

Hepatitis C

Hepatitis C (acute illness) is a Class C Disease and must be reported to the state within five business days.

Reportable cases of hepatitis C virus (HCV) infections consist of:

1-Acute Hepatitis C: newly infected individuals who are symptomatic and have elevated liver enzymes as an indicator of recent infection.

2-Hepatitis C past or present infection: Cases with serologic tests indicating HCV infection, newly reported to the Office of Public Health (OPH), without possibility of determination of date of infection. (This reporting category was added in 2003.)

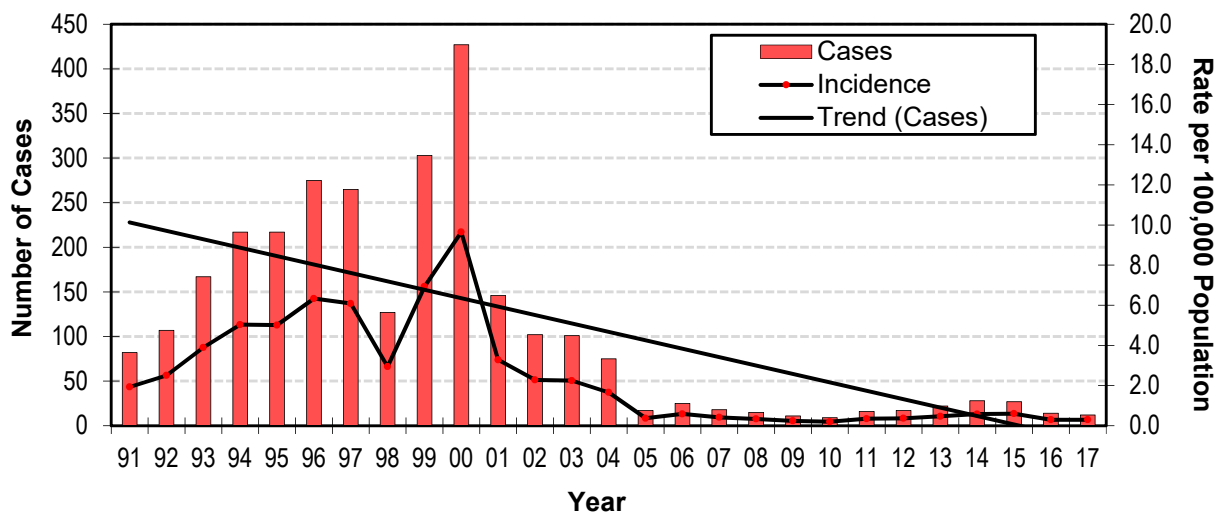
Reported Cases of Hepatitis C

Acute Hepatitis C

An estimated 500 people are infected with hepatitis C each year in Louisiana. Most of these infections are asymptomatic and therefore are not diagnosed and not reported. In the past, the number of new cases reported ranged from 100 to 400. During the 1990's there was a steady increase of reported "acute" HCV cases. This increase was probably due to the increased awareness and screening by medical care providers. Since 2000, reports of acute infections have declined; this trend is probably an artifact of the surveillance system.

To be classified as an acute case, a person must have clinical symptoms, laboratory evidence of infection with the HCV, and 'elevated' liver enzymes (ALT, AST). In 1990, the Centers for Disease Control and Prevention (CDC) defined liver enzymes as 'elevated' if they were two and a half times the upper limit of normal. In 2001, the CDC increased the required elevation level to seven times the upper limit of normal, thus excluding a large number of cases that previously would have been considered reportable. In 2003, a new reporting category was established: "Hepatitis C past or present infection" (HCV-PPI). Some cases that were considered "acute hepatitis" in the 1990s would now be considered "HCV-PPI" due to changes in case definitions (Figure 1).

Figure 1: Hepatitis C Reported Acute Cases and Incidence Rates - Louisiana, 1991-2017



In 2016, the latest case definition update included:

- **Clinical description:** An acute illness with a discrete onset of any sign or symptom* consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), AND either jaundice, OR elevated serum alanine aminotransferase (ALT) levels >200 IU/L during the period of acute illness.

**A documented negative HCV antibody laboratory test result followed within six months by a positive test (as described in the laboratory criteria for diagnosis) result does not require an acute clinical presentation to meet the surveillance case definition.*

- **Laboratory criteria** for diagnosis:

--A positive test for antibodies to hepatitis C virus (anti-HCV),

OR

--Hepatitis C virus detection test: Nucleic acid test (NAT) for HCV RNA positive (including qualitative, quantitative or genotype testing),

OR

--A positive test indicating presence of hepatitis C viral antigen(s) (HCV antigen)**

*** When, and if, a test for HCV antigen(s) is approved by the Food and Drug Administration and is available.*

- **Case definition**

--**Confirmed:** A case that meets clinical criteria and has a positive hepatitis C virus detection test (HCV NAT or HCV antigen),

OR

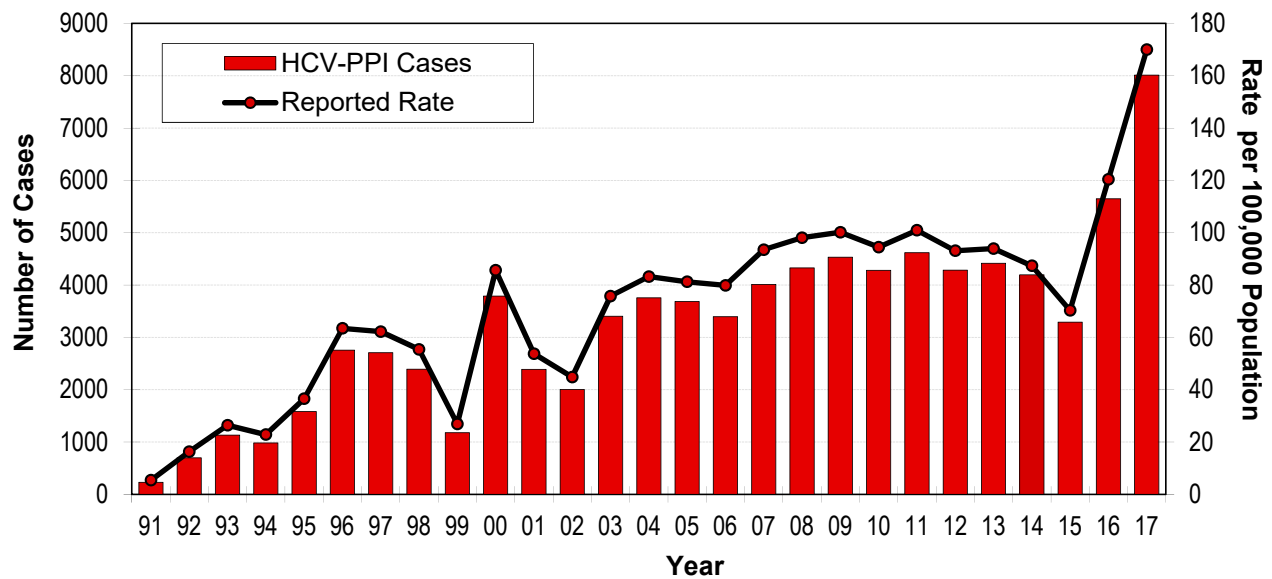
A documented negative HCV antibody, HCV antigen, or NAT laboratory test result followed within 12 months by a positive result of any of these tests (test conversion).

--**Probable:** A case that meets clinical criteria and has a positive anti-HCV antibody test, but has no reports of a positive HCV NAT or positive HCV antigen tests, AND does not have test conversion within 12 months or has no report of test conversion.

Hepatitis C Past or Present Infection

Case reports and trends

Since 1990, the Infectious Disease Epidemiology Program (IDEpi) has maintained a state-level hepatitis registry which includes data from various sources. Before the case definition changes in 2003, IDEpi was already registering cases of HCV that met this criteria in the registry. Figure 2 shows a summary of all cases meeting the HCV-PPI case definition, including cases from the hepatitis registry and cases reported after HCV-PPI was added as a reportable disease.

Figure 2: Reported Cases of HCV-PPI - Louisiana, 1991-2017

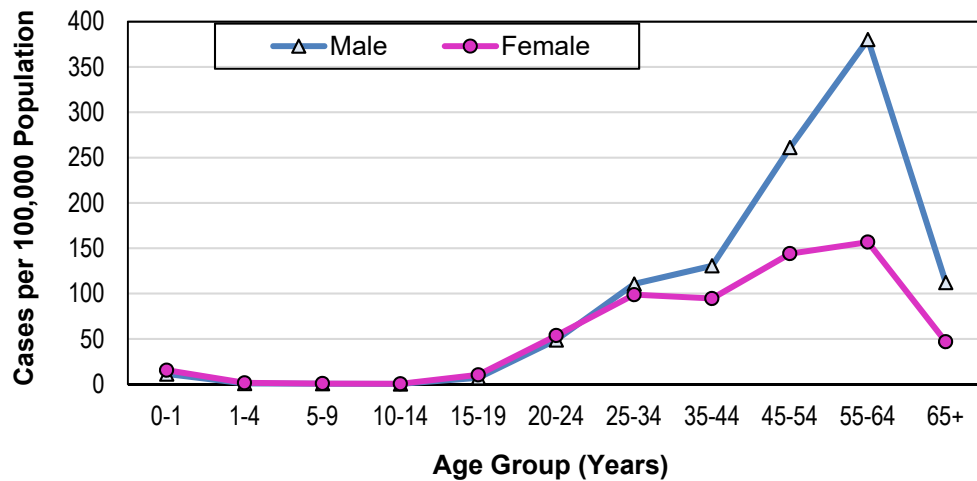
There is a pool of undiagnosed HCV-PPI cases in Louisiana; as these people enter into medical care they are diagnosed and reported, especially with increased screening in the 1945-1965 birth cohort. The most current case definition change in 2016, is likely a contributing factor to the observed increase reported cases from 2015 to 2017, given that the ALT/AST requirement was dropped from the previous case definition necessary to be considered a “probable” case. Prior to 2016, these cases were captured locally as “suspect.” Other factors that likely contributed to the increase include enhanced surveillance and increased screening. It is likely that the number of cases reported each year will continue to fluctuate as the data gets closer to estimating the true rate of infection in the population.

Age and Sex Distribution

The age group distribution of HCV-PPI shows a pattern similar to that of acute HCV. Infection of HCV is rare among children and case rates increase after 19 years of age. The highest rates for both males and females are seen in the 45 to 64 year-old age group (1945-1965) cohort.

The rates are equal among males and females in most age groups, except 45 to 54 year-old and 55 to 64 year-old age groups, where rates in males are much higher than those in females (Figure 3).

Figure 3: HCV-PPI Average Rate per 100,000 Population; Sex and Age Group Distribution Louisiana, 2010-2017



There is a definite difference when looking at the distribution of HCV infection by age over the past 15 years (Table 1). A comparison of five-year sequences (2000-2004, 2005-2009, and 2010-2014) with 2015-2017 shows:

- An increase in the younger age groups, mainly 20 to 24 year-old and 25 to 34 year-old
- Fluctuations in the 35 to 44 year-old age group and the 45 to 54 year-old age group
- An increase in the age group 55 to 64 year-old: 2015-2017 is 506% of the 2000-2004 rate
- An increase in the 65 year-old and older age group: 2015-2017 is 271% of the 2000-2004 rate

Table 1: Comparison of Reporting Rates for HCV Infection by 5-year Sequences Louisiana, 2000-2017

All	2000-04	2005-09	2010-14	2015-17
0-1	36.7	35.2	17.9	5.9
1-4	0.9	0.2	0.9	1.6
5-9	0.5	0.5	0.5	0.8
10-14	1.1	0.9	0.4	0.3
15-19	8.7	5.1	8.1	9.8
20-24	39.1	32.6	46.1	59.7
25-34	59.1	71.4	83.9	138.9
35-44	175.8	141.6	97.0	137.9
45-54	168.7	270.1	215.2	178.7
55-64	66.1	148.4	222.1	334.5
65+	37.6	51.8	57.9	102.1

The changes may be the result of the more systematic screening for HCV infection in recent years. It is important to remember that reporting of HCV- PPI is the result of screening for HCV infection from the pool of infected people who have not been diagnosed before.

Hepatitis C Past & Present Infection Reporting by Parish

The geographical distribution of HCV in Louisiana shows higher rates in urban centers (greater New Orleans, Baton Rouge, and Lafayette). Some rural parishes have high infection rates but this is due to the small population of the parish (Table 2).

Table 2: Hepatitis C PPI by Parish – Louisiana, 2005-2017

Parish	*	Avg 2005-09	Avg 2010-14	Avg 2015-17	Parish	*	Avg 2005-09	Avg 2010-14	Avg 2015-17
Acadia	H1, H3	91.1	78.2	82.7	Madison	H1, H2, H3	94.7	111.1	92.4
Allen	H3	42.5	71.8	207.1	Morehouse	H3	65.5	61.3	84.5
Ascension	H3	63.3	77.6	103.1	Natchitoches	M	60.2	55.6	56.5
Assumption	H3	24.4	52.4	87.3	Orleans	H1, H2, H3	293.3	167.2	189.8
Avoyelles	M	52.6	73.6	72.1	Ouachita	H1, H3	85.7	75.3	86.9
Beauregard	L	24.8	43.2	51.1	Plaquemines	H3	46.9	19.4	88.7
Bienville	M	47.2	69.2	77.9	Pointe Coupee	H1, H2	86.6	77.7	85.5
Bossier	M	73.5	74.9	72.1	Rapides	H3	58.2	70.2	116.3
Caddo	H1, H2, H3	175.1	167.1	112.9	Red River	M	68.0	62.1	45.7
Calcasieu	H2, H3	64.5	119.5	159.7	Richland	L	39.7	49.8	63.2
Caldwell	H2	63.1	144.2	75.7	Sabine	M	46.0	61.1	38.2
Cameron	H3	29.6	31.3	84.1	St. Bernard	H1, H3	145.6	68.4	249.2
Catahoula	M	43.7	63.6	70.6	St. Charles	M	42.2	77.5	79.3
Claiborne	H1, H3	173.6	77.0	92.9	St. Helena	M	51.6	34.8	77.0
Concordia	H3	38.5	46.8	82.8	St. James	M	21.8	52.9	57.8
De Soto	H1	80.2	73.8	67.1	St. John	L	25.3	36.5	50.8
E. Baton Rouge	H1, H2, H3	87.0	107.8	140.3	St. Landry	M	67.8	79.0	76.6
E. Carroll	M	57.9	67.8	78.2	St. Martin	H1	80.2	72.4	60.0
E. Feliciana	H1, H2, H3	114.0	180.7	316.8	St. Mary	H3	34.6	60.2	132.7
Evangeline	M	54.0	76.2	66.7	St. Tammany	H3	73.1	67.8	104.5
Franklin	M	35.7	41.3	73.8	Tangipahoa	H1, H2, H3	113.2	113.7	159.3
Grant	H2, H3	62.4	83.8	315.0	Tensas	M	46.6	66.8	42.6
Iberia	H3	74.9	59.8	90.7	Terrebonne	H2, H3	65.5	108.5	110.5
Iberville	H1, H2, H3	81.6	230.4	276.5	Union	M	42.2	48.0	68.9
Jackson	M	47.2	57.5	70.7	Vermilion	H3	71.8	59.1	99.1
Jefferson Davis	H3	70.3	39.3	100.1	Vernon	L	25.0	36.5	47.6
Jefferson	H3	46.3	61.7	86.9	Washington	H1, H2, H3	170.5	199.6	270.9
La Salle	H2, H3	11.8	99.4	141.6	Webster	H3	66.7	77.9	91.5
Lafayette	H1, H2, H3	180.6	100.0	100.8	W. Baton Rouge	H2, H3	61.1	130.9	150.4
Lafourche	M	41.0	51.0	69.0	W. Carroll	H3	44.4	37.6	85.3
Lincoln	L	26.4	27.5	41.0	W. Feliciana	H1, H2, H3	172.2	102.7	400.7
Livingston	H1, H2, H3	84.5	112.1	163.7	Winn	H1, H2, H3	122.1	151.4	91.8
					LOUISIANA	H1, H2, H3	95.2	91.8	120.4

* The geographical distribution reflects differences in population at risk and screening availability. Several patterns are observed:

H1 or H2 or H3 or any combination of H= High rates (above 80) for the periods 1 or 2 or 3

M=Medium rates in the range of 50 to 80

L=Low rates in the range of 20 to 50.

Hospitalization Surveillance

Hospitalization surveillance is based on the Louisiana Inpatient Hospital Discharge Data (LaHIDD). In 1997, the Louisiana legislature mandated the reporting of hospital discharge data. LaHIDD serves as the state registry containing hospital discharge data submitted to the Louisiana Department of Health (LDH). The Office of Public Health (OPH) is responsible for making the data available to OPH sections as needed; however, the data is available with a two-year delay. The IDEpi Section uses these data sets for the surveillance of infectious diseases in hospitals. LaHIDD data sets contain demographic information (names, gender, age, date of birth), address, admit diagnosis, discharge diagnoses (main plus eight more diagnoses), procedures (main plus five), charges, length of stay, and hospital name. The diagnoses and procedures are coded with ICD-9 codes. Repeat hospitalizations are not included. The data are based on the years 1999 to 2014. Due to restructuring of the LAHIDD system, data since 2014 is not available.

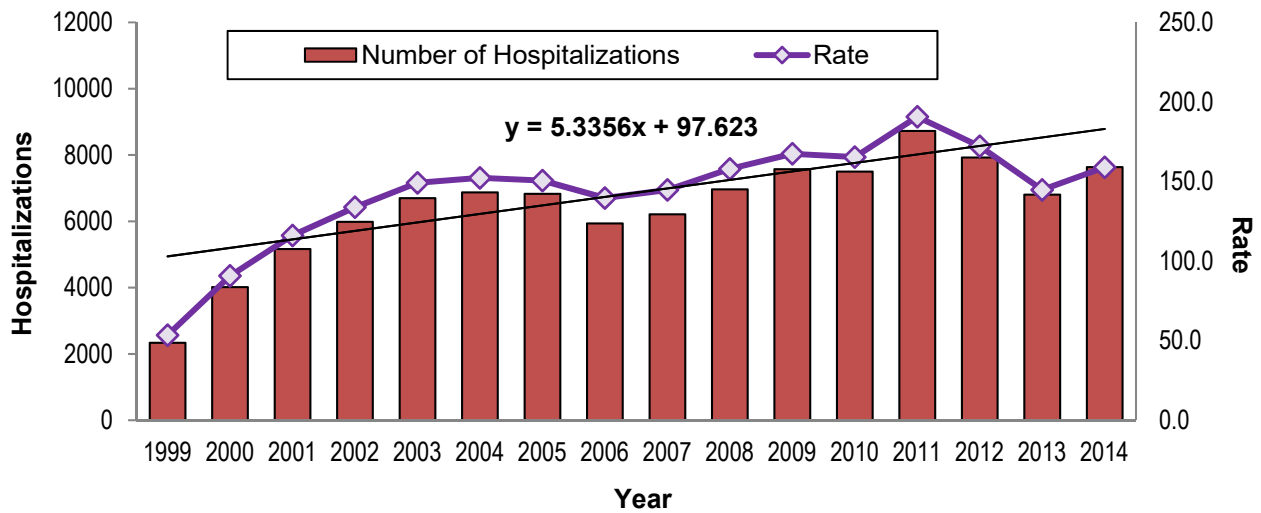
Repeat hospitalizations are not included. Records of patients with hepatitis C were extracted using the following ICD-9 codes whether in the main diagnosis or in the eight additional secondary diagnoses:

Code	Disease
07041	Other specified viral hepatitis with hepatic coma, hepatitis C
07051	Other specified viral hepatitis without mention of hepatic coma, hepatitis C
07044	Chronic hepatitis C with hepatic coma
07054	Chronic hepatitis C without hepatic coma
07070	Hepatitis C without hepatic coma NOS
07071	Hepatitis C with hepatic coma NOS
V0262	Hepatitis C carrier

Hospitalization Numbers, Rates and Trends

The number of HCV hospitalizations increased progressively from 2,337 in 1999 to almost 7,634 in 2014. Since these data represent all the hospitalizations occurring in Louisiana, it is reasonable to assume that these are population-based data and rates can be calculated for the entire Louisiana population. The hospitalization rates ranged from 54 per 100,000 to 191 per 100,000 hospitalizations. Although there are some variations from year to year, there is a definite trend of increase in the proportion of hospitalizations (Figure 4).

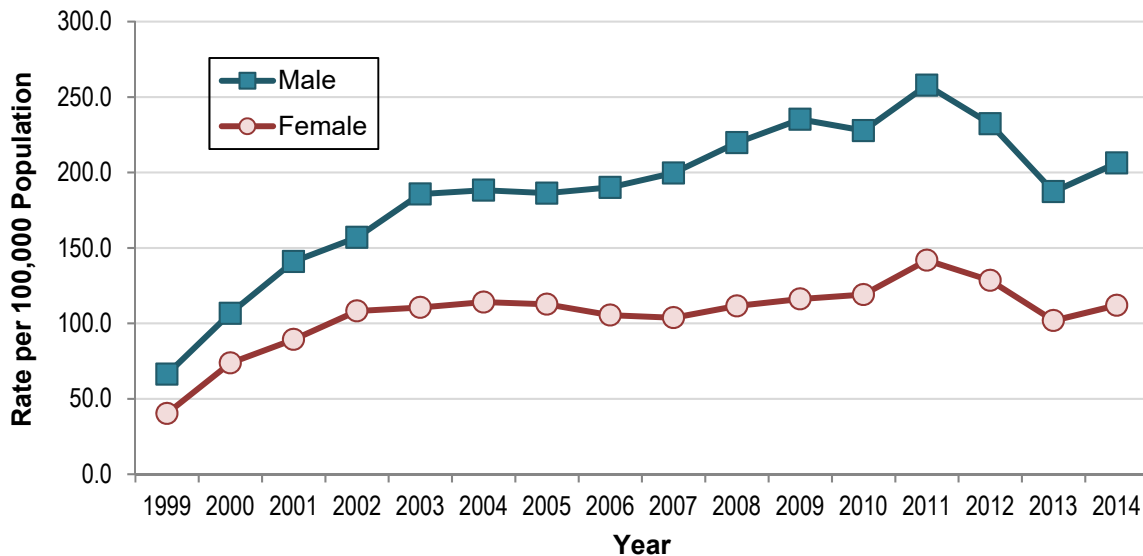
Figure 4: Trend in hospitalization rates for Hepatitis C per 100,000 population Louisiana, 1999-2014



Gender Distribution

The overall rates of HCV hospitalization were 186.7 per 100,000 population for males and 105.6 per 100,000 population for females (an increased rate of disease among males is shown as well) (Figure 5).

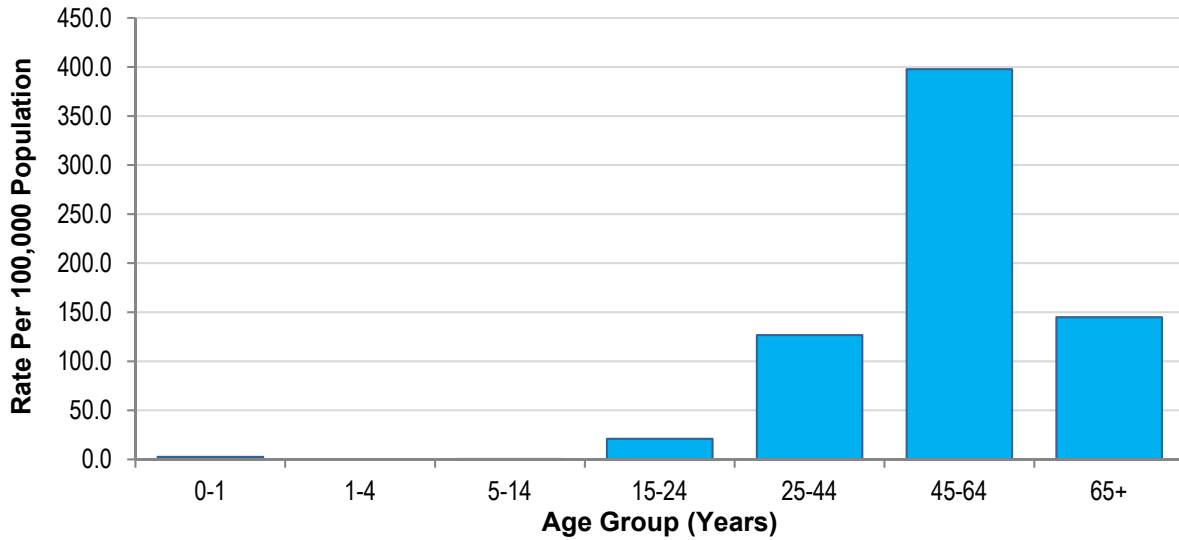
Figure 5: Hospitalization Rates for Hepatitis C per 100,000 Population by Gender Louisiana, 1999-2014



Age Group Distribution

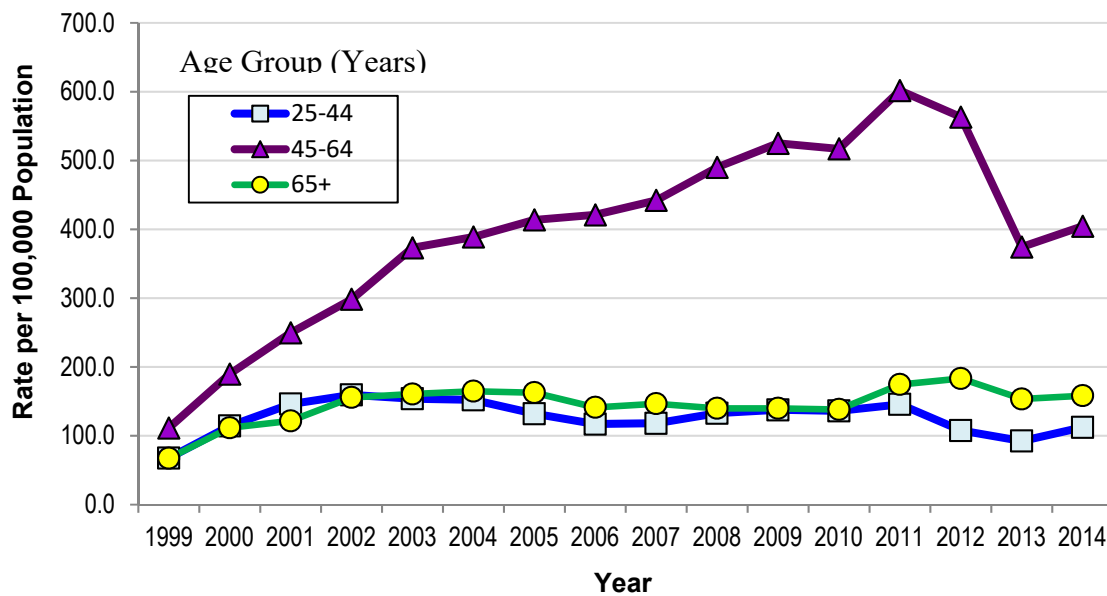
The highest rates of hepatitis C hospitalizations are seen among adults within the 45 to 64 year-old age group (Figure 6).

Figure 6: Overall Hospitalization Rate per 100,000 Population for Hepatitis C by Age Group Louisiana, 1999-2014



Hepatitis C hospitalizations occur most commonly in adults older than 25 years of age; there is an increasing trend in the 45 to 64-year old age group (Figure 7).

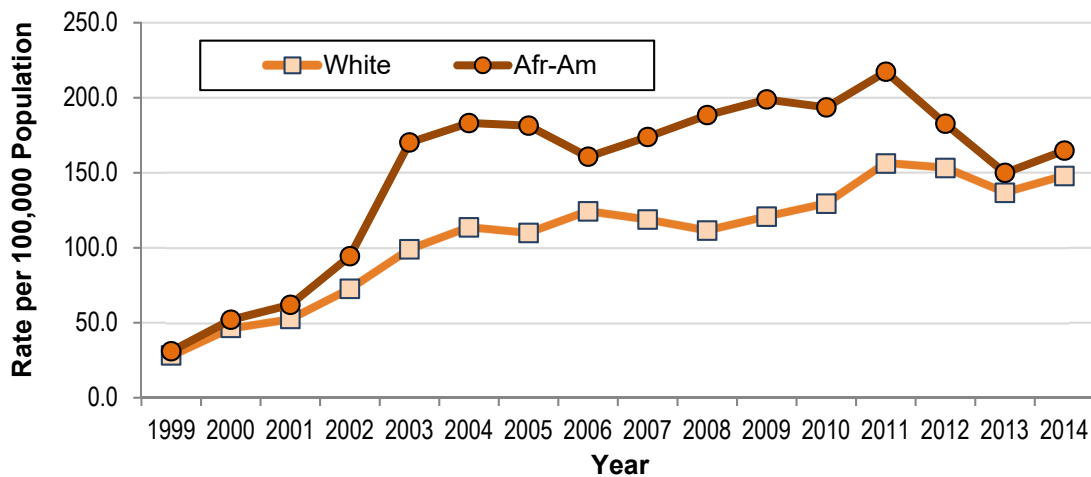
Figure 7: Hospitalization Rate for Hepatitis C per 100,000 Population by Age Group Louisiana, 1999-2014



Race Distribution

Rates were calculated for race/ethnicity and rates graphed are for Whites and African-Americans groups only due to the small numbers for other groups and large number of unknown. Rates based on race are underestimates of real rates since a good proportion of cases do not have race reported. The overall rates of HCV hospitalizations were 107.5 per 100,000 population among Whites and 150.2 per 100,000 among African-Americans. There is a trend of increasing rates among African-Americans (Figure 8).

Figure 8: Hepatitis C Hospitalization Rate by Race per 100,000 Population Louisiana, 1999-2014



Mortality

From 1999 to 2014 there was an average of 204 deaths per year among patients hospitalized with hepatitis C (Table 3).

Table 3: Hepatitis C Hospitalizations and Mortality – Louisiana, 1999-2014

Year	Hospitalizations	Deaths	Percent Deaths
1999	2337	147	6.3
2000	4014	184	4.6
2001	5163	207	4.0
2002	5982	244	4.1
2003	6699	248	3.7
2004	6873	247	3.6
2005	6830	263	3.9
2006	5934	210	3.5
2007	6211	179	2.9
2008	6965	179	2.6

2009	7573	184	2.4
2010	7497	233	3.1
2011	8724	242	2.8
2012	7922	181	2.3
2013	6805	162	2.4
2014	7634	156	2.0

Estimating Prevalence in 2014

Estimating prevalence may be done using the data contained in the Hepatitis C Registry utilizing multiple data sources. This data was used to create the Hepatitis C Epidemiologic Profile. The data used and the limitations to estimate prevalence are discussed below.

The Louisiana Hepatitis C Epidemiologic profile provides information about the trends and distribution of HCV infection in Louisiana. This information is used by LDH, community health stakeholders, local jurisdictions, and others to plan and implement comprehensive HCV prevention and control programs. Surveillance data for HCV has been systematically collected since 1990. The Louisiana Viral Hepatitis Prevention Program was initiated 2001 by the Louisiana OPH, IDEpi. The VHP program receives HCV case reports from various sources and maintains the LA Hepatitis Registry. As of December 2014 the LA Hepatitis Registry had 79,000 records.

Louisiana Infectious Disease Epidemiologic Hepatitis Registry

Since 1990, the IDEpi department has maintained a state-level HCV Registry which currently includes 89,000 cases. The HCV registry uses the following data sources to identify cases:

Infectious Disease Reporting Information System (IDRIS):

IDRIS, IDEpi's disease surveillance system, is a web-based system which receives reportable disease surveillance data manually entered by health care providers and external users.

The IDEpi Section has a robust infectious disease surveillance data collection system that has evolved from an EpiInfo® system, to an Access® program, to a proprietary web based system, and finally to IDRIS 2, an adaptation of the Center for Disease Control and Prevention's (CDC) National Electronic Disease Surveillance Base (NBS) system, which was customized to meet the IDEpi section's surveillance needs.

Electronic Laboratory reports (ELR)

IDEpi receives HCV laboratory reports from laboratory facilities throughout the state through electronic reporting. A majority are imported directly into IDRIS 2. Others remaining are stored, printed, and entered.

LA Hospital Inpatient Discharge Database (LaHIDD):

LAHIDD receives hospital discharge data submitted by facilities throughout the state. The total number of hospitalizations from 1999 to 2014 ranged from 467,000 to 608,000 (mean of 543,000). The numbers are increasing by 2,400 each year. The number of hospitalization reported in LaHIDD is consistent with estimates derived from the National Center for Health Statistics (NCHS Report #5, 7/30/2008, 2006 National Hospital Discharge Survey). In this report, the rate of hospitalizations for the Southern U.S. is 1,212 hospitalizations per 10,000 population per year. This would amount to 545,400 hospitalizations in Louisiana, which is a close approximation to the number reported in the 2006 LaHIDD data.

State Center for Health Statistics (SCHS):

This State Center for Health Statistics provides mortality data from death certificates with HCV mentioned as a primary cause of death or a contributing factor.

There are currently a total of 89,001 cases recorded in the HCV Registry. The majority of records were entered through the IDRIS (78.3%), while LAHIDD produced 43.2%, and death certificate records accounted for the remaining 18.1%. Figure 9 and Table 4 show the number of cases by data source and how they overlap. Numbers have been rounded in Table 4.

Figure 9: Overlap of Records by Source - Louisiana, 2014

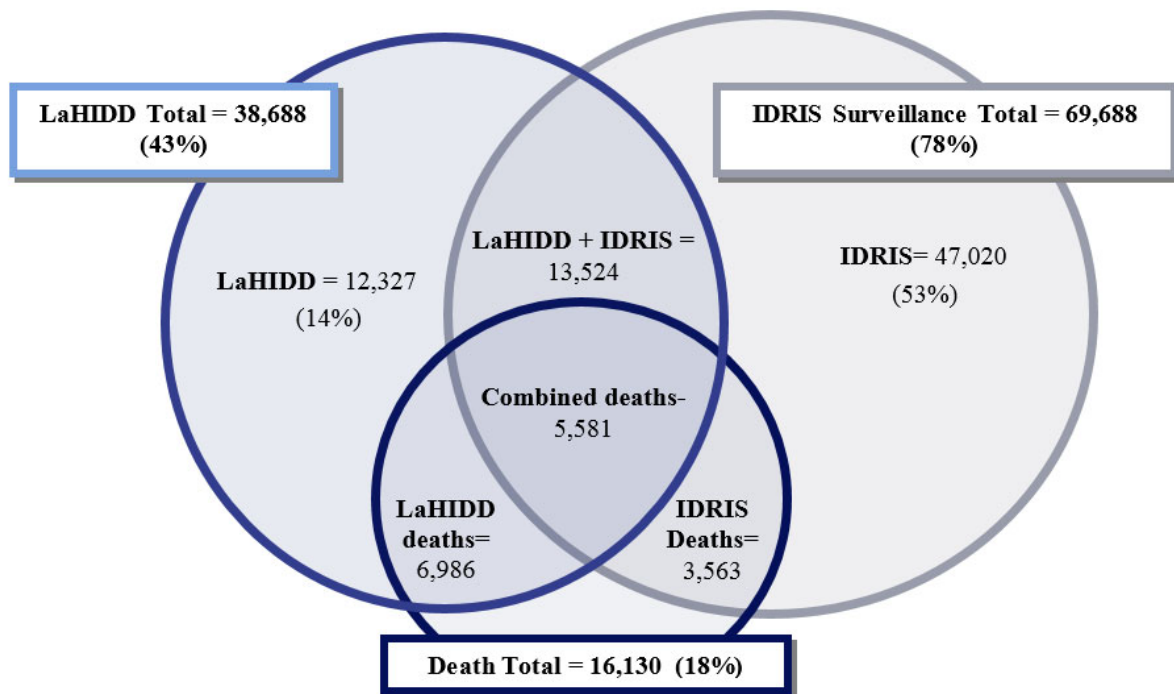


Table 4: Number of HCV Cases by Source – Louisiana, 2014

	Source	Number	Still Alive
1	IDRIS only	47,000	47,000
2	IDRIS and LAHIDD	13,500	13,500
3	IDRIS & Death	3,500	0
4	IDRIS & LAHIDD & DEATH	5,500	0
5	LAHIDD only	12,500	12,500
6	LAHIDD & Death	7,000	0
7	Death only	0	0
	Total	89,000	73,000

Using Table 4 it appears that in 2014 there were 73,000 persons with hepatitis C still alive for a population of 4,650,000. Thus ...

the estimated prevalence is 1.6% of the total population.

Limitations:

Using this methodology has some limitations:

- Many HCV-infected persons may not have been reported yet, thus the real number of those in 2014 is higher than 47,000. Estimating that 12% of the population does not have medical insurance (about 560,000 persons) and using the 1.6% proportion for hepatitis C infection estimated above, we would have an additional 9,000 persons, a total of 82,000 infections (73,000 + 9,000). Using 82,000 as a corrected number of hepatitis C infection, would bring the estimate to 1.8%.
- Some of cases may have died but their status may not have been noted in the death certificate. A match between hepatitis Registry and death certificate was done, (but no match is perfect.) Therefore, some would be erroneously considered as ‘still alive’.