

Hepatitis C

Hepatitis C is a Class C Disease and must be reported to the state within one business day.

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.)

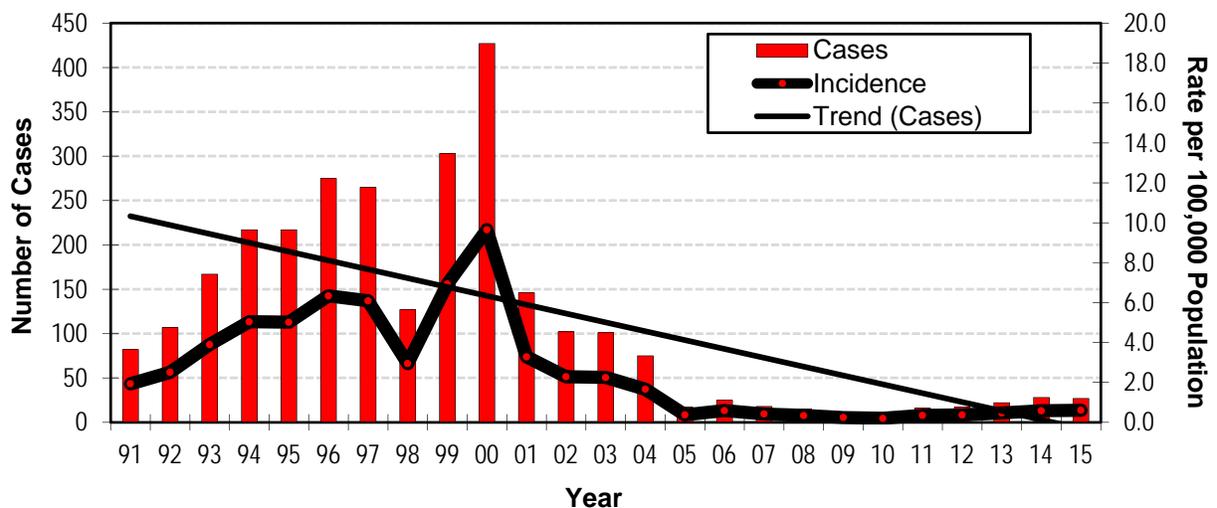
Reported Cases of Hepatitis C

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" hepatitis C cases. This increase was probably due to the increased awareness of hepatitis C, 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 hepatitis C case, a person must have clinical symptoms, laboratory evidence of infection with the hepatitis C virus and 'elevated' liver enzymes. 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. Then, in 2003, a new reporting category was established: "Hepatitis C past or present infection" (HCV-PPI). Some cases that were reported as "acute hepatitis" in the 1990s are now reported as "HCV-PPI" due to changes in case definitions (Figure 1).

Figure 1: Hepatitis C reported acute cases and incidence rates - Louisiana, 1991-2015



The latest definition includes

- **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 >200IU/L during the period of acute illness.

**A documented negative HCV antibody laboratory test result followed within 6 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 FDA and 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

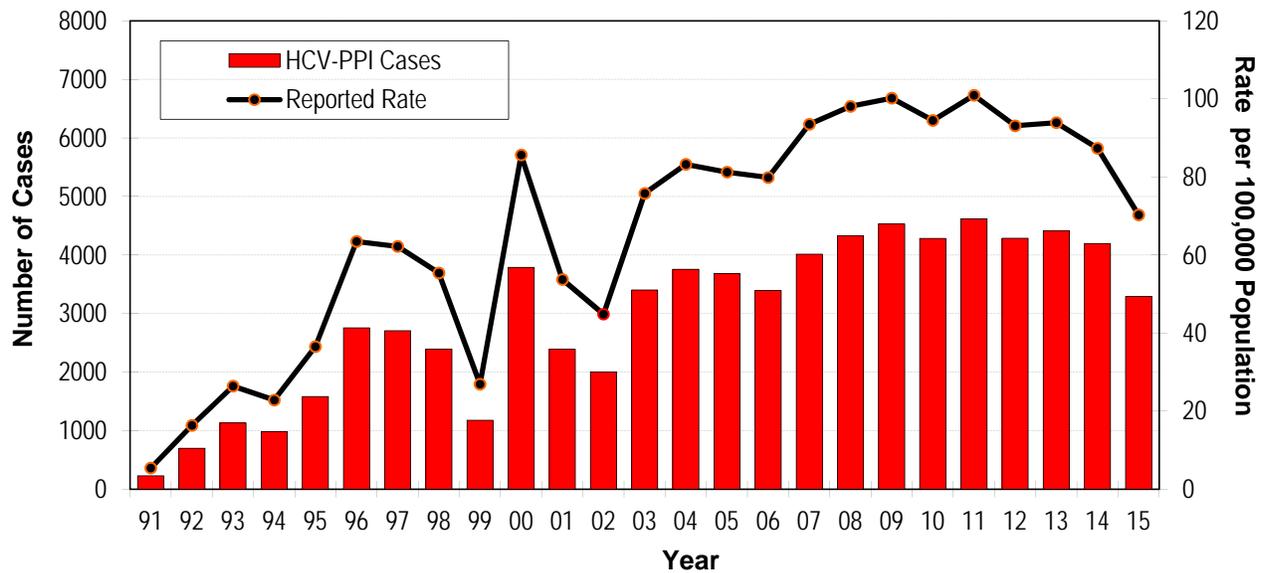
A documented negative HCV antibody, HCV antigen, or NAT laboratory test result followed within 12 months by a positive result of any of these tests (test conversion).

--**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

Prior to 2003, cases of hepatitis C that corresponded to the 2003 classification of C, past or HCV-PPI was entered into a hepatitis register. Figure 2 shows a summary of all cases meeting the HCV-PPI case definition, including cases from the hepatitis register and cases reported after HCV-PPI was added as a reportable disease.

Figure 2: Reported cases of HCV-PPI - Louisiana, 1991-2014

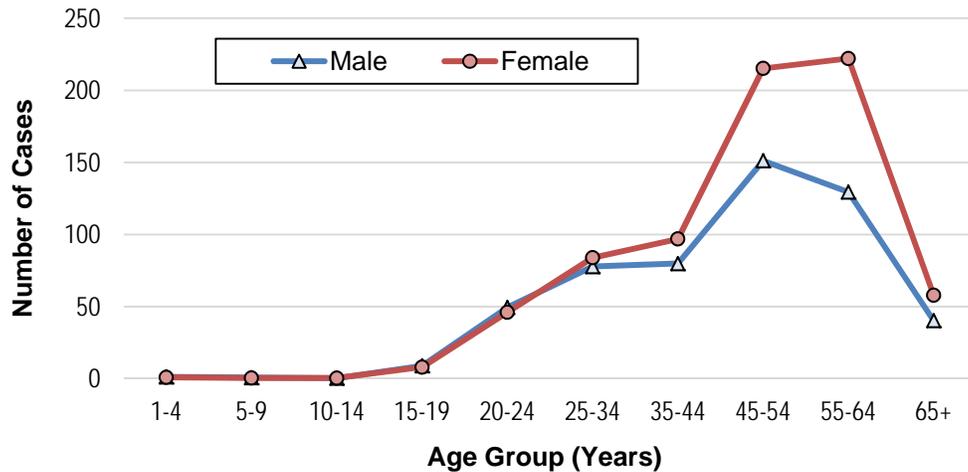
The number of cases entered in the register shows some deep troughs due to surveillance artifacts. Overall, the number of cases reported each year was increasing until 2011 then it started to decrease. There is also a pool of undiagnosed HCV-PPI cases in Louisiana. As these people enter into medical care they are diagnosed and reported. The decrease may be due to the increase in screening tests which would deplete the pool of undiagnosed HCV infections.

Age and Sex Distribution

The age group distribution of HCV-PPI shows a pattern similar to that of acute hepatitis C. Hepatitis C is rare among children; case rates increase after 19 years of age. Low rates are seen in the early years reaching a peak among adults and decreasing among the elderly. The highest rates for both males and females are seen in the 45 to 54 year-old age group.

In the younger age groups rates are equal among males and females. The main difference appears in the age groups 45 to 64 year groups where rates in males are much higher than those in females. The distribution in 2015 is similar to that of 2010-2014 (Figure 3).

Figure 3: HCV-PPI sex and age group distribution - Louisiana, 2010-2014



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 2010-2015) shows:

- No major rate changes for younger age groups (below 35)
- A major reduction in the 2015 age group 35-44: 2015 is 33% of the 2000-2004 rate
- A major reduction in the 2015 age group 45-54: 2015 is 71% of the 2000-2004 rate
- An increase in the 2015 age group 55-64: 2015 is 300% of the 2000-2004 rate
- No major change in the 65 and over age group.

Table 1: Comparison of reporting rates for HCV infection by 5 year-sequences Louisiana, 2000-2015

| All | 2000-04 | 2005-09 | 2010-14 | 2015 |
|--------------|---------|---------|---------|-------|
| 1-4 | 0.9 | 0.2 | 0.9 | 1.6 |
| 5-9 | 0.5 | 0.5 | 0.5 | 0.6 |
| 10-14 | 1.1 | 0.9 | 0.4 | 0.0 |
| 15-19 | 8.7 | 5.1 | 8.1 | 5.3 |
| 20-24 | 39.1 | 32.6 | 46.1 | 33.8 |
| 25-34 | 59.1 | 71.4 | 83.9 | 73.2 |
| 35-44 | 175.8 | 141.6 | 97.0 | 59.0 |
| 45-54 | 168.7 | 270.1 | 215.2 | 120.2 |
| 55-64 | 66.1 | 148.4 | 222.1 | 200.0 |
| 65+ | 37.6 | 51.8 | 57.9 | 53.7 |

The decrease may be the result of the more systematic screening for HCV infection in the recent year. 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.

In all age groups, incidence is higher among males than females. The race distribution shows the same pattern as that observed for gender distribution. The highest incidence of acute hepatitis is seen in African-American males between the ages of 45 and 54 years.

Hepatitis C Past & Present Infection Reporting by Parish

The geographical distribution of hepatitis C in Louisiana shows higher rates in urban centers (greater New Orleans, Baton Rouge, and Lafayette). Orleans parish has the highest rates. Although some rural parishes have high infection rates, they actually have very few cases; their rates are high because their population counts are low (Table 2).

Table 2: Hepatitis C PPI by Parish – Louisiana, 2005-2015

| Parish | * | Avg 2005-09 | Avg 2010-14 | 2015 | Parish | | Avg 2005-09 | Avg 2010-14 | 2015 |
|------------------|------|-------------|-------------|-------|------------------|------|-------------|-------------|-------|
| ACADIA | H1 | 91.0 | 77.9 | 40.0 | OUACHITA | M | 85.7 | 74.6 | 36.7 |
| ALLEN | L | 44.1 | 71.2 | 41.1 | PLAQUEMINES | L | 45.9 | 19.2 | 24.5 |
| ASCENSION | M | 64.4 | 75.7 | 57.3 | POINTE COUPEE | M | 86.7 | 76.7 | 30.9 |
| ASSUMPTION | L | 24.4 | 52.0 | 39.2 | RAPIDES | M | 58.4 | 68.1 | 68.1 |
| AVOYELLES | L | 52.8 | 72.7 | 25.2 | RED RIVER | M | 68.3 | 60.7 | 15.5 |
| BEAUREGARD | L | 24.4 | 43.0 | 19.8 | RICHLAND | L | 39.6 | 49.0 | 20.4 |
| BIENVILLE | L | 47.0 | 66.0 | 34.4 | SABINE | L | 46.3 | 59.8 | 17.5 |
| BOSSIER | M | 73.4 | 74.2 | 39.2 | ST. BERNARD | H1 | 183.4 | 66.4 | 72.7 |
| CADDO | H2 | 174.8 | 166.1 | 60.0 | ST. CHARLES | M | 42.2 | 75.0 | 38.8 |
| CALCASIEU | H1 | 64.4 | 117.8 | 43.2 | ST. HELENA | L | 51.5 | 34.3 | 50.4 |
| CALDWELL | H2 | 62.9 | 143.2 | 41.8 | ST. JAMES | L | 21.5 | 52.6 | 28.7 |
| CAMERON | L | 28.8 | 30.5 | 20.6 | ST. JOHN | L | 25.3 | 35.2 | 13.8 |
| CATAHOULA | L | 44.0 | 61.3 | 33.9 | ST. LANDRY | L | 67.6 | 77.9 | 11.8 |
| CLAIBORNE | H1 | 173.9 | 76.1 | 32.8 | ST. MARTIN | M | 80.1 | 72.0 | 28.4 |
| CONCORDIA | L | 38.2 | 45.9 | 37.3 | ST. MARY | L | 34.7 | 59.1 | 42.6 |
| DE SOTO | M | 80.1 | 72.3 | 39.7 | ST. TAMMANY | M | 72.2 | 66.7 | 42.9 |
| EAST BATON ROUGE | H2 | 87.0 | 105.7 | 73.6 | TANGIPAHOA | H123 | 112.8 | 110.8 | 106.6 |
| EAST CARROLL | M | 59.1 | 66.9 | 45.5 | TENSAS | L | 46.1 | 66.4 | 26.9 |
| EAST FELICIANA | H123 | 113.8 | 175.6 | 135.8 | TERREBONNE | H2 | 65.3 | 106.7 | 39.1 |
| EVANGELINE | L | 54.4 | 75.5 | 27.0 | UNION | L | 42.3 | 47.7 | 21.7 |
| FRANKLIN | L | 36.0 | 41.4 | 27.2 | MADISON | H12 | 95.8 | 109.4 | 35.0 |
| GRANT | M | 62.4 | 82.2 | 88.6 | MOREHOUSE | M | 65.4 | 60.1 | 35.3 |
| IBERIA | M | 75.0 | 59.8 | 48.2 | NATCHITOCHE | L | 60.4 | 55.9 | 30.3 |
| IBERVILLE | H2 | 80.2 | 226.2 | 76.1 | ORLEANS | H12 | 316.2 | 166.1 | 63.2 |
| JACKSON | L | 47.7 | 56.9 | 34.7 | OUACHITA | M | 85.7 | 74.6 | 36.7 |
| JEFF. DAVIS | L | 70.5 | 38.3 | 22.5 | PLAQUEMINES | L | 45.9 | 19.2 | 24.5 |
| JEFFERSON | L | 46.4 | 61.1 | 33.5 | POINTE COUPEE | M | 86.7 | 76.7 | 30.9 |
| LA SALLE | M | 38.9 | 96.4 | 47.4 | RAPIDES | M | 58.4 | 68.1 | 68.1 |
| LAFAYETTE | H1 | 203.9 | 98.9 | 38.5 | VERMILION | M | 71.9 | 57.6 | 64.5 |
| LAFOURCHE | L | 41.1 | 50.0 | 29.3 | VERNON | L | 25.0 | 35.4 | 29.7 |
| LINCOLN | L | 26.4 | 27.4 | 13.6 | WASHINGTON | H123 | 169.5 | 225.6 | 139.1 |
| LIVINGSTON | H2 | 83.6 | 110.1 | 81.6 | WEBSTER | M | 66.8 | 76.0 | 44.5 |
| MADISON | H2 | 95.8 | 109.4 | 35.0 | WEST BATON ROUGE | H2 | 61.3 | 133.0 | 53.4 |
| MOREHOUSE | L | 65.4 | 60.1 | 35.3 | WEST CARROLL | L | 44.6 | 50.1 | 36.5 |
| NATCHITOCHE | L | 60.4 | 55.9 | 30.3 | WEST FELICIANA | H12 | 158.6 | 123.0 | 49.7 |
| ORLEANS | H12 | 316.2 | 166.1 | 63.2 | WINN | H12 | 121.6 | 149.8 | 64.5 |
| | | | | | LOUISIANA | M | 94.7 | 93.6 | 69.1 |

* 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 90 to 100) for the periods 1 or 2 or 3 the periods such as East Feliciana, Tangipahoa and Washington,

M=Medium rates in the range of 50 to 80

L=Low rates in the rge 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 Department of Health (LDH). The Office of Public Health (OPH) is responsible for making the data available to OPH sections as needed. The data is available with a delay of two years. The Infectious Disease Epidemiology 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. The LAHIDD data is not yet available for 2015.

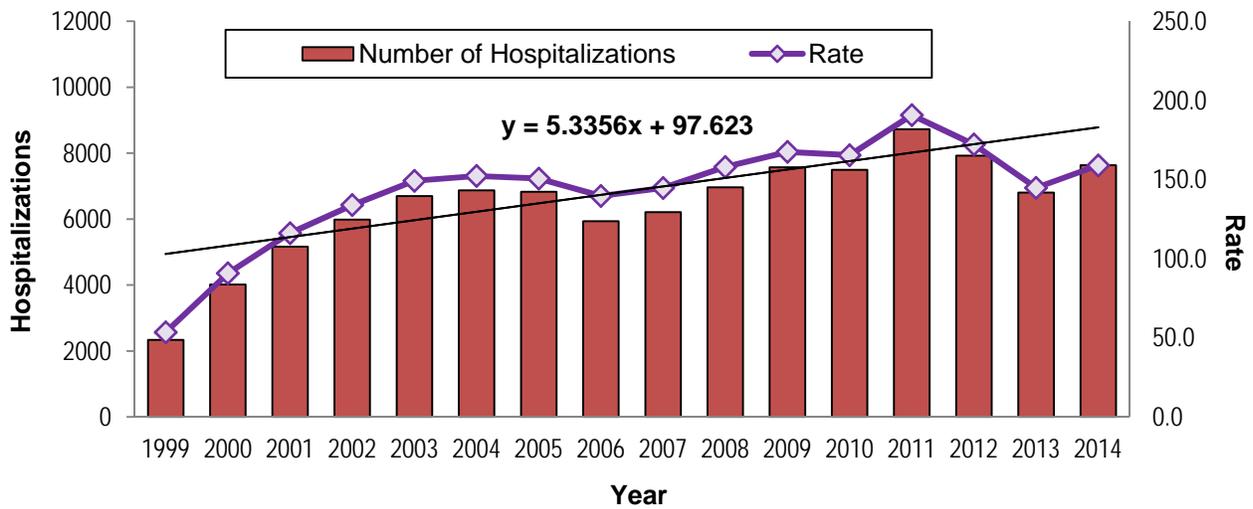
Repeat hospitalizations are not included. Records of patients with hepatitis C were extracted using the following ICD-9 codes whether in the main diagnosis or in the eight additional secondary diagnoses:

| 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 following statistics are based on unduplicated patients. The number of hepatitis C hospitalizations increased progressively from 2,337 in 1999 to almost 7,634 in 2014. Since these data represent all the hospitalization 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 toward increasing proportion of hospitalizations (Figure 4).

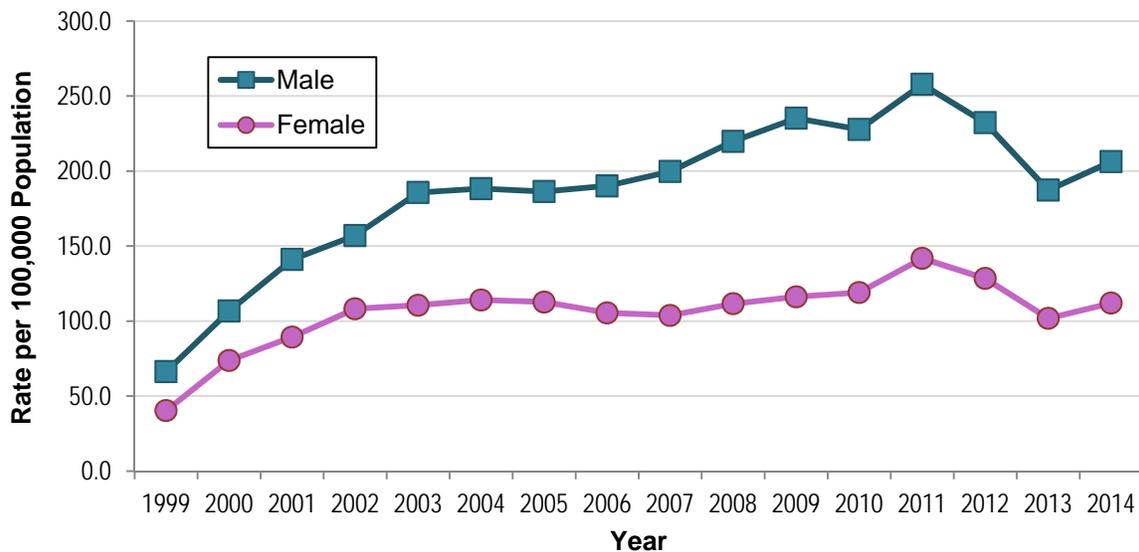
Figure 4: Trend in hospitalization rates for hepatitis C per 100,000 population Louisiana, 1999-2014



Gender Distribution

The overall rates of hepatitis C 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).

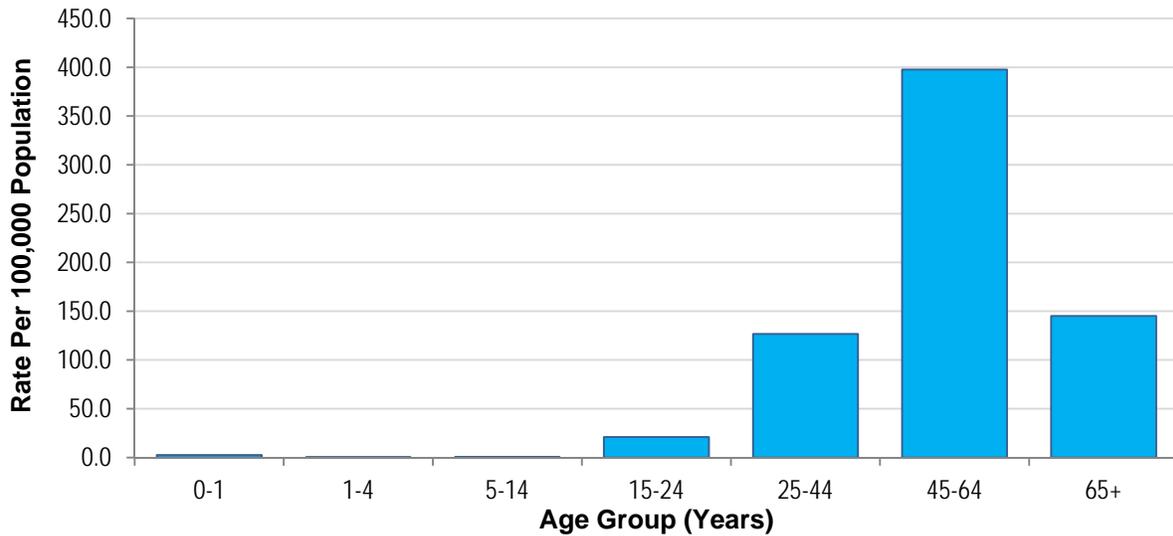
Figure 5: Hospitalization rates for hepatitis C per 100,000 population by gender Louisiana, 1999-2014



Age Group Distribution

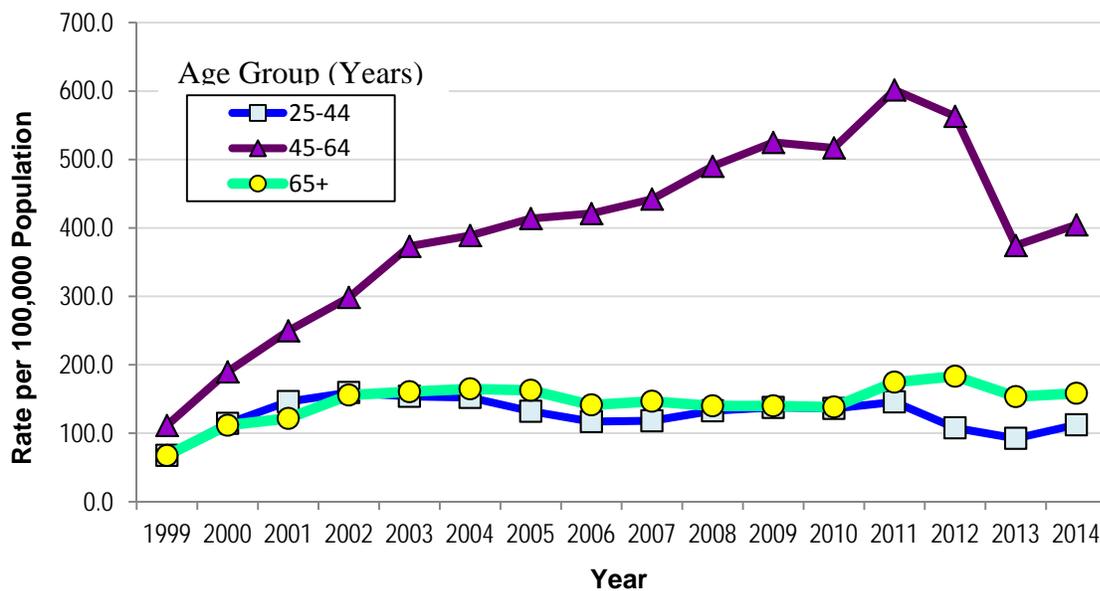
The highest rates of hepatitis C hospitalizations are seen among adults within the 45 to 64-year old age group (Figure 6).

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 over the age of 25 years. 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

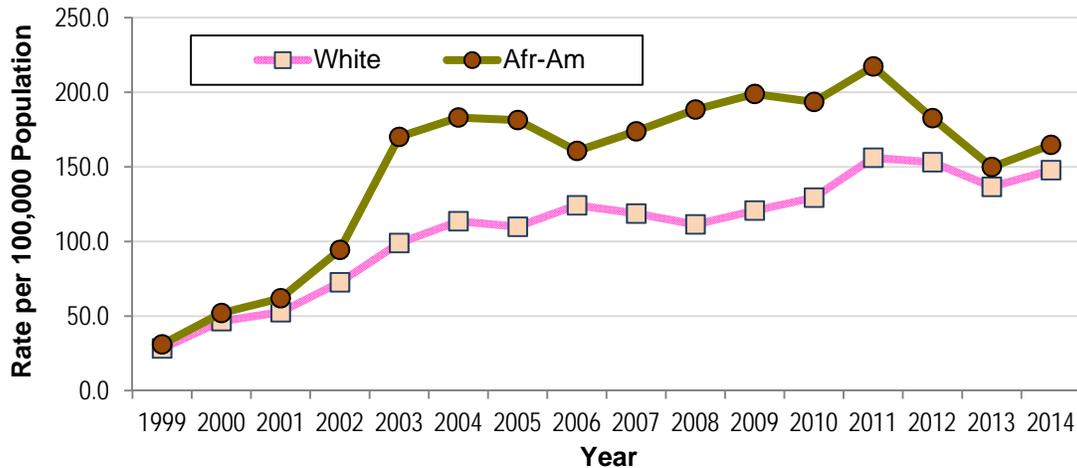


Race Distribution

Rates were calculated for Whites and African-Americans only. Numbers for other race and ethnic groups are small and the populations are often inaccurate. Rates based on race are underestimates of real rates since a good proportion of cases do not have race reported.

The overall rates of hepatitis C hospitalizations were 107.5 per 100,000 population for Whites and 150.2 per 100,000 for African-Americans. There is an increasing trend with a higher rate 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 |

Hepatitis Register

Estimating prevalence may be done using the data presented in the 2015 Louisiana Hepatitis C Profile. However this estimate does have some limitations that are discussed below.

What is the 2015 Louisiana Hepatitis C Epidemiologic Profile?

This epidemiologic profile provides information about the trends and distribution of hepatitis C (HCV) infection in Louisiana (LA). This information is used by the LA Department of Health, community health stakeholders, local jurisdictions and others to plan and implement a comprehensive HCV prevention and control programs. Surveillance data for HCV has been systematically collected since 1990. The LA Viral Hepatitis Prevention Program was initiated 2001 by the LA Office of Public Health, Infectious Disease Epidemiology Section (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.

LA IDEpi Hepatitis Registry

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

Infectious Disease Reporting Information System (IDRIS):

IDRIS receives reportable disease surveillance data manually entered by health care providers remotely through web-based system.

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 the IDRIS2, an adaptation of CDC's NBS system which was customized to meet the IDEpi section's surveillance needs. Throughout the years legacy data were added into an Access® database.

Electronic Laboratory reports (ELR)

IDEpi also receives HCV laboratory reports from laboratory facilities throughout the state. This was reported by fax previously and electronically recently. Even at the time of fax reporting reports were systematically 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 LA, which is a close approximation to the number reported in the 2006 LaHIDD data.

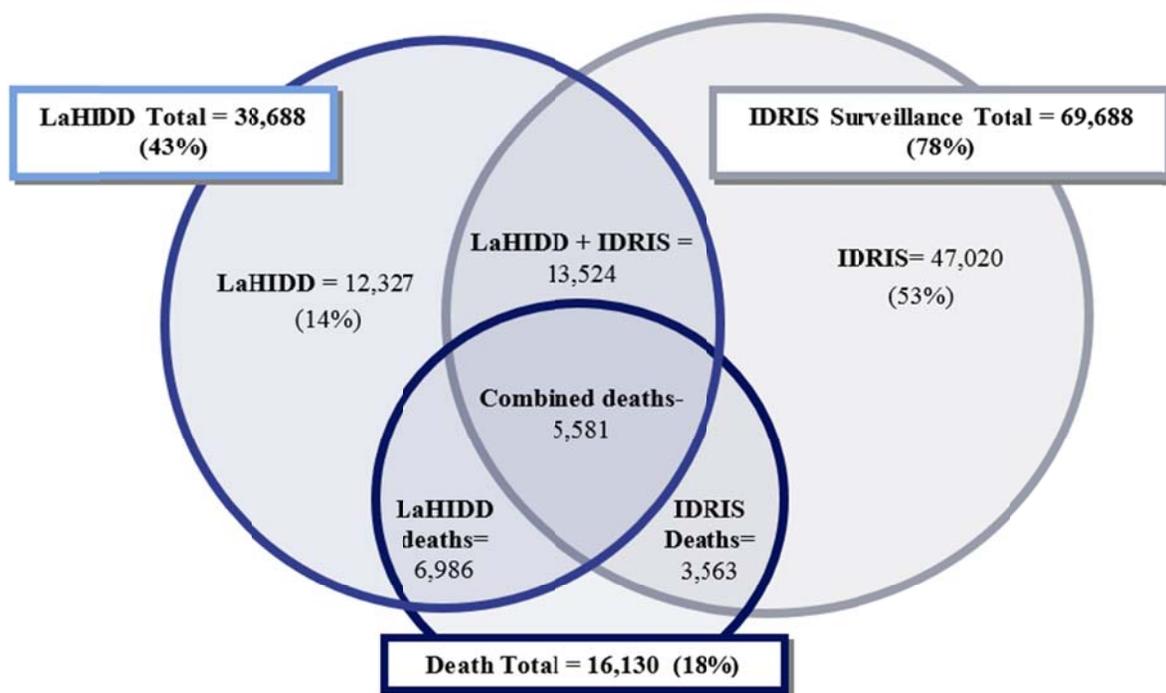
State Center for Health Statistics (SCHS):

This center provides mortality data from death certificates with HCV mentioned as a primary cause of death or a contributing factor.

Estimating Prevalence in 2014 from the Registry Data

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 only 43.2%, and death certificate records accounted for the remaining 18.1%. There was overlap between the sources (Figure 9).

Figure 9: Overlap of records by source - Louisiana, 2014



The figure above and Table 4 show the number of cases by sources and how they overlap. Numbers have been rounded in the table.

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 |
| T | 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 method has some limitations:

- Many hepatitis C infected persons may not have been reported yet, thus the real number of those that existed 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 hepatitis C infections, 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 hepatitis C 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 hepatitis C cases would be erroneously considered as 'still alive'.