



Department of  
**Health**

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# Tennessee Viral Hepatitis Epidemiological Profile, 2018

Tennessee Department of Health, Viral Hepatitis Program | January 2020



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## Executive Summary

This report presents 2018 surveillance data for Viral Hepatitis (VH) in Tennessee (TN). The profile focuses on reported cases of acute hepatitis B virus (HBV), acute hepatitis C virus (HCV), chronic HCV, and perinatal HCV in the state.

The TN Department of Health's (TDH) VH Program manages the VH cases within the TDH surveillance registry. Acute HBV, acute HCV, and chronic HCV are reportable conditions. Demographic information, vital status, transmission risk, and laboratory results are collected on standardized case report forms and laboratory reports. This data is then stored in the National Electronic Disease Surveillance System (NEDSS) Based System (NBS) and used to create yearly epidemiological reports.

The data reported are for 2014 through 2018 and all data are based on information received by TDH as of July 31, 2019.

### Background

- From 2006 to 2013, the rate of acute HBV infection in the United States remained stable; however, TN and two other Appalachian states demonstrated a 114% increase in acute HBV cases. This increase, in the Central Appalachia region, occurred after 2009 and was most pronounced among non-Hispanic White individuals, aged 30–39 years, and those who reported injection drug use.<sup>1</sup>
- TN has one of the highest reported case rates of acute HCV infection in the nation; case rates continue to rise. Tennessee (along with three other states in the Central Appalachia region) demonstrated a 364% increase in reported acute HCV cases from 2006 to 2012 among individuals aged 30 years and younger from nonurban areas.<sup>2</sup>
- Given that more than 70% of acute HCV cases are asymptomatic, it is likely that some newly reported cases of chronic HCV (particularly among younger individuals) represent recently acquired or even acute HCV infection.

### Key Findings

#### Acute Hepatitis B Virus (HBV)

- From 2014 to 2018, there was a **32% increase in reported acute HBV cases in TN**.
- Other notable findings among HBV cases reported during 2014–2018 include:
  - Men accounted for 61% of acute HBV cases;
  - Individuals age 30 years and older accounted for 95% of acute HBV cases, demonstrating the vaccine effect<sup>3</sup>; and
  - From 2014 to 2018, **rates of acute HBV**:
    - Decreased 36% among individuals less than 30 years,
    - Increased 22% among individuals aged 30–44 years, and
    - Increased 52% among individuals aged 45 and older.

<sup>1</sup> Harris AM, Iqbal K, Schillie S, et al. Increases in Acute Hepatitis B Virus Infections – Kentucky, Tennessee, and West Virginia, 2006–2013. *MMWR Morb Mortal Wkly Rep*. 2016; 65(3): 47–50.

<sup>2</sup> Zibbell JE, Iqbal K, Patel RC, et al. Increases in hepatitis C virus infection related to injection drug use among persons aged ≤30 years - Kentucky, Tennessee, Virginia, and West Virginia, 2006–2012. *MMWR Morb Mortal Wkly Rep*. 2015;64(17):453–458.

<sup>3</sup> <https://www.tn.gov/health/cedep/immunization-program/ip/immunization-requirements.html>

## **Acute and Chronic Hepatitis C Virus (HCV)**

- From 2014 to 2018, there was a **193% increase in the number of newly reported chronic HCV cases in TN**. These findings are thought to be reflective of the following factors in TN: 1) increasing rates of HCV, 2) increasing testing for HCV, and 3) the implementation of centralized chronic HCV surveillance efforts beginning in mid-2015.
- Other notable findings among cases reported from 2014–2018 include:
  - Individuals less than 45 years of age accounted for:
    - 52% of new chronic HCV infections, and
    - 81% of acute HCV infections;
  - Women accounted for:
    - 48% of acute and 49% of new chronic HCV cases among individuals less than 45 years of age, and
    - 39% of acute and 37% of new chronic HCV cases among individuals 45 years of age and older;
  - **The increased number of HCV cases among women of child-bearing age prompted the initiation of surveillance of HCV positive pregnant females on January 1<sup>st</sup>, 2018.**

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## Background

Tennessee (TN), a southern state which borders eight other states, is a mid-sized state that consists of 95 counties and is home to over 6.5 million people. The TN Department of Health's (TDH) Central Office is located in Nashville and partners with all of the state's 95 counties, which are divided into 13 public health regions. Six of the most populous counties operate as stand-alone metropolitan public health regions, and the remaining 89 counties are divided into seven rural health regions. The rural counties are considered to be an extension of TDH, whereas TDH partners with the metropolitan regions through contractual agreements.

### *Population*

Tennessee was home to 6,770,010 people in 2018, which accounts for approximately 2% of the population in the United States.<sup>3</sup> The population in TN increased by 229,184 people (4%) between 2014 and 2018.<sup>3</sup> The most populous areas include: Memphis/Shelby County, Nashville/Davidson County, and the Mid-Cumberland public health region.<sup>3</sup>

### *Age*

The median age in TN in 2018 was 39, similar to that of the U.S. median age (38 years).<sup>3</sup> The age distribution in TN roughly reflects that of the U.S. population in general.<sup>3</sup>

### *Race and Ethnicity*

According to the most recent census estimates<sup>4</sup>, TN's population is predominantly non-Hispanic White (74%) followed by non-Hispanic Black (17%) and Hispanic (6%).

### *Income and Poverty*

The median household income in TN in 2017 was \$48,708, compared to the national median income of \$57,652; 15% of TN's population falls below the federal poverty level, which is greater than the national average of 12%.<sup>3</sup> There are noticeable racial and ethnic disparities in household income in TN. White households had a median income of \$54,405 in 2017, while Black and Hispanic households had median incomes of \$38,190 and \$41,462, respectively.<sup>3</sup>

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<sup>4</sup> <https://www.census.gov/quickfacts/tn>

## Reporting Laws and Regulations

Acute HBV infection and acute HCV infection are reportable conditions and require notification to TDH within one week of identification. Acute HBV and acute HCV have been reportable since 1995, although baseline data vastly improved in 2015 due to the development and implementation of new NBS pages to facilitate VH-specific data collection. Consumption of all HCV laboratory results was enhanced beginning July 1, 2015 and chronic HCV became laboratory reportable in 2017.

TDH's Reportable Disease regulations can be located here:

<https://www.tn.gov/health/cedep/reportable-diseases.html>

Condition	Reportable in 2018 (Yes/No)	Existing Practices	Barriers/Gaps
Acute HBV	Yes	Laboratory results are reported by providers and laboratories either directly into NBS, on paper, and/or via Electronic Laboratory Reporting (ELR). Chronic HBV is not currently reportable in TN.	There is limited capacity to conduct surveillance and epidemiologic activities on chronic VH conditions due to a lack of routinely entered historical data. Due to the large volume of cases, regional health department staff investigates acute HBV cases, chronic HBV cases in females of childbearing age (11-50), and acute HCV cases. Central Office staff conducts NBS surveillance activities on chronic and perinatal HCV cases.
Chronic HBV	No		
Acute HCV	Yes	All past and present HCV infections are notifiable diseases. For acute HCV, laboratory results are reported by providers and laboratories either directly into NBS, on paper, and/or via ELR. Chronic HCV was made laboratory reportable beginning January 1, 2017.	
Chronic HCV	Yes		

# Viral Hepatitis

## *Hepatitis B Virus*

Hepatitis B virus (HBV) infection has been vaccine preventable since 1981. In 1982, HBV vaccination was recommended for infants born to HBsAg positive mothers and high-risk adult populations. HBV vaccination has been a universally recommended childhood vaccination since 1991 and an elementary school mandate in TN since 1999.<sup>5</sup> Remarkably, HBV infection remains a major public health challenge in the United States. Progression of acute to chronic HBV is highly dependent upon age: approximately 90% of perinatally-infected infants become chronically infected, while only about 5% of acutely infected adults become chronically infected.<sup>6</sup> While there is no cure for HBV, treatment is available. Without treatment, approximately 25% of persons with chronic HBV infection die prematurely from cirrhosis or liver cancer.<sup>6</sup> Strategies for the elimination of HBV include: universal vaccination of infants beginning at birth, routine HBV screening of all pregnant women at first prenatal visit, vaccination of previously unvaccinated children and adults, and vaccination of adults at increased risk for infection.

## *Hepatitis C Virus*

Hepatitis C virus (HCV) infection is the most common chronic bloodborne pathogen in the United States.<sup>7</sup> Most cases of acute HCV are asymptomatic and, therefore, not diagnosed. Progression to chronic HCV occurs in about 75% of persons with acute HCV.<sup>8</sup> Acute HCV infections are on the rise, particularly among younger people who inject drugs<sup>2</sup>; however, approximately three-fourths of persons in the United States living with chronic HCV infection are Baby Boomers (e.g. born between 1945 and 1965).<sup>9</sup> In 2013, HCV-related mortality surpassed the total combined number of deaths from all other infectious diseases.<sup>10</sup>

Despite new therapies that can cure greater than 95% of persons with chronic HCV, only about half of those living with HCV are aware of their infection, and most have not received recommended care and treatment.<sup>8</sup> Without diagnosis and treatment, people living with HCV may develop liver cancer, cirrhosis, or other life-threatening HCV-related diseases, and may unknowingly transmit the disease to others.

## *Risk Factors*

There are a number of known transmission risks for HBV and HCV, many overlapping between the two conditions. The main routes of transmission occur primarily when infected blood enters the bloodstream of non-infected individuals. These pathways include, but are not limited to:

- Past or present injection drug use
- Sharing drug equipment (cotton, cookers, snorting straws, etc.)
- Use of unregulated tattooing equipment
- Blood transfusions or organ transplants prior to 1992
- Needle sticks in health care settings
- Being born to a viral hepatitis-infected mother

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<sup>5</sup> <https://www.immunize.org/laws/>

<sup>6</sup> <https://www.cdc.gov/hepatitis/hbv/hbvfaq.htm>

<sup>7</sup> Hofmesiter MG, Rosenthal EM, Barker LK, Rosenberg ES, Barranco MA, Hall EW, Edlin BR, Mermin J, Ward JW, Ryerson AB. Estimating prevalence of hepatitis C Virus Infection in the United States, 2013–2016. *Hepatology*. 2018;69(3):1020–1031.

<sup>8</sup> US Department of Health and Human Services. (2017). National Viral Hepatitis Action Plan, 2017–2020. Available at: <https://www.hhs.gov/sites/default/files/National%20Viral%20Hepatitis%20Action%20Plan%202017-2020.pdf>

<sup>9</sup> <https://www.cdc.gov/nchhstp/newsroom/2017/Hepatitis-Surveillance-Press-Release.html>

<sup>10</sup> <https://www.cdc.gov/media/releases/2016/p0504-hepc-mortality.html>

- Sex with a hepatitis-infected person (more common in HBV transmission)
- Sharing personal and household items that are contaminated with infected blood (razors, toothbrushes, diabetic equipment, etc.) and/or
- Infection control breaches in health care settings (primarily observed in facility-based outbreaks)

## Acute Hepatitis B

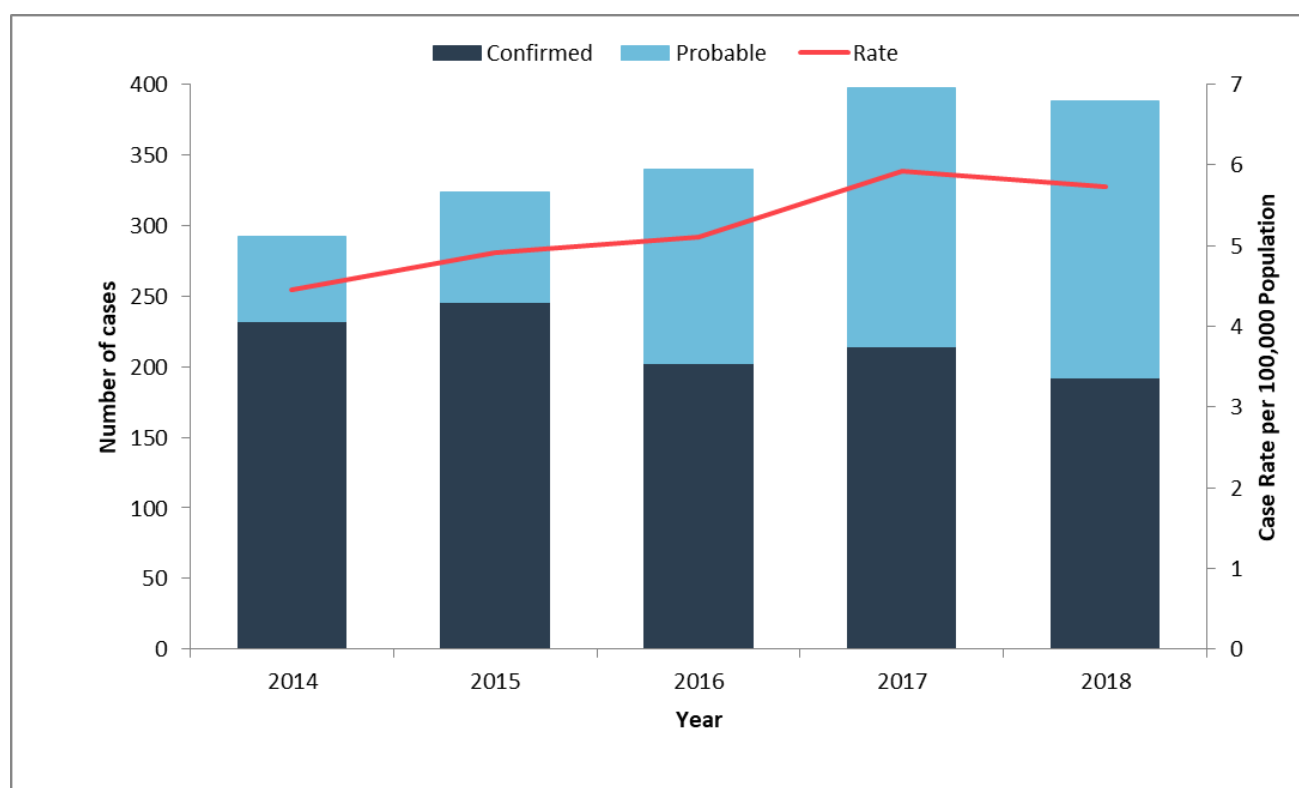
This section summarizes trends in acute HBV infection in TN from 2014 to 2018.

The CDC/CSTE case definition for acute HBV can be found at:

<https://wwwn.cdc.gov/nndss/conditions/hepatitis-b-acute/case-definition/2012/>

Of note, TDH has a specific case classification for probable acute HBV infection (see Glossary).

**Figure 1 - Case Counts and Rates of Confirmed and Probable Acute HBV Infection, Tennessee, 2014–2018**



**Table 1 - Case Counts and Rates of Confirmed and Probable Acute HBV Infection, Tennessee, 2014–2018**

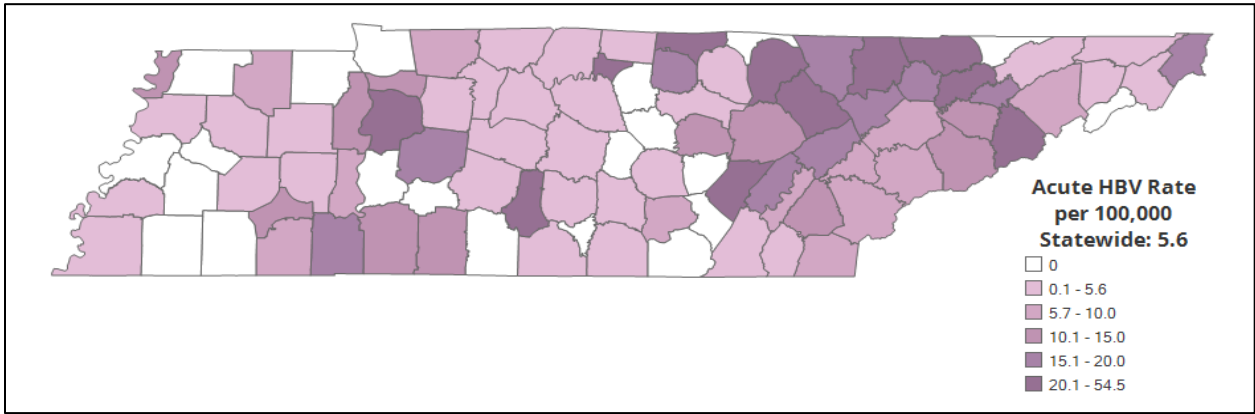
Cases and Case Rates per 100,000 population	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	292	4.5	324	4.9	340	5.1	398	5.9	388	5.7
Confirmed Only	232	3.5	246	3.7	202	3.0	214	3.2	192	2.8
Probable Only	60	0.9	78	1.2	138	2.1	184	2.7	196	2.9

From 2014 to 2018, case counts and rates of total acute HBV (confirmed and probable) increased in TN. This increase was driven by an increase in the rate of acute probable HBV cases (a 227% increase) as compared to a 17% decrease in the rate of acute confirmed HBV cases over the same period of time. In 2018, the proportion of total acute HBV cases attributed to acute probable HBV was 51%, as compared to 21% in 2014, reflecting the addition of the TDH-specific probable case definition in 2015.

Additionally in 2018, Tennessee experienced the beginning of a statewide hepatitis A virus outbreak that occurred among populations with risk factors that overlap those found in the population of cases diagnosed

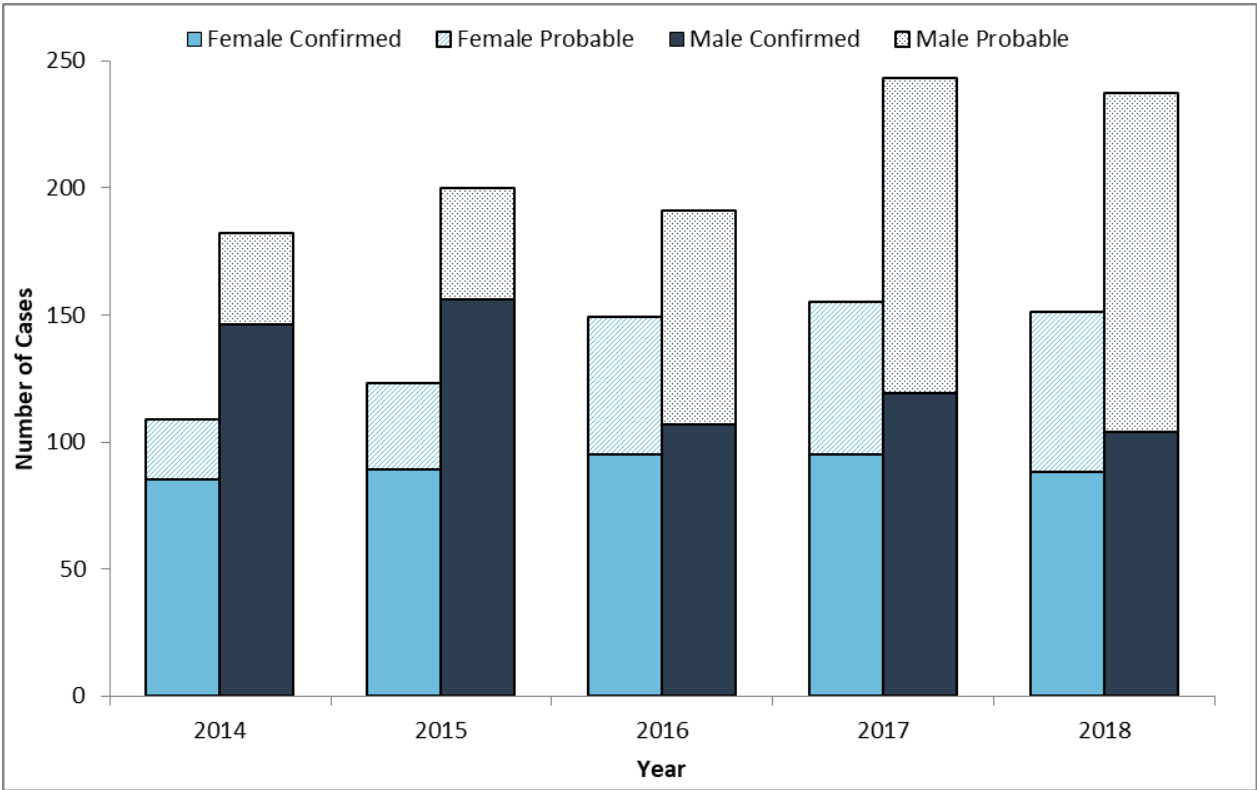
with acute HBV including recreational drug use (injection or non-injection). Cases co-infected with hepatitis A and hepatitis B were considered acutely infected for both conditions if available laboratory and clinical data could not distinguish between the two conditions.

Figure 2 - Case Rates of Confirmed and Probable Acute HBV Infection by County, Tennessee, 2018



Though acute HBV cases are found throughout Tennessee, the counties with the highest rates of acute HBV are largely found in eastern TN.

Figure 3 - Case Counts and Rates of Confirmed and Probable Acute HBV Infection by Sex, Tennessee, 2014–2018

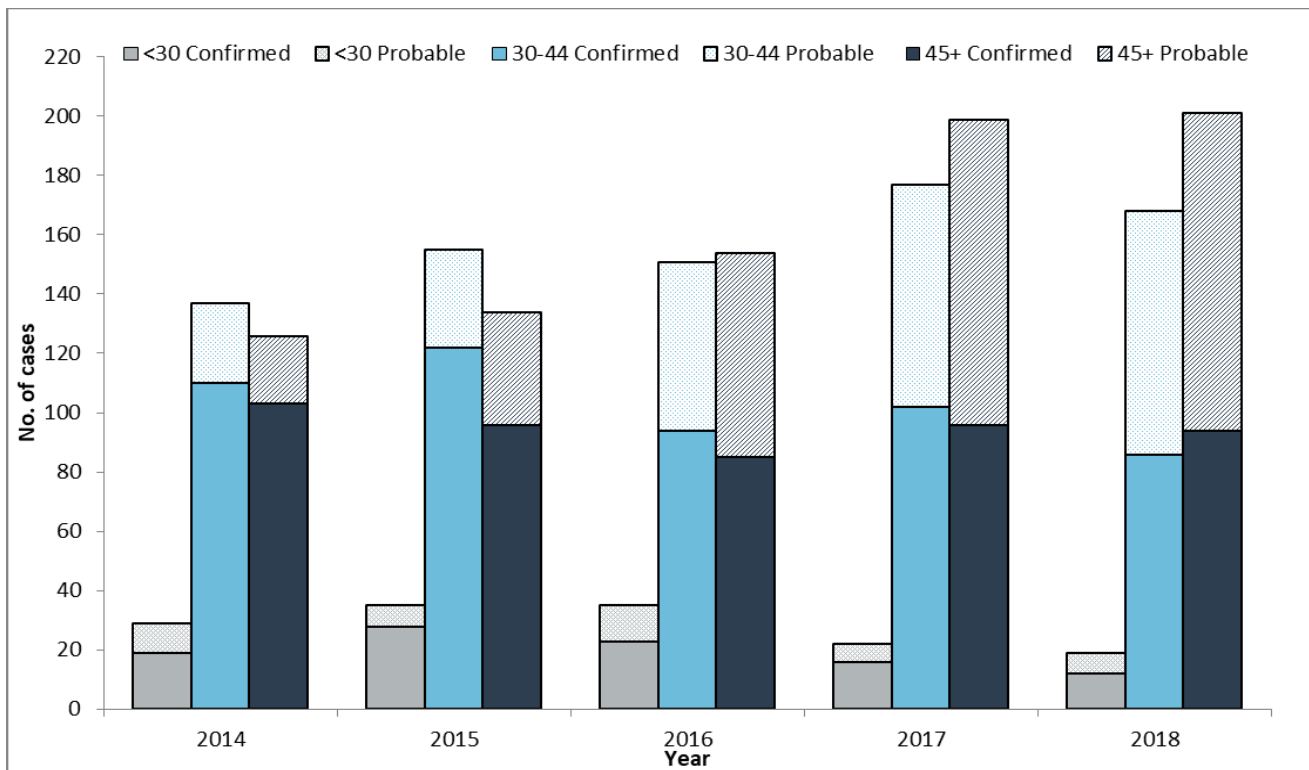


**Table 2 - Case Counts and Rates of Confirmed and Probable Acute HBV Infection by Sex, Tennessee, 2014–2018**

Sex	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	292	4.5	324	4.9	340	5.1	398	5.9	388	5.7
Female	109	3.2	123	3.6	149	4.4	155	4.5	151	4.4
Male	182	5.7	200	6.2	191	5.9	243	7.4	237	7.2

From 2014 to 2018, rates of acute HBV (confirmed and probable) in TN have consistently been higher among males than females. In 2018, the rate of acute HBV in males was 48% higher than the rate among females (7.2 cases per 100,000 compared to 4.4 cases per 100,000 respectively). Although rates are higher in males than females, they have continued to climb in both groups. From 2014 to 2018, the rate of acute HBV among men increased 26% and the rate of acute HBV among women increased 38%.

**Figure 4 - Case Counts of Confirmed and Probable Acute HBV Infection by Age Group, Tennessee, 2014–2018**



**Table 3 – Case Counts and Rates of Confirmed and Probable Acute HBV Infection by Age Group, Tennessee, 2014–2018**

Age Group (years)	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	292	4.5	324	4.9	340	5.1	398	5.9	388	5.7
<30	29	1.1	35	1.4	35	1.4	22	0.8	19	0.7
30-44	137	10.8	155	12.3	151	12.0	177	13.9	168	13.2
45+	126	4.6	134	4.8	154	5.5	199	7.0	201	7.0
<b>Confirmed</b>	232	3.5	246	3.7	202	3.0	214	3.2	192	2.8
<30	19	0.7	28	1.1	23	0.9	16	0.6	12	0.6
30-44	110	8.7	122	9.7	94	7.5	102	8.0	86	8.0
45+	103	3.8	96	3.5	85	3.0	96	3.4	94	3.3
<b>Probable</b>	60	0.9	78	1.2	138	2.1	184	2.7	196	2.9
<30	10	0.4	7	0.3	12	0.5	6	0.2	7	0.2
30-44	27	2.1	33	2.6	57	4.5	75	5.9	82	5.9
45+	23	0.8	38	1.4	69	2.5	103	3.6	107	3.6

From 2014 to 2018, rates of acute HBV (confirmed and probable) in TN have consistently been higher among the 30–44 year old age group when compared to the other two age groups. In 2018, individuals age 30 years and older accounted for 95% of all acute HBV cases.

The lower case counts and rates in those less than 30 years old are likely due to increased vaccine coverage from routine childhood vaccination against HBV. Recognizing the gap in vaccination coverage for those born before the universal childhood vaccination recommendation and the increased risk of exposure among those who are incarcerated, TDH launched the HBV Jail Vaccination Program in 2012. The program provides HBV vaccination to all eligible jail inmates in all East and Northeast counties in TN.

**Figure 5 - Case Counts of Confirmed and Probable Acute HBV Infection by Age Group and Sex, Tennessee, 2014–2018**

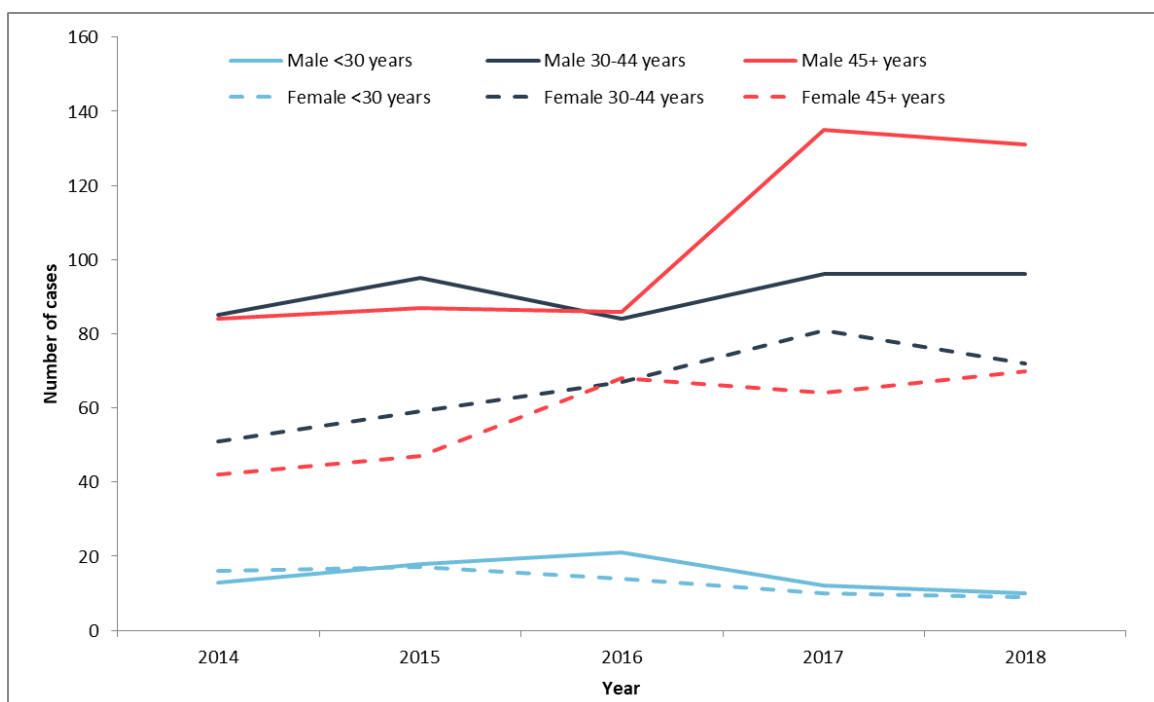




Figure 6 - Rates of Confirmed and Probable Acute HBV Infection by Age Group and Sex, Tennessee, 2014–2018

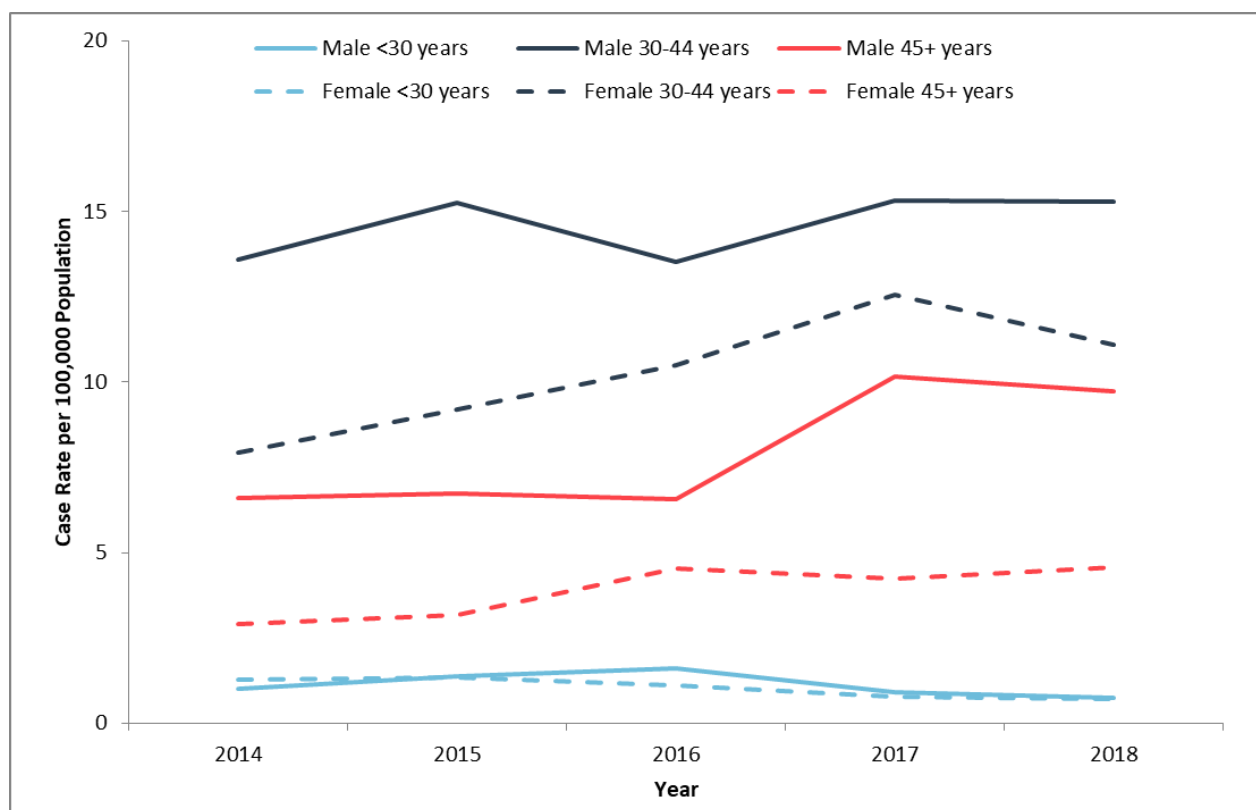
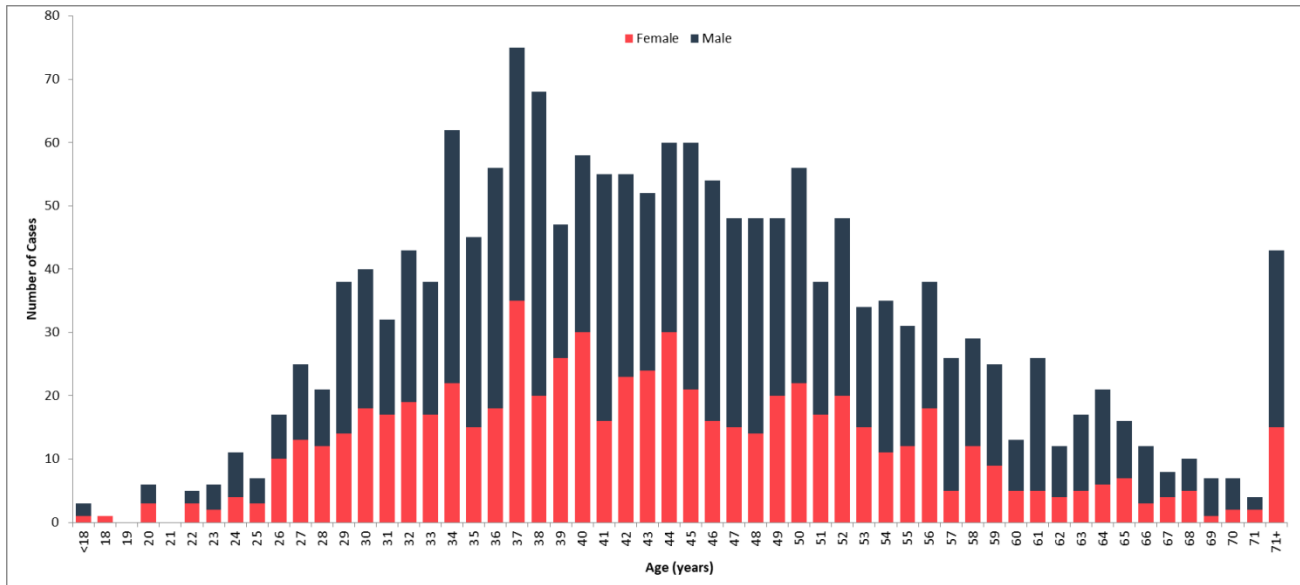


Table 4 - Case Counts and Rates of Confirmed and Probable Acute HBV Infection by Age Group and Sex, Tennessee, 2014–2018

Age Group (years)	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	292	4.5	324	4.9	340	5.1	398	5.9	388	5.7
<b>Female</b>	109	3.2	123	3.6	149	4.4	155	4.5	151	4.4
<30	16	1.3	17	1.3	14	1.1	10	0.8	9	0.7
30-44	51	7.9	59	9.2	67	10.5	81	12.5	72	11.1
45+	42	2.9	47	3.2	68	4.5	64	4.2	70	4.6
<b>Male</b>	182	5.7	200	6.2	191	5.9	243	7.4	237	7.2
<30	13	1.0	18	1.4	21	1.6	12	0.9	10	0.8
30-44	85	13.6	95	15.2	84	13.5	96	15.3	96	15.3
45+	84	6.6	87	6.7	86	6.6	135	10.2	131	9.7

From 2014 to 2018, rates of acute HBV among males and females have consistently been highest among the 30–44 year old age group when compared to the other age groups. Among all age groups, rates have been higher among men than women.

Figure 7 - Case Counts of Confirmed and Probable Acute HBV Infection by Age and Sex, Tennessee, 2014–2018



From 2014 to 2018, individuals aged 30 years and older accounted for 92% of all acute HBV cases.

Figure 8 - Case Counts of Confirmed and Probable Acute HBV Infection by Race/Ethnicity, Tennessee, 2014–2018

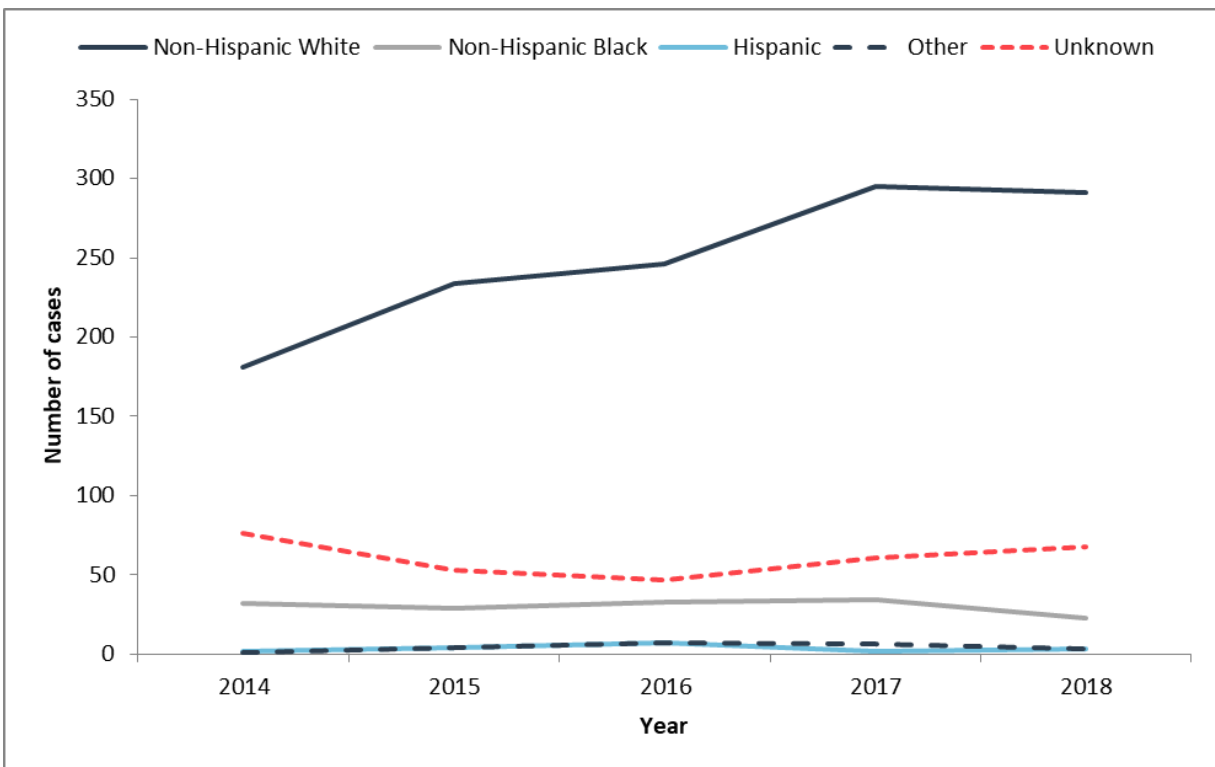


Figure 9 - Rates of Confirmed and Probable Acute HBV Infection by Race/Ethnicity, Tennessee, 2014–2018

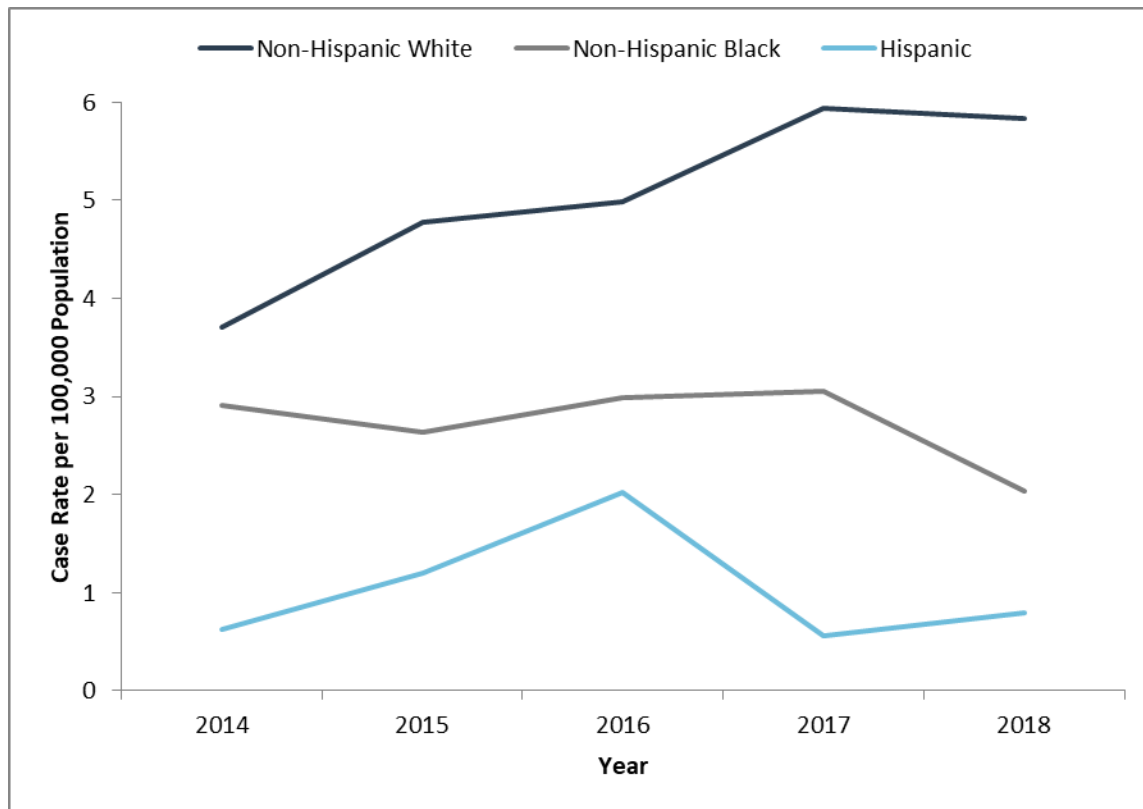


Table 5 - Case Counts and Rates of Confirmed and Probable Acute HBV Infection by Race/Ethnicity, Tennessee, 2014–2018

Race/Ethnicity	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	292	4.5	324	4.9	340	5.1	398	5.9	388	5.7
Non-Hispanic White	181	3.7	234	4.8	246	5.0	295	5.9	291	5.8
Non-Hispanic Black	32	2.9	29	2.6	33	3.0	34	3.0	23	2.0
Hispanic	2	0.6	4	1.2	7	2.0	2	0.6	3	0.8
Other	1	0.4	4	1.5	7	2.6	6	2.2	3	1.1
Unknown	76	-	23	-	47	-	61	-	68	-

The majority of cases in each year occurred among non-Hispanic Whites, followed by non-Hispanic Blacks and those of Hispanic ethnicity. From 2014 to 2018, the rate of acute HBV among non-Hispanic Whites increased 57% from 3.7 cases per 100,000 population in 2014 to 5.8 cases per 100,000 population in 2018.

Figure 10 - Percentage of Confirmed and Probable Acute HBV Infection by Self-Reported Select Risk Factors, Tennessee, 2014–2018

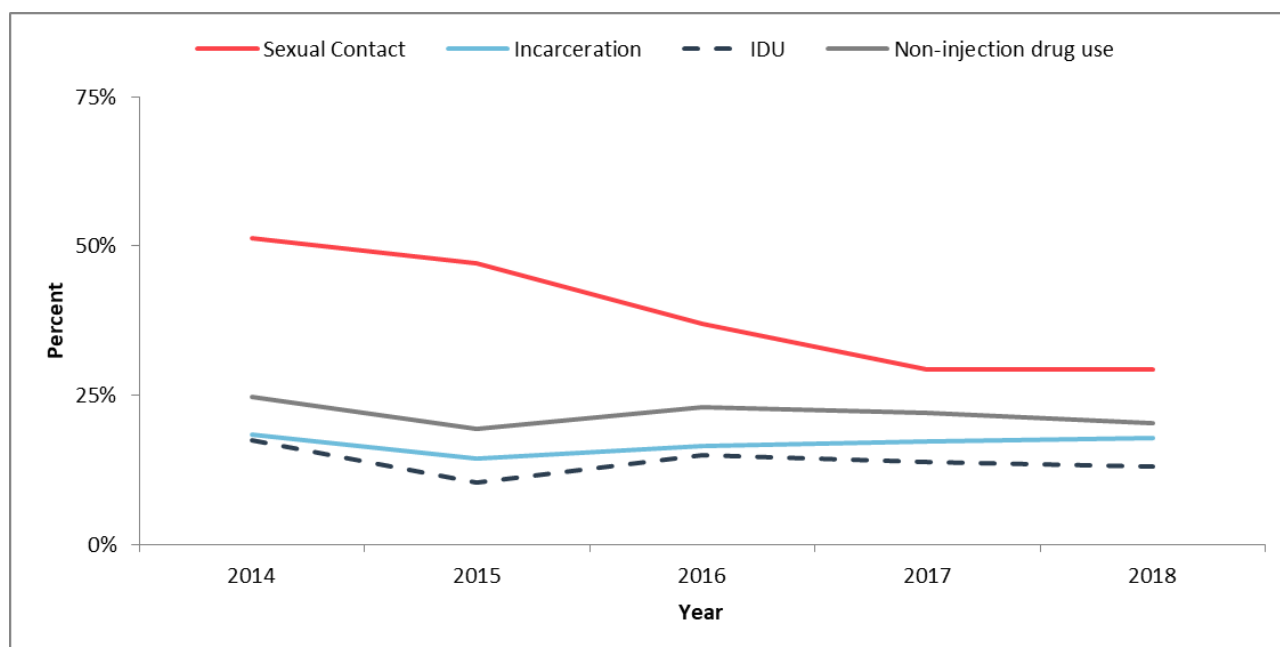


Table 6 - Cases of Confirmed and Probable Acute HBV Infection, Select Self-Reported Risk Factors, Tennessee, 2014–2018

Risk Factors	2014		2015		2016		2017		2018	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Total Cases	292	-	324	-	340	-	398	-	388	-
Sexual Contact	150	51.4	153	47.2	126	37.1	117	29.4	114	29.4
Past incarceration	54	18.5	47	14.5	56	16.5	69	17.3	69	17.8
Intravenous Drug Use	51	17.5	34	10.5	51	15.0	55	13.8	51	13.1
Non-injection Drug Use	72	24.7	63	19.4	78	22.9	88	22.1	79	20.4

From 2014 to 2018, among cases with self-reported risk factor information available, the highest proportion of cases reported sexual contact with an HBV-infected person as a risk factor followed by non-injection drug use. Self-reported risk factors are not mutually exclusive.

## Acute Hepatitis C

This section summarizes trends in acute HCV infection in TN from 2014 to 2018.

The CDC/CSTE case definition for acute HCV can be found at:

<https://wwwn.cdc.gov/nndss/conditions/hepatitis-c-acute/case-definition/2016/>

Figure 11 - Case Counts and Rates of Confirmed and Probable Acute HCV Infection, Tennessee, 2014–2018

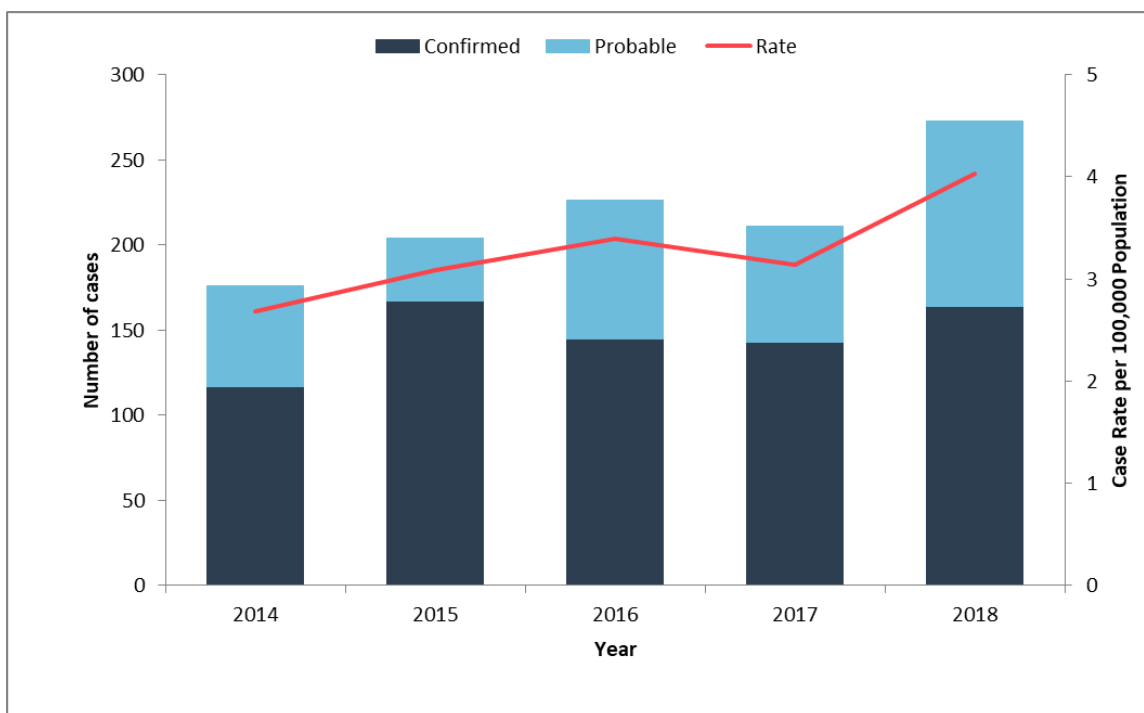


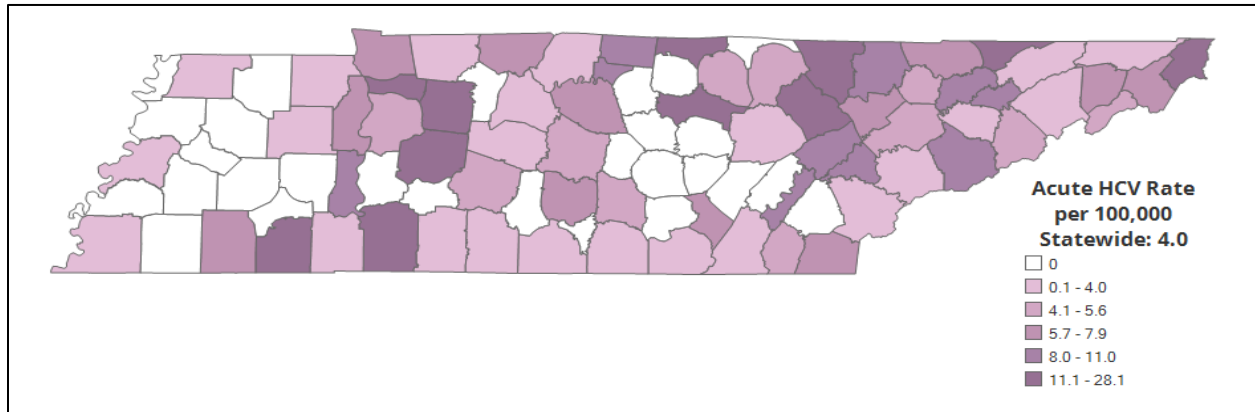
Table 7 - Case Counts and Rates of Confirmed and Probable Acute HCV Infection, Tennessee, 2014–2018

Cases and Case Rates per 100,000 population	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	176	2.7	204	3.1	226	3.4	211	3.1	273	4.0
Confirmed Only	117	1.8	167	2.5	145	2.2	143	2.1	164	2.4
Probable Only	59	0.9	37	0.6	81	1.2	68	1.0	109	1.6

From 2014 to 2018, case counts and rates of acute HCV increased in TN. The rate of acute HCV increased 48% from 2.7 cases per 100,000 in 2014 to 4.0 cases per 100,000 in 2018. This increase can be attributed to enhanced surveillance efforts by TDH, as well as the growing HCV epidemic driven by injection drug use.

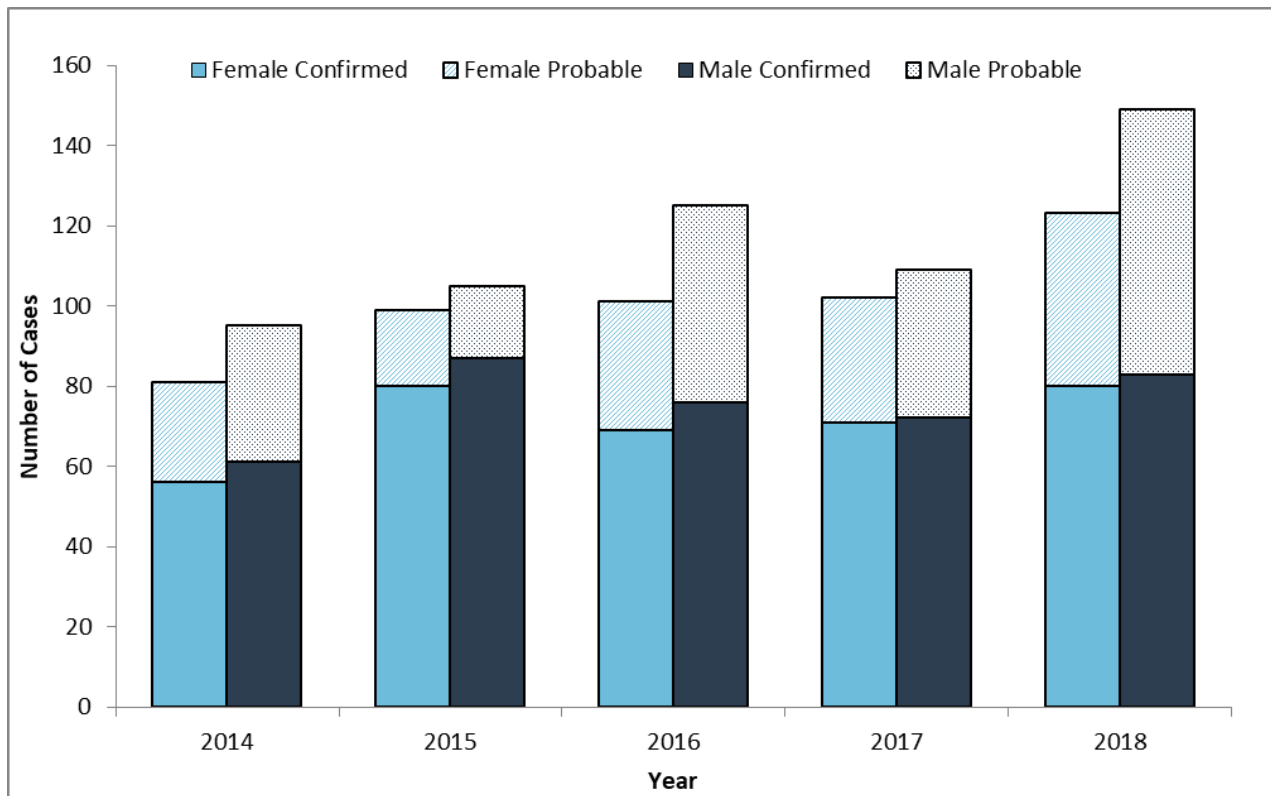
Additionally in 2018, Tennessee experienced the beginning of a statewide hepatitis A virus outbreak that occurred among populations with risk factors that overlap those found in the population of cases diagnosed with acute HCV including recreational drug use (injection or non-injection). Cases co-infected with hepatitis A and hepatitis C were considered acutely infected for both conditions if available laboratory and clinical data could not distinguish between the two conditions.

Figure 12 - Case Rates of Confirmed and Probable Acute HCV Infection by County, Tennessee, 2018



Similar to acute HBV, the counties with the highest rates of acute HCV are predominately found in east and northeastern TN. Though there are fewer counties in west TN with high rates of acute HCV when compared to the eastern part of the state, the number of cases reported to TDH from west TN has steadily increased in recent years. This increase may be due to increased HCV testing, more robust surveillance efforts, or may reflect a true increase in cases.

Figure 13 - Case Counts and Rates of Confirmed and Probable Acute HCV Infection by Sex, Tennessee, 2014–2018



**Table 8 - Case Counts and Rates of Confirmed and Probable Acute HCV Infection by Sex, Tennessee, 2014–2018**

Sex	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	176	2.7	204	3.1	226	3.4	211	3.1	273	4.0
Female	81	2.4	99	2.9	101	3.0	102	3.0	123	3.5
Male	95	3.0	105	3.3	125	3.8	109	3.3	149	4.5

From 2014 to 2018, rates of acute HCV in TN have been similar among men and women, though men have slightly higher rates than women. Among females, the rate of acute HCV increased 46% from 2.4 cases per 100,000 in 2014 to 3.5 cases per 100,000 in 2018. Among males, the rate of acute HCV increased 50% from 3.0 cases per 100,000 in 2014 to 4.5 cases per 100,000 in 2018.

**Figure 14 - Case Counts of Confirmed and Probable Acute HCV Infection by Age Group, Tennessee, 2014–2018**

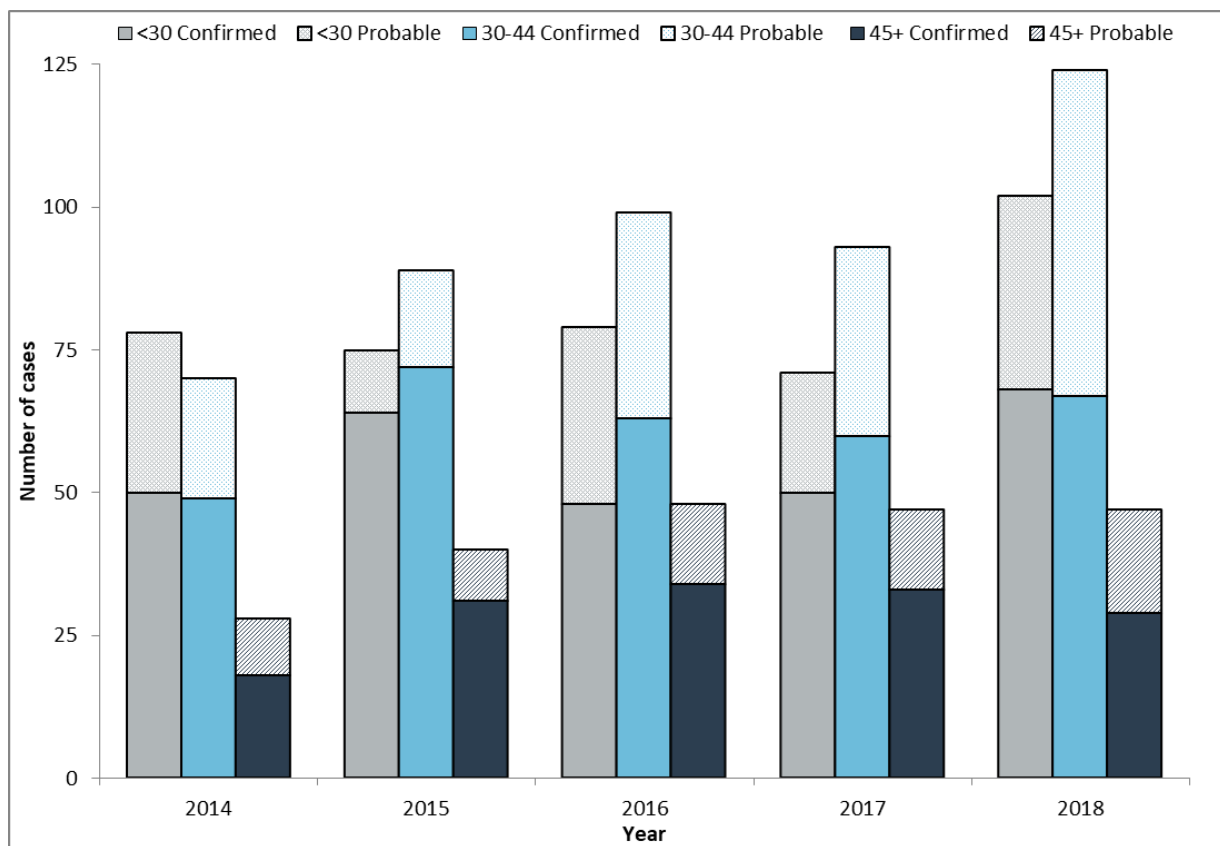


Table 9 - Case Counts and Rates of Confirmed and Probable Acute HCV Infection by Age Group, Tennessee, 2014–2018

Age Group (years)	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	176	2.7	204	3.1	226	3.4	211	3.1	273	4.0
<30	78	3.0	75	2.9	79	3.1	71	2.7	102	3.9
30-44	70	5.5	89	7.0	99	7.9	93	7.3	124	9.7
45+	28	1.0	40	1.4	48	1.7	47	1.7	47	1.6
<b>Confirmed</b>	117	1.8	167	2.5	145	2.2	143	2.1	164	2.4
<30	50	2.0	64	2.5	48	1.9	50	1.9	68	2.6
30-44	49	3.9	72	5.7	63	5.0	60	4.7	67	5.2
45+	18	0.7	31	1.1	34	1.2	33	1.2	29	1.0
<b>Probable</b>	59	0.9	37	0.6	81	1.2	68	1.0	109	1.6
<30	28	1.1	11	0.4	31	1.2	21	0.8	34	1.3
30-44	21	1.7	17	1.3	36	2.9	33	2.6	57	4.5
45+	10	0.4	9	0.3	14	0.5	14	0.5	18	0.6

From 2014 to 2018, rates of acute HCV in TN have consistently been higher among the 30–44 year old age group when compared to the other two age groups. In 2018, the rate of acute HCV among the 30–44 year old age group was 85% more than those less than 30 years of age and 143% more than those over the age of 45 years.

Figure 15 - Case Counts of Confirmed and Probable Acute HCV Infection by Age Group and Sex, Tennessee, 2014–2018

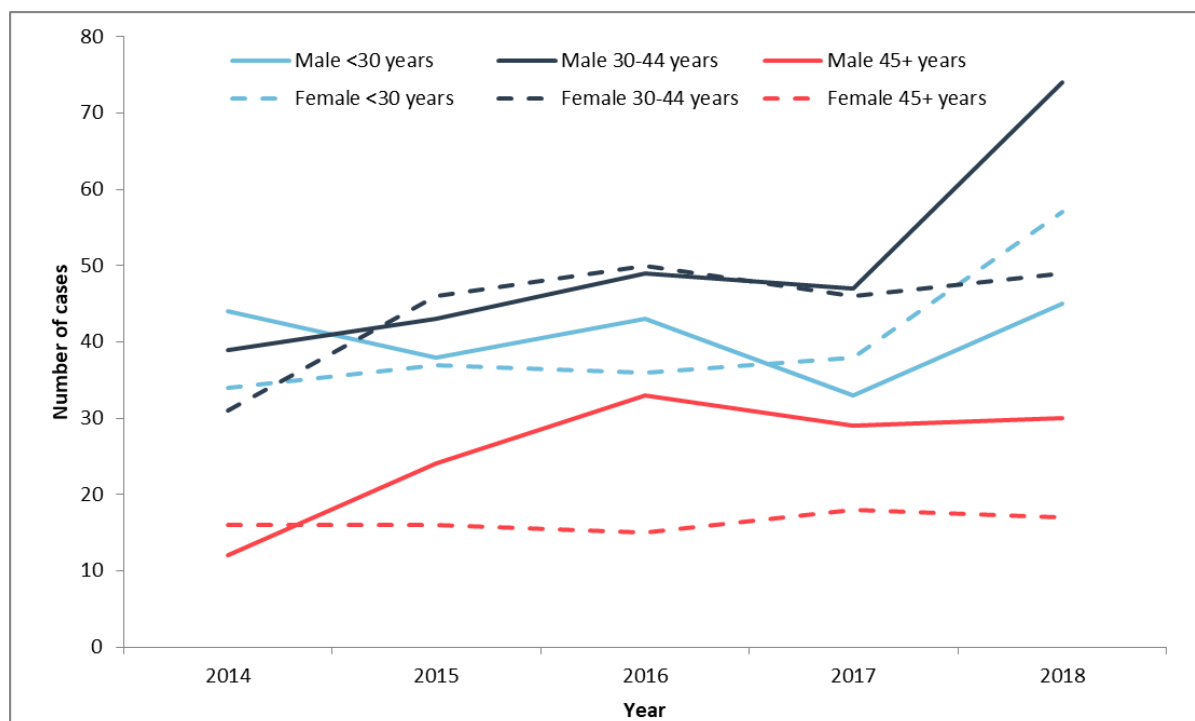




Figure 16 - Rates of Confirmed and Probable Acute HCV Infection by Age Group and Sex, Tennessee, 2014–2018

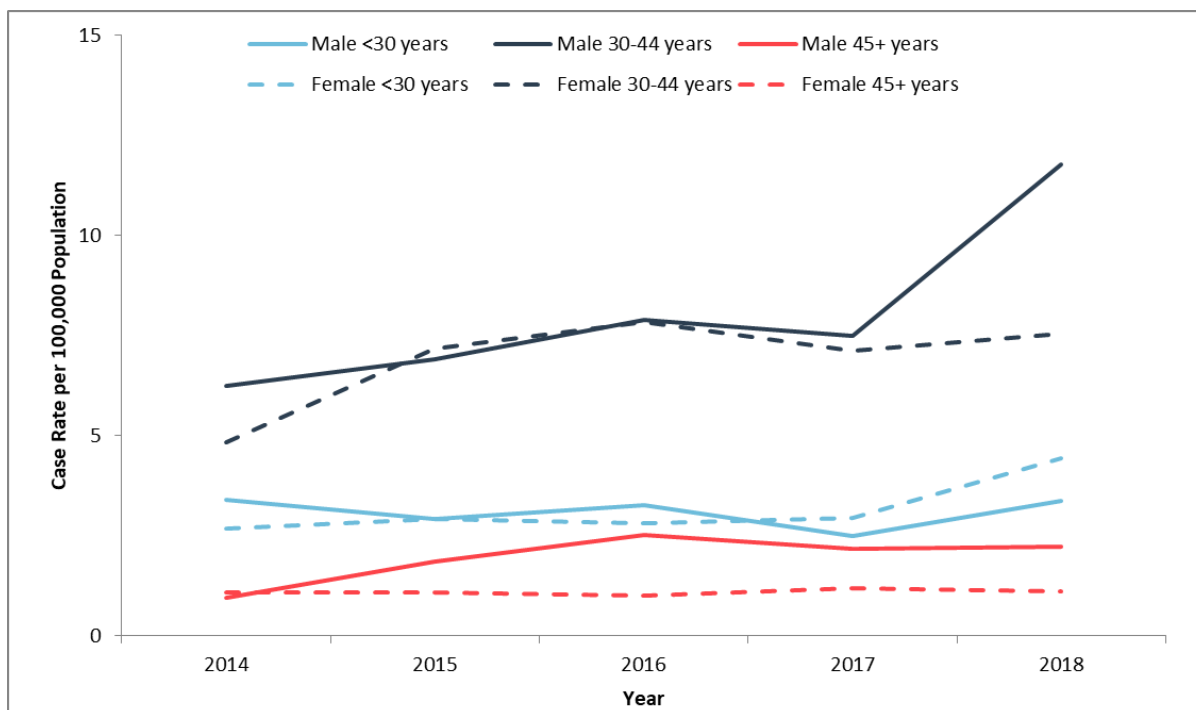
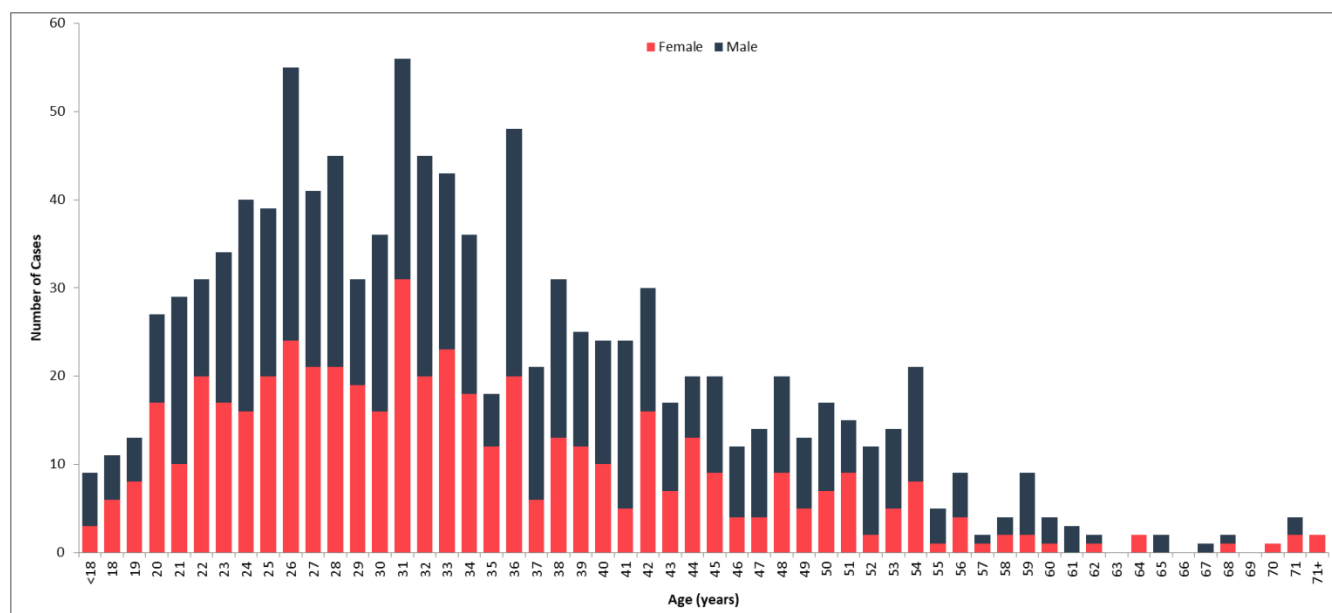


Table 10 - Case Counts and Rates of Confirmed and Probable Acute HCV Infection by Age Group and Sex, Tennessee, 2014–2018

Age Group (years)	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	176	2.7	204	3.1	226	3.4	211	3.1	273	4.0
<b>Female</b>	81	2.4	99	2.9	101	3.0	102	3.0	123	3.5
<30	34	2.7	37	2.9	36	2.8	38	3.0	57	4.4
30-44	31	4.8	46	7.2	50	7.8	46	7.1	49	7.6
45+	16	1.1	16	1.1	15	1.0	18	1.2	17	1.1
<b>Male</b>	95	3.0	105	3.3	125	3.8	109	3.3	149	4.5
<30	44	3.4	38	2.9	43	3.3	33	2.5	45	3.4
30-44	39	6.2	43	6.9	49	7.9	47	7.5	74	11.8
45+	12	0.9	24	1.9	33	2.5	29	2.2	30	2.2

From 2014 to 2018, rates of acute HCV among males and females have consistently been highest among the 30–44 year old age group when compared to the other age groups. In 2018, men between the ages of 30 and 44 years accounted for 27% of all reported cases. Though men had a higher total rate of acute HCV in 2018, women less than 30 years of age had a 26% higher rate than men in the same age group.

Figure 17 - Case Counts of Confirmed and Probable Acute HCV Infection by Age and Sex, Tennessee, 2014–2018



From 2014 to 2018, the majority of cases have been in individuals under the age of 45 years.

Figure 18 - Case Counts of Confirmed and Probable Acute HCV Infection by Race/Ethnicity, Tennessee, 2014–2018

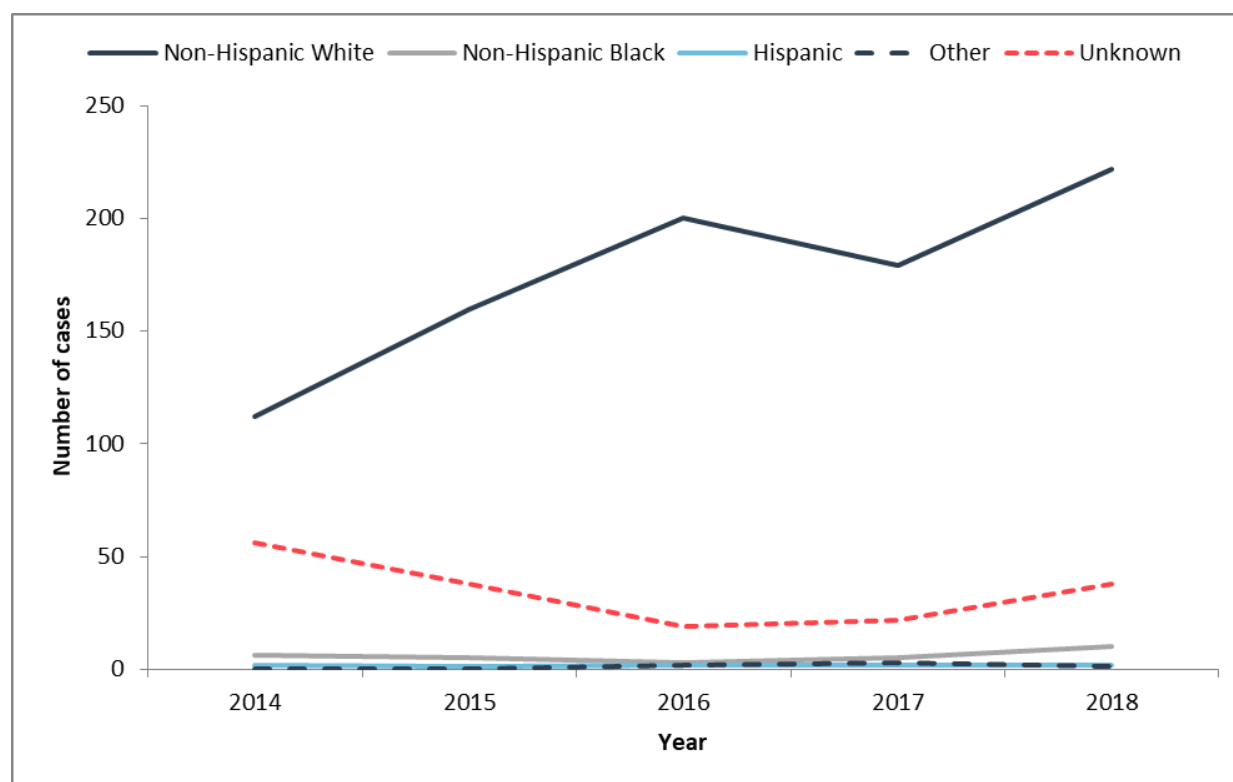


Figure 19 - Rates of Confirmed and Probable Acute HCV Infection by Race/Ethnicity, Tennessee, 2014–2018

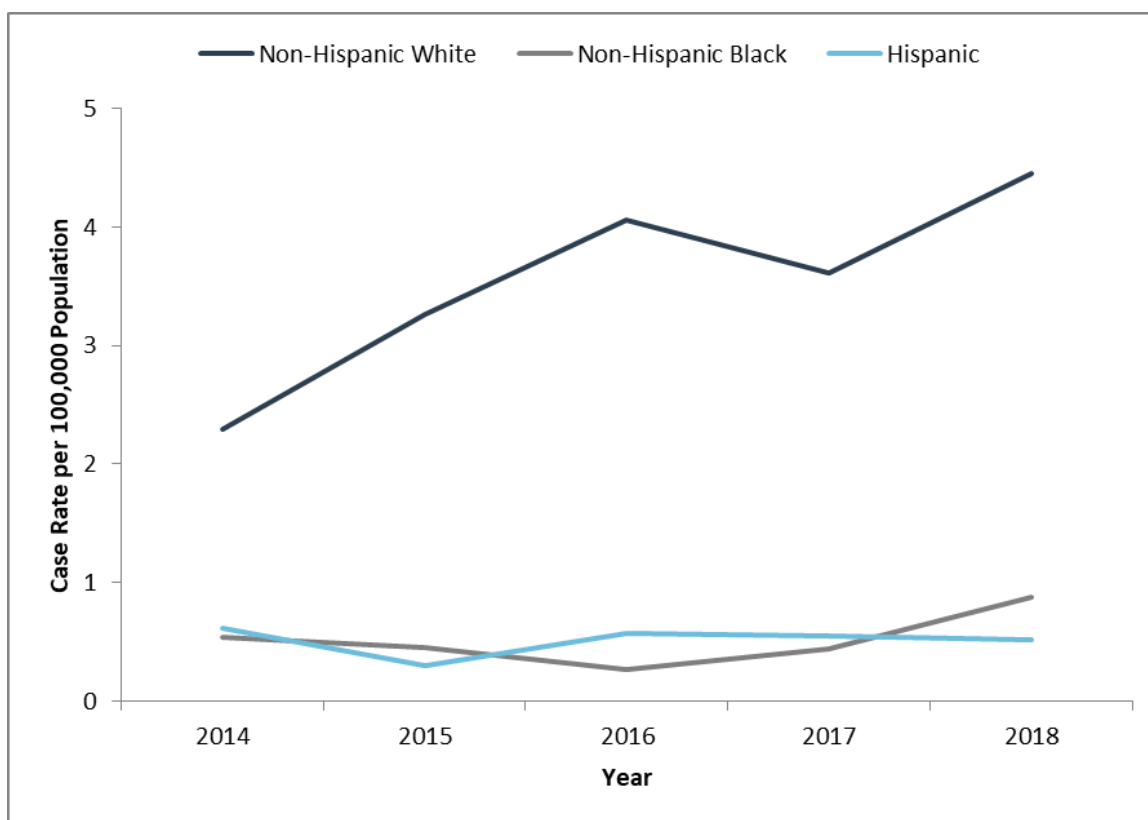


Table 11 - Case Counts and Rates of Confirmed and Probable Acute HCV Infection by Race/Ethnicity, Tennessee, 2014–2018

Race/Ethnicity	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	176	2.7	204	3.1	226	3.4	211	3.1	273	4.0
Non-Hispanic White	112	2.3	160	3.3	200	4.1	179	3.6	222	4.4
Non-Hispanic Black	6	0.5	5	0.5	3	0.3	5	0.4	10	0.9
Hispanic	2	0.6	1	0.3	2	0.6	2	0.6	2	0.5
Other	0	0.0	0	0.0	2	0.7	3	1.1	1	0.4
Unknown	56	-	38	-	19	-	22	-	38	-

Similar to acute HBV, the majority of acute HCV cases in each year occurred among non-Hispanic Whites, which accounted for 94% of all cases of acute HCV with a known race and/or ethnicity.

Figure 20 - Cases of Confirmed and Probable Acute HCV Infection by Select Self-Reported Risk Factors, Tennessee, 2014–2018

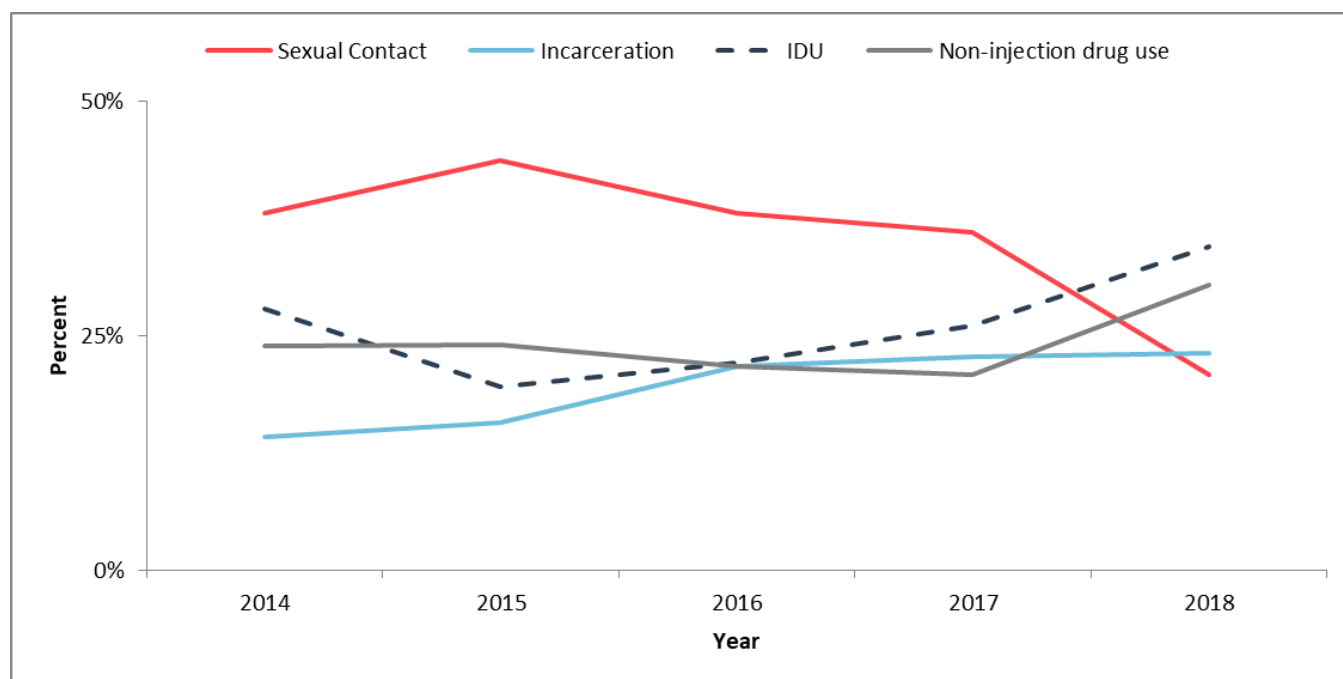


Table 12 - Case Counts of Confirmed and Probable Acute HCV Infection by Select Self-Reported Risk Factors, Tennessee, 2014–2018

Risk Factors	2014		2015		2016		2017		2018	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Total Cases	176	-	204	-	226	-	211	-	273	-
Sexual Contact	67	38.1	89	43.6	86	38.1	76	36.0	57	20.9
Past incarceration	25	14.2	32	15.7	49	21.7	48	22.7	63	23.1
Intravenous Drug Use	49	27.8	40	19.6	50	22.1	55	26.1	94	34.4
Non-injection Drug Use	42	23.9	49	24.0	49	21.7	44	20.9	83	30.4

In 2018, among cases with self-reported risk factor information available, the highest proportion of cases reported injection drug use as a risk factor for acute HCV. From 2014 to 2018, the proportion of individuals reporting history of incarceration and non-injection drug use has increased 62% and 27%, respectively. Self-reported risk factors are not mutually exclusive.

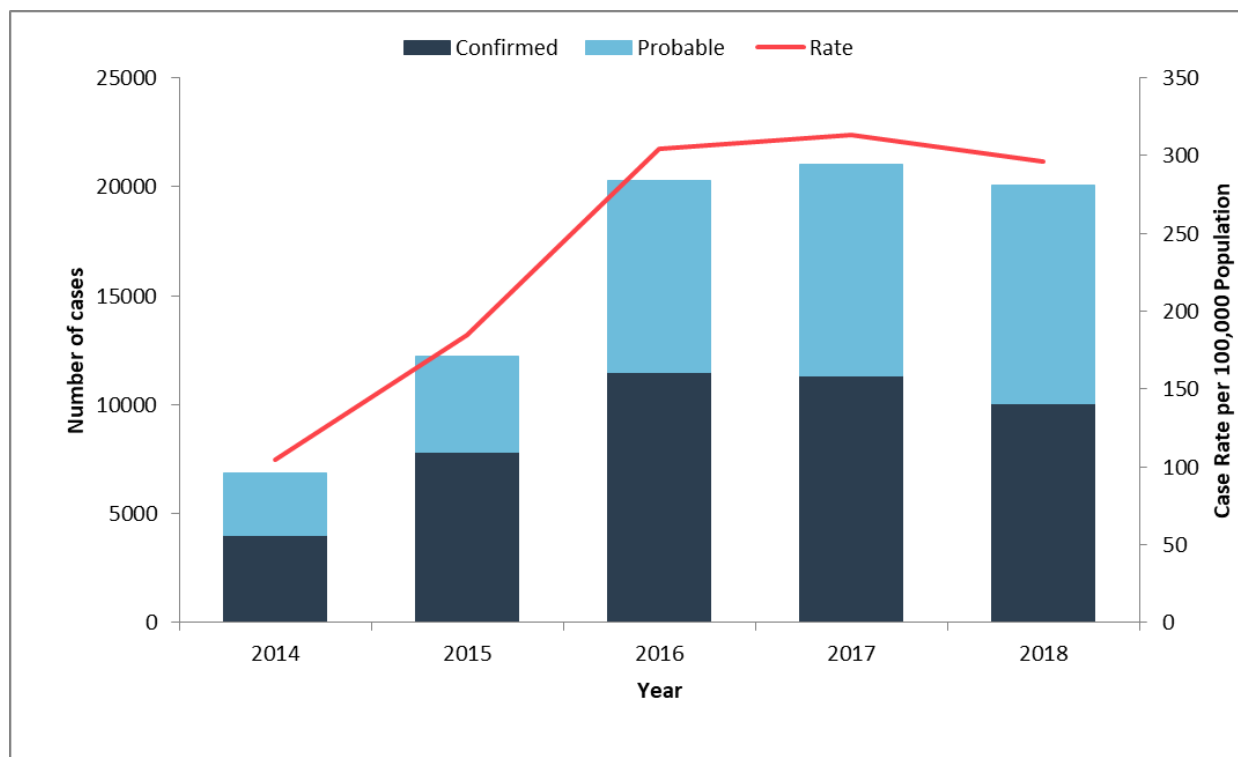
## Chronic Hepatitis C

This section summarizes trends in chronic HCV infection in TN from 2014 to 2018.

The CDC/CSTE case definition for chronic HCV can be found at:

<https://wwwn.cdc.gov/nndss/conditions/hepatitis-c-chronic/case-definition/2016/>

**Figure 21 - Case Counts and Rates of Newly Reported Confirmed and Probable Chronic HCV Infection, Tennessee, 2014–2018**

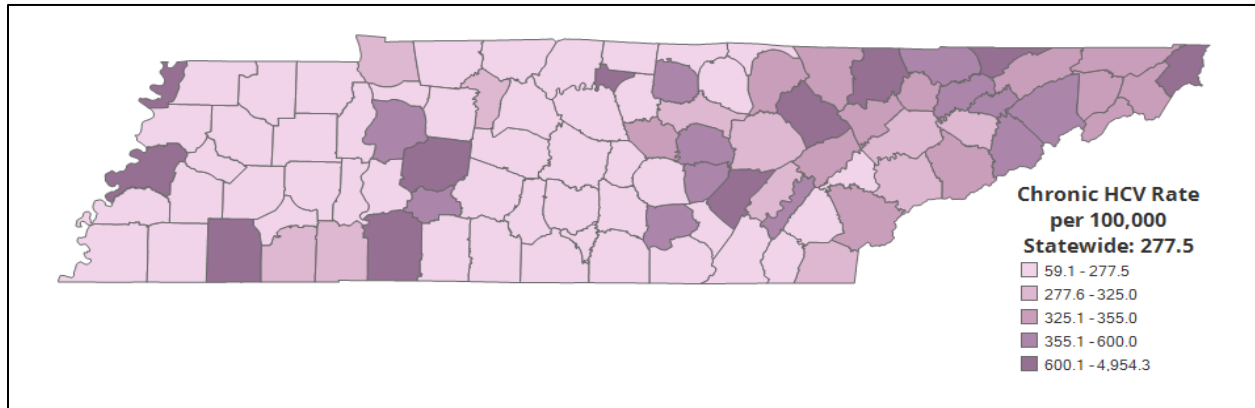


**Table 13 - Case Counts and Rates of Newly Reported Confirmed and Probable Chronic HCV Infection, Tennessee, 2014–2018**

Cases and Case Rates per 100,000 population	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	6,848	104.6	12,221	185.2	20,267	304.7	21,027	313.1	20,066	296.4
Confirmed Only	3,987	60.9	7,832	118.7	11,481	172.6	11,337	168.8	10,019	148.0
Probable Only	2,861	43.7	4,389	66.5	8,786	132.1	9,690	144.3	10,047	148.4

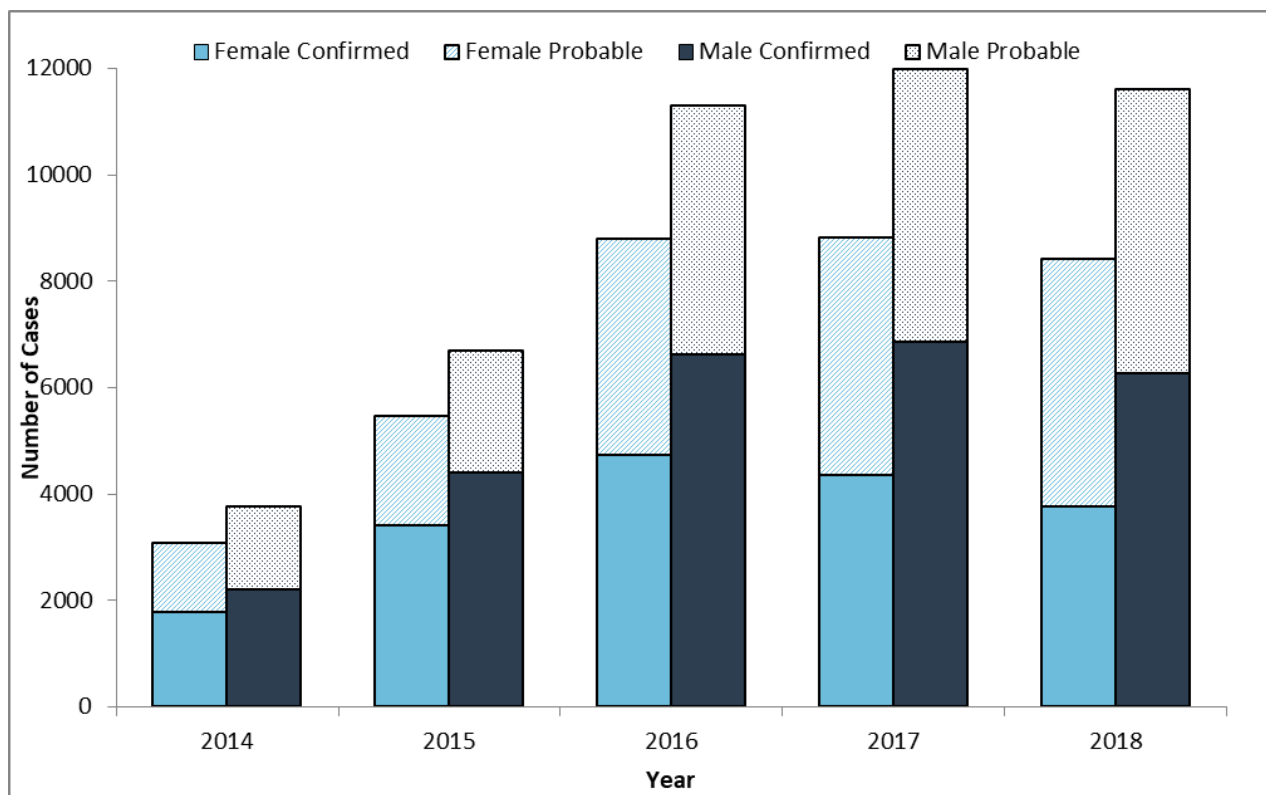
Enhanced chronic HCV surveillance in TN began mid-2015, with the first complete year of centralized chronic HCV data available in 2016. As a result of this increased capacity to consume chronic HCV laboratory data and the growing epidemic of HCV driven by injection drug use, rates of chronic HCV have increased 183%, from 104.6 cases of chronic HCV per 100,000 in 2014 to 296.4 cases per 100,000 in 2018.

Figure 22 – Case Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by County, Tennessee, 2018



Cases of chronic HCV are found in all counties in TN. Similar to acute HBV and HCV, the counties with the highest rates of chronic HCV are predominately found in east and northeastern TN. As with acute HCV, though there are fewer counties in west TN with high rates of chronic HCV when compared to the eastern part of the state, the number of cases reported to TDH from west TN has steadily increased in recent years. This increase may be due to increased HCV testing, more robust surveillance efforts, or may reflect a true increase in cases.

Figure 23 - Case Counts and Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by Sex, Tennessee, 2014–2018

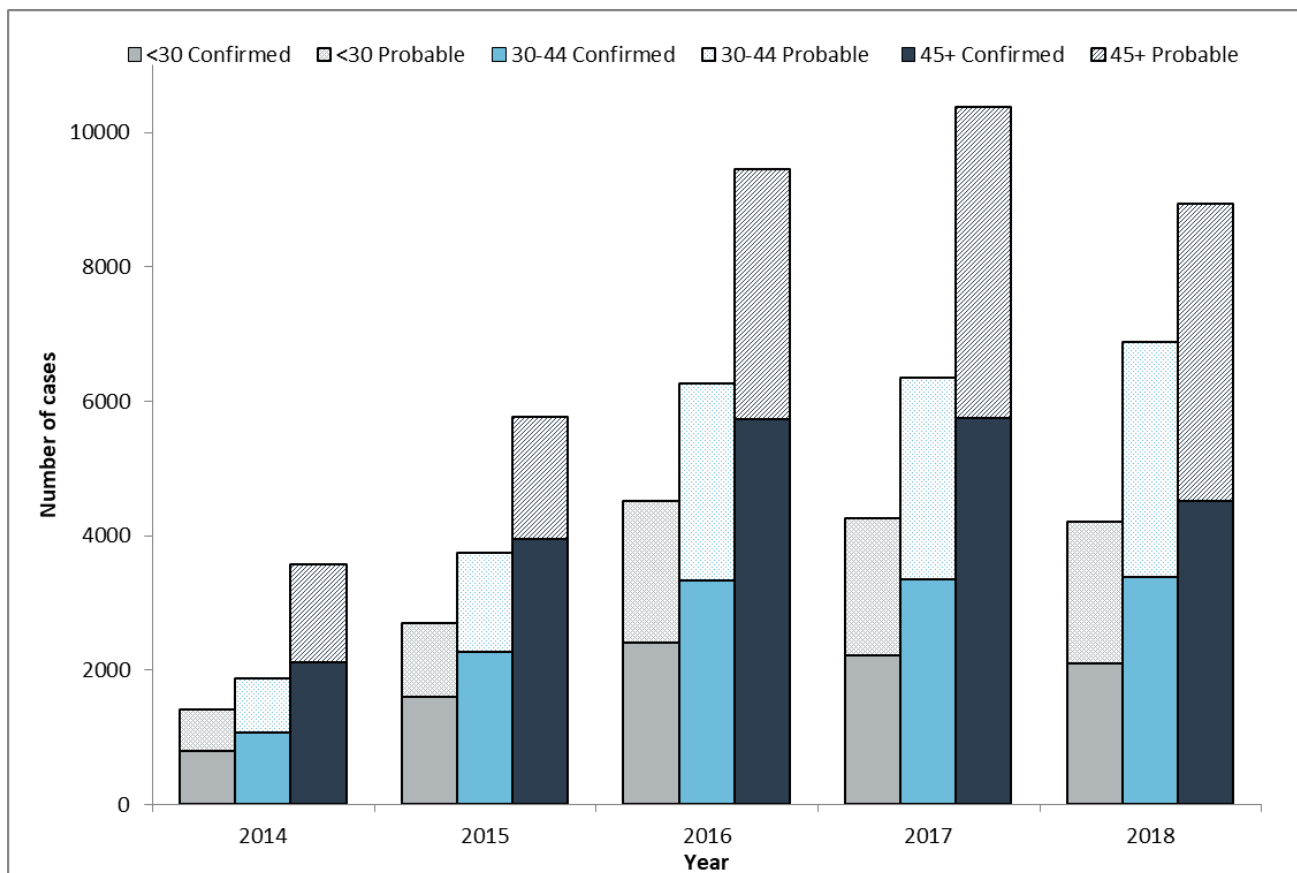


**Table 14 - Case Counts and Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by Sex, Tennessee, 2014–2018**

Sex	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	6,848	104.6	12,221	185.2	20,267	304.7	21,027	313.1	20,066	296.4
Female	3,062	91.2	5,457	161.2	8,779	257.9	8,819	256.1	8,414	242.6
Male	3,757	117.8	6,686	208.0	11,293	347.8	11,978	366.1	11,605	351.4

From 2014 to 2018, rates of chronic HCV in TN have consistently been higher among men than women, although rates have continued to climb in both groups. In 2018, men had a 45% higher rate of chronic HCV than women.

**Figure 24 - Case Counts of Newly Reported Confirmed and Probable Chronic HCV Infection by Age Group, Tennessee, 2014–2018**



**Table 15 - Case Counts and Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by Age Group, Tennessee, 2014–2018**

Age Group (years)	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	6,848	104.6	12,221	185.2	20,267	304.7	21,027	313.1	20,066	296.4
<30	1,407	55.0	2,693	104.8	4,519	174.8	4,256	163.6	4,209	161.1
30-44	1,870	147.6	3,749	296.7	6,269	498.2	6,346	498.6	6,886	539.2
45+	3,566	131.0	5,761	208.2	9,460	336.9	10,376	365.2	8,936	310.3
<b>Confirmed</b>	3,987	60.9	7,832	118.7	11,481	172.6	11,337	168.8	10,019	148.0
<30	793	31.0	1,605	62.4	2,411	93.3	2,213	85.0	2,098	80.3
30-44	1,075	84.9	2,269	179.6	3,335	265.0	3,346	262.9	3,393	265.7
45+	2,115	77.7	3,951	142.8	5,729	204.0	5,759	202.7	4,512	156.7
<b>Probable</b>	2,861	43.7	4,389	66.5	8,786	132.1	9,690	144.3	10,047	148.4
<30	614	24.0	1,088	42.3	2,108	81.6	2,043	78.5	2,111	80.8
30-44	795	62.8	1,480	117.1	2,934	233.1	3,000	235.7	3,493	273.5
45+	1,451	53.3	1,810	65.4	3,731	132.9	4,617	162.5	4,424	153.6

From 2014 to 2018, rates of chronic HCV in TN have increased among all age groups. Rates of chronic HCV among the 30–44 year old age group have consistently been highest when compared to the other two age groups.

**Figure 25 - Case Counts of Newly Reported Confirmed and Probable Chronic HCV Infection by Age Group and Sex, Tennessee, 2014–2018**

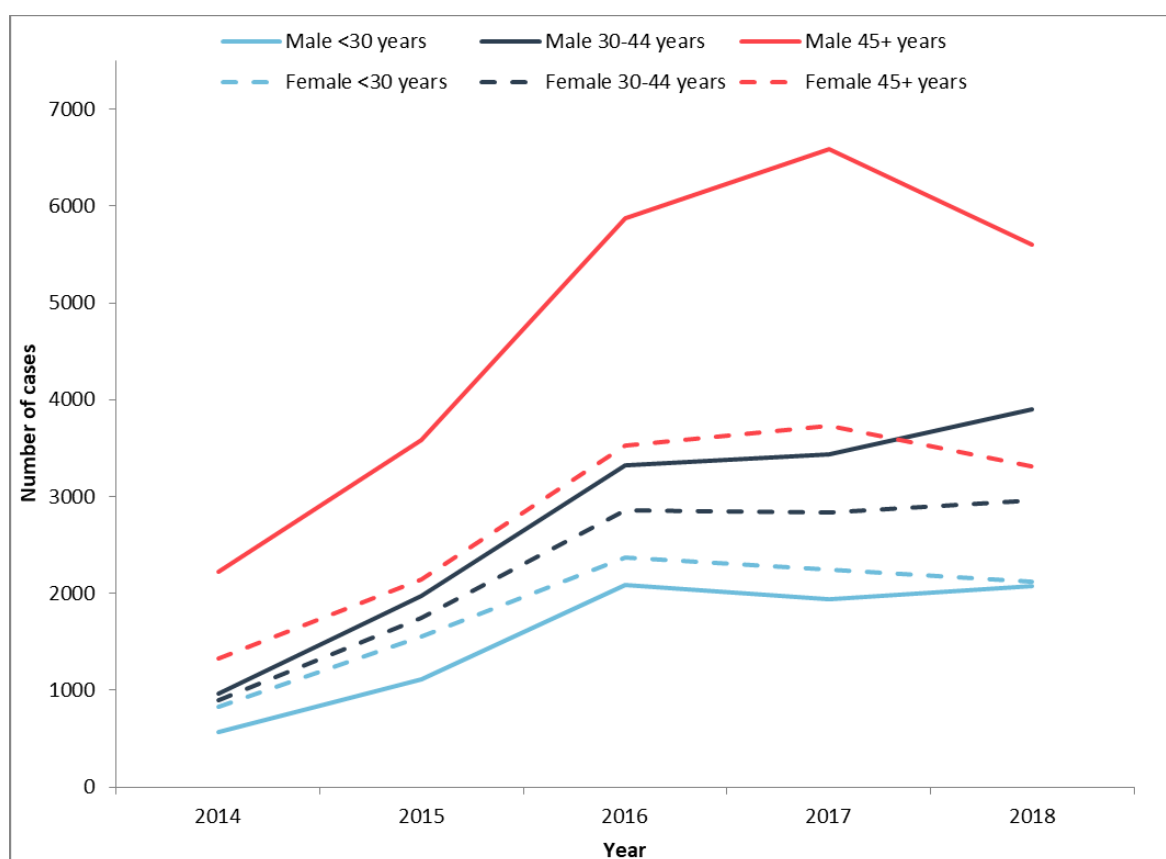




Figure 26 - Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by Age Group and Sex, Tennessee, 2014–2018

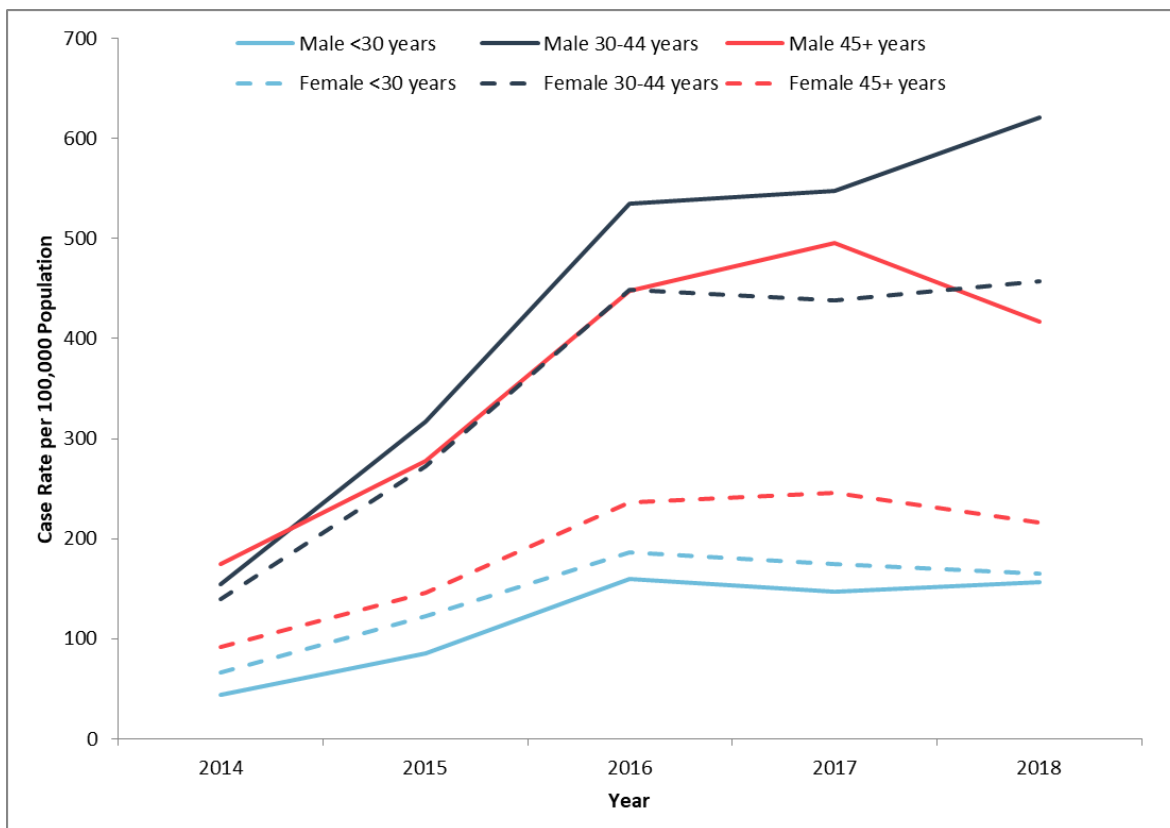
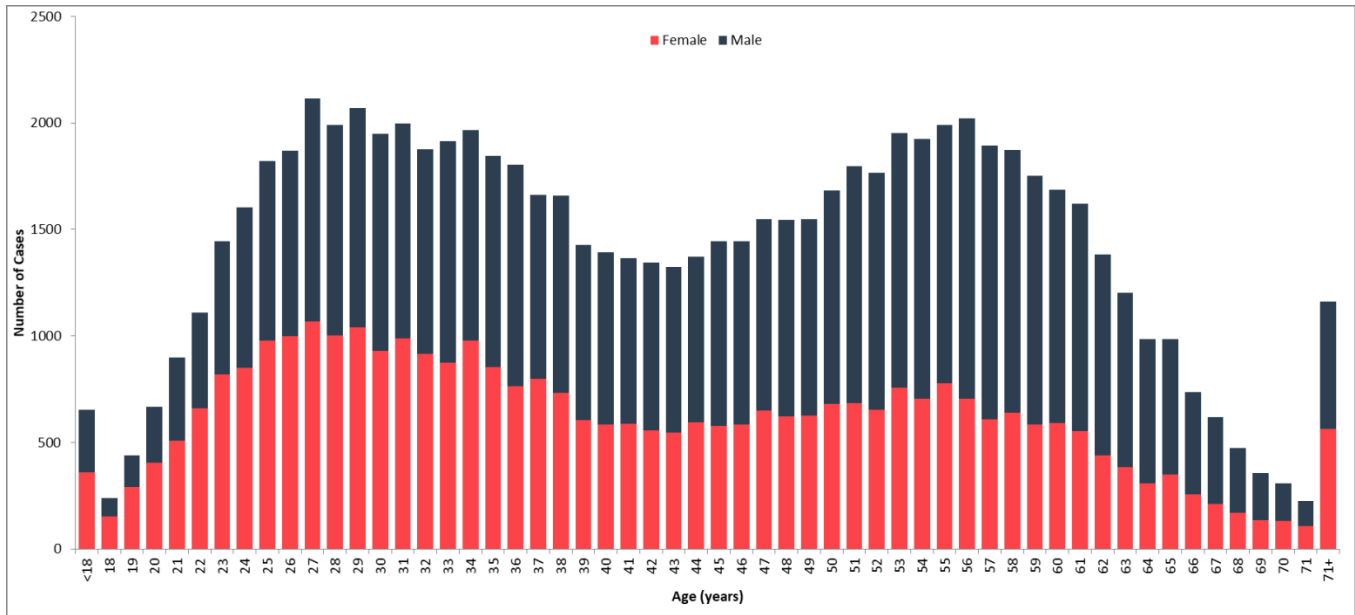


Table 16 - Case Counts and Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by Age Group and Sex, Tennessee, 2014–2018

Age Group (years)	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	6,848	104.6	12,221	185.2	20,267	304.7	21,027	313.1	20,066	296.4
<b>Female</b>	3,062	91.2	5,457	161.2	8,779	257.9	8,819	256.1	8,414	242.6
<30	830	65.8	1,558	122.9	2,376	186.4	2,243	174.6	2,123	165.3
30-44	898	140.0	1,745	272.4	2,864	449.2	2,832	438.5	2,964	457.0
45+	1,332	91.7	2,147	145.6	3,531	236.0	3,727	246.2	3,313	215.9
<b>Male</b>	3,757	117.8	6,686	208.0	11,293	347.8	11,978	366.1	11,605	351.4
<30	568	43.8	1,118	85.8	2,086	159.3	1,937	147.0	2,077	156.3
30-44	964	154.2	1,973	316.7	3,324	535.4	3,431	547.4	3,905	621.4
45+	2,223	174.9	3,586	277.5	5,872	447.6	6,585	496.0	5,605	416.7

From 2014 to 2018, rates of chronic HCV in TN have increased among all age groups and sexes. The highest rates of chronic HCV have been among males 30 years of age and older. Though the overall rate of chronic HCV is higher among men than women, women less than 30 years of age have a higher rate of chronic HCV than men in the same age group.

Figure 27 - Case Counts of Newly Reported Confirmed and Probable Chronic HCV Infection by Age and Sex, Tennessee, 2014–2018



From 2014 to 2018, case counts of chronic HCV continue to show there is a clear bimodal distribution with the first mode among individuals less than 39 years of age and the second mode among baby boomers.

Figure 28 - Case Counts of Newly Reported Confirmed and Probable Chronic HCV Infection by Race/Ethnicity, Tennessee, 2014–2018

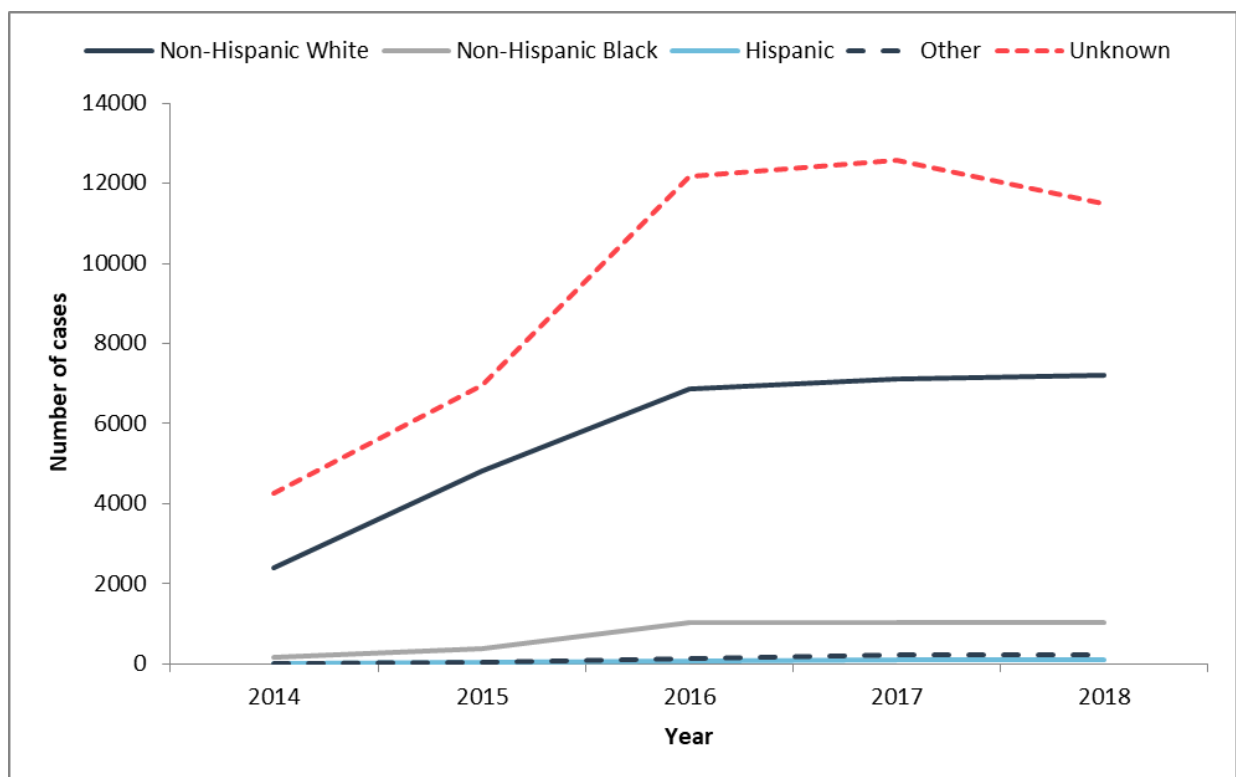


Figure 29 - Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by Race/Ethnicity, Tennessee, 2014–2018

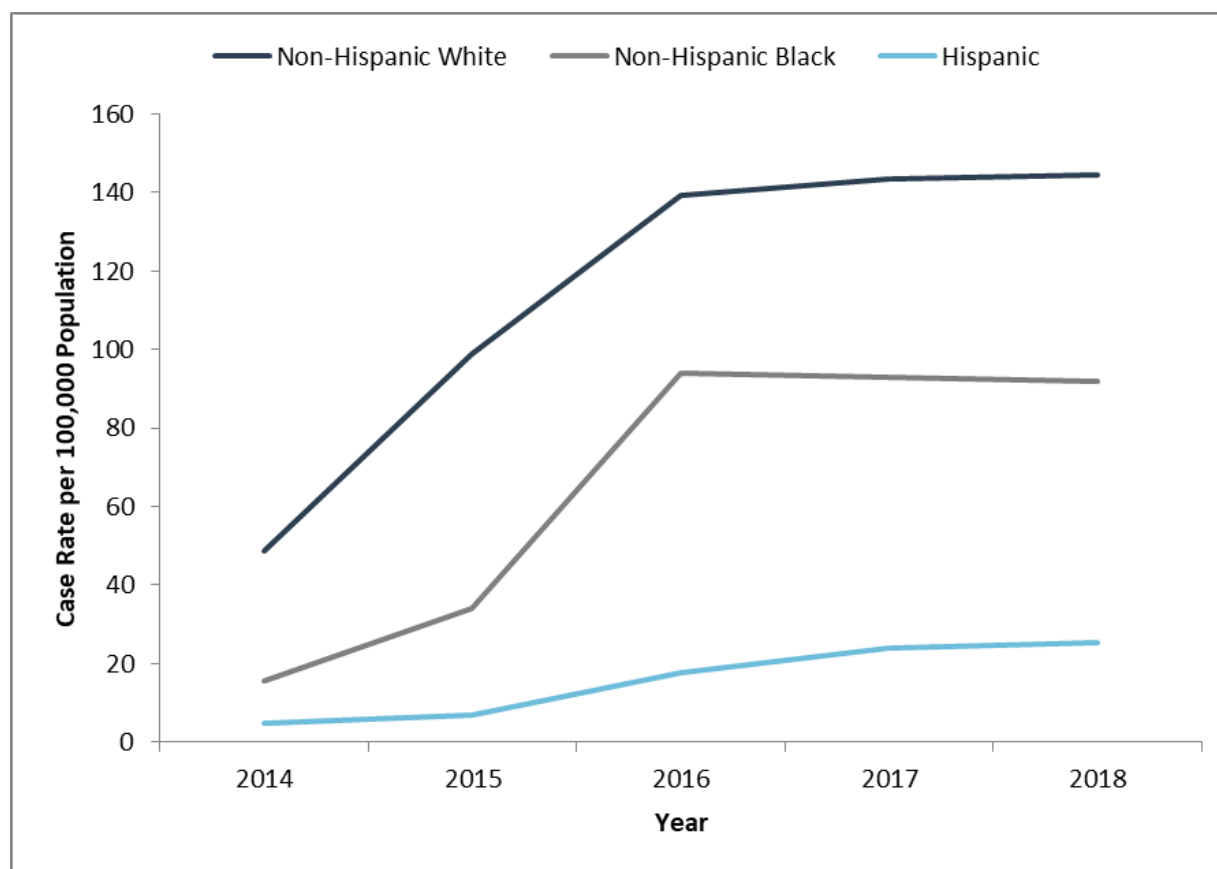


Table 17 - Case Counts and Rates of Newly Reported Confirmed and Probable Chronic HCV Infection by Race/Ethnicity, Tennessee, 2014–2018

Race/Ethnicity	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	6,848	104.6	12,221	185.2	20,267	304.7	21,027	313.1	20,066	296.4
Non-Hispanic White	2,383	48.8	4,834	98.7	6,860	139.2	7,120	143.5	7,215	144.6
Non-Hispanic Black	172	15.7	376	34.2	1,040	94.0	1,035	92.8	1,043	92.0
Hispanic	15	4.7	23	6.9	61	17.6	87	24.1	97	25.5
Other	18	7.3	33	12.4	142	52.9	217	78.2	210	79.0
Unknown	4,260	-	6,955	-	12,164	-	12,568	-	11,501	-

The majority of cases in each year where race and/or ethnicity is known occurred among non-Hispanic Whites followed by non-Hispanic Blacks.

## Hepatitis C Positive Pregnant Females and Perinatal Hepatitis C

### *Positive Pregnant Females*

This section summarizes trends in HCV infection among pregnant women in TN in 2018. Given the high rates of pregnancy reported among women with newly diagnosed HCV, and the release of the perinatal HCV surveillance case definition, TDH began surveillance on HCV positive pregnant women on January 1<sup>st</sup>, 2018 to quantify HCV among persons giving birth in TN.

Of note, TDH has specific case definitions for HCV Positive Pregnant Female investigations. Laboratory data was used to determine the maternal HCV case status for each pregnancy as follows: (1) 'confirmed case', if a mother had at least one HCV RNA-positive laboratory report during pregnancy or, in the absence of a pregnancy laboratory report, at least one HCV RNA was conducted prior to pregnancy and the last HCV RNA prior to pregnancy was positive; (2) 'probable case', if a mother did not have an HCV RNA test, but had an HCV antibody (Ab)-positive laboratory report preceding or during pregnancy. Only pregnancies with a date of delivery in 2018 were included in this analysis.

**Table 18- Case Counts and Rates of Confirmed and Probable HCV Positive Pregnant Females, Tennessee, 2018**

Cases and Case Rates per 1,000 Live Births	2018	
	Cases	Rate
<b>Total Cases</b>	1,341	16.6
Confirmed Only	932	11.5
Probable Only	409	5.1

In 2018 there were 1,319 pregnancies among women with an HCV infection (confirmed or probable) during their pregnancy, exposing 1,341 infants to HCV (21 pregnancies resulted in multiple births and three mothers had more than one pregnancy in 2018).

**Table 19- Case Counts and Rates of Confirmed and Probable HCV Positive Pregnant Females by Age Group, Tennessee, 2018**

Age Group (years)	2018	
	Cases	Rate per 1,000 Live Births
<b>Total Cases</b>	1,341	16.6
15-24	272	10.9
25-29	556	22.2
30-34	342	17.1
35+	171	15.7

In 2018, HCV rates (confirmed or probable) among pregnant females were highest among the 25–29 year old age group. Maternal age is defined as age at date of delivery and was obtained from birth certificate data received from the TDH Division of Vital Statistics.<sup>11</sup> The population used for rate calculations is based off the number of women who had a live birth in 2018 in each respective age group.

<sup>11</sup> Tennessee Department of Health Birth Statistical File 2018, accessed October 14, 2019.

**Table 20 - Case Counts and Rates of Confirmed and Probable HCV Positive Pregnant Females by Race/Ethnicity, Tennessee, 2018**

Race/Ethnicity	2018	
	Cases	Rate per 1,000 Live Births
<b>Total Cases</b>	1,341	16.6
Non-Hispanic White	1,221	22.7
Non-Hispanic Black	78	4.7
Hispanic	25	3.2
Other	8	3.3
Unknown	9	—

The majority of cases in 2018 occurred among non-Hispanic Whites, followed by non-Hispanic Blacks, other racial groups, and those of Hispanic ethnicity. A woman's race/ethnicity designation is extracted from the 2018 birth certificate data received from the TDH Division of Vital Statistics.<sup>11</sup> The population used for rate calculations is based on the number of women who had a live birth in 2018 in each respective race/ethnicity category.

### ***Perinatal Hepatitis C***

This section summarizes trends in Perinatal HCV exposure and infection in TN. Given the high rates of pregnancy reported among women with newly diagnosed HCV, TDH began surveillance on January 1st, 2018 to quantify the number of HCV perinatal exposures.

Of note, TDH has specific case definitions for Perinatal HCV Investigations (e.g., probable, suspect). Laboratory data was used to determine perinatal HCV case status for each live birth as follows: (1) 'confirmed case', if an infant had a RNA-positive laboratory report between 2 and less than 36 months of age; (2) 'probable case', if an infant had an HCV Ab-positive laboratory report between 18 and less than 36 months of age; (3) 'suspect', if an infant was born to a mother with an HCV infection (probable or confirmed) during the pregnancy, an HCV RNA-positive laboratory report at less than 2 months of age, or an HCV antibody (Ab)-positive laboratory report at less than 18 months of age; (4) 'not a case', if an infant only had HCV RNA-negative laboratory reports between 2 and 36 months of age and/or HCV Ab-negative laboratory report between 18 and 36 months of age and not known to have been exposed to HCV via a mechanism other than perinatal. Only infants born in 2018 and alive as of October 14, 2019 were included in this analysis.

The CDC/CSTE case definition for acute HCV can be found at:

<https://wwwn.cdc.gov/nndss/conditions/hepatitis-c-perinatal-infection/case-definition/2018/>

**Table 21 - Case Counts and Rates of Confirmed, Probable and Suspect Perinatal HCV, Tennessee, 2018**

Cases and Case Rates per 1,000 Live Births	2018	
	Cases	Rate per 1,000 Live Births
<b>Total Exposures</b>	1,367	16.9
Confirmed Only	5	0.1
Probable Only	1	0.01
Suspect Only	1,328	16.4
Not a Case Only	33	0.4

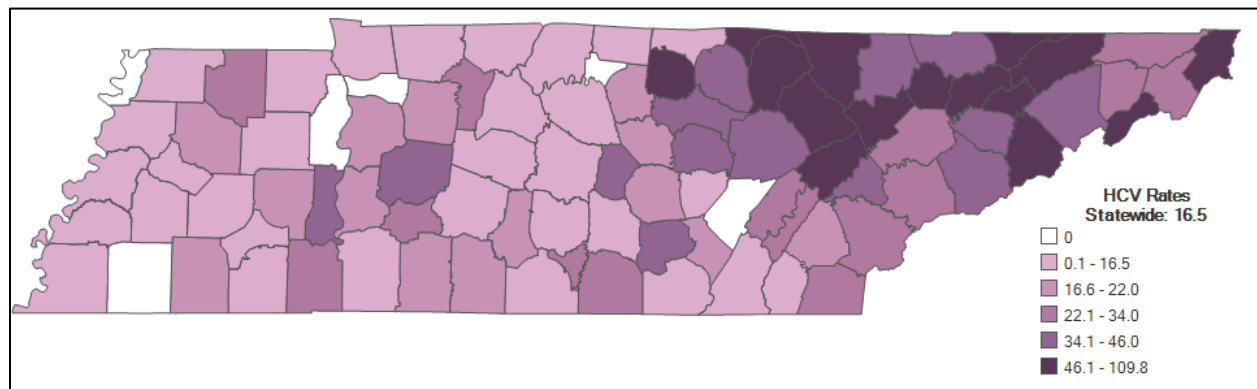
Infants meeting the suspect case definition comprised approximately 97% of all reported perinatal cases, 2% were not a case, 0.4% were confirmed, and 0.1% were probable. Of note, this does not represent infants tested and not reported to the TDH.

**Table 22 - Infant Testing by Case Status and Testing Appropriateness, Tennessee, 2018**

Case Status	2018		
	Tested Appropriately	Tested Inappropriately	Not Tested
<b>Total Cases</b>	35	38	1,294
Confirmed Only	5	0	0
Probable Only	1	0	0
Suspect Only	0	34	1,294
Not a Case Only	29	4	0

In 2018 there were 1,367 infants perinatally exposed to HCV. The majority of infants were not tested for HCV (95%). Of the 73 infants that were tested for HCV, 35 were appropriately tested (HCV RNA laboratory report between 2 and less than 36 months and/or HCV Ab laboratory report between 18 and less than 36 months) and 38 were tested inappropriately (HCV RNA laboratory report less than 2 months and/or HCV Ab laboratory report less than 18 months).

**Figure 30 - Case Rates of Confirmed, Probable and Suspect Perinatal HCV by County, Tennessee, 2018**



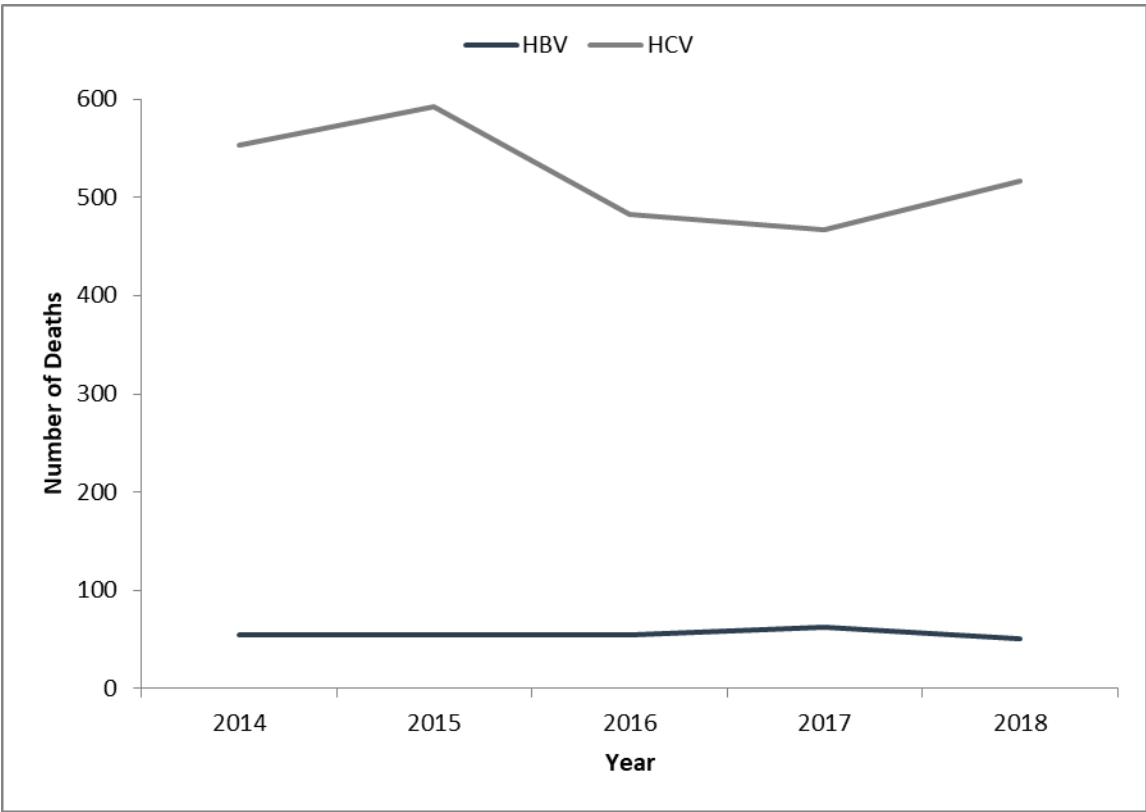
The highest rates of perinatal HCV exposure are found in eastern and northeastern TN; some TN counties demonstrated perinatal HCV exposure rates as high as 5% to 11% of all live births.

# Hepatitis B or Hepatitis C Mortality

This section summarizes mortality trends associated with HBV or HCV from 2014 to 2018.

Deaths recorded from death certificate data reported to the TDH Division of Vital Statistics<sup>12</sup> with HBV or HCV listed as either the underlying cause or one of multiple causes of death per the following ICD-10 Codes (HBV: B16.2, B16.9, B18.1 HCV: B17.1, B18.2).<sup>13</sup>

Figure 31 - Number of Deaths Associated with HBV or HCV Tennessee, 2014–2018



The Centers for Disease Control and Prevention (CDC) National Progress Report 2020 Goal aims to reduce the rate of deaths attributable to HBV and HCV to 0.5 and 4.2 per 100,000 population, respectively; 2017 numbers suggest a national HBV death rate of 0.46 and a national HCV death rate of 4.1.<sup>14,15</sup> Mortality data should be interpreted with caution given the potential for ICD-10 codes to be used incorrectly and possible under-reporting of VH as a cause of death. Despite these limitations, TN’s death rate from HBV and HCV exceeded the 2017 national rates in 2018, 0.7 and 7.6, respectively. Differences in reporting on death certificates and in the state surveillance systems may point to gaps in testing of specific populations, or diagnosis and testing prior to mandatory reporting requirements.

<sup>12</sup> Tennessee Department of Health Death Statistical File, 2014–2018. Accessed December 05, 2019.

<sup>13</sup> Ly KN, Hughes EM, Jiles RB, Holmberg SD. Rising Mortality Associated With Hepatitis C Virus in the United States, 2003–2013, Clinical Infectious Diseases, Volume 62, Issue 10, 15 May 2016, Pages 1287–1288.

<sup>14</sup> <https://www.cdc.gov/hepatitis/policy/NationalProgressReport-HepC-ReduceDeaths.htm>

<sup>15</sup> <https://www.cdc.gov/hepatitis/policy/NationalProgressReport-HepB-ReduceDeaths.htm>

**Table 23 - Number and Rates of Deaths Associated with HBV or HCV, Tennessee, 2014–2018**

Deaths and Death Rates per 100,000 population	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total</b>	608	9.3	646	9.8	538	8.1	530	7.9	567	8.4
HBV-related	54	0.8	54	0.8	55	0.8	63	0.9	50	0.7
HCV-related	554	8.5	592	9.0	483	7.3	467	7.0	517	7.6

From 2014 to 2018, the number of deaths associated with HCV far surpassed those associated with HBV. On average, deaths associated with HCV were 161% greater than those associated with HBV.

**Table 24 - Number and Rates of Deaths Associated with HBV and HCV by Sex, Tennessee, 2014–2018**

Sex	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	608	9.3	646	9.8	538	8.1	530	7.9	567	8.4
Female	170	5.1	181	5.3	164	4.8	167	4.8	167	4.8
Male	438	137.3	465	144.6	374	115.2	363	110.9	400	121.1

From 2014 to 2018, the rate of deaths associated with HBV and HCV have remained relatively steady. When examining rates by Sex, the rate of deaths associated with HBV and HCV among males was consistently higher than females. In 2018, the rate of deaths associated with HBV and HCV among males was 185% higher than females.

**Table 25 - Number and Rates of Deaths Associated with HBV and HCV by Race/Ethnicity, Tennessee, 2014–2018**

Race/Ethnicity	2014		2015		2016		2017		2018	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Total Cases</b>	608	9.3	646	9.8	538	8.1	530	7.9	567	8.4
Non-Hispanic White	469	9.6	484	9.9	405	8.2	402	8.1	460	9.2
Non-Hispanic Black	123	11.2	137	12.4	116	10.5	111	10.0	96	8.5
Hispanic	1	0.3	6	1.8	8	2.3	8	2.2	5	1.3
Other	10	4.1	18	6.8	7	2.6	9	3.2	5	1.9
Unknown	5	-	1	-	2	-	0	-	1	-

Though non-Hispanic Whites had a larger proportion of deaths due to HBV and HCV compared to the other races and ethnicities examined, non-Hispanic Blacks experienced the highest rate of death associated with HBV and HCV from 2014 to 2017.



## Glossary

**Acute Viral Hepatitis:** The early stage of viral infection of the liver caused by one of three different hepatitis viruses (A, B, or C). Signs and symptoms of early (or acute) viral hepatitis include yellowing of the skin or eyes (jaundice), abdominal pain, vomiting, nausea, diarrhea, malaise, grey-colored stools, or dark urine. For Hepatitis B and C, acute infection can lead to chronic infection.

**Chronic Viral Hepatitis:** A long-term illness that occurs when Hepatitis B or Hepatitis C remains in a person's body. Chronic hepatitis can last a lifetime and lead to serious liver problems, including cirrhosis (scarring of the liver) or liver cancer.

**Hepatitis B core antibody total (anti-HBc):** The total anti-HBc appears at the onset of symptoms in acute hepatitis B and persists for life. It indicates previous or ongoing infection with hepatitis B virus in an undefined time frame.

**Hepatitis B core IgM antibody (IgM anti-HBc):** Positivity indicates recent infection with hepatitis B virus ( $\leq 6$  months).

**Hepatitis B surface antibody (anti-HBs):** The presence of anti-HBs is generally interpreted as indicating recovery and immunity from hepatitis B virus infection, either naturally or through vaccination.

**Hepatitis B surface antigen (HBsAg):** A protein on the surface of hepatitis B virus; it can be detected in high levels in serum during acute or chronic hepatitis B virus infection. The presence of HBsAg indicates that the person is infectious.

**Hepatitis B Virus (HBV):** A double-stranded deoxyribonucleic acid (DNA) virus in the family Hepadnaviridae and genus *Orthohepadnavirus*. HBV is vaccine preventable.

**Hepatitis C antibody (anti-HCV):** The presence of antibodies to hepatitis C virus in the blood. It indicates previous or current infection with hepatitis C virus.

**Hepatitis C Virus (HCV):** An enveloped, single-stranded ribonucleic acid (RNA) virus in the family Flaviviridae and genus *Hepacivirus*. HCV is not vaccine preventable.

**Nucleic Acid Test (NAT)/Nucleic Acid Amplification Test (NAAT):** A molecular technique that tests for the presence of a virus or bacterium by testing for the presence of viral DNA (for HBV)/viral RNA (for HCV). NAT testing can be quantitative or qualitative and includes polymerase chain reaction (PCR) and genotype tests.

**Probable Acute Hepatitis B infection (TDH definition):** 1) signs or symptoms (jaundice or ALT  $>100$ ) of HBV, positive HBsAg, and unknown IgM anti-HBc; **OR** 2) in the absence of both signs and symptoms of HBV, HBsAg positive and positive IgM anti-HBc.

**Sustained Virologic Response (SVR):** With successful HCV treatment, the virus will become undetectable in the blood. Patients are considered cured of HCV when the virus remains undetectable in their blood for 12 weeks after the completion of their treatment, which is also known as a sustained virologic response.

**Vertical Transmission (Perinatal Transmission):** A pathogen transmitted from mother to baby in pregnancy or during childbirth.

**Window Period:** The period of time after a person is infected with a communicable disease but before antibodies to the infection is detectable on testing. During the window period, a patient's antibody test will be negative despite the fact that the patient is infected.

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