Viral Hepatitis Surveillance

United States, 2017

SUMMARY

Each week, health departments report cases of hepatitis A, hepatitis B, and hepatitis C to the Centers for Disease Control and Prevention (CDC) through the National Notifiable Diseases Surveillance System (NNDSS). CDC aggregates the information to conduct ongoing viral hepatitis surveillance nationwide.

Hepatitis A is an acute infection that can result in mild illness or be severe enough to result in hospitalization or, in rare cases, death. Hepatitis A has been a vaccine preventable disease since the hepatitis A vaccine first became available in 1995. Incidence rates decreased more than 95% from 1995 to 2011, then increased by 140% from 2011 to 2017. Until 2017, US incidence rates were influenced by occasional outbreaks, often linked to imported food, and from time-to-time among non-immune persons. In 2017, large person-to-person outbreaks began occurring among persons who use drugs and persons experiencing homelessness (https://www.cdc.gov/hepatitis/outbreaks/2017March-HepatitisA.htm).

Hepatitis B often occurs as an acute infection that may or may not be identified or reported. Later, a chronic infection may develop. Hepatitis B is a vaccine preventable disease and reported cases of acute hepatitis B declined from 1990–2014 after routine vaccination of children was recommended. Injection drug use is a major risk factor associated with acute hepatitis B cases in the US. Chronic hepatitis B infections primarily occur among persons born outside the US in countries with intermediate or high rates of hepatitis B prevalence. Chronic hepatitis B infection can be treated and managed clinically but cannot be cured.

Hepatitis C occurs as an acute infection that is most often asymptomatic and frequently develops into a chronic infection. New cases of acute hepatitis C have increased rapidly in the US since 2010, and have most often been

associated with injection drug use. There is no vaccine against hepatitis C, but short-term treatment for chronic hepatitis C can clear the virus and cure the infection.

BACKGROUND

Viral hepatitis A, B, and C are transmitted in different ways. Main transmission routes and risk factors are summarized in the table below. Hepatitis B and C may be transmitted from a mother to her baby, known as perinatal transmission. Perinatal hepatitis C cases were not reportable to the CDC in 2017. This report contains only perinatal hepatitis B cases, which have been reported to the CDC since 1995.

	Hepatitis A	Hepatitis B	Hepatitis C
Main transmission	Fecal-oral	Blood Sexual	Blood
Perinatal transmission	No	Yes	Yes
Risk factors (1-4)	Direct contact with someone with hepatitis A Traveling to or adopting a child from countries where hepatitis A is common Men who have sex with men Injection or non-injection drug use Homelessness Clotting factor disorders Working with nonhuman primates	Born to infected mother Sexual partners or household contacts of infected persons Men who have sex with men Injection drug use Health care and public safety workers at risk for exposure to blood Hemodialysis patients	Injection drug use Specific types of health care exposures HIV-positive Born to infected mother
Number of acute infections reported in 2017	3,366	3,407	3,186
Adjusted number of acute infections in 2017 (5)*	6,700 (4,700-7,400)	22,100 (12,600-54,200)	44,300 (35,000-151,000)
Estimated prevalence of chronic infections (6,7)	Not applicable	862,000 (668,000-1,056,000) in 2011–2016	2.4 million (2.0-2.8 million) in 2013–2016
Vaccine	Yes	Yes	No
Treatment of Chronic Infections	Not applicable	Yes, not curative	Yes, curative

* The adjusted number accounts for under-ascertainment and under-reporting based on data from 2011. The methods are documented in Klevens, et al. (5) with multipliers and confidence intervals developed by the CDC.

After the hepatitis virus is transmitted to an uninfected person, it can cause acute infection. It is not possible to diagnose every acute case, because symptoms may be so mild that the person does not seek care or too vague to prompt a health care provider to suspect and test for viral hepatitis.

An acute infection can either resolve or, for hepatitis B and hepatitis C, the infection can become chronic. Not every chronic infection is diagnosed because the infection can last for many years without signs and symptoms, gradually causing damage to the liver and other organs. Without treatment, chronic viral hepatitis can lead to liver fibrosis or liver cancer; either of which can lead to liver failure or death.

VACCINATION

Vaccines are the best way to prevent infectious diseases, including viral hepatitis; and there are vaccines to prevent both hepatitis A and hepatitis B infections. No vaccine is available for hepatitis C. To learn more about vaccines, for hepatitis A visit https://www.cdc.gov/hepatitis/hav/havfaq.htm#B1 and for hepatitis B visit https://www.cdc.gov/hepatitis/hbv/hbvfaq.htm#vaccFAQ.

For surveillance, it is important to remember that certain populations have higher levels of immunity, whether from vaccination or prior infection. In general, young people have been vaccinated at a higher rate because of childhood vaccine recommendations issued in 1991 for hepatitis B and starting in 1996 for hepatitis A.

SCREENING

For chronic hepatitis B and hepatitis C, certain groups at high risk should receive appropriate blood tests in order to detect the disease before the virus causes liver damage. The CDC recommends screening for current hepatitis B and hepatitis C infection based on patient characteristics (e.g., born from 1945–1965 for hepatitis C, and birth in countries with intermediate to high endemic hepatitis B) and risk behaviors. To learn more about testing, for hepatitis B visit https://www.cdc.gov/hepatitis/hbv/hbvfaq.htm#b5 and for hepatitis C visit https://www.cdc.gov/hepatitis/hcv/hcvfaq.htm#c1.

In addition to testing based on risk behaviors, hepatitis B screening recommendations for all pregnant women were introduced in 2007, and hepatitis C screening recommendations for persons born from 1945 to 1965 were introduced in 2012. For surveillance, it is important to remember that if certain populations and settings are prioritized for testing, more cases will be detected within those populations and settings.

TREATMENT

If a person develops acute viral hepatitis, supportive treatment and even hospitalization may be required. Antiviral therapies are typically effective and recommended for chronic hepatitis B or hepatitis C infections.

New drugs that can reliably cure hepatitis C have been available since 2013. To learn more about hepatitis B treatment, visit https://www.cdc.gov/hepatitis/hbv/hbvfaq.htm#b13 and for chronic hepatitis C visit https://www.cdc.gov/hepatitis/hcv/hcvfaq.htm#d3. As more people living with chronic hepatitis C infection are cured, mortality rates are expected to decline even for those with advanced liver damage due to chronic infection. In the context of public health surveillance, hepatitis C treatment will have an effect on the number and prevalence of chronic hepatitis C infections and the proportion of resolved cases versus currently infected cases.

HEPATITIS C IS THE MOST COMMON TYPE OF VIRAL HEPATITIS INFECTION IN THE UNITED STATES. NO VACCINE IS AVAILABLE, BUT CHRONIC CASES CAN BE CURED.

CASE DEFINITIONS

To ensure consistent reporting across states, the Council for State and Territorial Epidemiologists (CSTE) developed case definitions for viral hepatitis A, B, and C. The case definitions serve as a way to standardize reporting using uniform criteria and differentiate between acute and chronic cases. When new technologies are developed for laboratory testing or better clinical data becomes available, the case definitions are updated. Changes to case definitions should be considered when examining trends over time. For more information on

2017 case definitions, visit https://wwwn.cdc.gov/nndss/conditions/notifiable/2017/infectious-diseases/. There were no changes to case definitions for acute or chronic viral hepatitis; however, the case definition for perinatal hepatitis B was updated in 2017.

DATA SOURCES

In order for a health department to report diagnosed cases of viral hepatitis to the CDC, they must have systems in place that ensure each diagnosed case is detected. Due to varying state laws and infrastructure, not all health departments report all cases of acute or newly reported chronic viral hepatitis to the CDC.

Case reporting generally begins when a local or state health department receives a positive laboratory report, indicating an individual has one or more viral hepatitis infections. Since initial reporting provides limited information and clinical symptoms are frequently needed to classify cases as acute, reported cases may require extensive follow-up to obtain full information for establishing case status and case classification. Health departments prioritize cases for follow-up using their own protocols and may submit cases to CDC with incomplete or missing information. Additionally, the volume of laboratory reports for chronic viral hepatitis infections is so large that not all health departments are able to consistently detect and report all chronic cases to the CDC. This under-reporting translates into underestimation of chronic viral hepatitis cases when using state reports based on data from NNDSS. NNDSS data on chronic hepatitis B and hepatitis C are in this report where available; however these are newly identified chronic cases and do not measure prevalence.

STATES FUNDED FOR ENHANCED SURVEILLANCE IN 2017

FLORIDA

GEORGIA

INDIANA

KENTUCKY

LOUISIANA

MASSACHUSETTS

NEW JERSEY

NORTH CAROLINA

OKLAHOMA

OHIO

TENNESSEE

UTAH

WASHINGTON

WEST VIRGINIA

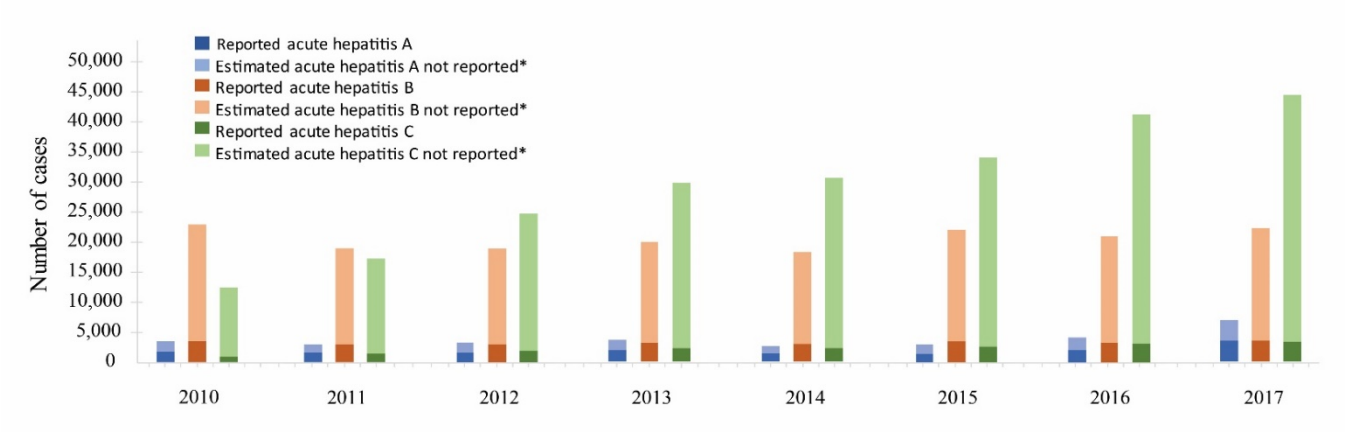
In 2017, the CDC provided funding to 14 states to perform enhanced surveillance of hepatitis B and hepatitis C through a cooperative agreement. Previously, only five states and two cities were funded from 2013–2016. Funding states for enhanced surveillance improves detection of cases and completeness of reports.

Cases of viral hepatitis that are submitted to CDC by health departments are collected in NNDSS, for which information on acute cases in this report are based.

Deaths due to viral hepatitis among reported acute cases are submitted by states to CDC through NNDSS. Data entered on death certificates are also available to the CDC through the National Vital Statistics System (NVSS). Both data sources are used in this report and more information on NVSS mortality data is provided.

ACUTE VIRAL HEPATITIS CASES FROM 2010 TO 2017

Figure 1.1. Actual number of acute viral hepatitis cases submitted to CDC by states and estimated* number of acute viral hepatitis cases — United States, 2010–2017.



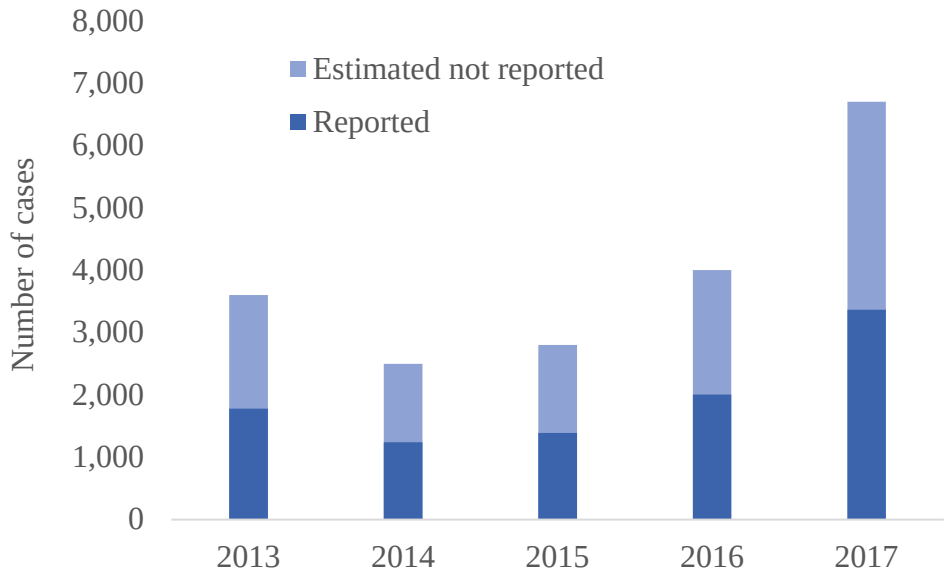
Source: CDC, National Notifiable Diseases Surveillance System.

* The number of estimated viral hepatitis cases was determined by multiplying the number of reported cases by a factor that adjusted for under-ascertainment and under-reporting (5).In this visual representation, the reported and estimated not reported add to the total estimated number of acute cases. The 95% bootstrap confidence intervals for the adjusted number of cases are shown in the Appendix.

HEPATITIS A

The number of reported hepatitis A cases declined after 2013; however, person-to-person hepatitis A outbreaks in 2016 and 2017 among persons who used drugs and persons experiencing homelessness caused the number of cases to increase.

Figure 2.1. Actual number of hepatitis A cases submitted to CDC by states and estimated* number of hepatitis A cases — United States, 2013–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* The number of estimated viral hepatitis cases was determined by multiplying the number of reported cases by a factor that adjusted for under-ascertainment and under-reporting (5). In this visual representation, the reported and estimated not reported add to the total estimated number of acute cases. The 95% bootstrap confidence intervals for the adjusted number of cases are shown in the Appendix.

HEPATITIS A: ACUTE CASES BY STATE

Acute hepatitis A cases fluctuate when states experience outbreaks.

- Hawaii reported fewer cases of acute hepatitis A in 2017 compared to 2016, after a large foodborne outbreak occurred in 2016.
- California, Kentucky, Michigan, and Utah reported outbreaks of hepatitis A in 2017 (8). Epidemiologic investigations revealed that these were not common source or foodborne outbreaks, but instead person-to-person transmission among persons who use drugs and persons experiencing homelessness.

Table 2.1. Number and rate* of reported cases† of hepatitis A, by state or jurisdiction and nationally — United States, 2013–2017.

State	2013		2014		2015		2016		2017	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Alabama	10	0.2	15	0.3	23	0.5	19	0.4	23	0.5
Alaska	1	0.1	1	0.1	4	0.5	2	0.3	0	0.0
Arizona	66	1.0	29	0.4	54	0.8	32	0.5	59	0.8
Arkansas	9	0.3	2	0.1	10	0.3	13	0.4	7	0.2
California	255	0.7	142	0.4	179	0.5	229	0.6	947	2.4
Colorado	51	1.0	23	0.4	25	0.5	22	0.4	65	1.2
Connecticut	19	0.5	23	0.6	9	0.3	16	0.4	17	0.5
Delaware	4	0.4	1	0.1	2	0.2	1	0.1	6	0.6
District of Columbia	U	U	U	U	U	U	4	0.6	3	0.4
Florida	115	0.6	90	0.5	108	0.5	115	0.6	261	1.2
Georgia	36	0.4	24	0.2	30	0.3	44	0.4	24	0.2
Hawaii	16	1.1	5	0.4	6	0.4	285	20.0	8	0.6
Idaho	8	0.5	7	0.4	9	0.5	7	0.4	4	0.2
Illinois	79	0.6	82	0.6	57	0.4	71	0.6	73	0.6
Indiana	32	0.5	20	0.3	19	0.3	18	0.3	21	0.3
Iowa	17	0.6	12	0.4	16	0.5	16	0.5	9	0.3
Kansas	11	0.4	7	0.2	7	0.2	5	0.2	6	0.2
Kentucky	24	0.5	19	0.4	16	0.4	9	0.2	71	1.6
Louisiana	14	0.3	5	0.1	5	0.1	12	0.3	8	0.2
Maine	10	0.8	8	0.6	8	0.6	8	0.6	7	0.5
Maryland	29	0.5	27	0.5	19	0.3	37	0.6	29	0.5
Massachusetts	43	0.6	43	0.6	34	0.5	64	0.9	52	0.8
Michigan	83	0.8	45	0.5	51	0.5	112	1.1	670	6.7
Minnesota	32	0.6	19	0.3	21	0.4	15	0.3	30	0.5
Mississippi	5	0.2	3	0.1	2	0.1	2	0.1	3	0.1
Missouri	8	0.1	20	0.3	9	0.1	16	0.3	27	0.4
Montana	6	0.6	5	0.5	2	0.2	3	0.3	3	0.3
Nebraska	13	0.7	9	0.5	6	0.3	21	1.1	4	0.2
Nevada	19	0.7	5	0.2	11	0.4	14	0.5	19	0.6
New Hampshire	9	0.7	5	0.4	2	0.2	8	0.6	7	0.5
New Jersey	68	0.8	59	0.7	59	0.7	74	0.8	71	0.8
New Mexico	20	1.0	8	0.4	6	0.3	4	0.2	4	0.2
New York	167	0.8	84	0.4	123	0.6	99	0.5	218	1.1

Table 2.1 (cont'd). Number and rate* of reported cases† of hepatitis A, by state or jurisdiction and nationally — United States, 2013–2017.

State	2013		2014		2015		2016		2017	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
North Carolina	46	0.5	38	0.4	45	0.4	52	0.5	29	0.3
North Dakota	9	1.2	9	1.2	5	0.7	2	0.3	0	0.0
Ohio	59	0.5	32	0.3	36	0.3	36	0.3	45	0.4
Oklahoma	14	0.4	17	0.4	11	0.3	11	0.3	9	0.2
Oregon	29	0.7	13	0.3	28	0.7	15	0.4	20	0.5
Pennsylvania	53	0.4	48	0.4	43	0.3	62	0.5	69	0.5
Rhode Island	4	0.4	8	0.8	4	0.4	4	0.4	6	0.6
South Carolina	14	0.3	6	0.1	16	0.3	21	0.4	21	0.4
South Dakota	4	0.5	3	0.4	2	0.2	1	0.1	1	0.1
Tennessee	20	0.3	12	0.2	14	0.2	7	0.1	6	0.1
Texas	109	0.4	124	0.5	147	0.5	139	0.5	129	0.5
Utah	12	0.4	8	0.3	8	0.3	12	0.4	159	5.1
Vermont	7	1.1	1	0.2	3	0.5	5	0.8	2	0.3
Virginia	36	0.4	27	0.3	50	0.6	190	2.3	46	0.5
Washington	45	0.6	26	0.4	26	0.4	31	0.4	28	0.4
West Virginia	4	0.2	12	0.6	8	0.4	15	0.8	6	0.3
Wisconsin	37	0.6	7	0.1	9	0.2	7	0.1	16	0.3
Wyoming	0	0.0	1	0.2	3	0.5	0	0.0	18	3.1
Total	**1,781**	**0.6**	**1,239**	**0.4**	**1,390**	**0.4**	**2,007**	**0.6**	**3,366**	**1.0**

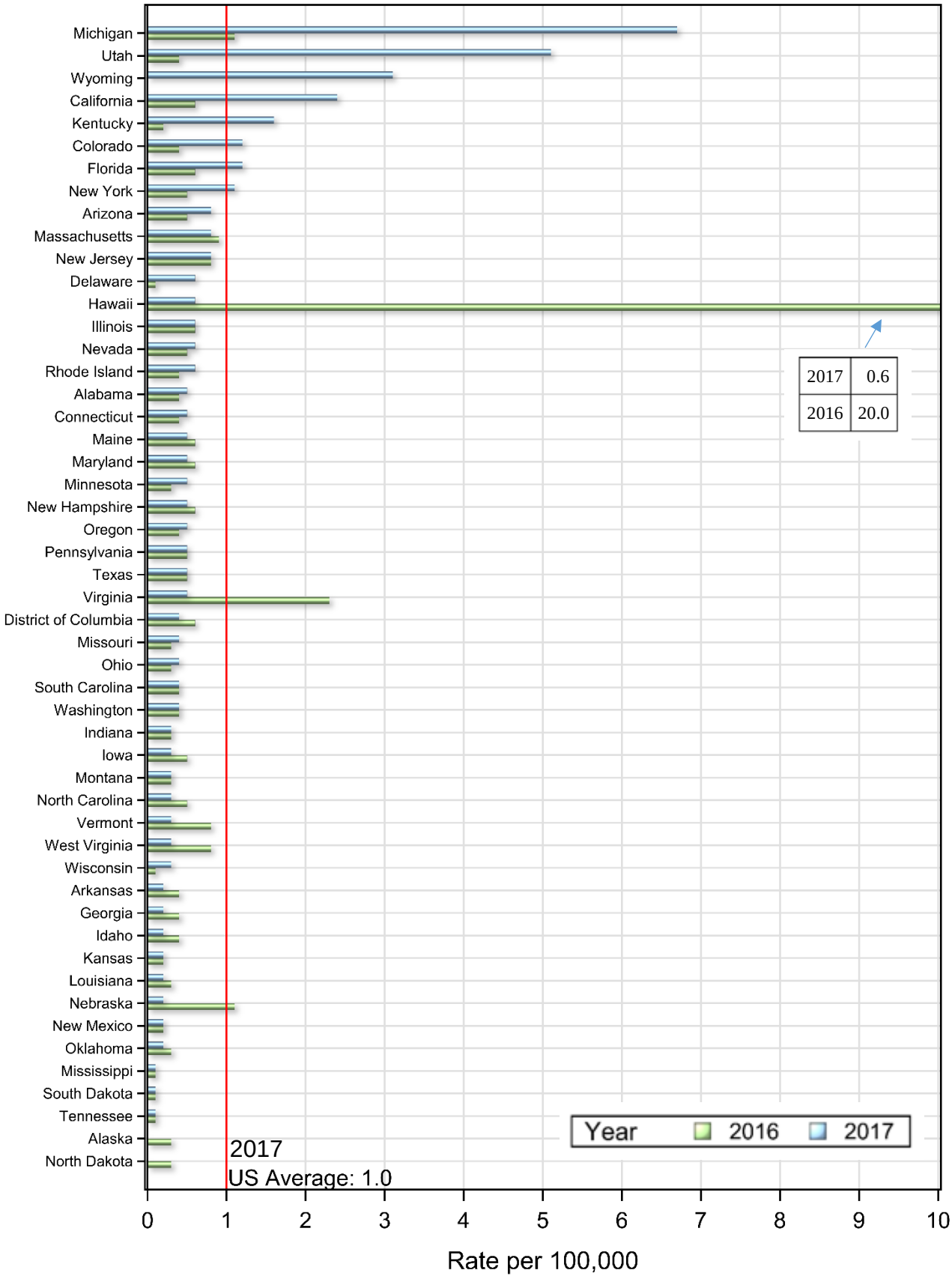
Source: CDC, National Notifiable Diseases Surveillance System.

* Rate per 100,000 population.

† For case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-a-acute/

U=No data available for reporting.

Figure 2.2. Rates of reported hepatitis A cases, by state compared to the 2017 overall rate of hepatitis A — United States, 2016 and 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

HEPATITIS A: SUBGROUP TRENDS FOR ACUTE CASES

Adult age groups influence the trend in reported acute hepatitis A cases per 100,000 population for two main reasons:

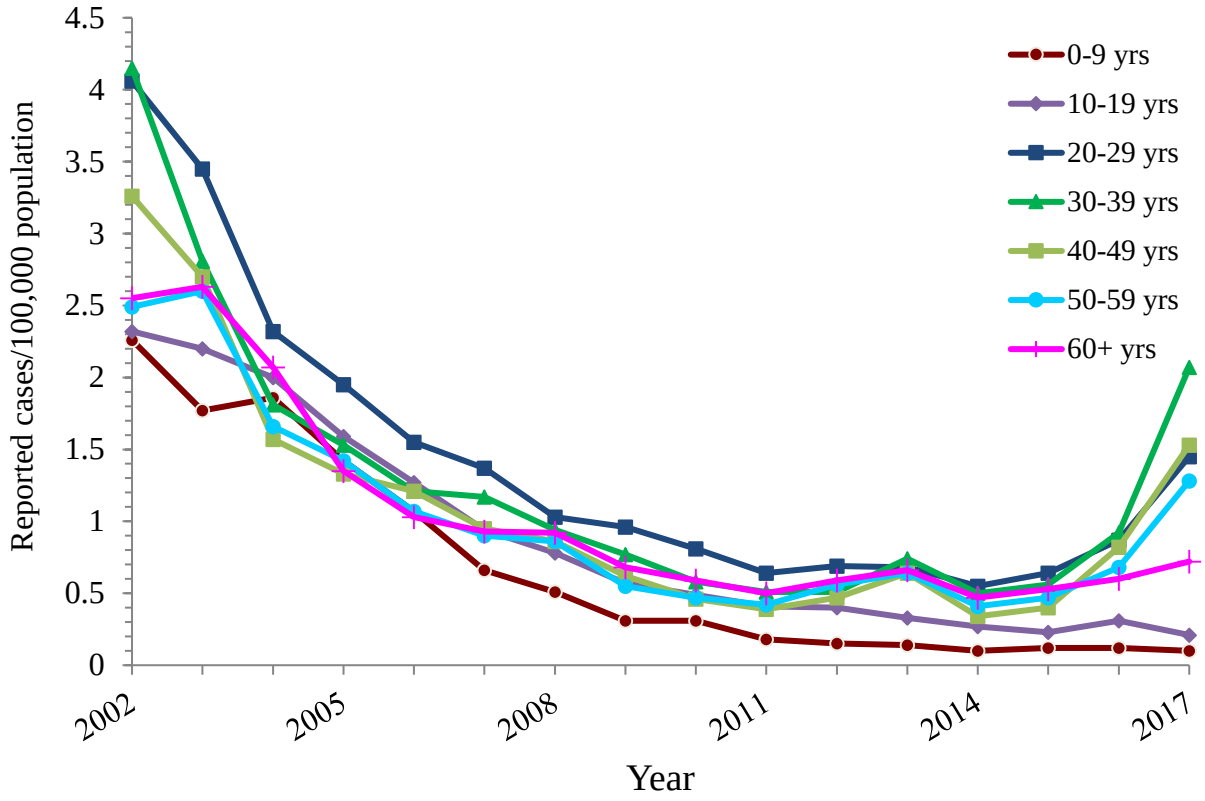
- Rates of acute hepatitis A infection remain low in children and adolescents due to childhood vaccination recommendations for hepatitis A starting in 1996.
- Change in the epidemiology including population-level immunity, source of infection, and affected populations.

In 2017, rates of reported acute hepatitis A cases increased more markedly for males than for females, consistent with higher rates of drug use among men compared to women (9).

Trends by race/ethnicity revealed the following:

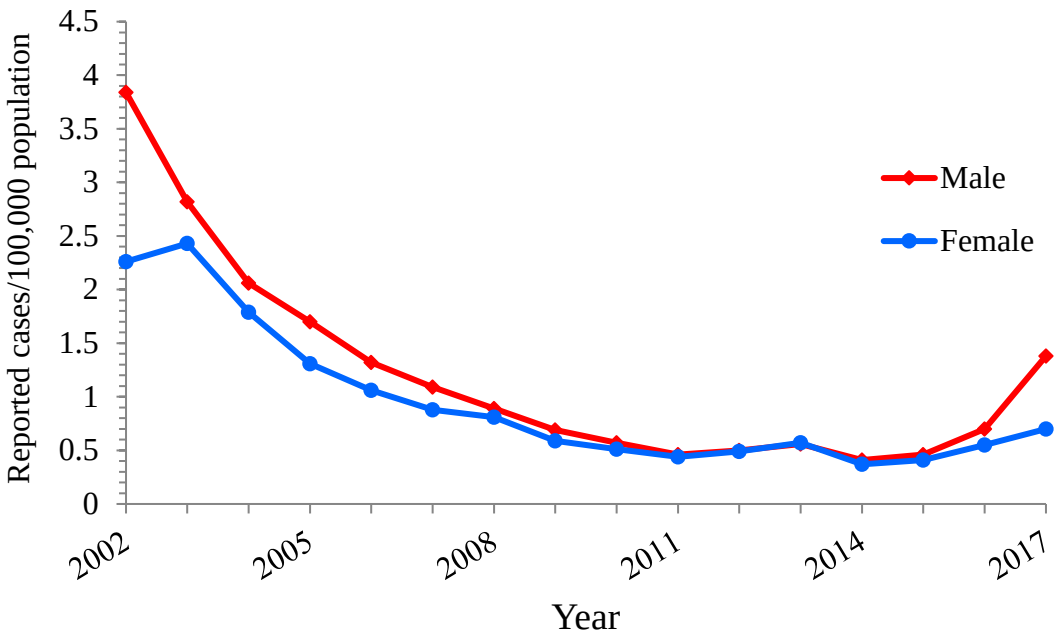
- The incidence among Asian/Pacific Islanders returned to the 2015 rate following an uptick in 2016 that was likely due to the ending of a large foodborne outbreak that occurred in Hawaii.
- The incidence among all other race/ethnicity groups increased from 2016 to 2017.

Figure 2.3. Rates of reported hepatitis A, by age group — United States, 2002–2017.



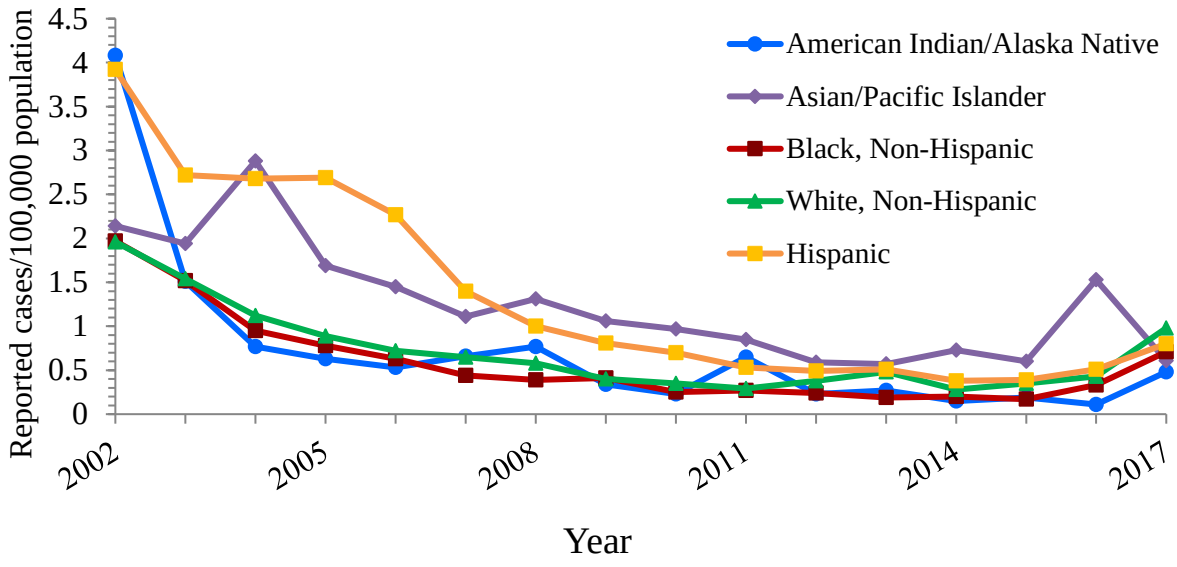
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 2.4. Rates of reported hepatitis A, by sex — United States, 2002–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

Figure 2.5. Rates of reported hepatitis A, by race/ethnicity — United States, 2002–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

Table 2.2. Number and rate* of reported cases† of hepatitis A, by selected characteristics — United States 2013–2017.

	2013		2014		2015		2016		2017	
	No.	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***
Total§	1,781	0.6	1,239	0.4	1,390	0.4	2,007	0.6	3,366	1.0
Age group										
0–9 years	57	0.1	41	0.1	48	0.1	47	0.1	40	0.1
10–19 years	138	0.3	114	0.3	97	0.2	131	0.3	86	0.2
20–29 years	299	0.7	246	0.5	287	0.6	392	0.9	659	1.4
30–39 years	302	0.7	207	0.5	233	0.6	391	0.9	893	2.1
40–49 years	267	0.6	139	0.3	164	0.4	333	0.8	621	1.5
50–59 years	278	0.6	182	0.4	205	0.5	297	0.7	554	1.3
60+ years	415	0.7	304	0.5	353	0.5	409	0.6	509	0.7
Sex										
Male	864	0.6	645	0.4	726	0.5	1,107	0.7	2,209	1.4
Female	914	0.6	591	0.4	662	0.4	897	0.5	1,149	0.7
Race/ethnicity										
American Indian/Alaskan Native	7	0.3	4	0.2	5	0.2	3	0.1	13	0.5
Asian/Pacific Islander	101	0.6	135	0.7	114	0.6	299	1.5	124	0.6
Black, Non-Hispanic	75	0.2	82	0.2	71	0.2	137	0.3	303	0.7
White, Non-Hispanic	962	0.5	566	0.3	701	0.3	865	0.4	1,979	1.0
Hispanic	278	0.5	211	0.4	219	0.4	293	0.5	471	0.8
HHS Region¶										
Region 1	92	0.6	88	0.6	60	0.4	105	0.7	91	0.6
Region 2	235	0.8	143	0.5	182	0.6	173	0.6	289	1.0
Region 3	126	0.4	115	0.4	122	0.4	309	1.0	159	0.5
Region 4	270	0.4	207	0.3	254	0.4	269	0.4	438	0.7
Region 5	322	0.6	205	0.4	193	0.4	259	0.5	855	1.6
Region 6	166	0.4	156	0.4	179	0.4	179	0.4	157	0.4
Region 7	49	0.4	48	0.3	38	0.3	58	0.4	46	0.3
Region 8	82	0.7	49	0.4	45	0.4	40	0.3	246	2.1
Region 9	356	0.7	181	0.4	250	0.5	560	1.1	1,033	2.0
Region 10	83	0.6	47	0.4	67	0.5	55	0.4	52	0.4

Source: CDC, National Notifiable Diseases Surveillance System.

* Rate per 100,000 population.

† For the case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-a-acute/

§ Numbers reported in each category may not add up to the total number of reported cases in a year due to cases with missing data or, in the case of race/ethnicity, cases categorized as “Other”.

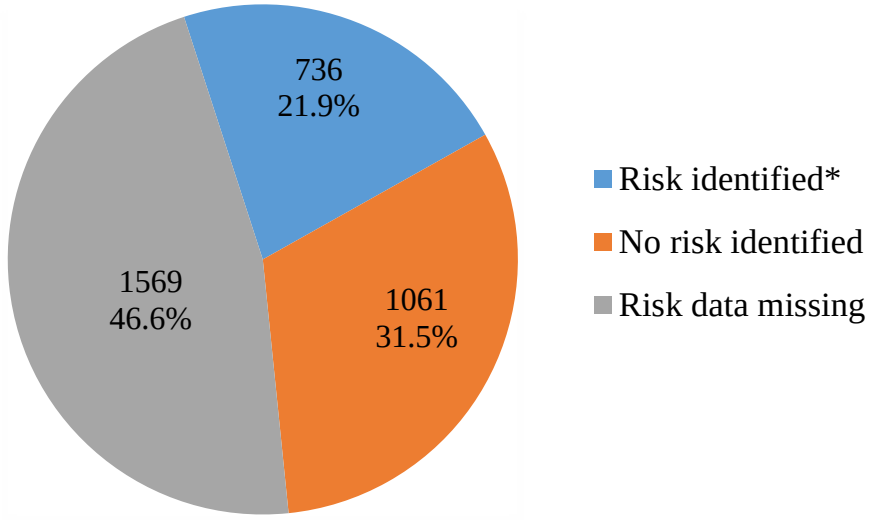
¶ Health and Human Services Regions were categorized according to the grouping of states and US territories assigned under each of the ten Department of Health and Human Services regional offices (https://www.hhs.gov/about/agencies/iea/regional-offices/index.html). For the purposes of this report, regions with US territories (Region 2 and Region 9) contain data from states only.

HEPATITIS A: RISK FACTORS FOR ACUTE CASES

Risk data were missing for 46.6% of reported acute hepatitis A cases reported to CDC in 2017, up slightly from 45.7% in 2016.

The most common risk factors reported in 2017 were injection drug use, consumption of food contaminated with the hepatitis A virus, and sexual/household contact with a hepatitis A patient.

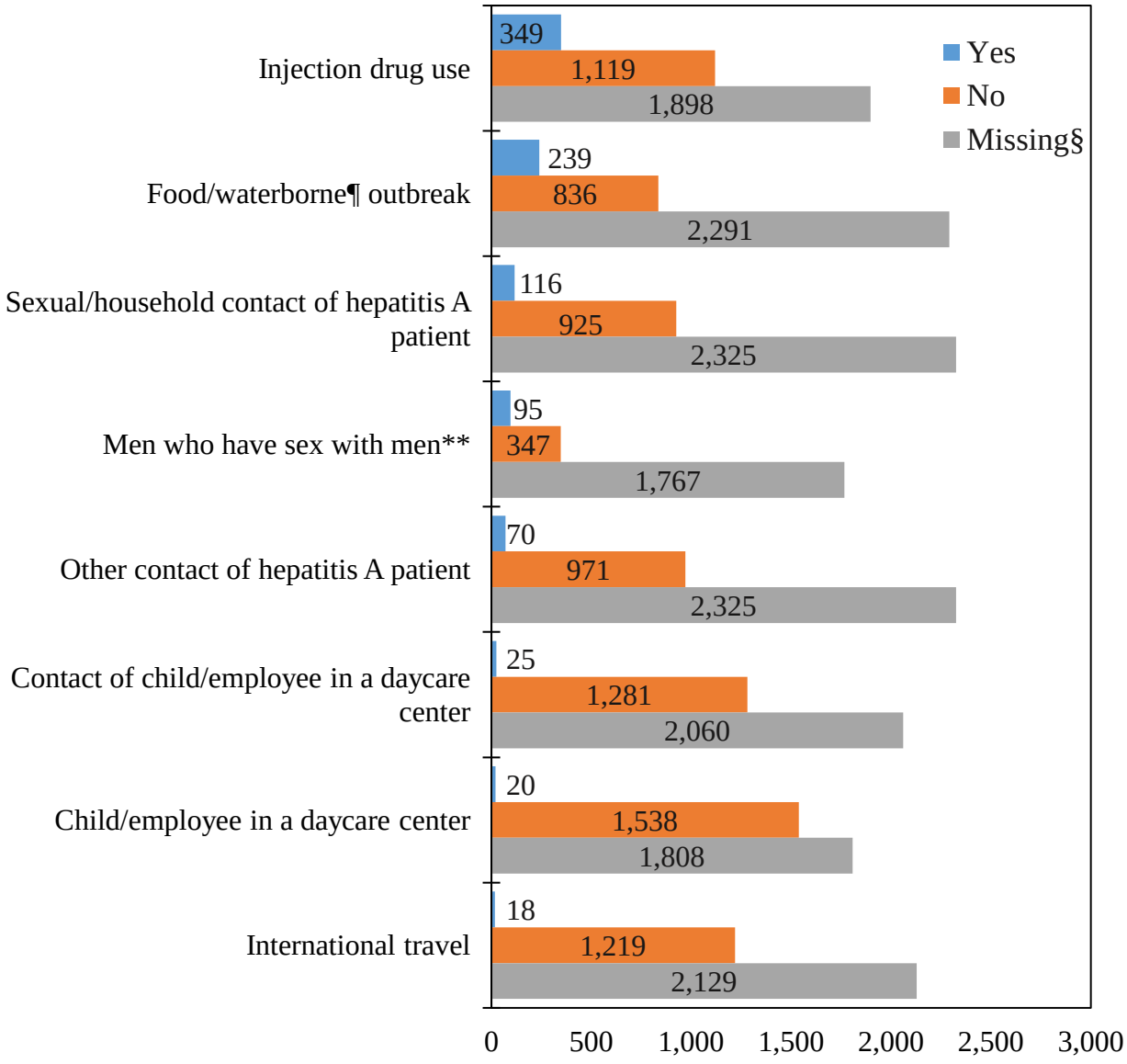
Figure 2.6. Availability of information on risk behaviors/exposures* associated with reported cases of hepatitis A — United States, 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* Includes case reports indicating the presence of at least one of the following risks 2–6 weeks prior to onset of symptomatic hepatitis A: 1) traveled to hepatitis A-endemic regions of Mexico, South/Central America, Africa, Asia/South Pacific, or the Middle East; 2) sexual/household or other contact with suspected/confirmed hepatitis A patient; 3) a child/employee in day-care center/nursery/preschool or having had contact with such persons; 4) involved in a foodborne/waterborne outbreak; 5) being a man who has sex with men; and 6) injection drug use.

Figure 2.7. Reported cases of hepatitis A,* by risk behavior/exposure† — United States, 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* A total of 3,366 case reports of hepatitis A were received in 2017.

† More than one risk behavior/exposure may be indicated on each case report.

§ No risk data reported.

¶ No outbreaks in 2017 were waterborne.

** A total of 2,209 hepatitis A cases were reported among males in 2017.

HEPATITIS A: HOSPITALIZATION FOR ACUTE CASES

Hospitalization data were missing for 49.0% of acute hepatitis A cases reported to CDC in 2017, up from 45.3% in 2016.

Of those with hospitalization data, 67.2% (1,154 of 1,717) were hospitalized in 2017, which was substantially higher than 41.6% in 2016.

HEPATITIS A: MORTALITY

In 2017, there were 91 death certificates among US residents that listed hepatitis A as the underlying or a contributing cause of death.

- While the rates did not change over time, the number of death certificates with hepatitis A listed increased from 70 in 2016 to 91 in 2017.
- The increase in the number of deaths in 2017 was likely due to the increasing number of cases associated with outbreaks.

Only 24 hepatitis A deaths were reported through NNDSS. No additional information, including US resident status, was submitted through NNDSS.

Table 2.3. Number and rate* of deaths with hepatitis A listed as a cause of death† among US residents, by demographic characteristic and year — United States, 2013–2017.

Demographic characteristic	2013		2014		2015		2016		2017	
	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)
Age group										
0–44 years	4	-	4	-	5	-	6	-	9	-
45–64 years	43	0.05 (0.04-0.07)	35	0.04 (0.03-0.06)	25	0.03 (0.02-0.04)	33	0.04 (0.03-0.06)	35	0.04 (0.03-0.06)
65+ years	33	0.07 (0.05-0.10)	37	0.08 (0.06-0.11)	37	0.08 (0.05-0.11)	31	0.06 (0.04-0.09)	47	0.09 (0.07-0.12)
Race/ethnicity										
White, non-Hispanic	63	0.02 (0.02-0.03)	51	0.02 (0.02-0.03)	45	0.01 (0.00-0.01)	50	0.02 (0.01-0.02)	69	0.02 (0.02-0.03)
Other	17	-	25	-	22	-	20	-	21	-
Sex										
Male	50	0.03 (0.02-0.04)	42	0.02 (0.01-0.03)	38	0.02 (0.01-0.03)	38	0.01 (0.01-0.02)	63	0.03 (0.02-0.03)
Female	30	0.01 (0.00-0.01)	34	0.01 (0.01-0.02)	29	0.01 (0.00-0.01)	32	0.01 (0.01-0.02)	28	0.00 (0.00-0.00)
Overall	**80**	**0.02 (0.02-0.03)**	**76**	**0.02 (0.02-0.03)**	**67**	**0.01 (0.01-0.02)**	**70**	**0.01 (0.00-0.01)**	**91**	**0.02 (0.02-0.03)**

Source: CDC, National Center for Health Statistics, Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. Data are from the 2013–2017 Multiple Cause of Death files and are based on information from all death certificates filed in the vital records offices of the fifty states and the District of Columbia through the Vital Statistics Cooperative Program. Deaths of nonresidents (e.g., nonresident aliens, nationals living abroad, residents of Puerto Rico, Guam, the Virgin Islands, and other territories of the US) and fetal deaths are excluded. Accessed at http://wonder.cdc.gov/mcd-icd10.html on August 23, 2019. CDC WONDER dataset documentation and technical methods can be accessed at https://wonder.cdc.gov/wonder/help/mcd.html#.

* Rates for race/ethnicity, sex, and the overall total are age-adjusted per 100,000 U.S. standard population in 2000 using the following age group distribution (in years): <1, 1–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85+. Missing data are not included. Rates where death counts were less than 20 were not displayed due to the instability associated with those rates or where CDC WONDER did not have the functionality to calculate rates (e.g., for the "Other" race/ethnicity group). For age-adjusted death rates, the age-specific death rate is rounded to one decimal place before proceeding to the next step in the calculation of age-adjusted death rates for NCHS Multiple Cause of Death on CDC WONDER. This rounding step may affect the precision of rates calculated for small numbers of deaths.

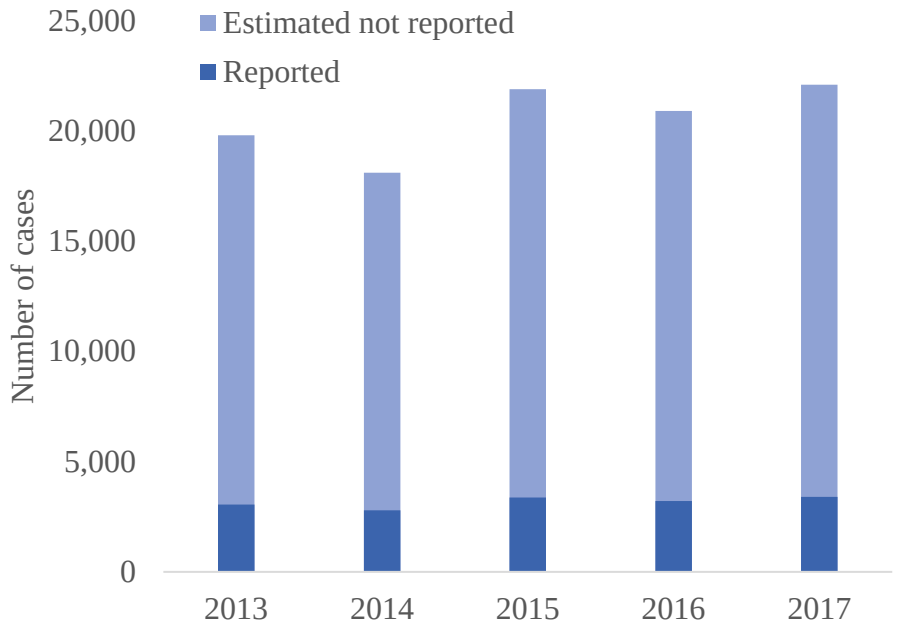
† Cause of death is defined as one of the multiple causes of death and is based on the International Classification of Diseases, 10th Revision (ICD-10) codes B15 (hepatitis A).

Note: Numbers are slightly lower than previously reported for 2013–2016 due to NCHS standards which restrict displayed data to US residents.

HEPATITIS B

The number of reported acute hepatitis B cases has remained stable with a slight increase in 2017. The trend is influenced by improved immunization, increasing injection drug use related to the opioid crisis (10), and improved surveillance.

Figure 3.1. Actual number of acute hepatitis B cases submitted to CDC by states and estimated* number of acute hepatitis B cases — United States, 2013–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* The number of estimated viral hepatitis cases was determined by multiplying the number of reported cases by a factor that adjusted for under-ascertainment and under-reporting (5). In this visual representation, the reported and estimated not reported add to the total estimated number of acute cases. The 95% bootstrap confidence intervals for the adjusted number of cases are shown in the Appendix.

HEPATITIS B: ACUTE CASES BY STATE

While national incidence of acute hepatitis B has been relatively stable, in 2017 certain states experienced increases. State-level trends were influenced by the opioid crisis (10) and lack of protection among populations for whom vaccination is recommended.

Table 3.1. Number and rate* of reported cases† of acute hepatitis B, by state or jurisdiction and nationally — United States, 2013–2017.

State	2013		2014		2015		2016		2017	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Alabama	90	1.9	117	2.4	101	2.1	59	1.2	82	1.7
Alaska	1	0.1	3	0.4	3	0.4	6	0.8	9	1.2
Arizona	28	0.4	31	0.5	25	0.4	14	0.2	26	0.4
Arkansas	50	1.7	28	0.9	36	1.2	49	1.6	46	1.5
California	138	0.4	110	0.3	160	0.4	115	0.3	126	0.3
Colorado	24	0.5	29	0.5	28	0.5	28	0.5	32	0.6
Connecticut	8	0.2	9	0.3	6	0.2	7	0.2	10	0.3
Delaware	14	1.5	8	0.9	8	0.8	3	0.3	9	0.9
District of Columbia	U	U	U	U	U	U	U	U	U	U
Florida	323	1.7	313	1.6	432	2.1	558	2.7	588	2.8
Georgia	104	1.0	103	1.0	119	1.2	100	1.0	106	1.0
Hawaii	4	0.3	6	0.4	14	1.0	0	0.0	0	0.0
Idaho	13	0.8	6	0.4	8	0.5	6	0.4	6	0.3
Illinois	94	0.7	58	0.5	55	0.4	37	0.3	27	0.2
Indiana	101	1.5	126	1.9	133	2.0	146	2.2	170	2.5
Iowa	11	0.4	9	0.3	16	0.5	10	0.3	12	0.4
Kansas	11	0.4	11	0.4	19	0.7	21	0.7	24	0.8
Kentucky	214	4.9	164	3.7	162	3.7	222	5.0	236	5.3
Louisiana	82	1.8	87	1.9	87	1.9	48	1.0	73	1.6
Maine	11	0.8	12	0.9	9	0.7	53	4.0	77	5.8
Maryland	43	0.7	40	0.7	40	0.7	27	0.4	34	0.6
Massachusetts	71	1.1	30	0.4	25	0.4	31	0.5	51	0.7
Michigan	53	0.5	50	0.5	56	0.6	45	0.5	61	0.6
Minnesota	19	0.4	16	0.3	19	0.3	21	0.4	23	0.4
Mississippi	55	1.8	48	1.6	50	1.7	31	1.0	44	1.5
Missouri	61	1.0	31	0.5	35	0.6	40	0.7	31	0.5
Montana	4	0.4	0	0.0	4	0.4	1	0.1	3	0.3
Nebraska	9	0.5	8	0.4	3	0.2	8	0.4	10	0.5
Nevada	29	1.0	21	0.7	25	0.9	22	0.7	30	1.0
New Hampshire	2	0.2	4	0.3	0	0.0	0	0.0	0	0.0
New Jersey	65	0.7	77	0.9	85	0.9	59	0.7	57	0.6
New Mexico	3	0.1	2	0.1	2	0.1	1	0.0	1	0.0
New York	117	0.6	95	0.5	80	0.4	103	0.5	81	0.4

Table 3.1 (cont'd). Number and rate* of reported cases† of acute hepatitis B, by state or jurisdiction and nationally — United States, 2013–2017.

State	2013		2014		2015		2016		2017	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
North Carolina	75	0.8	100	1.0	165	1.6	170	1.7	190	1.8
North Dakota	0	0.0	0	0.0	2	0.3	2	0.3	0	0.0
Ohio	225	1.9	171	1.5	409	3.5	299	2.6	285	2.4
Oklahoma	40	1.0	57	1.5	37	0.9	32	0.8	41	1.0
Oregon	32	0.8	32	0.8	24	0.6	20	0.5	23	0.6
Pennsylvania	43	0.3	68	0.5	61	0.5	43	0.3	69	0.5
Rhode Island	U	U	U	U	U	U	U	U	U	U
South Carolina	58	1.2	37	0.8	30	0.6	34	0.7	40	0.8
South Dakota	5	0.6	3	0.4	2	0.2	2	0.2	2	0.2
Tennessee	262	4.0	232	3.5	243	3.7	204	3.1	215	3.2
Texas	142	0.5	122	0.5	159	0.6	156	0.6	106	0.4
Utah	5	0.2	11	0.4	10	0.3	5	0.2	18	0.6
Vermont	2	0.3	4	0.6	3	0.5	2	0.3	1	0.2
Virginia	72	0.9	61	0.7	69	0.8	56	0.7	61	0.7
Washington	33	0.5	44	0.6	34	0.5	45	0.6	45	0.6
West Virginia	195	10.5	186	10.1	272	14.7	268	14.6	212	11.7
Wisconsin	9	0.2	11	0.2	5	0.1	9	0.2	14	0.2
Wyoming	U	U	U	U	U	U	U	U	U	U
Total	**3,050**	**1.0**	**2,791**	**0.9**	**3,370**	**1.1**	**3,218**	**1.0**	**3,407**	**1.1**

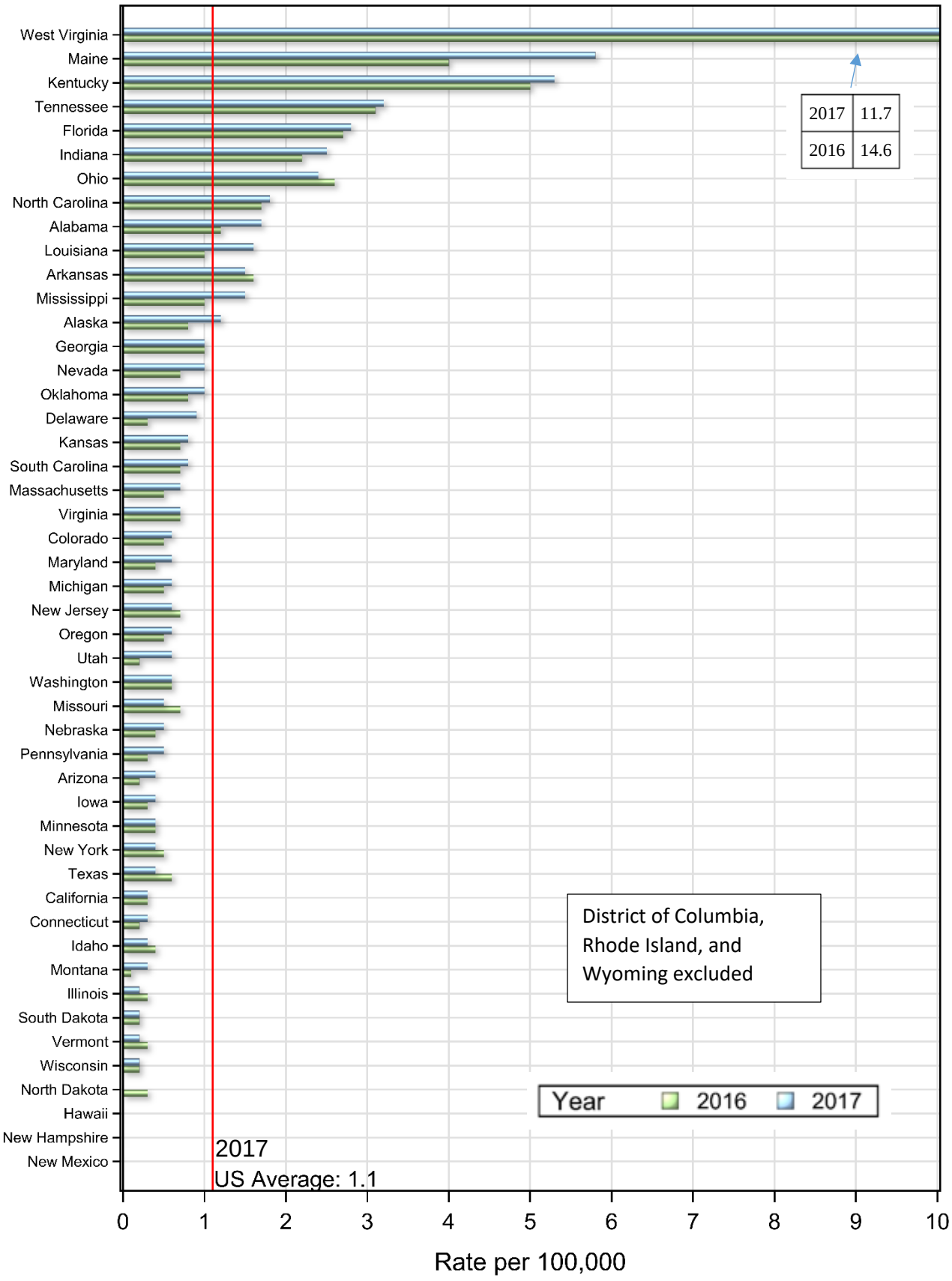
Source: CDC, National Notifiable Diseases Surveillance System.

* Rate per 100,000 population.

† For case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-b-acute/

U=No data available for reporting.

Figure 3.2. Rates of reported acute hepatitis B cases, by state compared to the 2017 overall rate of acute hepatitis B — United States, 2016 and 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

HEPATITIS B: SUBGROUP TRENDS FOR ACUTE CASES

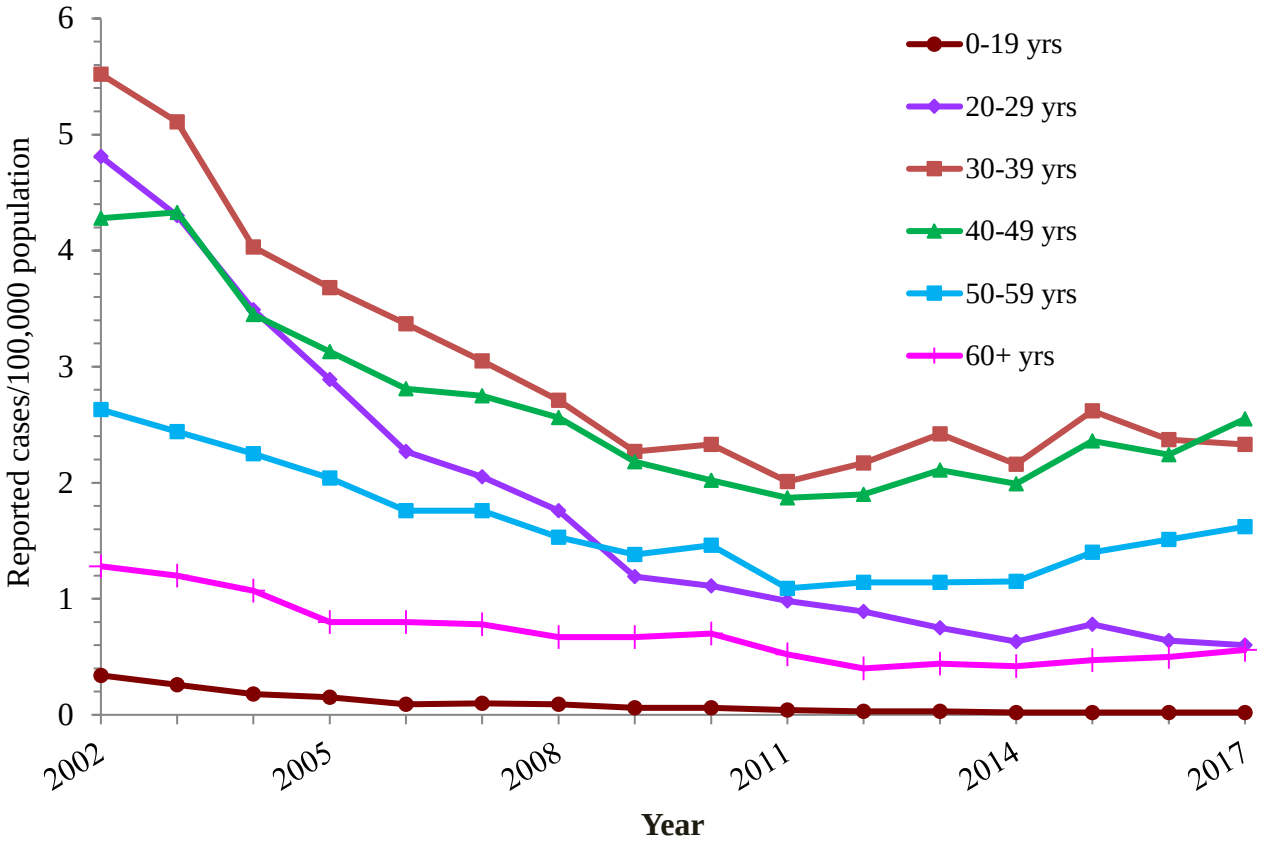
Age groups showed different trends in reported acute hepatitis B cases per 100,000 population:

- Rates of hepatitis B infection remained low in children and adolescents, likely due to childhood vaccinations.
- Rates decreased for young adults aged 20–29, likely because this is the first age cohort to reach young adulthood who were vaccinated as children or offered catch-up vaccination as adolescents. This group influenced the overall trend to remain stable, even as some older age groups experienced increases.
- For the first time between 2002 and 2017, adults aged 40–49 had the highest rate of acute hepatitis B in 2017. Risk factors such as injection drug use and having multiple sex partners, combined with lack of protection by vaccination, put older age groups at risk for infection.

Males have historically experienced higher rates of reported hepatitis B compared to females, consistent with risk factors being more common in males (8). Trends by race/ethnicity revealed the following differences in trends:

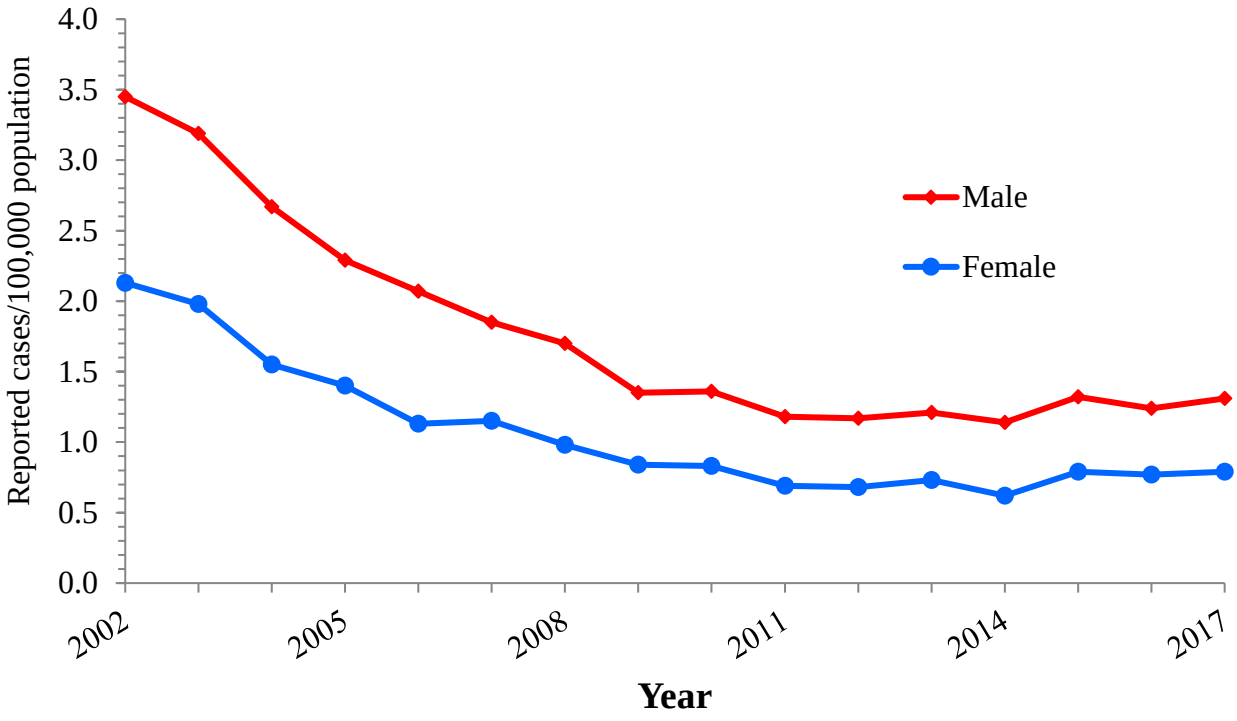
- For non-Hispanic whites, rates transitioned from being the lowest among all categories in 2002 to being the highest in 2015–2017.
- Rates among non-Hispanic blacks and American Indian/Alaska Natives were very high in 2002, subsequently decreased, and stabilized in recent years to just below the national average.
- Rates among Hispanics and Asians/Pacific Islanders were high in 2002, subsequently decreased, and stabilized in recent years to well below the national average.

Figure 3.3. Rates of reported acute hepatitis B, by age group — United States, 2002–2017.



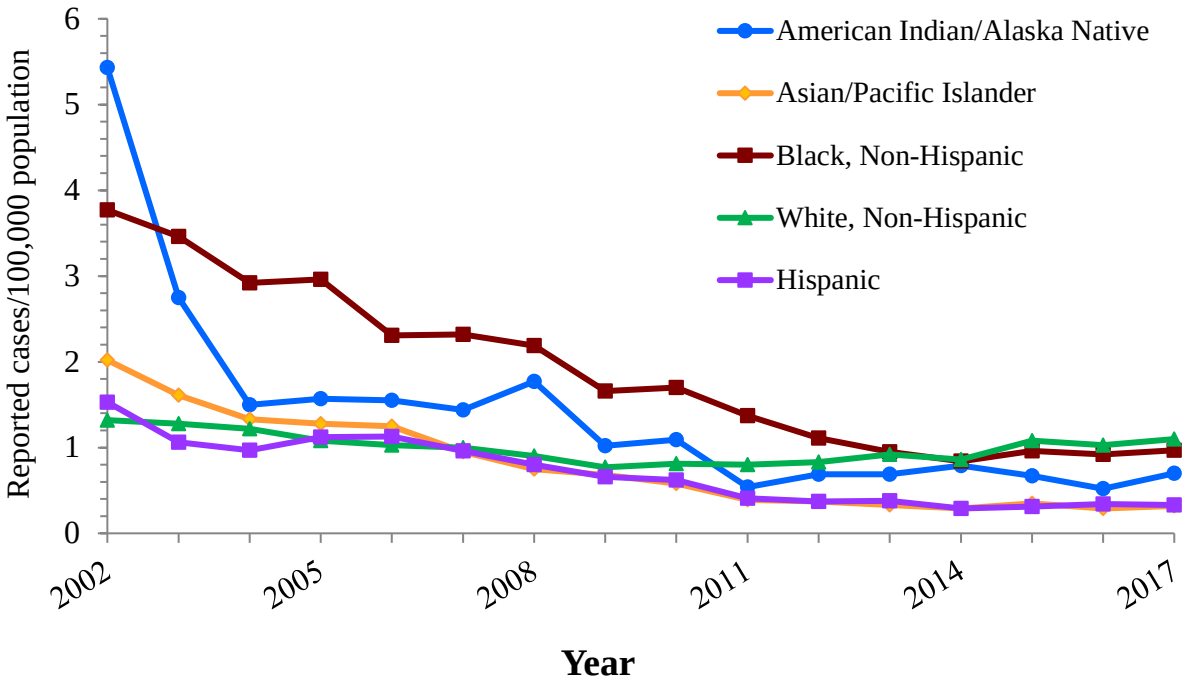
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 3.4. Rates of reported acute hepatitis B, by sex — United States, 2002–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

Figure 3.5. Rates of reported acute hepatitis B, by race/ethnicity — United States, 2002–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

Table 3.2. Number and rate* of reported cases† of acute hepatitis B, by selected characteristics — United States 2013–2017.

	2013		2014		2015		2016		2017	
	No.	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***
Total§	3,050	1.0	2,953	0.9	3,370	1.1	3,218	1.1	3,407	1.1
Age group										
0–19 years	25	0.0	14	0.0	19	0.0	18	0.0	16	0.0
20–29 years	332	0.8	282	0.6	348	0.8	286	0.6	271	0.6
30–39 years	980	2.4	888	2.2	1,094	2.6	1,000	2.4	997	2.3
40–49 years	880	2.1	818	2.0	961	2.4	906	2.2	1,027	2.5
50–59 years	496	1.1	504	1.2	615	1.4	655	1.5	700	1.6
60+ years	272	0.4	272	0.4	312	0.5	342	0.5	395	0.6
Sex										
Male	1,873	1.2	1,778	1.1	2,080	1.3	1,957	1.2	2,094	1.3
Female	1,163	0.7	1,001	0.6	1,280	0.8	1,252	0.8	1,300	0.8
Race/ethnicity										
American Indian/Alaskan Native	18	0.7	21	0.8	18	0.7	14	0.5	19	0.7
Asian/Pacific Islander	58	0.3	53	0.3	67	0.4	56	0.3	64	0.3
Black, Non-Hispanic	382	0.9	343	0.8	398	1.0	386	0.9	411	1.0
White, Non-Hispanic	1,830	0.9	1,713	0.9	2,150	1.1	2,059	1.0	2,197	1.1
Hispanic	205	0.4	158	0.3	175	0.3	194	0.3	196	0.3
HHS Region¶										
Region 1	94	0.7	59	0.4	43	0.3	93	0.7	139	1.0
Region 2	182	0.6	172	0.6	165	0.6	162	0.6	138	0.5
Region 3	367	1.2	363	1.2	450	1.5	397	1.3	385	1.3
Region 4	1,181	1.9	1,114	1.8	1,302	2.0	1,378	2.1	1,501	2.3
Region 5	501	1.0	432	0.8	677	1.3	557	1.1	580	1.1
Region 6	317	0.8	296	0.7	321	0.8	286	0.7	267	0.6
Region 7	92	0.7	59	0.4	73	0.5	79	0.6	77	0.5
Region 8	38	0.4	43	0.4	46	0.4	38	0.3	55	0.5
Region 9	199	0.4	168	0.3	224	0.4	151	0.3	182	0.4
Region 10	79	0.6	85	0.6	69	0.5	77	0.6	83	0.6

Source: CDC, National Notifiable Diseases Surveillance System.

* Rate per 100,000 population.

† For the case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-b-acute/

[§] Numbers reported in each category may not add up to the total number of reported cases in a year due to cases with missing data or, in the case of race/ethnicity, cases categorized as “Other”.

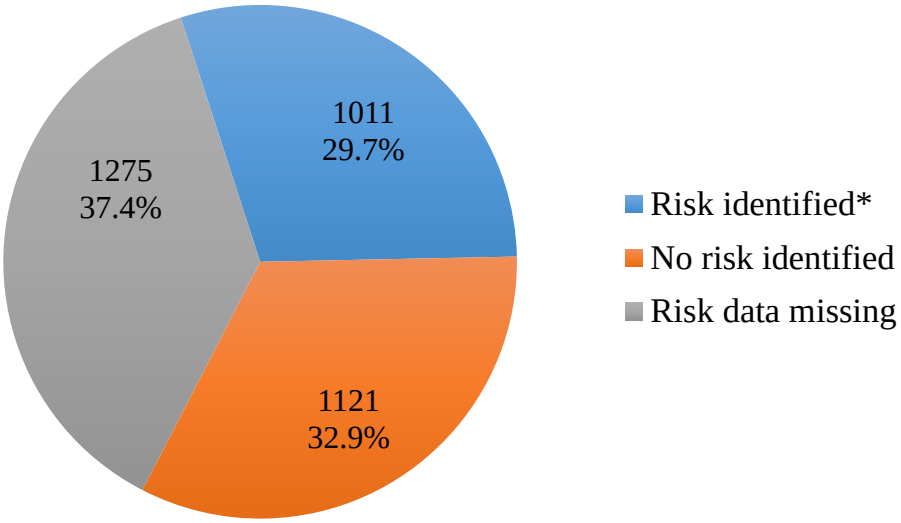
[¶] Health and Human Services Regions were categorized according to the grouping of states and US territories assigned under each of the ten Department of Health and Human Services regional offices (https://www.hhs.gov/about/agencies/iea/regional-offices/index.html). For the purposes of this report, regions with US territories (Region 2 and Region 9) contain data from states only.

HEPATITIS B: RISK FACTORS FOR ACUTE CASES

Risk data were missing for 37.4% of acute hepatitis B cases reported to CDC in 2017, down from 51.9% in 2016.

The most common risk factors reported in 2017 were injection drug use, multiple sex partners, and men who have sex with men.

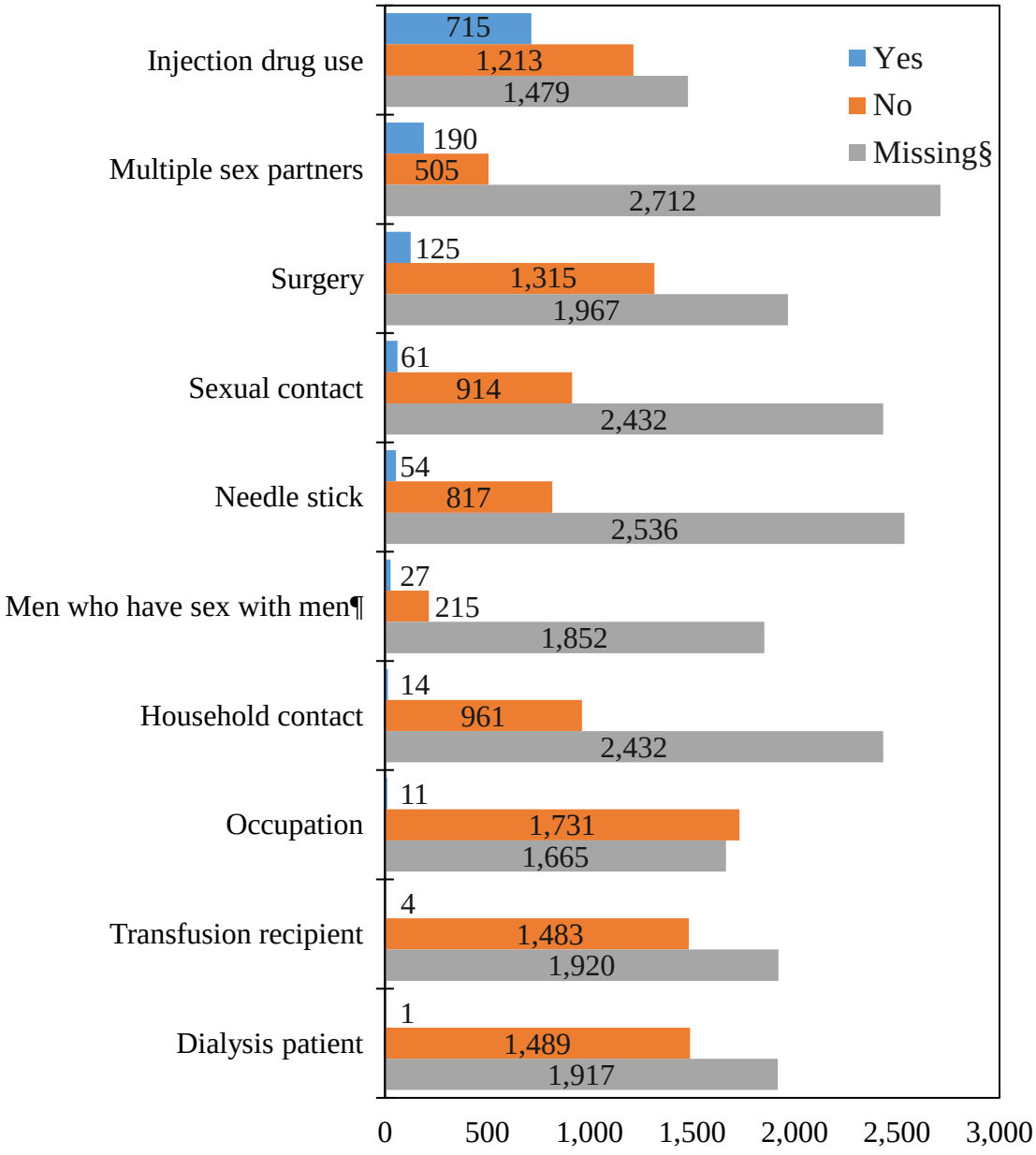
Figure 3.6. Availability of information on risk behaviors/exposures* associated with reported cases of acute hepatitis B — United States, 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* Includes case reports indicating the presence of at least one of the following risks 6 weeks to 6 months prior to onset of symptomatic hepatitis B: 1) injection drug use; 2) sexual contact with suspected/confirmed hepatitis B patient; 3) being a man who has sex with men; 4) multiple sex partners concurrently; 5) household contact with suspected/confirmed hepatitis B patient; 6) occupational exposure to blood; 7) hemodialysis patient; 8) received a blood transfusion; 9) sustained a percutaneous injury; and 10) underwent surgery.

Figure 3.7. Reported cases of acute hepatitis B,* by risk behavior/exposure† — United States, 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* A total of 3,407 case reports of hepatitis B were received in 2017.

† More than one risk behavior/exposure may be indicated on each case report.

§ No risk data reported.

¶ A total of 2,094 acute hepatitis B cases were reported among males in 2017.

HEPATITIS B: HOSPITALIZATION FOR ACUTE CASES

Hospitalization data were missing for 25.7% of acute hepatitis B cases submitted to CDC in 2017, down from 42.0% in 2016.

Of those with hospitalization data, 62.8% (1,589 of 2,530) were hospitalized in 2017, which was higher than 58.2% in 2016.

HEPATITIS B: CHRONIC CASES

In 2017, 41 states submitted 14,106 cases of chronic hepatitis B cases to CDC, which is less than the 14,847 cases submitted by 43 states in 2016.

Table 3.3. Number of newly reported cases* of confirmed chronic hepatitis B and reporting status, by state or jurisdiction — United States, 2017.

State/Jurisdiction	No. chronic hepatitis B case reports submitted†	Reportable condition§
Alabama	0	No
Alaska	50	Yes
Arizona	192	Yes
Arkansas	0	No
California	0	Yes
Colorado	129	Yes
Connecticut	75	Yes
Delaware	118	No
District of Columbia	0	No
Florida	2,117	Yes
Georgia	860	Yes
Hawaii	0	Yes
Idaho	53	Yes
Illinois	593	No
Indiana	285	Yes
Iowa	53	No
Kansas	60	Yes
Kentucky	14	Yes
Louisiana	184	Yes
Maine	60	Yes
Maryland	689	Yes
Massachusetts	406	Yes
Michigan	456	Yes
Minnesota	344	No
Mississippi	0	No
Missouri	411	Yes
Montana	23	Yes
Nebraska	59	Yes
Nevada	26	Yes
New Hampshire	0	No
New Jersey	244	Yes
New Mexico	39	Yes

Table 3.3. (cont'd) Number of newly reported cases* of confirmed chronic hepatitis B and reporting status, by state or jurisdiction — United States, 2017.

State/Jurisdiction	No. chronic hepatitis B case reports submitted†	Reportable condition§
New York	2,053	Yes
North Carolina	551	Yes
North Dakota	30	No
Ohio	733	No
Oklahoma	69	Yes
Oregon	122	Yes
Pennsylvania	870	Yes
Rhode Island	0	No
South Carolina	195	Yes
South Dakota	32	Yes
Tennessee	626	Yes
Texas	0	No
Utah	73	Yes
Vermont	44	Yes
Virginia	526	Yes
Washington	335	Yes
West Virginia	295	Yes
Wisconsin	0	No
Wyoming	12	No
Total	**14,106**	**-**

Source: CDC, National Notifiable Diseases Surveillance System.

* For case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-b-chronic/

† Reports may not reflect unique cases.

§ Condition reportable as of May 2019, but may not have been reportable in 2017. If laboratory results are reportable, the condition is considered reportable for the purposes of this report.

HEPATITIS B: MORTALITY

In 2017, there were 1,727 death certificates among US residents that listed hepatitis B as the underlying or a contributing cause of death.

- While the overall annual mortality rate remained constant during 2015—2017, the number of deaths decreased slightly from 2015 to 2016 and increased slightly from 2016 to 2017.
- While death rates steadily decreased each year among adults aged 55 to 64 years, older age groups did not experience the same decrease.
- Asian/Pacific Islanders have historically experienced the highest hepatitis B-related mortality rates, and the age-adjusted death rate for this group increased from 2015 to 2017.
- Males have historically experienced a higher age-adjusted hepatitis B-related mortality rate than females; this trend continued through 2017.

Only 23 hepatitis B deaths were reported through NNDSS. No additional information, including US resident status, was submitted through NNDSS.

Table 3.4. Number and rate* of deaths with hepatitis B listed as a cause of death† among US residents, by demographic characteristic and year – United States, 2013–2017.

Demographic characteristic	2013		2014		2015		2016		2017	
	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)
Age group										
0–34 years	39	0.03 (0.02-0.04)	35	0.02 (0.02-0.03)	30	0.02 (0.01- 0.03)	39	0.03 (0.02-0.04)	29	0.02 (0.01-0.03)
35–44 years	146	0.36 (0.30-0.42)	126	0.31 (0.26-0.37)	118	0.29 (0.24-0.34)	116	0.29 (0.23-0.34)	106	0.26 (0.21-0.31)
45–54 years	388	0.89 (0.80-0.97)	384	0.88 (0.80-0.97)	330	0.76 (0.68-0.85)	324	0.76 (0.67-0.84)	323	0.76 (0.68-0.85)
55–64 years	701	1.78 (1.65-1.91)	682	1.70 (1.57-1.83)	610	1.49 (1.37-1.61)	576	1.39 (1.28-1.50)	548	1.30 (1.20-1.41)
65–74 years	342	1.36 (1.21-1.50)	356	1.35 (1.21-1.49)	382	1.39 (1.25-1.53)	383	1.34 (1.20-1.47)	417	1.40 (1.27-1.54)
75+ years	250	1.28 (1.12-1.44)	254	1.28 (1.12-1.44)	236	1.17 (1.02-1.32)	252	1.22 (1.07-1.37)	303	1.43 (1.27-1.59)
Race/ethnicity										
White, NH (non-Hispanic)	866	0.32 (0.30-0.34)	851	0.33 (0.30-0.35)	805	0.28 (0.26-0.30)	767	0.29 (0.27-0.31)	776	0.28 (0.26-0.30)
Black, NH	384	0.98 (0.88-1.08)	330	0.81 (0.72-0.89)	318	0.75 (0.67-0.84)	315	0.73 (0.65-0.81)	320	0.74 (0.66-0.83)
Hispanic	150	0.37 (0.31-0.43)	156	0.40 (0.33-0.46)	136	0.32 (0.27-0.38)	128	0.30 (0.25-0.36)	109	0.26 (0.21-0.32)
Asian/Pacific Islander	446	2.59 (2.34-2.84)	475	2.69 (2.44-2.93)	419	2.23 (2.01-2.45)	454	2.38 (2.16-2.60)	492	2.45 (2.23-2.67)
American Indian/Alaskan Native	13	-	10	-	13	-	16	-	17	-
Sex										
Male	1,373	0.79 (0.75-0.83)	1,301	0.74 (0.70-0.78)	1,270	0.70 (0.66-0.74)	1,231	0.67 (0.64-0.71)	1,275	0.70 (0.66-0.74)
Female	493	0.26 (0.23-0.28)	536	0.27 (0.24-0.29)	437	0.21 (0.19-0.23)	459	0.22 (0.20-0.24)	452	0.23 (0.20-0.25)
Overall	**1,866**	**0.53 (0.50-0.55)**	**1,837**	**0.50 (0.47-0.52)**	**1,707**	**0.46 (0.44-0.49)**	**1,690**	**0.45 (0.43-0.48)**	**1,727**	**0.46 (0.44-0.49)**

Source: CDC, National Center for Health Statistics, Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. Data are from the 2013–2017 Multiple Cause of Death files and are based on information from all death certificates filed in the vital records offices of the fifty states and the District of Columbia through the Vital Statistics Cooperative Program. Deaths of nonresidents (e.g., nonresident aliens, nationals living abroad, residents of Puerto Rico, Guam, the Virgin Islands, and other territories of the US) and fetal deaths are excluded. Accessed at http://wonder.cdc.gov/mcd-icd10.html on August 23, 2019. CDC WONDER dataset documentation and technical methods can be accessed at https://wonder.cdc.gov/wonder/help/mcd.html#.

* Rates for race/ethnicity, sex, and the overall total are age-adjusted per 100,000 U.S. standard population in 2000 using the following age group distribution (in years): <1, 1–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85+. Missing data are not included. Rates where death counts were less than 20 were not displayed due to the instability associated with those rates. For age-adjusted death rates, the-age specific death rate

is rounded to one decimal place before proceeding to the next step in the calculation of age-adjusted death rates for NCHS Multiple Cause of Death on CDC WONDER. This rounding step may affect the precision of rates calculated for small numbers of deaths.

† Cause of death is defined as one of the multiple causes of death and is based on the International Classification of Diseases, 10th Revision (ICD-10) codes B16, B17.0, B18.0, B18.1 (hepatitis B).

Note: Numbers are slightly lower than previously reported for 2013–2016 due to NCHS standards which restrict displayed data to US residents.

PERINATAL HEPATITIS B

In 2017, 17 states notified CDC of perinatal hepatitis B cases, up from 13 in 2016.

Table 3.5. Number of newly reported cases* of perinatal hepatitis B, by state or jurisdiction — United States, 2017.

State/Jurisdiction	No. of perinatal hepatitis B case reports submitted
Alabama	1
Arizona	1
California	5
Georgia	1
Hawaii	2
Indiana	1
Kentucky	1
Louisiana	1
Michigan	1
Mississippi	1
Nevada	1
New York	4
North Carolina	2
Ohio	3
Oregon	1
Pennsylvania	2
Texas	2
Total	**30**

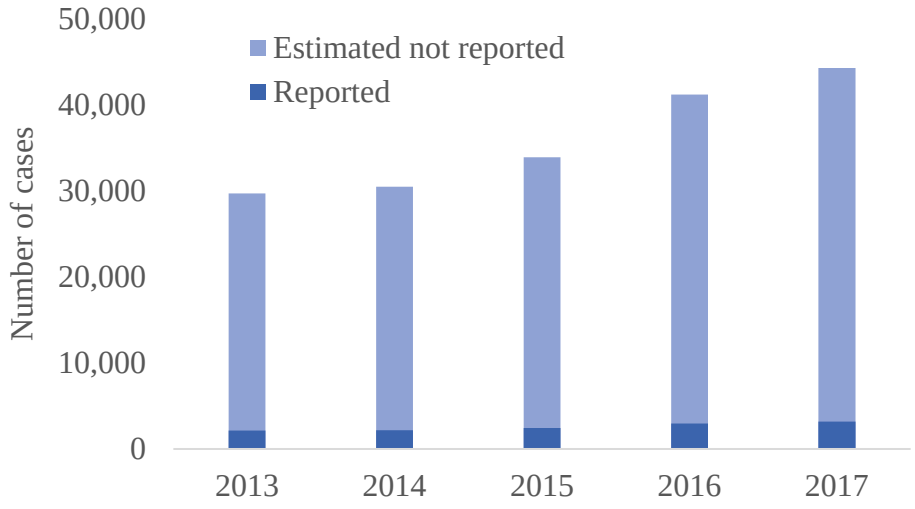
Source: CDC, National Notifiable Diseases Surveillance System.

* For case-definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-b-perinatal-virus-infection/

HEPATITIS C

Steady increases in the number of reported acute hepatitis C cases have occurred each year since 2013. This trend is influenced by increasing injection drug use related to the opioid crisis (10) and improved surveillance.

Figure 4.1. Actual number of acute hepatitis C cases submitted to CDC by states and estimated* number of acute hepatitis C cases — United States, 2013–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* The number of estimated viral hepatitis cases was determined by multiplying the number of reported cases by a factor that adjusted for under-ascertainment and under-reporting (5). In this visual representation, the reported and estimated not reported add to the total estimated number of acute cases. The 95% bootstrap confidence intervals for the adjusted number of cases are shown in the Appendix.

HEPATITIS C: ACUTE CASES BY STATE

Most states experienced increases in reported acute hepatitis C infections from 2013 to 2017; trends varied from state to state and were influenced by the opioid crisis (10).

Table 4.1. Number and rate* of reported cases† of acute hepatitis C, by state or jurisdiction and nationally — United States, 2013–2017.

State	2013		2014		2015		2016		2017	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Alabama	30	0.6	35	0.7	70	1.4	32	0.7	17	0.3
Alaska	U	U	U	U	U	U	U	U	U	U
Arizona	U	U	U	U	U	U	U	U	U	U
Arkansas	30	1.0	13	0.4	2	0.1	0	0.0	1	0.0
California	72	0.2	73	0.2	59	0.2	60	0.2	103	0.3
Colorado	21	0.4	33	0.6	40	0.7	35	0.6	42	0.7
Connecticut	U	U	U	U	U	U	17	0.5	9	0.3
Delaware	U	U	U	U	4	0.4	25	2.6	4	0.4
District of Columbia	U	U	U	U	U	U	U	U	U	U
Florida	134	0.7	93	0.5	126	0.6	236	1.1	357	1.7
Georgia	48	0.5	57	0.6	84	0.8	93	0.9	100	1.0
Hawaii	U	U	U	U	U	U	U	U	U	U
Idaho	14	0.9	6	0.4	4	0.2	7	0.4	8	0.5
Illinois	37	0.3	27	0.2	31	0.2	21	0.2	39	0.3
Indiana	175	2.7	122	1.8	138	2.1	146	2.2	191	2.9
Iowa	U	U	U	U	U	U	U	U	U	U
Kansas	17	0.6	28	1.0	22	0.8	15	0.5	19	0.7
Kentucky	226	5.1	176	4.0	119	2.7	103	2.3	83	1.9
Louisiana	19	0.4	22	0.5	24	0.5	5	0.1	7	0.1
Maine	8	0.6	31	2.3	30	2.3	25	1.9	21	1.6
Maryland	53	0.9	42	0.7	38	0.6	35	0.6	32	0.5
Massachusetts	174	2.6	228	3.4	249	3.7	424	6.2	327	4.8
Michigan	74	0.7	78	0.8	83	0.8	107	1.1	152	1.5
Minnesota	47	0.9	40	0.7	37	0.7	51	0.9	57	1.0
Mississippi	U	U	U	U	U	U	U	U	U	U
Missouri	6	0.1	6	0.1	8	0.1	24	0.4	49	0.8
Montana	16	1.6	13	1.3	15	1.5	20	1.9	14	1.3
Nebraska	2	0.1	2	0.1	8	0.4	2	0.1	2	0.1
Nevada	9	0.3	6	0.2	12	0.4	16	0.5	35	1.2
New Hampshire	U	U	U	U	U	U	U	U	U	U
New Jersey	106	1.2	113	1.3	130	1.5	122	1.4	125	1.4
New Mexico	12	0.6	16	0.8	40	1.9	18	0.9	16	0.8
New York	131	0.7	126	0.6	121	0.6	179	0.9	188	0.9

Table 4.1 (cont'd). Number and rate* of reported cases† of acute hepatitis C, by state or jurisdiction and nationally — United States, 2013–2017.

State	2013		2014		2015		2016		2017	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
North Carolina	79	0.8	111	1.1	144	1.4	82	0.8	114	1.1
North Dakota	4	0.6	0	0.0	0	0.0	1	0.1	1	0.1
Ohio	116	1.0	105	0.9	122	1.1	187	1.6	159	1.4
Oklahoma	40	1.0	45	1.2	35	0.9	32	0.8	46	1.2
Oregon	14	0.4	15	0.4	13	0.3	19	0.5	35	0.8
Pennsylvania	81	0.6	69	0.5	129	1.0	225	1.8	224	1.7
Rhode Island	U	U	U	U	U	U	U	U	U	U
South Carolina	0	0.0	4	0.1	5	0.1	10	0.2	13	0.3
South Dakota	U	U	U	U	U	U	20	2.3	19	2.2
Tennessee	98	1.5	123	1.9	173	2.6	150	2.3	142	2.1
Texas	28	0.1	47	0.2	48	0.2	40	0.1	35	0.1
Utah	11	0.4	38	1.3	30	1.0	76	2.5	81	2.6
Vermont	3	0.5	4	0.6	1	0.2	5	0.8	9	1.4
Virginia	41	0.5	54	0.6	52	0.6	43	0.5	62	0.7
Washington	63	0.9	82	1.2	63	0.9	62	0.9	52	0.7
West Virginia	58	3.1	62	3.4	63	3.4	94	5.1	102	5.6
Wisconsin	40	0.7	49	0.9	64	1.1	103	1.8	94	1.6
Wyoming	U	U	U	U	U	U	U	U	U	U
Total	**2,138**	**0.7**	**2,194**	**0.7**	**2,436**	**0.8**	**2,967**	**1.0**	**3,186**	**1.0**

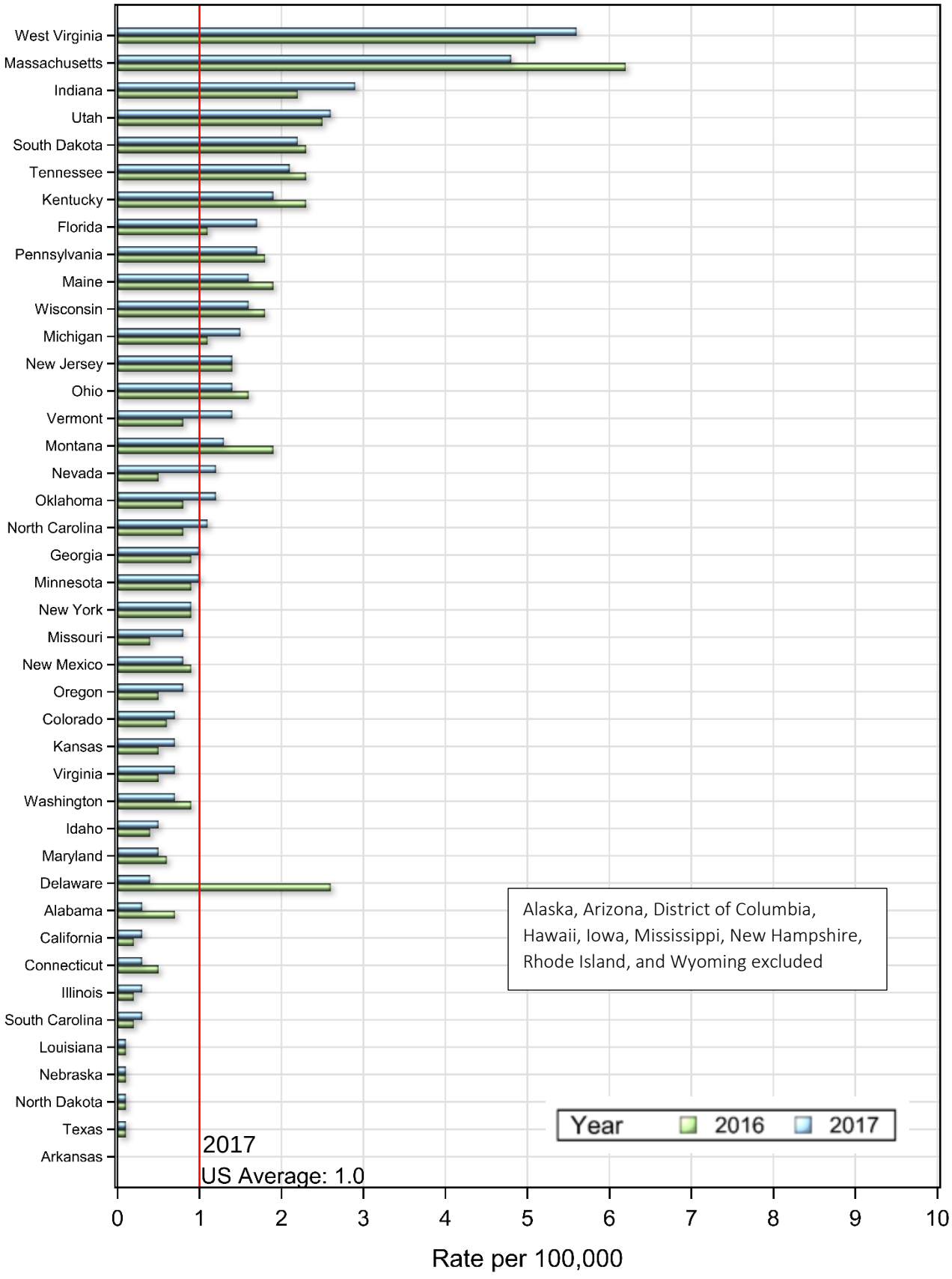
Source: CDC, National Notifiable Diseases Surveillance System.

* Rate per 100,000 population.

† For case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-c-acute/

U=No data available for reporting.

Figure 4.2. Rates of reported acute hepatitis C cases, by state compared to the 2017 overall rate of acute hepatitis C — United States, 2016 and 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

HEPATITIS C: SUBGROUP TRENDS FOR ACUTE CASES

Age groups showed different trends in the number of reported acute hepatitis C cases per 100,000 population:

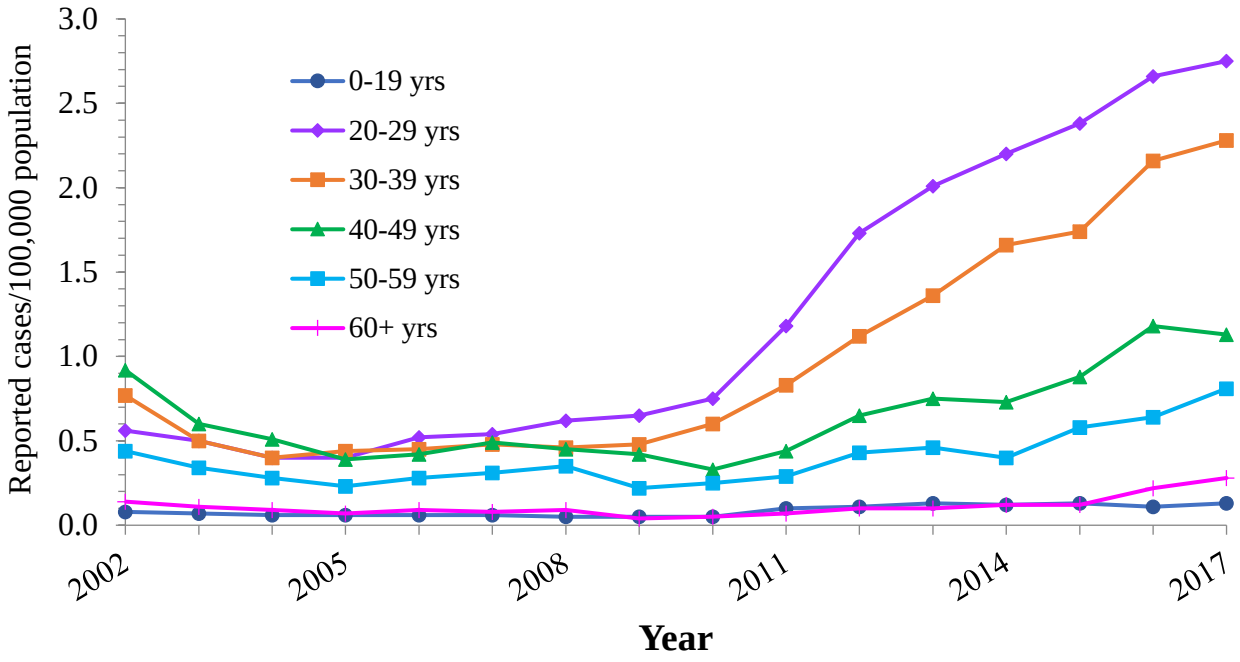
- Rates rapidly increased for young adults aged 20–29 years and aged 30–39 years from 2009 to 2017. These age groups have been most affected by the nation's opioid crisis (10).
- For the first time since 2014, adults aged 40–49 years experienced a decrease in infection rates from 2016 to 2017.
- Rates increased among adults aged 50–59 years and aged ≥60 years from 2015 to 2017 to the highest rate reported from 2002 through 2017.

Both males and females experienced an increased rate of reported acute hepatitis C from 2010 to 2017, although the increase for males was more pronounced.

Trends by race/ethnicity revealed the following differences in trends:

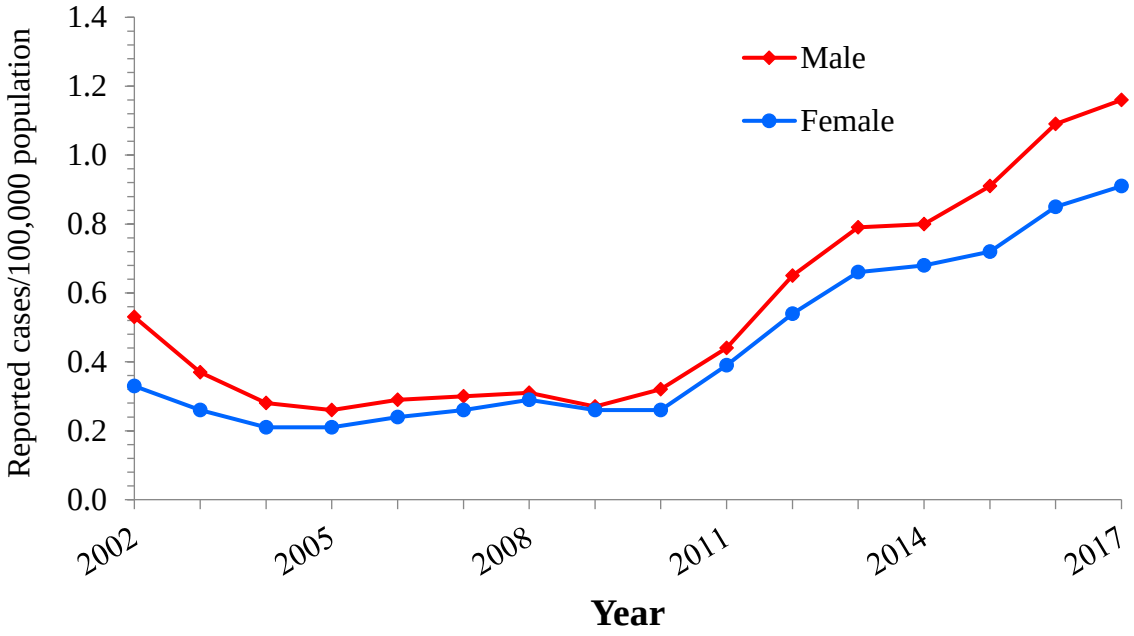
- Rates among American Indian/Alaska Natives remain higher than other groups, and the increase since 2010 is more pronounced in this group despite some instability due to the small size of the population.
- Rates among non-Hispanic whites began a marked increase in 2010 that continued through 2017.
- Hispanics and non-Hispanic blacks experienced increases each year from 2014 to 2017.
- The rate for Asian/Pacific Islanders remained low and decreased from 2016 to 2017.

Figure 4.3. Rates of reported acute hepatitis C, by age group — United States, 2002–2017.



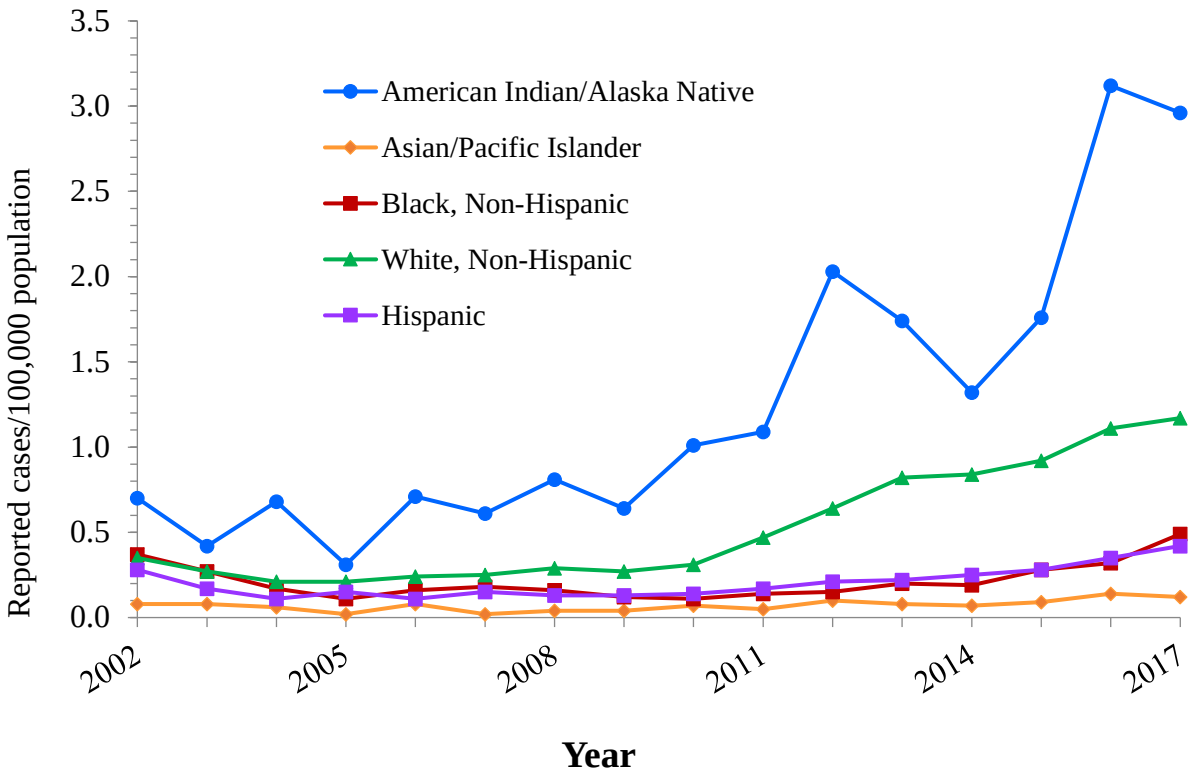
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 4.4. Rates of reported acute hepatitis C, by sex — United States, 2002–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

Figure 4.5. Rates of reported acute hepatitis C, by race/ethnicity — United States, 2002–2017.



Source: CDC, National Notifiable Diseases Surveillance System.

Table 4.2. Number and rate* of reported cases† of acute hepatitis C, by selected characteristics — United States 2013–2017.

	2013		2014		2015		2016		2017	
	No.	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***
Total§	2,138	0.7	2,203	0.7	2,451	0.8	2,967	1.0	3,186	1.0
Age group										
0–19 years	102	0.1	88	0.1	100	0.1	86	0.1	102	0.1
20–29 years	831	2.0	921	2.2	1,008	2.4	1,135	2.7	1,176	2.7
30–39 years	519	1.3	647	1.7	684	1.7	868	2.2	929	2.3
40–49 years	294	0.7	282	0.7	338	0.9	452	1.2	435	1.1
50–59 years	189	0.5	166	0.4	240	0.6	264	0.6	331	0.8
60+ years	59	0.1	72	0.1	79	0.1	141	0.2	184	0.3
Sex										
Male	1,142	0.8	1,173	0.8	1,340	0.9	1,627	1.1	1,758	1.2
Female	993	0.7	1,028	0.7	1,102	0.7	1,310	0.8	1,418	0.9
Race/ethnicity										
American Indian/Alaskan Native	38	1.7	29	1.3	39	1.7	70	3.1	67	3.0
Asian/Pacific Islander	13	0.1	11	0.1	16	0.1	25	0.1	22	0.1
Black, Non-Hispanic	75	0.2	74	0.2	112	0.3	130	0.3	199	0.5
White, Non-Hispanic	1,527	0.8	1,575	0.8	1,739	0.9	2,109	1.1	2,208	1.2
Hispanic	114	0.2	127	0.2	148	0.3	191	0.4	234	0.4
HHS Region¶										
Region 1	185	1.5	272	2.2	295	2.4	471	3.8	366	2.9
Region 2	237	0.8	239	0.8	251	0.9	301	1.0	313	1.1
Region 3	233	0.8	227	0.8	286	1.0	422	1.4	424	1.4
Region 4	615	1.0	599	1.0	721	1.2	706	1.1	826	1.3
Region 5	489	0.9	421	0.8	475	0.9	615	1.2	692	1.3
Region 6	129	0.3	143	0.4	149	0.4	95	0.2	105	0.2
Region 7	25	0.2	36	0.3	38	0.3	41	0.4	70	0.6
Region 8	53	0.5	84	0.8	85	0.8	152	1.4	157	1.4
Region 9	81	0.2	79	0.2	71	0.2	76	0.2	138	0.3
Region 10	91	0.7	103	0.8	80	0.6	88	0.7	95	0.7

Source: CDC, National Notifiable Diseases Surveillance System.

* Rate per 100,000 population.

† For the case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-c-acute/

§ Numbers reported in each category may not add up to the total number of reported cases in a year due to cases with missing data or, in the case of race/ethnicity, cases categorized as “Other”.

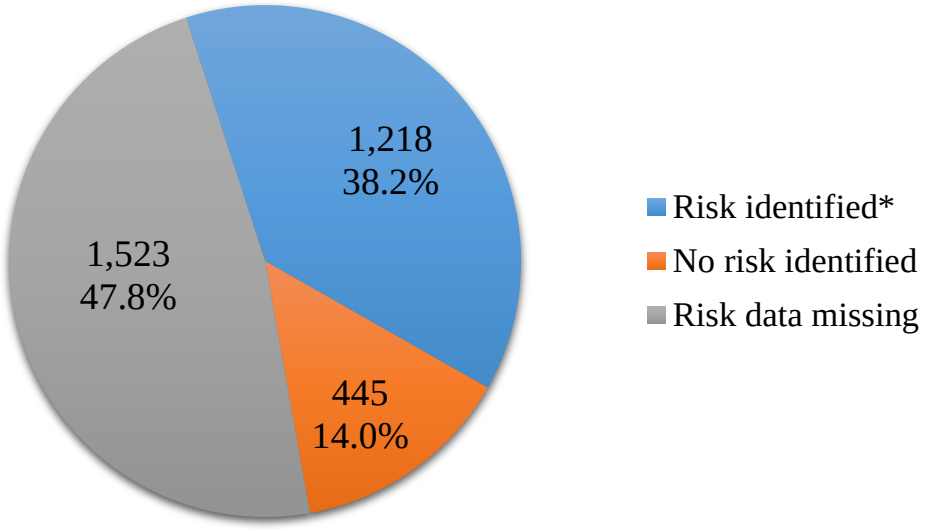
¶ Health and Human Services Regions were categorized according to the grouping of states and US territories assigned under each of the ten Department of Health and Human Services regional offices (https://www.hhs.gov/about/agencies/iea/regional-offices/index.html). For the purposes of this report, regions with US territories (Region 2 and Region 9) contain data from states only.

HEPATITIS C: RISK FACTORS FOR ACUTE CASES

Risk data were missing for 47.8% of acute hepatitis C cases reported to CDC in 2017, down from 52.5% in 2016.

The most common risk factors reported in 2017 were injection drug use and multiple sex partners.

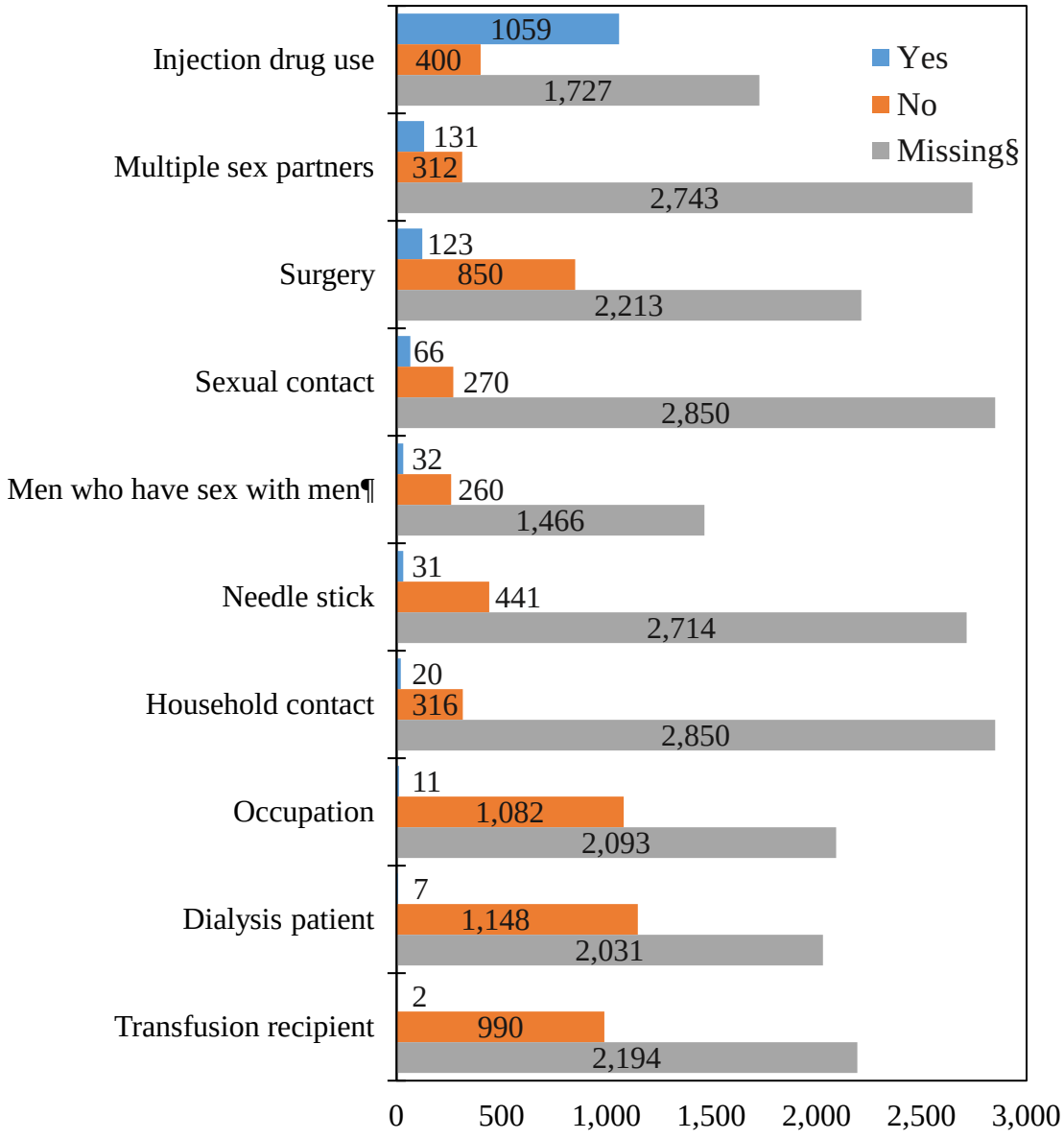
Figure 4.6. Availability of information on risk behaviors/exposures* associated with reported cases of acute hepatitis C — United States, 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* Includes case reports indicating the presence of at least one of the following risks 2 weeks to 6 months prior to onset of acute, symptomatic hepatitis C: 1) injection drug use; 2) sexual contact with suspected/confirmed hepatitis C patient; 3) being a man who has sex with men; 4) multiple sex partners concurrently; 5) household contact with suspected/confirmed hepatitis C patient; 6) occupational exposure to blood; 7) hemodialysis patient; 8) received a blood transfusion; 9) sustained a percutaneous injury; and 10) underwent surgery.

Figure 4.7. Reported cases of acute hepatitis C,* by risk behavior/exposure† — United States, 2017.



Source: CDC, National Notifiable Diseases Surveillance System.

* A total of 3,186 case reports of acute hepatitis C were received in 2017.

† More than one risk behavior/exposure may be indicated on each case report.

§ No risk data reported.

¶ A total of 1,758 acute hepatitis C cases were reported among males in 2017.

HEPATITIS C: HOSPITALIZATION FOR ACUTE CASES

Hospitalization data were missing for 46.0% of reported acute hepatitis C cases submitted to CDC in 2017, up from 32.8% in 2016.

Of those with hospitalization data, 48.3% (1,029 of 2,130) were hospitalized in 2017, which was higher than 46.3% in 2016.

HEPATITIS C: CHRONIC CASES

In 2017, 40 states submitted 144,513 cases of chronic hepatitis C cases to CDC, which is less than the 148,932 cases submitted by 42 states in 2016.

Table 4.3. Number of newly reported cases* of confirmed chronic hepatitis C and reporting status, by state or jurisdiction, 2017.

State/Jurisdiction	No. of chronic hepatitis C case reports submitted†	Reportable condition§
Alabama	0	No
Alaska	766	Yes
Arizona	0	Yes
Arkansas	0	No
California	0	Yes
Colorado	2,735	Yes
Connecticut	1,760	Yes
Delaware	1,224	No
District of Columbia	0	No
Florida	18,164	Yes
Georgia	7,376	Yes
Hawaii	0	No
Idaho	834	Yes
Illinois	5,695	No
Indiana	0	No
Iowa	1,472	No
Kansas	1,197	Yes
Kentucky	3	Yes
Louisiana	3,340	Yes
Maine	439	Yes
Maryland	4,327	Yes
Massachusetts	4,174	Yes
Michigan	4,751	Yes
Minnesota	1,475	No
Mississippi	0	Yes
Missouri	4,897	Yes
Montana	1,042	Yes
Nebraska	772	Yes
Nevada	106	Yes
New Hampshire	158	No
New Jersey	4,601	Yes
New Mexico	783	Yes

Table 4.3 (cont'd). Number of newly reported cases* of confirmed chronic hepatitis C and reporting status, by state or jurisdiction, 2017.

State/Jurisdiction	No. of chronic hepatitis C case reports submitted†	Reportable condition§
New York	8,963	Yes
North Carolina	0	Yes
North Dakota	581	Yes
Ohio	12,460	No
Oklahoma	622	Yes
Oregon	3,389	Yes
Pennsylvania	13,545	Yes
Rhode Island	0	No
South Carolina	3,341	Yes
South Dakota	440	Yes
Tennessee	11,086	Yes
Texas	0	No
Utah	1,113	Yes
Vermont	568	Yes
Virginia	5,228	Yes
Washington	5,126	Yes
West Virginia	3,232	No
Wisconsin	2,344	No
Wyoming	384	No
Total	**144,513**	-

Source: CDC, National Notifiable Diseases Surveillance System

* For case definition, see https://wwwn.cdc.gov/nndss/conditions/hepatitis-c-chronic/

† Reports may not reflect unique cases.

§ Condition reportable as of May 2019, but may not have been reportable in 2017. If laboratory results are reportable, the condition is considered reportable for the purposes of this report.

HEPATITIS C: MORTALITY

In 2017, there were 17,253 death certificates among US residents that listed hepatitis C as the underlying or a contributing cause of death.

- The overall hepatitis C-related mortality rate decreased from 2013 to 2017.
- Decreasing hepatitis C-related mortality rates occurred for adults aged 35 to 64. Other age groups experienced a decrease from 2015 to 2016, but the decrease did not continue in 2017.
- American Indian/Alaskan Natives have historically experienced the highest age-adjusted hepatitis C-related mortality rates, and the rate increased from 2016 to 2017.
- Males have historically experienced a higher age-adjusted hepatitis C-related mortality rate than females, but rates decreased for both sexes from 2016 to 2017.

Only 17 hepatitis C deaths were reported through NNDSS. No additional information, including US resident status, was submitted through NNDSS.

Table 4.4. Number and rate* of deaths with hepatitis C listed as a cause of death† among US residents, by demographic characteristic and year – United States, 2013–2017.

Demographic characteristic	2013		2014		2015		2016		2017	
	No.	Rate 95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)	No.	Rate (95% CI)
Age group										
0–34 years	121	0.08 (0.07-0.10)	162	0.11 (0.09-0.13)	196	0.13 (0.11-0.15)	164	0.11 (0.09-0.13)	180	0.12 (0.10-0.14)
35–44 years	571	1.41 (1.30-1.53)	549	1.36 (1.24-1.47)	592	1.46 (1.34-1.58)	532	1.31 (1.20-1.43)	507	1.24 (1.13-1.35)
45–54 years	4,327	9.89 (9.59-10.18)	4,108	9.45 (9.16-9.74)	3,659	8.47 (8.20-8.75)	3,026	7.07 (6.82-7.32)	2,556	6.03 (5.80-6.27)
55–64 years	9,879	25.13 (24.63-25.62)	9,976	24.89 (24.40-25.38)	9,678	23.68 (23.20-24.15)	9,011	21.73 (21.28-22.18)	8,275	19.70 (19.28-20.13)
65–74 years	2,997	11.88 (11.46-12.31)	3,382	12.81 (12.38-13.24)	4,009	14.55 (14.10-15.00)	4,071	14.22 (13.78-14.66)	4,397	14.81 (14.38-15.25)
75+ years	1,423	7.30 (6.92-7.68)	1,431	7.21 (6.84-7.58)	1,431	7.08 (6.71-7.45)	1,288	6.25 (5.91-6.59)	1,329	6.28 (5.94-6.61)
Race/ ethnicity										
White, NH (non-Hispanic)	12,188	4.41 (4.32-4.49)	12,438	4.42 (4.34-4.50)	12,329	4.35 (4.27-4.43)	11,389	3.95 (3.88-4.03)	10,781	3.70 (3.63-3.78)
Black, NH	3,520	8.33 (8.05-8.62)	3,535	8.12 (7.85-8.39)	3,602	8.13 (7.86-8.40)	3,360	7.42 (7.16-7.68)	3,262	7.03 (6.79-7.28)
Hispanic	2,747	7.03 (6.76-7.30)	2,792	6.90 (6.63-7.16)	2,737	6.48 (6.23-6.74)	2,510	5.76 (5.53-6.00)	2,399	5.29 (5.08-5.51)
Asian/ Pacific Islander	473	2.95 (2.68-3.23)	419	2.43 (2.19-2.67)	415	2.32 (2.09-2.55)	384	2.03 (1.82-2.24)	368	1.86 (1.67-2.05)
American Indian/Alaskan Native	285	10.79 (9.50-12.08)	287	10.05 (8.86-11.24)	324	11.45 (10.18-12.73)	285	9.80 (8.63-10.97)	299	10.24 (9.04-11.44)
Sex										
Male	13,705	7.37 (7.24-7.49)	13,962	7.38 (7.26-7.51)	14,043	7.27 (7.15-7.40)	12,815	6.48 (6.36-6.59)	12,287	6.12 (6.01-6.23)
Female	5,614	2.86	5,651	2.82	5,523	2.71	5,278	2.54	4,966	2.32

		(2.78-2.94)		(2.75-2.90)		(2.63-2.78)		(2.47-2.61)		(2.26-2.39)
Overall	**19,319**	**5.03 (4.95-5.10)**	**19,613**	**5.01 (4.93-5.08)**	**19,566**	**4.91 (4.84-4.98)**	**18,093**	**4.42 (4.36-4.49)**	**17,253**	**4.13 (4.07-4.20)**

Source: CDC, National Center for Health Statistics, Multiple Cause of Death 1999–2017 on CDC WONDER Online Database. Data are from the 2013–2017 Multiple Cause of Death files and are based on information from all death certificates filed in the vital records offices of the fifty states and the District of Columbia through the Vital Statistics Cooperative Program. Deaths of nonresidents (e.g., nonresident aliens, nationals living abroad, residents of Puerto Rico, Guam, the Virgin Islands, and other territories of the US) and fetal deaths are excluded. Accessed at http://wonder.cdc.gov/mcd-icd10.html on August 23, 2019. CDC WONDER dataset documentation and technical methods can be accessed at https://wonder.cdc.gov/wonder/help/mcd.html#.

* Rates for race/ethnicity, sex, and the overall total are age-adjusted per 100,000 U.S. standard population in 2000 using the following age group distribution (in years): <1, 1–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84, and 85+. Missing data are not included. For age-adjusted death rates, the age-specific death rate is rounded to one decimal place before proceeding to the next step in the calculation of age-adjusted death rates for NCHS Multiple Cause of Death on CDC WONDER. This rounding step may affect the precision of rates calculated for small numbers of deaths.

† Cause of death is defined as one of the multiple causes of death and is based on the International Classification of Diseases, 10th Revision (ICD-10) codes B17.1, and B18.2 (hepatitis C).

Note: Numbers are slightly lower than previously reported for 2013–2016 due to NCHS standards which restrict displayed data to US residents.

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APPENDIX

Number of acute viral hepatitis cases reported and estimated* with 95% bootstrap confidence intervals — United States, 2010-2017.

Year	Hepatitis A		Hepatitis B		Hepatitis C	
	Reported	Estimated* (95% bootstrap confidence interval)	Reported	Estimated* (95% bootstrap confidence interval)	Reported	Estimated* (95% bootstrap confidence interval)
2010	1,670	3,300 (2,300-3,700)	3,350	21,800 (12,400-53,300)	850	11,800 (9,400-40,300)
2011	1,398	2,800 (2,000-3,100)	2,903	18,900 (10,700-46,200)	1,232	17,100 (13,600-58,400)
2012	1,562	3,100 (2,200-3,400)	2,895	18,800 (10,700-46,000)	1,778	24,700 (19,600-84,300)
2013	1,781	3,500 (2,500- 3,900)	3,050	19,800 (11,300-48,500)	2,138	29,700 (23,500-101,400)
2014	1,239	2,500 (1,700- 2,800)	2,791	18,100 (10,300-44,400)	2,194	30,500 (24,200-104,200)
2015	1,390	2,800 (1,900- 3,100)	3,370	21,900 (12,500-53,600)	2,436	33,900 (26,800-115,500)
2016	2,007	4,000 (2,800–4,400)	3,218	20,900 (11,900–51,200)	2,967	41,200 (32,600– 140,600)
2017	3,366	6,700 (4,700–7,400)	3,407	22,100 (12,600–54,200)	3,186	44,300 (35,000– 151,000)

Source: CDC, National Notifiable Diseases Surveillance System.

*The reported number of cases were adjusted for under-ascertainment and under-reporting (5).