is more common among the men that have sex with men (MSM) population and thus tends to be more male and younger in age. HCV/HIV co-infection is associated with intravenous drug use and follows the demographics of people who are living with HIV and inject drugs.

Figure 13.2 Prevalence of Diagnosed HCV-HIV Co-infections in Michigan, 2004-2019



Between 2004 and 2018, 846 people were reported in Michigan with HBV/HIV co-infection. Table 13.1 shows a breakdown of the HBV/HIV co-infected population in 2019. The 2019 cases are similar to the historical cases in regard to race and sex. MSM is the predominant risk factor in the HBV and HIV co-infected population with an age that tends to be over 30 years old.

Table 13.1 Hepatitis B and HIV Co-Infection Data in Michigan, 2019

Variable	2019 HBV/HIV Co-infections		2004-2018 HBV/HIV Co-infections	
Total Co-infections	30		846	
Sex				
Male	28	*(93.3%)*	753	*(89.0%)*
Female	2	*(6.7%)*	93	*(11.0%)*
Unknown	0	*(0.0%)*	0	*(0.0%)*
Race				
White or Caucasian	10	*(33.3%)*	242	*(28.6%)*
Black or African American	16	*(53.3%)*	550	*(65.0%)*
Hispanic	3	*(10.0%)*	25	*(3.0%)*
Asian	1	*(3.3%)*	5	*(0.6%)*
American Indian or Alaskan Native	0	*(0.0%)*	1	*(0.1%)*
Multi/Other/Unknown	0	*(0.0%)*	23	*(2.7%)*
HIV Transmission Risk				
MSM	16	*(53.3%)*	508	*(60.0%)*
IDU	3	*(10.0%)*	77	*(9.1%)*
MSM/IDU	4	*(13.3%)*	45	*(5.3%)*
Blood Recipient	0	*(0.0%)*	5	*(0.6%)*
Heterosexual	2	*(6.7%)*	77	*(9.1%)*
Perinatal	0	*(0.0%)*	2	*(0.2%)*
Unknown/Undetermined	5	*(16.7%)*	132	*(15.6%)*
Age at Coinfection				
0-19	0	*(0.0%)*	8	*(0.9%)*
20-29	5	*(16.7%)*	96	*(11.3%)*
30-39	8	*(26.7%)*	225	*(26.6%)*
40-49	9	*(30.0%)*	304	*(35.9%)*
50-59	5	*(16.7%)*	166	*(19.6%)*
60+	3	*(10.0%)*	47	*(5.6%)*

Between 2004 and 2018, 1,687 people were reported in Michigan with HIV/HCV co-infection. Table 13.2 shows a breakdown of the HCV/HIV co-infected population in 2019. The 2019 cases are similar to the historical cases in regard to sex, but MSM was the predominant risk factor for HCV/HIV co-infection, and the age distribution has shifted slightly toward younger patients. In comparison, IDU was the predominant risk factor in the HCV and HIV co-infected population from 2004-2018, with an age generally over 30 years old. However, in recent years there has been a shift from IDU risk to MSM risk in this co-infected population. While sexual transmission of HCV is rare, it has been reported in HIV-infected MSM populations.

Table 13.2 Hepatitis C and HIV Co-Infection Data in Michigan, 2019

Variable	2019 HCV/HIV Co-infections		2004-2018 HCV/HIV Co-infections	
Total Co-infections	67		1,687	
Sex				
Male	54	*(80.6%)*	1,233	*(73.1%)*
Female	13	*(19.4%)*	445	*(26.4%)*
Unknown	0	*(0.0%)*	9	*(0.5%)*
Race				
White or Caucasian	27	*(40.3%)*	557	*(33.0%)*
Black or African American	34	*(50.7%)*	982	*(58.2%)*
Hispanic	4	*(6.0%)*	72	*(4.3%)*
Asian	0	*(0.0%)*	13	*(0.8%)*
American Indian or Alaskan Native	0	*(0.0%)*	1	*(0.1%)*
Multi/Other/Unknown	2	*(3.0%)*	62	*(3.7%)*
HIV Transmission Risk				
MSM	29	*(43.3%)*	409	*(24.2%)*
IDU	19	*(28.4%)*	677	*(40.1%)*
MSM/IDU	6	*(9.0%)*	213	*(12.6%)*
Blood Recipient	0	*(0.0%)*	43	*(2.5%)*
Heterosexual	6	*(9.0%)*	188	*(11.1%)*
Perinatal	0	*(0.0%)*	3	*(0.2%)*
Unknown/Undetermined	7	*(10.4%)*	154	*(9.1%)*
Age at Coinfection				
0-19	0	*(0.0%)*	11	*(0.7%)*
20-29	12	*(17.9%)*	135	*(8.0%)*
30-39	23	*(34.3%)*	246	*(14.6%)*
40-49	10	*(14.9%)*	462	*(27.4%)*
50-59	8	*(11.9%)*	599	*(35.5%)*
60+	14	*(20.9%)*	234	*(13.9%)*

Hepatitis C and HIV Co-infections Among MIDAP Beneficiaries

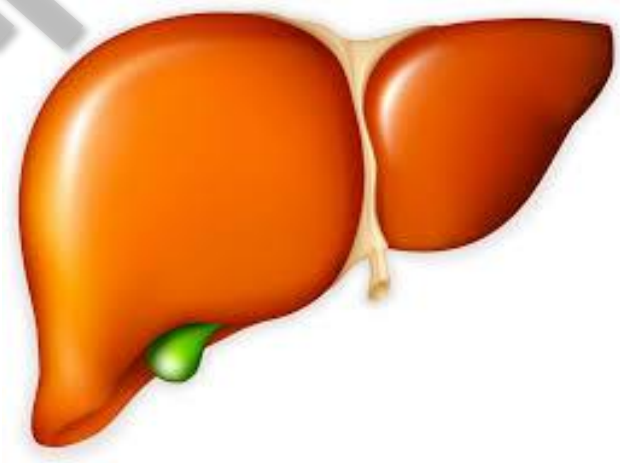
The Michigan Drug Assistance Program (MIDAP) is a Ryan White program that specifically covers the cost of health insurance and/or medication for people living with HIV. MIDAP can be useful for all medical needs – not just HIV. Beginning March 1, 2018, MIDAP began providing treatment assistance for hepatitis C medications for eligible individuals at no cost. To learn more visit, www.Michigan.gov/dap.

As of December 13, 2019, there were 3,040 active MIDAP beneficiaries, of which 3.0% were identified to be living with HIV and co-infected with hepatitis C.

Table 13.3 Hepatitis C and HIV MIDAP Co-Infections data in Michigan, 2019

	2019 HCV/MIDAP Co-infections	
Total Co-infections	80	
Sex		
Male	69	*86.3%*
Female	11	*13.7%*
Unknown	0	*0.0%*
Race		
White or Caucasian	34	*42.5%*
Black or African American	40	*50.0%*
Hispanic	1	*1.3%*
Asian	3	*3.8%*
American Indian or Alaskan Native	0	*0.0%*
Multi/Other/Unknown	2	*2.5%*
HIV Transmission Risk		
MSM	35	*50.7%*
IDU	12	*15.0%*
MSM/IDU	5	*7.2%*
Blood Recipient	0	*0.0%*
Heterosexual	17	*21.3%*
Perinatal	0	*0.0%*
Unknown/Undetermined	11	*13.8%*
Age at Coinfection		
0-19	4	*5.0%*
20-29	15	*18.8%*
30-39	24	*30.0%*
40-49	19	*23.8%*
50-59	10	*12.5%*
60+	8	*10.0%*

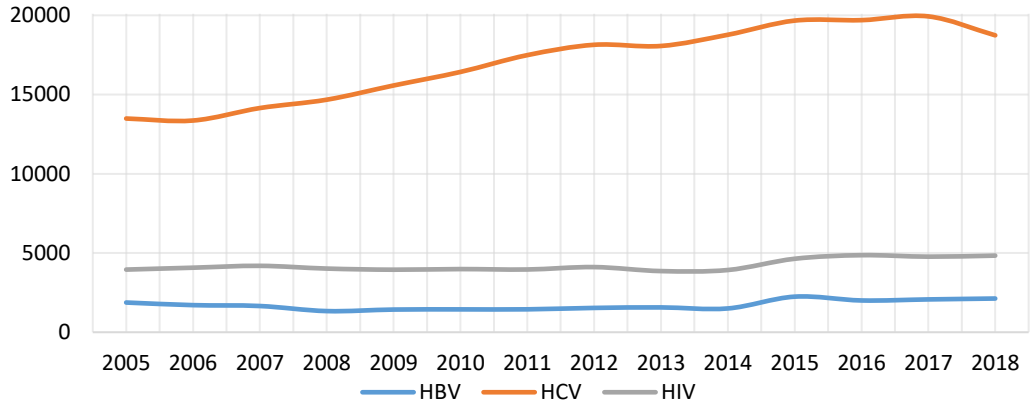
Viral Hepatitis Outcomes



Viral Hepatitis Hospitalizations and Liver Transplants

Trends in hospitalization totals are indicative of a marked increase in health complications as a result of HCV. Figure 14.1 indicates that hospitalizations attributed to HCV increased by nearly 46% from 2005 through 2018, while total hospitalizations due to HBV and HIV each stayed relatively steady. The magnitude of HCV-related hospitalizations is also staggering, at nearly four times as many admissions as HIV.

Figure 14.1 Hospitalizations Due to HBV, HCV and HIV, Michigan, 2005-2018

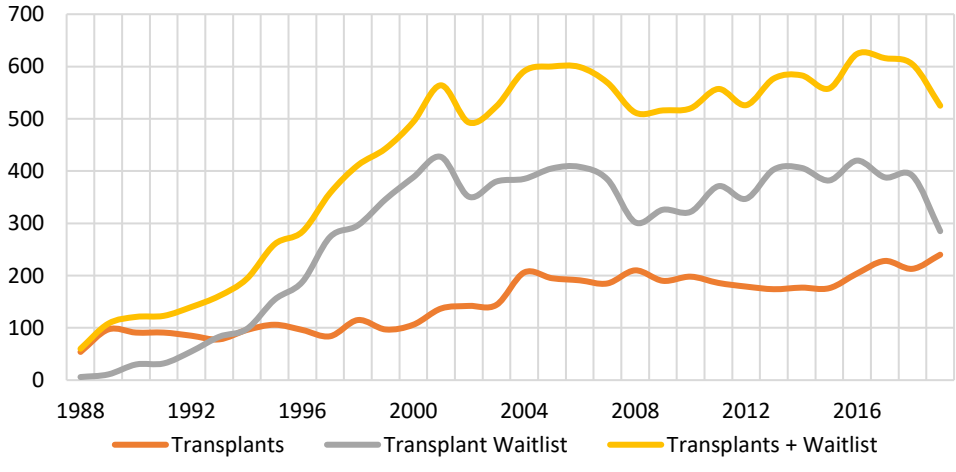


Note: Hospitalizations documenting hepatitis B include inpatient hospitalizations with ICD-9-CM codes for acute, chronic, or unspecified hepatitis B (07020, 07021, 07022, 07023, 07030, 07031, 07032, 07033, or V0261). Hospitalizations documenting hepatitis C include ICD-9-CM codes for acute, chronic, or unspecified hepatitis C (07041, 07044, 07054, 07059, 07070, 07071, or V0262). Hospitalizations documenting HIV include inpatient hospitalizations with ICD-9-CM codes 042, 07953, 79571, or V08.

Liver transplantation may be indicated for individuals with hepatocellular carcinoma (HCC). HBV and HCV infection increases the risk of development of HCC; therefore, trends in liver transplantation may be indicative of increasing disease progression and morbidity associated with long-term HBV and/or HCV infection. However, these data should be interpreted with caution as there are many other indicators for liver transplantation independent of viral hepatitis (e.g. alcoholic cirrhosis).

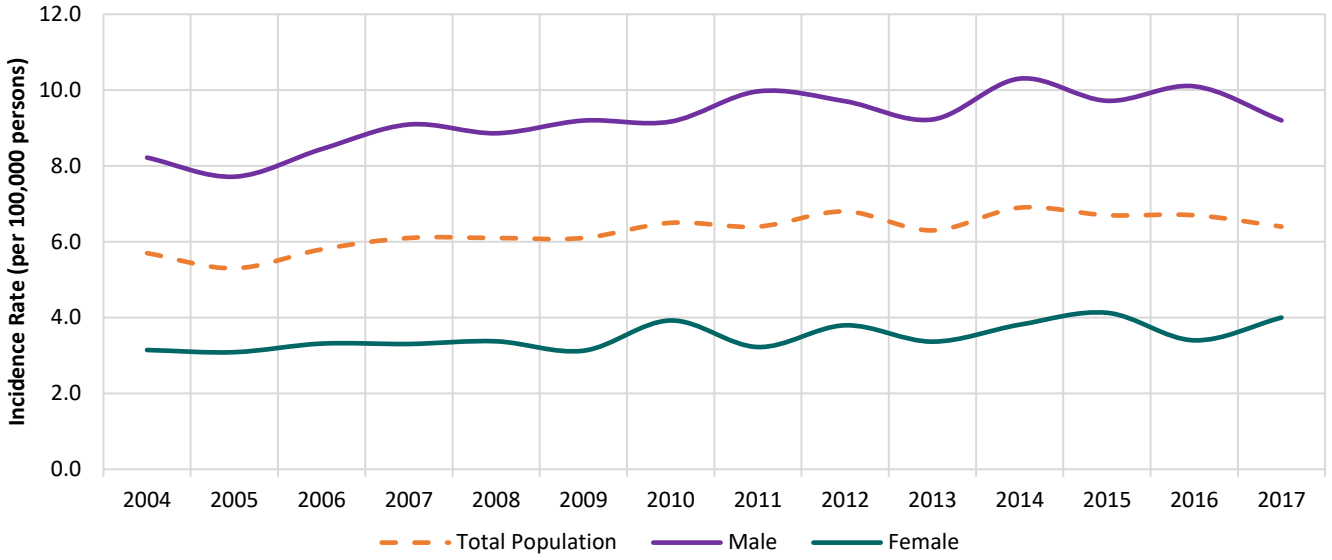
Counts of the number of individuals on the liver transplant waitlist and the number of liver transplants conducted in Michigan between 1988 and 2019 were requested through the United Network of Organ Sharing (UNOS, https://www.unos.org/).

Figure 14.2 Liver Transplants and Transplant Waitlist, Michigan, 1988-2019



Viral Hepatitis-Related Cancer & Mortality

Figure 15.1 Invasive Cancers of the Liver and Intrahepatic Bile Ducts in Michigan by Sex, 2004-2017



Viral hepatitis is a primary risk factor for the development of liver cancer. Figure 15.1 shows the age-adjusted rate of liver and intrahepatic bile duct cancer by sex The number of cases per year of liver and bile duct cancer have increased 27% between 2008 and 2017. Black/African American males experience an incidence rate that is approximately 2.2 times higher, on average, than White/Caucasian males. The incidence rate for Black/African American females tends to be similar to the state average, while White/Caucasian females have the lowest incidence rate of the specified race categories. Without improved efforts to test and treat persons with HBV and HCV infection, the rate of liver cancer may continue to rise, particularly as the population with greatest viral hepatitis prevalence ("Baby Boomers") ages.

Table 15.1 Incidence Rates of Invasive Cancers of the Liver and Intrahepatic Bile Ducts by Age-adjusted Rates of Race and Sex in Michigan, 2008-2017

Year of Diagnosis	Total		White or Caucasian Male		White or Caucasian Female		Black or African American Male		Black or African American Female	
	Incidence	Rate	Incidence	Rate	Incidence	Rate	Incidence	Rate	Incidence	Rate
2008	688	6.1	344	7.6	168	3.1	107	19.0	41	5.3
2009	706	6.1	361	7.9	154	2.9	116	18.8	36	4.7
2010	780	6.5	387	8.0	197	3.6	114	18.2	47	6.3
2011	767	6.4	419	8.8	156	2.9	122	18.3	42	5.5
2012	852	6.8	404	8.0	196	3.5	152	22.4	48	5.8
2013	797	6.3	404	7.9	173	3.0	133	18.8	48	6.0
2014	884	6.9	472	9.1	203	3.6	133	19.4	45	5.2
2015	874	6.7	448	8.5	206	3.6	130	19.2	66	7.6
2016	896	6.7	502	9.3	179	3.0	112	15.4	55	6.1
2017	873	6.4	459	8.3	220	3.7	119	16.3	53	5.8

Table 15.1 shows the rate of new cases of liver and intrahepatic bile duct cancer per year from 2008 to 2017 in Michigan per 100,000 people. The overall rate of liver and intrahepatic bile duct cancer in Michigan was 6.4 per 100,000 in 2017. Black/African American males had an incidence rate of 16.3 per 100,000, which was 96% higher than that of White/Caucasian males (8.3 per 100,000). The incidence rate in Black/African American females (5.8 per 100,000) was almost twice that of White/Caucasian females (3.0 per 100,000) in 2017.

Figure 15.2 Mortality Due to Invasive Cancer of the Liver and Intrahepatic Bile Ducts and Age-Adjusted Death Rates by Race and Sex in Michigan, 2009 - 2018

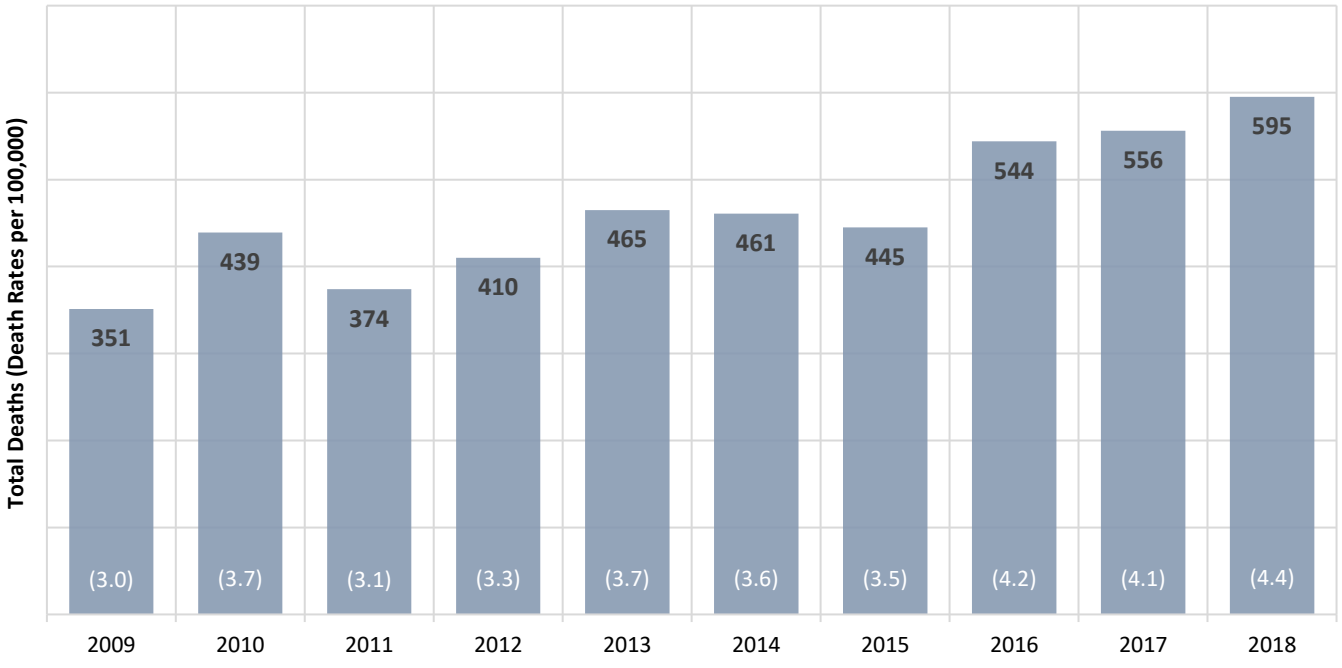


Figure 15.2 shows the number of deaths per year due to liver and intrahepatic bile duct cancer. This total has risen 70% from 2009 to 2018. Chronic infection with viral hepatitis, over time, can lead to liver cancer. As rates of liver cancer increase, we have observed a subsequent increase in mortality associated with liver cancer. Improved efforts to test and treat viral hepatitis infections may help reverse these trends.

Table 15.2 Numbers of Deaths Due to Invasive Cancer of the Liver and Intrahepatic Bile Ducts and Age-Adjusted Death Rates by Race and Sex in Michigan, 2009 - 2018

Year of Death	Total		White or Caucasian Male		White or Caucasian Female		Black or African American Male		Black or African American Female	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
2009	351	3.0	170	3.8	84	1.6	58	9.3	15	*
2010	439	3.7	214	4.5	120	2.1	66	10.7	15	*
2011	374	3.1	197	4.1	91	1.6	63	10.2	17	*
2012	410	3.3	197	4.1	112	2.0	59	8.9	17	*
2013	465	3.7	227	4.5	129	2.2	65	9.3	27	3.4
2014	461	3.6	226	4.4	119	2.1	64	8.9	36	4.3
2015	445	3.5	218	4.2	121	2.1	60	9.9	26	3.1
2016	544	4.2	291	5.6	138	2.4	54	7.8	38	4.4
2017	556	4.1	293	5.4	156	2.5	64	8.7	23	2.5
2018	595	4.4	309	5.7	142	2.3	72	10.5	38	4.2

Table 15.2 shows the death rate per 100,000 Michigan population due to cancer of the liver and intrahepatic bile ducts between 2009 and 2018. The overall liver and intrahepatic bile duct cancer mortality rate in Michigan in 2018 was 4.4 per 100,000. Black/African American males show the highest death rates due to these cancers with a death rate of 10.5 per 100,000. The death rate in Black/African American males (10.5 per 100,000) is 84% higher than the rate in White/Caucasian males (5.7 per 100,000). The death rate in White/Caucasian males has increased by 50% between 2009 and 2018 while the death rate in White/Caucasian females has increased by 44%.

While not all liver cancers are a direct result of viral hepatitis, viral hepatitis remains a primary risk factor for development of liver cancer. These data highlight racial disparities in liver cancer data that may be reflective of disparities seen in viral hepatitis infection.

Figure 15.3 Deaths Due to Acute and Chronic HCV, Michigan, 2010-2019

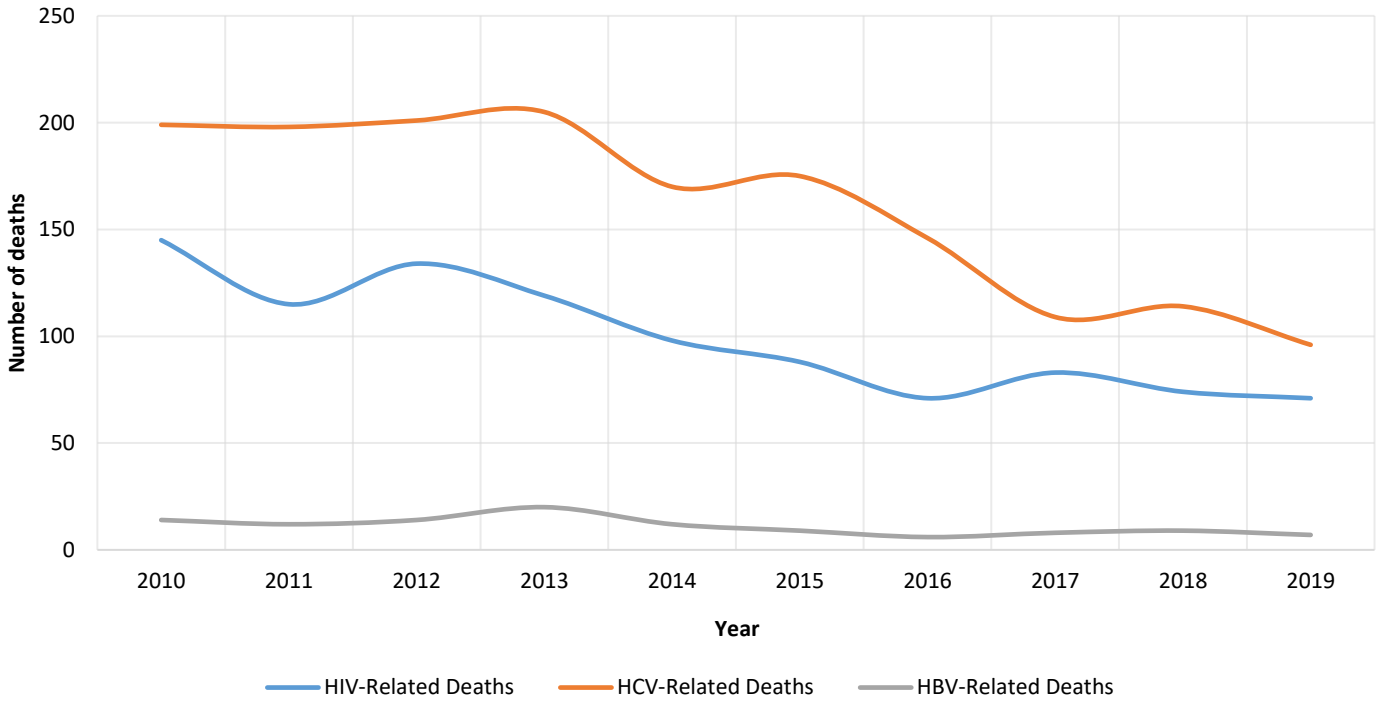


Figure 15.3 shows the number of deaths per year in Michigan residents between 2010 and 2019 due to acute and chronic HCV, according to death certificate data, in comparison to hepatitis B and HIV. The Vital Records and Health Statistics Section provides data on underlying causes of death in Michigan, which is classified using the Tenth Revision of the International Classification of Diseases (ICD-10).

In 2019 there were 96 deaths attributed to HCV in Michigan (ICD-10: B17.1, B18.2, B19.2). Between 2010 and 2019, deaths due to chronic HCV decreased by 52%, likely resulting from the introduction of new medications that treat HCV infections, among other factors. From 2010 through 2019, HBV deaths (ICD-10: B16.2, B16.9, B18.1) decreased from 14 to 7, while HIV-related deaths (ICD-10: B20-B24) were reduced from 115 to 71.

Hepatitis C Emerging Threats Project

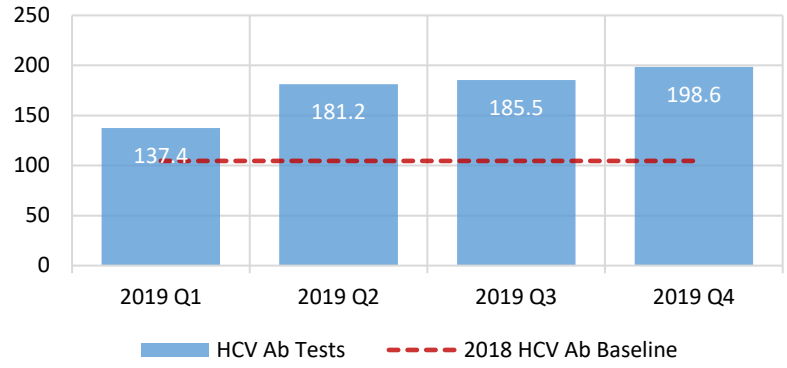
In 2017, the Viral Hepatitis Unit at MDHHS wrote a Proposal for Change, which supported the allocation of general funds to local health departments for HCV testing, case investigation, linkage to care, and follow-up. The $4.5 million proposal was supported in the governor's budget and eventually approved by the Michigan legislature at $1 million.

The project goal was to fund each local health jurisdiction, but a shortage of funds prompted an effort to prioritize a smaller cohort. Therefore, it was decided to fund the 10 jurisdictions with the highest HCV case burden in 2017 according to the Michigan Disease Surveillance System (MDSS). Disbursement of funds and project implementation began on January 1, 2019.

Table 16.1 Local Health Departments participating in the HCV Emerging Threats Project

Funded Local Health Departments	2017 Hepatitis C Cases
Detroit City	1,941
Wayne County	1,360
Oakland County	1,010
Macomb County	896
Genesee County	647
Kent County	564
Ingham County	351
St. Clair County	271
Muskegon County	264
Kalamazoo County	259

Figure 16.1 Combined average number of HCV specimens submitted to BOL from the funded LHDs (Project Period: Q1 2019 - Q4 2019)

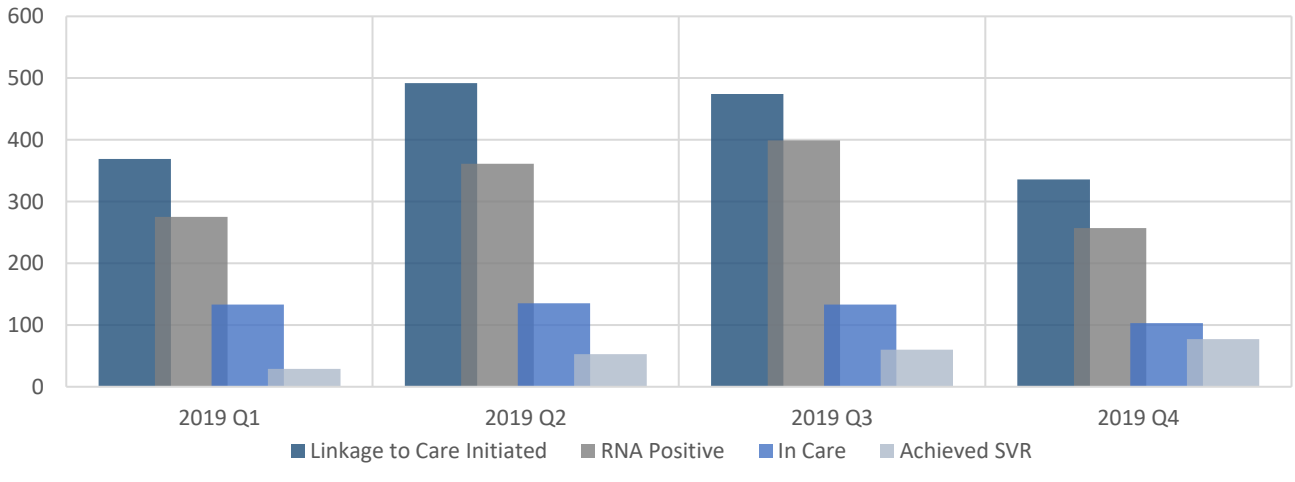


Hepatitis C Testing: Project dollars went to the Michigan Bureau of Laboratories (BOL) to continue to offer HCV antibody (Ab) and RNA testing services at no cost to our submitters. Since the start of the project (Jan 1, 2019 – Dec 31, 2019), funded health departments have submitted 7,027 HCV specimens to BOL.

Hepatitis C Case Investigation: Completion rates for fields found in the MDSS have increased. Specifically, demographics (6.0%), clinical info (1.2%), and epidemiological info (11.3%).

Hepatitis C Linkage to Care: Funded local health departments have reached out to 1,508 individuals to offer linkage to care activities such as informing cases of their HCV lab result, encouraging confirmatory HCV testing (if needed), providing viral hepatitis education and helping to refer and navigate cases through the complex process of hepatitis C treatment (e.g., PCP, HCV treatment providers, insurance). In 2019, of the individuals living with hepatitis C and contacted for linkage to care, 62.3% were linked to a hepatitis C treatment provider and so far 165 have been cured!

Figure 16.2 Linkage to Care Activities Perfomed by the Funded LHDs from Jan 1 - Dec 31, 2019

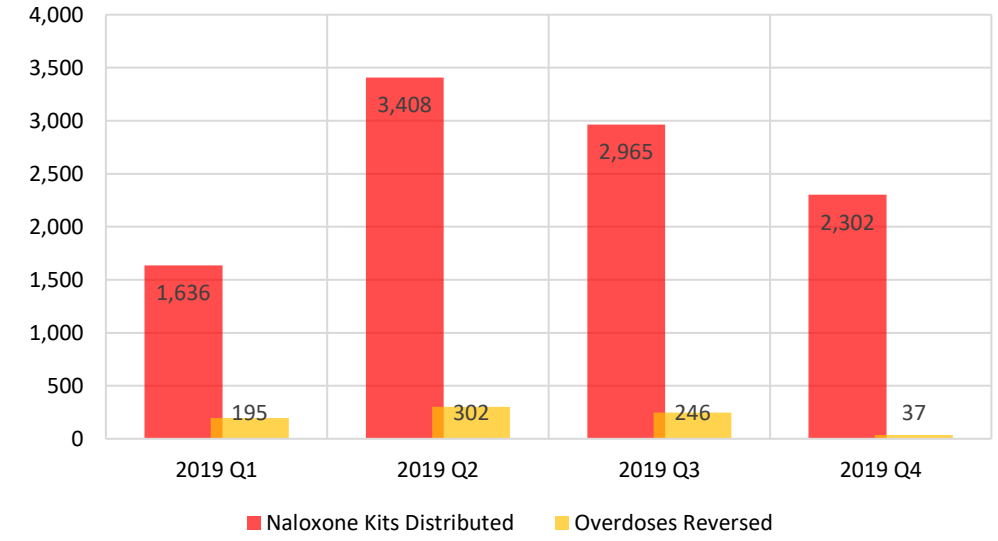


Harm Reduction and Syringe Service Programs

As viral hepatitis data has indicated year after year, there is growing concern for dissemination of infectious disease through use of injection drugs. In response to this pressing issue, MDHHS has supported development of a statewide harm reduction platform, which includes provision of funds for several existing and start-up syringe service programs (SSPs). Harm reduction is a respectful, non-judgmental approach to reducing the harms of substance use that meets people where they are at. This approach has been proven effective in SSPs and can reduce HCV and HIV prevalence by as much as 50%, reduce fatal and non-fatal overdoses, and increase access to substance use disorder treatment and recovery services (which can often include hepatitis C testing and linkage to care).

In fiscal year 2019, MDHHS invested approximately $1.25 million in harm reduction and SSPs in 15 different local health jurisdictions. With inclusion of all operating SSPs in Michigan, as of 3/20/2020, there is coverage in 23 counties over a total of 53 sites (Figure 17.1) with 9 programs expected to open in the near future.

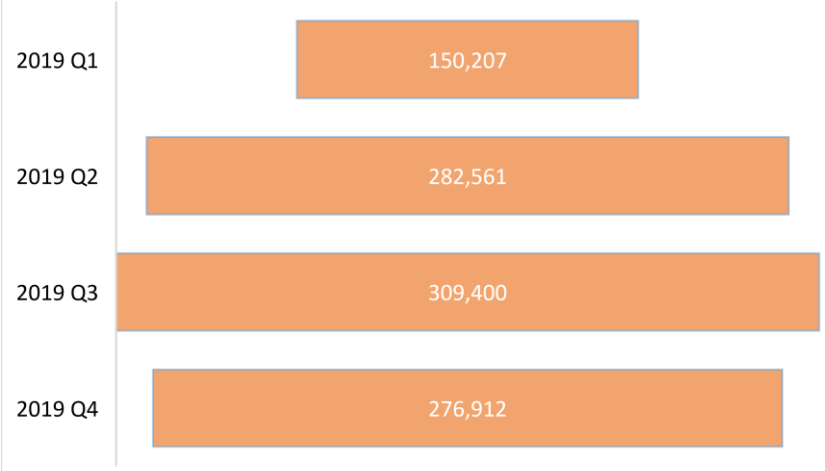
Figure 17.2 Naloxone Kits Distributed and Overdoses Reversed as Result of SSP, MI by Quarter, 2019



In 2019, SSPs in Michigan:

- Provided 1,318 referrals to substance use treatment
- Served 8,930 participants directly
- Distributed 10,585 naloxone kits
- Reversed 835 overdoses
- Conducted 851 HIV tests
- Conducted 492 hepatitis C tests
- Distributed 1,020,340 sterile syringes

Figure 17.3 Syringes Dispensed by MI SSP's by Quarter, 2019



Appendices

Appendix A1: Hepatitis Data by County

County	Total Population	2019 Chronic HCV Cases	2019 Acute HCV Cases	2019 Chronic HBV Cases	2019 Acute HBV Cases	2019 Chronic HCV Rate*	2019 Acute HCV Rate*	2019 Chronic HBV Rate*	2019 Acute HBV Rate*
Alcona	10,362	5	1	0	0	48.25	9.65	0.00	0.00
Alger	9,097	7	0	0	0	76.95	0.00	0.00	0.00
Allegan	117,327	34	1	1	0	28.98	0.85	0.85	0.00
Alpena	28,360	20	0	2	0	70.52	0.00	7.05	0.00
Antrim	23,365	17	2	0	0	72.76	8.56	0.00	0.00
Arenac	15,041	7	0	3	0	46.54	0.00	19.95	0.00
Baraga	8,320	11	0	0	0	132.21	0.00	0.00	0.00
Barry	61,157	22	0	1	0	35.97	0.00	1.64	0.00
Bay	103,923	63	4	3	1	60.62	3.85	2.89	0.96
Benzie	17,753	12	0	0	0	67.59	0.00	0.00	0.00
Berrien	154,141	67	4	6	0	43.47	2.60	3.89	0.00
Branch	43,622	23	0	0	0	52.73	0.00	0.00	0.00
Calhoun	134,487	87	1	10	0	64.69	0.74	7.44	0.00
Cass	51,653	29	1	5	0	56.14	1.94	9.68	0.00
Charlevoix	26,244	13	0	0	0	49.54	0.00	0.00	0.00
Cheboygan	25,413	17	2	1	1	66.89	7.87	3.93	3.93
Chippewa	37,517	29	1	2	0	77.30	2.67	5.33	0.00
Clare	30,757	13	0	0	1	42.27	0.00	0.00	3.25
Clinton	79,332	14	1	4	0	17.65	1.26	5.04	0.00
Crawford	13,901	5	2	0	1	35.97	14.39	0.00	7.19
Delta	35,857	25	0	3	0	69.72	0.00	8.37	0.00
Detroit City	673,103	986	2	167	5	146.49	0.30	24.81	0.74
Dickinson	25,383	9	1	0	0	35.46	3.94	0.00	0.00
Eaton	109,826	60	0	7	1	54.63	0.00	6.37	0.91
Emmet	33,308	11	1	2	0	33.03	3.00	6.00	0.00
Genesee	406,892	225	6	35	12	55.30	1.47	8.60	2.95
Gladwin	25,337	16	1	0	0	63.15	3.95	0.00	0.00
Gogebic	15,096	8	0	1	0	52.99	0.00	6.62	0.00
Grand Traverse	92,573	45	4	6	2	48.61	4.32	6.48	2.16
Gratiot	40,599	11	0	1	0	27.09	0.00	2.46	0.00
Hillsdale	45,749	27	0	2	2	59.02	0.00	4.37	4.37
Houghton	36,219	12	1	2	0	33.13	2.76	5.52	0.00
Huron	31,166	7	1	1	0	22.46	3.21	3.21	0.00
Ingham	292,735	166	6	50	1	56.71	2.05	17.08	0.34
Ionia	64,210	24	2	2	0	37.38	3.11	3.11	0.00
Iosco	25,081	14	1	3	0	55.82	3.99	11.96	0.00
Iron	11,117	11	0	0	0	98.95	0.00	0.00	0.00
Isabella	70,562	40	0	3	0	56.69	0.00	4.25	0.00
Jackson	158,823	89	7	6	1	56.04	4.41	3.78	0.63
Kalamazoo	264,870	117	2	28	2	44.17	0.76	10.57	0.76
Kalkaska	17,824	7	0	0	1	39.27	0.00	0.00	5.61
Kent	653,786	250	6	83	0	38.24	0.92	12.70	0.00
Keweenaw	2,113	1	0	0	0	47.33	0.00	0.00	0.00

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts

County	Total Population	2019 Chronic HCV Cases	2019 Acute HCV Cases	2019 Chronic HBV Cases	2019 Acute HBV Cases	2019 Chronic HCV Rate*	2019 Acute HCV Rate*	2019 Chronic HBV Rate*	2019 Acute HBV Rate*
Lake	11,881	5	0	0	0	42.08	0.00	0.00	0.00
Lapeer	88,028	48	0	4	0	54.53	0.00	4.54	0.00
Leelanau	21,764	9	0	1	0	41.35	0.00	4.59	0.00
Lenawee	98,266	45	1	2	0	45.79	1.02	2.04	0.00
Livingston	191,224	67	0	8	0	35.04	0.00	4.18	0.00
Luce	6,283	3	0	0	0	47.75	0.00	0.00	0.00
Mackinac	10,787	2	0	0	0	18.54	0.00	0.00	0.00
Macomb	874,759	493	22	93	3	56.36	2.51	10.63	0.34
Manistee	24,528	9	0	0	0	36.69	0.00	0.00	0.00
Marquette	66,516	39	2	1	0	58.63	3.01	1.50	0.00
Mason	29,100	21	0	0	0	72.16	0.00	0.00	0.00
Mecosta	43,545	12	0	0	0	27.56	0.00	0.00	0.00
Menominee	22,983	19	1	1	0	82.67	4.35	4.35	0.00
Midland	83,209	31	2	3	0	37.26	2.40	3.61	0.00
Missaukee	15,113	6	0	0	0	39.70	0.00	0.00	0.00
Monroe	150,439	129	1	12	0	85.75	0.66	7.98	0.00
Montcalm	63,968	39	0	4	0	60.97	0.00	6.25	0.00
Montmorency	9,265	5	0	0	0	53.97	0.00	0.00	0.00
Muskegon	173,588	103	10	8	3	59.34	5.76	4.61	1.73
Newaygo	48,892	24	0	0	0	49.09	0.00	0.00	0.00
Oakland	1,259,201	555	2	168	9	44.08	0.16	13.34	0.71
Oceana	26,625	7	0	0	0	26.29	0.00	0.00	0.00
Ogemaw	20,952	12	0	0	0	57.27	0.00	0.00	0.00
Ontonagon	5,795	3	0	0	0	51.77	0.00	0.00	0.00
Osceola	23,341	9	0	0	0	38.56	0.00	0.00	0.00
Oscoda	8,276	2	0	0	0	24.17	0.00	0.00	0.00
Otsego	24,665	14	1	2	0	56.76	4.05	8.11	0.00
Ottawa	290,494	63	1	19	1	21.69	0.34	6.54	0.34
Presque Isle	12,738	12	0	1	0	94.21	0.00	7.85	0.00
Roscommon	23,884	16	0	0	0	66.99	0.00	0.00	0.00
Saginaw	190,800	88	0	7	2	46.12	0.00	3.67	1.05
St Clair	159,337	119	6	13	3	74.68	3.77	8.16	1.88
St Joseph	61,043	35	0	1	1	57.34	0.00	1.64	1.64
Sanilac	41,182	19	1	4	0	46.14	2.43	9.71	0.00
Schoolcraft	8,068	2	0	0	0	24.79	0.00	0.00	0.00
Shiawassee	68,192	30	0	4	0	43.99	0.00	5.87	0.00
Tuscola	52,516	17	0	1	0	32.37	0.00	1.90	0.00
Van Buren	75,448	28	1	2	2	37.11	1.33	2.65	2.65
Washtenaw	370,963	102	7	45	3	27.50	1.89	12.13	0.81
Wayne	1,080,790	778	9	172	7	71.98	0.83	15.91	0.65
Wexford	33,466	31	0	0	0	92.63	0.00	0.00	0.00
MDOC	38,761	327	3	8	0	843.63	7.74	20.64	0.00
State-wide†	9,995,915	6,036	131	1,024	65	60.38	1.31	10.24	0.65

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts

Appendix A2: Heroin Data by County

County	Total Population	Young Adult (18-39) Population	2019 Young Adult (18-39) HCV Cases	2019 Heroin Treatment Admissions	2018 Heroin Overdose Deaths	2019 Young Adult (18-29) HCV Rate*	2019 Heroin Treatment Admission Rate*	2018 Heroin Overdose Death Rate*
Alcona	10,362	1,616	3	6	0	185.64	57.90	0.00
Alger	9,097	2,208	4	4	0	181.16	43.97	0.00
Allegan	117,327	30,319	12	45	0	39.58	38.35	0.00
Alpena	28,360	6,565	15	36	0	228.48	126.94	0.00
Antrim	23,365	4,726	12	39	0	253.91	166.92	0.00
Arenac	15,041	3,228	3	23	0	92.94	152.92	0.00
Baraga	8,320	2,170	8	7	1	368.66	84.13	12.02
Barry	61,157	15,314	12	43	1	78.36	70.31	1.64
Bay	103,923	26,765	41	439	1	153.19	422.43	0.96
Benzie	17,753	3,807	7	16	0	183.87	90.13	0.00
Berrien	154,141	39,666	30	363	9	75.63	235.50	5.84
Branch	43,622	11,204	13	54	2	116.03	123.79	4.58
Calhoun	134,487	36,837	38	488	12	103.16	362.86	8.92
Cass	51,653	12,253	9	47	0	73.45	90.99	0.00
Charlevoix	26,244	5,878	5	38	1	85.06	144.80	3.81
Cheboygan	25,413	5,306	8	36	0	150.77	141.66	0.00
Chippewa	37,517	11,845	24	7	0	202.62	18.66	0.00
Clare	30,757	6,838	6	104	0	87.74	338.13	0.00
Clinton	79,332	21,259	8	74	1	37.63	93.28	1.26
Crawford	13,901	2,871	5	17	1	174.16	122.29	7.19
Delta	35,857	7,919	16	20	0	202.05	55.78	0.00
Detroit City	673,103	209,892	147	3,705	131	70.04	550.44	19.46
Dickinson	25,383	5,907	5	43	0	84.65	169.40	0.00
Eaton	109,826	30,619	23	171	6	75.12	155.70	5.46
Emmet	33,308	8,159	7	34	0	85.79	102.08	0.00
Genesee	406,892	108,876	105	1,657	51	96.44	407.23	12.53
Gladwin	25,337	5,159	11	33	0	213.22	130.24	0.00
Gogebic	15,096	3,627	2	12	0	55.14	79.49	0.00
Grand Traverse	92,573	24,345	35	116	1	143.77	125.31	1.08
Gratiot	40,599	12,490	9	33	1	72.06	81.28	2.46
Hillsdale	45,749	11,553	17	44	2	147.15	96.18	4.37
Houghton	36,219	13,308	8	9	1	60.11	24.85	2.76
Huron	31,166	6,758	3	20	1	44.39	64.17	3.21
Ingham	292,735	115,308	67	1,128	22	58.11	385.33	7.52
Ionia	64,210	18,954	16	90	0	84.41	140.17	0.00
Iosco	25,081	4,975	9	47	0	180.90	187.39	0.00
Iron	11,117	2,018	10	6	0	495.54	53.97	0.00
Isabella	70,562	31,756	24	115	1	75.58	162.98	1.42
Jackson	158,823	43,354	40	376	1	92.26	236.74	0.63
Kalamazoo	264,870	93,346	56	491	8	59.99	185.37	3.02
Kalkaska	17,824	4,344	4	39	0	92.08	218.81	0.00
Kent	653,786	209,794	117	726	22	55.77	111.05	3.37
Keweenaw	2,113	329	1	0	0	303.95	0.00	0.00

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts

County	Total Population	Young Adult (18-39) Population	2019 Young Adult (18-39) HCV Cases	2019 Heroin Treatment Admissions	2018 Heroin Overdose Deaths	2019 Young Adult (18-29) HCV Rate*	2019 Heroin Treatment Admission Rate*	2018 Heroin Overdose Death Rate*
Lake	11,881	2,167	1	7	1	46.15	58.92	8.42
Lapeer	88,028	21,502	31	167	2	144.17	189.71	2.27
Leelanau	21,764	4,269	7	9	0	163.97	41.35	0.00
Lenawee	98,266	26,167	25	181	5	95.54	184.19	5.09
Livingston	191,224	47,352	24	128	8	50.68	66.94	4.18
Luce	6,283	1,741	1	0	0	57.44	0.00	0.00
Mackinac	10,787	2,204	0	1	0	0.00	9.27	0.00
Macomb	874,759	241,939	244	4,141	94	100.85	473.39	10.75
Manistee	24,528	5,545	3	32	0	54.10	130.46	0.00
Marquette	66,516	21,800	27	49	0	123.85	73.67	0.00
Mason	29,100	6,689	13	114	2	194.35	391.75	6.87
Mecosta	43,545	15,000	4	60	0	26.67	137.79	0.00
Menominee	22,983	4,980	11	12	0	220.88	52.21	0.00
Midland	83,209	22,314	21	204	1	94.11	245.17	1.20
Missaukee	15,113	3,636	2	12	0	55.01	79.40	0.00
Monroe	150,439	38,150	67	414	16	175.62	275.19	10.64
Montcalm	63,968	17,039	18	209	4	105.64	326.73	6.25
Montmorency	9,265	1,575	1	12	0	63.49	129.52	0.00
Muskegon	173,588	47,870	64	583	12	133.70	335.85	6.91
Newaygo	48,892	11,956	8	93	1	66.91	190.22	2.05
Oakland	1,259,201	349,933	198	2,106	26	56.58	167.25	2.06
Oceana	26,625	6,355	2	54	0	31.47	202.82	0.00
Ogemaw	20,952	4,388	3	19	1	68.37	90.68	4.77
Ontonagon	5,795	802	1	2	0	124.69	34.51	0.00
Osceola	23,341	5,531	5	14	0	90.40	59.98	0.00
Oscoda	8,276	1,590	2	9	0	125.79	108.75	0.00
Otsego	24,665	6,012	9	49	1	149.70	198.66	4.05
Ottawa	290,494	92,193	24	180	13	26.03	61.96	4.48
Presque Isle	12,738	2,273	5	2	0	219.97	15.70	0.00
Roscommon	23,884	4,112	9	30	1	218.87	125.61	4.19
Saginaw	190,800	52,400	42	503	5	80.15	263.63	2.62
St Clair	159,337	38,961	60	464	8	154.00	291.21	5.02
St Joseph	61,043	15,699	15	87	0	95.55	142.52	0.00
Sanilac	41,182	9,478	11	22	1	116.06	32.26	1.47
Schoolcraft	8,068	1,517	0	2	0	0.00	3.81	0.00
Shiawassee	68,192	17,543	21	147	2	119.71	194.84	2.65
Tuscola	52,516	12,723	6	49	0	47.16	13.21	0.00
Van Buren	75,448	18,776	9	89	2	47.93	8.23	0.19
Washtenaw	370,963	145,750	61	665	23	41.85	179.26	6.20
Wayne	1,080,790	296,589	245	3,750	130	82.61	346.97	12.03
Wexford	33,466	8,295	15	58	1	180.83	173.31	2.99
MDOC	38,761	12,282	254	-	-	2,068.07	-	-
State-wide†	9,995,915	2,858,280	2,565	25,538	639	89.74	255.48	6.39

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts

Appendix B1: Hepatitis Data by Local Health Jurisdiction

Local Health Jurisdiction	Total Population	2019 Chronic HCV Cases	2019 Acute HCV Cases	2019 Chronic HBV Cases	2019 Acute HBV Cases	2019 Chronic HCV Rate*	2019 Acute HCV Rate*	2019 Chronic HBV Rate*	2019 Acute HBV Rate*
Allegan	117,327	34	1	1	0	28.98	0.85	0.85	0.00
Barry-Eaton	170,983	82	0	8	1	47.96	0.00	4.68	0.58
Bay	103,923	63	4	3	1	60.62	3.85	2.89	0.96
Benzie-Leelanau	39,517	21	0	1	0	53.14	0.00	2.53	0.00
Berrien	154,141	67	4	6	0	43.47	2.60	3.89	0.00
Branch-Hillsdale-St. Joseph	150,414	85	0	3	3	56.51	0.00	1.99	1.99
Calhoun	134,487	87	1	10	0	64.69	0.74	7.44	0.00
Central Michigan	188,922	101	1	6	1	53.46	0.53	3.18	0.53
Chippewa	37,517	29	1	2	0	77.30	2.67	5.33	0.00
Delta-Menominee	58,840	44	1	4	0	74.78	1.70	6.80	0.00
Detroit City	673,103	986	2	167	5	146.49	0.30	24.81	0.74
Dickinson-Iron	36,500	20	1	0	0	54.79	2.74	0.00	0.00
District Health Department #10	264,875	127	2	0	2	47.95	0.76	0.00	0.76
District Health Department #2	64,671	33	2	3	0	51.03	3.09	4.64	0.00
District Health Department #4	75,776	54	2	4	1	71.26	2.64	5.28	1.32
Genesee	406,892	225	6	35	12	55.30	1.47	8.60	2.95
Grand Traverse	92,573	45	4	6	2	48.61	4.32	6.48	2.16
Huron	31,166	7	1	1	0	22.46	3.21	3.21	0.00
Ingham	292,735	166	6	50	1	56.71	2.05	17.08	0.34
Ionia	64,210	24	2	2	0	37.38	3.11	3.11	0.00
Jackson	158,823	89	7	6	1	56.04	4.41	3.78	0.63
Kalamazoo	264,870	117	2	28	2	44.17	0.76	10.57	0.76
Kent	653,786	250	6	83	0	38.24	0.92	12.70	0.00
Lapeer	88,028	48	0	4	0	54.53	0.00	4.54	0.00
Lenawee	98,266	45	1	2	0	45.79	1.02	2.04	0.00
Livingston	191,224	67	0	8	0	35.04	0.00	4.18	0.00
Luce-Mackinac-Alger-Schoolcraft	34,235	14	0	0	0	40.89	0.00	0.00	0.00
Macomb	874,759	493	22	93	3	56.36	2.51	10.63	0.34
Marquette	66,516	39	2	1	0	58.63	3.01	1.50	0.00
Midland	83,209	31	2	3	0	37.26	2.40	3.61	0.00
Mid-Michigan	183,899	64	1	9	0	34.80	0.54	4.89	0.00
Monroe	150,439	129	1	12	0	85.75	0.66	7.98	0.00
Muskegon	173,588	103	10	8	3	59.34	5.76	4.61	1.73
Northwest Michigan	107,582	55	4	4	0	51.12	3.72	3.72	0.00
Oakland	1,259,201	555	2	168	9	44.08	0.16	13.34	0.71
Ottawa	290,494	63	1	19	1	21.69	0.34	6.54	0.34
Saginaw	190,800	88	0	7	2	46.12	0.00	3.67	1.05
Sanilac	41,182	19	1	4	0	46.14	2.43	9.71	0.00
Shiawassee	68,192	30	0	4	0	43.99	0.00	5.87	0.00
St Clair	159,337	119	6	13	3	74.68	3.77	8.16	1.88
Tuscola	52,516	17	0	1	0	32.37	0.00	1.90	0.00
Van Buren-Cass	127,101	57	2	7	2	44.85	1.57	5.51	1.57
Washtenaw	370,963	102	7	45	3	27.50	1.89	12.13	0.81
Wayne	1,080,790	778	9	172	7	71.98	0.83	15.91	0.65
Western Upper Peninsula	67,543	35	1	3	0	51.82	1.48	4.44	0.00
MDOC	38,761	327	3	8	0	843.63	7.74	20.64	0.00
Statewide†	9,995,915	6,036	131	1,024	65	60.38	1.31	10.24	0.65

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts

Appendix B2: Heroin Data by Local Health Jurisdiction

Local Health Jurisdiction	Total Population	Young Adult (18-39) Population	2019 Young Adult (18-39) HCV Cases	2019 Heroin Treatment Admissions	2018 Heroin Overdose Deaths	2019 Young Adult (18-29) HCV Rate*	2019 Heroin Treatment Admission Rate*	2018 Heroin Overdose Death Rate*
Allegan	117,327	30,319	12	45	0	39.58	38.35	0.00
Barry-Eaton	170,983	45,933	35	214	7	76.20	125.16	4.09
Bay	103,923	26,765	41	439	1	153.19	422.43	0.96
Benzie-Leelanau	39,517	8,076	14	25	0	173.35	63.26	0.00
Berrien	154,141	39,666	30	363	9	75.63	235.50	5.84
Branch-Hillsdale-St. Joseph	150,414	38,456	45	185	4	117.02	122.99	2.66
Calhoun	134,487	36,837	38	488	12	103.16	362.86	8.92
Central Michigan	188,922	56,624	58	319	2	102.43	168.85	1.06
Chippewa	37,517	11,845	24	7	0	202.62	18.66	0.00
Delta-Menominee	58,840	12,899	27	32	0	209.32	54.38	0.00
Detroit City	673,103	209,892	147	3,705	131	70.04	550.44	19.46
Dickinson-Iron	36,500	7,925	15	49	0	189.27	134.25	0.00
District Health Department #10	264,875	66,858	57	486	6	85.26	183.48	2.27
District Health Department #2	64,671	12,569	17	81	1	135.25	125.25	1.55
District Health Department #4	75,776	15,719	29	86	0	184.49	113.49	0.00
Genesee	406,892	108,876	105	1,657	51	96.44	407.23	12.53
Grand Traverse	92,573	24,345	35	116	1	143.77	125.31	1.08
Huron	31,166	6,758	3	20	1	44.39	64.17	3.21
Ingham	292,735	115,308	67	1,128	22	58.11	385.33	7.52
Ionia	64,210	18,954	16	90	0	84.41	140.17	0.00
Jackson	158,823	43,354	40	376	1	92.26	236.74	0.63
Kalamazoo	264,870	93,346	56	491	8	59.99	185.37	3.02
Kent	653,786	209,794	117	726	22	55.77	111.05	3.37
Lapeer	88,028	21,502	31	167	2	144.17	189.71	2.27
Lenawee	98,266	26,167	25	181	5	95.54	184.19	5.09
Livingston	191,224	47,352	24	128	8	50.68	66.94	4.18
Luce-Mackinac-Alger-Schoolcraft	34,235	7,670	5	7	0	65.19	20.45	0.00
Macomb	874,759	241,939	244	4,141	94	100.85	473.39	10.75
Marquette	66,516	21,800	27	49	0	123.85	73.67	0.00
Midland	83,209	22,314	21	204	1	94.11	245.17	1.20
Mid-Michigan	183,899	50,788	35	316	6	68.91	171.83	3.26
Monroe	150,439	38,150	67	414	16	175.62	275.19	10.64
Muskegon	173,588	47,870	64	583	12	133.70	335.85	6.91
Northwest Michigan	107,582	24,775	33	160	2	133.20	148.72	1.86
Oakland	1,259,201	349,933	198	2,106	26	56.58	167.25	2.06
Ottawa	290,494	92,193	24	180	13	26.03	61.96	4.48
Saginaw	190,800	52,400	42	503	5	80.15	263.63	2.62
Sanilac	41,182	9,478	11	22	1	116.06	53.42	2.43
Shiawassee	68,192	17,543	21	147	2	119.71	215.57	2.93
St Clair	159,337	38,961	60	464	8	154.00	291.21	5.02
Tuscola	52,516	12,723	6	49	0	47.16	93.30	0.00
Van Buren-Cass	127,101	31,029	18	136	2	58.01	107.00	1.57
Washtenaw	370,963	145,750	61	665	23	41.85	179.26	6.20
Wayne	1,080,790	296,589	245	3,750	130	82.61	346.97	12.03
Western Upper Peninsula	67,543	20,236	20	30	2	98.83	44.42	2.96
MDOC	38,761	12,282	254	-	-	2,068.07	-	-
Statewide†	9,995,915	2,858,280	2,565	25,538	639	89.74	255.48	6.39

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts

Appendix C1: Hepatitis Data by Region

Region	Total Population	2019 Chronic HCV Cases	2019 Acute HCV Cases	2019 Chronic HBV Cases	2019 Acute HBV Cases	2019 Chronic HCV Rate*	2019 Acute HCV Rate*	2019 Chronic HBV Rate*	2019 Acute HBV Rate*
1	1,084,746	509	15	84	5	46.92	1.38	7.74	0.46
3	1,102,765	554	17	64	15	50.24	1.54	5.80	1.36
5	963,748	442	10	54	5	45.86	1.04	5.60	0.52
6	1,530,749	610	19	119	5	39.85	1.24	7.77	0.33
7	444,164	249	12	15	5	56.06	2.70	3.38	1.13
8	301,151	181	6	10	0	60.10	1.99	3.32	0.00
2N	2,293,297	1,167	30	274	15	50.89	1.31	11.95	0.65
2S	2,275,295	1,995	19	396	15	87.68	0.84	17.40	0.66
MDOC	38,761	327	3	8	0	843.63	7.74	20.64	0.00
Statewide†	9,995,915	6,036	131	1,024	65	60.38	1.31	10.24	0.65

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts

Appendix C2: Heroin Data by Region

Region	Total Population	Young Adult (18-39) Population	2019 Young Adult (18-39) HCV Cases	2019 Heroin Treatment Admissions	2018 Heroin Overdose Deaths	2019 Young Adult (18-29) HCV Rate*	2019 Heroin Treatment Admission Rate*	2018 Heroin Overdose Death Rate*
1	1,084,746	325,645	234	2,282	48	71.86	210.37	4.42
3	1,102,765	281,772	291	3,198	63	103.27	290.00	5.71
5	963,748	273,414	194	1,707	34	70.95	177.12	3.53
6	1,530,749	472,142	302	2,349	56	63.96	153.45	3.66
7	444,164	101,718	149	575	6	146.48	129.46	1.35
8	301,151	82,375	118	174	2	143.25	57.78	0.66
2N	2,293,297	630,833	502	6,711	128	79.58	292.64	5.58
2S	2,275,295	690,381	520	8,534	300	75.32	375.07	13.19
MDOC	38,761	12,282	254	-	-	2,068.07	-	-
Statewide†	9,995,915	2,858,280	2,565	25,538	639	89.74	255.48	6.39

*Rates are calculated per 100,000 persons in the population

†Due to cases without a defined jurisdiction, state-wide totals may include cases that were not included in jurisdiction counts