WEST VIRGINIA
Viral Hepatitis Epidemiologic Profile
2017

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WEST VIRGINIA Department of Health & Human Resources
BUREAU FOR PUBLIC HEALTH

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West Virginia Viral Hepatitis Epidemiologic Profile 2017

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West Virginia Viral Hepatitis Epidemiologic Profile 2017
West Virginia Department for Health and Human Resources (DHHR)
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Executive Summary

This Viral Hepatitis Epidemiologic Profile is developed to describe the burden of hepatitis B virus (HBV) and hepatitis C virus (HCV) in West Virginia, summarize relevant data from a variety of sources, and inform healthcare professionals, public health practitioners, and policymakers. In 2015, West Virginia reported the highest rate of acute HBV, and the second highest rate of acute HCV in the nation. With the Opioid Drug Epidemic annual increases, these two types of viral hepatitis are also continuing to increase. This creates the potential public health problem of co-infection and only grows as West Virginia continues to experience the highest hepatitis incidence rates in the country. The most common risk factors reported among cases of hepatitis B and C are drug misuse, both injection use and non-injection use. Coupled with this issue, maternal drug use is rising, thus a concern for increasing Neonatal Abstinence Syndrome (NAS).

The West Virginia Viral Hepatitis Epidemiologic Profile, 2017 displays data available from key hepatitis and related data systems. Data throughout the Profile are gathered from multiple sources, i.e., Vital Statistics, HBV and HCV surveillance, Syndromic Surveillance, Emergency Medical Service annual ambulance run data, maternal risk screening data, NAS, Medicaid member data, Echo Project data, and morbidity and mortality data. An explanation of how each of these data sets are gathered is also provided. Variations of each data methodology range from self-reported data to laboratory-confirmed test results reported to public health.

The hepatitis B and C surveillance data identified differences among age groups. HBV predominantly occurs among the 30-39-year-old population while HCV impacts the younger 20-29 age group. Medicaid claims data were provided among diagnosed hepatitis B and C cases showing differences by gender with males diagnosed as having more HBV cases and females consistently diagnosed with a greater occurrence of HCV cases. Treatment for HCV in West Virginia is mainly provided to enrolled Medicaid patients.

West Virginia's age-adjusted hepatitis mortality rates, though low, are also included in this profile and these data indicate rates are increasing for males since 2013. For HCV mortality rates, males are consistently higher than females. The HBV and HCV age-adjusted mortality rates for all races from 2006 to 2015 was 1.6 deaths per 100,000 population. However, mortality rates by race varied considerably. Black non-Hispanic residents have a mortality rate of 3.0 per 100,000 population, which is twice the mortality rate of White non-Hispanic residents (1.5 per 100,000 population).

Availability of hepatitis treatment in rural West Virginia is challenging and West Virginia is without a sufficient quantity of specialists to provide medical care. The West Virginia University (WVU) ECHO Project is aimed at expanding the availability of treatment in the state by connecting less experienced practitioners with hepatitis experts in virtual learning sessions. Therefore, supporting treatment in a primary care setting at Federally Qualified Healthcare Centers is the pathway to accomplish successful cure and recovery. Medical care needs to be a collaborative effort with Syringe Service Programs and behavioral health facilities. West Virginia's behavioral health residential facilities are providing substance abuse treatment and recovery residences services statewide.

Abbreviations Used

ACA: Affordable Care Act

ASTHO: Association of State and Territorial Health Officers

BBHHF: DHHR's Bureau for Behavioral Health and Health Facilities

BPH: DHHR's Bureau for Public Health

CDC: Centers for Disease Control and Prevention

DEIE: DHHR, BPH's Division of Epidemiologic Informatics and Evaluation

DHHR: West Virginia Department of Health and Human Resources

DIDE: DHHR, BPH's Division of Infectious Disease Epidemiology

ECHO: Extension for Community Healthcare Outcomes

ESSENCE: Electronic Surveillance System for the Early Notification of Community-based Epidemics

FQHC: Federally Qualified Healthcare Center

HBIG: Hepatitis B Immune Globulin

HBV: Hepatitis B Virus

HCV: Hepatitis C Virus

IDU: Injection Drug Use

LHD: Local health department

NAS: Neonatal Abstinence Syndrome

OEMS: DHHR, BPH's Office of Emergency Medical Services

OEPS: DHHR, BPH's Office of Epidemiology and Prevention Services

OMCFH: DHHR, BPH's Office of Maternal, Child, and Family Health

PEP: Post-Exposure Prophylaxis

PRSI: Pregnancy Risk Screening Instrument

SAPT: Substance Abuse Prevention and Treatment

SSP: Syringe Service Program

VHPC: Viral Hepatitis Prevention Coordinator

Background

Hepatitis B and hepatitis C are severe liver infections caused by the hepatitis B virus (HBV) and the hepatitis C virus (HCV), respectively. In comparison to 2015 national rates, West Virginia reported the highest incidence of acute HBV infection at 14.7 per 100,000 population and the second highest rate of acute HCV infection at 3.4 per 100,000 population in the United States. Since 2010, the incidence of acute HBV and acute HCV has increased 213% and 209%, respectively.

Both HBV and HCV infection can cause acute (short-term) or chronic (lifelong) infection. Symptoms of acute HBV and HCV infections are analogous and can include malaise, anorexia, abdominal pain, jaundice, nausea, vomiting, diarrhea and/or dark urine. Symptoms of HBV infection can take 42 to 180 days (6 weeks to 6 months) and HCV infection can take 14 to 180 days (2 weeks to 6 months) to display. Patients who are chronically infected with HBV and/or HCV are frequently asymptomatic, but can present with symptoms like an acute infection.

Most individuals who are chronically infected with HBV and/or HCV can remain asymptomatic for as long as 20 to 30 years. It is estimated that 15%–25% of those chronically infected with HBV will develop health complications, including liver damage, liver failure and liver cancer. It is estimated that 2,000 to 4,000 people die each year from HBV-related liver illness. Chronic HCV infection is the most common chronic bloodborne infection in the United States, with an estimated 3.2 million chronically infected individuals. HCV infection is most prevalent among “baby boomers,” or those born between 1945 - 1965, the majority of whom were likely infected during the 1970s and 1980s. The high prevalence of HCV infection in this birth cohort is largely attributed to exposures that occurred during this period of increased incidence. Many of those exposures were thought to be associated with illicit drug use or blood transfusions.

HBV and HCV are transmitted through exposure to infected blood or body fluids. In the United States, common risk factors for infection include injection drug use (IDU), non-injection street drug use, sexual transmission, and incarceration. Body piercing and tattooing are other potential risk factors for transmission if contaminated equipment or supplies are used. Sharing of personal items (i.e. razor, toothbrush) contaminated with HBV- or HCV-infected blood can also be potential sources of infection.

HBV infection is a sexually transmitted disease; however, HCV infection is less commonly transmitted sexually, unless there is high risk sexual activity. Healthcare acquired HBV or HCV infection can occur if there are lapses in infection control during medical care and an individual is exposed to surfaces, medications, or equipment contaminated with HBV- or HCV-infected blood or body fluids. HBV infection is a vaccine preventable disease. A dose of HBV vaccine is recommended at birth, 2 months of age and 6 months of age, to provide immunity to HBV (CDC, 1991). Hepatitis B Immune Globulin (HBIG) is effective for post-exposure prophylaxis. It can prevent transmission of HBV if given within 24 hours of birth for infants born to HBV-infected mothers to prevent perinatal transmission, within 2 weeks of contact for sexual and household contact exposure to HBV, and within 1 week for direct blood exposure to HBV, such as needle sticks or the shared use of syringes associated with IDU. Currently, there is no vaccine available for HCV, and the prevention of HCV infection with immunoglobulin (IG) is not effective for post-exposure prophylaxis West Virginia Viral Hepatitis B and Surveillance 2012-2015, 2016).

Demographics of West Virginia

West Virginia is a small rural Mid-Atlantic state consisting of 55 counties. Only 3 counties have a population of 100,000 or more and only one city, Charleston, has more than 50,000 people according to 2015 United States Census estimates.

Population Growth

West Virginia's population in 2015 was 1,844,128, accounting for 0.6% of the nation's total. From 2005 to 2015, West Virginia's population increased by 1.3%, with most of the increase occurring in the eastern panhandle (Fig 1.). From 2010 to 2015, however, the state's population decreased by 0.5%.

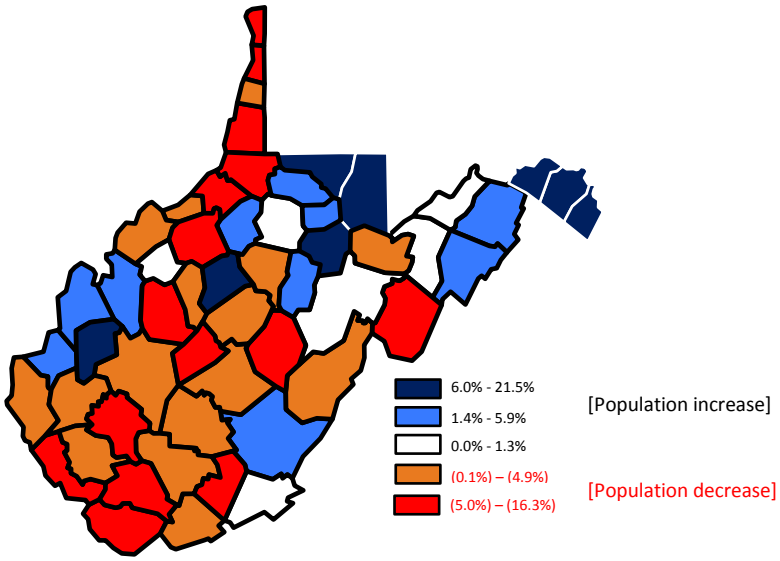


Figure 1. Change in population, West Virginia, 2005-2015.
Source: United States Census Bureau, American FactFinder

Age

West Virginia's population is among the oldest in the nation. The 2015 median age was 41.0 years which increased from 39.4 a decade ago. This increase in median age indicates the population is aging overall in the mountain state. The adult population ages 18-64 has only decreased slightly since 2005, from 1,148,800 to 1,139,633; the elderly population has increased nearly 50,000 from 281,261 to 328,397, or from 15.4% to 17.8% of the state total.

Race and Ethnicity

West Virginia's population has always been predominantly White non-Hispanic. However, the race/ethnicity distribution is becoming slightly more diverse. In 2005, West Virginia's population was 94.7% White non-Hispanic. In 2015, that distribution decreased marginally to 93.3%. The Black non-Hispanic population has increased nearly 11,000 since 2005 while making up 4.0% of the state total, compared to 3.5% in 2005. The Hispanic population has also increased since 2005, from approximately 17,500 to nearly 28,000.

Health Insurance

The percentage of uninsured West Virginia adults ages 18-64 has dropped from an estimated 22.2% in 2005 to 13.0% in 2014, the latest year available according to the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (Fig. 2). Preliminary figures for 2015 indicate West Virginia's uninsured rate is 9.6%. These increases in coverage are likely attributed to implementation of the Affordable Care Act (ACA). Provisions of this policy went into effect from 2010-2014.

Income and Poverty

In 2015, the median household income in West Virginia was $41,969, nearly a 10% increase from 2010 ($38,241). Nationwide, the median household income increased by nearly 11.5% going from $50,046 in 2010 to $55,775 in 2015. Figure 3 indicates that the highest income area is in the eastern panhandle and scattered throughout other parts of the state. The southern coalfield counties tend to have the lowest income due mainly to the decline in the mining industry.

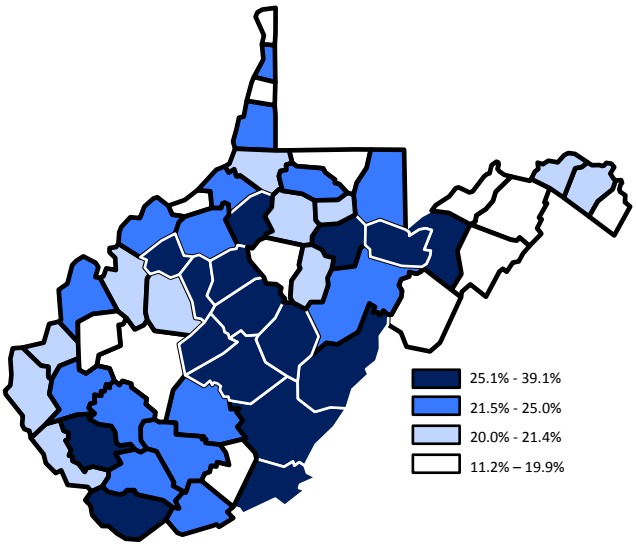


Figure 2. Prevalence of uninsured adults ages 18 to 64, 2010-2014. Source: DHHR, BPH, Health Statistics Center, Vital Statistics System

Statewide, 18.0% of West Virginians were living below the poverty level in 2015 (Fig. 4), down slightly from 18.2% in 2010. West Virginia's poverty rate was above the national average in both 2010 (United States rate 15.3%) and in 2015 (United States rate 14.7%).

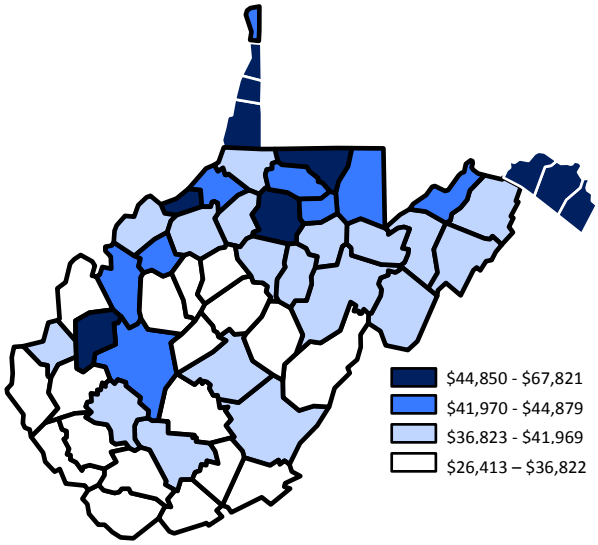


Figure 3. Median household income, West Virginia, 2015. Source: United States Census Bureau, Small Area Income and Poverty Estimates.

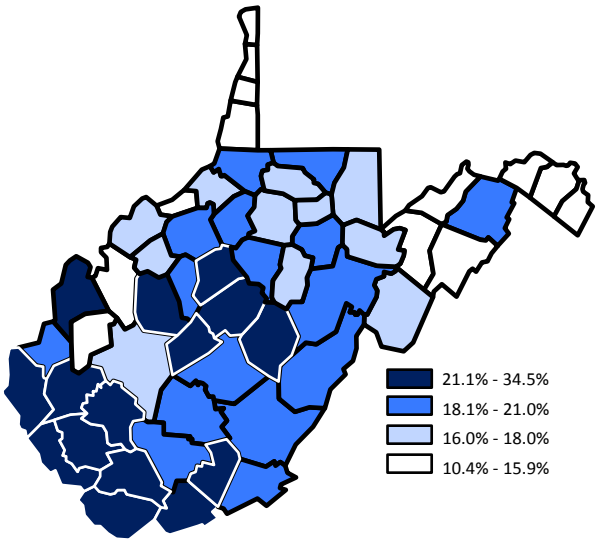


Figure 4. Percentage living in poverty, 2015. Source: United States Census Bureau, Small Area Income and Poverty Estimates.

Surveillance

The reporting process for hepatitis B and hepatitis C is required by West Virginia State Code under the West Virginia Reportable Disease Legislative Rule (64CSR7). The rule establishes procedures governing the reporting of certain diseases and conditions, unusual health events, and clusters or outbreaks of diseases to the Bureau for Public Health. It also establishes the responsibility of various individuals and facilities in controlling communicable diseases.

Disease surveillance for hepatitis B and C is required to be reported according to specifications in the Reportable Disease Rule. Positive lab reports of these two notifiable infectious diseases are reportable to the state and local health department (LHD) by hospitals, providers, laboratories, blood collection centers, and drug treatment centers. Hepatitis B is required to be reported within 24 hours to the LHD. Hepatitis C is required to be reported within 1 week to the state health department.

Hepatitis B Surveillance

In 2016, 267 cases of acute HBV were identified in West Virginia, a rate of 14.5 per 100,000 (Fig. 5). In comparison, in 2015, there were 272 cases of acute HBV identified in West Virginia, a rate of 14.7 per 100,000. West Virginia has consecutively reported the highest incidence of acute HBV in the United States from 2007-2015. The incidence of acute HBV infection in West Virginia residents is 14 times the national average. Medicaid costs for treating hepatitis B totaled over $152,000 for 2014-2016.

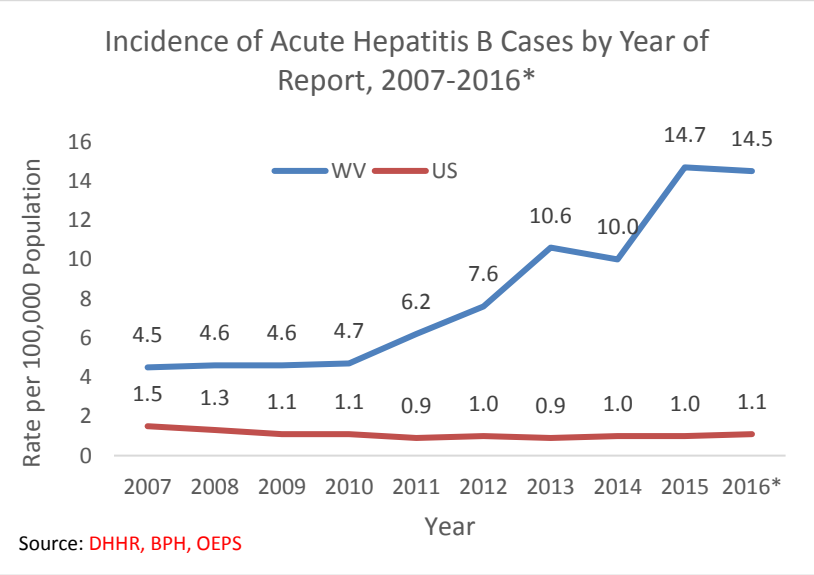


*Figure 5. Incidence of acute hepatitis B cases by year of report, West Virginia, 2007-2016 (n=1,576). *2016 data are provisional.*

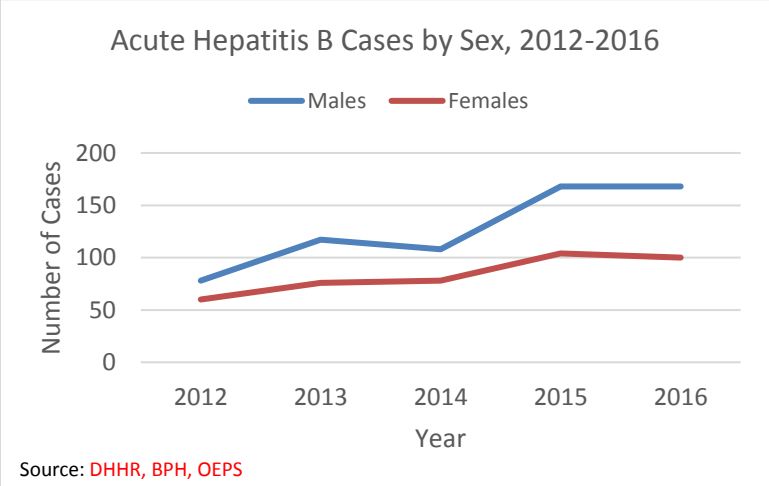


Figure 6. Incidence of acute hepatitis B cases by sex, West Virginia, 2012-2016 (n=1,057).

Figure 6 shows the distribution of acute HBV by sex among cases reported between 2012-2016. Each year, there are consistently more cases of acute HBV among men than women in West Virginia.

In the United States, rates of acute HBV infection decreased across all age groups from 2000 to 2011 (Fig. 7). From 2011 to 2014, rates have increased for the 30 to 39, 40 to 49, and 50 to 59-year age groups. In West Virginia, the highest rates of

acute HBV infection are also seen in the 30-39 and 40-49 age groups, followed by the 20-29 group for 2012 to 2015 (Fig. 8).

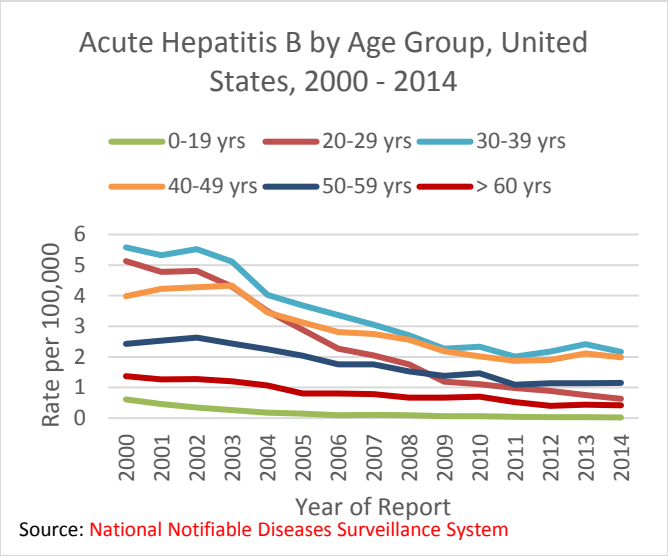


Figure 7. Acute hepatitis B by age group, United States, 2000-2014.

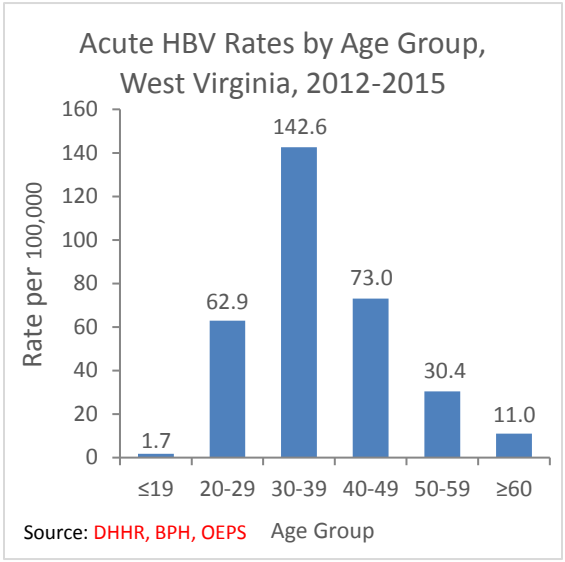


Figure 8. Acute hepatitis B rates by age group, West Virginia, 2012-2015.

Risk factors for HBV include injection drug use (IDU), use of street drugs (non-IDU), contact with a hepatitis B case, incarceration, prior treatment for a sexually transmitted disease, and having tattoos or body piercings. From 2012-2016, IDU and non-IDU were the most commonly reported risk factors among newly confirmed cases of HBV (Fig. 9).

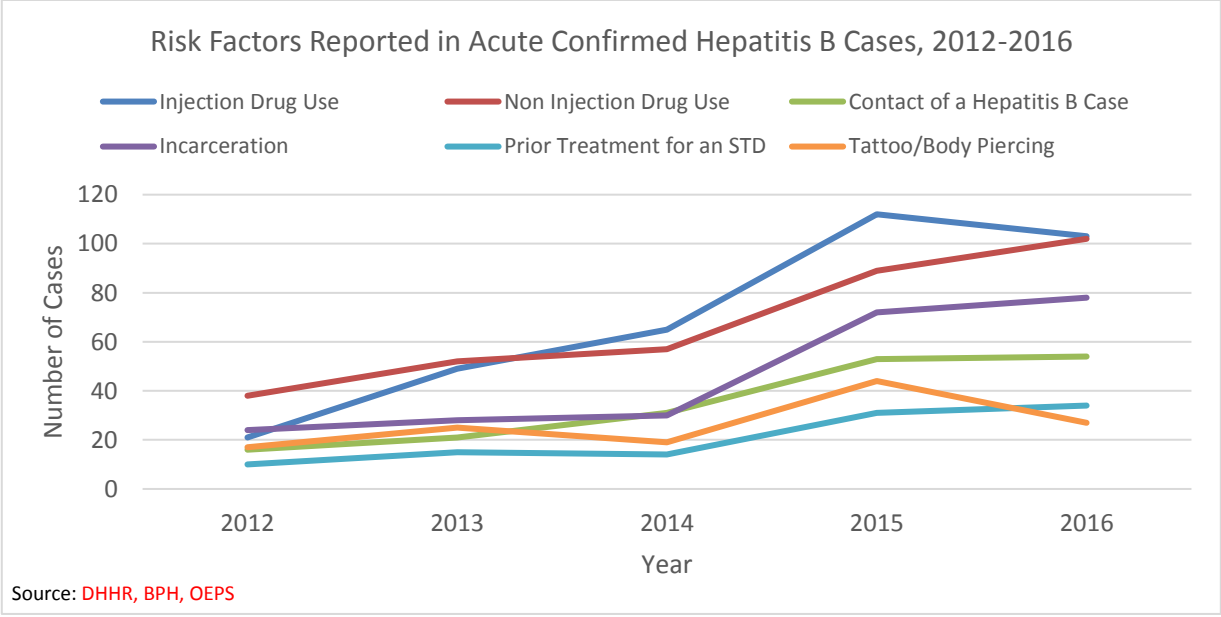


Figure 9. Risk factors reported in acute confirmed hepatitis B cases, West Virginia, 2012-2016 (n=1,057).

Hepatitis C Surveillance

West Virginia has the highest incidence rate for acute HCV in the nation. West Virginia's rate of HCV has increased significantly since 2010. In 2016, 131 cases of acute HCV were reported in West Virginia. The incidence of HCV infection in 2016 was 7.1 cases per every 100,000 West Virginia residents, while the national rate in 2016 was only 0.8 cases per every 100,000 persons in the United States (Fig. 10). The incidence of acute HCV infection in West Virginia residents is 9 times the national average. Medicaid costs for treating hepatitis C totaled more than $27 million dollars for 2014-2016.

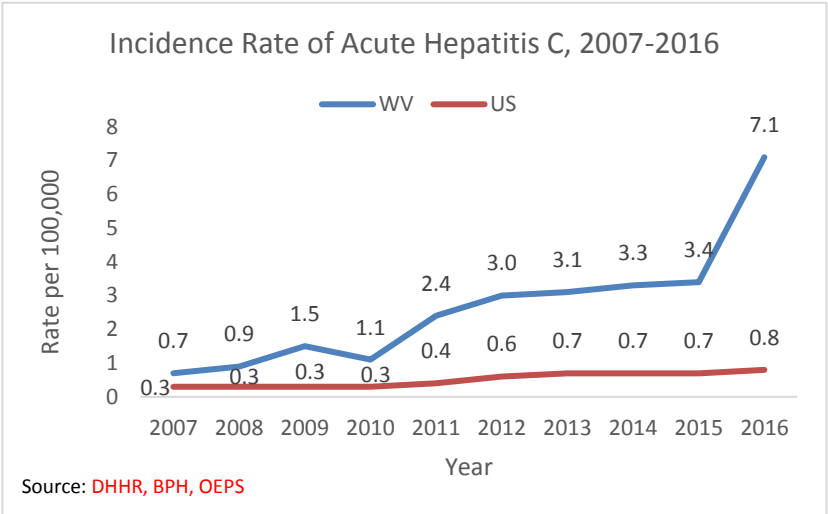


Figure 10. Incidence of acute hepatitis C by year of report, West Virginia, 2007-2016 (n=492).

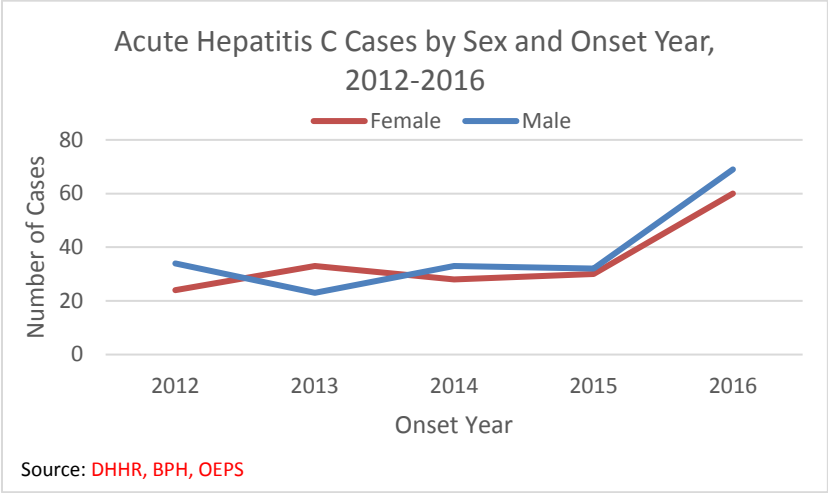


Figure 11. Acute hepatitis C cases by sex and onset year, West Virginia, 2012-2016 (n=366).

The number of cases among males and females was relatively steady from 2012 to 2015, with both sexes experiencing roughly double the number of cases in 2016, compared to 2015 (Fig. 11). A higher incidence of acute HCV was reported for males in all years, except for in 2013 (33 females vs. 24 males). Among cases of acute hepatitis C between 2012 and 2016 where race was reported, 97% were among whites.

In the United States, the 40-49 age group had the highest incidence of acute hepatitis C in 2000 (Fig. 12). Since that time, the demographics have shifted to younger ages. In 2014, both the 20-29 and 30-39 age groups had higher incidence rates than the 40-49 group. In West Virginia, the age distribution of cases mirrors the national numbers. The highest rates are seen in the 20-29, 30-39, and 40-49 age groups (Fig. 13).

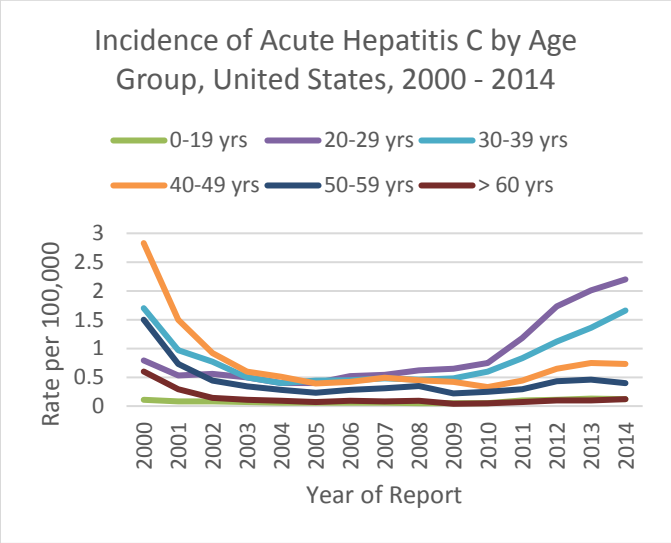


Figure 12. Incidence of acute hepatitis C by age group, United States, 2000-2014.

Source: DHHR, BPH, OEPS

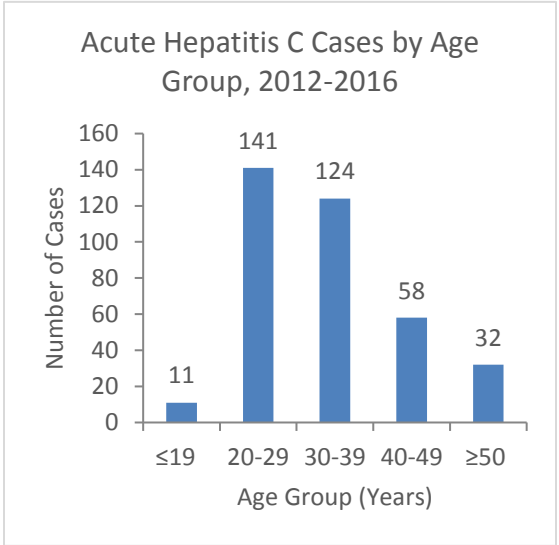


Figure 13. Acute hepatitis C cases by age group, West Virginia, 2012-2016 (n=366).

Source: DHHR, BPH, OEPS

Among those who reported various risk factors, injection drug use and street drug use were the most common risk factors for hepatitis C infection from 2012 to 2016 (Fig. 14), as was true for cases of hepatitis B over the same period. Injection drug use in 2016 increased from 39% to 43% when compared to 2015. The percentage of cases who reported a history of incarceration also increased across these years.

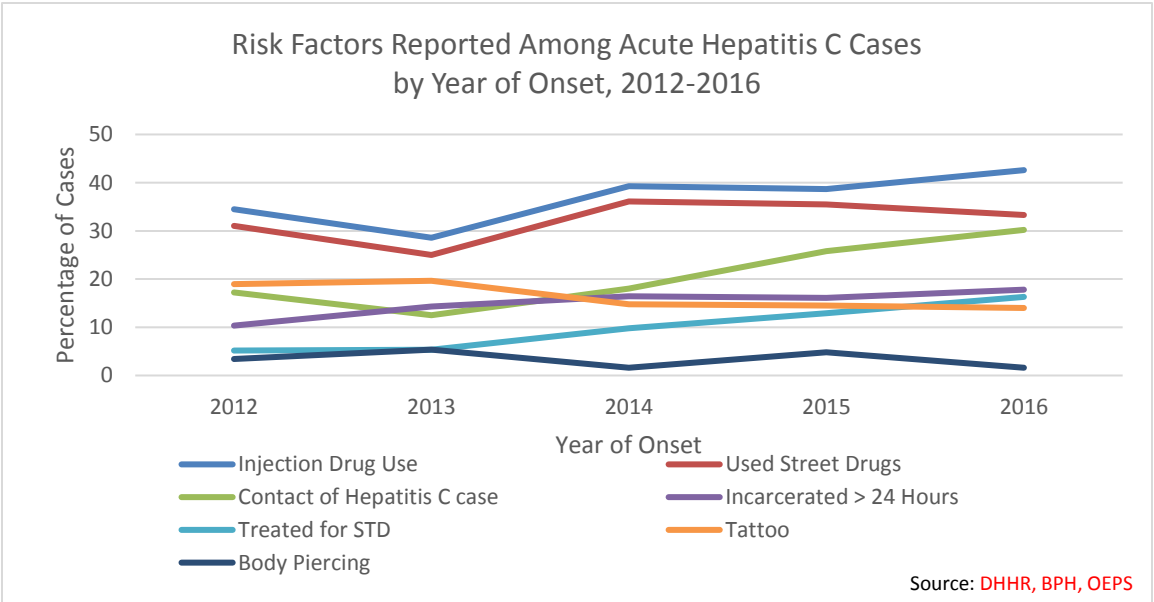


Figure 14. Risk factors reported among hepatitis C cases by year of onset, West Virginia, 2012-2016 (n=366).

Syndromic Emergency Department Surveillance

Syndromic surveillance allows public health to monitor disease indicators in near real-time to detect clusters of disease earlier than would be possible with traditional public health methods. ESSENCE (Electronic Surveillance System for the Early Notification of Community-based Epidemics) is the current electronic syndromic surveillance system in the state, which utilizes emergency department visit data.

Currently, 37 of 51 (73%) facilities in the state with emergency departments submit data daily. Chief complaint data is the primary source of queried information. Searches of non-identifiable information can be done with free text, ICD-10 codes or by selecting pre-defined syndromes. Queries can be saved for repeated use for surveillance.

There are limitations of these data that should be considered:

- Not all available facilities are connected, leading to an incomplete picture of West Virginia's disease rates
- Possible generalization while utilizing free text option (ex.-feeling ill; difficult to categorize)
- Many Urgent Care Centers have yet to be connected
- It is not a stand-alone system; it is complementary with other methods of surveillance
- Possible delays with diagnostic information, as ESSENCE captures suspected/unconfirmed cases

Figure 15 shows the incidence rate of both hepatitis B and hepatitis C visits between 2014-2016. As previously mentioned, risk factors associated with HBV and HCV include injection drug use and street drug use, which have both increased dramatically since 2015. Visitors seeking treatment/medical clearance for drug use are often flagged for having a history of HBV or HCV infection.

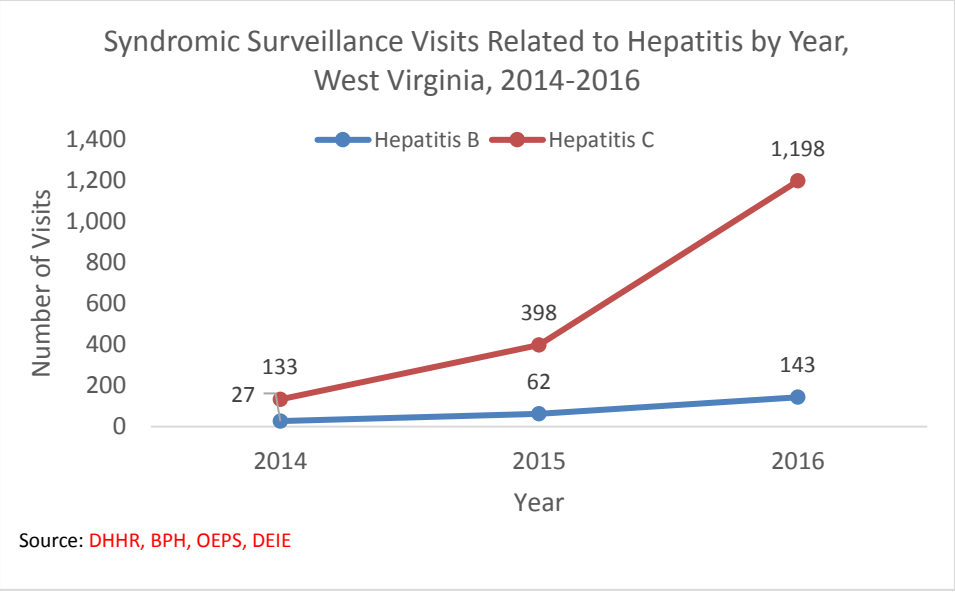


Figure 15. West Virginia syndromic surveillance visits related to hepatitis by year, West Virginia, 2014-2016 (N=1,958).

Figure 16 shows the distribution of ages in HBV and HCV-related visits between 2014 and 2016. HBV visits remained steady throughout the state's emergency departments in all ages, tapering off in patients 65 and older. The number of HCV cases is similar across the 20 to 29, 30 to 39, and 40 to 49-year age groups. A dramatic increase can be seen in the number of visitors between the ages of 50 and 59 in HCV-related visits.

The majority of visitors (95%) identified as white, which matches the racial/ethnic composition of the state. Fifty-seven percent of recorded patient visits were identified as male between 2014 and 2016, which is consistent with information shown throughout this report.

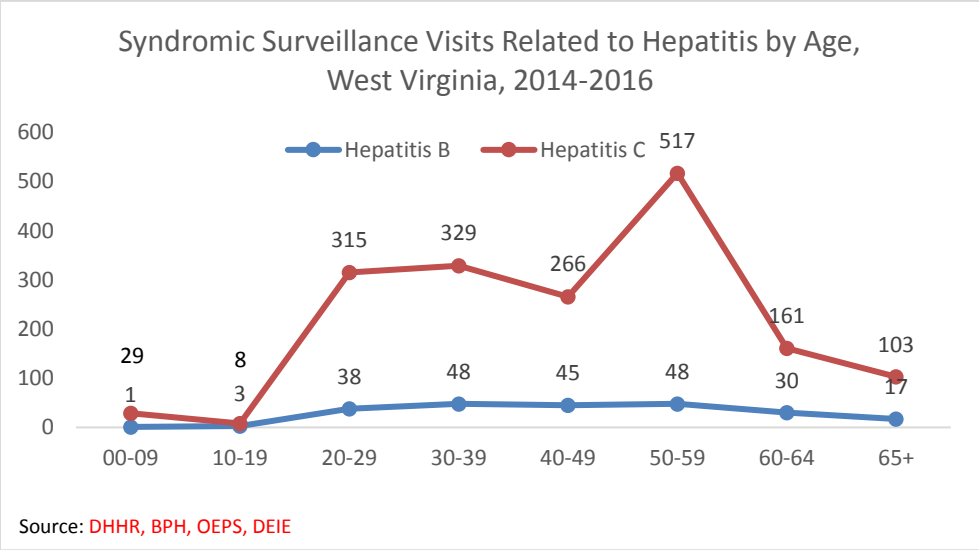


Figure 16. West Virginia syndromic surveillance visits related to hepatitis by age, 2014-2016 (N=1,958).

Special Populations and Risk Factors

Office of Emergency Medical Services Run Data

The data presented here are from emergency medical service (EMS) runs in West Virginia between 2014 and 2016. For each ambulance response call to the scene of traumatic injury where there is a risk of exposure to blood or other body fluids, emergency medical technicians typically ask patients if they have

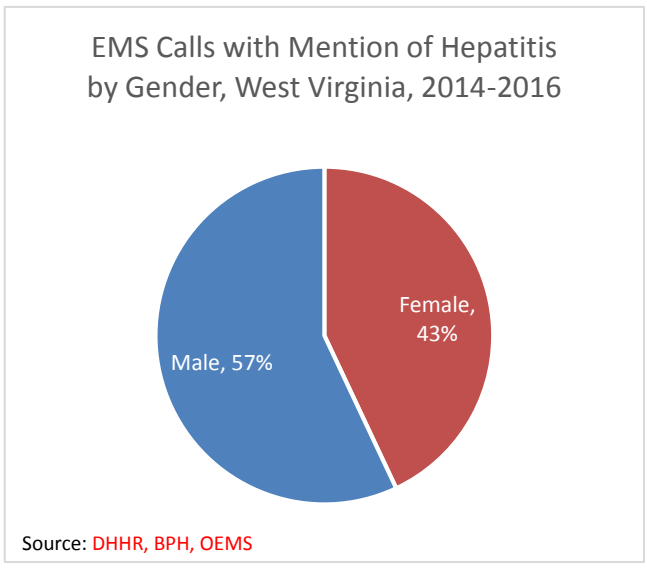


Figure 17. EMS calls with a mention of hepatitis by gender, West Virginia 2014-2016.

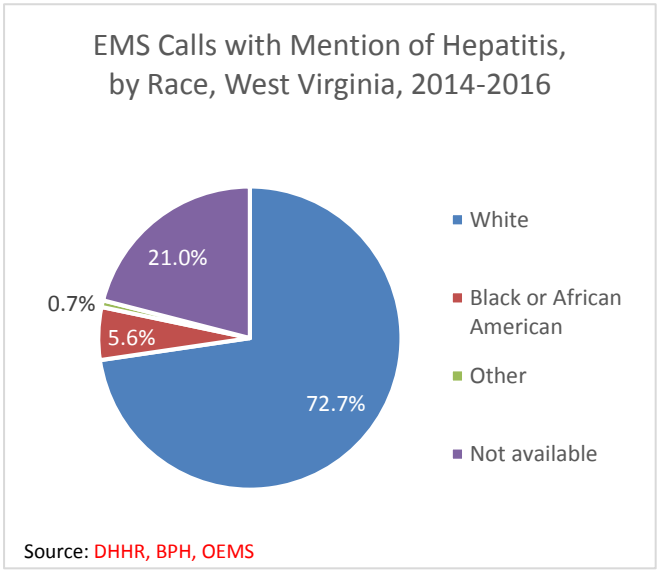


Figure 18. EMS calls with a mention of hepatitis by race, West Virginia, 2014-2016.

hepatitis, HIV, or other infectious diseases. Among the EMS runs where the patient mentioned hepatitis (excluding hepatitis A), more patients were male (57%, Figure 17), and more patients were Black or African American (5.6%, Figure 18) compared to the overall population of West Virginia (49.4% male and 4.0% Black or African American). The patient's race was not noted in 21% of the EMS calls.

For the years 2014 to 2016, the greatest number of EMS calls were for people aged 55 to 59 years (224 calls). Figure 19 shows that the spike in this age group is largely driven by a high number of EMS calls for males (142 calls) compared to females (77 calls). Calls for females were highest in a slightly younger age group: there were 83 calls for females ages 50 to 54 years. For those 34 years and younger, the number of calls for males and females was relatively similar; this is also true for those 75 years and older. Males had a higher number of EMS calls with a mention of hepatitis compared to females for ages 35 to 74.

The 7 counties with the highest per capita rate of EMS events with hepatitis reports are adjacent to one another and located in southern West Virginia. These counties are Boone, Fayette, Logan, McDowell, Mercer, Raleigh, and Wyoming.

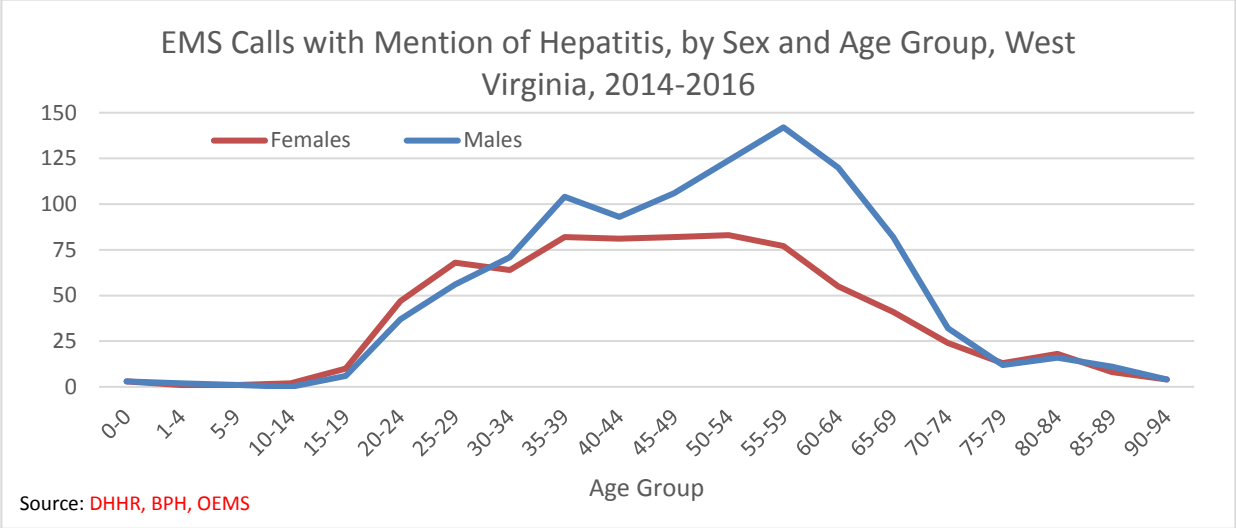


Figure 19. EMS calls with mention of hepatitis by sex and age group, West Virginia, 2014-2016.

Maternal Risk Screening for Hepatitis

The Uniform Maternal Risk Screening Act (§16-4E), signed into law on May 28, 2009, established the need for a comprehensive and uniform approach to prenatal screenings conducted by physicians and midwives to discover at-risk and high-risk pregnancies. The West Virginia Prenatal Risk Screening Instrument (PRSI) is the screening tool developed for this purpose. Implementation began on January 1, 2011, and required all healthcare providers that offer maternity services to utilize the PRSI in their initial examinations of all pregnant women and submit completed forms to the Office of Maternal, Child, and Family Health (OMCFH) under DHHR's Bureau for Public Health in accordance with West Virginia Legislative Rule §64-97-5.

The PRSI assesses numerous risk factors including hepatitis B, hepatitis C, and opioid abuse treatment for prior and current pregnancies as a medical condition. There are approximately 20,000 live births per year

in West Virginia, while PRSI submission ranges from roughly 11,000 to 12,000 each year. This should be kept in mind when evaluating related data.

For purposes of this report, PRSI submissions were matched with live births from West Virginia birth certificate data. Although more than 70% of PRSIs could be matched (approximately 26% of pregnancies are statistically expected to have an outcome other than live birth), there were some limitations to the matching process, as some live births may not have been included or matched—including birth certificates from 2016, which are still considered preliminary. This information is presented by calendar year for the first prenatal visit.

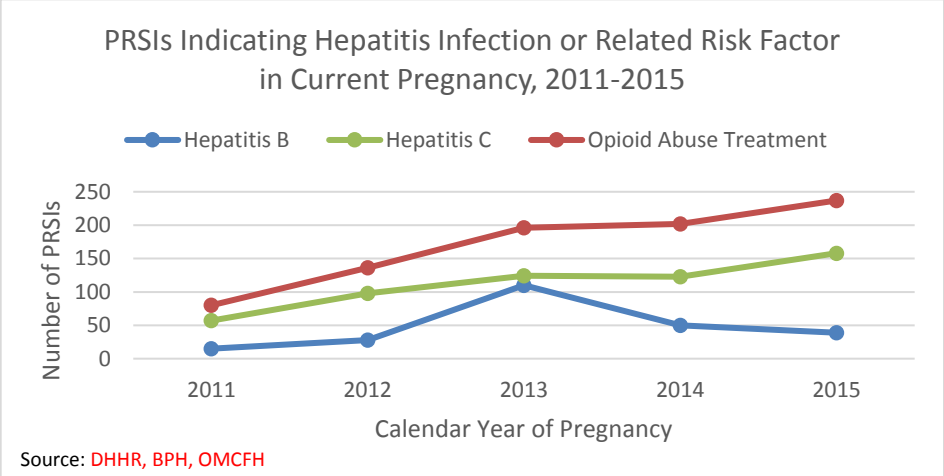


Figure 20. PRSIs indicating hepatitis infection or related risk factor in current pregnancy, West Virginia, 2011-2015.

Overall, hepatitis C, hepatitis B, and opioid abuse treatment (Fig. 20) have increased for current pregnancy over the past 5 years. Of these risk factors, hepatitis B is the risk factor indicated least on PRSIs, while opioid abuse treatment is the risk factor indicated most. All of these risk factors indicated during the current pregnancy have more than doubled from 2011 to 2015, showing increased prevalence in West Virginia pregnancies. Opioid abuse treatment, indicated as a risk factor on PRSIs, has nearly tripled from 1.0% of PRSIs in 2011 to 2.9% in 2015. Of PRSIs reported in 2015, there were more than 18 additional

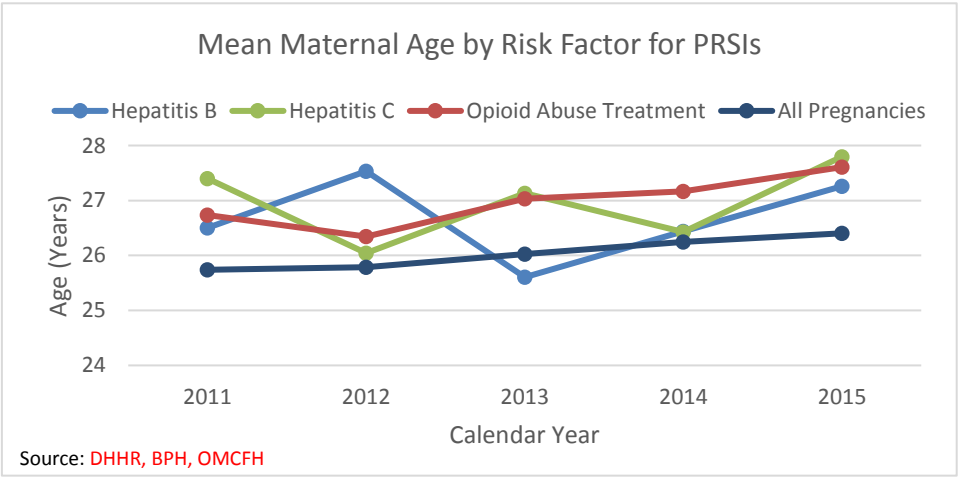
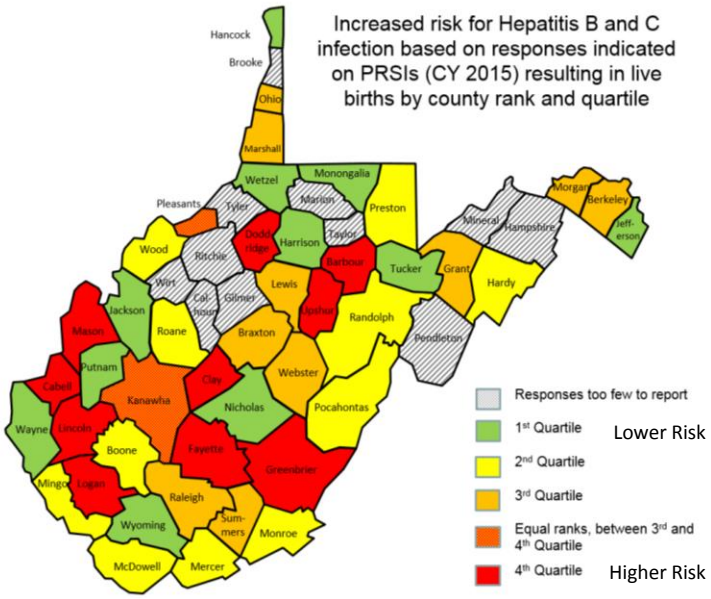


Figure 21. Mean maternal age by risk factor for PRSIs (resulting in live births), West Virginia, 2011-2015.

reports of opioid abuse treatment per 1,000 PRSIs, compared to 2011 PRSIs, and nearly 12 additional pregnancies per 1,000 PRSIs indicating hepatitis C infection in the current pregnancy.



Source: DHHR, BPH, OMCFH

Figure 22. Increased risk for hepatitis B and C infection based on responses indicated on PRSIs resulting in live births by county rank and quartile, West Virginia, 2015.

Maternal age for pregnancies identified through the PRSI has been increasing gradually over the past few years. In 2011, the mean maternal age was 25.7 years for all live-birth outcome pregnancies reported through the PRSI; this increased to 26.4 years by 2015 (Fig. 21). Pregnancies with risk factors/indicators such as opioid abuse treatment, hepatitis C, and/or hepatitis B infection typically had a greater maternal age compared to the mean age for all pregnancies reported for each calendar year. The average maternal age for PRSIs indicating opioid abuse treatment or hepatitis C infection for current pregnancy in 2015 was more than a year older than the average for all pregnancies for that year. Additionally, from 2011 to 2015, PRSIs indicating opioid abuse treatment had an increase in maternal age by nearly a full year of age; that is 26.7 years in 2011 to 27.6 years in 2015.

PRSI risk factors, including indicators for hepatitis B or C infection and opioid abuse treatment during the current pregnancy, were used to rank counties for calendar year 2015 (Fig. 22). The first quartile (green) represents the counties with the lowest risk of hepatitis B or C infection for a newborn. The fourth quartile (red) shows the 10 counties with the highest hepatitis B or C infection risk to a newborn: Doddridge, Clay, Mason, Logan, Barbour, Cabell, Fayette, Lincoln, Upshur, and Greenbrier.

Hepatitis B Virus Births and Risk Factors

Ninety-four hepatitis B births were recorded among West Virginia residents between 2014 and 2016. The number of hepatitis B births has gradually increased since 2014 (Fig. 23). The majority of these births (77%) are among white mothers, but minority racial/ethnic groups are overrepresented among hepatitis B births compared to the state as whole (Fig. 24). The highest number of hepatitis B births (34%) occurred in mothers between the ages of 25 and 29, followed by 24 births in mothers between the ages of 20 and 24; 2 births (2%) occurred in women age 45 or older. While 0.2% of births among mothers between the ages of 25 and 29 were positive for hepatitis B, the rate of hepatitis B births was 7 times higher (1.4%) in mothers 45 years and older. In the same time, nearly two-thirds (65%) of hepatitis B births were to unmarried mothers, and 62% of births had record of maternal smoking during pregnancy. In addition, maternal drug use during pregnancy among these births has increased dramatically between 2014 and 2016, though the rate of neonatal abstinence syndrome has not followed the same clear pattern (Fig. 25). Seventy-eight percent of hepatitis B births were funded by Medicaid. Twenty-six percent of hepatitis B births were low birthweight, meaning less than 2,500 grams.

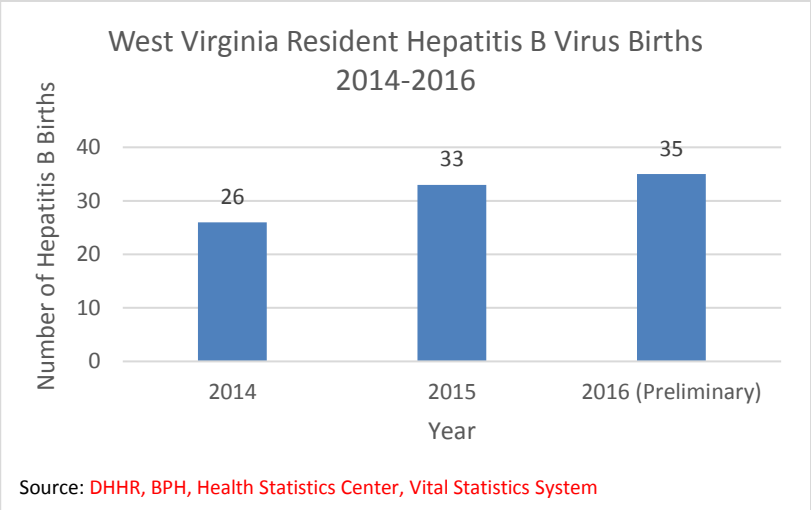


Figure 23. Hepatitis B virus births, West Virginia, 2014-2016.

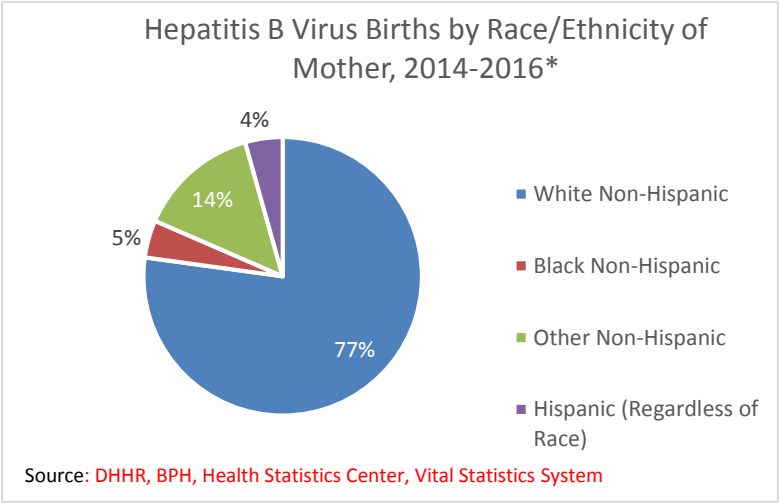


Figure 24. Hepatitis B virus births by race/ethnicity of mother, 2014-2016.
**2016 data are preliminary.*

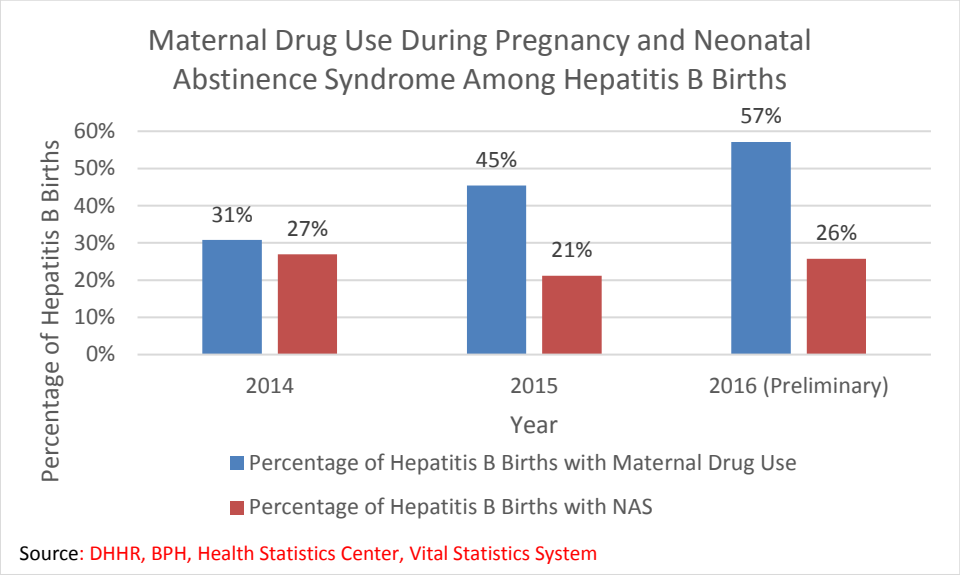


Figure 25. Percentage of hepatitis B virus births with maternal drug use during pregnancy and percentage of hepatitis B virus births with neonatal abstinence syndrome, West Virginia, 2014-2016. 2016 data are preliminary.

Hepatitis C Virus Births and Risk Factors

Between 2014 and 2016, 1,636 hepatitis C births have been recorded among West Virginia residents. Similar to hepatitis B births, the number of hepatitis C births among West Virginia residents has increased from 2014 to 2016 (Fig. 26). Unlike hepatitis B births, the percentage of hepatitis C births to mothers of minority racial/ethnic groups (3%) is much more comparable to the proportion of West Virginians who identify as a minority racial or ethnic group (Fig. 27). Most hepatitis C births (37%) occurred in women between the ages of 25 and 29, followed by women between the ages of 20 and 24 (451 births or 28%); 21 births (1%) occurred in women aged 40 or older. Out of all births among women aged 45 and older, 15% were hepatitis C births; in comparison, 3% of births among women between the ages of 25 and 29 were positive for hepatitis C.

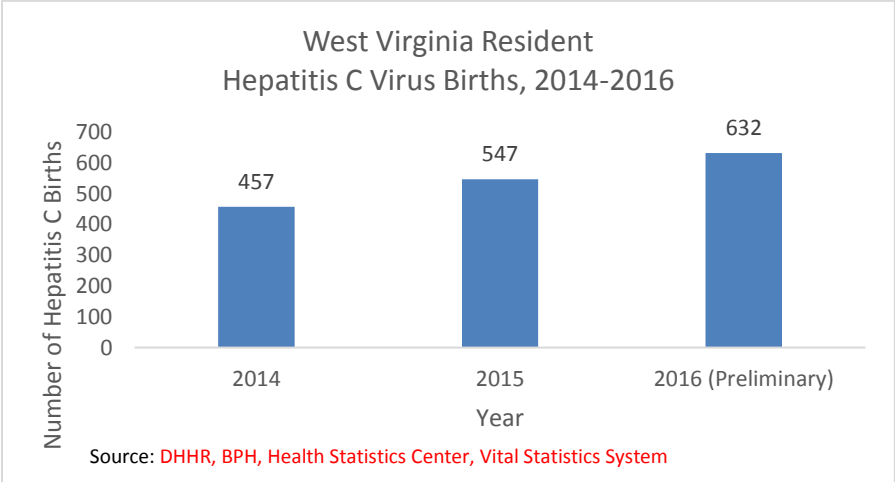


Figure 26. West Virginia resident hepatitis C births, 2014-2016. 2016 data are preliminary.

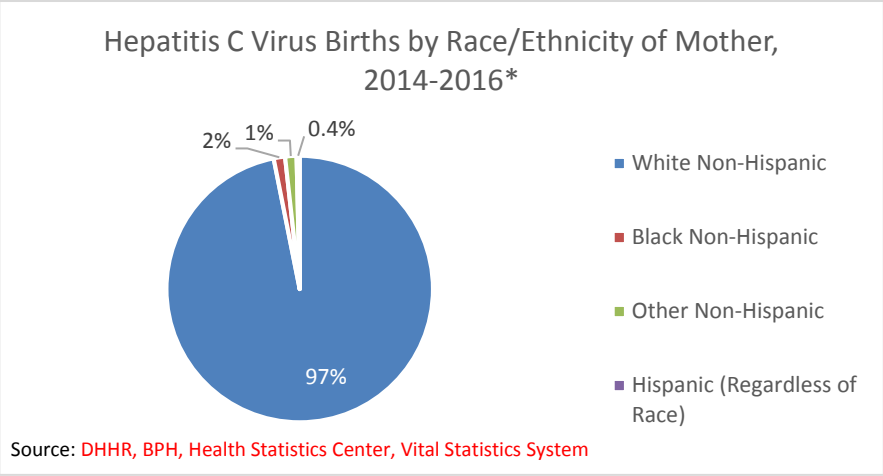


*Figure 27. Hepatitis C virus births by race/ethnicity of mother, West Virginia, 2014-2016. *2016 data are preliminary.*

During the same period (2014 to 2016), unmarried mothers gave birth to 72% of hepatitis C births. Fifteen percent of hepatitis C births occurred in mothers with third trimester prenatal care or no prenatal care; 80% of hepatitis C births had record of maternal smoking during pregnancy. About one-fifth (19%) of hepatitis C births were recorded as low birthweight (less than 2,500 grams), and 84% of hepatitis C births were funded through Medicaid. The trend of maternal drug use during pregnancy among hepatitis C births echoes that of hepatitis B births; the percentage has increased between 2014 and 2016 (Fig. 28).

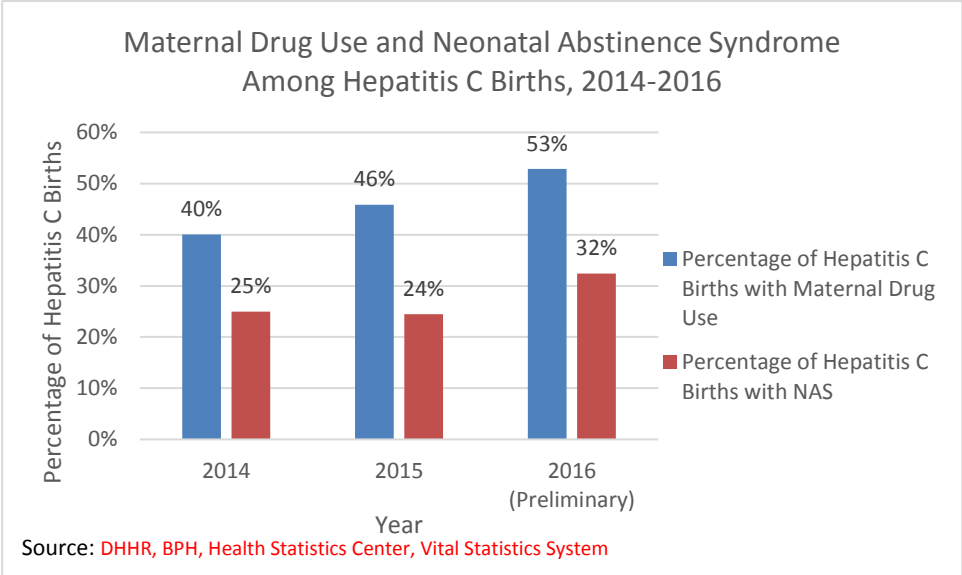


Figure 28. Maternal drug use among hepatitis C births and neonatal abstinence syndrome among hepatitis C births, 2014-2016. 2016 data are preliminary.

Neonatal Abstinence Syndrome (NAS)

NAS occurs when infants that are exposed to drugs in utero develop withdrawal symptoms after birth. NAS is often associated with exposure to narcotics or opioids. However, prenatal exposure to other neuroactive substances can result in withdrawal symptoms too. Symptoms can include tremors, irritability, sleep problems, hyperactive reflexes, seizures, poor feeding, vomiting, diarrhea, dehydration,

sweating, and fever or unstable temperature. The onset of symptoms can vary based on the drug and the timing of the last exposure in relation to birth. Many factors can contribute to the development of NAS including polydrug use, and the frequency and amount of drug used during gestation.

In 2016, NAS was added to the list of conditions the West Virginia Newborn Screening Program monitors through surveillance data. West Virginia has a developmental and risk screening tool called the West Virginia Birth Score that is collected on all infants born at West Virginia birthing facilities. Intrauterine substance exposure and NAS were added to the West Virginia Birth Score for surveillance data collection. Data collection began October 1, 2016. Based on the first 7 months of data collection, from October 1, 2016 to May 1, 2017, 5.48% of infants have symptoms of NAS, and 14.28% of infants born in West Virginia have been exposed to a neuroactive substance during gestation.

Medicaid Population

Hepatitis B

The following graphs show the number of West Virginia Medicaid members with a diagnosis of hepatitis B between 2011 and 2015. An increase in the incidence of hepatitis B diagnoses can be attributed to both an increase in the Medicaid population beginning in 2014, made possible by the Affordable Care Act, and an increased awareness of chronic infectious hepatitis. The advent of new drugs to treat hepatitis C has been a key driver in the promotion of testing for both hepatitis B and hepatitis C. The criteria for treatment with hepatitis C drugs, which are heavily advertised and widely known, often includes testing for hepatitis B.

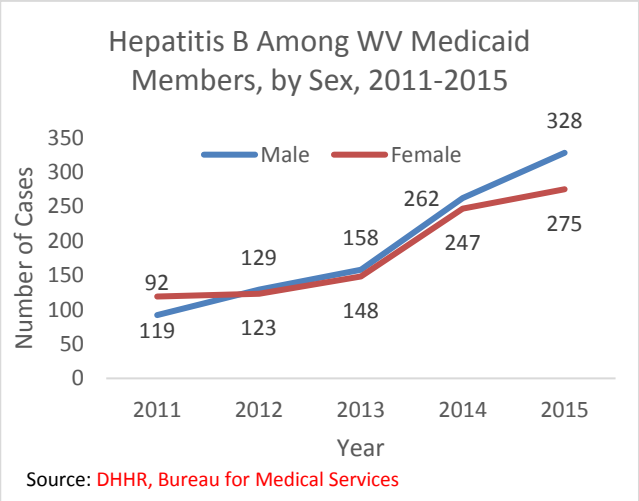


Figure 29. Incident cases of hepatitis B among WV Medicaid members by sex, 2011-2015.

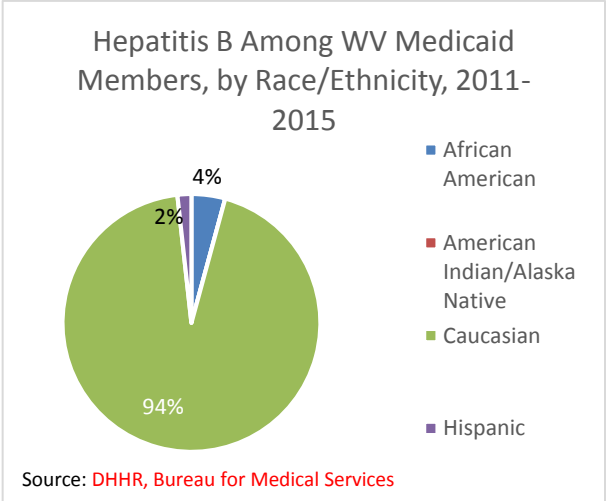


Figure 30. Hepatitis B among WV Medicaid members, by race/ethnicity, 2011-2015.

From 2012 to 2015, there were more cases of hepatitis B among male Medicaid members compared to females (Fig. 29). Since 2011, the number of cases has increased each year overall and for both sexes; in 2015, there were approximately 3.5 times as many cases among males and approximately 2 times as many cases among females, compared to 2011 data. Nearly all cases (94%) of hepatitis B among Medicaid members occurred in whites (Fig. 30).

Hepatitis C

The graphs below show the incidence of hepatitis C in West Virginia Medicaid members. An increase in the number of cases in 2012 is most likely in response to the demand for the first-generation protease inhibitor drugs, bocepivir and telaprevir, introduced that year. The increase in the number of diagnosed members from 2014 to 2016 is reflective of the increase in the Medicaid population and also in the development of breakthrough treatments for hepatitis C. These treatments, including sofosbuvir and sofosbuvir/ledapsivir, have convenient dosing, few adverse effects, minimal drug interactions and sustained virologic response. The first of the breakthrough antivirals, sofosbuvir (Sovaldi,) became available in the last quarter of 2013, and others that followed have changed the landscape for treatment of hepatitis C and created an awareness regarding the importance of testing for hepatitis B and hepatitis C infections.

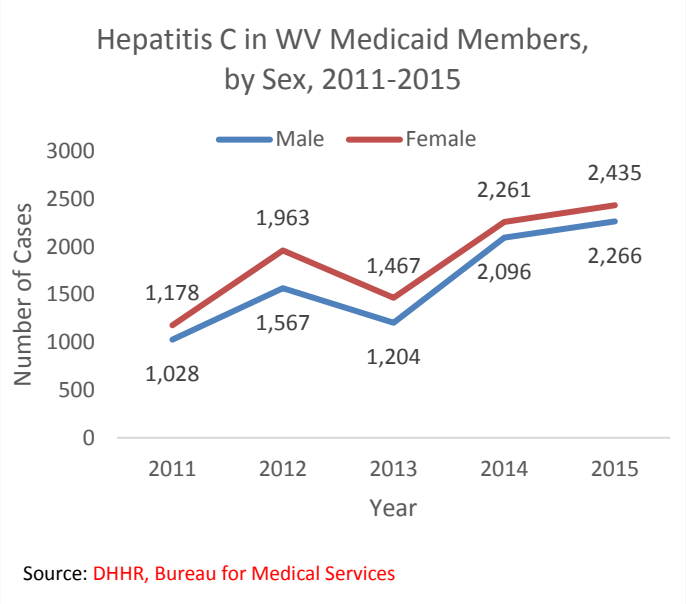


Figure 31. Hepatitis C among WV Medicaid members by sex, 2011-2015.

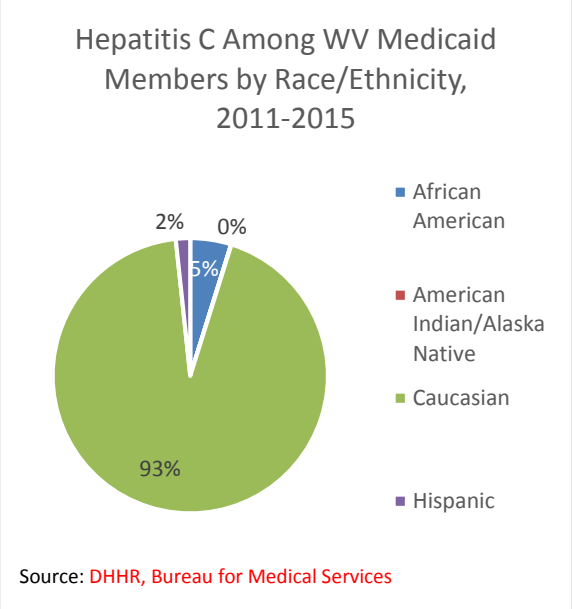


Figure 32. Hepatitis C among WV Medicaid members by race/ethnicity, 2011-2015.

In 2015, there were 4,701 cases of hepatitis C among West Virginia Medicaid members. This is more than double the number of cases that occurred in 2011. In contrast to hepatitis B, more cases of hepatitis C occurred in female Medicaid members each year from 2011 to 2015 (Fig. 31). However, the racial breakdown of hepatitis C cases is almost identical to that of hepatitis B (Fig. 32).

Testing and Treatment

Project ECHO

The West Virginia Project ECHO hepatitis C program was started to address the increasing burden of hepatitis C in the state. With a webcam and an internet connection, rural physicians can present hepatitis C cases to a panel of experts from WVU and receive mentoring in the management of hepatitis C. To date, there have been 32 ECHO sessions attended by 55 providers. Fifty-three unique cases and 4 follow-ups have been reviewed. Of the 57 cases reviewed, most were insured by Medicaid (70%), followed by Medicare (19%) and private insurance (10.5%).

HBV and HCV Testing

The Office of Laboratory Services (OLS) in DHHR's Bureau for Public Health provides a range of testing services for antibodies and antigens related to viral hepatitis. From 2014 to 2016, more than 12,000 hepatitis C serology tests were performed, with 10.8% showing positive results. During the same period, more than 19,000 hepatitis B serology tests were performed, with 3.6% yielding positive results.

Residential Substance Abuse Treatment Centers

Overview

In West Virginia, the SAPT Block Grant is a major source of funding, allocating $6.5 million for substance abuse early intervention, treatment and recovery services in West Virginia. DHHR's Bureau for Behavioral Health and Health Facilities (BBHHF) provides funding support to a continuum of treatment options, including outpatient and intensive services, and short and long term residential treatment that is not otherwise covered by Medicaid, Medicare, or private insurance. BBHHF provides funds for community-based recovery support services that include recovery residences that provide focused short and long-term housing access for people who need safe and supportive housing to live drug and/or alcohol free.

Crisis Stabilization/Detoxification/Residential Services

Crisis Stabilization/Detoxification/Residential Treatment Facilities (Fig. 33) are limited and prioritized for intravenous (IV) drug users, women who are pregnant, transitioning aged youth, and individuals being transitioned from a higher level of care. These facilities provide clinically managed, high intensity services that feature a planned regimen of care in a safe, structured and stable environment. Residential programming is gender specific, trauma informed and in coordination with day habilitation, rehabilitation and peer support services.

Recovery Residences

The number of Peer-Operated Recovery Homes and Facilities (Fig. 34) has increased providing safe housing for individuals age 18 and older who are recovering from substance use and/or co-occurring substance use and mental health disorders. These facilities assist individuals for up to 12 months. Residents are encouraged to participate in outpatient and intensive services provided off site so that Medicaid may pay for Medicaid reimbursable services, which will not occur at the facility. Service areas provided by the facility include: Prevention, Health Promotion and Wellness and Recovery Support Services. Key components of a Recovery Residence include but are not restricted to drug screening, house/resident meetings, mutual aid/self-help meetings, structured house/resident rules, peer-run groups, life skill development emphasis, and clinical treatment services accessed and utilized within the community. Staff positions include but are not restricted to a Facility Manager, Certified Peer Coach(es), Case Manager(s), and other Certified Peer staff. Resident capacity is 6-8 for home settings and 60-100 beds for residential facilities. All grantees abide by National Association of Recovery Residence Standards.

Infectious Disease Services

While West Virginia has never received the designation of being an "HIV State," West Virginia has always required that priority be given to this population for treatment admission. Due to increased incidence of hepatitis and heroin use, West Virginia has partnered with BPH and local communities to provide funding and technical support for needle exchange programs and enhanced outreach and education programs in high need targeted areas. All BBHHF grantees are required to screen for HIV, hepatitis and tuberculosis and fiscal codes have been added to support health screens if not covered by other payers.

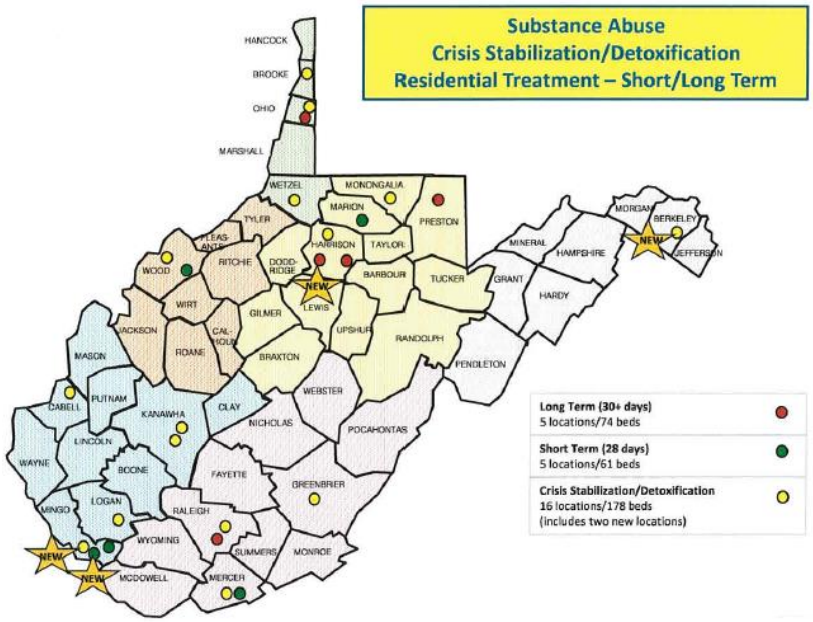


Figure 33. Crisis stabilization/detoxification residential treatment centers, West Virginia, 2017.

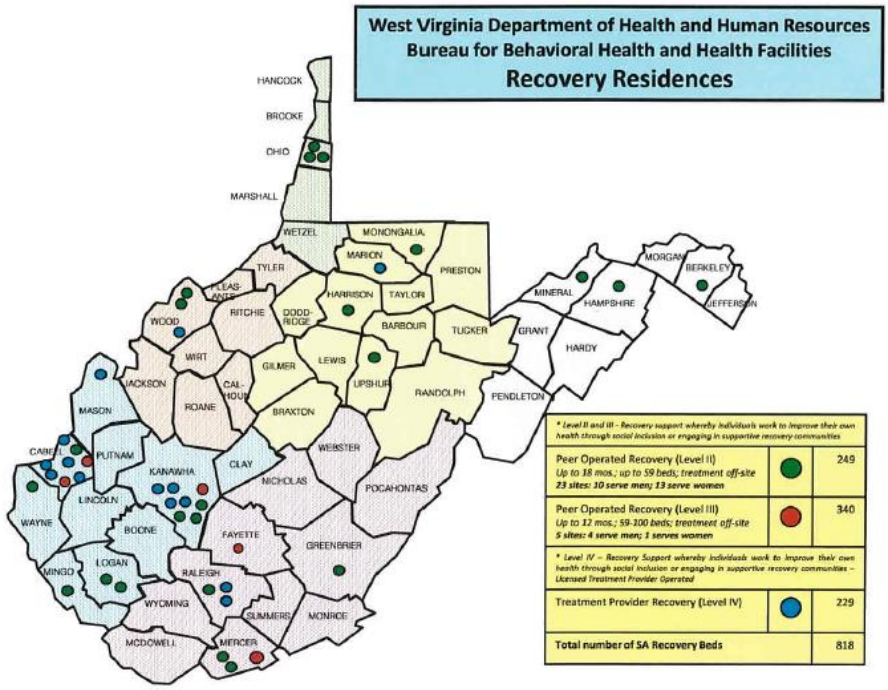


Figure 34. Recovery residences, West Virginia, 2017.

Morbidity

HIV Coinfection with Hepatitis B and Hepatitis C

Human immunodeficiency virus (HIV), HBV, and HCV are bloodborne pathogens that share common transmission routes. About 10% of people living with HIV in the United States are coinfected with HBV, and approximately one-third of persons who have received an HIV diagnosis in the United States are coinfected with HCV. These persons have greater risk for chronic liver disease and liver-related death than persons infected with HIV alone.

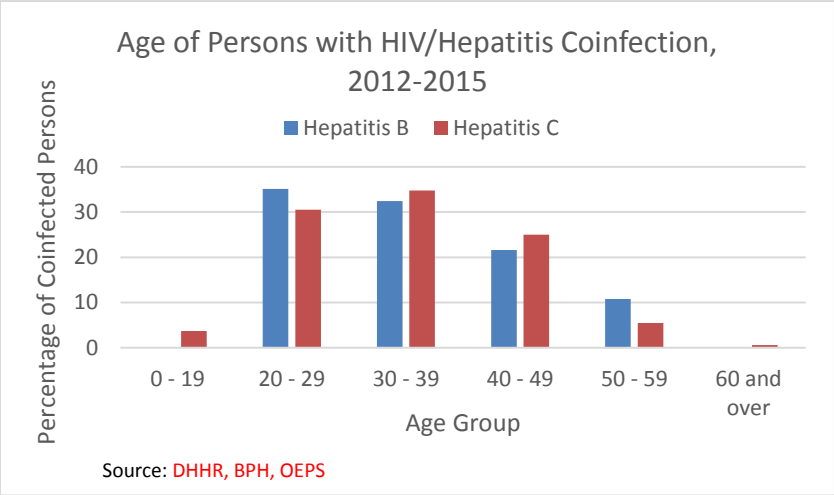


Figure 35. Persons with HIV/hepatitis coinfection, West Virginia, 2012-2015.

Coinfection with HBV was defined as any HIV or AIDS patient with acute or chronic HBV infection. Of persons living with HIV in West Virginia between 2012 and 2015 (n=2,089), 37 (1.8%) tested positive with HBV. Coinfection with HCV was defined as any HIV or AIDS patient with acute or past or present HCV infection, or past or present HBV infection. Of persons living with HIV in West Virginia between 2012 and 2015, 164 (7.9%) tested positive with HCV between 2012 and 2015. West Virginia's rates of coinfection are considerably lower compared to national estimates of coinfection. This is likely due to West Virginia's low rate of HIV-positive persons, related to the state's racial/ethnic distribution and its large rural population.

Among HIV/HBV coinfected persons, the largest percentage (35.1%) was between the ages of 20 and 29; among those coinfected with HIV/HCV, the largest percentage (34.8%) was between the ages of 30 and 39. HIV/HCV coinfection affected persons across a wider age range, compared to HIV/HBV coinfection (Fig. 35). Of HIV/HCV coinfected persons, 42.7% belong to the baby boomer generation (born between 1946 and 1964). HIV/HCV coinfection was present in a higher proportion of females (28.7%) compared to HIV/HBV coinfection (10.8%).

White persons with HIV/HBV coinfection make up only 54.1% of coinfections; Blacks, who make up less than 4% of West Virginia's population, are disproportionately represented among persons with HIV/HBV coinfection (35.1%). The racial disparity, while present, is slightly less pronounced among those with HIV/HCV coinfection: 65.2% of coinfected persons were white, and 23.8% were Black.

As shown in Figure 36, men who have sex with men (MSM) was the most commonly reported transmission route for HIV/HBV coinfection (48.7%), followed by injection drug use (IDU; 18.9%). For HIV/HCV coinfection, the reverse is true: IDU was the most common transmission route for HIV/HCV coinfection (41.5%), followed by MSM (23%).

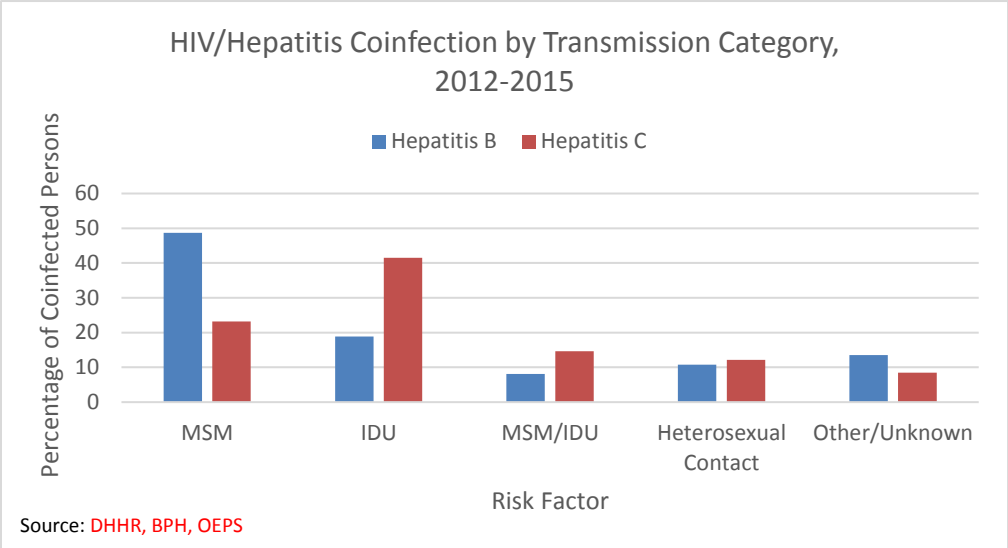


Figure 36. Persons with HIV/hepatitis coinfection by transmission category, West Virginia, 2012-2015.

Hepatocellular Carcinoma

The DHHR's West Virginia Cancer Registry in the Bureau for Public Health collects information from doctors, hospitals, and treatment centers on cancer cases diagnosed among West Virginia residents. From 2009-2013, two-thirds (68%) of all liver cancer cases in West Virginia were of the histology types associated with viral hepatitis (484 of 715 total cases). The state incidence rate for this specific subset of histologies is not available, but for overall liver and intrahepatic bile duct cancers, the average annual age-adjusted incidence rate was 5.7 per 100,000 for 2009-2013.

Figure 37 shows liver and intrahepatic bile duct cancer incidence rates by county for 2009-2013. This is the overall rate, not the rate for the specific subset of histologies related to viral hepatitis. The graph shows the incidence rate for each county, arranged high to low, along with the 95% confidence interval error bars, and the overall rate for West Virginia (in yellow) with its confidence interval.

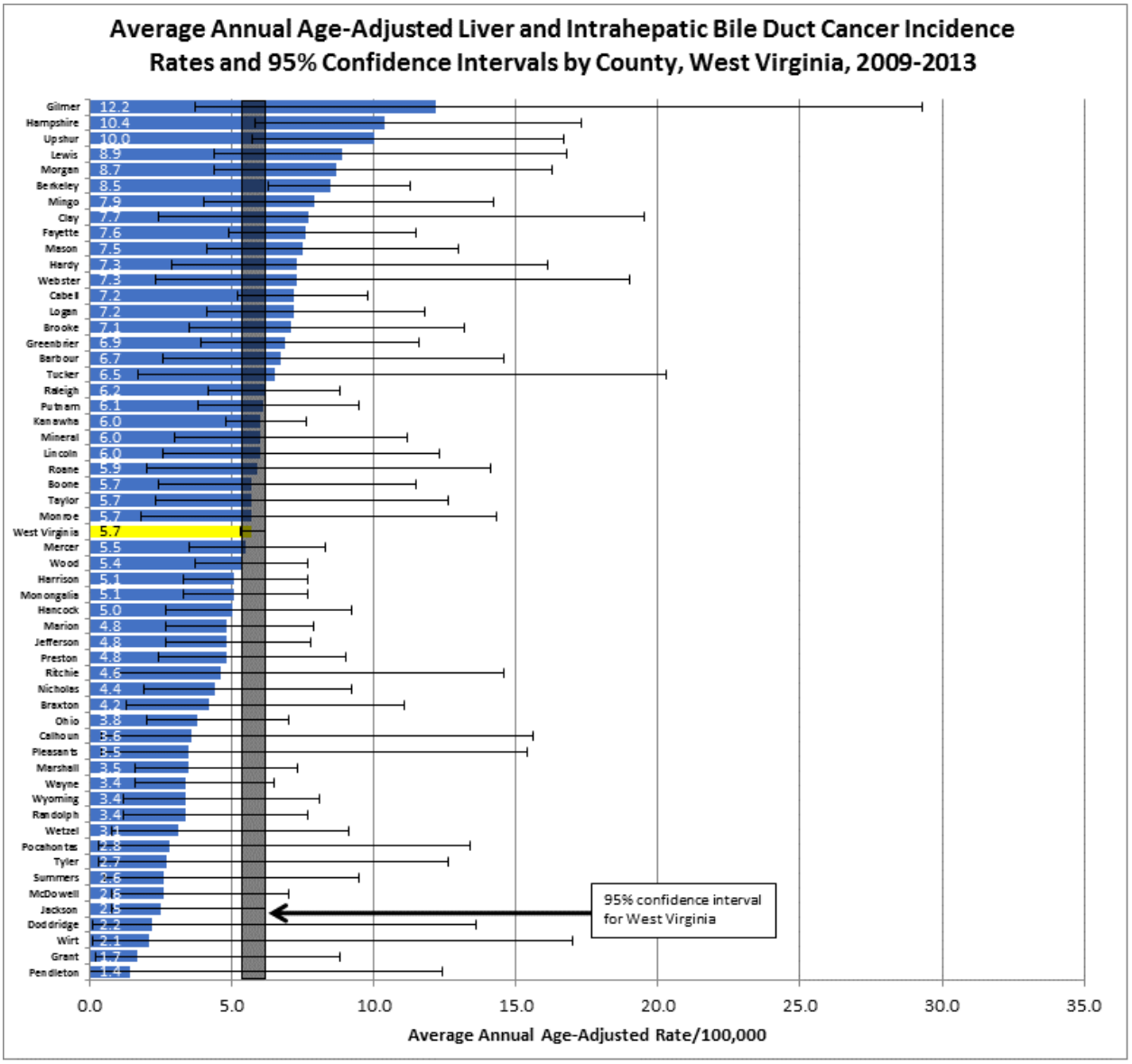


Figure 37. Average annual age-adjusted liver and intrahepatic bile duct cancer incidence rates and 95% confidence intervals by county, West Virginia, 2009-2013.

Source: DHHR, BPH, WV Cancer Registry

Mortality

Hepatitis B Mortality

Hepatitis B-related mortality in West Virginia is quite low; in 2013, there were no deaths among West Virginia residents with hepatitis B as the underlying cause. From 2006 to 2015, males have consistently experienced higher death rates from hepatitis B than females.

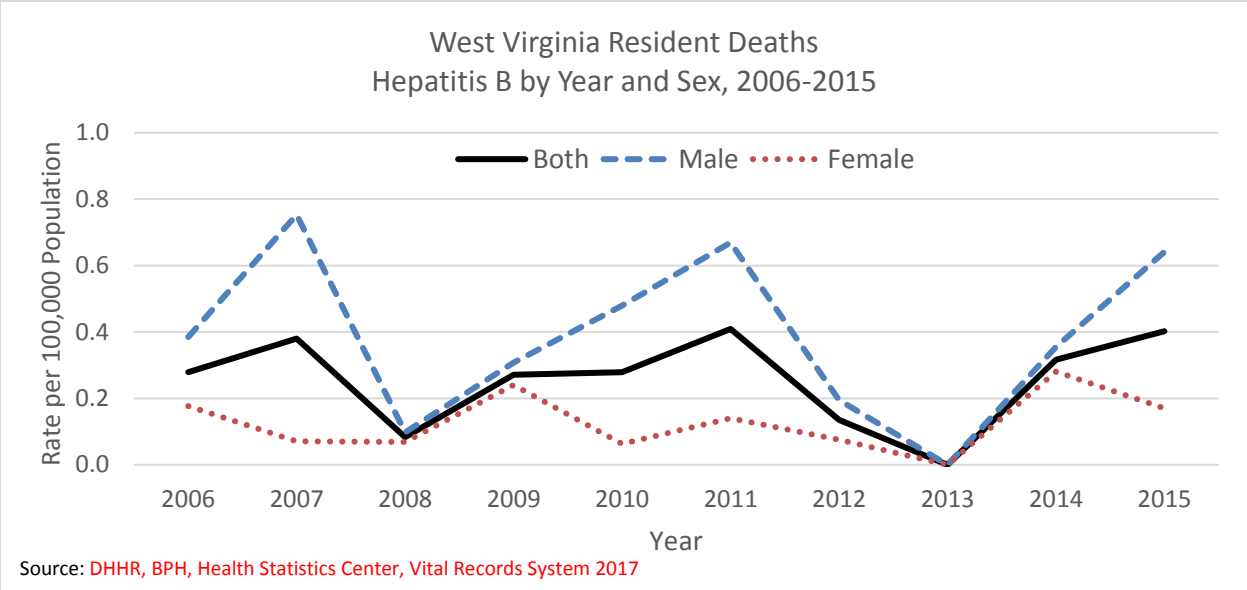


Figure 38. Hepatitis B mortality among West Virginia residents by year and sex, 2006-2015. ICDA 10 Codes for Hepatitis B are B16, B18.0-B18.1.

Across all races, the age-adjusted mortality rate for hepatitis B was 0.3 per 100,000 population. Deaths in West Virginia from hepatitis B disproportionately affected Black non-Hispanic residents, who experienced an age-adjusted mortality rate of 0.6 per 100,000, twice as high as white non-Hispanic residents (0.3 per

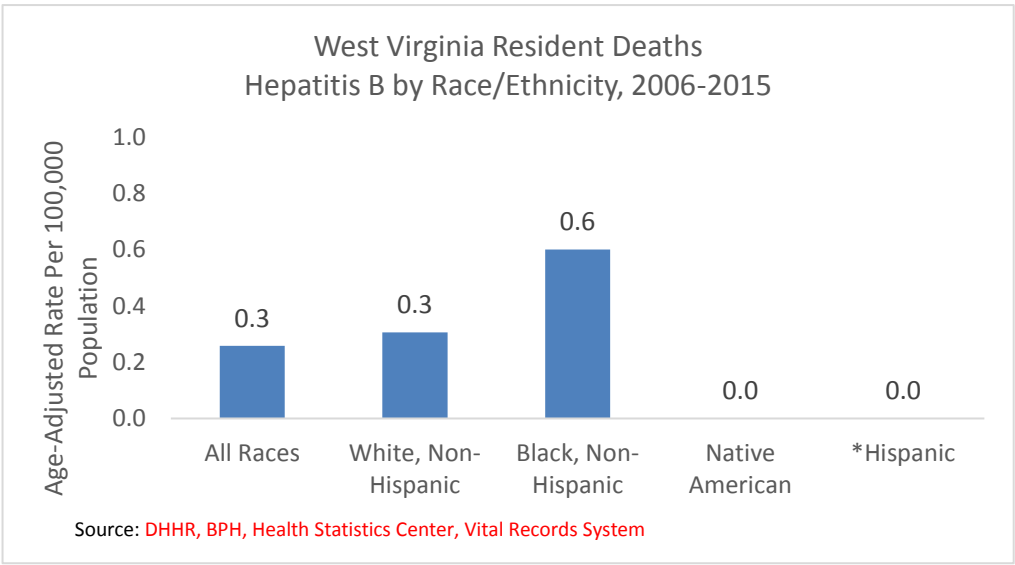


Figure 39. Age-adjusted hepatitis B mortality among West Virginia residents by race, 2006-2015.

100,000 population). The age-adjusted mortality rates for Native American and Hispanic (any race) West Virginia residents was 0 from 2006 to 2015 (Fig. 39).

In West Virginia, residents aged 45 to 54 years had the highest mortality rate from hepatitis B, at 0.8 per 100,000 population, from 2006 to 2015 (Fig. 40). Residents aged 65-74 had a similar hepatitis B mortality rate at 0.7 per 100,000 population. Residents under the age of 45 have had the lowest risk of hepatitis B-associated mortality.

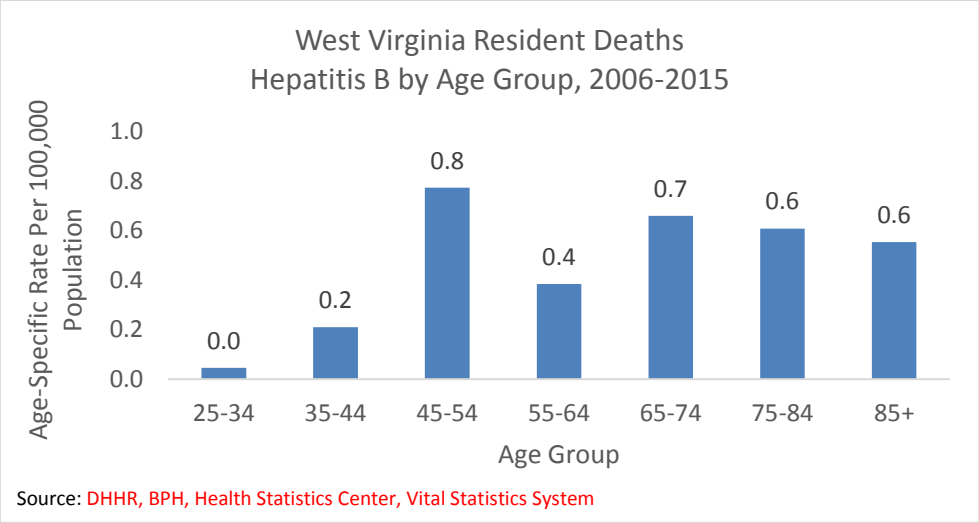


Figure 40. Age-specific hepatitis B mortality rates among West Virginia residents, 2006-2015.

Hepatitis B mortality is largely concentrated in southern West Virginia. Twenty-nine counties did not have any deaths from hepatitis B between 2006 and 2015 (Fig. 41).

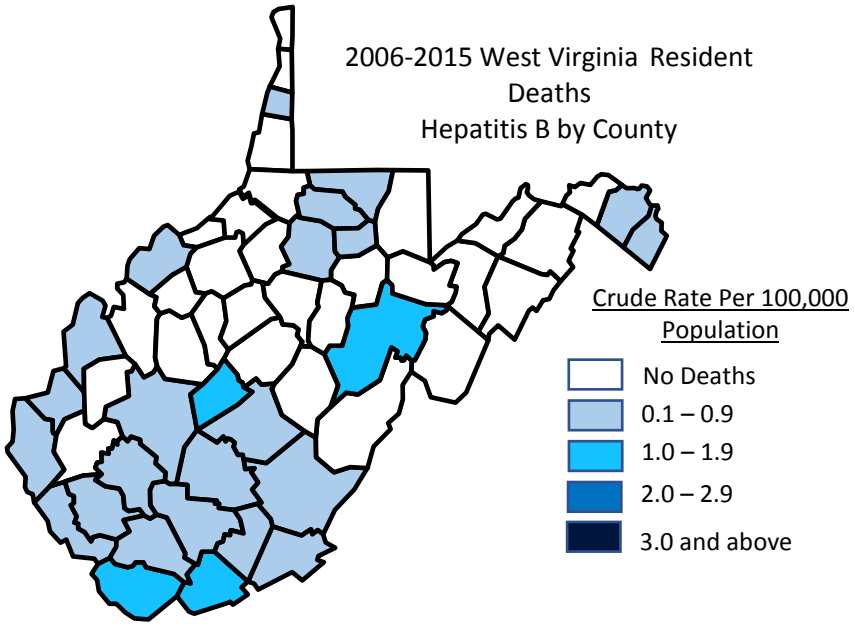


Figure 41. Hepatitis B mortality rates among West Virginia residents by county, 2006-2015.
Source: DHHR, BPH, Health Statistics Center, Vital Statistics System

Hepatitis C Mortality

Since 2012, overall mortality from hepatitis C has declined. From 2006 to 2015, the age-adjusted hepatitis C mortality rate in West Virginia was consistently higher in males compared to females.

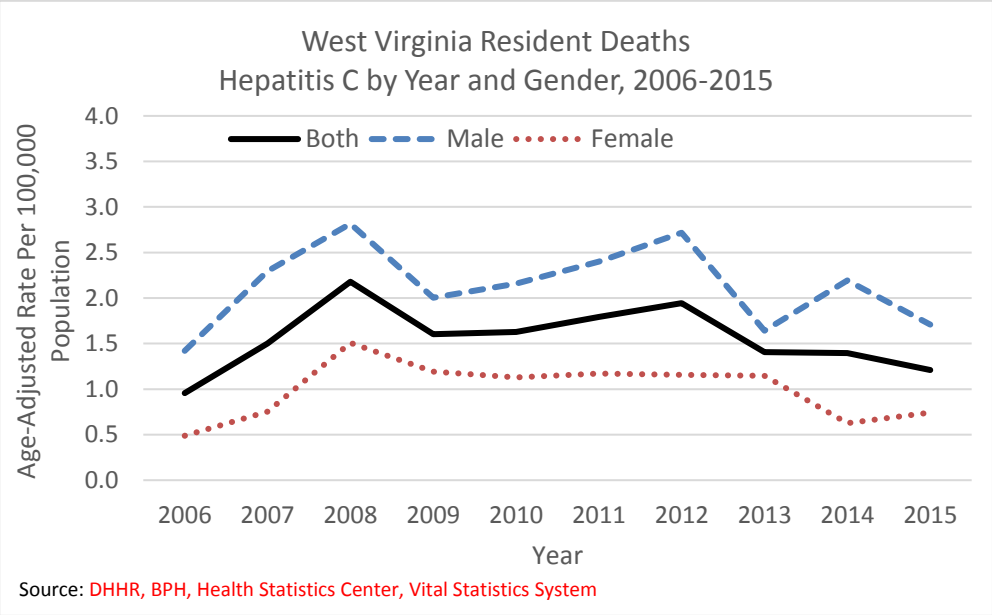


Figure 42. Hepatitis C mortality among WV residents by county, 2006-2015.
ICDA 10 Codes for Hepatitis C are B17.1 and B18.2.

The age-adjusted mortality rate for all races from 2006 to 2015 was 1.6 deaths per 100,000 population. Mortality rates by race varied considerably. White non-Hispanic residents had a mortality rate of 1.5 per 100,000 population, which is half the mortality rate of Black non-Hispanic residents (3.0 per 100,000 population). Native American residents also experience a higher mortality rate (2.7 per 100,000) than White non-Hispanic residents. The mortality rate of Hispanic residents (any race) was 0.4 per 100,000.

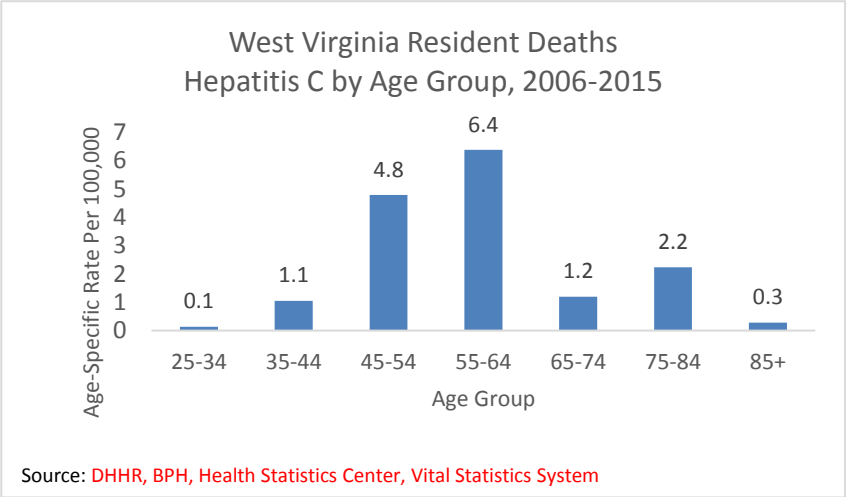


Figure 43. Hepatitis C mortality among West Virginia residents by age, 2006-2015.

From 2006 to 2015, the hepatitis C mortality rate among those aged 55 to 64 years was 6.4 per 100,000 population (Fig. 43). This is higher than the mortality rate of any other age group. Residents aged 45 to 54 years had the second-highest mortality rate, 4.8 per 100,000 population.

All but 5 counties (Clay, Doddridge, Tucker, Wetzel, and Wirt) in West Virginia experienced mortality from hepatitis C (Fig. 44).

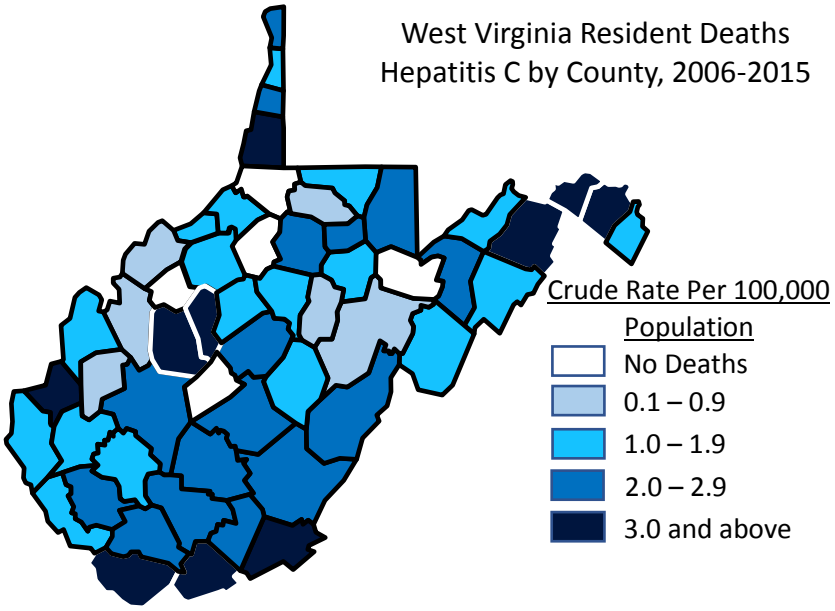


Figure 44. Hepatitis C mortality among WV residents by county, 2006-2015. ICDA 10 Codes for Hepatitis C are B17.1 and B18.2.

Ongoing Initiatives and Next Steps

Harm Reduction Programs

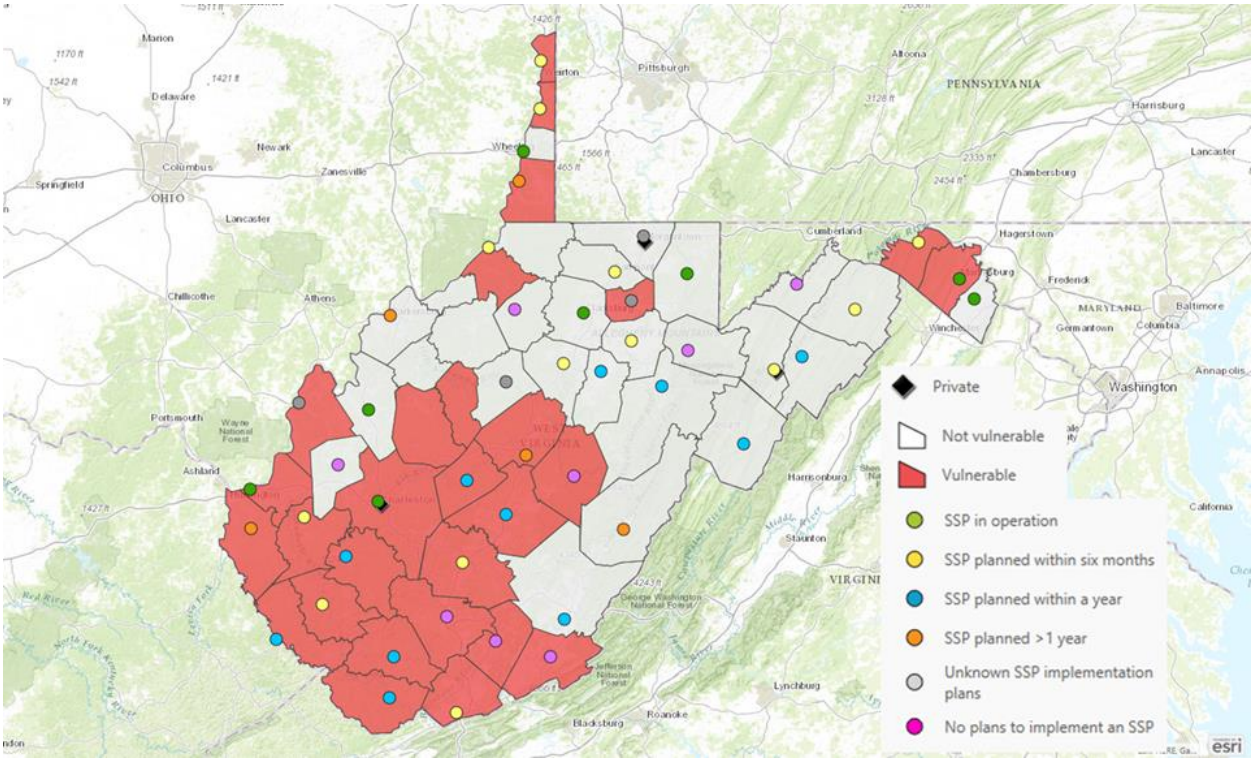
To reduce the spread of HBV and/or HCV among persons who inject drugs (PWID), several counties in West Virginia have implemented harm reduction programs, which include syringe service programs (SSPs). SSPs are comprehensive programs designed to provide safe disposal of needles for injection drug users (IDUs), testing for blood borne viral infections for those at greater risk of infection due to injection drug use, supply clean needles to lessen the possibility of infection from shared needles, and to help IDUs find treatment and social services with which they may not otherwise be familiar. SSPs can also provide resources and education to the family members and friends of IDUs.

SSPs are designed to reduce the likelihood of transmission of blood borne diseases by providing sterile injection equipment to IDUs and reducing the potential of sharing syringes among this population. IDUs account for approximately 8 percent of new HIV infections in the United States[1] and more than two thirds

[1] http://www.cdc.gov/hiv/risk/idu.html

(68.2%) of newly reported acute HCV infections are IDU related.[2] Currently, there are no commercially available vaccines for HIV and HCV.

As of July 3, 2017, 10 West Virginia counties provide SSPs in 11 locations. SSPs are provided in Cabell, Kanawha (2 sites), Grant, Mason, Monongalia, Ohio, Preston, Berkeley, Jefferson, and Harrison counties. Interest in developing additional SSPs has been indicated in several more counties. However, there were no SSPs currently serving West Virginia's counties most vulnerable to rapid dissemination of HIV or HCV infection among PWID (County-Level Vulnerability Assessment for Rapid Dissemination of HIV or HCV Among Persons Who Inject Drugs, United States, 2016).



Viral Hepatitis Prevention Coordinator

Since 2004, West Virginia has had 1 Viral Hepatitis Prevention Coordinator (VHPC) who provides hepatitis information to the public. This includes education on viral hepatitis prevention, testing, and patient linkage to care/medical providers. The VHPC also provides education to school systems, addiction treatment centers, harm reduction/syringe service programs and correctional facilities.

Hepatitis Regional Training

From December 2015 to April 2016, the VHPC, in collaboration with Hepatitis B and C epidemiologists and the Perinatal Hepatitis B Prevention Coordinator, provided 6 regional hepatitis trainings across West Virginia to LHD nurses and others involved in HBV and HCV investigations. LHD personnel were provided with education on how to properly investigate and educate patients on viral hepatitis, ways for patients to prevent disease transmission and steps patients must take to manage their infection with connection to physician care.

[2] http://www.cdc.gov/hepatitis/statistics/2014surveillance/commentary.htm#hepatitisC

Electronic Laboratory Reporting

In 2015, 3 commercial laboratories (LabCorp®, Mayo Medical Laboratories®, and Quest Diagnostics®) started reporting test results as electronic laboratory reports. Electronic lab reporting has decreased human error and non-reporting due to the automatic transmission of positive viral hepatitis results from the resulting laboratory directly to the WVEDSS. This resulted in an increase in viral hepatitis reporting and increased detection of cases in 2015.

Hepatitis B Pilot Project

In response to the growing rate of acute HBV infections in West Virginia, the CDC funded the Adult Hepatitis B Vaccination Pilot Project (AHBVPP). The AHBVPP was implemented in January 2013 in 17 counties in West Virginia, with the highest reported incidence of acute HBV infection in 2012, to reduce the number of new cases of HBV in West Virginia by immunizing adults at risk (Harris et al., 2016). The project's goal was to reach adults at risk for HBV infection in settings serving high-risk populations such as STD clinics, HIV care facilities, correctional facilities and substance abuse treatment facilities. All participating LHDs implemented standing HBV vaccination orders, provided HBV education, and vaccinated all adults requesting protection from HBV infection regardless of risk (Epi-log fourth quarter 2015). The AHBVPP ended in 2015.

Surveillance

In 2015, West Virginia received more than 33,000 HBV and HCV laboratory reports (paper and electronic laboratory reports). Through partnership with West Virginia LHDs and the DIDE, new cases of acute HBV, HCV, and chronic HBV are investigated by the LHD of the county of residence of the patient. Patients are interviewed for risk factors and disease contacts, assisted in finding an infectious disease specialist and are provided with viral hepatitis education to prevent the spread of disease. Surveillance activities and case reporting of HBV and HCV are managed and reported to the CDC by West Virginia's Hepatitis B Epidemiologist, Hepatitis C Epidemiologist, and Hepatitis C Registrar.

Perinatal Hepatitis B

Hepatitis B infection in a pregnant mother poses a risk of vertical disease transmission to the unborn child during childbirth. The Division of Immunization Services, in collaboration with the Hepatitis B Epidemiologist, receives all reports of HBV infection among pregnant women. Reports of HBV positive pregnant women are received from providers, labs, or the West Virginia Health Statistics Center (Vital Statistics). All pregnant women should be screened for HBV before delivery of the infant. At birth, infants of HBV positive pregnant women receive the HBV vaccine and Hepatitis B Immune Globulin (HBIG) within 12 hours of birth to prevent vertical transmission of HBV from mother to child. The disease intervention specialist (DIS) conducts case management on each HBV positive pregnant mother to ensure the delivery facility is prepared to administer post-exposure prophylaxis (PEP) and HBV vaccine to the infant, as well as follow up to ensure the infants receive the following 2 doses of the HBV vaccine at 2 months of age and at 6 months of age.

Recommendations

SSPs need to be expanded throughout West Virginia's counties to positively impact public health. Most of West Virginia's SSPs are in LHDs and can serve as a huge asset for disease surveillance with direct access to high-risk populations. SSPs provide comprehensive services based on the harm reduction

concept. Such programs are designed to provide safe disposal of needles for Injection Drug Users (IDU), testing for blood borne viral infections (HBV, HCV and HIV) for those at greatest risk of infections resulting from drug use and to prevent the potential for blood borne disease transmission. SSPs also assist with locating treatment, behavioral health and social service programs for these high-risk populations.

A community partnership among public health, social services, law enforcement, pharmacies, medicinal care, emergency services, drug control policy groups, and fire departments can provide a pathway to planning and operating linkages to appropriate care and harm reduction services. Supporting high-risk populations with education, counseling, testing, treatment, referral to care, and syringe exchange services works to prevent and control blood borne pathogens.

Strengthening the use of ESSENCE (syndromic surveillance data) in West Virginia is imperative to connect the remaining 27% of eligible medical facilities. Efforts need to be put forth to contact and engage these facilities to begin the onboarding process. Next steps also include recommendations to properly identify and prepare urgent care centers fitting the eligible facility definition provided by the National Syndromic Surveillance Program (NSSP) and the CDC. This will be more time consuming than onboarding hospital facilities, as urgent care centers in the state are not operating under a regulating body such as the West Virginia Hospital Association.

The efficiency of mother to child transmission of HBV and 2015 West Virginia data indicating a high incidence of 3 perinatal HBV cases reported among every 20,000 births support the need to improve HBV vaccination coverage rates. West Virginia needs to overcome the barriers of inadequate prenatal screening, inadequate reporting of positive results, and inadequate or incorrect testing after 3-dose vaccination completion. Recommendations to address these barriers include education of birthing facilities and providers for improving practices of vaccine hesitancy, ordering the birth dose to be given within 24 hours of birth or at the same time as the dose of vitamin K, improving the reporting of positive HBV results, and ensuring correct testing after vaccination. Results of a Perinatal Hepatitis B Investigation of West Virginia hospital birthing centers exhibited a higher percentage of success in delivering the hep B birth dose by having preprinted standing orders, instructing (or directing) vaccination with the newborn's first bath, and a nurse championing the standing orders by having the vaccine dispensed when delivery is imminent.

Datasets analyzed

Data for this report came from a variety of sources, described below.

Hepatitis B and C Surveillance

Positive test results for any cases of hepatitis B or C are required by state law to be reported to the state or LHD. All hospitals, medical providers, laboratories, blood collection centers, and drug treatment centers are required to submit these reports. There are reciprocal data sharing agreements in place with adjacent states to capture reports of cases treated or diagnosed outside of West Virginia.

These reports are stored in a statewide data system called the West Virginia Electronic Disease Surveillance System (WVEDSS), managed by the Division of Infectious Disease Epidemiology. Each record contains demographic information, report dates, test results, risk factors for acute cases, incarceration

status, and other relevant epidemiologic information. WVEDSS records with the disease condition hepatitis B or hepatitis C were the source data for this section.

Syndromic Surveillance

Syndromic surveillance is conducted in West Virginia by accessing the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE). This system captures information from 37 of the state's 51 emergency departments (73%) and is managed by the West Virginia Division of Epidemiologic Informatics and Evaluation. Emergency department visits with a chief complaint of hepatitis B or hepatitis C were the source data for this section.

Emergency Medical Services

Emergency medical services data contain information on all ambulance response runs in West Virginia and is managed by the Office of Emergency Medical Services. Emergency medical personnel usually ask responsive patients if they have hepatitis, HIV, or other infectious conditions that could be spread during treatment when blood or other bodily fluids are involved. Ambulance response records that mentioned hepatitis, hepatitis B, or hepatitis C in the text fields served as the source data for this section. Hepatitis A records were excluded from these analyses.

Maternal Risk Screening

Since 2011, healthcare providers that offer maternity services are required to administer the Prenatal Risk Screening Instrument (PRSI) at the initial examination for pregnant women in West Virginia. The PRSI assesses numerous risk factors related to hepatitis and opioid abuse, among other health-related information. PRSIs that were matched to live births from West Virginia birth certificates were the source data for this section.

Hepatitis B or C Births, Neonatal Abstinence Syndrome

Data for hepatitis B or C births, risk factors at birth, and neonatal abstinence syndrome (NAS) were extracted from birth certificates by the West Virginia Health Statistics Center. The presence of hepatitis at birth is recorded under "Infections present and/or treated during this pregnancy." Maternal drug use is found under "Risk factors in this pregnancy." NAS is identified in the "Abnormal conditions of the newborn" category on the birth certificate.

Medicaid Data

Data on West Virginia's Medicaid population is stored in the Bureau for Medical Services data warehouse. The source for the data shown in this section is Medicaid records with a diagnosis code of hepatitis B or hepatitis C. Patients who are covered by Medicaid with a fibrosis metavir score of 2 are eligible for coverage of treatment for HCV.

HIV Data

Data were linked from West Virginia's HIV/acquired immunodeficiency syndrome (AIDS) and HCV databases. Coinfection was defined as any HIV or AIDS patient with acute, confirmed HCV or HBV infection. Demographic and risk behavior information was obtained from the HIV/AIDS database.

Hepatocellular Carcinoma

Data on liver cancer in West Virginia were extracted from the Rocky Mountain Data System, which is the statewide cancer registry database managed by the West Virginia Division of Cancer Epidemiology. Cases

of hepatocellular carcinoma, and the subset of those cancers with histologies known to be associated with viral hepatitis were the source data for this section.

Mortality

Mortality data were compiled by the West Virginia Health Statistics Center from death certificates. Individuals with an underlying cause of death of hepatitis B or hepatitis C were used in these analyses.