

Pertussis

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

Pertussis (Whooping Cough) is an acute bacterial disease caused by *B. pertussis*. Humans are the only known host. Pertussis is highly contagious.

It is characterized by paroxysmal cough, post-tussive vomiting and an inspiratory whoop. Pertussis also can occur as a mild or moderate cough illness in persons who are partially immune. In the U.S., most hospitalizations and nearly all deaths from pertussis are reported in infants younger than six months of age, but substantial morbidity does occur in other age groups.

Pertussis is vaccine-preventable. Infant/childhood vaccination has contributed to a reduction of more than 90% in pertussis-related morbidity and mortality since the early 1940s in the United States. Estimates of childhood vaccination coverage with more than three doses of pertussis-containing vaccine have exceeded 90% since 1994. Pertussis is the only disease for which universal childhood vaccination is recommended and that has an increasing trend in reported cases in the United States. Pertussis is an epidemic disease with two- to five-year cycles. Immunization reduced the total number of cases but did not change the cycles, suggesting that immunization controlled the disease but not the propagation of infection in the human population.

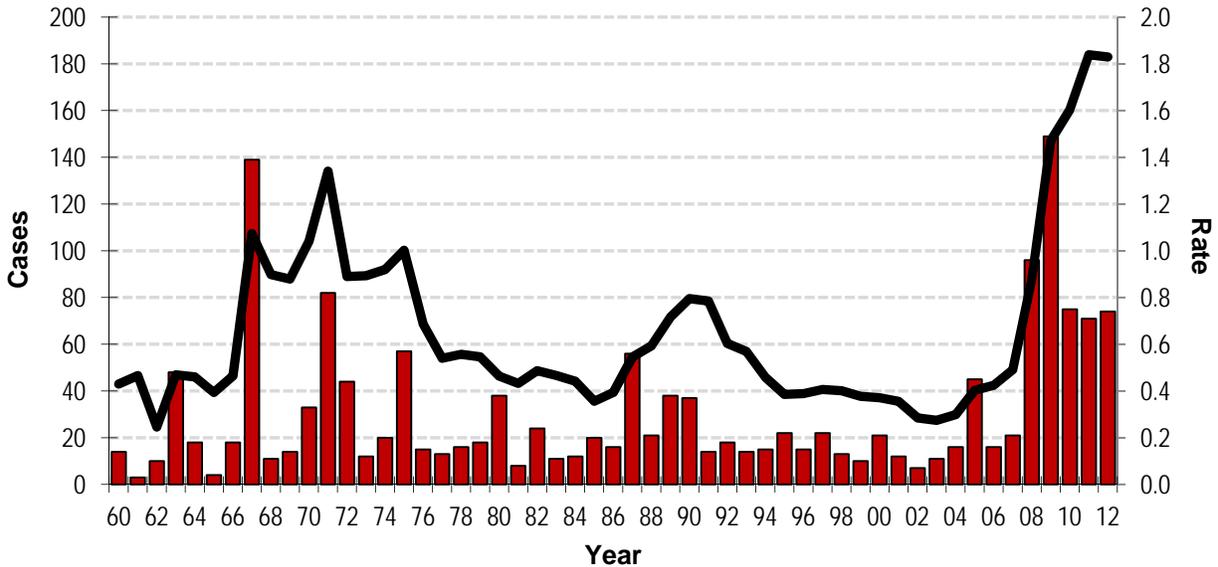
Recent studies support the hypothesis that pertussis infection is very common among adults. IgA antibodies to pertussis antigens are only produced after a natural infection and not after immunization. Prevalence studies of IgA antibodies show similar rates among adults in countries with generalized immunization (U.S.) and in countries with no systematic pertussis immunization (Germany in the 1970's).

Case, Rates and Trends

In the 1960's and 1970's, pertussis showed the expected peaks and troughs in the United States. Reported pertussis cases reached a low in the late 1980's and 1990's. The number increased progressively in the 2000's. A large increase in reported cases has occurred among adolescents, who become susceptible to pertussis approximately six to ten years after childhood vaccination. More recently, booster vaccines for adolescents and adults combining pertussis antigens with tetanus and diphtheria toxoids (Tdap) were approved by the Food and Drug Administration (FDA). On June 30, 2005, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap for all persons between the ages of 11 to 18 years.

In the past 10 years the number of pertussis cases in Louisiana has increased, with peaks at 96 in 2008, 149 cases in 2009, and 74 cases in 2012. Incidence rates have ranged from 0.24 to 3.33 per 100,000 persons. All rates are below the national average of 9.3 per 100,000 persons (Figure 1).

Figure 1: Pertussis cases and five-year average incidence rates - Louisiana, 1960-2012

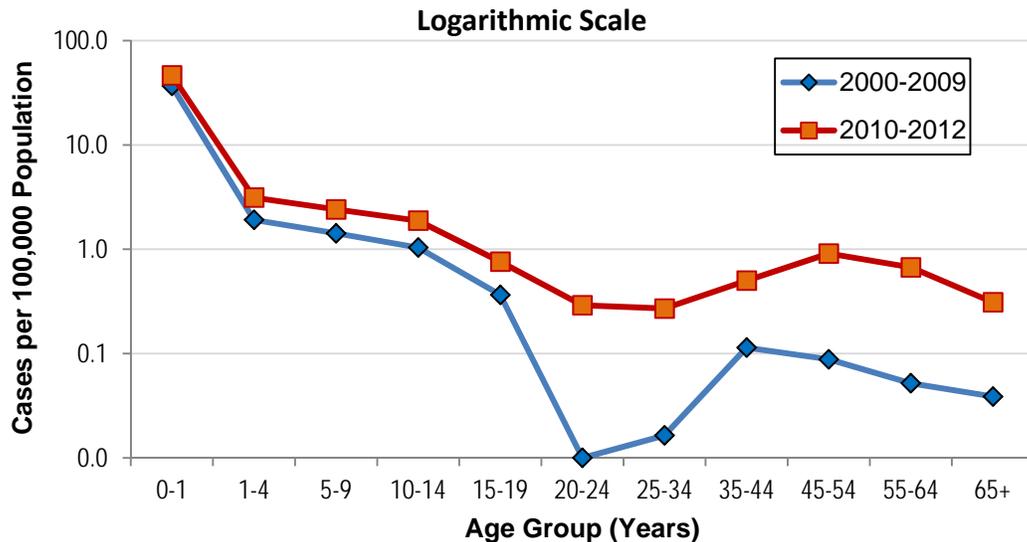


Age group, Sex and Race Distribution

There is no significant difference between males and females.

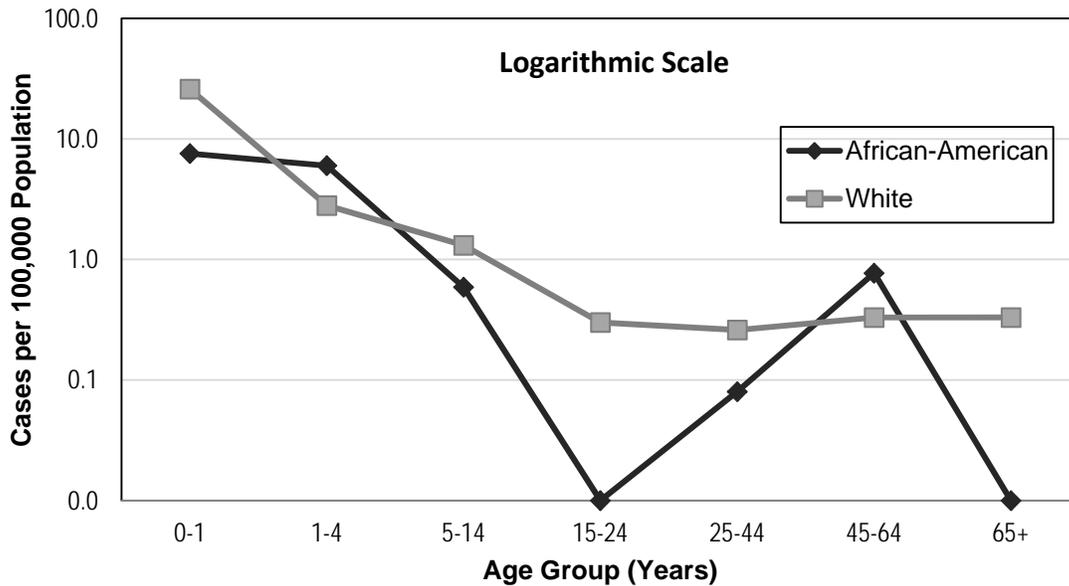
The age group distribution shows that pertussis in Louisiana is mostly affecting infants (newborn to one year-olds), and young children more than adolescents and adults. In recent years however, incidence rates have increased amongst adults and the elderly. In 2010, there was a notable increase in the incidence rate for the 25 to 34 year age group. Adult cases are generally under-reported because they are not being diagnosed (Figure 2).

Figure 2: Pertussis average and annual incidence rates by age - Louisiana, 2000-2012



The distribution by race shows that five-year rates are higher among White infants and children with the exception of the one to four-year old age group. Also, rates are higher among African-American adults aged 45 to 54 years and almost equal for the 55 to 64 age group (Figure 3).

Figure 3: Pertussis five-year average incidence rates by race and age - Louisiana, 2010-2012



The geographical distribution does not show any remarkable trends or differences (Table).

Table: Pertussis incidence rates by parish - Louisiana, 1991-2012

Parish	1990-1999	2000-2009	2010-2012
ACADIA	0.00	0.17	0.53
ALLEN	0.00	1.58	7.69
ASCENSION	0.75	0.70	4.60
ASSUMPTION	0.44	0.43	0.00
AVOUELLES	0.00	0.94	0.00
BEAUREGARD	0.31	0.59	1.39
BIENVILLE	0.00	0.00	0.00
BOSSIER	0.34	0.96	1.27
CADDO	0.41	0.75	3.10
CALCASIEU	0.11	0.11	0.26
CALDWELL	0.98	1.87	0.00
CAMERON	0.00	0.00	0.00
CATAHOULA	0.00	0.00	0.00
CLAIBORNE	0.00	0.00	0.00
CONCORDIA	0.47	1.41	0.00
DESOTO	0.79	1.95	0.00

EAST BATON ROUGE	0.25	0.49	2.35
EAST CARROLL	2.12	0.00	6.35
EAST FELICIANA	0.00	0.97	0.00
EVANGELINE	0.30	3.50	8.75
FRANKLIN	0.00	0.00	2.37
GRANT	0.00	0.00	0.00
IBERIA	0.00	1.23	0.68
IBERVILLE	0.64	0.62	2.97
JACKSON	0.00	0.00	0.00
JEFFERSON	0.51	0.63	1.60
JEFF. DAVIS	0.00	0.32	0.00
LA SALLE	0.00	1.39	6.66
LAFAYETTE	0.11	0.49	0.89
LAFOURCHE	0.68	0.11	0.51
LINCOLN	0.47	0.24	1.06
LIVINGSTON	0.14	1.16	1.15
MADISON	0.00	2.28	0.00
MOREHOUSE	1.25	0.91	0.00
NATCHITOCHE	0.27	0.26	0.00
ORLEANS	0.48	0.79	1.44
OUACHITA	0.55	0.46	0.00
PLAQUEMINES	1.56	0.00	2.14
POINTE COUPEE	0.44	0.44	8.68
RAPIDES	0.24	0.54	0.00
RED RIVER	0.00	0.00	0.00
RICHLAND	0.49	0.48	0.00
SABINE	0.00	0.41	0.00
ST. BERNARD	0.00	0.73	5.50
ST. CHARLES	0.42	0.62	4.67
ST. HELENA	0.00	0.00	4.40
ST. JAMES	0.00	0.00	2.23
ST. JOHN	0.71	0.93	0.00
ST. LANDRY	0.37	0.94	1.78
ST. MARTIN	0.44	1.69	0.00
ST. MARY	0.17	0.17	0.00
ST. TAMMANY	0.70	0.67	2.96
TANGIPAHOA	0.11	0.92	0.81
TENSAS	0.00	0.00	0.00
TERREBONNE	0.20	0.18	0.88
UNION	0.47	1.34	0.00
VERMILION	0.20	0.55	0.00
VERNON	0.70	0.19	0.00
WASHINGTON	0.93	0.88	6.29
WEBSTER	0.47	0.23	0.00
WEST BATON ROUGE	0.00	1.49	0.00
WEST CARROLL	0.84	0.00	0.00
WEST FELICIANA	0.00	0.72	0.00
WINN	1.12	0.55	0.00
Louisiana	0.36	0.66	1.50

Hospitalization

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 and Hospitals (DHH). 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 several months. 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. Records of patients with pertussis were extracted using the ICD9 code 0330 whether in the main diagnosis or in the eight additional secondary diagnoses.

The number of hospitalizations has ranged from zero to ten per year but we only have inpatient data up until 2011. There was a spike in cases in 2012 so hospitalizations would be expected to follow the increase. Admissions diagnoses are: pertussis (25%), bronchiolitis, pneumonia, cough and apnea. Pertussis is always reported as the main diagnosis (Figure 4).

The majority of cases are admitted before the age of three months (Figure 5).

Figure 4: Reported and hospitalized pertussis cases – Louisiana, 1999-2011

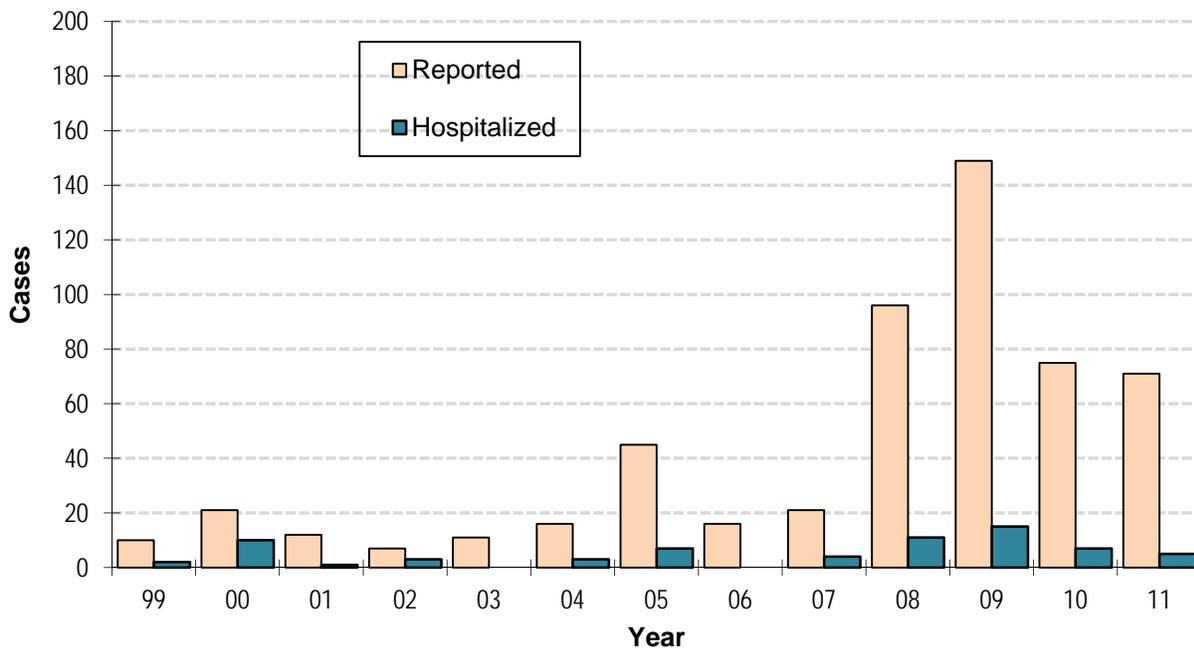
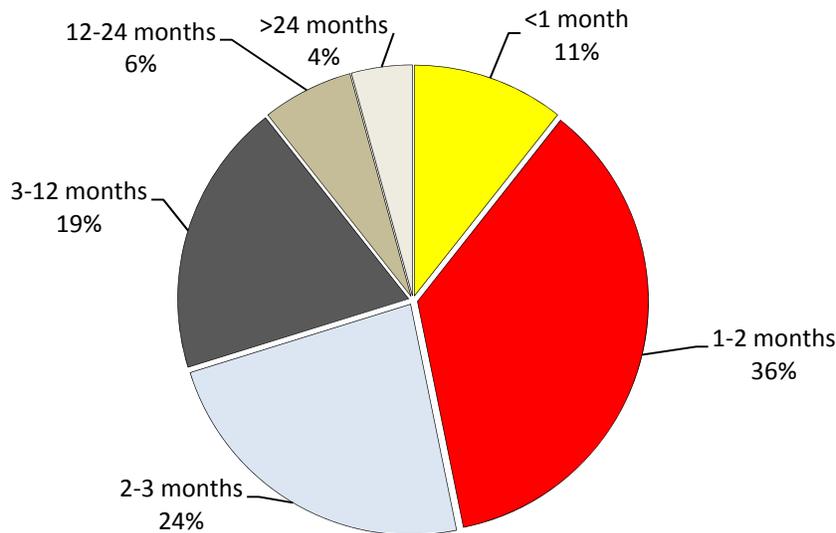


Figure 5: Age at admission – pertussis – Louisiana, 1999-2011



Mortality

In Louisiana, only two deaths have been attributed to pertussis: a six-week old African-American male in 2003 and a six-week old White female in 2004.

Outbreaks

Pertussis outbreaks can be difficult to identify and manage. Other respiratory pathogens often cause clinical symptoms similar to pertussis; co-circulation with other pathogens (bacterial and viral) does occur. In order to respond appropriately (e.g., provide appropriate antibiotic prophylaxis), it is important to confirm that *B. pertussis* is circulating in the outbreak setting and to determine whether other pathogens are contributing to the outbreak. Polymerase chain reaction (PCR) tests vary in specificity, so obtaining culture confirmation of pertussis for at least one suspicious case is recommended any time there is suspicion of a pertussis outbreak. Pseudo outbreaks of pertussis have resulted because of false positive test results with PCR. This underscores the importance of recognizing clinical signs and symptoms and practicing careful laboratory testing. An outbreak of pertussis is defined as the occurrence of two or more cases which are related.

In 2009, there were six documented pertussis outbreaks involving two to four children; in 2010 only two outbreaks with two cases each. Most outbreaks have occurred among family groups. The 2009 outbreaks involving four cases occurred in a school.