

2013 Hepatitis B and C Surveillance Report

*Michigan Department
of Community Health*



Viral Hepatitis Surveillance and Prevention Unit

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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.

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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, 2013 and December 31, 2013 in MDSS. A frozen data set containing all 2013 cases was created on 04/30/2014.

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, 2012 and 2013. 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 2013. In general, this is not necessarily reflective of the true number of new infections that occurred in 2013 nor the total number of individuals infected with viral hepatitis currently living in

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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 2013. 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 up to 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).

Enhanced Viral Hepatitis Surveillance, 2013

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 to ensure that clients were not reported twice and active surveillance of select cases to gather additional case report information. These enhancements to routine surveillance activities resulted in a more accurate hepatitis C, past or present, case count and an increase in the percentage of case reports with complete risk factor information. Large discrepancies in the data between 2013 and prior years may be a result of these enhanced surveillance efforts and not necessarily indicative of disease trends.

Summary

This report presents hepatitis B and C data collected from case reports submitted to MDSS for calendar year 2013. 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 56 cases of acute hepatitis B infection reported in Michigan in 2013 for a rate of 0.57 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 90% of acute hepatitis B cases in 2013.
 - There was no risk factor that was commonly shared between 2013 acute hepatitis B cases.

Chronic Hepatitis B

- There were 1,130 cases of chronic hepatitis B reported in Michigan in 2013 for a rate of 11.43 cases per 100,000 people. This was a decrease in the rate from 2012, where 14.33 cases per 100,000 were reported.
- Asian-Americans are disproportionately affected by chronic hepatitis B with an infection rate of 89.2 per 100,000, lower than the infection rate of 129.2 per 100,000 in 2012, but much higher than the state average.

Acute Hepatitis C

- There were 74 cases of acute hepatitis C reported in Michigan in 2013 for a rate of 0.75 cases per 100,000 people. This is close to the 2012 infection rate of 0.76 cases per 100,000.
- The average age of acute hepatitis C cases, 33 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 2013.
 - Injection drug use was a factor shared by 60% of the acute hepatitis C cases where data was available.

Hepatitis C, Past or Present

- There were 6,719 cases of hepatitis C, past or present reported in Michigan in 2013 for a rate of 67.98 cases per 100,000 people. This is a sharp decline from the 8005 cases in 2012 and 8050 cases in 2011. Some of this decrease may be attributed to increased efforts at removing duplicate cases throughout 2013.
- The rate of hepatitis C, past or present is almost twice as high in Michigan males (88.7 per 100,000) versus females (47.7 per 100,000).
- American Indians and Alaskan Natives (122.6 per 100,000) and African Americans (94.4 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 38% of hepatitis C, past or present cases in 2013, up from 30% of hepatitis C, past or present cases in 2012.
 - Injection drug use was a factor shared by 34% of cases where data was available. Incarceration was a risk factor in 31% 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 343% increase in the number of chronic hepatitis C cases aged 18 to 25 reported to MDSS.

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

- From 2004-2013, there were 804 persons in Michigan with Hepatitis B/HIV co-infection.
 - 88% 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 57.3%, intravenous drug use (IDU) at 10.3% and heterosexual contact at 9.6%.
 - In 92% of persons with HBV/HIV co-infection, the HIV infection was detected prior to HBV diagnosis.
- In 2013 there were 1,068 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 IDU at 44.2%, MSM at 16.5% and MSM and IDU at 12.5%.
 - 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 and Liver Cancer

- Liver Cancer Incidence – The overall incidence rate for liver cancer in Michigan has remained mostly stable, increasing only by 3% between 2003 and 2011.
 - African American males show the highest incidence rate of liver and intrahepatic bile duct cancer (17.8 cases per 100,000) followed by Caucasian males (8.1 cases per 100,000) in Michigan in 2011. The rate among African American males is 75% greater than among Caucasian males.
 - Incidence of liver and intrahepatic bile duct cancer in African American males has increased by 21% between 2003 and 2011, while incidence in Caucasian males has increased by 8%.
 - In Michigan, the incidence rate in African American females has increased 28% between 2003 and 2011 while the incidence rate in Caucasian females has remained steady over the same time period.
- Liver Cancer Mortality - The overall death rate has increased by 27% between 2003 and 2012 in Michigan.
 - African American males show the highest death rates due to liver and intrahepatic bile duct cancers in Michigan at 8.8 cases per 100,000 in 2012. In comparison, the death rate for Caucasian males was 4.1 per 100,000 and the rate for Caucasian females was 2.0 per 100,000 in 2012. The death rate among African American males was 73% greater than among Caucasian males and 126% greater than among Caucasian females.
 - The death rate for African American males has increased 57% between 2003 and 2012.
 - In Michigan, the death rate in Caucasian males has increased by 24% during between 2003 and 2012 while the death rate in Caucasian females has increased by 18%.

Viral Hepatitis-Related Mortality

- Mortality directly due to viral hepatitis has increased by 36% between 2003 and 2012.
- Deaths due to acute and chronic hepatitis C alone increased by 116% between 2003 and 2012.

Viral Hepatitis Demographic Data

Table 1.1. Summary of Demographic Information by Type of Hepatitis, Michigan, 2013

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
n	56	100%	1130	100%	74	100%	6719	100%
Sex								
Male	39	69.6%	691	61.2%	34	45.9%	4299	64.0%
Female	17	30.4%	437	38.7%	40	54.1%	2400	35.7%
Unknown	0	0.0%	2	0.2%	0	0.0%	20	0.3%
Race or Ethnicity								
Caucasian	37	66.1%	257	22.7%	58	78.4%	3194	47.5%
Black or African American	13	23.2%	286	25.3%	5	6.8%	1306	19.4%
Hispanic	2	3.6%	14	1.2%	2	2.7%	97	1.4%
Asian	0	0.0%	211	18.7%	0	0.0%	23	0.3%
American Indian or Alaskan Native	0	0.0%	5	0.4%	1	1.4%	67	1.0%
Other	0	0.0%	52	4.6%	0	0.0%	90	1.3%
Unknown	4	7.1%	305	27.0%	8	10.8%	1942	28.9%
Age								
Mean	46		46		33		48	
Median	46		47		28		52	
Range	(23-91)		(0-90)		(18-74)		(0-112)	
0-19	0	0.0%	37	3.3%	6	8.1%	124	1.8%
20-29	4	7.1%	147	13.0%	35	47.3%	1102	16.4%
30-39	17	30.4%	223	19.7%	16	21.6%	852	12.7%
40-49	12	21.4%	240	21.2%	8	10.8%	909	13.5%
50-59	13	23.2%	249	22.0%	6	8.1%	2145	31.9%
60+	10	17.9%	234	20.7%	3	4.1%	1572	23.4%
Unknown	0	0.0%	0	0.0%	0	0.0%	15	0.2%

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.

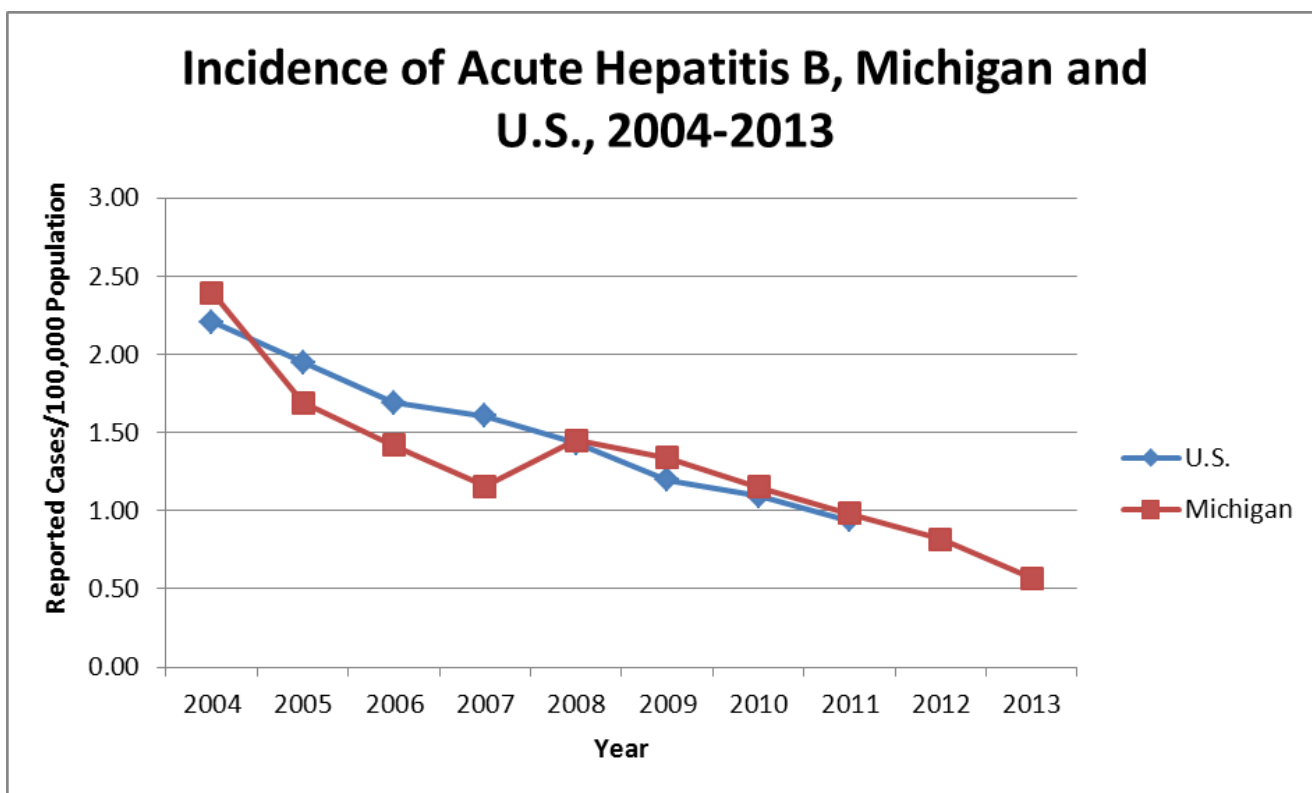
Acute Hepatitis B

Table 1.2 Incidence* of Acute Hepatitis B, Michigan and U.S., 2004-2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
U.S.	2.21	1.95	1.69	1.61	1.43	1.20	1.09	0.94	N/A	N/A
Michigan	2.39	1.69	1.42	1.16	1.45	1.34	1.15	0.98	0.82	0.57

*Incidence per 100,000 Population

Figure 1.1. Incidence of Acute Hepatitis B, Michigan and U.S., 2004-2013



The incidence of acute hepatitis B has decreased in Michigan and in the United States from 2004 through 2013. The incidence of acute cases of hepatitis B decreased by 76% overall from 2004 to 2013 in Michigan. Appendix C contains an incidence map of acute hepatitis B by county in 2013.

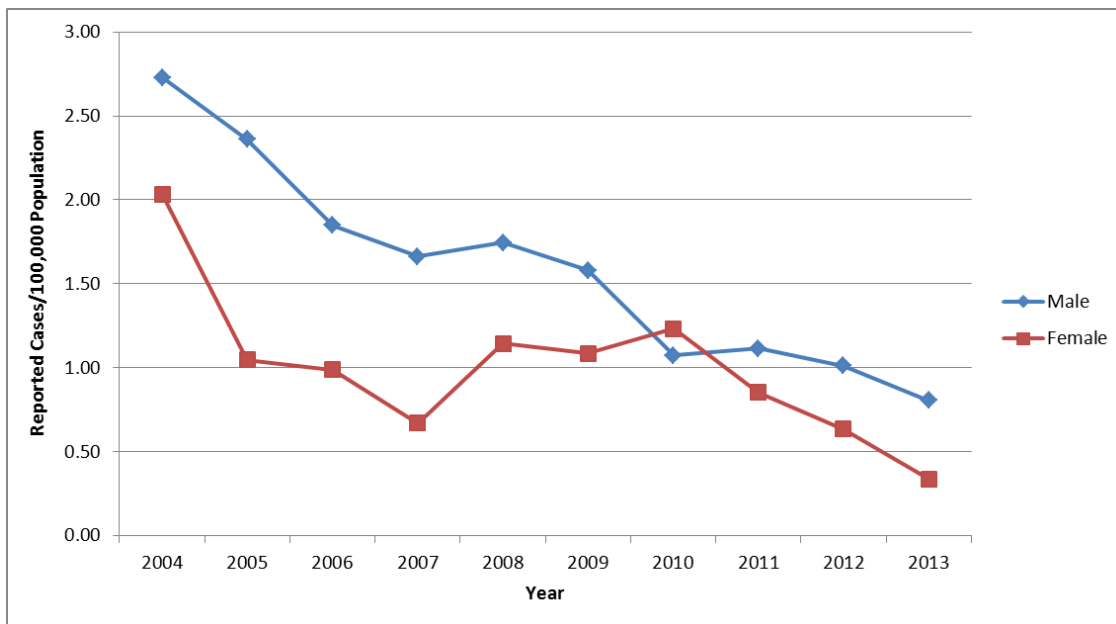
Acute Hepatitis B

Table 1.3. Incidence* of Acute Hepatitis B by Gender, Michigan, 2004-2013

Year	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
2013	0.80	0.34

*Incidence per 100,000 Population

Figure 1.2. Incidence of Acute Hepatitis B by Gender, Michigan, 2004-2013



The incidence of acute hepatitis B has decreased for both sexes from 2004 to 2013. While the overall incidence of acute hepatitis B in females decreased between 2004 and 2013, 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 2013, except during 2010, when incidence in females exceeded incidence in males. In 2013, the rate for males was approximately 2.4 times higher than that for females (0.80 cases and 0.34 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.

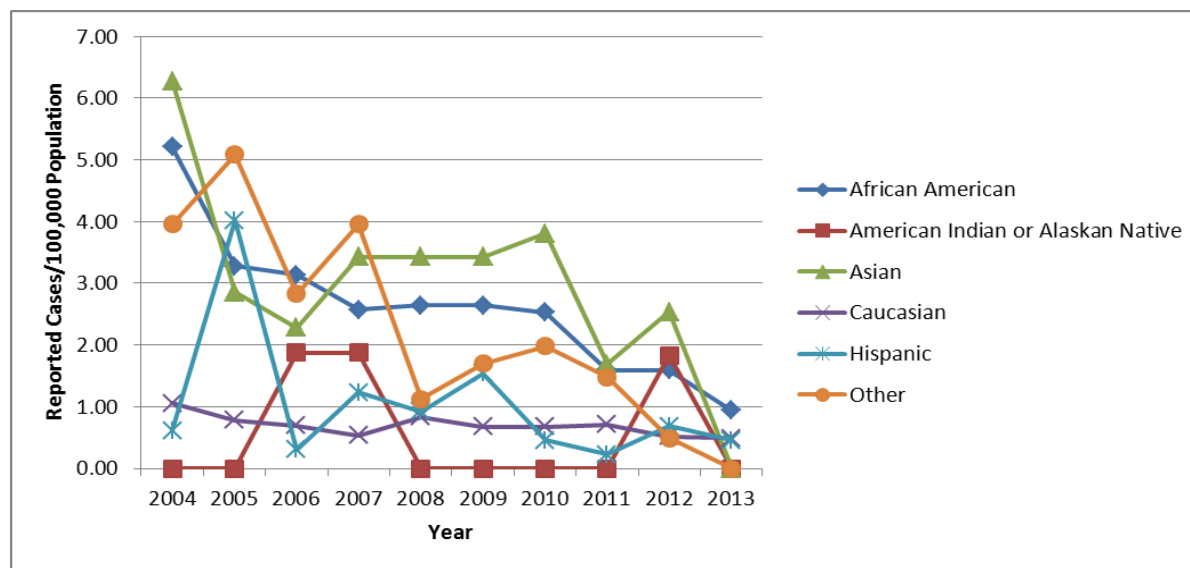
Acute Hepatitis B

Table 1.4. Incidence* of Acute Hepatitis B by Race and Ethnicity, Michigan, 2004-2013

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
2013	0.94	13	0.00	0	0.00	0	0.49	37	0.46	2	0.00	0

*Incidence per 100,000 Population

Figure 1.3. Incidence of Acute Hepatitis B by Race and Ethnicity, Michigan, 2004-2013



African Americans and Caucasians have the greatest incidence of acute hepatitis B in Michigan. Incidence of acute hepatitis B has decreased in all racial and ethnic groups between 2004 and 2013. The largest decrease from 2012 to 2013 was seen in Asians. The incidence in Asians went from being the highest in 2012 at 2.54 cases per 100,000 population to zero in 2013. In 2013, the rate of acute hepatitis B was lowest for Asians and American Indian or Alaskan Natives.

Acute Hepatitis B

Table 1.5a. Completeness of Acute Hepatitis B Reports by Risk Behavior, Michigan, 2013 (n=56)

Risk Behavior	Complete
Injection Drug User	54/56 (96%)
Used Street Drugs	49/56 (88%)
Hemodialysis	53/56 (95%)
Received Blood Products	53/56 (95%)
Received a Tattoo	53/56 (95%)
Accidental Needle Stick	51/56 (91%)
Contact of Person with Hepatitis B	53/56 (95%)
Surgery Other than Oral	43/56 (77%)
Oral Surgery or Dental Work	51/56 (91%)
Employed in Medical Field	51/56 (91%)
Employed as Public Safety Officer	53/56 (95%)
Incarceration Longer than 6 Months	52/56 (93%)
Any Part of Body Pierced (other than ear)	52/56 (93%)

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 B epidemiologic information questions were completed on 90% of case reports. This is a sizable increase from the 70% of acute hepatitis B questions completed in 2012. According to the CDC, the national average for completeness of acute hepatitis B case report forms was 59% in 2011.

Table 1.5b Response of Completed Acute Hepatitis B Reports by Risk Behavior, Michigan 2013

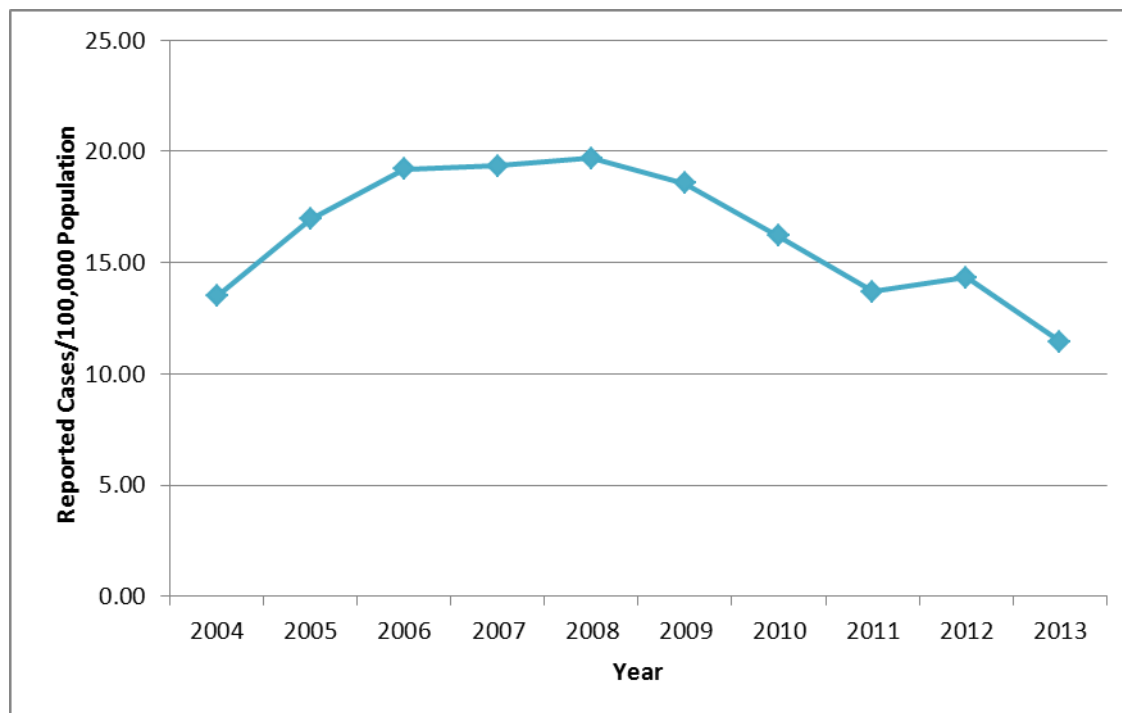
Risk Behavior	Yes*	No*	Unknown*
Injection Drug User	10/54 (19%)	38/54 (70%)	6/54 (11%)
Used Street Drugs	14/49 (29%)	28/49 (57%)	7/49 (14%)
Hemodialysis	0/53 (0%)	43/53 (81%)	10/53 (19%)
Received Blood Products	3/53 (6%)	40/53 (75%)	10/53 (19%)
Received a Tattoo	14/53 (26%)	27/53 (51%)	12/53 (23%)
Accidental Needle Stick	0/51 (0%)	34/51 (66%)	17/51 (33%)
Contact of Person with Hepatitis B	8/53 (15%)	27/53 (51%)	18/53 (34%)
Surgery Other than Oral	12/43 (28%)	24/43 (56%)	7/43 (16%)
Oral Surgery or Dental Work	30/51 (59%)	11/51 (22%)	10/51 (20%)
Employed in Medical Field	1/51 (2%)	39/51 (76%)	11/51 (22%)
Employed as Public Safety Officer	0/53 (0%)	44/53 (83%)	9/53 (17%)
Incarceration Longer than 6 Months	6/52 (12%)	34/52 (65%)	12/52 (23%)
Any Part of Body Pierced (other than ear)	6/52 (12%)	34/52 (65%)	12/52 (23%)

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

Table 1.5b shows the responses among the completed risk behavior questions. Oral surgery or dental work was the most common potential exposure, with 'Yes' being selected on 59% of cases with completed risk behavior questions. No 2013 acute HBV cases were receiving hemodialysis, had an accidental needle stick or worked as a public safety officer.

Chronic Hepatitis B

Figure 2.1. Chronic Hepatitis B Cases per 100,000 Population, Michigan, 2004-2013



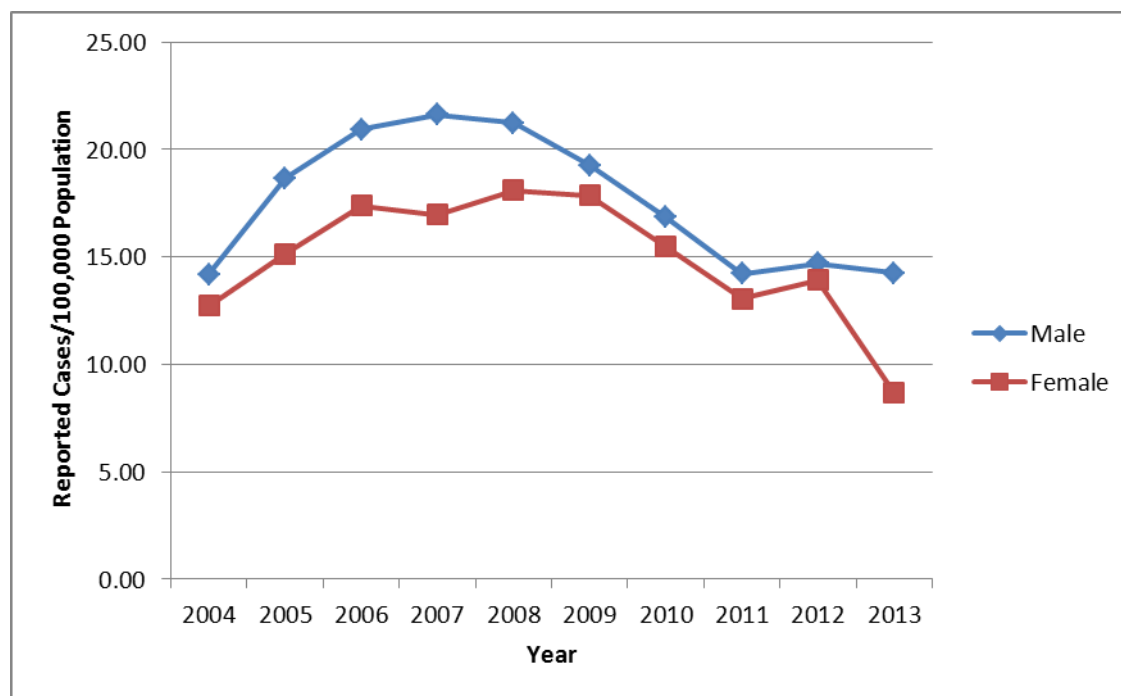
The number of chronic hepatitis B case reports peaked in 2008 in Michigan, and then decreased until 2011. After a small increase in cases in 2012, chronic hepatitis B cases decreased again in 2013. Appendix C contains a map of 2013 chronic hepatitis B rates by county. There is no national benchmark for comparing rates of chronic hepatitis B infection. Decreases in 2013 cases may be due to increased de-duplication efforts, and removal of redundant cases, on the part of MDCH Viral Hepatitis Surveillance staff.

Chronic Hepatitis B

Table 2.1. Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2013

Year	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
2013	14.25	8.68

Figure 2.2. Chronic Hepatitis B Cases per 100,000 Population by Gender, Michigan, 2004-2013



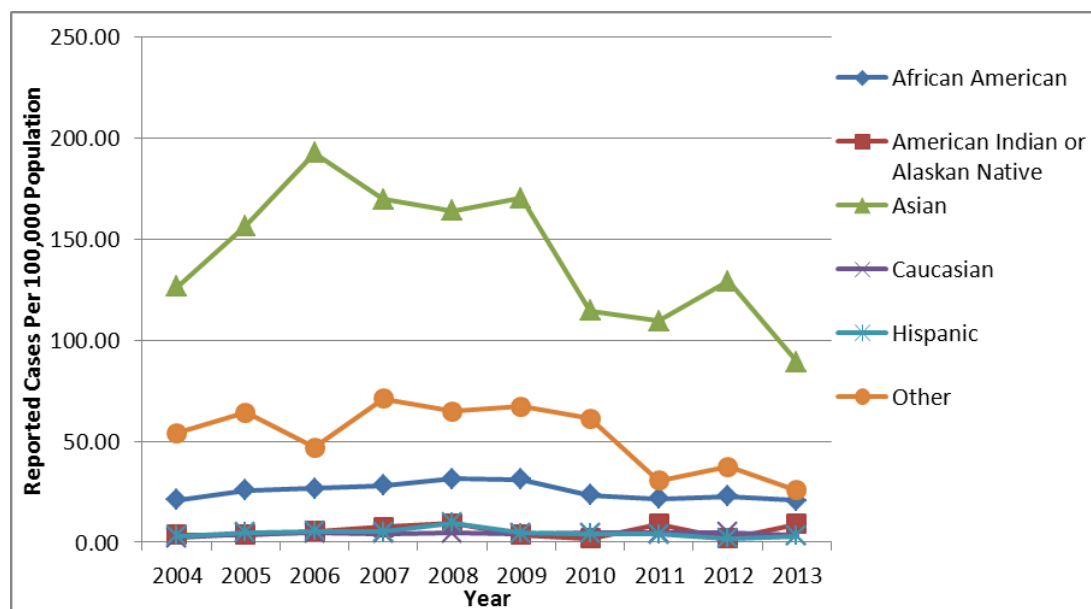
The rate of chronic hepatitis B reporting in Michigan has remained higher among males in comparison to females between the years of 2004 and 2013. The rate for males peaked in 2007, while the rate for females peaked in 2008. The drop in female cases from 2012 to 2013 is largely due to increased emphasis on the removal of duplicate chronic hepatitis B cases, particularly among women of childbearing age.

Chronic Hepatitis B

Table 2.2. Chronic Hepatitis B Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2013

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
2013	20.67	286	9.15	5	89.22	211	3.40	257	3.21	14	25.69	52

Figure 2.3. Chronic Hepatitis B Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2013



Asians have the highest rate of chronic hepatitis B infection in Michigan, followed by African Americans. In 2013 the rate of chronic hepatitis B in Asians was 89.22 per 100,000 population. That rate is 26.2 times higher than the 2013 Caucasian rate (3.4 cases per 100,000 population) and 4.3 times higher than the 2013 African American rate (20.67 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.

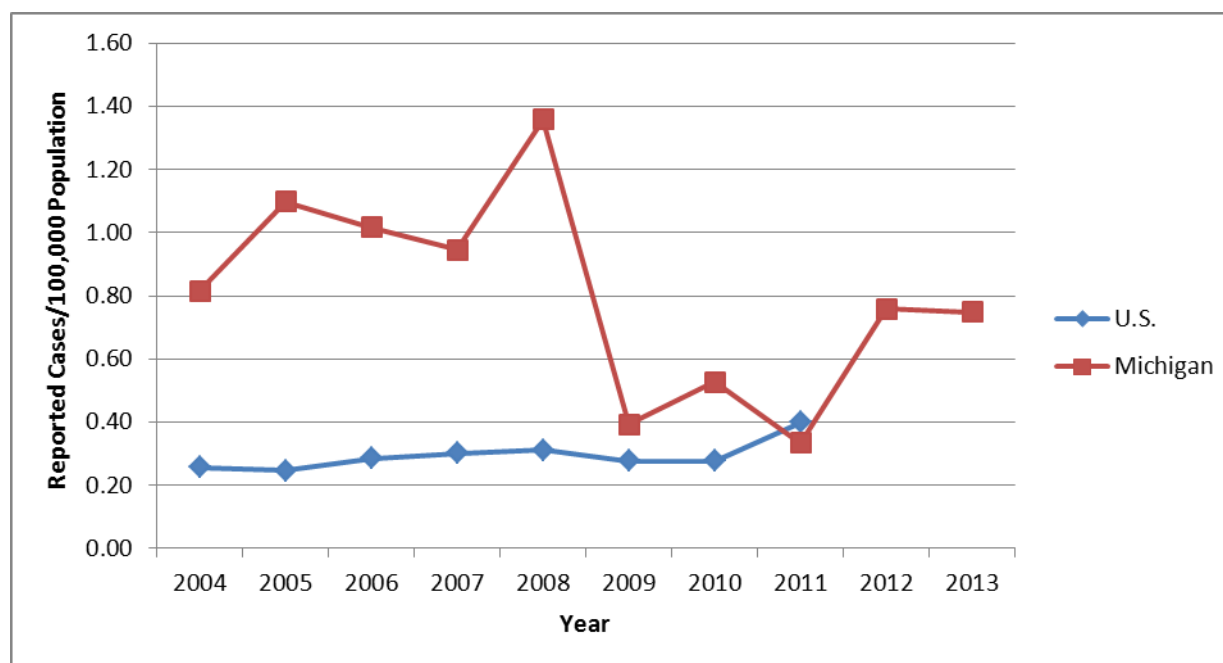
Acute Hepatitis C

Table 3.1. Incidence* of Acute Hepatitis C, Michigan and U.S., 2004-2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
U.S.	0.26	0.25	0.28	0.30	0.31	0.28	0.28	0.40	N/A	N/A
Michigan	0.82	1.10	1.02	0.95	1.36	0.39	0.53	0.33	0.76	0.75

*Incidence per 100,000 Population

Figure 3.1. Incidence of Acute Hepatitis C, Michigan and U.S., 2004-2013



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 2013, 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 and beyond. The number of acute hepatitis C cases stayed relatively stable from 2012 to 2013. Appendix C contains an incidence map of acute hepatitis C by county in 2013.

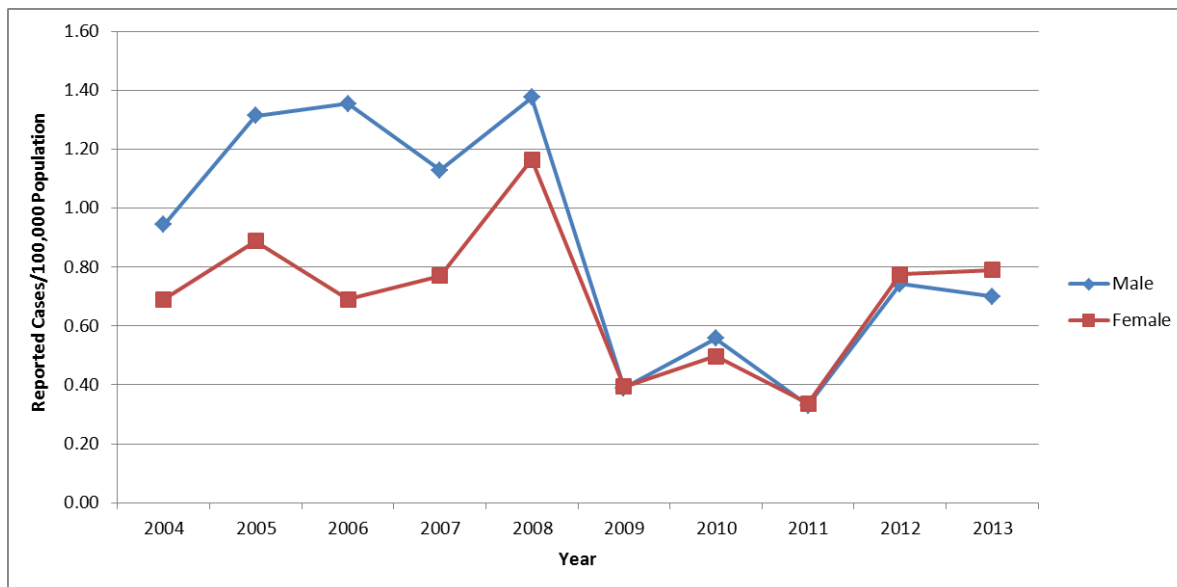
Acute Hepatitis C

Table 3.2. Incidence* of Acute Hepatitis C by Gender, Michigan, 2004-2013

Year	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
2013	0.70	0.79

*Incidence per 100,000 Population

Figure 3.2. Incidence of Acute Hepatitis C by Gender, Michigan, 2004-2013



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. There were slightly more female cases than male cases in 2012 and 2013.

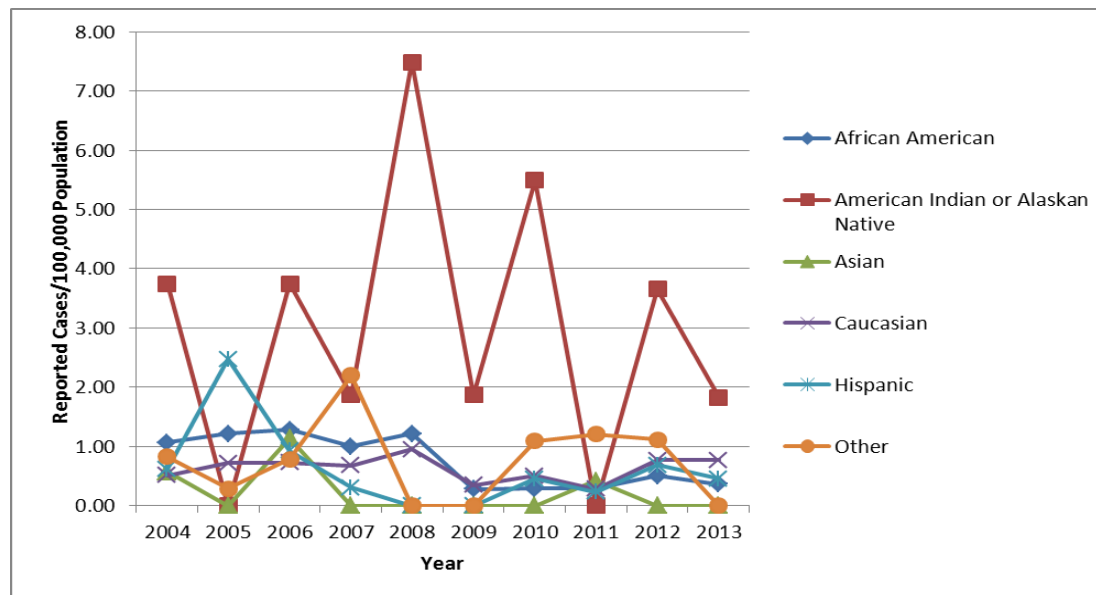
Acute Hepatitis C

Table 3.3. Incidence* of Acute Hepatitis C by Race and Ethnicity, Michigan, 2004-2013

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
2013	0.36	5	1.83	1	0.00	0	0.77	58	0.46	2	0.00	0

*Incidence per 100,000 Population

Figure 3.3. Incidence of Acute Hepatitis C by Race and Ethnicity, Michigan, 2004-2013



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 0.36 cases per 100,000 in 2013. 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 2013. 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 1.83 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, 2013 (n=74)

Risk Behavior	Completed
Injection Drug User	62/74 (83%)
Used Street Drugs	50/74 (68%)
Hemodialysis	57/74 (77%)
Received Blood Products	58/74 (78%)
Received a Tattoo	58/74 (78%)
Accidental Needle Stick	54/74 (73%)
Contact of Person with Hepatitis C	58/74 (78%)
Other Surgery	55/74 (74%)
Oral Surgery or Dental Work	58/74 (78%)
Employed in Medical Field	57/74 (77%)
Employed as Public Safety Officer	58/74 (78%)
Incarceration Longer than 6 Months	58/74 (78%)
Any Part of Body Pierced (other than ear)?	56/74 (76%)

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 77% of case reports. This is a slight increase from the 75% of case report questions completed in 2012. 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.

Table 3.4b. Response of Completed Acute Hepatitis C Reports by Risk Behavior, Michigan, 2013

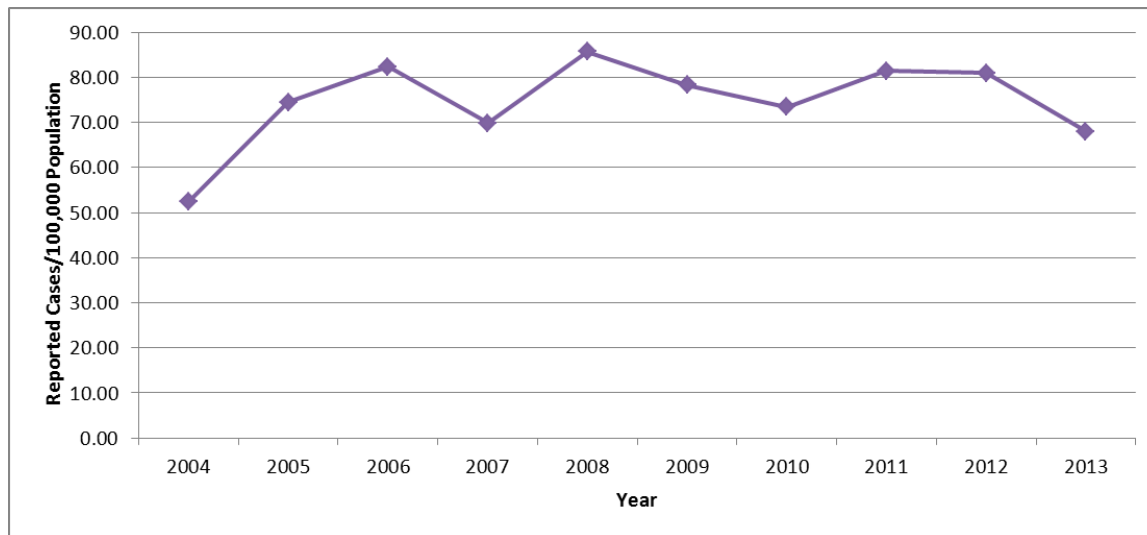
Risk Behavior	Yes*	No*	Unknown*
Injection Drug User	37/62 (60%)	18/62 (29%)	7/62 (11%)
Used Street Drugs	22/50 (44%)	16/50 (32%)	12/50 (24%)
Hemodialysis	0/57 (0%)	40/57 (70%)	17/57 (30%)
Received Blood Products	1/58 (2%)	39/58 (67%)	18/58 (31%)
Received a Tattoo	26/58 (45%)	14/58 (24%)	18/58 (31%)
Accidental Needle Stick	1/54 (2%)	30/54 (55%)	23/54 (43%)
Contact of Person with Hepatitis C	23/58 (40%)	14/58 (24%)	21/58 (36%)
Surgery Other than Oral	10/55 (18%)	25/55 (45%)	20/55 (36%)
Oral Surgery or Dental Work	13/58 (22%)	20/58 (34%)	25/58 (43%)
Employed in Medical Field	4/57 (7%)	33/57 (58%)	20/57 (35%)
Employed as Public Safety Officer	0/58 (0%)	42/58 (72%)	16/58 (28%)
Incarceration Longer than 6 Months	7/58 (12%)	25/58 (43%)	26/58 (45%)
Any Part of Body Pierced (other than ear)?	9/56 (16%)	22/56 (39%)	25/56 (45%)

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

Hepatitis C, Past or Present

Figure 4.1. Hepatitis C, Past or Present Cases per 100,000 Population, Michigan, 2004-2013



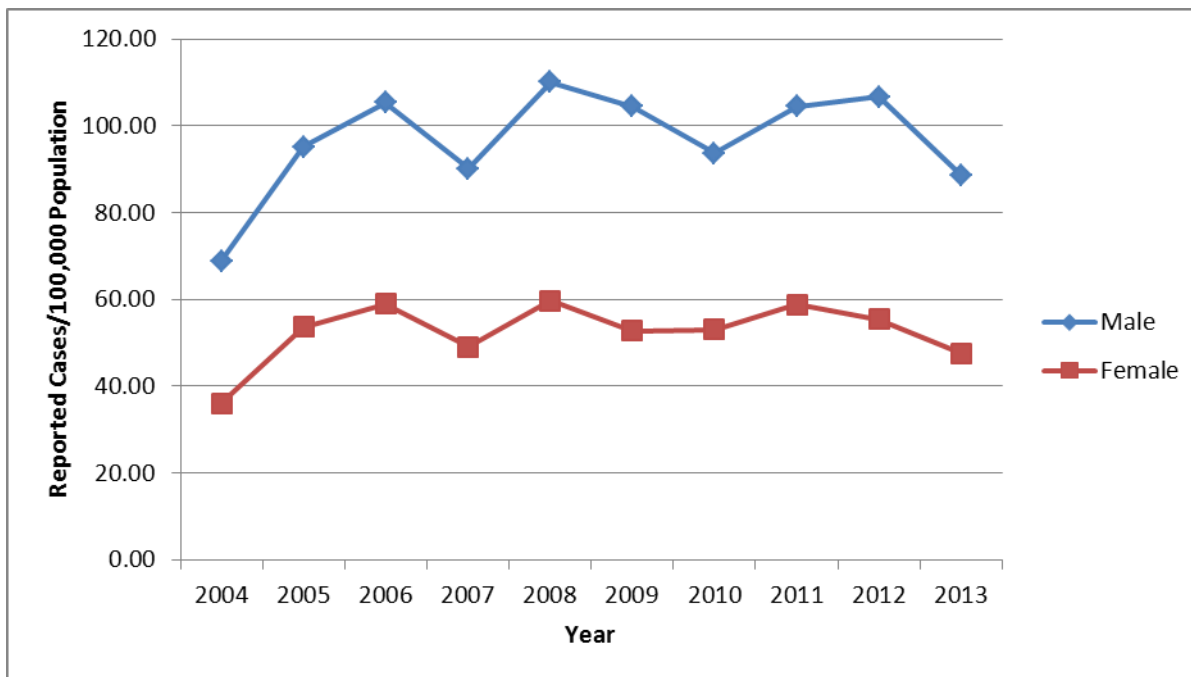
Reported cases of hepatitis C, past or present in Michigan have increased 29% between 2004 and 2013. There is no nationally available benchmark for comparing rates of hepatitis C, past or present. There was a decrease in the number of cases from 2012 to 2013, most likely due to increased efforts to remove duplicate cases. Appendix C contains a map of hepatitis C, past or present by county for 2013. Decreases in 2013 cases may be due to increased de-duplication efforts, and removal of redundant cases, on the part of MDCH Viral Hepatitis Surveillance staff.

Hepatitis C, Past or Present

Table 4.1. Hepatitis C, Past or Present Cases per 100,000 Population by Gender, Michigan, 2004-2013

Year	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
2013	88.67	47.66

Figure 4.2. Hepatitis C, Past or Present Cases per 100,000 Population by Gender, Michigan, 2004-2013



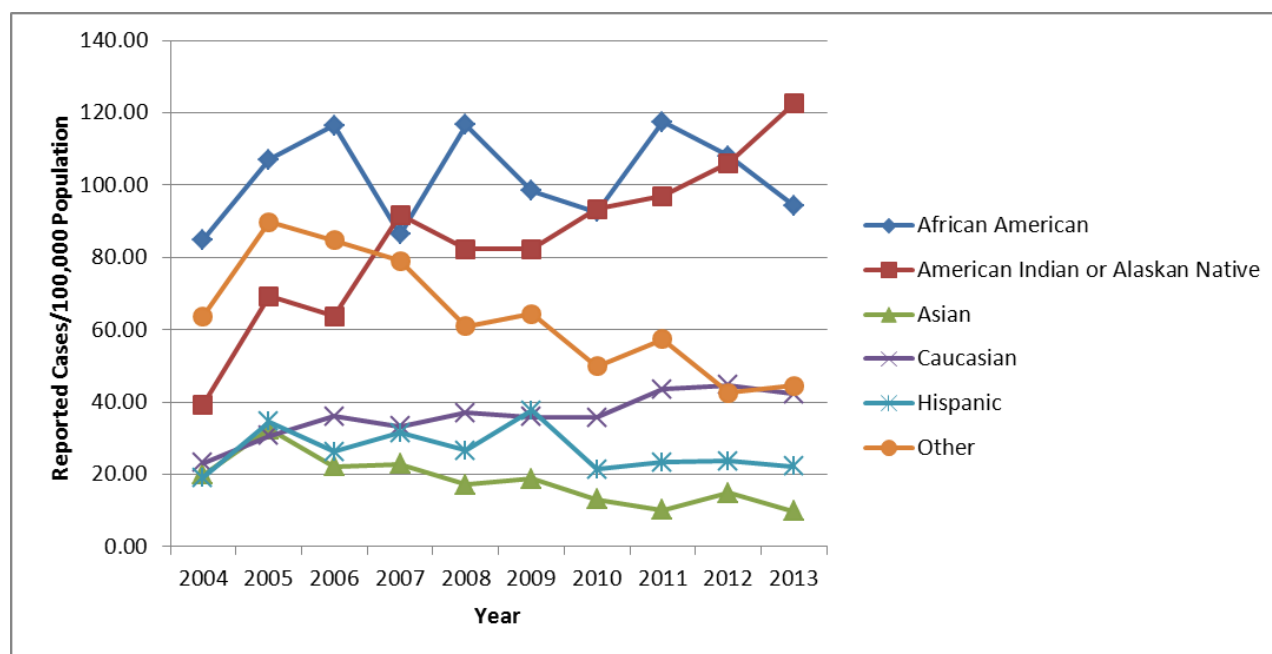
Males account for the majority of chronic hepatitis C cases. In 2013, the rate of hepatitis C, past or present reports was 1.9 times higher in males than females. Between 2004 and 2013, the rate of chronic hepatitis C infection increased by 29% in males and 32% in females.

Hepatitis C, Past or Present

Table 4.2. Hepatitis C, Past or Present Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2013

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
2013	94.38	1306	122.56	67	9.73	23	42.19	3194	22.23	97	44.46	90

Figure 4.3. Hepatitis C, Past or Present Cases per 100,000 by Race and Ethnicity, Michigan, 2004-2013



In 2013 in Michigan, American Indian/Alaskan Natives have the highest rate of hepatitis C, past or present infection, followed by African Americans, Caucasians, Hispanics and then Asians. The rate of hepatitis C, past or present infection in American Indian/Alaskan Natives has increased 212% between 2004 and 2013, the highest increase among races/ethnicities. Only Asians have experienced a decrease in hepatitis C, past or present infection rate during the 2004 to 2013 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, perhaps identified due to increases in testing and awareness.

Hepatitis C, Past or Present

Table 4.3a. Completeness of Hepatitis C, Past or Present Reports by Risk Behavior, Michigan, 2013 (n=6719)

Risk Behavior	Completed
Received Blood Transfusion Prior to 1992	2584/6719 (38%)
Received an Organ Transplant Prior to 1992	2560/6719 (38%)
Received Clotting Factor Concentrates Prior to 1992	2575/6719 (38%)
Hemodialysis	2536/6719 (38%)
Injection Drug User	2646/6719 (39%)
Incarcerated in Lifetime	2588/6719 (39%)
Treated for a Sexually Transmitted Disease in Lifetime	2478/6719 (37%)
Contact of Person with Hepatitis C	2584/6719 (38%)
Employed in Medical Field	2517/6719 (37%)

Table 4.3b. Response of Completed Hepatitis C, Past or Present Reports by Risk Behavior, Michigan, 2013

Risk Behavior	Yes*	No*	Unknown*
Received Blood Transfusion Prior to 1992	147/2584 (6%)	993/2584 (38%)	1444/2584 (56%)
Received an Organ Transplant Prior to 1992	3/2560 (0.1%)	1223/2560 (48%)	1334/2560 (52%)
Received Clotting Factor Concentrates Prior to 1992	9/2575 (0.3%)	1156/2575 (45%)	1410/2575 (55%)
Hemodialysis	21/2536 (0.8%)	1202/2536 (47%)	1313/2536 (52%)
Injection Drug User	901/2646 (34%)	571/2646 (22%)	1174/2646 (44%)
Incarcerated in Lifetime	815/2588 (31%)	401/2588 (15%)	1372/2588 (53%)
Treated for a Sexually Transmitted Disease in Lifetime	258/2478 (10%)	628/2478 (25%)	1592/2478 (64%)
Contact of Person with Hepatitis C	467/2584 (18%)	386/2584 (15%)	1731/2584 (67%)
Employed in Medical Field	99/2517 (4%)	1005/2517 (40%)	1413/2517 (56%)

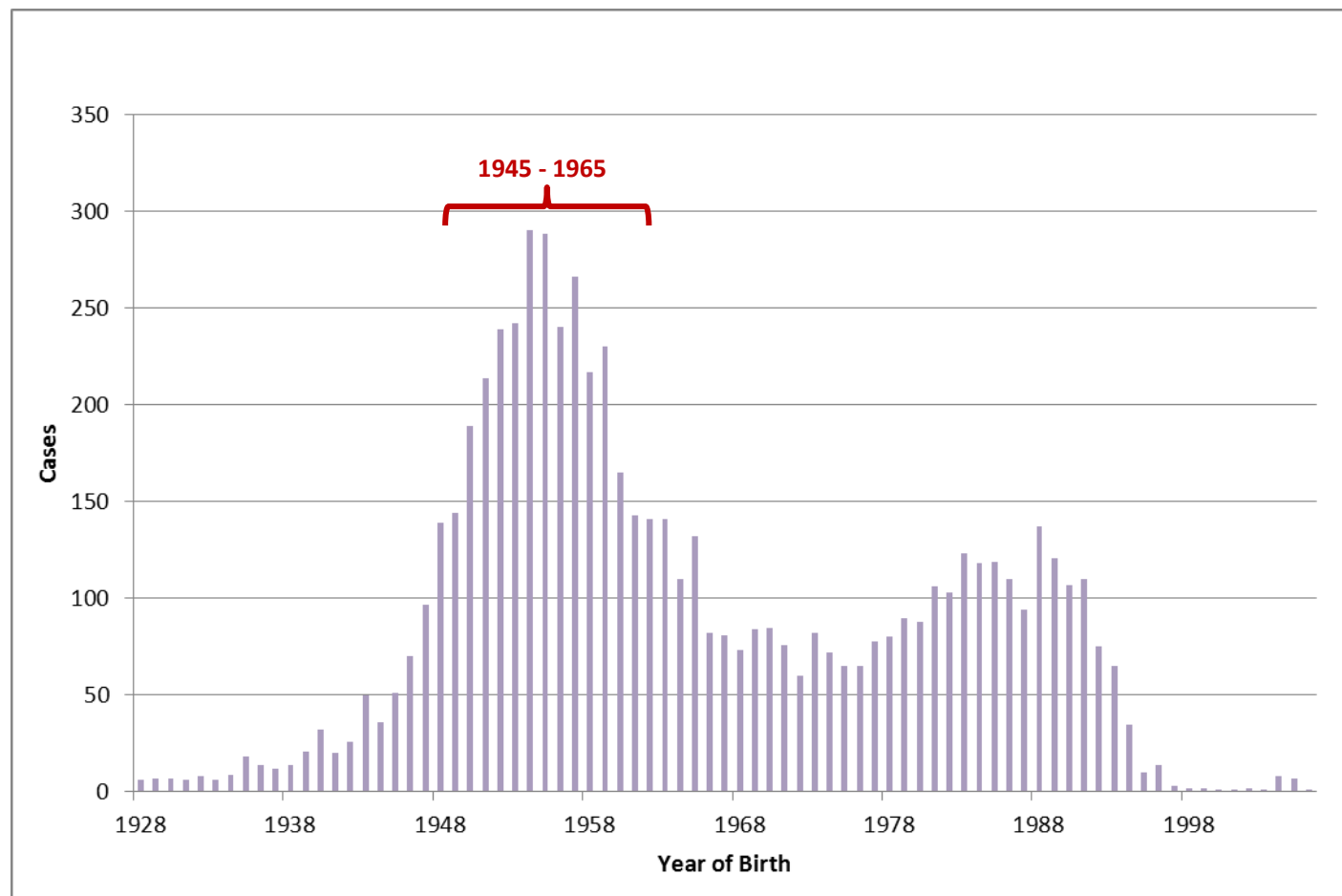
* Percentages calculated based upon those who completed the field; excludes missing data

Table 4.3a shows the percentage of hepatitis C, past or present 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 hepatitis C, past or present epidemiologic information questions were completed on 38% of case reports. This is a 10% increase from 2012. 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 hepatitis C, past or present.

Hepatitis C, Past or Present

Figure 4.4. Number of Hepatitis C, Past or Present Cases Reported to MDCH by Year of Birth, 2013



This figure depicts the number of hepatitis C, past or present cases reported to MDCH by birth year in 2013. “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 hepatitis C, past or present diagnoses in Michiganders born between 1945 and 1965 is greater than any other birth cohort.

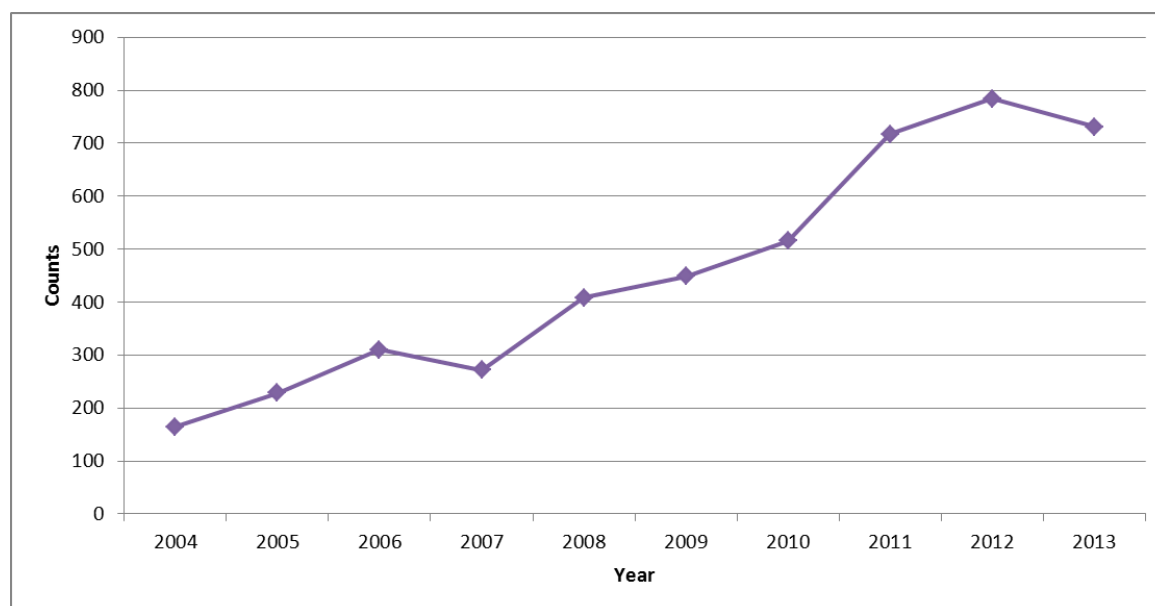
A second smaller ‘peak’ of hepatitis C cases exists in young adults born between approximately 1978 and 1992. An emerging epidemic of HCV in young adults has been identified in areas across the US and it is reasonable to assume that Michigan is not exempt from this observation. For more information please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

Hepatitis C, Past or Present

Table 4.4. Hepatitis C, Past or Present Cases between 18 and 25 Years of Age, Michigan, 2004-2013

Year	Cases	Percentage of Total Cases
2004	165	3%
2005	228	3%
2006	310	4%
2007	272	4%
2008	408	5%
2009	449	6%
2010	515	7%
2011	717	9%
2012	784	10%
2013	731	11%

Figure 4.5. Hepatitis C, Past or Present Cases between 18 and 25 Years of Age, Michigan, 2004-2013



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 2013, the number of cases has increased 343%, from 165 cases in 2004 to 731 cases in 2013.

More detailed information on hepatitis C infection in young adults can be found on the MDCH viral hepatitis website and in the links below:

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

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

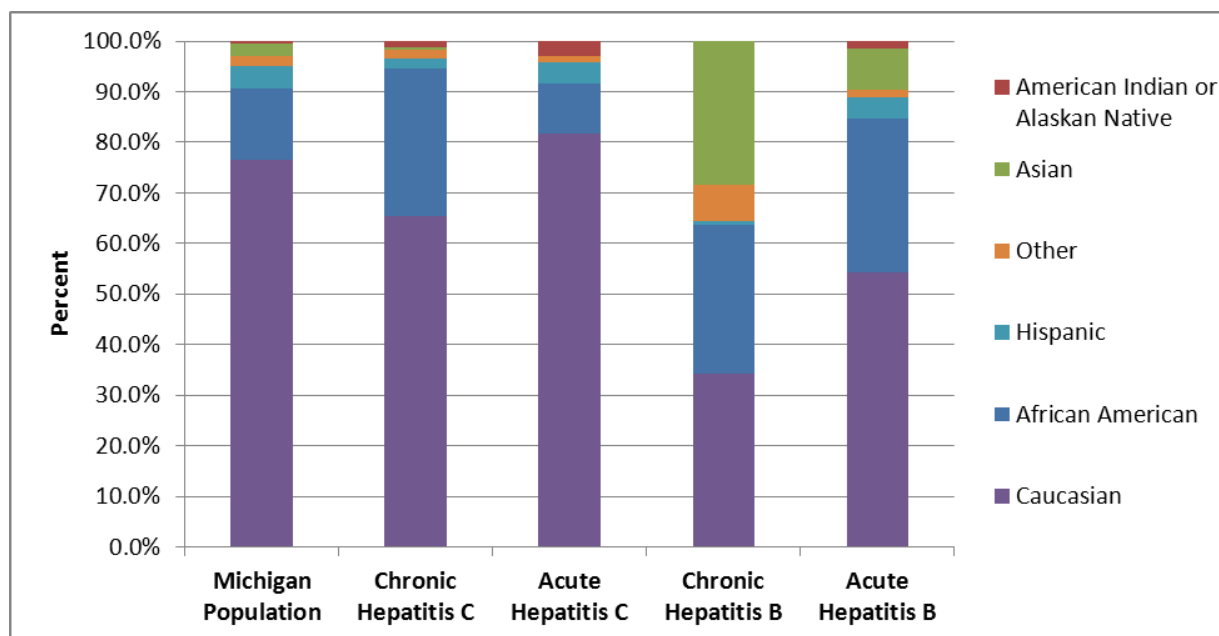
[Emerging Epidemic of Hepatitis C Virus Infections Among Young Non-Urban Persons who Inject Drugs in the United States, 2006–2012. Clin Infect Dis. Aug 2014.](#)

Racial Disparities

Table 5.1. Racial Distribution of Total Population and Hepatitis Population, Michigan, 2013

	African American	American Indian or Alaskan Native	Asian	Caucasian	Hispanic	Other
Michigan Population	14.0%	0.6%	2.4%	76.6%	4.4%	2.0%
Chronic Hepatitis C	27.3%	1.4%	0.5%	66.9%	2.0%	1.9%
Acute Hepatitis C	7.6%	1.5%	0.0%	87.9%	3.0%	0.0%
Chronic Hepatitis B	34.7%	0.6%	25.6%	31.2%	1.7%	6.3%
Acute Hepatitis B	25.0%	0.0%	0.0%	71.2%	3.8%	0.0%

Figure 5.1. Racial Distribution of Total Population and Hepatitis Population, Michigan, 2013



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 2013. 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 25% of all chronic HBV infections diagnosed in Michigan in 2013. Similarly, African-Americans represent 14% of the Michigan population but make up 27% of hepatitis C, past or present and 35% of chronic HBV infections, respectively, and 25% 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 88% of all cases.

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, 2004-2013

Variable	Hepatitis B	% Hepatitis B	Hepatitis C	% Hepatitis C
n	804		1068	
Sex				
Male	707	87.9%	756	70.8%
Female	97	12.1%	304	28.5%
Unknown	0	0.0%	8	0.7%
Race				
Caucasian	209	26.0%	310	29.0%
Black or African American	549	68.3%	672	62.9%
Hispanic	22	2.7%	34	3.2%
Asian	7	0.9%	14	1.3%
American Indian or Alaskan Native	1	0.1%	3	0.3%
Multi/Other/Unknown	16	2.0%	35	3.3%
HIV Transmission Risk				
MSM	461	57.3%	176	16.5%
IDU	83	10.3%	472	44.2%
MSM/IDU	34	4.2%	134	12.5%
Blood Recipient	7	0.9%	34	3.2%
Heterosexual	77	9.6%	125	11.7%
Perinatal	1	0.1%	2	0.2%
Unknown/Undetermined	141	17.5%	125	11.7%
Age at Coinfection				
0-19	7	0.9%	4	0.4%
20-29	102	12.7%	53	5.0%
30-39	231	28.7%	127	11.9%
40-49	286	35.6%	342	32.0%
50-59	140	17.4%	433	40.5%
60+	38	4.7%	109	10.2%
First Disease in Coinfection				
HIV	741	92.2%	991	92.8%
Hepatitis	60	7.5%	77	7.2%
Same	3	0.4%	0	0.0%

Viral Hepatitis and HIV Co-infection

Between 2004 and 2013, 1068 people were reported in Michigan with HIV/HCV co-infection. Seventy-one percent of those co-infected were male and 44.2% had intravenous drug use documented as their transmission risk.

Of the 804 cases reported with HIV/HBV co-infection between 2004 and 2013 in Michigan, 87.9% were men. MSM (men who have sex with men) was reported as the HIV risk factor for 57.3% of all those with HIV/HBV co-infection and 65.2% 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 (44.2%) versus the HBV/HIV co-infection group (10.3%). 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.

Viral Hepatitis and Liver Cancer

Figure 7.1 Age-adjusted incidence rates of invasive cancers of the liver and intrahepatic bile ducts by race and sex, Michigan, 2003-2011

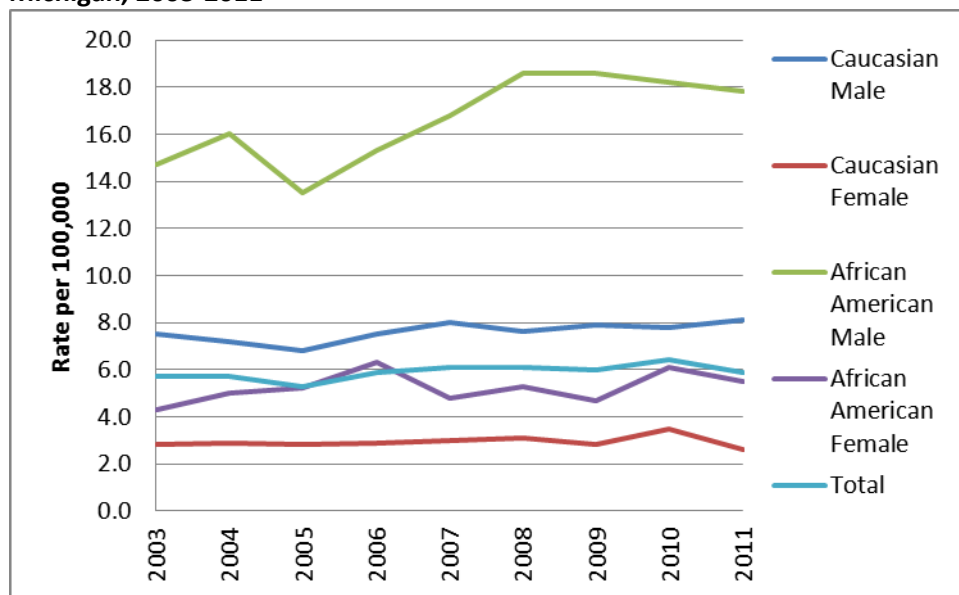
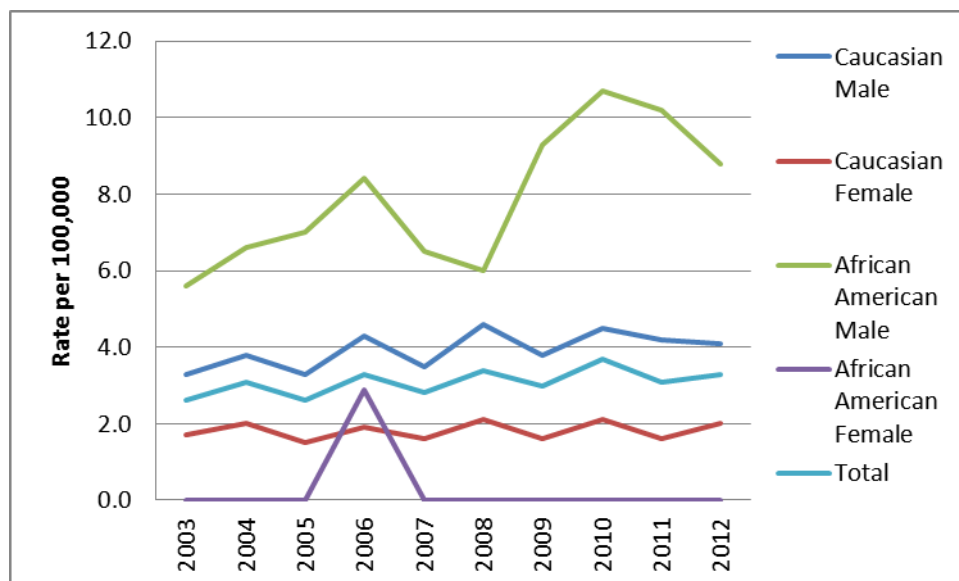


Figure 7.2 Age-adjusted death rates due to invasive cancer of the liver and intrahepatic bile ducts by race and sex, Michigan, 2003-2012



Source: Michigan Resident Cancer Incidence File. Includes cases diagnosed in 2003 – 2011 and processed by the Michigan Department of Community Health, Division for Vital Records and Health Statistics by November 30, 2013.

Note: Rates for African American females were unavailable for all years except 2006 due to a small number of cases.

Viral Hepatitis and Liver Cancer

Data shown in Figures 7.1 and 7.2 were provided by the MDCH Division for Vital Records and Health Statistics using the Michigan Resident Cancer Incidence File.

Long-term infection with hepatitis B or C is a cause of liver and intrahepatic bile duct cancer. Figure 7.1 shows the rate per 100,000 population of new cases of liver and intrahepatic bile duct cancer per year from 2003 to 2011 in Michigan residents. The overall rate of liver and intrahepatic bile duct cancer in Michigan was 5.9 per 100,000 in Michigan in 2011. African American males have an incidence rate of 17.8 per 100,000, which is 75% higher than that of Caucasian males (8.1 per 100,000).

The liver and intrahepatic bile duct cancer incidence has risen 3% between 2003 (5.7 per 100,000) and 2011 (5.9 per 100,000). Incidence in African American males has increased by 21% between 2003 and 2011, while incidence in Caucasian males has increased by 8%. The incidence rate in African American females has increased 28% between 2003 and 2011 while the incidence rate in Caucasian females has remained steady over the same time period. Caucasian females show the lowest incidence rate of liver and intrahepatic bile duct cancer.

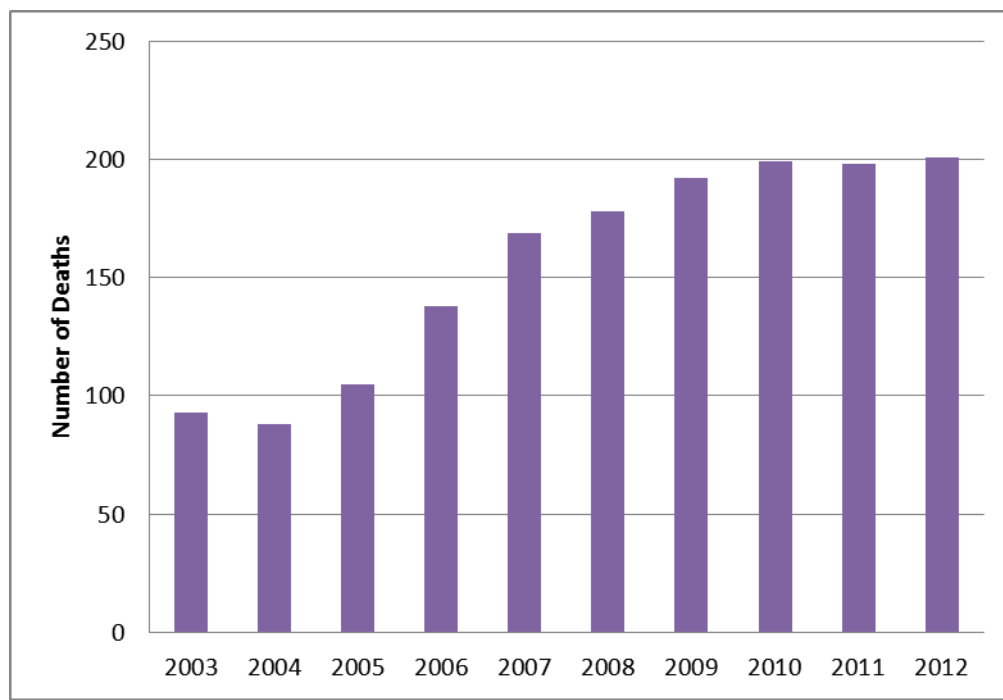
Figure 7.2 shows the death rate per 100,000 Michigan population due to invasive cancer of the liver and intrahepatic bile ducts between 2003 and 2012. The liver and intrahepatic bile duct mortality rate in Michigan in 2012 was 3.3 per 100,000. This mortality rate has risen 27% from 2003 to 2012.

African American males show the highest death rates due to these cancers and rates have increased between 2003 and 2012. The death rate for African American males has increased 57% over this time period. The death rate in African American males (8.8 per 100,000) is 73% higher than the rate in Caucasian males (4.1 per 100,000). The death rate in Caucasian males has increased by 24% during between 2003 and 2012 while the death rate in Caucasian females has increased by 18%.

There are clearly noticeable racial/ethnic disparities when it comes to viral hepatitis infections and infection outcomes. It should come as little surprise that the population with highest viral hepatitis prevalence (African-Americans and males) have the highest rates of liver and intrahepatic bile duct cancer and mortality. Further, in [last year's Annual Report](#), we showed that African Americans are diagnosed with HCV, on average, 11.9 years later than Caucasians. This delay in HCV diagnosis in African Americans likely results in delays in liver evaluation, preventative counseling, and treatment, during which the individual's liver may become increasingly damaged. Ultimately, this may result in a higher proportion of infected African-Americans progressing to liver disease, liver cancer, and suffering from liver cancer-related mortality.

Viral Hepatitis-Related Mortality

Figure 8.1. Deaths Due to Acute and Chronic Hepatitis C, Michigan, 2003-2012



Source: Vital Records and Health Statistics Section, Michigan Department of Community Health

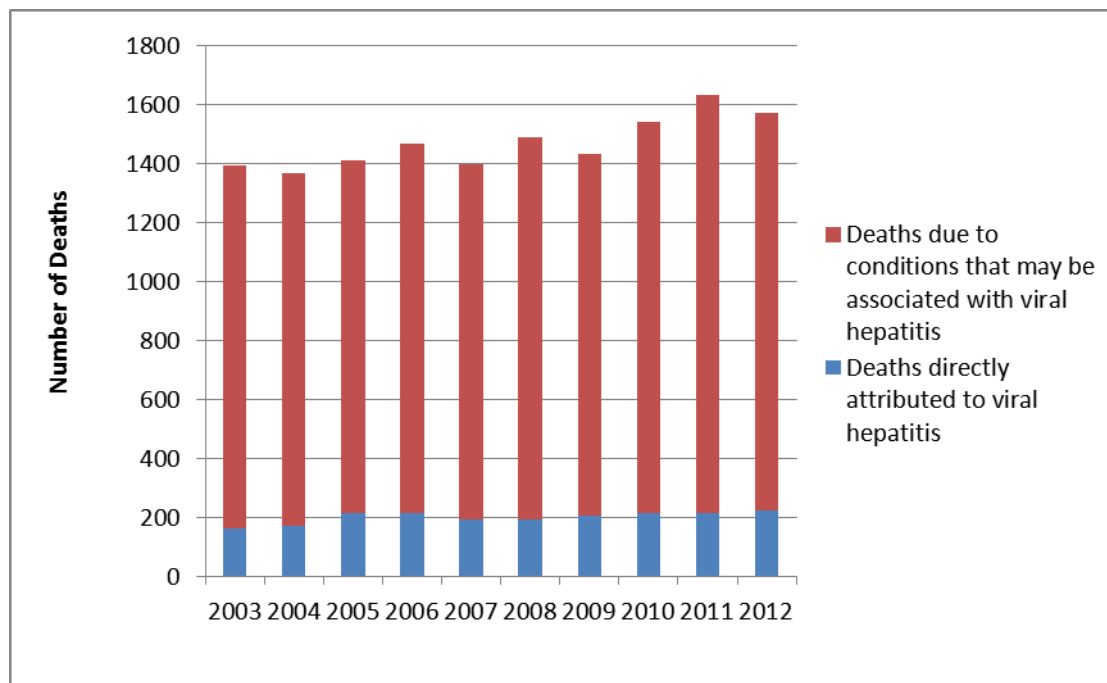
Hepatitis B and C are well-recognized causes of liver-related disease and death. The Vital Records and Health Statistics Section provided the above data on underlying causes of death in Michigan residents between 2003 and 2012, as listed on death certificates. Data on underlying causes of death is classified using the Tenth Revision of the International Classification of Diseases (ICD-10).

Figure 8.1 shows deaths with an underlying cause of acute or chronic hepatitis C.

In 2012 there were 201 deaths directly attributed to Hepatitis C in Michigan. Between 2003 and 2012, deaths due to acute and chronic hepatitis C increased by 116%.

Viral Hepatitis-Related Mortality

Figure 8.2 Mortality directly and indirectly attributed to viral hepatitis, Michigan, 2003-2012



Source: Vital Records and Health Statistics Section, Michigan Department of Community Health

Deaths shown in Figure 8.2 are either directly attributed to viral hepatitis infection or are due to conditions that can be associated with viral hepatitis. The notes section below indicates which ICD-10 codes we attributed as a cause of death directly related to viral hepatitis and which were conditions associated with, though not necessarily directly a result of, viral hepatitis. Deaths due to conditions that are associated with viral hepatitis may be the result of a non-viral hepatitis related condition (e.g. cirrhosis as a result of alcohol consumption).

Mortality directly due to viral hepatitis has increased by 36% between 2003 (163 deaths) and 2012 (222 deaths). Mortality due to conditions that may be associated with viral hepatitis has increased by 10% over the same time period (1,230 in 2003 and 1,349 in 2012).

Note:

Deaths that are directly attributed to viral hepatitis include the following ICD-10 diagnoses:

- B16.2 - Acute hepatitis B without delta-agent with hepatic coma
- B16.9 - Acute hepatitis B without delta-agent and without hepatic coma
- B17.1 - Acute hepatitis C
- B17.9 - Acute viral hepatitis, unspecified
- B18.1 - Chronic viral hepatitis B without delta-agent
- B18.2 - Chronic viral hepatitis C
- B18.9 - Chronic viral hepatitis, unspecified
- B19.9 - Unspecified viral hepatitis without hepatic coma
- B94.2 - Sequelae of viral hepatitis

Deaths due to conditions that are known to be associated with viral hepatitis include the following ICD-10 diagnoses:

Viral Hepatitis-Related Mortality

C22.0 - Liver cell carcinoma
C22.9 - Malignant neoplasm of liver, not specified as primary or secondary
K71.7 - Toxic liver disease with fibrosis and cirrhosis of liver
K72.1 - Chronic hepatitis failure
K72.9 - Hepatic failure, unspecified
K73.2 - Chronic active hepatitis, not elsewhere classified
K73.9 - Chronic hepatitis, not specified
K74.0 - Hepatic fibrosis
K74.1 - Hepatic sclerosis
K74.3 - Primary biliary cirrhosis
K74.4 - Secondary biliary cirrhosis
K74.5 - Biliary cirrhosis, unspecified
K74.6 - Other and unspecified cirrhosis of liver
K75.9 - Inflammatory liver disease, not specified
K76.6 - Portal hypertension
K76.9 - Liver disease unspecified

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 8.1 Reported Cases of Hepatitis by County, Michigan, 2013

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	-	-	1	9.14	-	-	9	82.25
Alger County	9,601	-	-	-	-	-	-	7	72.91
Allegan County	111,408	-	-	6	5.39	-	-	33	29.62
Alpena County	29,598	1	3.38	2	6.76	-	-	17	57.44
Antrim County	23,580	-	-	1	4.24	-	-	9	38.17
Arenac County	15,899	-	-	-	-	-	-	4	25.16
Baraga County	8,860	-	-	1	11.29	1	11.29	29	327.31
Barry County	59,173	-	-	2	3.38	-	-	19	32.11
Bay County	107,771	1	0.93	2	1.86	-	-	70	64.95
Benzie County	17,525	-	-	-	-	-	-	5	28.53
Berrien County	156,813	-	-	18	11.48	1	0.64	75	47.83
Branch County	45,248	-	-	-	-	-	-	18	39.78
Calhoun County	136,146	-	-	35	25.71	1	0.73	129	94.75
Cass County	52,293	-	-	3	5.74	-	-	23	43.98
Charlevoix County	25,949	-	-	-	-	-	-	12	46.24
Cheboygan County	26,152	-	-	-	-	-	-	19	72.65
Chippewa County	38,520	-	-	15	38.94	1	2.60	65	168.74
Clare County	30,926	-	-	2	6.47	-	-	20	64.67
Clinton County	75,382	-	-	4	5.31	-	-	30	39.80
Crawford County	14,074	1	7.11	-	-	1	7.11	15	106.58
Delta County	37,069	4	10.79	2	5.40	3	8.09	34	91.72
Detroit City County*	713,777	9	1.26	173	24.24	6	0.84	1111	155.65
Dickinson County	26,168	-	-	2	7.64	2	7.64	34	129.93
Eaton County	107,759	-	-	9	8.35	-	-	52	48.26
Emmet County	32,694	-	-	-	-	1	3.06	11	33.65
Genesee County	425,790	3	0.70	39	9.16	4	0.94	262	61.53
Gladwin County	25,692	-	-	1	3.89	1	3.89	15	58.38
Gogebic County	16,427	-	-	-	-	1	6.09	14	85.23
Grand Traverse County	86,986	1	1.15	1	1.15	3	3.45	72	82.77
Gratiot County	42,476	-	-	1	2.35	-	-	39	91.82
Hillsdale County	46,688	-	-	-	-	-	-	19	40.70
Houghton County	36,628	-	-	3	8.19	-	-	8	21.84
Huron County	33,118	-	-	-	-	1	3.02	12	36.23
Ingham County	280,895	2	0.71	53	18.87	9	3.20	161	57.32
Ionia County	63,905	-	-	5	7.82	-	-	59	92.32
Iosco County	25,887	-	-	-	-	-	-	17	65.67
Iron County	11,817	-	-	-	-	-	-	24	203.10
Isabella County	70,311	-	-	2	2.84	-	-	15	21.33
Jackson County	160,248	2	1.25	11	6.86	-	-	403	251.49
Kalamazoo County	250,331	-	-	15	5.99	-	-	106	42.34
Kalkaska County	17,153	-	-	-	-	1	5.83	16	93.28
Kent County	602,622	2	0.33	58	9.62	1	0.17	326	54.10

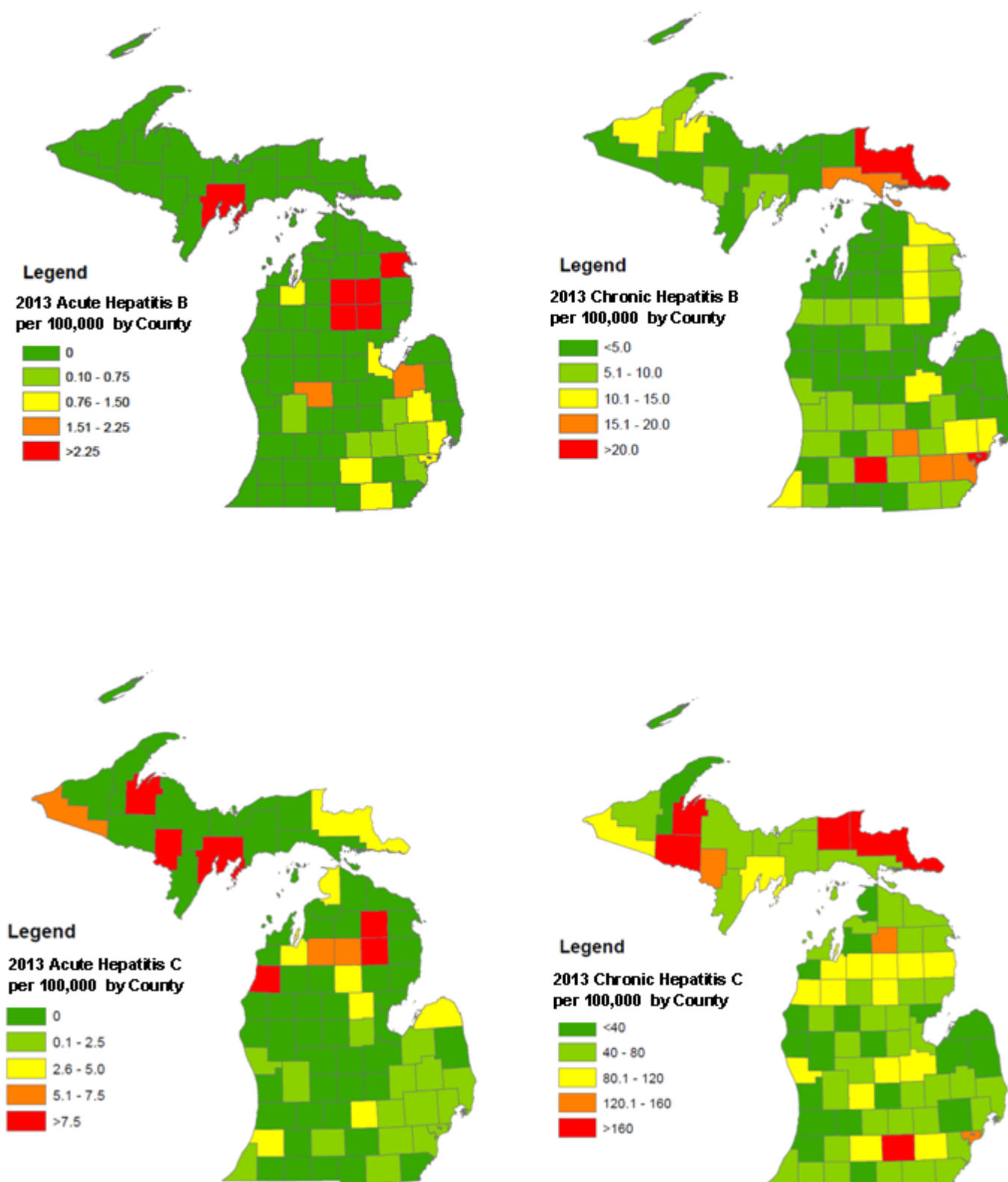
Appendix B: County Data

Keweenaw County	2,156	-	-	-	-	-	-	-	-
Lake County	11,539	-	-	-	-	-	-	8	69.33
Lapeer County	88,319	1	1.13	2	2.26	1	1.13	45	50.95
Leelanau County	21,708	-	-	-	-	-	-	13	59.89
Lenawee County	99,892	1	1.00	5	5.01	2	2.00	68	68.07
Livingston County	180,967	1	0.55	12	6.63	2	1.11	100	55.26
Luce County	6,631	-	-	-	-	-	-	13	196.05
Mackinac County	11,113	-	-	2	18.00	-	-	5	44.99
Macomb County	840,978	8	0.95	122	14.51	7	0.83	497	59.10
Manistee County	24,733	-	-	2	8.09	2	8.09	23	92.99
Marquette County	67,077	-	-	-	-	-	-	52	77.52
Mason County	28,705	-	-	-	-	-	-	7	24.39
Mecosta County	42,798	-	-	1	2.34	-	-	18	42.06
Menominee County	24,029	-	-	-	-	-	-	10	41.62
Midland County	83,629	-	-	3	3.59	2	2.39	41	49.03
Missaukee County	14,849	-	-	1	6.73	-	-	7	47.14
Monroe County	152,021	-	-	12	7.89	-	-	108	71.04
Montcalm County	63,342	1	1.58	1	1.58	-	-	41	64.73
Montmorency County	9,765	-	-	1	10.24	1	10.24	4	40.96
Muskegon County	172,188	-	-	12	6.97	3	1.74	145	84.21
Newaygo County	48,460	-	-	1	2.06	-	-	15	30.95
Oakland County	1,202,362	8	0.67	158	13.14	8	0.67	466	38.76
Oceana County	26,570	-	-	-	-	-	-	8	30.11
Ogemaw County	21,699	1	4.61	3	13.83	-	-	17	78.34
Ontonagon County	6,780	-	-	1	14.75	-	-	3	44.25
Osceola County	23,528	-	-	-	-	-	-	5	21.25
Oscoda County	8,640	1	11.57	1	11.57	1	11.57	8	92.59
Otsego County	24,164	-	-	1	4.14	-	-	31	128.29
Ottawa County	263,801	-	-	15	5.69	-	-	52	19.71
Presque Isle County	13,376	-	-	2	14.95	-	-	8	59.81
Roscommon County	24,449	1	4.09	2	8.18	1	4.09	22	89.98
Saginaw County	200,169	-	-	22	10.99	-	-	163	81.43
Sanilac County	43,114	-	-	2	4.64	-	-	15	34.79
Schoolcraft County	8,485	-	-	-	-	-	-	6	70.71
Shiawassee County	70,648	-	-	3	4.25	-	-	51	72.19
St Clair County	163,040	-	-	8	4.91	1	0.61	127	77.89
St Joseph County	61,295	-	-	2	3.26	-	-	30	48.94
Tuscola County	55,729	1	1.79	1	1.79	1	1.79	18	32.30
Van Buren County	76,258	-	-	3	3.93	2	2.62	27	35.41
Washtenaw County	344,791	-	-	62	17.98	1	0.29	276	80.05
Wayne County	1,106,807	6	0.54	198	17.89	1	0.09	716	64.69
Wexford County	32,735	-	-	2	6.11	-	-	28	85.54

*City of Detroit is counted as its own county

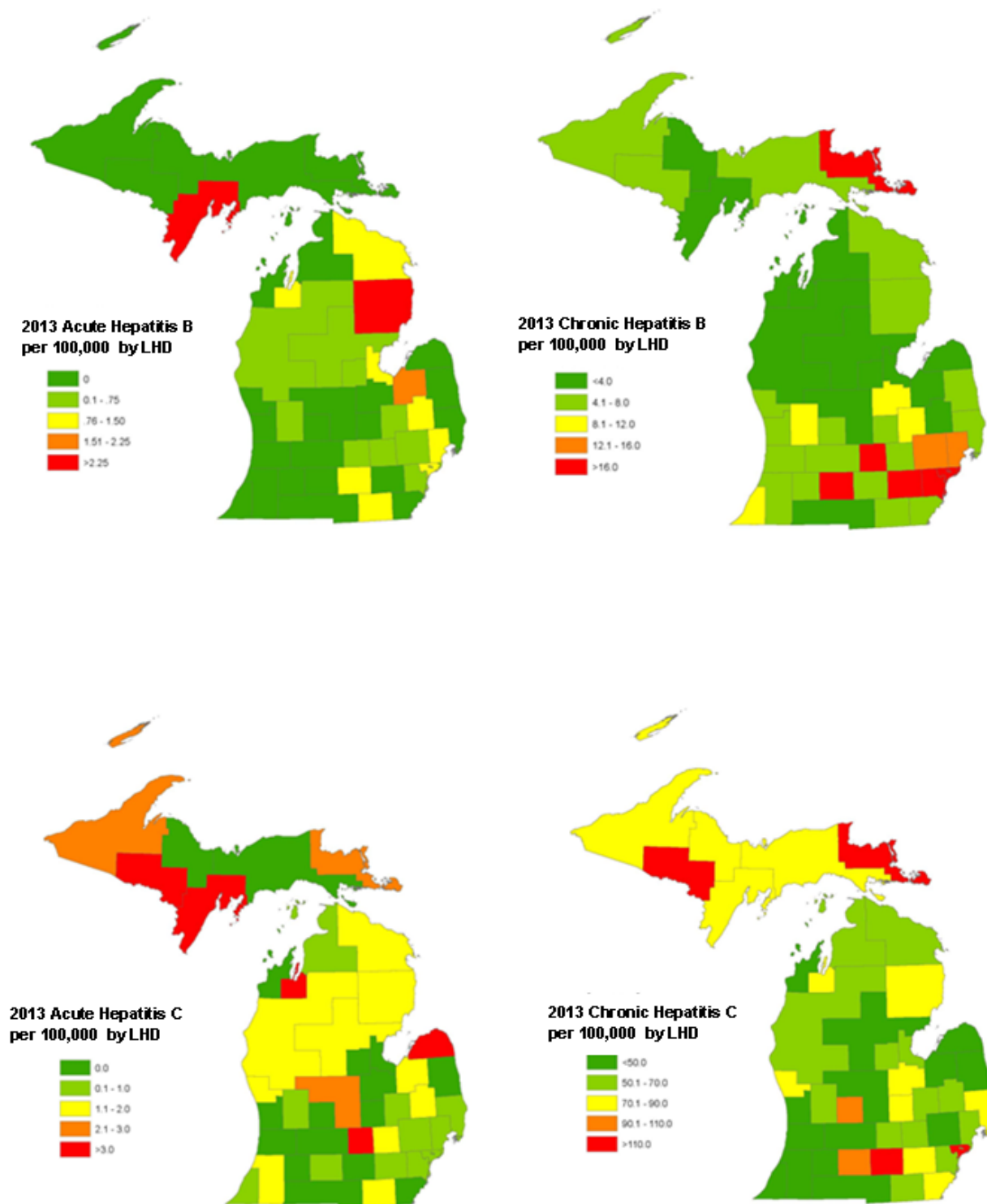
Appendix C: Geographical Data

Figure 8.1: Acute and Chronic Hepatitis B and C Rates by County



Appendix C: Geographical Data

Figure 8.2: Acute and Chronic Hepatitis B and C Rates by Local Health Department



Appendix C: Geographical Data

Figure 8.3: Acute and Chronic Hepatitis B and C Rates by Region

