

# Hepatitis B and C Surveillance Report 2012

*Michigan Department  
of Community Health*



**Viral Hepatitis Surveillance and Prevention Unit**

November 1, 2013

# Table of Contents

Introduction.....	4
Background.....	4
Hepatitis B.....	4
Hepatitis C.....	5
Technical Notes.....	5
Michigan Communicable Disease Reporting Requirements.....	5
Michigan Disease Surveillance System.....	6
Determination of Rates.....	6
National Benchmarks.....	6
Data Limitations.....	6
Summary.....	8
Table 1.1 Summary of Demographic Information by Type of Hepatitis, Michigan, 2012.....	10
Acute Hepatitis B Data Summary.....	11
Table 1.2: Incidence of Acute Hepatitis B, Michigan and U.S., 2004-2012.....	11
Figure 1.1: Incidence of Acute Hepatitis B, Michigan and U.S., 2004-2012.....	11
Table 1.3: Incidence of Acute Hepatitis B by Gender, Michigan, 2004-2012.....	12
Figure 1.2: Incidence of Acute Hepatitis B by Gender, Michigan, 2004-2012.....	12
Table 1.4: Incidence of Acute Hepatitis B by Race and Ethnicity, Michigan, 2004-2012.....	13
Figure 1.3: Incidence of Acute Hepatitis B by Race and Ethnicity, Michigan, 2004-2012.....	13
Table 1.5a: Completeness of Acute Hepatitis B Reports by Risk Behavior, Michigan, 2012.....	14
Table 1.5b: Response of Completed Acute Hepatitis B Reports by Risk Behavior, Michigan, 2012.....	14
Chronic Hepatitis B Data Summary.....	15
Figure 2.1: Chronic Hepatitis B Cases per 100,000 Population, Michigan, 2004-2012.....	15
Table 2.1: Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2012.....	16
Figure 2.2: Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2012.....	16
Table 2.2: Chronic Hepatitis B Cases per 100,000 Population by Race and Ethnicity, Michigan, 2004-2012.....	17
Figure 2.3: Chronic Hepatitis B Cases per 100,000 Population by Race and Ethnicity, Michigan, 2004-2012.....	17
Acute Hepatitis C Data Summary.....	18
Table 3.1: Incidence of Acute Hepatitis C, Michigan and U.S., 2004-2012.....	18
Figure 3.1: Incidence of Acute Hepatitis C, Michigan and U.S., 2004-2012.....	18
Table 3.2: Incidence of Acute Hepatitis C by Gender, Michigan, 2004-2012.....	19
Figure 3.2: Incidence of Acute Hepatitis C by Gender, Michigan, 2004-2012.....	19
Table 3.3: Incidence of Acute Hepatitis C by Race and Ethnicity, Michigan, 2004-2012.....	20
Figure 3.3: Incidence of Acute Hepatitis C by Race and Ethnicity, Michigan, 2004-2012.....	20
Table 3.4a: Completeness of Acute Hepatitis C Reports by Risk Behavior, Michigan, 2012.....	21
Table 3.4b: Response of Completed Acute Hepatitis C Reports by Risk Behavior, Michigan, 2012.....	21
Chronic Hepatitis C Data Summary.....	22
Figure 4.1: Chronic Hepatitis B Cases per 100,000 Population, Michigan, 2004-2012.....	22
Table 4.1: Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2012.....	23
Figure 4.2: Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2012.....	23
Table 4.2: Chronic Hepatitis B Cases per 100,000 Population by Race and Ethnicity, Michigan, 2004-2012.....	24
Figure 4.3: Chronic Hepatitis C Cases per 100,000 Population by Race and Ethnicity, Michigan, 2004-2012.....	24
Table 4.3a: Completeness of Chronic Hepatitis C Reports by Risk Behavior, Michigan, 2012.....	25
Table 4.3b: Response of Completed Acute Hepatitis C Reports by Risk Behavior, Michigan, 2012.....	25
Figure 4.4: Number of Chronic Hepatitis C Cases Reported to MDCH by Year of Birth, 2004-2012.....	26
Table 4.4: Chronic Hepatitis C Cases Between 18 and 25 Years of Age, Michigan, 2012.....	27

# Table of Contents

Figure 4.5: Chronic Hepatitis C Cases Between 18 and 25 Years of Age, Michigan, 2012.....	27
Young Adults with Hepatitis C Enhanced Surveillance Study.....	28
Racial Disparities.....	29
Table 5.1: Racial Distribution of Total Population and Hepatitis Population, Michigan, 2004-2012.....	29
Figure 5.1: Racial Distribution of Total Population and Hepatitis Population, Michigan, 2004-2012.....	29
Figure 5.2a: Age at Chronic Hepatitis C Diagnosis by Race, Michigan, 2012.....	30
Figure 5.2b: Age at Chronic Hepatitis C Diagnosis by Race, Michigan, 2012.....	30
Viral Hepatitis and HIV Co-Infection.....	31
Table 6.1: Hepatitis B/Hepatitis C and HIV Co-Infection Data, Michigan, 2004-2012.....	31
Appendix A: Definitions and Forms.....	33
Appendix B: Table 7.1: Reported Cases of Hepatitis by County.....	34
Appendix C: Geographical Distribution of Hepatitis B and C in Michigan.....	36
Figure 7.1: Acute and Chronic Hepatitis B and C Rates by County.....	36
Figure 7.2: Acute and Chronic Hepatitis B and C Rates by Local Health Department.....	37
Figure 7.3: Acute and Chronic Hepatitis B and C Rates by Region.....	38

# Viral Hepatitis Surveillance

## **INTRODUCTION**

The Michigan Department of Community Health (MDCH) 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 MDCH 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 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. While acute hepatitis A, acute hepatitis B, acute hepatitis C, chronic hepatitis B, chronic (past or present) hepatitis C, perinatal hepatitis B, hepatitis D and hepatitis E are all reported in MDSS, this report will highlight acute and chronic hepatitis B and C surveillance. MDCH 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. Special populations, such as cases younger than 30 years old or with certain risk factors, may be targeted for surveillance by using MDSS queries which enable surveillance staff to download lists of cases of interest from MDSS for follow-up.

## **BACKGROUND**

"Hepatitis" means inflammation of the liver and also refers to a group of viruses that infect the liver. The most common types of viral hepatitis are hepatitis A, hepatitis B, and hepatitis C. 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. Hepatitis A is transmitted from person to person via ingestion of contaminated food and water while hepatitis B and C are both bloodborne infections. Many persons infected with hepatitis B or hepatitis C are unaware they are infected. Both hepatitis B and hepatitis C viruses 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. An estimated 4.4 million Americans are living with chronic hepatitis; most do not know they are infected.

### **Hepatitis B**

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, 800,000-1.4 million persons are estimated to be infected with the virus, most of whom are unaware of their infection status. Worldwide, more than 240 million people have chronic hepatitis B infection and about 600,000 people die every year due to the acute or chronic consequences of hepatitis B.

# Viral Hepatitis Surveillance

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

Hepatitis C Virus (HCV) is transmitted primarily through exposure to infected blood, which can result from sharing infected injection-drug use equipment, needle-stick 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 health-care 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 incubation period for hepatitis C 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 (past or present) HCV infection. Diagnosis of chronic infection is made on the basis of anti-HCV positive results upon repeat testing and the presence of hepatitis C virus 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 estimated 3.2 million chronically infected persons nationwide, HCV infection is the most common blood-borne infection in the United States. Worldwide, about 150 million people are chronically infected with hepatitis C virus, and more than 350,000 people die every year from hepatitis C-related liver diseases.

Since no vaccine is available for preventing hepatitis C infection, other prevention activities, such as not sharing infected injection drug equipment and consistently implementing and practicing infection control in health-care 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. Treatment success rates are now being improved with the addition of polymerase and protease inhibitors to standard pegylated interferon/ribavirin combination therapy.

## **TECHNICAL NOTES**

### **Michigan Communicable Disease Reporting Requirements**

Michigan's communicable disease rules are promulgated under the authority conferred on the Department of Community Health by Section 5111 of Act No. 368 of the Public Health Acts 1978, as amended, being 333.5111 of the Michigan Compiled Laws. MDCH 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 MDCH. MDCH provides administration of MDSS, expert consultation and other support as needed to LHDs. Physicians and laboratories report diseases to local health departments, who have authority to investigate and follow-up on the case in accordance with their own priorities and available resources.

# Viral Hepatitis Surveillance

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

## 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, MDCH and federal public health agencies. MDSS provides for the secure transfer, maintenance and analysis of communicable disease surveillance information. Cases can be entered into MDSS either electronically or manually. 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 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. MDCH submits weekly de-identified individual case reports to CDC via NETSS, a computerized public health surveillance information system.

The data in this report includes all cases which meet the standardized confirmed, completed case definitions referenced in Appendix A. Data includes cases with referral dates between January 1, 2012 and December 31, 2012 in MDSS. A frozen data set containing all 2012 cases was created on 04/17/2013.

## Determination of Rates

2000 and 2010 Census data were used to calculate all of the rates throughout the annual report. 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, 2011 and 2012. All rates were calculated per 100,000 of the Michigan population. Michigan Census data used in the annual report can be found at:

<http://www.michigan.gov/cgi/0,4548,7-158-54534-252541--,00.html>

## National Benchmarks

Reference 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 cases, which meet CDC/CSTE case definitions, reported to the Michigan Disease Surveillance System in the year 2012. In general, this is not necessarily reflective of the true number of new infections that occurred in 2012 nor the total number of individuals infected with viral hepatitis currently living in

# Viral Hepatitis Surveillance

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 2012. 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.

Like many reportable diseases, cases of viral hepatitis are largely under-reported. CDC estimates suggest that only about 8-10% of acute hepatitis B and 15-17% of acute hepatitis C 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 approximately 75% of individuals infected with HCV do not know they are infected. CDC data approximates that, nationwide, 1.25 million individuals (about 0.3% of the US population) and 3.2 million (about 1% of the US population) are infected with hepatitis B and C respectively. Extrapolating that to the Michigan population, we would then expect approximately 30,000 Michiganders to be infected and living with HBV and 99,000 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 cases in our disease surveillance system and are not removed from our numbers. 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 and are counted in the county where their correctional facility is located. Therefore, counties that have correctional facilities within their boundaries may have a higher number of HCV cases than would be expected (e.g. Jackson County).

# Summary

This report presents hepatitis B and C data collected from case reports submitted to MDSS for calendar year 2012. Performing surveillance for viral hepatitis infections is important for identifying trends in rates of infection, characterizing at 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.

## Acute Hepatitis B

- There were 81 cases of acute hepatitis B infection reported in Michigan in 2012 for a rate of 0.82 cases per 100,000 people. The rate of acute hepatitis B infection has decreased in Michigan every year since 2008, likely a sign of successful vaccination programs.
- Case follow-up and completion of epidemiological risk factors was completed for 75% of acute hepatitis B cases in 2012.
  - There was no risk factor that was commonly shared between 2012 acute hepatitis B cases.

## Chronic Hepatitis B

- There were 1,416 cases of chronic hepatitis B reported in Michigan in 2012 for a rate of 14.3 cases per 100,000 people. Though this was an increase in the rate from 2011, overall new chronic hepatitis B diagnoses have been declining in Michigan over the last few years.
- Asian-Americans are disproportionately affected by chronic hepatitis B with an infection rate of 129.4 per 100,000, much higher than the state average.

## Acute Hepatitis C

- There were 75 cases of acute hepatitis C reported in Michigan in 2012 for a rate of .076 cases per 100,000 people. This is more than double the 2011 infection rate, though this is largely due to recent changes in the CDC/CSTE acute hepatitis C case definition which went into effect on January 1<sup>st</sup>, 2012.
- The average age of acute hepatitis C cases, 35 years old, was much younger than the other hepatitis case classifications.
- Case follow-up and completion of epidemiological risk factors was completed for about 80% of acute hepatitis C cases in 2012.
  - Injection drug use was a factor shared by 53% of the acute hepatitis C cases where data was available.

## Chronic Hepatitis C

- There were 8,005 cases of chronic hepatitis C reported in Michigan in 2012 for a rate of 81.0 cases per 100,000 people. Over the last 5 years the rate of chronic hepatitis C infection has remained fairly stable.
- The rate of chronic hepatitis C is almost twice as high in Michigan males (106.6 per 100,000) versus females (55.4 per 100,000).
- American Indians and Alaskan Natives (108.1 per 100,000) and African Americans (106.1 per 100,000) have a higher rate of chronic hepatitis C infection than the overall Michigan population.
- Case follow-up and completion of epidemiological risk factors was completed for about 30% of chronic hepatitis C cases in 2012.
  - Injection drug use was a factor shared by 31% of cases where data was available. Incarceration was a risk factor in 27% of cases.
- Persons born between 1945 and 1965 make up the majority of chronic hepatitis C cases reported to the MDSS.
- Though the number of new chronic hepatitis C reports has remained relatively stable we have measured large increases in the proportion of new cases in persons 18 to 25 years old.
  - There has been a year-over-year increase in the number of chronic hepatitis C diagnoses in young adults dating back to 2007.

- Since 2004 there has been a 375% increase in the number of chronic hepatitis C cases aged 18 to 25 reported to MDSS.
- On average, African Americans are diagnosed with chronic hepatitis C later in life than Whites (56.2 vs. 44.3 years old at diagnosis).
  - Because early diagnosis and treatment is important for patient outcomes, further investigation needs to be done to determine if Whites are actually infected earlier than African Americans or if the discrepancy in age at diagnosis is due to Whites having better access to care.

## **Hepatitis B and C Co-infection with Human Immunodeficiency Virus (HIV)**

- As of 2012 there are 879 persons in Michigan with Hepatitis B/HIV co-infection.
  - 87% of these persons are male.
  - The primary modes of HIV transmission in the HIV/HBV co-infection group were men who have sex with men (MSM) at 57%, intravenous drug use (IDU) at 10% and MSM and IDU at 4%.
  - In 93% of persons with HBV/HIV co-infection, the HBV infection was detected at least one year after the HIV diagnosis.
- As of 2012 there are 1,046 persons in Michigan with Hepatitis C/HIV co-infection.
  - 71% of these persons are male.
  - The primary modes of HIV transmission in the HIV/HCV co-infection group were MSM at 16%, intravenous drug use (IDU) at 43% and MSM and IDU at 13%.
  - In 93% of persons with HCV/HIV co-infection, the HCV infection was detected at least one year after the HIV diagnosis.
- MSM was the primary mode of HIV transmission in the HIV/HBV co-infection group, while IDU was the primary mode of HIV transmission in the HIV/HCV co-infection group.

# Viral Hepatitis Demographic Data

**Table 1.1. Summary of Demographic Information by Type of Hepatitis, Michigan, 2012**

Variable	Acute Hepatitis B	% Acute Hepatitis B	Chronic Hepatitis B	% Chronic Hepatitis B	Acute Hepatitis C	% Acute Hepatitis C	Chronic Hepatitis C	% Chronic Hepatitis C
<b>n</b>	81	100%	1416	100%	75	100%	8005	100%
<b>Sex</b>								
Male	49	60.5%	713	50.4%	36	48.0%	5170	64.6%
Female	32	39.5%	701	49.5%	39	52.0%	2791	34.9%
Unknown	0	0.0%	2	0.1%	0	0.0%	44	0.5%
<b>Race or Ethnicity</b>								
Caucasian	39	48.1%	369	26.1%	58	77.3%	3379	42.2%
Black or African American	22	27.2%	317	22.4%	7	9.3%	1496	18.7%
Hispanic	3	3.7%	8	0.6%	3	4.0%	103	1.3%
Asian	6	7.4%	306	21.6%	0	0.0%	35	0.4%
American Indian or Alaskan Native	1	1.2%	1	0.1%	2	2.7%	58	0.7%
Other	1	1.2%	76	5.4%	1	1.3%	86	1.1%
Unknown	9	11.1%	339	23.9%	4	5.3%	2848	35.6%
<b>Age</b>								
Mean	46		44		35		48	
Median	44		43		32		52	
Range	(13-78)		(0-92)		(1-64)		(0-111)	
0-19	1	1.2%	60	4.2%	7	9.3%	156	1.9%
20-29	8	9.9%	219	15.5%	25	33.3%	1155	14.4%
30-39	14	17.3%	323	22.8%	17	22.7%	920	11.5%
40-49	29	35.8%	290	20.5%	13	17.3%	1164	14.5%
50-59	19	23.5%	274	19.4%	8	10.7%	2871	35.9%
60+	10	12.3%	250	17.7%	5	6.7%	1714	21.4%
Unknown	0	0.0%	0	0.0%	0	0.0%	25	0.3%

The summary table above was created to illustrate the differences in the demographic make-up between the various viral hepatitis classifications. For instance, males are more likely to have an acute hepatitis B or chronic hepatitis C diagnosis, while chronic hepatitis B and acute hepatitis C cases are even in respect to sex. There are some noticeable racial differences among reported hepatitis cases. Asians have a higher proportion of acute and chronic hepatitis B cases than acute or chronic hepatitis C. Caucasians have a large majority of the acute hepatitis C cases, accounting for over 75% of cases reported. While they make up a minority of all cases, it should be noted that American/Indians and Alaskan Natives are far 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 further in the report.

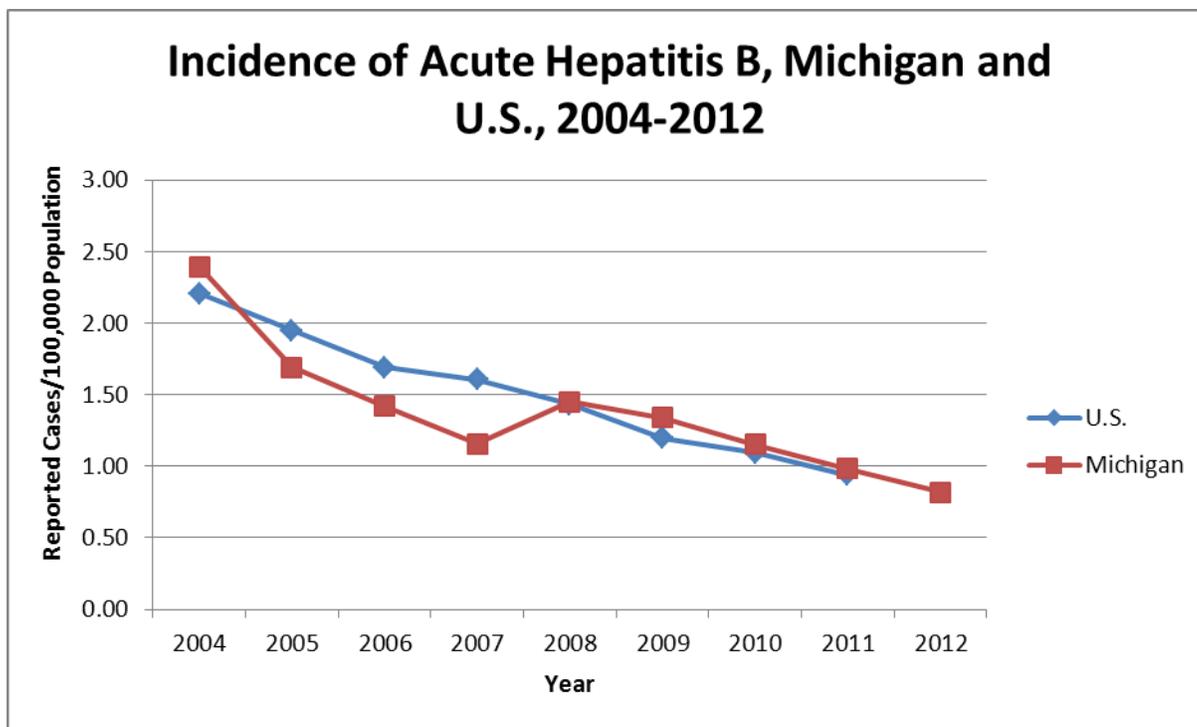
# Acute Hepatitis B

**Table 1.2 Incidence\* of Acute Hepatitis B, Michigan and U.S., 2004-2012**

	2004	2005	2006	2007	2008	2009	2010	2011	2012
U.S.	2.21	1.95	1.69	1.61	1.43	1.20	1.09	0.94	N/A
Michigan	2.39	1.69	1.42	1.16	1.45	1.34	1.15	0.98	0.82

\*Incidence per 100,000 Population

**Figure 1.1. Incidence of Acute Hepatitis B, Michigan and U.S., 2004-2012**



The incidence of acute hepatitis B has decreased in Michigan and in the United States from 2004 through 2012. The incidence of acute cases of hepatitis B decreased by 34% overall from 2004 to 2012 in Michigan. Appendix C contains an incidence map of acute hepatitis B by county in 2012.

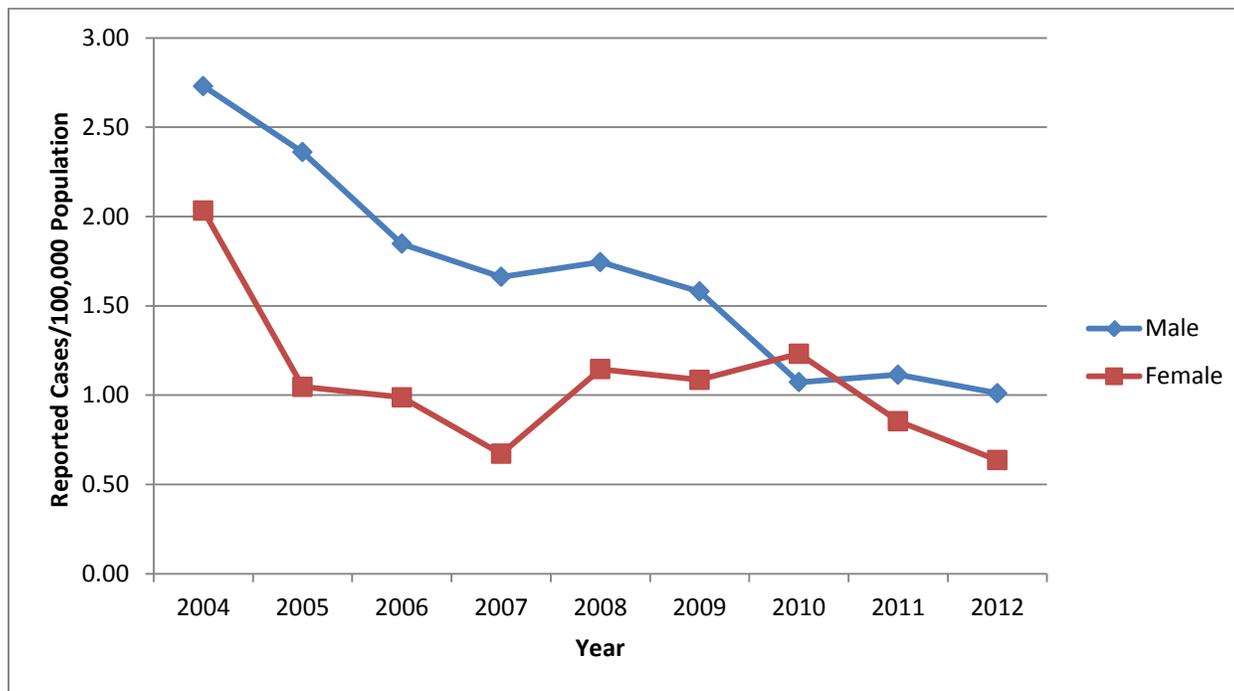
# Acute Hepatitis B

**Table 1.3. Incidence\* of Acute Hepatitis B by Gender, Michigan, 2004-2012**

	Male	Female
2004	2.73	2.03
2005	2.36	1.05
2006	1.85	0.99
2007	1.66	0.67
2008	1.74	1.15
2009	1.58	1.09
2010	1.07	1.23
2011	1.11	0.85
2012	1.01	0.64

\*Incidence per 100,000 Population

**Figure 1.2. Incidence of Acute Hepatitis B by Gender, Michigan, 2004-2012**



The incidence of acute hepatitis B has decreased for sexes from 2004 to 2012. While the overall incidence of acute hepatitis B in females decreased between 2004 and 2012, there was a period of time between 2007 and 2010 where incidence increased, before decreasing again in 2011. Incidence of acute hepatitis B was higher in males than in females between the years of 2004 and 2012, except during 2010, when incidence in females exceeded incidence in males. In 2012, the rate for males was approximately 1.6 times higher than that for females (1.01 cases and 0.64 cases per 100,000 population, respectively). Again, this is not necessarily a surprising observation, as males have a higher incidence of acute HBV infection than females according to CDC national viral hepatitis statistics.

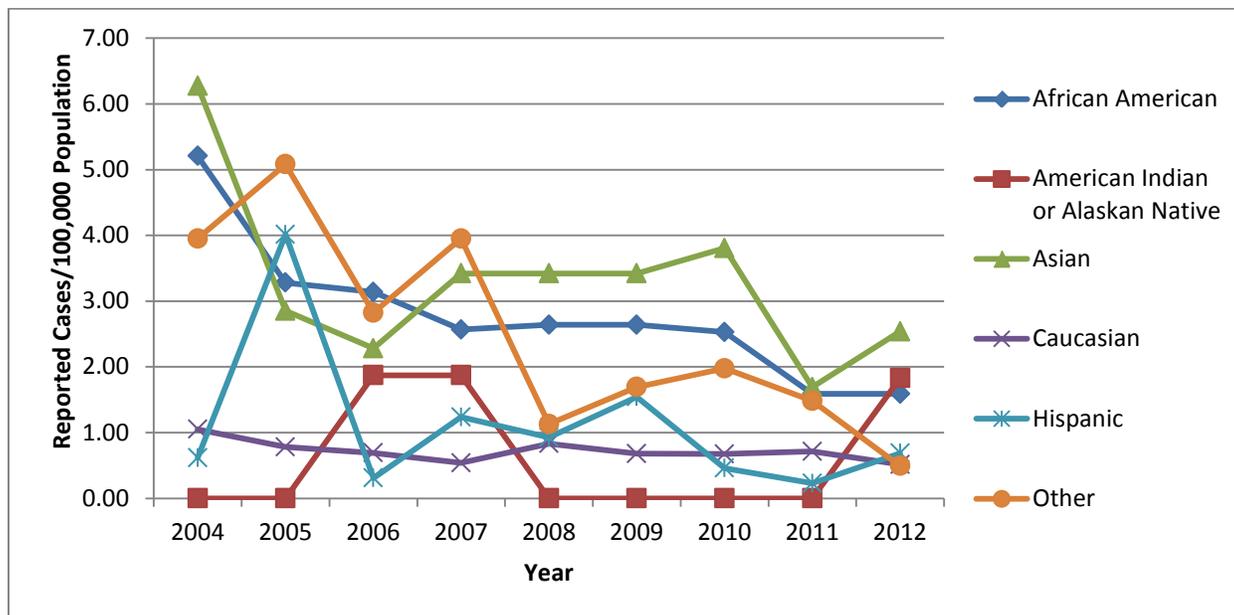
# Acute Hepatitis B

**Table 1.4. Incidence\* of Acute Hepatitis B by Race and Ethnicity, Michigan, 2004-2012**

Year	African American Incidence	African American Cases	American Indian or Alaskan Native Incidence	American Indian or Alaskan Native Cases	Asian Incidence	Asian Cases	Caucasian Incidence	Caucasian Cases	Hispanic Incidence	Hispanic Cases	Other Incidence	Other Cases
2004	5.21	73	0.00	0	6.27	11	1.05	82	0.62	2	3.95	7
2005	3.28	46	0.00	0	2.85	5	0.78	61	4.01	13	5.08	9
2006	3.14	44	1.87	1	2.28	4	0.69	54	0.31	1	2.82	5
2007	2.57	36	1.87	1	3.42	6	0.54	42	1.24	4	3.95	7
2008	2.64	37	0.00	0	3.42	6	0.83	65	0.93	3	1.13	2
2009	2.64	37	0.00	0	3.42	6	0.68	53	1.54	5	1.69	3
2010	2.53	35	0.00	0	3.81	9	0.67	51	0.46	2	1.98	4
2011	1.59	22	0.00	0	1.69	4	0.71	54	0.23	1	1.48	3
2012	1.59	22	1.83	1	2.54	6	0.52	39	0.69	3	0.49	1

\*Incidence per 100,000 Population

**Figure 1.3. Incidence of Acute Hepatitis B by Race and Ethnicity, Michigan, 2004-2012**



Asians and African Americans have the greatest incidence of acute hepatitis B in Michigan. Asians have the highest rate of hepatitis B in the US, so it is not surprising to see this trend in Michigan as well. Asian-Americans are the prime target of CDC's **KNOW HEPATITIS B** campaign. Incidence of acute hepatitis B has decreased in all racial and ethnic groups between 2004 and 2012. In 2012 the rate of acute hepatitis B was lowest for Caucasians and Hispanics.

# Acute Hepatitis B

**Table 1.5a. Completeness of Acute Hepatitis B Reports by Risk Behavior, Michigan, 2012 (n=81)**

Risk Behavior	Completed
Injection Drug User	61/81 (75%)
Used Street Drugs	51/81 (63%)
Hemodialysis	59/81 (73%)
Received Blood Products	61/81 (75%)
Received a Tattoo	59/81 (73%)
Accidental Needle Stick	53/81 (65%)
Contact of Person with Hepatitis B	62/81 (77%)
Other Surgery	42/81 (52%)
Oral Surgery or Dental Work	60/81 (74%)
Employed in Medical Field	60/81 (74%)
Employed as Public Safety Officer	60/81 (74%)
Incarceration Longer than 6 Months	61/81 (75%)
Men who have Sex with Men¶	39/49 (80%)
Any Part of Body Pierced (other than ear)	57/81 (70%)

Table 1.5a shows the percentage of acute hepatitis B case report form epidemiologic information questions that are completed by risk behavior. A risk behavior was considered completed if the question was marked as 'Yes', 'No', or 'Unknown'. Most acute hepatitis C epidemiologic information questions were completed on 70-80% of case reports. According to the CDC, the national average for completeness of acute hepatitis B case report forms was 59% in 2011.

¶ A Total of 49 male case reports were received in 2012

**Table 1.5b Response of Completed Acute Hepatitis B Reports by Risk Behavior, Michigan 2012**

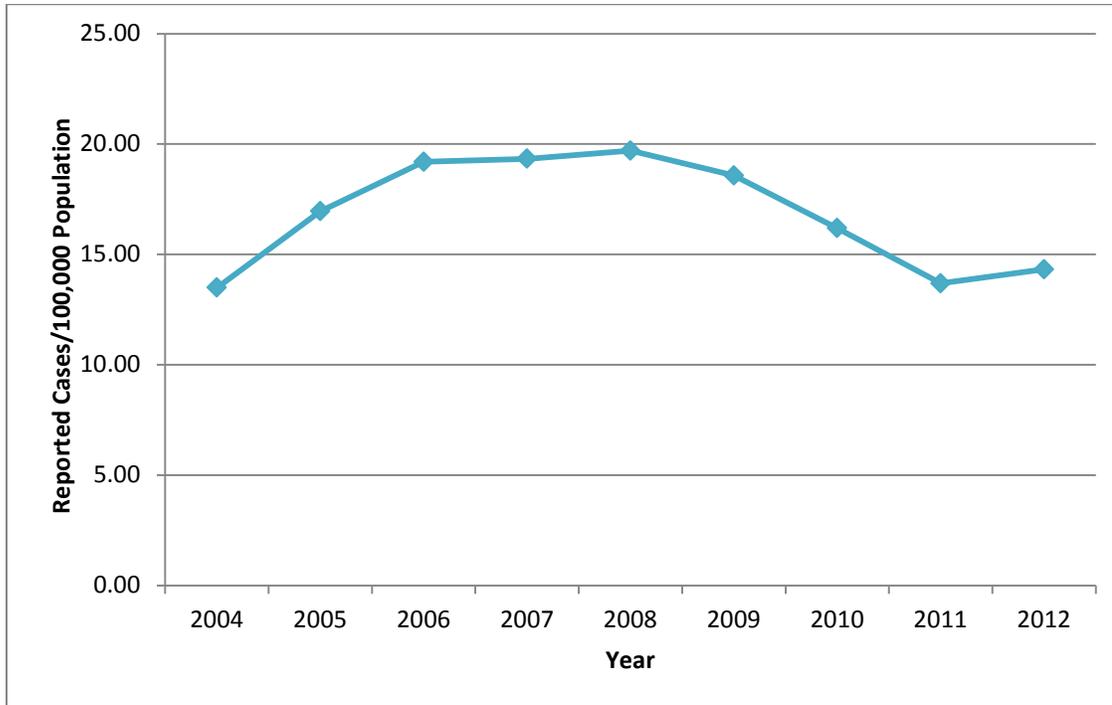
Risk Behavior	Unknown*	No*	Yes*
Injection Drug User	13/61 (21%)	42/61 (69%)	6/61 (10%)
Used Street Drugs	13/51 (25%)	31/51 (61%)	7/51 (14%)
Hemodialysis	11/59 (19%)	48/59 (81%)	0/59 (0%)
Received Blood Products	15/61 (25%)	43/61 (70%)	3/61 (5%)
Received a Tattoo	17/59 (29%)	36/59 (61%)	6/59 (10%)
Accidental Needle Stick	13/53 (25%)	37/53 (70%)	3/53 (6%)
Contact of Person with Hepatitis B	24/62 (39%)	33/62 (53%)	5/62 (8%)
Other Surgery	9/42 (21%)	24/42 (57%)	9/42 (21%)
Oral Surgery or Dental Work	17/60 (28%)	36/60 (60%)	7/60 (12%)
Employed in Medical Field	13/60 (22%)	44/60 (73%)	3/60 (5%)
Employed as Public Safety Officer	15/60 (25%)	45/60 (75%)	0/60 (0%)
Incarceration Longer than 6 Months	18/61 (30%)	41/61 (67%)	2/61 (3%)
Men who have Sex with Men	12/39 (31%)	23/39 (59%)	4/39 (10%)
Any Part of Body Pierced (other than ear)	16/57 (28%)	39/57 (68%)	2/57 (4%)

Table 1.5b shows the responses among the completed risk behavior questions. While having surgery was the most common potential exposure, no single factor stood out as being primarily responsible for the majority of acute HBV infections. No 2012 acute HBV cases were receiving hemodialysis or worked as a public safety officer.

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

# Chronic Hepatitis B

Figure 2.1. Chronic Hepatitis B Cases per 100,000 Population, Michigan, 2004-2012



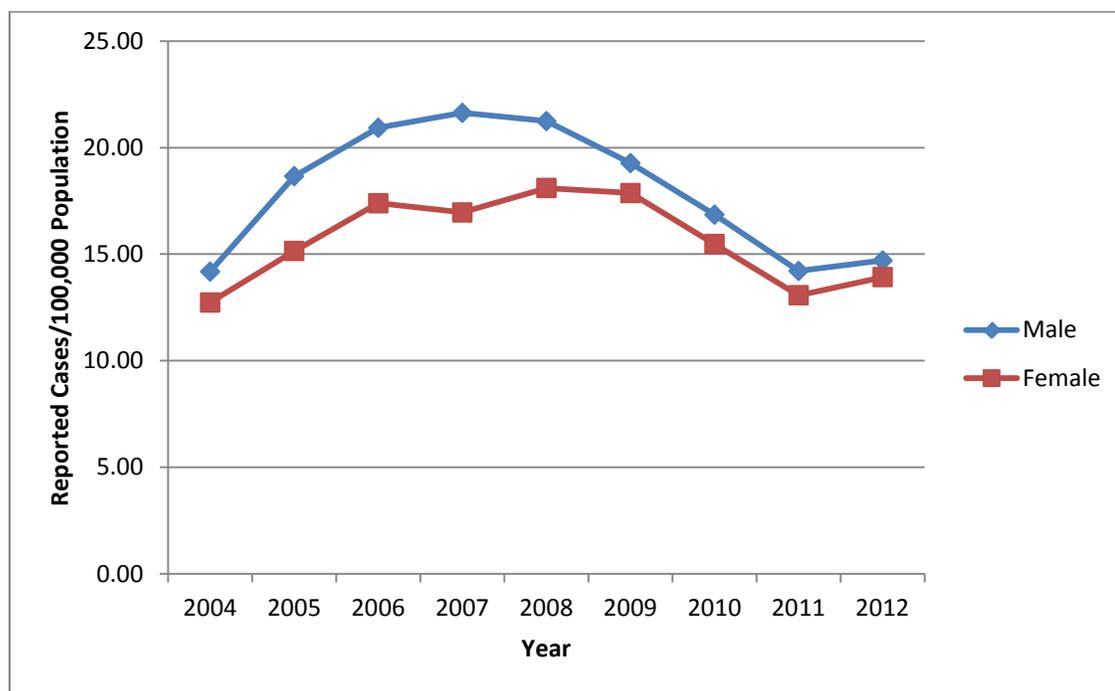
The number of chronic hepatitis B case reports peaked in 2008 in Michigan, and then decreased until 2011. Appendix C contains a map of 2012 chronic hepatitis B rates by county. There is no national benchmark for comparing rates of chronic hepatitis B infection.

# Chronic Hepatitis B

**Table 2.1. Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2012**

	Male	Female
2004	14.18	12.73
2005	18.65	15.14
2006	20.93	17.39
2007	21.63	16.96
2008	21.24	18.10
2009	19.27	17.87
2010	16.85	15.47
2011	14.21	13.07
2012	14.71	13.92

**Figure 2.2. Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2012**



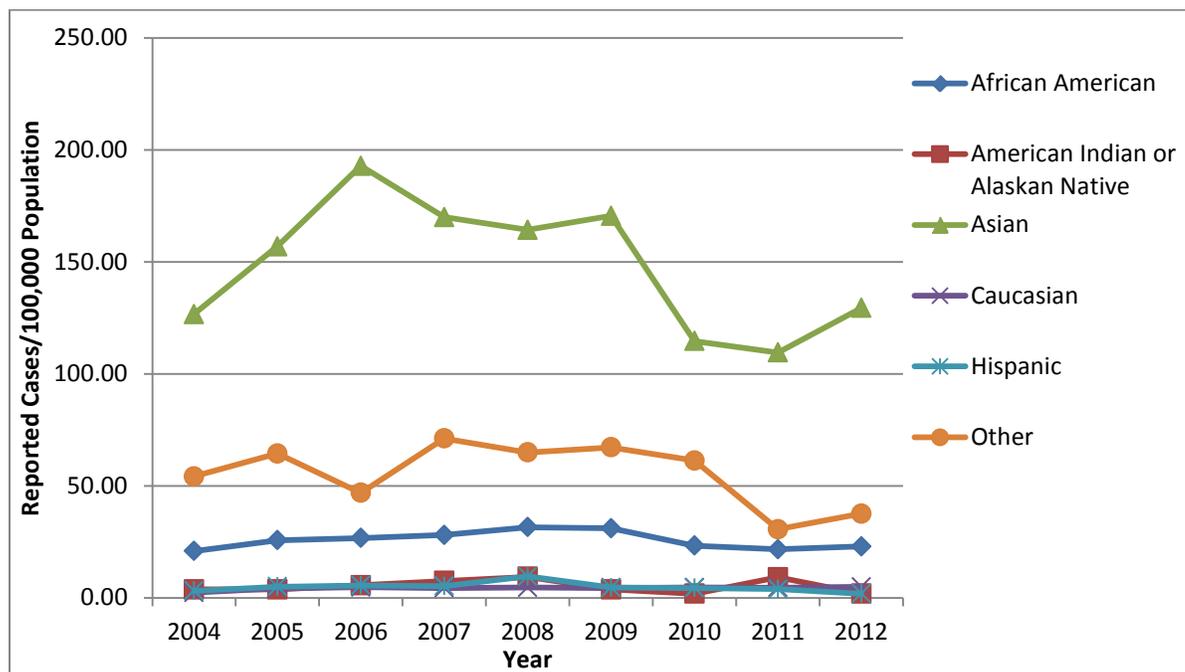
The rate of chronic hepatitis B reporting in Michigan has remained higher among males in comparison to females between the years of 2004 and 2012. The rate for males peaked in 2007, while the rate for females peaked in 2008.

# Chronic Hepatitis B

Table 2.2. Chronic Hepatitis B Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2012

Year	African American Cases Per 100,000	African American Cases	American Indian or Alaskan Native Cases Per 100,000	American Indian or Alaskan Native Cases	Asian Cases Per 100,000	Asian Cases	Caucasian Cases Per 100,000	Caucasian Cases	Hispanic Cases Per 100,000	Hispanic Cases	Other Cases Per 100,000	Other Cases
2004	20.90	293	3.74	2	126.63	222	2.33	182	3.09	10	54.21	96
2005	25.68	360	3.74	2	156.86	275	4.27	333	4.94	16	64.37	114
2006	26.68	374	5.62	3	192.80	338	4.74	370	5.56	18	46.87	83
2007	28.03	393	7.49	4	169.98	298	4.39	343	5.25	17	71.15	126
2008	31.53	442	9.36	5	164.28	288	4.59	358	9.57	31	64.94	115
2009	31.03	435	3.74	2	170.55	299	4.36	340	4.63	15	67.19	119
2010	23.27	322	1.83	1	114.59	271	4.61	349	4.35	19	61.26	124
2011	21.68	300	9.15	5	109.52	259	4.53	343	3.90	17	30.63	62
2012	22.91	317	1.83	1	129.39	306	4.87	369	1.83	8	37.54	76

Figure 2.3. Chronic Hepatitis B Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2012



Asians have the highest rate of chronic hepatitis B infection in Michigan, followed by African Americans. In 2012 the rate of chronic hepatitis B in Asians was 129.39 per 100,000 population. That rate is 26.6 times higher than the 2012 Caucasian rate (4.87 cases per 100,000 population) and 5.6 times higher than the 2012 African American rate (22.91 cases per 100,000 population). As explained earlier, Asians have the highest rate of hepatitis B in the US, so this racial-disparity in the Michigan data was expected. Asian-Americans are the target of CDC's **KNOW HEPATITIS B** campaign.

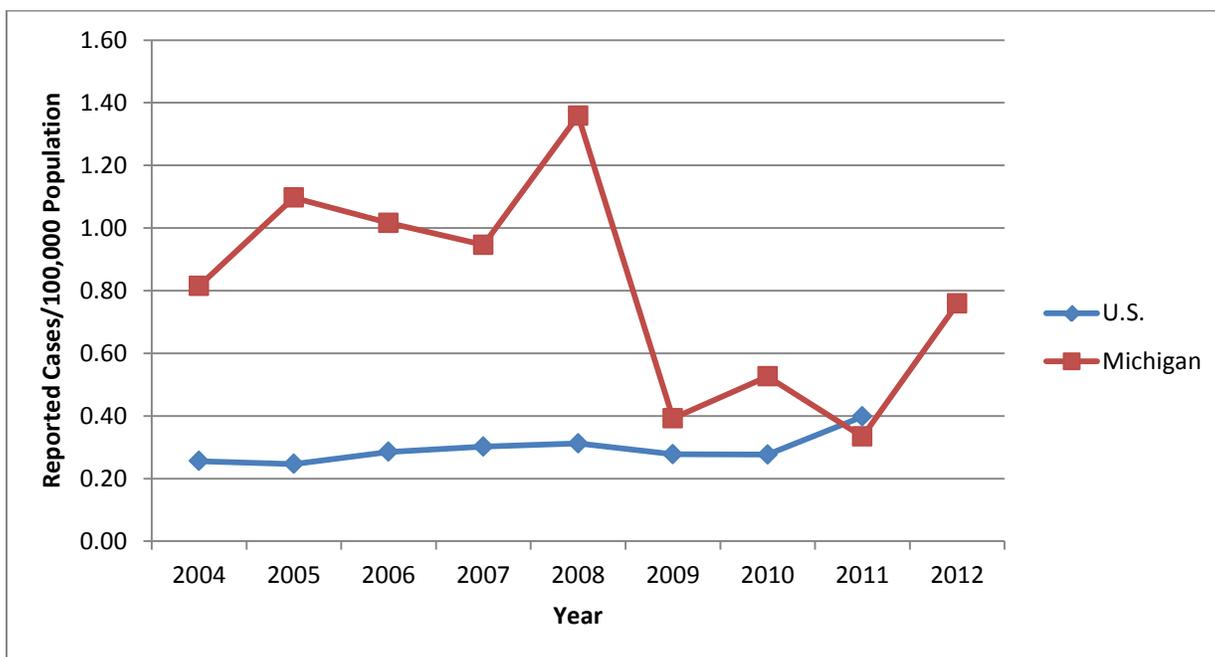
# Acute Hepatitis C

**Table 3.1. Incidence\* of Acute Hepatitis C, Michigan and U.S., 2004-2012**

	2004	2005	2006	2007	2008	2009	2010	2011	2012
U.S.	0.26	0.25	0.28	0.30	0.31	0.28	0.28	0.40	N/A
Michigan	0.82	1.10	1.02	0.95	1.36	0.39	0.53	0.33	0.76

\*Incidence per 100,000 Population

**Figure 3.1. Incidence of Acute Hepatitis C, Michigan and U.S., 2004-2012**



The national rate of acute cases of hepatitis C remained relatively stable, hovering between 0.25 and 0.31 cases per 100,000 population from 2004 through 2010. In comparison, the incidence rate of acute hepatitis C in Michigan varied considerably between the years of 2004 and 2012, averaging 0.81 cases per 100,000. This may be explained by changes in surveillance procedures during that time period. In 2009, MDCH staff began reviewing reported cases of acute hepatitis C to determine if they met the CDC/CSTE case definition. In years prior to enhanced MDCH case review, there likely were errors in reporting that resulted in an inflated number of acute HCV cases. In subsequent years cases not meeting the definition were correctly reclassified and therefore our confirmed cases have decreased. A CDC/CSTE acute HCV case definition change in January 2012 is most likely responsible for the sharp increase in acute HCV cases reported to MDCH in 2012. Appendix C contains an incidence map of acute hepatitis C by county in 2012.

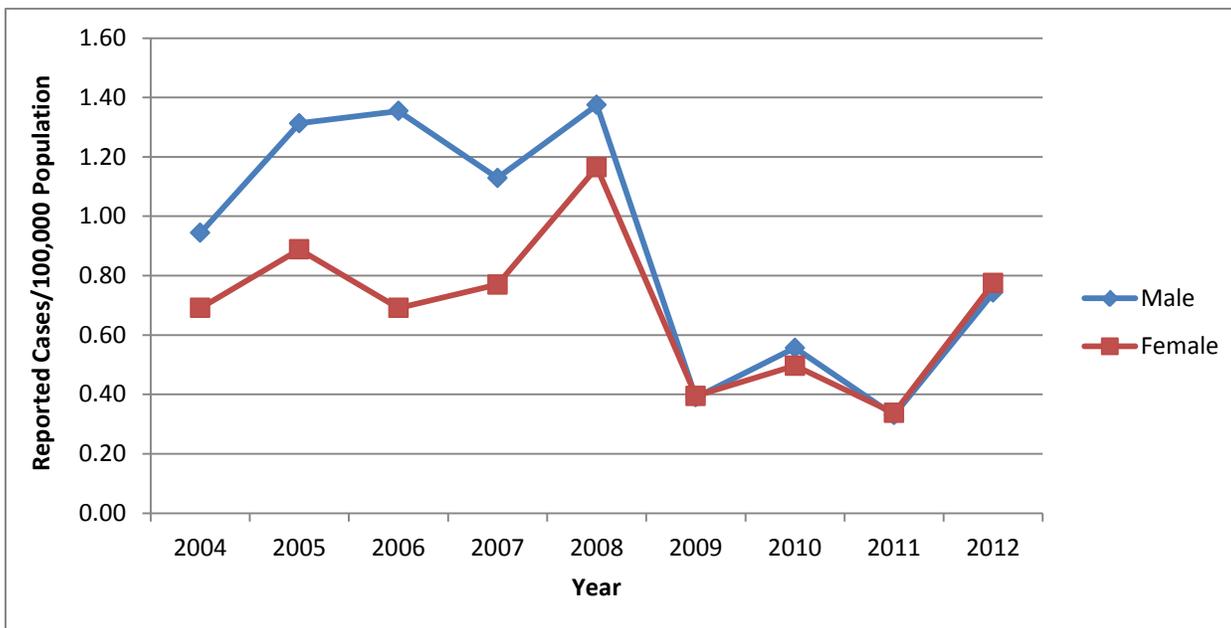
# Acute Hepatitis C

**Table 3.2. Incidence\* of Acute Hepatitis C by Gender, Michigan, 2004-2012**

	Male	Female
2004	0.94	0.69
2005	1.31	0.89
2006	1.35	0.69
2007	1.13	0.77
2008	1.37	1.16
2009	0.39	0.39
2010	0.56	0.50
2011	0.33	0.34
2012	0.74	0.77

\*Incidence per 100,000 Population

**Figure 3.2. Incidence of Acute Hepatitis C by Gender, Michigan, 2004-2012**



Prior to 2009, incidence rates of acute hepatitis C in Michigan were markedly higher among males than females. However, beginning in 2009, incidence rates in men and women have become nearly equal.

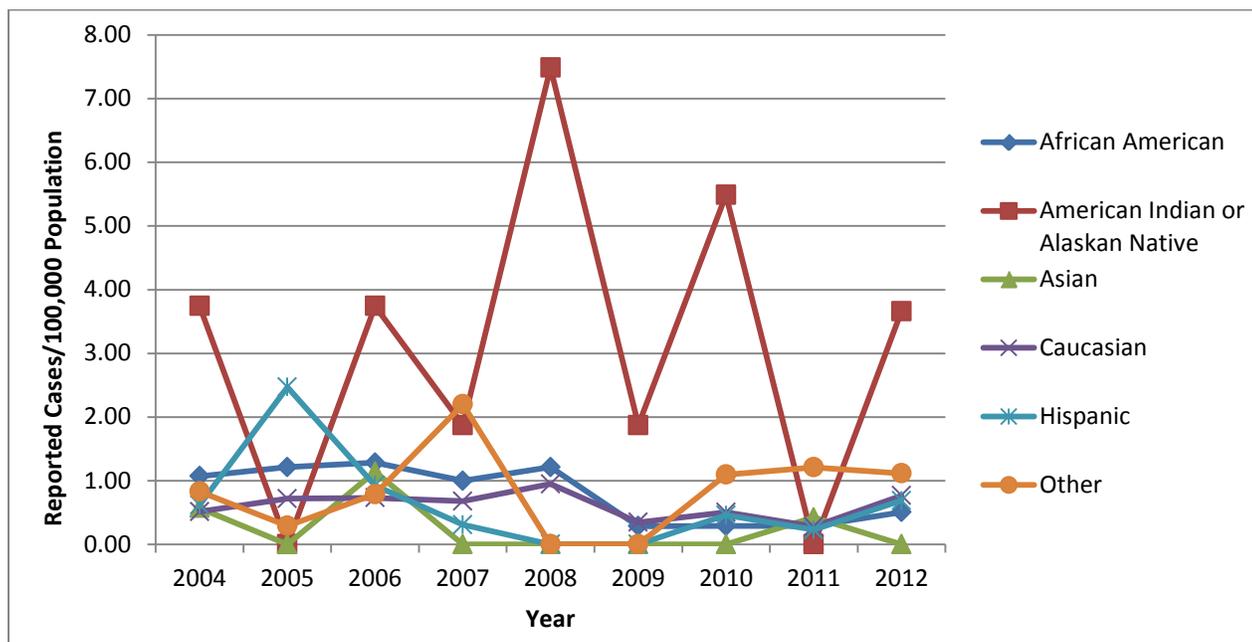
# Acute Hepatitis C

**Table 3.3. Incidence\* of Acute Hepatitis C by Race and Ethnicity, Michigan, 2004-2012**

Year	African American Incidence	African American Cases	American Indian or Alaskan Native Incidence	American Indian or Alaskan Native Cases	Asian Incidence	Asian Cases	Caucasian Incidence	Caucasian Cases	Hispanic Incidence	Hispanic Cases	Other Incidence	Other Cases
2004	1.07	15	3.74	2	0.57	1	0.51	40	0.62	2	0.83	4
2005	1.21	17	0.00	0	0.00	0	0.72	56	2.47	8	0.29	1
2006	1.28	18	3.74	2	1.14	2	0.73	57	0.93	3	0.79	0
2007	1.00	14	1.87	1	0.00	0	0.68	53	0.31	1	2.20	1
2008	1.21	17	7.49	4	0.00	0	0.95	74	0.00	0	0.00	0
2009	0.29	4	1.87	1	0.00	0	0.35	27	0.00	0	0.00	1
2010	0.29	4	5.49	3	0.00	0	0.50	38	0.46	2	1.10	0
2011	0.29	4	0.00	0	0.42	1	0.28	21	0.23	1	1.21	0
2012	0.51	7	3.66	2	0.00	0	0.77	58	0.69	3	1.11	1

\*Incidence per 100,000 Population

**Figure 3.3. Incidence of Acute Hepatitis C by Race and Ethnicity, Michigan, 2004-2012**



Incidence of acute hepatitis C in Michigan has decreased in African Americans, with a high of 1.28 cases per 100,000 population in 2006 and the most recent incidence rate of 0.51 cases per 100,000 in 2012. Incidence of acute hepatitis C in Caucasians has been variable in the past 9 years with an incidence of 0.51 cases per 100,000 in 2004 and an incidence of 0.77 cases per 100,000 in 2012. Though Native Americans make up only a few cases of acute HCV each year, due to the relatively few Native Americans who live in Michigan the incidence rate for Native Americans and Alaskan Natives is disproportionately high at 3.66 cases per 100,000. This observation is consistent with national acute HCV racial/ethnic trends published by CDC.

# Acute Hepatitis C

**Table 3.4a. Completeness of Acute Hepatitis C Reports by Risk Behavior, Michigan, 2012 (n=75)**

Risk Behavior	Completed
Injection Drug User	59/75 (79%)
Used Street Drugs	56/75 (75%)
Hemodialysis	58/75 (77%)
Received Blood Products	58/75 (77%)
Received a Tattoo	59/75 (79%)
Accidental Needle Stick	58/75 (77%)
Contact of Person with Hepatitis C	58/75 (77%)
Other Surgery	39/75 (52%)
Oral Surgery or Dental Work	57/75 (76%)
Employed in Medical Field	57/75 (76%)
Employed as Public Safety Officer	59/75 (79%)
Incarceration Longer than 6 Months	57/75 (76%)
Men who have Sex with Men¶	22/36 (61%)
Any Part of Body Pierced (other than ear)?	55/75 (73%)

Table 3.4a shows the percentage of acute hepatitis C case report form epidemiologic information questions that are completed by risk behavior. A risk behavior was considered completed if the question was marked as 'Yes', 'No', or 'Unknown'. Most acute hepatitis C epidemiologic information questions were completed on 75-80% of case reports. According to the CDC, the national average for completeness of acute hepatitis C case report forms was 64% in 2011. This is the most recent year for national acute hepatitis C surveillance data from the CDC.

¶ A Total of 36 male case reports were received in 2012

**Table 3.4b. Response of Completed Acute Hepatitis C Reports by Risk Behavior, Michigan, 2012**

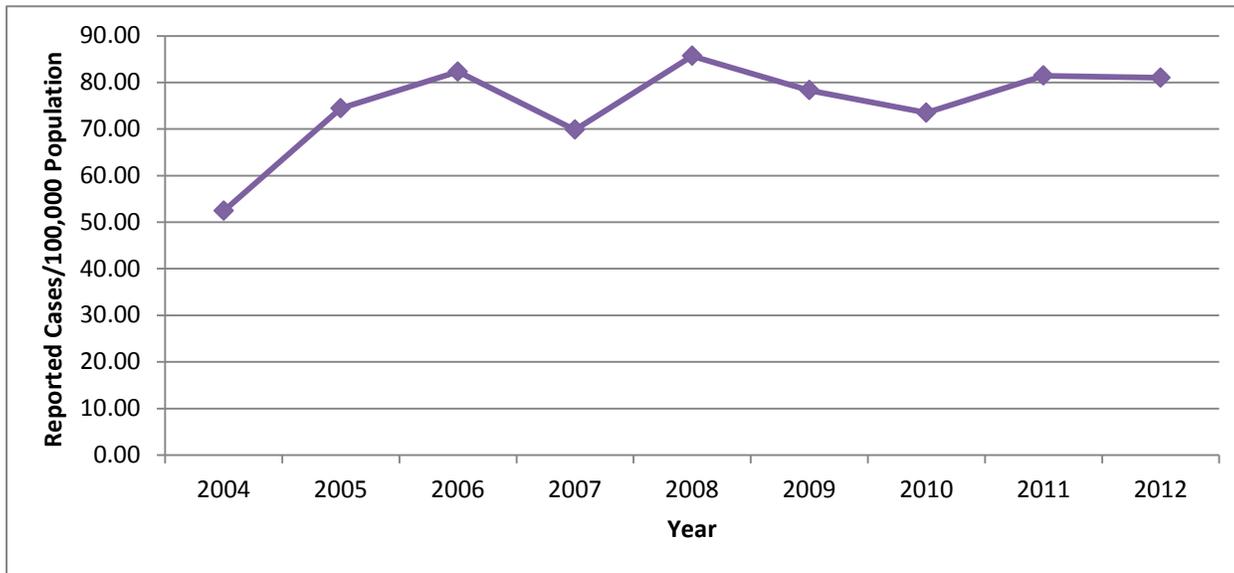
Risk Behavior	Unknown*	No*	Yes*
Injection Drug User	8/59 (14%)	20/59 (34%)	31/59 (53%)
Used Street Drugs	14/56 (25%)	25/56 (45%)	17/56 (30%)
Hemodialysis	12/58 (21%)	46/58 (79%)	0/58 (0%)
Received Blood Products	15/58 (26%)	41/58 (71%)	2/58 (3%)
Received a Tattoo	20/59 (34%)	15/59 (25%)	24/59 (41%)
Accidental Needle Stick	20/58 (34%)	35/58 (60%)	3/58 (5%)
Contact of Person with Hepatitis C	18/58 (31%)	21/58 (36%)	19/58 (33%)
Other Surgery	10/39 (26%)	21/39 (54%)	8/39 (21%)
Oral Surgery or Dental Work	22/57 (39%)	26/57 (46%)	9/57 (16%)
Employed in Medical Field	17/57 (30%)	37/57 (65%)	3/57 (5%)
Employed as Public Safety Officer	16/59 (27%)	43/59 (73%)	0/59 (0%)
Incarceration Longer than 6 Months	23/57 (40%)	28/57 (49%)	6/57 (11%)
Men who have Sex with Men	12/22 (55%)	9/22 (41%)	1/22 (5%)
Any Part of Body Pierced (other than ear)?	24/55 (44%)	19/55 (35%)	12/55 (22%)

Table 3.4b 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. As with acute HBV, no acute HCV case reported being a hemodialysis patient or a public safety officer.

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

# Chronic Hepatitis C

Figure 4.1. Chronic Hepatitis C Cases per 100,000 Population, Michigan, 2004-2012



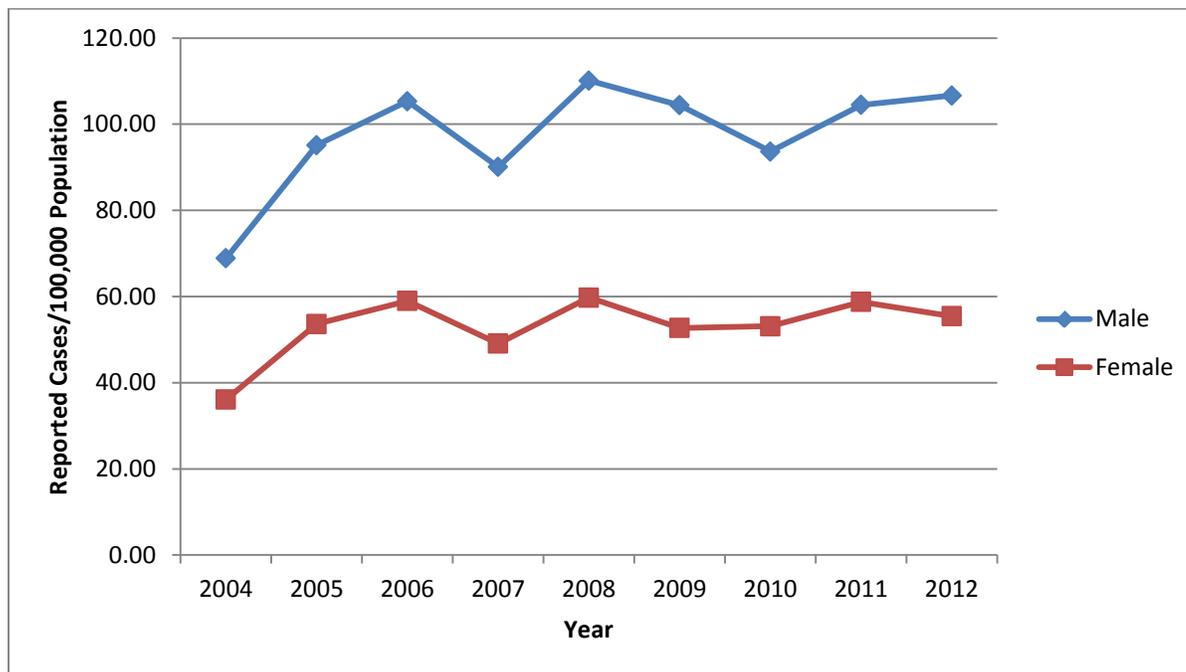
Reported cases of chronic hepatitis C in Michigan have increased approximately 1.5 times between 2004 and 2012. There is no nationally available benchmark for comparing rates of chronic HCV. Appendix C contains a map of chronic hepatitis C by county for 2012.

# Chronic Hepatitis C

**Table 4.1. Chronic Hepatitis C Cases per 100,000 Population by Gender, Michigan, 2004-2012**

	Male	Female
2004	68.89	36.09
2005	95.13	53.64
2006	105.31	58.99
2007	90.09	49.10
2008	110.11	59.76
2009	104.39	52.71
2010	93.64	53.12
2011	104.47	58.76
2012	106.64	55.43

**Figure 4.2. Chronic Hepatitis C Cases per 100,000 Population by Gender, Michigan, 2004-2012**



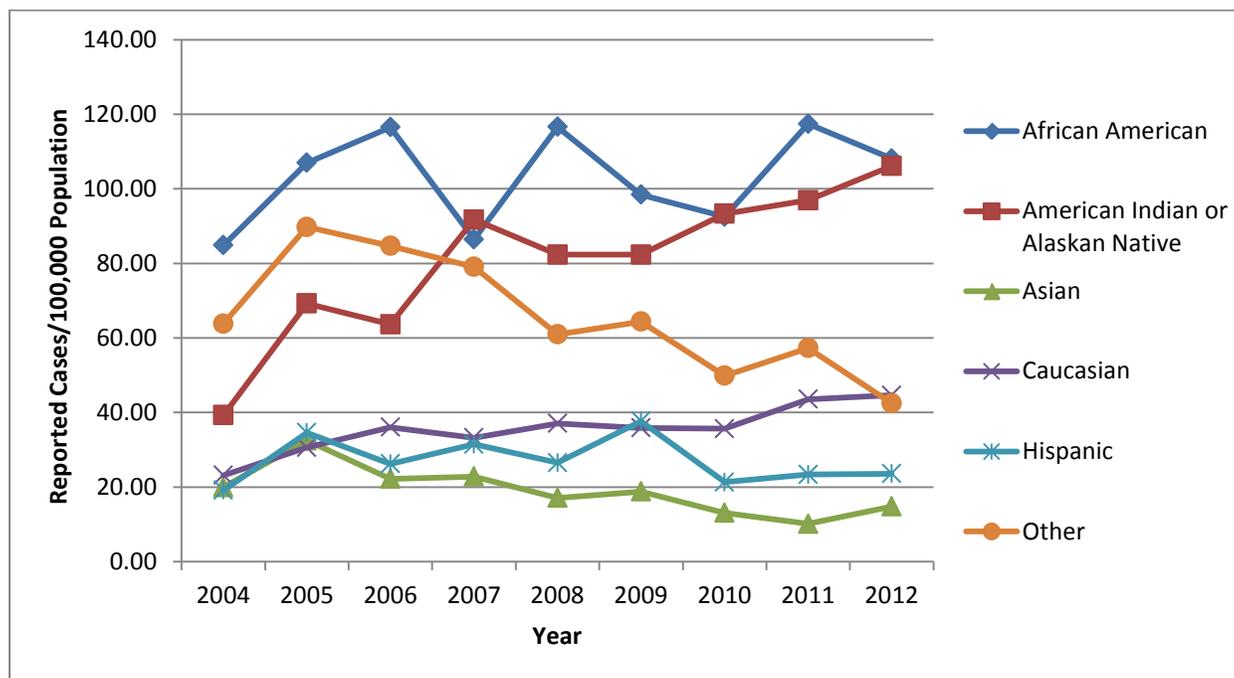
Males account for the majority of chronic hepatitis C cases. In 2012 the rate of chronic hepatitis C reports was 1.9 times higher in males than females. Between 2004 and 2012, the rate of chronic hepatitis C infection increased by 54.8% in males and 53.6% in females.

# Chronic Hepatitis C

**Table 4.2. Chronic Hepatitis C Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2012**

Year	African American Rate Per 100,000	African American Cases	American Indian or Alaskan Native Rate Per 100,000	American Indian or Alaskan Native Cases	Asian Rate Per 100,000	Asian Cases	Caucasian Rate Per 100,000	Caucasian Cases	Hispanic Rate Per 100,000	Hispanic Cases	Other Rate Per 100,000	Other Cases
2004	84.88	1190	39.31	21	19.96	35	23.16	1808	19.14	62	63.81	113
2005	106.99	1500	69.26	37	32.51	57	30.65	2393	34.58	112	89.78	159
2006	116.54	1634	63.65	34	22.25	39	36.07	2816	26.24	85	84.70	150
2007	86.45	1212	91.72	49	22.82	40	33.23	2594	31.49	102	79.05	140
2008	116.62	1635	82.36	44	17.11	30	37.07	2894	26.55	86	60.98	108
2009	98.43	1380	82.36	44	18.82	33	35.88	2801	37.67	122	64.37	114
2010	92.50	1280	93.30	51	13.11	31	35.68	2701	21.31	93	49.89	101
2011	117.43	1625	96.95	53	10.15	24	43.55	3297	23.38	102	57.30	116
2012	108.11	1496	106.10	58	14.80	35	44.64	3379	23.60	103	42.48	86

**Figure 4.3. Chronic Hepatitis C Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2012**



In 2012 in Michigan African Americans have the highest rate of chronic hepatitis C infection, followed by American Indian/Alaskan Natives, Caucasians, Hispanics and then Asians. The rate of chronic hepatitis C infection in American Indian/Alaskan Natives has increased 170% between 2004 and 2012, the highest increase among races/ethnicities. Only Asians have experienced a decrease in chronic hepatitis C infection rate during the 2004 to 2012 time period. The rise in chronic HCV rates is not believed to be due to new infections but rather the diagnosis of older chronic infections, identified due to increases in testing and awareness.

# Chronic Hepatitis C

**Table 4.3a. Completeness of Chronic Hepatitis C Reports by Risk Behavior, Michigan, 2012 (n=8005)**

Risk Behavior	Completed
Received Blood Transfusion Prior to 1992	2322/8005 (29%)
Received an Organ Transplant Prior to 1992	2307/8005 (29%)
Received Clotting Factor Concentrates Prior to 1992	2298/8005 (29%)
Hemodialysis	2294/8005 (29%)
Injection Drug User	2342/8005 (29%)
Incarcerated in Lifetime	2328/8005 (29%)
Treated for a Sexually Transmitted Disease in Lifetime	2229/8005 (28%)
Contact of Person with Hepatitis C	2327/8005 (29%)
Employed in Medical Field	2325/8005 (29%)

**Table 4.3b. Response of Completed Chronic Hepatitis C Reports by Risk Behavior, Michigan, 2012**

Risk behavior	Unknown*	No*	Yes*
Received Blood Transfusion Prior to 1992	1194/2322 (51%)	967/2322 (42%)	161/2322 (7%)
Received an Organ Transplant Prior to 1992	1089/2307 (47%)	1213/2307 (53%)	5/2307 (0.2%)
Received Clotting Factor Concentrates Prior to 1987	1202/2298 (52%)	1083/2298 (47%)	13/2298 (0.6%)
Hemodialysis	1053/2294 (46%)	1219/2294 (53%)	22/2294 (1%)
Injection Drug User	1044/2342 (45%)	565/2342 (24%)	733/2342 (31%)
Incarcerated in Lifetime	1204/2328 (52%)	506/2328 (22%)	618/2328 (27%)
Treated for a Sexually Transmitted Disease in Lifetime	1302/2229 (58%)	674/2229 (30%)	253/2229 (11%)
Contact of Person with Hepatitis C	1419/2327 (61%)	459/2327 (20%)	449/2327 (19%)
Employed in Medical Field	1180/2325 (51%)	1033/2325 (44%)	112/2325 (5%)

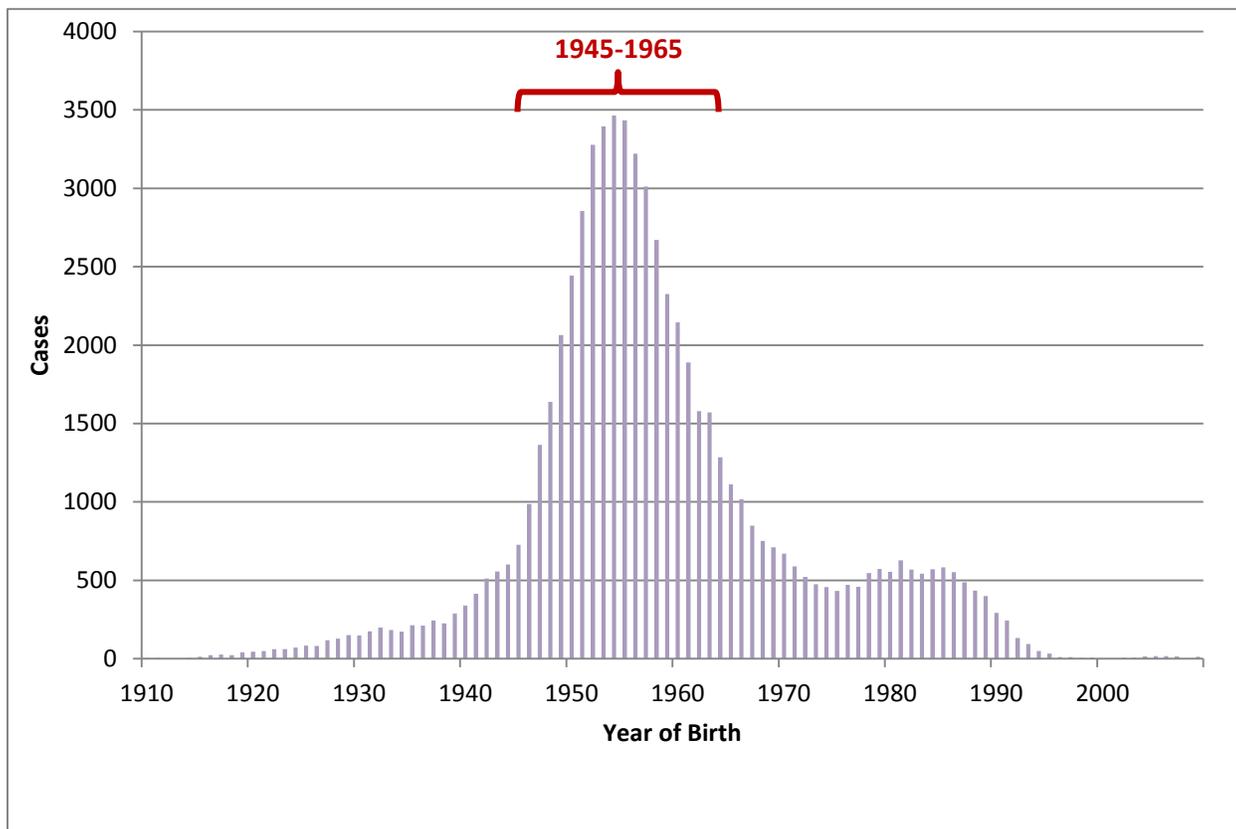
\* Percentages calculated based upon those who completed the field; excludes missing data

Table 4.3a shows the percentage of chronic hepatitis C case report form epidemiologic information questions that are completed by risk behavior. A risk behavior was considered completed if the question was marked as 'Yes', 'No', or 'Unknown'. Most chronic hepatitis C epidemiologic information questions were completed on 28-29% of case reports. There is no national comparison for completion of case report forms.

Table 4.3b 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.

# Chronic Hepatitis C

Figure 4.4. Number of Chronic Hepatitis C Cases Reported to MDCH by Year of Birth, 2004-2012



This figure depicts the number of chronic hepatitis C cases reported to MDCH by birth year. All cases were reported between 2004 and 2012. “Baby Boomers,” those born between 1945 and 1965, are five times more likely than other adults to be infected with hepatitis C according to national statistics. Seventy-five percent of adults with hepatitis C were born between 1945 and 1965. CDC now recommends one-time hepatitis C testing of everyone born between 1945 and 1965. MDCH data shows that the number of chronic HCV diagnoses in Michiganders born between 1945 and 1965 is greater than any other birth cohort.

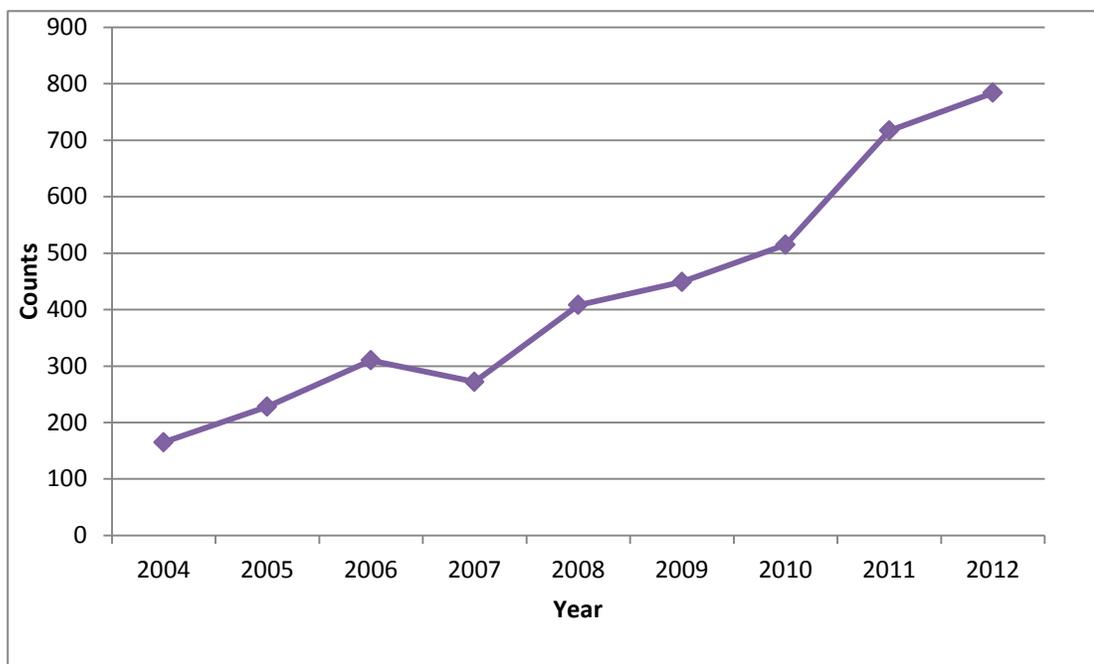
A second smaller ‘peak’ of hepatitis C cases exists in young adults born between approximately 1978 and 1992. An emerging epidemic of HCV in young adults has been identified in areas across the US and it is reasonable to assume that Michigan is not exempt from this observation. For more information please see the subsequent sections on pages 26 and 27.

# Chronic Hepatitis C

**Table 4.4. Chronic Hepatitis C Cases between 18 and 25 Years of Age, Michigan, 2004-2012**

Year	Cases
2004	165
2005	228
2006	310
2007	272
2008	408
2009	449
2010	515
2011	717
2012	784

**Figure 4.5. Chronic Hepatitis C Cases between 18 and 25 Years of Age, Michigan, 2004-2012**



The number of chronic hepatitis C cases among persons 18 to 25 years of age have increased year-over-year since 2004 (Table 4.4 and Figure 4.5). Between 2004 and 2012, the number of cases has increased 375%, from 165 cases in 2004 to 784 cases in 2012.

# Chronic Hepatitis C

## Young Adults with Hepatitis C Enhanced Surveillance Study

Beginning in February 2012, MDCH staff conducted enhanced surveillance focused on Michigan young adult hepatitis C cases. Individuals, aged 18 to 25, who had a positive hepatitis C lab reported to MDCH between July 2011 and April 2012 were asked to complete a survey. The goal of the survey was to obtain demographic, behavioral and clinical information related to the participants and help determine why more young adults are becoming infected with hepatitis C in Michigan.

Detailed information on the study and the study's results and conclusions can be found on the MDCH viral hepatitis website and the links below:

[Young Adults with Hepatitis C Virus Summary Report](#)

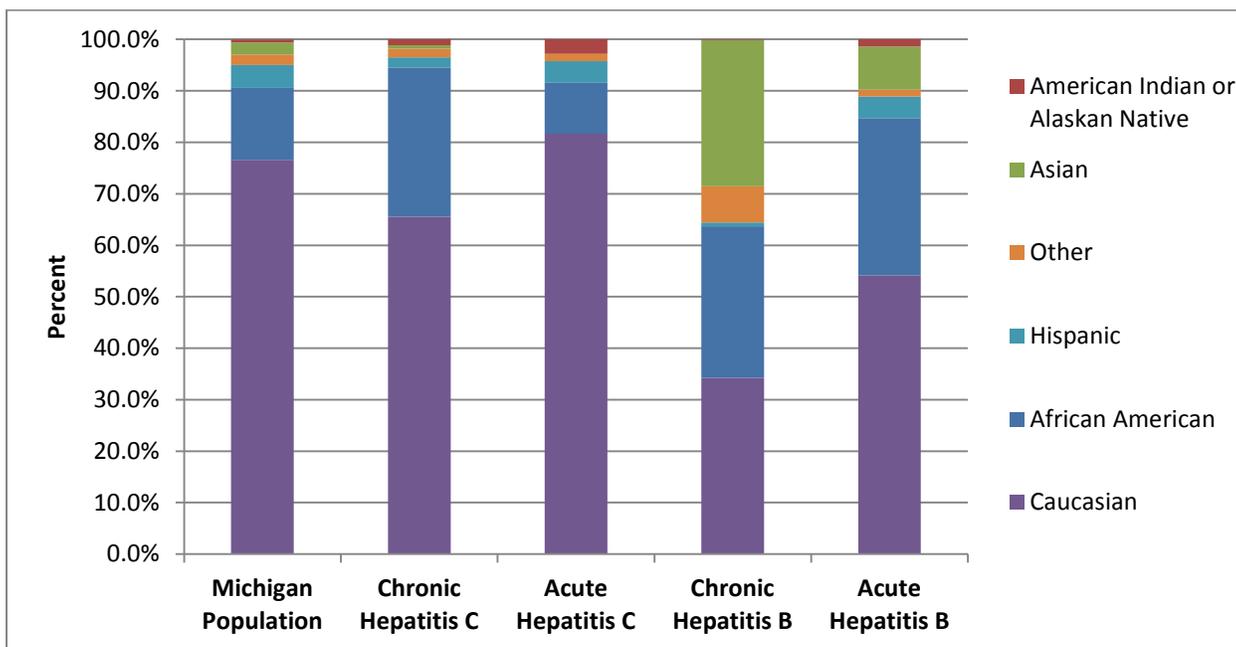
[Young Adults with Hepatitis C Study Fact Sheet](#)

# Racial Disparities

**Table 5.1. Racial Distribution of Total Population and Hepatitis Population, Michigan, 2012**

	African American	American Indian or Alaskan Native	Asian	Caucasian	Hispanic	Other
<b>Michigan Population</b>	<b>14.0%</b>	<b>0.6%</b>	<b>2.4%</b>	<b>76.6%</b>	<b>4.4%</b>	<b>2.0%</b>
Chronic Hepatitis C	29.0%	1.1%	0.7%	65.5%	2.0%	1.7%
Acute Hepatitis C	9.9%	2.8%	0%	81.7%	4.2%	1.4%
Chronic Hepatitis B	29.4%	0.1%	28.4%	34.3%	0.7%	7.1%
Acute Hepatitis B	30.6%	1.4%	8.3%	54.2%	4.2%	1.4%

**Figure 5.1. Racial Distribution of Total Population and Hepatitis Population, Michigan, 2012**



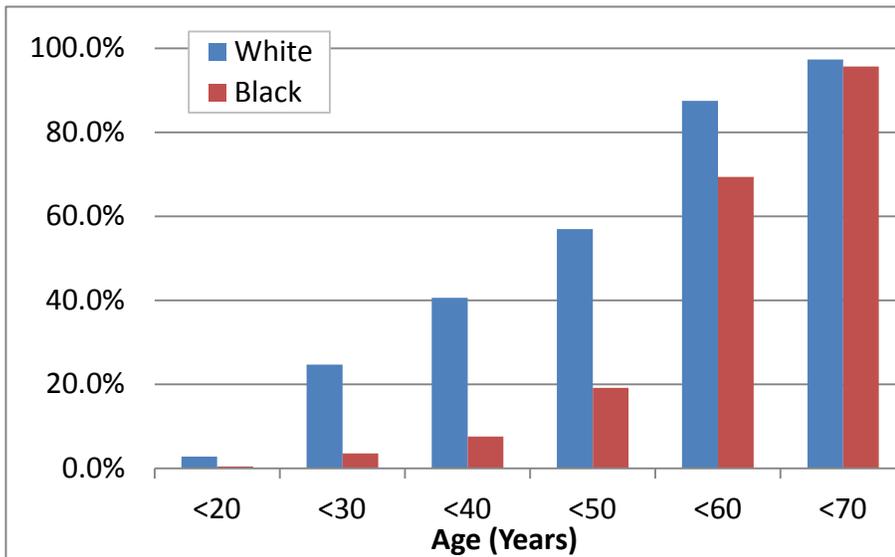
The table and figure above show how the demographics of the general Michigan population compares to the racial/ethnic breakdown of the various viral hepatitis case classifications reported to MDCH via the MDSS in 2012. Some racial groups are clearly disproportionately affected by certain viral hepatitis infections. For instance, Asians make up approximately 2.4% of the Michigan population according to the latest Census data, though they account for over 28% of all chronic HBV infections diagnosed in Michigan in 2012. Similarly, African-Americans represent 14% of the Michigan population but make up 29% of chronic HCV and chronic HBV infections, and 31% of acute HBV infections. Caucasians are the most common racial group in Michigan (77% of the population) and understandably make up the majority of viral hepatitis infections. Though, relative to the size of the population, Caucasians are less affected than other racial groups in regard to viral hepatitis infection with the exception of acute hepatitis C, where Caucasians account for 82% of all cases.

# Racial Disparities

Figure 5.2a. Age at Chronic Hepatitis C Diagnosis by Race, Michigan, 2012

Age (Years)	White (% of Cases Reported)	Black (% of Cases Reported)
≤20	2.8%	0.5%
≤30	24.7%	3.6%
≤40	40.6%	7.6%
≤50	57.0%	19.2%
≤60	87.5%	69.4%
≤70	97.3%	95.7%
<b>Mean Age</b>	<b>44.3 years</b>	<b>56.2 years</b>

Figure 5.2b. Age at Chronic Hepatitis C Diagnosis by Race, Michigan, 2012



The data presented above shows the age at diagnosis of chronic HCV infections stratified by race. On average, whites are reported with chronic hepatitis C at an earlier age than blacks (44.3 vs. 56.2 years). Earlier diagnosis, linkage to care, and treatment has been shown to significantly improve HCV outcomes. So the fact that blacks are diagnosed over a decade later than whites, according to our data, is potentially troublesome. For instance, 40% of white chronic HCV cases reported to MDCH in 2012 were 40 years old or younger. In comparison, only 8% of the black cases were 40 or younger. It remains to be seen whether this observation is due to whites simply acquiring HCV earlier in their lifetime than blacks, explaining why white HCV cases are detected earlier, or whether the groups acquire HCV at approximately the same age but blacks are more likely to go undiagnosed for an extended period of time due to disparities in access to care and diagnostic testing between the races.

# Viral Hepatitis and HIV Co-infection

Health outcomes for individuals with HIV/HBV or HIV/HCV co-infections are worse than individuals infected with only one virus. In order to assess viral hepatitis and HIV co-infection in Michigan, MDCH staff performed a cross-match between HIV cases reported in eHARS and viral hepatitis cases reported in the MDSS. Cases were matched by first name, last name and date of birth using LinkPlus, a probabilistic record-linkage software program publically available from the CDC. Risk factors for HIV transmission were obtained from eHARS.

**Table 6.1. Hepatitis B/Hepatitis C and HIV Co-Infection Data, Michigan, 2004-2012**

Variable	Hepatitis B	% Hepatitis B	Hepatitis C	% Hepatitis C
<b>n</b>	879	100%	1046	100%
<b>Sex</b>				
Male	760	86.5%	743	71.0%
Female	118	13.4%	295	28.2%
Unknown	1	0.1%	8	0.8%
<b>Race</b>				
Caucasian	216	24.6%	313	29.9%
Black or African American	616	70.1%	658	62.9%
Hispanic	22	2.5%	30	2.9%
Asian	7	0.8%	13	1.2%
American Indian or Alaskan Native	1	0.1%	2	0.2%
Other	14	1.6%	16	1.5%
Unknown	3	0.3%	14	1.3%
<b>HIV Transmission Risk</b>				
MSM	502	57.1%	172	16.4%
IDU	91	10.4%	454	43.4%
MSM/IDU	35	4.0%	136	13.0%
Blood Recipient	7	0.8%	34	3.3%
Heterosexual	82	9.3%	126	12.0%
Perinatal	1	0.1%	2	0.2%
Unknown/Undetermined	161	18.3%	122	11.7%
<b>Age at Coinfection</b>				
0-19	8	0.9%	4	0.4%
20-29	114	13.0%	47	4.5%
30-39	249	28.3%	123	11.8%
40-49	319	36.3%	339	32.4%
50-59	151	17.2%	439	42.0%
60+	38	4.3%	94	8.9%
<b>First Disease in Coinfection</b>				
HIV	819	93.2%	980	93.7%
Hepatitis	57	6.5%	66	6.3%
Same Year	3	0.3%	0	0

# Viral Hepatitis and HIV Co-infection

Between 2004 and 2012, 1046 people were reported in Michigan with HIV/HCV co-infection. Seventy-one percent of those co-infected were male and 43.4% had intravenous drug use documented as their transmission risk.

Of the 879 cases reported with HIV/HBV co-infection between 2004 and 2012 in Michigan, 86.5% were men. MSM (men who have sex with men) was reported as the HIV risk factor for 57.1% of all those with HIV/HBV co-infection and 65.1% of males with HIV/HBV co-infection. Intravenous Drug Use (IDU) was much more commonly cited as the HIV mode of transmission in the HIV/HCV co-infection group (43.4%) versus the HBV/HIV co-infection group (10.4%). This suggests, perhaps, that HIV/HBV prevention projects should focus on the MSM population, while HIV/HCV prevention projects should focus more on the IDU population.

For both HIV/HBV and HIV/HCV co-infections the majority of individuals were diagnosed with HIV more than one year prior to HBV or HCV. There are two possible explanations for this observation. One scenario is that persons contract HIV before they acquire HBV or HCV infection. Alternatively, these persons may not be tested for HBV and HCV at the time of their HIV diagnosis. In either case, it shows an area of potential improvement – either with better counseling of persons newly diagnosed with HIV to prevent subsequent viral hepatitis infection or more timely viral hepatitis testing for persons newly diagnosed with HIV. Because people with HIV-viral hepatitis co-infections have significantly worse health outcomes and respond poorly to standard treatments, early diagnosis and recognition of the co-infection is crucial, as is preventing these co-infections in the first place.

# Appendix A: Case definitions and forms

## Web Links to Case Definitions and Case Report Forms

### National Notifiable Disease Surveillance System 2012 Case Definitions

- [Acute Hepatitis B](#)
- [Chronic Hepatitis B](#)
- [Acute Hepatitis C](#)
- [Hepatitis C, Past or Present](#)

### Michigan Viral Hepatitis Case Report Forms, 2012

- [Acute Hepatitis B](#)
- [Chronic Hepatitis B](#)
- [Acute Hepatitis C](#)
- [Hepatitis C, Past or Present](#)

# Appendix B: County Data

**Table 7.1 Reported Cases of Hepatitis by County, Michigan, 2012**

County	2010 Census Population	Acute Hepatitis B Cases	Acute Hepatitis B Per 100,000 Population	Chronic Hepatitis B Cases	Chronic Hepatitis B Per 100,000 Population	Acute Hepatitis C Cases	Acute Hepatitis C Per 100,000 Population	Chronic Hepatitis C Cases	Chronic Hepatitis C Per 100,000 Population
Alcona County	10,942	-	-	-	-	-	-	4	36.56
Alger County	9,601	-	-	-	-	-	-	4	41.66
Allegan County	111,408	2	1.80	8	7.18	2	1.80	37	33.21
Alpena County	29,598	-	-	2	6.76	2	6.76	22	74.33
Antrim County	23,580	-	-	2	8.48	1	4.24	13	55.13
Arenac County	15,899	-	-	-	-	-	-	4	25.16
Baraga County	8,860	1	11.29	-	-	-	-	20	225.73
Barry County	59,173	-	-	-	-	-	-	17	28.73
Bay County	107,771	1	0.93	1	0.93	-	-	32	29.69
Benzie County	17,525	-	-	1	5.71	-	-	6	34.24
Berrien County	156,813	1	0.64	13	8.29	2	1.28	100	63.77
Branch County	45,248	-	-	5	11.05	-	-	28	61.88
Calhoun County	136,146	1	0.73	53	38.93	-	-	144	105.77
Cass County	52,293	1	1.91	2	3.82	-	-	30	57.37
Charlevoix County	25,949	-	-	-	-	-	-	10	38.54
Cheboygan County	26,152	-	-	1	3.82	-	-	24	91.77
Chippewa County	38,520	-	-	5	12.98	3	7.79	81	210.28
Clare County	30,926	-	-	3	9.70	-	-	22	71.14
Clinton County	75,382	-	-	8	10.61	-	-	33	43.78
Crawford County	14,074	-	-	1	7.11	1	7.11	15	106.58
Delta County	37,069	3	8.09	5	13.49	3	8.09	32	86.33
Detroit City County*	713,777	18	2.52	257	36.01	11	1.54	1225	171.62
Dickinson County	26,168	-	-	-	-	1	3.82	14	53.50
Eaton County	107,759	-	-	9	8.35	-	-	43	39.90
Emmet County	32,694	-	-	1	3.06	2	6.12	17	52.00
Genesee County	425,790	11	2.58	47	11.04	1	0.23	388	91.12
Gladwin County	25,692	2	7.78	1	3.89	-	-	17	66.17
Gogebic County	16,427	-	-	2	12.18	-	-	22	133.93
Grand Traverse County	86,986	1	1.15	7	8.05	2	2.30	79	90.82
Gratiot County	42,476	-	-	1	2.35	-	-	57	134.19
Hillsdale County	46,688	-	-	2	4.28	2	4.28	25	53.55
Houghton County	36,628	-	-	3	8.19	-	-	15	40.95
Huron County	33,118	-	-	1	3.02	1	3.02	15	45.29
Ingham County	280,895	1	0.36	113	40.23	8	2.85	161	57.32
Ionia County	63,905	-	-	1	1.56	3	4.69	81	126.75
Iosco County	25,887	-	-	-	-	-	-	15	57.94
Iron County	11,817	-	-	-	-	-	-	8	67.70
Isabella County	70,311	-	-	3	4.27	-	-	17	24.18
Jackson County	160,248	1	0.62	8	4.99	2	1.25	613	382.53
Kalamazoo County	250,331	-	-	21	8.39	1	0.40	130	51.93
Kalkaska County	17,153	-	-	-	-	1	5.83	10	58.30
Kent County	602,622	1	0.17	70	11.62	1	0.17	285	47.29

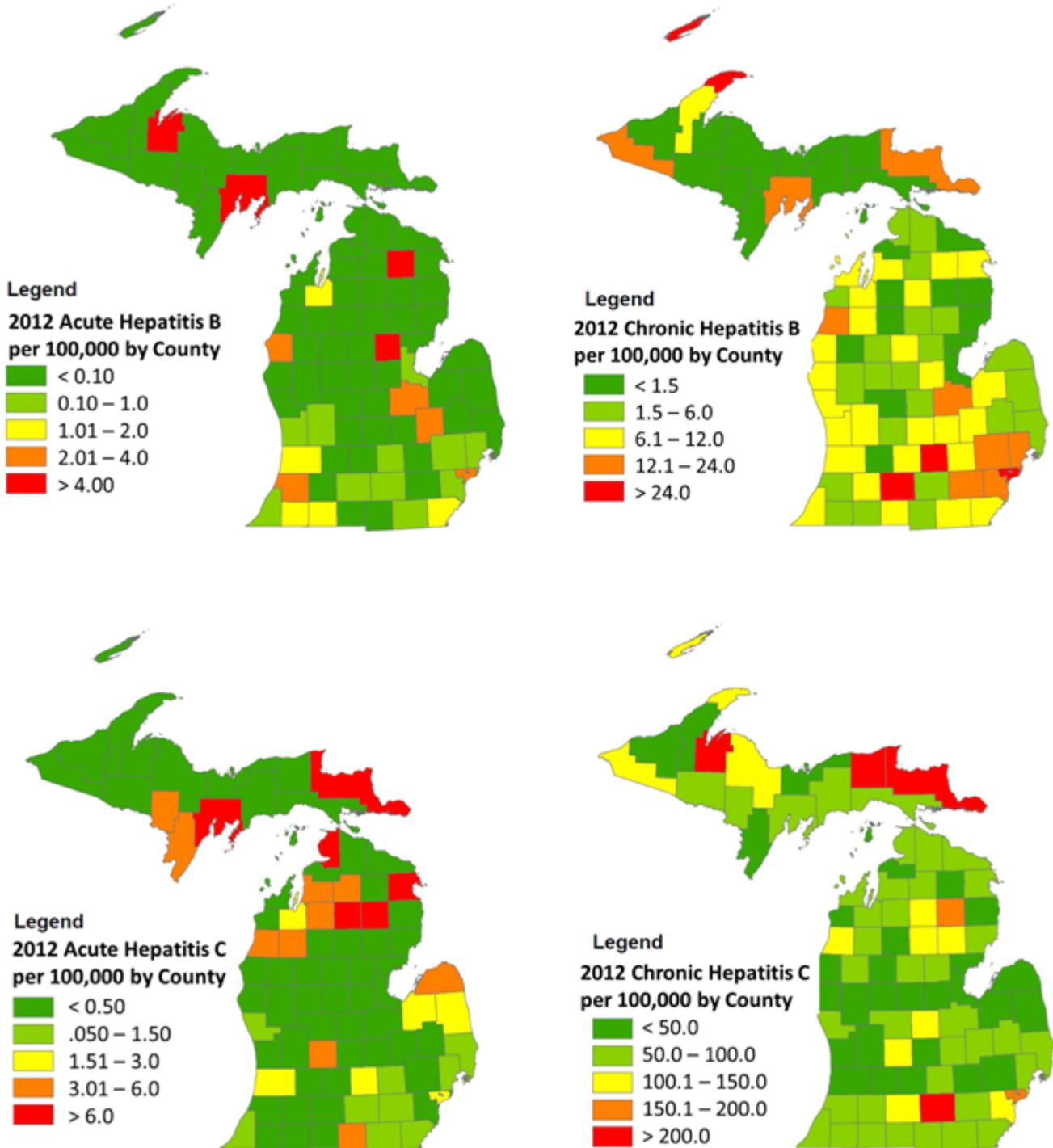
# Appendix B: County Data

Keweenaw County	2,156	-	-	2	92.76	-	-	3	139.15
Lake County	11,539	-	-	-	-	-	-	9	78.00
Lapeer County	88,319	-	-	3	3.40	-	-	54	61.14
Leelanau County	21,708	-	-	2	9.21	-	-	12	55.28
Lenawee County	99,892	1	1.00	9	9.01	1	1.00	92	92.10
Livingston County	180,967	-	-	15	8.29	2	1.11	84	46.42
Luce County	6,631	-	-	-	-	-	-	17	256.37
Mackinac County	11,113	-	-	-	-	-	-	8	71.99
Macomb County	840,978	5	0.59	152	18.07	6	0.71	598	71.11
Manistee County	24,733	-	-	4	16.17	1	4.04	30	121.30
Marquette County	67,077	-	-	-	-	-	-	78	116.28
Mason County	28,705	1	3.48	2	6.97	-	-	13	45.29
Mecosta County	42,798	-	-	1	2.34	-	-	17	39.72
Menominee County	24,029	-	-	-	-	1	4.16	8	33.29
Midland County	83,629	-	-	6	7.17	-	-	40	47.83
Missaukee County	14,849	-	-	-	-	-	-	6	40.41
Monroe County	152,021	2	1.32	11	7.24	2	1.32	123	80.91
Montcalm County	63,342	-	-	-	-	-	-	37	58.41
Montmorency County	9,765	1	10.24	1	10.24	-	-	2	20.48
Muskegon County	172,188	-	-	11	6.39	1	0.58	154	89.44
Newaygo County	48,460	-	-	1	2.06	-	-	16	33.02
Oakland County	1,202,362	5	0.42	153	12.72	-	-	513	42.67
Oceana County	26,570	-	-	2	7.53	-	-	11	41.40
Ogemaw County	21,699	-	-	1	4.61	-	-	28	129.04
Ontonagon County	6,780	-	-	-	-	-	-	2	29.50
Osceola County	23,528	-	-	1	4.25	-	-	9	38.25
Oscoda County	8,640	-	-	-	-	1	11.57	16	185.19
Otsego County	24,164	-	-	1	4.14	1	4.14	14	57.94
Ottawa County	263,801	1	0.38	24	9.10	-	-	63	23.88
Presque Isle County	13,376	-	-	-	-	-	-	9	67.28
Roscommon County	24,449	-	-	1	4.09	-	-	26	106.34
Saginaw County	200,169	8	4.00	31	15.49	-	-	168	83.93
Sanilac County	43,114	-	-	2	4.64	1	2.32	14	32.47
Schoolcraft County	8,485	-	-	-	-	-	-	7	82.50
Shiawassee County	70,648	-	-	6	8.49	-	-	48	67.94
St Clair County	163,040	-	-	5	3.07	1	0.61	113	69.31
St Joseph County	61,295	1	1.63	2	3.26	-	-	36	58.73
Tuscola County	55,729	-	-	4	7.18	1	1.79	18	32.30
Van Buren County	76,258	2	2.62	2	2.62	-	-	47	61.63
Washtenaw County	344,791	-	-	68	19.72	4	1.16	273	79.18
Wayne County	1,106,807	9	0.81	234	21.14	1	0.09	1245	112.49
Wexford County	32,735	-	-	2	6.11	1	3.05	27	82.48

\*City of Detroit is counted as its own county

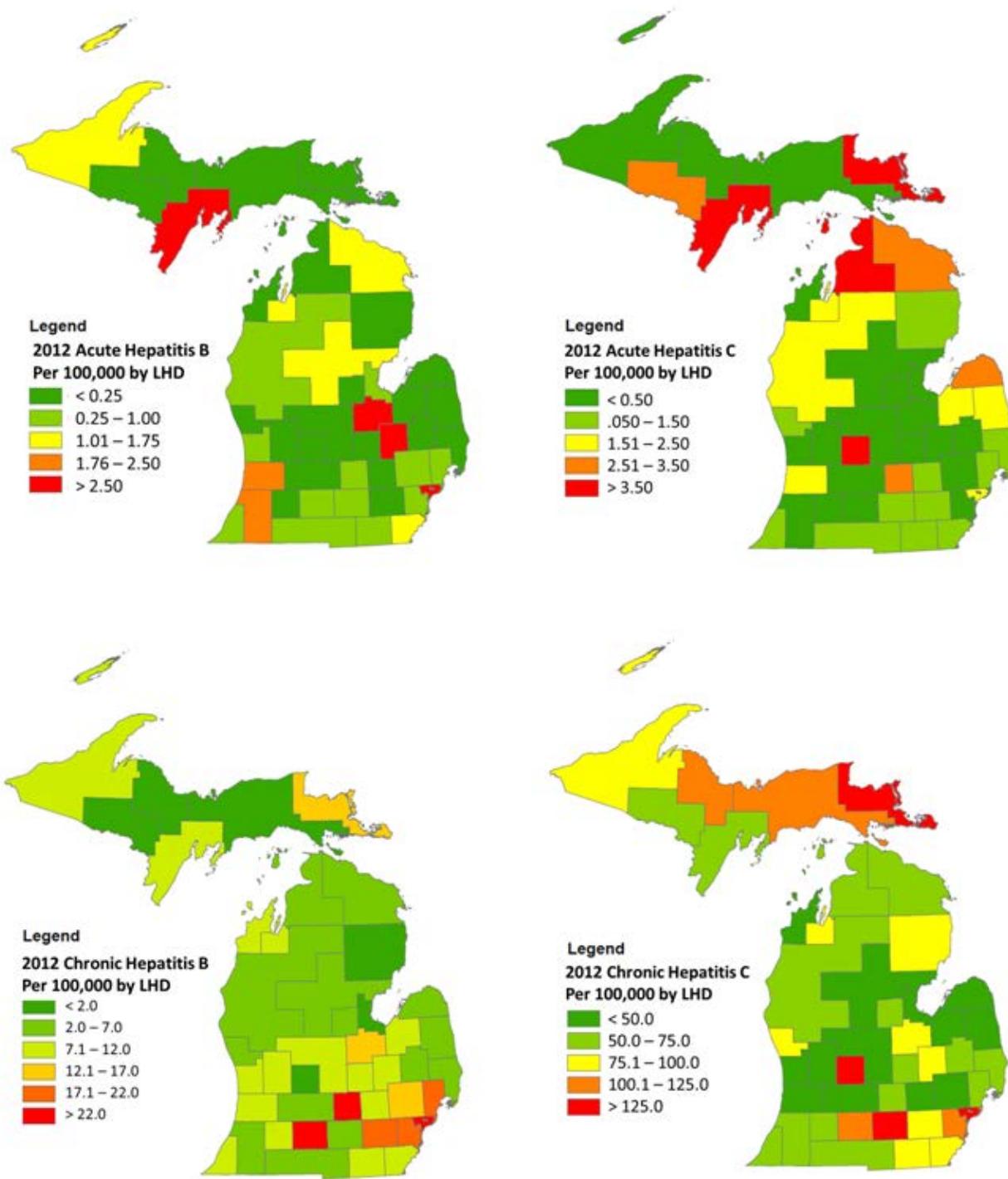
# Appendix C: Geographical Data

Figure 7.1: Acute and Chronic Hepatitis B and C Rates by County



# Appendix C: Geographical Data

Figure 7.2: Acute and Chronic Hepatitis B and C Rates by Local Health Department



# Appendix C: Geographical Data

Figure 7.3: Acute and Chronic Hepatitis B and C Rates by Region

