

# Vaccine-Preventable Disease Surveillance in California, 2016



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Annual Report

California Department of Public Health  
Center for Infectious Diseases  
Division of Communicable Disease Control  
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Vaccine-Preventable Diseases Epidemiology Section



Edmund G. Brown Jr., Governor  
State of California  
Diana S. Dooley, Secretary  
California Health and Human Services Agency  
Karen L. Smith, MD, MPH, Director and State Health Officer  
California Department of Public Health



# Vaccine-Preventable Disease Surveillance in California, 2016

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We are grateful to California local health department (LHD) staff for their continued support and tireless efforts in communicable disease surveillance and control and outbreak investigation. We also thank the healthcare providers and laboratorians who diligently reported case information to their LHDs.

### PROGRAM OVERVIEW

The Immunization Branch of the California Department of Public Health (CDPH) is responsible for collecting surveillance data on vaccine-preventable diseases (VPDs) for the purposes of determining disease impact, assessing trends in disease occurrence, characterizing affected populations, prioritizing control efforts, and evaluating prevention strategies in California.

### VACCINE-PREVENTABLE DISEASE SUMMARIES

Title 17 of the California Code of Regulations (CCR) (Sections 2500, 2505, 2593, 2641-2643, 2800-2812) requires healthcare providers and laboratories to report known or suspected cases of specified communicable diseases and conditions to the local health officer. LHDs in turn report cases to CDPH, and CDPH reports cases to the Centers for Disease Control and Prevention (CDC). Provisions of the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule allow for the disclosure of patient health information without patient authorization for public health activities and purposes (e.g., routine disease reporting). Prompt reporting allows outbreaks to be recognized when control measures are most likely to be effective in preventing additional cases.

In this report, we describe the epidemiology of the following reportable VPDs in California: diphtheria, invasive *Haemophilus influenzae* disease, hepatitis A, acute and perinatal hepatitis B, measles, invasive meningococcal disease, mumps, pertussis, polio, rubella and congenital rubella syndrome, tetanus, and varicella. Vaccine-preventable conditions such as zoster, rotavirus gastroenteritis, human papillomavirus (HPV) infection, and invasive pneumococcal disease (other than pneumococcal meningitis) are not currently reportable under State reporting regulations. Influenza is covered in a separate report available on the [CDPH Influenza Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Influenza.aspx>).

Unless otherwise noted, the data in this summary are final annual totals for reported cases of VPDs, as prepared by the CDPH Immunization Branch. Case rates were calculated using population estimates provided by the California Department of Finance (DOF) Demographic Research Unit. To address potential confidentiality concerns with small numbers, county level data are not presented for the following diseases: *Haemophilus influenzae* disease in persons <5 years of age, perinatal hepatitis B, and congenital rubella syndrome. Surveillance case definitions were adapted from position statements published by the Council of State and Territorial Epidemiologists (CSTE).

*Last updated on May 17, 2018*

## Diphtheria

Although respiratory diphtheria is now extraordinarily rare in the United States, it remains endemic in many parts of the world, and unimmunized or incompletely immunized travelers can contract diphtheria when visiting endemic areas (Table 1). The countries with the most reported cases of diphtheria in 2016 were India and Madagascar. The last reported case in the U.S. occurred in 2014. However, *C. diphtheriae* may continue to circulate in areas of the U.S. with previously endemic diphtheria.

Table 1. Countries with endemic diphtheria

Region	Countries
Africa	Algeria, Angola, Egypt, Eritrea, Ethiopia, Guinea, Madagascar, Niger, Nigeria, Sudan, Zambia, and other sub-Saharan countries
Americas	Bolivia, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Haiti, Paraguay, and Venezuela
Asia/South Pacific	Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Thailand, and Vietnam
Middle East	Afghanistan, Iran, Iraq, Saudi Arabia, Syria, Turkey, and Yemen
Eastern Europe (including some countries in Asia)	Albania, Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan

### Surveillance Case Definition (2010)

California healthcare providers and laboratories are required to report known or suspected cases of diphtheria to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all probable and confirmed diphtheria cases to CDPH using the following case definition:

#### Case Classification

##### **Probable:**

In the absence of a more likely diagnosis, an upper respiratory tract illness with:

- An adherent membrane of the nose, pharynx, tonsils, or larynx; AND
- Absence of laboratory confirmation; AND
- Lack of epidemiologic linkage to a laboratory-confirmed case of diphtheria.

##### **Confirmed:**

An upper respiratory tract illness with an adherent membrane of the nose, pharynx, tonsils, or larynx; and any of the following:

- Isolation of *Corynebacterium diphtheriae* from the nose or throat; OR
- Histopathologic diagnosis of diphtheria; OR
- Epidemiologic linkage to a laboratory-confirmed case of diphtheria.

### Epidemiologic Summary

No cases of diphtheria were reported in California in 2016. Only three cases of diphtheria have been reported in California since 1994. The most recent case was reported in 2002.

For more information about diphtheria, please visit the [CDPH Diphtheria Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/diphtheria.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/diphtheria.aspx>).

## Haemophilus influenzae Disease

There are six types of *H. influenzae* (types a-f) as well as nontypeable strains, but only *H. influenzae* type b (Hib) is vaccine-preventable. Hib disease is now rare in the United States; the majority of invasive *H. influenzae* cases reported in children in recent years have been caused by non-type b strains.

### Surveillance Case Definition (2015)

California healthcare providers and laboratories are required to report known or suspected cases of invasive *Haemophilus influenzae* disease caused by all serotypes in persons <5 years of age to the LHD, in accordance with Title 17 of the California Code of Regulations. In 2016, the reportable age changed from <15 years of age to <5 years of age. The LHDs report all probable and confirmed invasive *Haemophilus influenzae* cases <5 years of age to CDPH using the following case definition:

#### **Clinical Description**

Invasive disease may manifest as pneumonia, bacteremia, meningitis, epiglottitis, septic arthritis, cellulitis, or purulent pericarditis; less common infections include endocarditis and osteomyelitis.

#### **Case Classification**

##### ***Probable:***

Meningitis with detection of *Haemophilus influenzae* type b antigen in cerebrospinal fluid (CSF)

##### ***Confirmed:***

- Isolation of *Haemophilus influenzae* from a normally sterile body site (e.g., blood or CSF, or, less commonly, joint, pleural, or pericardial fluid); OR
- Detection of *Haemophilus influenzae*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., CSF, blood, joint, pleural, or pericardial fluid), using a validated polymerase chain reaction (PCR) assay

### Epidemiologic Summary

In 2016, 42 invasive *Haemophilus influenzae* disease cases in persons <5 years of age were reported statewide. Of the 42 cases, 4 (10%) were fatal. The fatalities occurred in three infants <12 months of age and in a 3-year-old child. Serotyping was attempted on 32 (76%) isolates and one was identified as Hib (Table 2).

The case-patient with Hib was a 4-year-old male diagnosed with epiglottitis who had received the recommended 3 doses of Hib vaccine at 2, 4 and 6 months, but did not receive the recommended fourth dose between 12-18 months; dose 4 was given after the onset of illness. Hib vaccine failures occur rarely; more than 95% of infants will develop protective antibody levels after receiving the Hib vaccine series.

Of the 32 isolates that were serotyped, 9 (28%) were serotype a, 1 (3%) was serotype b, 2 (6%) were serotype f, 3 (9%) were identified only as other [a, c-f (non-b)], and 17 (53%) were nontypeable. The isolate for one of the fatal case-patients was nontypeable, one was serotype f and two were unknown. Prior to the 2016 case, the last case of Hib in a child <15 years of age in California occurred in 2015.

For more information about *Haemophilus influenzae* type b (Hib), please visit the [CDPH \*Haemophilus influenzae\* type b \(Hib\) Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Haemophilus-Influenzae-type-B.aspx)

(<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Haemophilus-Influenzae-type-B.aspx>).

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 2. Number of reported invasive *Haemophilus influenzae* disease cases <5 years of age by age, sex, race/ethnicity and serotype – California, 2016\*

	Cases	Percent of Cases
<b>Total</b>		
California	42	100
<b>Age, in years</b>		
< 1	25	60
1-4	17	40
<b>Sex</b>		
Female	15	36
Male	27	64
<b>Race/Ethnicity*</b>		
American Indian or Alaskan Native	0	0
Asian or Pacific Islander	5	12
Black or African American	2	5
Hispanic or Latino	18	43
White	11	26
Other or Multiple Race	2	5
<b>Serotype</b>		
a	9	21
b (Hib)	1	2
c	0	0
e	0	0
f	2	5
Other [a, c-f (non-b)]	3	7
Nontypeable	17	41
Unknown	10	24

\* In 2016, cases < 5 years of age are reportable.

† 4 cases had unknown race/ethnicity.

## Hepatitis A Infection

Hepatitis A virus (HAV) infection rates have declined significantly since the introduction of hepatitis A vaccine in 1995. Hepatitis A vaccine is routinely recommended for children 12-24 months of age. Vaccination is also recommended for persons at increased risk of HAV infection, including travelers to countries where HAV is common, men who have sex with men, users of illicit injection and noninjection drugs, people with chronic liver disease or clotting-factor disorders, and people who are close contacts of infected persons.

In 2016, there was a multi-state outbreak linked to frozen strawberries imported from Egypt. A total of 143 cases were reported in nine states, including one case in California. Most of the 143 outbreak-associated case-patients reported eating smoothies containing strawberries that were purchased out of state. In October, the International Company for Agricultural Production and Processing (ICAPP) recalled frozen strawberries, which were distributed to food service establishments nationwide, including numerous facilities in California. Outbreaks involving frozen berries and other food products continue to be identified in the United States and other countries.

### Surveillance Case Definition (2012)

California healthcare providers are required to report known or suspected cases of hepatitis A infection to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all confirmed hepatitis A cases to CDPH using the following case definition:

#### Clinical Case Definition

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 a) jaundice, or b) elevated serum alanine aminotransferase (ALT) or aspartate aminotransferase (AST) levels.

#### Laboratory Criteria for Diagnosis

Immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) positive.

#### Case Classification

##### **Confirmed:**

- A case that meets the clinical case definition and is laboratory confirmed; OR
- A case that meets the clinical case definition and occurs in a person who has an epidemiologic link with a person who has laboratory-confirmed hepatitis A (i.e., household or sexual contact with an infected person during the 15-50 days before the onset of symptoms)

### Epidemiologic Summary

In 2016, 232 hepatitis A cases were reported statewide in 35 (57%) of 61 LHJs (Table 3). The statewide incidence of reported hepatitis A infection in 2016 was 0.59 cases per 100,000 population (Table 4). This was a 28% increase in cases from the previous year, when 181 cases were reported in 38 (62%) of 61 LHJs at a rate of 0.46 cases per 100,000 population.

Of the 232 case-patients with disease onset in 2016, 119 (51%) were hospitalized. No deaths were reported.



## Vaccine-Preventable Disease Surveillance in California, 2016

Table 3. Reported hepatitis A cases by local health jurisdiction – California, 2015–2016

	2015	2016
CALIFORNIA	181	232
Alameda	6	9
City of Berkeley*	0	0
Alpine	0	0
Amador	0	0
Butte	1	2
Calaveras	1	1
Colusa	0	0
Contra Costa	6	6
Del Norte	1	0
El Dorado	1	1
Fresno	0	10
Glenn	0	0
Humboldt	1	1
Imperial	1	3
Inyo	0	0
Kern	5	0
Kings	1	0
Lake	1	1
Lassen	0	0
Los Angeles	33	67
City of Long Beach*	3	4
City of Pasadena*	1	2
Madera	1	0
Marin	1	0
Mariposa	0	0
Mendocino	0	0
Merced	0	1
Modoc	0	0
Mono	0	1
Monterey	1	0
Napa	9	0
Nevada	0	0
Orange	17	26
Placer	3	2
Plumas	0	0
Riverside	13	9
Sacramento	3	12
San Benito	0	0
San Bernardino	4	5
San Diego	22	26
San Francisco	5	3
San Joaquin	7	3
San Luis Obispo	0	2
San Mateo	2	1
Santa Barbara	2	1
Santa Clara	6	8
Santa Cruz	0	1
Shasta	0	1
Sierra	0	0
Siskiyou	0	1
Solano	1	5
Sonoma	3	4
Stanislaus	3	3
Sutter	1	0
Tehama	1	0
Trinity	0	0
Tulare	5	1
Tuolumne	0	0
Ventura	3	8
Yolo	4	1
Yuba	2	0

\*City health jurisdictions not included in county total.

The median age of all cases in 2016 was 40 years (range: 7-102 years). Persons aged 31-40 years had the highest rate of hepatitis A infection per 100,000 population (1.02), followed by persons aged 41-50 years (0.83). There were 11 cases in children under the age of 18 years, accounting for 5% of all confirmed cases. Of these, four (36%) were hospitalized. Although all were old enough to be vaccinated, only two reported a previous history of hepatitis A vaccination.

Persons reported in the “Other” race/ethnicity group, which includes American Indians, Alaskan Natives, multi-racial and other race/ethnicities, had the highest rate of HAV infection per 100,000 population (0.72), followed by non-Hispanic whites (0.64) and Asian and Pacific Islanders (0.52). Males became infected with hepatitis A in 2016 at a higher rate per 100,000 population than females (0.70 and 0.48, respectively).

Foreign travel to hepatitis A endemic areas was the most common risk factor identified in 2016 cases, with 92 (40%) of all cases reporting foreign travel during their exposure period (2-7 weeks prior to disease onset) [Figure 1]. Other risk factors included consuming raw or undercooked shellfish (48; 21%), being a male who has sex with men (16 of 137 reported male cases; 12%), illicit drug use (15; 6%), close contact with a person with hepatitis A infection (9; 4%), and homelessness (7; 3%). These categories are not mutually exclusive as some cases had more than one known risk factor. No known reason for infection or significant risk factors were identified in 91 (39%) of all cases reported in 2016.

For more information about hepatitis A infection, please visit the [CDPH Hepatitis A Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-A.aspx>).

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 4. Reported hepatitis A cases by age, sex, and race/ethnicity – California, 2016

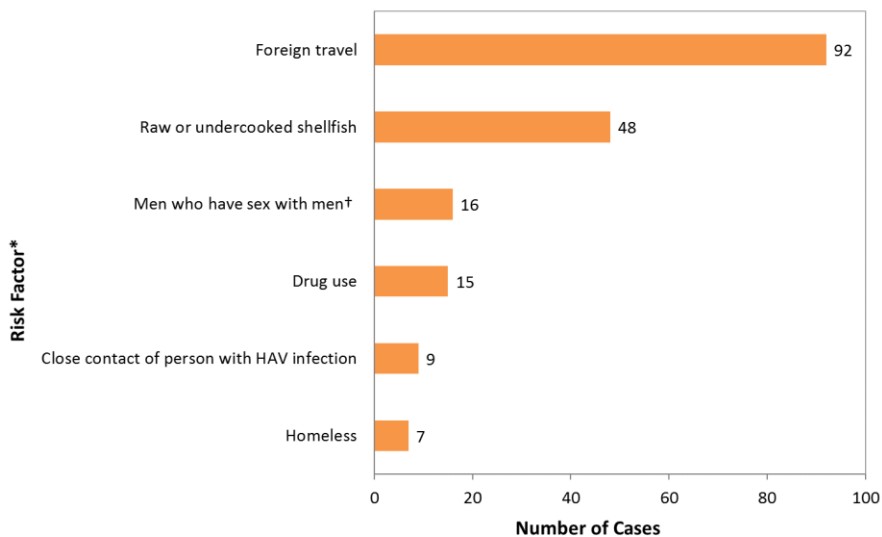
	Cases	Percent of Cases	Rate per 100,000 pop.
<b>Total</b>			
California	232	100	0.59
<b>Age, in years*†</b>			
< 2	0	0	0.00
2-5	0	0	0.00
6-10	3	1	0.12
11-20	17	7	0.33
21-30	43	19	0.76
31-40	55	24	1.02
41-50	43	19	0.83
≥ 51	71	31	0.58
<b>Sex†</b>			
Female	95	41	0.48
Male	137	59	0.70
<b>Race/Ethnicity†</b>			
Asian or Pacific Islander	28	12	0.52
Black or African American	6	3	0.27
Hispanic or Latino	63	27	0.41
White	96	41	0.64
Other‡	9	4	0.72

\* Most persons 2-18 years old should have been vaccinated according to previous and current ACIP recommendations.

† 30 cases had unknown race/ethnicity.

‡ Other includes American Indian or Alaskan Native, multiple race, and other race/ethnicity.

Figure 1. Reported risk factors of hepatitis A cases – California, 2016



\*Categories are not mutually exclusive; some cases had more than one risk factor

† A total of 137 hepatitis A cases were reported among males in 2016

## Hepatitis B Infection, Acute

Hepatitis B vaccine has been recommended for all infants since 1991. Vaccination is also recommended for people at increased risk for hepatitis B virus (HBV) infection, including: household or sexual contacts of infected persons, people with multiple sex partners, men who have sex with men, injection-drug users, healthcare and public safety personnel with occupational risk of exposure, dialysis patients, persons with diabetes mellitus, HCV infection, chronic liver disease, HIV infection, incarcerated persons, and travelers to countries where HBV infection is common.

Although the incidence of acute HBV infection has decreased dramatically due to universal childhood vaccination, it remains a major health issue in the United States. More than 850,000 persons are estimated to have chronic HBV infection and many persons with acute HBV infection are asymptomatic and undiagnosed. Therefore, data on reported acute HBV cases do not represent the complete burden or the actual number of new HBV infections. The current epidemics of heroin and opioid use are of concern and have resulted in transmission of HBV via the use of contaminated needles.

### Surveillance Case Definition (2012)

California healthcare providers are required to report known or suspected cases of acute HBV infection to the LHD, in accordance with Title 17 of the California Code of Regulations.

#### **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 a) jaundice, or b) elevated serum alanine aminotransferase (ALT) levels >100 IU/L.

#### **Laboratory Criteria**

- Hepatitis B surface antigen (HBsAg) positive; AND
- Immunoglobulin M (IgM) antibody to hepatitis B core antigen (IgM anti-HBc) positive (if done)

#### **Case Classification**

##### **Confirmed:**

- Case that meets the clinical case definition, is laboratory confirmed, and is not known to have chronic hepatitis B

\*A documented negative HBsAg laboratory test result within 6 months prior to a positive test (either HBsAg, HBeAg, or hepatitis B virus nucleic acid testing (HBV NAT) including genotype) result does not require an acute clinical presentation to meet the surveillance case definition.

### Epidemiologic Summary

In 2016, 118 cases of acute HBV infection were reported statewide in 26 (43%) of 61 LHJs, a 26% decrease from the previous year (Table 5). The overall incidence rate for 2016 was 0.30 cases per 100,000 population (Table 6), compared to 0.41 cases per 100,000 population in 2015. In 2016, rates were highest for persons aged 50–59 years (0.66 cases per 100,000 population) and 40–49 years (0.60 cases per 100,000 population); no acute HBV cases were reported among children or adolescents aged ≤19 years (see page 14 for information on perinatal hepatitis B cases). The median age of the 118 patients was 48 years (range: 22–85 years); 85 (72%) were male. Non-Hispanic white and Hispanic persons accounted for 32% and 28% of cases, respectively. Of the 118 patients, 62 (53%) were hospitalized and 1 (1%) died.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 5. Reported acute hepatitis B cases by local health jurisdiction – California, 2015–2016

	2015	2016
CALIFORNIA	159	118
Alameda	2	11
City of Berkeley*	0	0
Alpine	0	0
Amador	0	0
Butte	3	1
Calaveras	0	0
Colusa	0	0
Contra Costa	7	6
Del Norte	0	0
El Dorado	2	1
Fresno	4	4
Glenn	0	0
Humboldt	0	1
Imperial	0	0
Inyo	0	0
Kern	7	3
Kings	0	0
Lake	0	0
Lassen	0	0
Los Angeles†	51	42
City of Long Beach*	4	3
City of Pasadena*	1	2
Madera	2	0
Marin	0	1
Mariposa	0	0
Mendocino	0	0
Merced	0	0
Modoc	0	0
Mono	0	0
Monterey	3	0
Napa	0	0
Nevada	0	0
Orange	10	5
Placer	2	0
Plumas	0	0
Riverside	2	2
Sacramento	3	9
San Benito	0	0
San Bernardino	13	4
San Diego	12	3
San Francisco	4	2
San Joaquin	4	3
San Luis Obispo	0	0
San Mateo	5	1
Santa Barbara	0	1
Santa Clara	4	4
Santa Cruz	0	0
Shasta	0	0
Sierra	0	0
Siskiyou	0	1
Solano	1	1
Sonoma	2	2
Stanislaus	4	0
Sutter	1	0
Tehama	0	0
Trinity	0	0
Tulare	1	0
Tuolumne	0	0
Ventura	3	4
Yolo	1	1
Yuba	1	0

\*City health jurisdictions not included in county total.

Of the 118 patients, 50 (42%) reported one or more exposures or behaviors associated with acute HBV infection during their exposure period (45–160 days prior to illness onset) [Figure 2]. These exposures or behaviors included: multiple sex partners (22; 19%), being a man who has sex with men (18 of 85 reported male cases; 21%), injection-drug use (10; 8%), sexual contact with a person with confirmed or suspected HBV infection (6; 5%), and household contact of a person with confirmed or suspected HBV infection (4; 3%).

In addition, 8 (7%) cases reported a history of an accidental needlestick/puncture or other percutaneous injury involving exposure to blood. Six (5%) cases reported having surgery during their exposure period, but the source of their infection could not be determined.

For more information about acute HBV infection, please visit the [CDPH Hepatitis B Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-B.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Hepatitis-B.aspx>).

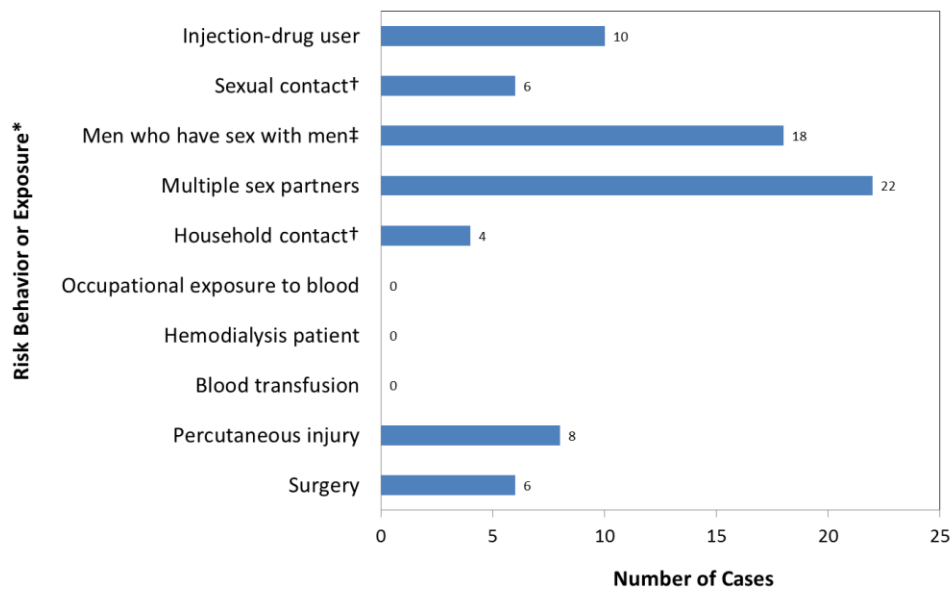
Table 6. Number and incidence rate of reported acute hepatitis B cases, by age, sex, and race/ethnicity – California, 2016

	Cases	Percent of Cases	Rate per 100,000 pop.
<b>Total</b>			
California	118	100	0.30
<b>Age, in years*</b>			
< 10	0	0	0.00
10-19	0	0	0.00
20-29	9	8	0.16
30-39	26	22	0.48
40-49	31	26	0.60
50-59	34	29	0.66
≥ 60	18	15	0.24
<b>Sex</b>			
Female	33	28	0.17
Male	85	72	0.43
<b>Race/Ethnicity†</b>			
American Indian or Alaskan Native	0	0	0.00
Asian or Pacific Islander	9	8	0.17
Black or African American	25	21	1.11
Hispanic or Latino	33	28	0.21
White	38	32	0.25
Other or Multiple Race	4	3	0.37

\* Most persons born after 1990 should have been vaccinated according to current and previous ACIP recommendations. ACIP began recommending hepatitis B vaccine for all infants in 1991.

† 9 cases had unknown race/ethnicity.

Figure 2. Reported risk behaviors/exposures for acute hepatitis B cases – California, 2016



\* Categories are not mutually exclusive; some cases had more than one risk behavior/exposure

† Contact with a person with confirmed or suspected hepatitis B

‡ A total of 85 acute hepatitis B cases were reported among males in 2016

## Perinatal Hepatitis B Infection

Administration of postexposure prophylaxis (PEP) at birth to infants of women with chronic HBV infection has reduced the number of infants infected with HBV. Unfortunately, even with appropriate PEP, a small percentage of infants born to infected women become infected and eventually develop chronic hepatitis B infection. It is now thought that a high maternal HBV viral load during pregnancy can result in perinatal transmission even when appropriate PEP is administered to the infant. To ensure that HBV-infected pregnant women with high viral loads are identified, the American Congress of Obstetricians and Gynecologists (ACOG) now recommends HBV DNA screening of all HBV-infected pregnant women and referral of women with HBV DNA >20,000 IU/mL to a specialist for possible antiviral treatment during pregnancy. For more information, see page 2 of the [ACOG Screening and Referral Algorithm for HBV Infection among Pregnant Women](http://immunizationforwomen.org/uploads/Prenatal%20HBsAg%20Testing%20Guide%20and%20Algorithm_Final.pdf)

([http://immunizationforwomen.org/uploads/Prenatal%20HBsAg%20Testing%20Guide%20and%20Algorithm\\_Final.pdf](http://immunizationforwomen.org/uploads/Prenatal%20HBsAg%20Testing%20Guide%20and%20Algorithm_Final.pdf)).

Infected infants are reported to CDPH using the criteria as outlined below.

### Surveillance Case Definition (1995)

California healthcare providers are required to report known or suspected cases of perinatal hepatitis B infection to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all confirmed perinatal hepatitis B infection cases to CDPH using the following case definition:

#### Case Classification

##### **Confirmed:**

- HBsAg positivity in any infant aged >1-24 months who was born in the United States or in U.S. territories to an HBsAg-positive mother

### Epidemiologic Summary

In 2016, 14 cases of perinatal hepatitis B infection were reported statewide. Three of the 14 children were born in 2014, nine were born in 2015, and two were born in 2016. The range of ages for the case-patients at the time of diagnosis was 9 to 20 months of age. All of the children received appropriate PEP at birth and at least three doses of hepatitis B vaccine. Two additional cases of hepatitis B infection were reported to CDPH in children 24 months of age and older (24 months and 34 months). These patients were classified as chronic hepatitis B cases according to the CSTE case definition.

For more information about perinatal hepatitis B infection, please visit the [CDPH Perinatal Hepatitis B Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Perinatal.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Perinatal.aspx>).

## Measles

Measles virus is highly contagious via the airborne route. Two doses of measles-containing vaccine are recommended as part of the routine childhood immunization schedule. After one dose of vaccine, approximately 95% of people will be protected against measles, and after two doses more than 99% will be protected against measles. Although endemic transmission of measles was declared eliminated in the United States in 2000, measles still circulates in many parts of the world and continues to be imported into the United States by susceptible persons traveling from measles-endemic areas.

In 2016 and early 2017 a measles outbreak involving a religious community occurred in California, resulting in 24 confirmed cases of measles. The majority of patients were unvaccinated. Transmission occurred in schools, households, and during religious events.

### Surveillance Case Definition (2013)

California healthcare providers are required to report known or suspected cases of measles to the LHD, in accordance with Title 17 of the California Code of Regulations using the following case definition:

#### **Clinical Description**

An acute illness characterized by:

- Generalized, maculopapular rash lasting  $\geq 3$  days; AND
- Temperature  $\geq 101^{\circ}\text{F}$  or  $38.3^{\circ}\text{C}$ ; AND
- Cough, coryza, or conjunctivitis.

#### **Case Classification**

##### ***Probable:***

In the absence of a more likely diagnosis, an illness that meets the clinical description with:

- No epidemiologic linkage to a laboratory-confirmed measles case; AND
- Noncontributory or no measles laboratory testing.

##### ***Confirmed:***

An acute febrile rash illness<sup>†</sup> with:

- Isolation of measles virus<sup>‡</sup> from a clinical specimen; OR
- Detection of measles-virus specific nucleic acid<sup>‡</sup> from a clinical specimen using polymerase chain reaction; OR
- Immunoglobulin G (IgG) antibody seroconversion<sup>‡</sup> or a significant rise in measles IgG antibody<sup>‡</sup> using any evaluated and validated method; OR
- A positive serologic test for measles immunoglobulin M (IgM) antibody<sup>‡§</sup>; OR
- Direct epidemiologic linkage to a case confirmed by one of the methods above.

<sup>†</sup> Temperature does not need to reach  $\geq 101^{\circ}\text{F}/38.3^{\circ}\text{C}$  and rash does not need to last  $\geq 3$  days.

<sup>‡</sup> Not explained by MMR vaccination during the previous 6-45 days.

<sup>§</sup> Not otherwise ruled out by other confirmatory testing or more specific measles testing in a public health laboratory.

### Epidemiologic Summary

In 2016, 24 measles cases were reported statewide from 5 (8%) of 61 LHJs (Table 7). Eighteen (75%) of the 24 cases were associated with an outbreak among members of a religious group. Of the remaining six cases not associated with the outbreak: three had international travel during their exposure period

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 7. Reported measles cases by local health jurisdiction† – California, 2015–2016

	2015	2016
CALIFORNIA	125	24
Alameda*	5	0
City of Berkeley*	1	0
Alpine	0	0
Amador	0	0
Butte	0	0
Calaveras	0	0
Colusa	0	0
Contra Costa	1	0
Del Norte	0	0
El Dorado	0	0
Fresno	0	0
Glenn	0	0
Humboldt	0	0
Imperial	0	0
Inyo	0	0
Kern	0	0
Kings	0	0
Lake	0	0
Lassen	0	0
Los Angeles*	28	18
City of Long Beach*	2	0
City of Pasadena*	3	0
Madera	0	0
Marin	2	0
Mariposa	0	0
Mendocino	0	0
Merced	1	0
Modoc	0	0
Mono	0	0
Monterey	0	0
Napa	0	0
Nevada	0	3
Orange	33	0
Placer	0	0
Plumas	0	0
Riverside	7	0
Sacramento	0	0
San Benito	0	0
San Bernardino	11	0
San Diego	12	0
San Francisco	0	0
San Joaquin	0	0
San Luis Obispo	0	0
San Mateo	4	0
Santa Barbara	0	1
Santa Clara	3	1
Santa Cruz	0	0
Shasta	0	0
Sierra	0	0
Siskiyou	0	0
Solano	1	0
Sonoma	0	0
Stanislaus	0	0
Sutter	0	0
Tehama	0	0
Trinity	0	0
Tulare	0	1
Tuolumne	0	0
Ventura	10	0
Yolo	1	0
Yuba	0	0

†Local health jurisdiction where case was identified.

\*City health jurisdictions not included in county total.

(Table 8), two had contact with a patient with rash illness, and one had no identified source.

The median age of the cases was 14 years (range: 1-52 years). Dates of rash onset ranged from January 26, 2016 to December 31, 2016.

Twenty-two (92%) of 24 cases had measles virus detected in a clinical specimen.

Of the 24 cases with disease onset in 2016, 2 (8%) were hospitalized (Table 9). Two case-patients reported complications; one had otitis media and one had diarrhea. The last fatal measles case in California was reported in 2003.

Sixteen (67%) of the 2016 measles cases were unvaccinated; among these, 14 were outbreak-related. All unvaccinated measles case-patients were age-eligible for vaccination (Table 10).

For more information about measles, please visit the [CDPH Measles Webpage](#)

(<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/measles.aspx>).

Table 8. Countries visited during incubation period reported by measles cases with history of international travel – California, 2016

Country/Region	Number Reporting Travel
India	1
Saudi Arabia	1
Western Europe	1



## Vaccine-Preventable Disease Surveillance in California, 2016

Table 9. Characteristics of measles cases – California, 2016

	Cases	Percent of Cases
<b>Total</b>		
California	24	100
<b>Age, in years</b>		
< 1	0	0
1-4	3	13
5-19	16	67
≥ 20	5	21
<b>Sex</b>		
Female	8	33
Male	16	67
<b>Hospitalized</b>		
Yes	2	8
No	22	92
<b>MMR Status</b>		
≥ 2 MMR	1	4
1 MMR	1	4
0 MMR	16	67
Unknown	6	25
<b>Source*</b>		
International	21	88
Indigenous	3	13
<b>Genotype†</b>		
B3	1	5
D8	20	95

\* Definition for importation status can be found here:  
<https://www.cdc.gov/nndss/conditions/measles/case-definition/2013/>

† Viral specimens were available for 22 patients; CDPH was unable to complete sequencing of 1 viral specimen.

Table 10. Measles cases by age and vaccination status – California, 2016

Age, in years	≥ 2 MMR	1 MMR	0 MMR	Unknown	Total Cases
< 2	0	1	1	0	2
2-5	0	0	2	0	2
6-17	0	0	12	0	12
18-54	1	0	1	6	8
≥ 55	1	0	0	0	0

## Meningococcal Disease

As many as 10% of adolescents and adults are asymptomatic carriers of the bacterium *Neisseria meningitidis*, however in some cases the bacteria can invade the body and manifest as meningitis or sepsis (meningococemia), or both. Almost all invasive meningococcal disease (IMD) is caused by one of five serogroups of *N. meningitidis*: A, B, C, Y, and W. A quadrivalent conjugate vaccine (MenACWY) which provides protection against infection due to serogroups A, C, Y, and W is routinely recommended for adolescents and other high risk persons. Two vaccines for serogroup B meningococcal disease (MenB) are available for children and adults 10-25 years of age and are routinely recommended for high-risk persons and for use during outbreaks. Adolescents and young adults 16-23 years of age may also be immunized with MenB vaccine.

The incidence of meningococcal disease in the United States is at an all-time low. However, outbreaks of meningococcal disease still occur. A serogroup C meningococcal disease outbreak among men who have sex with men occurred in southern California in 2016, and serogroup B meningococcal disease outbreaks occur among college students.

### Surveillance Case Definition (2015)

California healthcare providers and laboratories are required to report known or suspected cases of meningococcal disease to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all suspect, probable, and confirmed meningococcal disease cases to CDPH using the following case definition:

#### Case Classification

##### **Confirmed:**

- Detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., blood or cerebrospinal fluid [CSF]), using a validated polymerase chain reaction (PCR) assay; OR
- Isolation of *N. meningitidis*:
  - From a normally sterile body site (e.g., blood or CSF, or, less commonly, synovial, pleural, or pericardial fluid); OR
  - From purpuric lesions.

##### **Probable:**

- Detection of *N. meningitidis* antigen:
  - In formalin-fixed tissue by immunohistochemistry (IHC); OR
  - In CSF by latex agglutination.

##### **Suspected:**

- Clinical purpura fulminans in the absence of a positive blood culture; OR
- Gram-negative diplococci, not yet identified, isolated from a normally sterile body site (e.g., blood or CSF).

### Epidemiologic Summary

The incidence of IMD in California has declined over the past several decades (Figure 3). In 2016, 82 IMD cases were reported statewide, for an incidence rate of 0.21 cases per 100,000 population (Table 11). Of the 82 cases, 80 (98%) were serogrouped; serogroup C (36; 45%) was most frequently identified (Figure 4). Nine (11%) fatalities were reported in 2016.

## Vaccine-Preventable Disease Surveillance in California, 2016

Fourteen (17%) IMD cases occurred in infants and children less than 18 years of age, including one fatality (Table 12). The highest incidence of disease occurred in infants less than one year of age. Of the pediatric IMD cases with known serogroup, all were serogroup B (Figure 5). Vaccination status was known for ten patients with IMD ranging from 0-24 years of age caused by serogroups B (8), Y (1), or nongroupable (1). Among these patients, 5 (50%) had previously received at least one dose of MenACWY vaccine; 2 (20%) received at least one dose each of MenACWY and MenB, while vaccination type and dates were unknown for three patients. A serogroup B meningococcal disease outbreak occurred among students at a California university in 2016.

For more information about meningococcal disease, please visit the [CDPH Meningococcal Disease Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/meningococcal.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/meningococcal.aspx>).

Figure 3. Incidence of reported invasive meningococcal disease by year of onset – California, 1995–2016

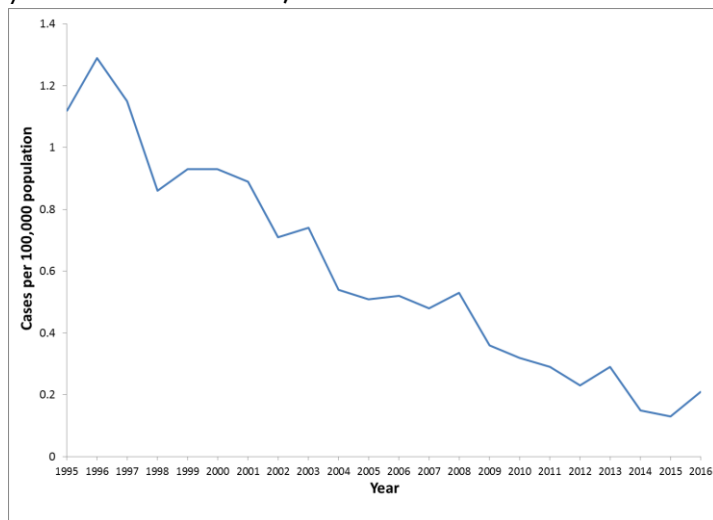
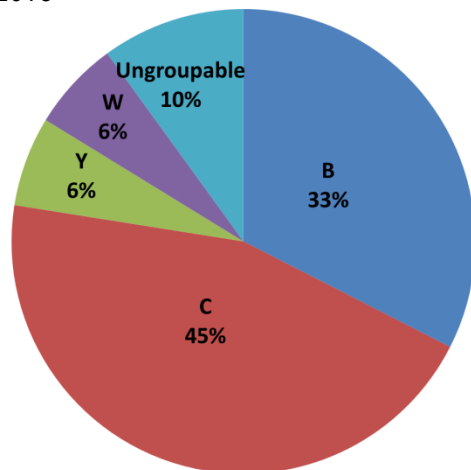


Figure 4. Invasive meningococcal disease cases by serogroup – California, 2016



\*2 (2%) cases had unknown serogroup

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 11. Reported invasive meningococcal disease by local health jurisdiction – California, 2015–2016

	2015†	2016
CALIFORNIA	49	82
Alameda*	2	5
City of Berkeley*	0	0
Alpine	0	0
Amador	0	0
Butte	0	1
Calaveras	0	0
Colusa	1	0
Contra Costa	1	1
Del Norte	0	0
El Dorado	0	0
Fresno	1	1
Glenn	0	0
Humboldt	1	0
Imperial	0	0
Inyo	0	0
Kern	0	1
Kings	0	0
Lake	0	0
Lassen	0	0
Los Angeles*	12	20
City of Long Beach*	0	8
City of Pasadena*	0	0
Madera	0	1
Marin	0	0
Mariposa	0	0
Mendocino	1	1
Merced	0	0
Modoc	0	0
Mono	0	0
Monterey	2	1
Napa	1	0
Nevada	0	0
Orange	2	11
Placer	0	0
Plumas	0	0
Riverside	2	0
Sacramento	2	7
San Benito	0	0
San Bernardino	2	1
San Diego	3	2
San Francisco	5	3
San Joaquin	1	1
San Luis Obispo	1	1
San Mateo	2	2
Santa Barbara	1	2
Santa Clara	1	3
Santa Cruz	0	0
Shasta	0	2
Sierra	0	0
Siskiyou	0	1
Solano	1	1
Sonoma	0	1
Stanislaus	1	0
Sutter	0	0
Tehama	0	0
Trinity	0	0
Tulare	1	0
Tuolumne	0	0
Ventura	1	2
Yolo	1	1
Yuba	0	1

\* City health jurisdictions not included in county total.

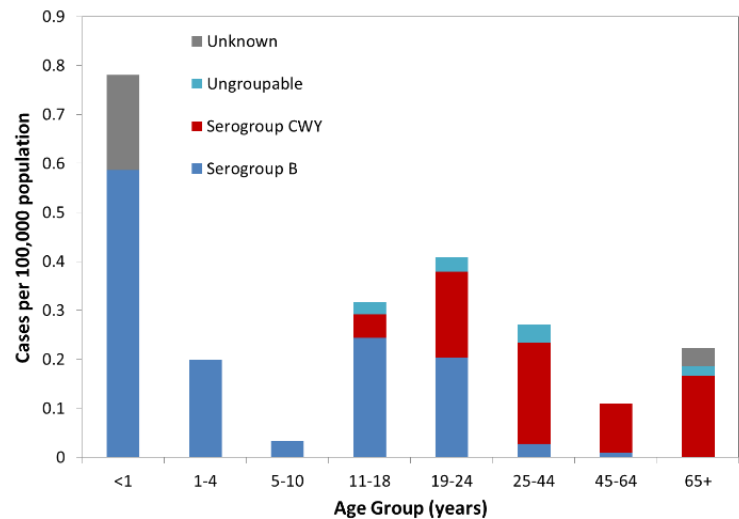
† In 2015, CSTE changed the meningococcal disease case definition.

Table 12. Number of reported invasive meningococcal disease cases by age, sex, race/ethnicity and serogroup – California, 2016

	All						
	Serogroups	B	C	Y	W	Ungroupable	Unknown
<b>Total</b>							
California	82	26	36	5	5	8	2
<b>Age, in years</b>							
< 1	4	3	0	0	0	1	0
1-4	1	1	0	0	0	0	0
5-10	1	1	0	0	0	0	0
11-18	13	10	1	1	0	1	0
19-24	14	7	6	0	0	1	0
25-44	26	3	18	0	1	4	0
45-64	11	1	7	1	2	0	0
≥ 65	12	0	4	3	2	1	2
<b>Sex</b>							
Female	29	10	8	2	5	3	1
Male	53	16	28	3	0	5	1
<b>Race/Ethnicity*</b>							
American Indian or Alaskan Native	1	0	1	0	0	0	0
Asian or Pacific Islander	5	1	2	0	2	0	0
Black or African American	8	1	4	1	0	2	0
Hispanic or Latino	23	5	12	3	0	2	1
White	34	17	12	1	2	1	1
Other or Multiple Race	3	0	1	0	0	2	0

\* 8 cases had unknown race/ethnicity.

Figure 5. Invasive meningococcal disease cases by age and serogroup\* – California, 2016



\*No serogroup A disease cases were identified.

## Mumps

Although mumps vaccine is recommended as part of the routine childhood vaccination schedule, protection may wane over time. Large mumps outbreaks among college students, most of whom have received two doses of measles, mumps and rubella (MMR) vaccine continue to occur in the United States.

### Surveillance Case Definition (2012)

California healthcare providers are required to report known or suspected cases of mumps to the LHD, in accordance with Title 17 of the California Code of Regulations using the following case definition:

#### Case Classification

##### **Suspected:**

- Parotitis, acute salivary gland swelling, orchitis, or oophoritis unexplained by another more likely diagnosis, OR
- A positive lab result with no mumps clinical symptoms (with or without epidemiological-linkage to a confirmed or probable case).

##### **Probable:**

- Acute parotitis or other salivary gland swelling lasting at least 2 days, or orchitis or oophoritis unexplained by another more likely diagnosis, in:
  - A person with a positive test for serum anti-mumps immunoglobulin M (IgM) antibody; OR
  - A person with epidemiologic linkage to another probable or confirmed case or linkage to a group/community defined by public health during an outbreak of mumps.

##### **Confirmed:**

- A positive mumps laboratory confirmation for mumps virus with reverse transcription polymerase chain reaction (RT-PCR) or culture in a patient with an acute illness characterized by any of the following:
  - Acute parotitis or other salivary gland swelling, lasting at least 2 days
  - Aseptic meningitis
  - Encephalitis
  - Hearing loss
  - Orchitis
  - Oophoritis
  - Mastitis
  - Pancreatitis

### Epidemiologic Summary

In 2016, 27 confirmed and 67 probable mumps cases were reported statewide (Table 13). A marked increase in mumps cases was observed nationally in 2016 with a number of outbreaks reported from several university campuses. The largest university outbreaks were from Illinois and Iowa.

In California, six outbreaks involving 31 patients were identified in 2016. Among these six outbreaks, two were associated with universities and four were associated with households (extended family or large household exposures). One of the household outbreaks involved adults 20-21 years of age residing in a congregate setting not associated with a university. Epidemiologic characteristics of probable and confirmed mumps cases appear in Table 14.

Reported complications include orchitis (n=15) and one patient with associated hearing loss. Prior to introduction of MMR vaccine, 1 in 20,000 cases of mumps resulted in permanent unilateral hearing loss.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 13. Reported confirmed and probable mumps cases by local health jurisdiction – California, 2015–2016

	2015	2016
CALIFORNIA	31	94
Alameda*	0	4
City of Berkeley*	0	4
Alpine	0	0
Amador	0	0
Butte	0	0
Calaveras	0	0
Colusa	0	0
Contra Costa	3	3
Del Norte	0	0
El Dorado	0	3
Fresno	0	0
Glenn	0	0
Humboldt	0	1
Imperial	0	1
Inyo	0	0
Kern	0	0
Kings	0	0
Lake	0	0
Lassen	0	0
Los Angeles*	14	18
City of Long Beach*	2	1
City of Pasadena*	0	0
Madera	0	0
Marin	0	0
Mariposa	0	0
Mendocino	0	0
Merced	0	0
Modoc	0	0
Mono	0	0
Monterey	1	1
Napa	0	0
Nevada	0	0
Orange	5	6
Placer	0	0
Plumas	0	0
Riverside	0	3
Sacramento	0	2
San Benito	0	0
San Bernardino	4	1
San Diego	0	23
San Francisco	2	9
San Joaquin	0	0
San Luis Obispo	0	1
San Mateo	0	1
Santa Barbara	0	2
Santa Clara	0	3
Santa Cruz	0	0
Shasta	0	0
Sierra	0	0
Siskiyou	0	0
Solano	0	1
Sonoma	0	1
Stanislaus	0	0
Sutter	0	0
Tehama	0	0
Trinity	0	0
Tulare	0	0
Tuolumne	0	0
Ventura	0	5
Yolo	0	0
Yuba	0	0

\* City health jurisdictions not included in county total.

Thirteen of the confirmed and probable cases reported international travel in their exposure period. Countries in which travel occurred included: Brazil (2), Ethiopia, Germany, Guatemala, India, Japan (2), Peru, Italy, Spain, Afghanistan, and China.

For more information about mumps, please visit the [CDPH Mumps Webpage](http://www.cdph.ca.gov/HealthInfo/discond/Pages/Mumps.aspx) (<http://www.cdph.ca.gov/HealthInfo/discond/Pages/Mumps.aspx>).

Table 14. Characteristics of mumps cases – California, 2016

	Cases	Percent of Cases
<b>Total</b>		
California	94	100
<b>Age, in years</b>		
< 1	0	0
1-4	7	7
5-19	8	9
≥ 20	79	84
<b>Sex</b>		
Female	45	48
Male	49	52
<b>Case Classification</b>		
Probable	66	70
Confirmed	28	30
<b>Hospitalized*</b>		
Yes	7	10
No	64	90
<b>Source†‡</b>		
International	13	15
Indigenous	73	85

\* 23 cases had unknown hospitalization status.

† 8 cases had unknown source.

‡ Importation status definition is located here: <https://wwwn.cdc.gov/nndss/conditions/mumps/case-definition/2012/>

## Pertussis

An increase in pertussis incidence in the United States has occurred in recent years. One factor thought to be associated with this increase is the use of acellular pertussis vaccines, which have been in use since the late 1990s. It is now known that the immunity conferred by acellular pertussis vaccines does not provide protection as long as the whole cell vaccines that preceded them. Pertussis peaks every 3 to 5 years. In 2014, California experienced an epidemic of pertussis that caused over 11,000 cases, including 3 infant deaths. This was the highest number of pertussis cases reported in California in over 60 years.

### Surveillance Case Definition (2014)

California healthcare providers are required to report known or suspected cases of pertussis to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all suspect, probable, and confirmed pertussis cases to CDPH using the following case definition:

#### **Clinical Case Definition**

In the absence of a more likely diagnosis, a cough illness lasting  $\geq 2$  weeks with at least one of the following:

- Paroxysms of coughing; OR
- Inspiratory “whoop”; OR
- Post-tussive vomiting; OR
- Apnea (with or without cyanosis) (FOR INFANTS AGED <1 YEAR ONLY)

#### **Case Classification**

##### **Confirmed:**

- An acute cough illness of any duration with isolation of *B. pertussis* from a clinical specimen; OR
- A case that meets the clinical case definition and is confirmed by detection of *B. pertussis*-specific nucleic acid by polymerase chain reaction (PCR); OR
- A case that meets the clinical case definition and is epidemiologically-linked directly to a laboratory-confirmed case of pertussis.

##### **Probable:**

- A case that meets the clinical case definition and is not laboratory-confirmed with culture or PCR and is not epidemiologically-linked directly to a confirmed case;

OR, FOR INFANTS AGED <1 YEAR ONLY:

- Acute cough illness of any duration, with at least one of the following:
  - Paroxysms of coughing; OR
  - Inspiratory “whoop”; OR
  - Post-tussive vomiting; OR
  - Apnea (with or without cyanosis); AND at least one of the following:
    - PCR positive for pertussis
    - Contact to a laboratory-confirmed case of pertussis

##### **Suspect (reportable in California, only):**

- An acute cough illness of any duration with detection of *B. pertussis*-specific nucleic acid by PCR; OR
- An acute cough illness of any duration with at least one of the following: paroxysms of coughing, inspiratory “whoop”, or post-tussive vomiting, that is epidemiologically-linked directly to a confirmed case.

**Epidemiologic Summary**

In 2016, 1,938 pertussis cases were reported statewide in 51 (84%) of 61 LHJs. This was a significant decrease from the previous year, when 4,706 cases were reported in 54 (89%) LHJs and consistent with the cyclical nature of pertussis (Table 15). The statewide incidence of reported pertussis in 2016 was 4.9 cases per 100,000 population.

Of the 1,938 cases with disease onset in 2016, 116 (6%) were hospitalized. Two fatalities with disease onset in 2016 were reported; both were infants less than 2 months of age at time of disease onset. The median age of all cases in 2016 was 11 years (range: 1 day–101 years). The majority of cases (1,599; 83%) occurred in children less than 18 years of age. Of the 1,599 pediatric cases, 118 (7%) were in infants less than 4 months of age who are too young to be fully vaccinated (Figure 6). Pregnant women are recommended to receive Tdap at the earliest opportunity between 27 and 36 weeks gestation of each pregnancy to protect their infants from pertussis. Among the 93 mothers of case infants less than 4 months of age with complete information, 63 (68%) did not receive a maternal Tdap during the correct timeframe of their pregnancy. Of the 118 cases less than 4 months of age, 51 (43%) were hospitalized (Table 16). Thirty-six (71%) of the 51 hospitalized cases less than 4 months of age were among infants of women who did not receive a maternal Tdap during the correct timeframe. Adolescents 14–17 years of age accounted for 487 (30%) of the pediatric cases; however only 1 (<1%) required hospitalization.

Of 1,481 pediatric cases aged 4 months–17 years, 1,208 (82%) were known to have previously received at least one dose of pertussis vaccine prior to illness onset, 109 (7%) were unimmunized against pertussis, and 164 (11%) had unknown pertussis vaccine history information.

Table 15. Reported pertussis cases by local health jurisdiction – California, 2015–2016

	2015	2016
California	4706	1938
Alameda*	179	78
City of Berkeley*	10	4
Alpine	0	0
Amador	2	2
Butte	8	2
Calaveras	1	2
Colusa	4	0
Contra Costa	181	49
Del Norte	0	0
El Dorado	27	9
Fresno	57	16
Glenn	2	1
Humboldt	56	1
Imperial	10	4
Inyo	0	0
Kern	146	27
Kings	6	7
Lake	6	1
Lassen	0	0
Los Angeles*	1141	310
City of Long Beach*	36	13
City of Pasadena*	7	4
Madera	6	3
Marin	53	30
Mariposa	0	1
Mendocino	9	8
Merced	13	1
Modoc	0	0
Mono	0	0
Monterey	76	16
Napa	49	5
Nevada	3	42
Orange	162	69
Placer	49	17
Plumas	2	0
Riverside	182	82
Sacramento	287	71
San Benito	7	9
San Bernardino	91	32
San Diego	896	390
San Francisco	69	9
San Joaquin	81	4
San Luis Obispo	22	29
San Mateo	40	109
Santa Barbara	66	10
Santa Clara	149	233
Santa Cruz	79	46
Shasta	15	25
Sierra	0	0
Siskiyou	6	0
Solano	42	14
Sonoma	34	42
Stanislaus	38	13
Sutter	2	1
Tehama	5	4
Trinity	6	1
Tulare	86	13
Tuolumne	9	0
Ventura	107	35
Yolo	83	43
Yuba	3	1

\* City health jurisdictions not included in county total.

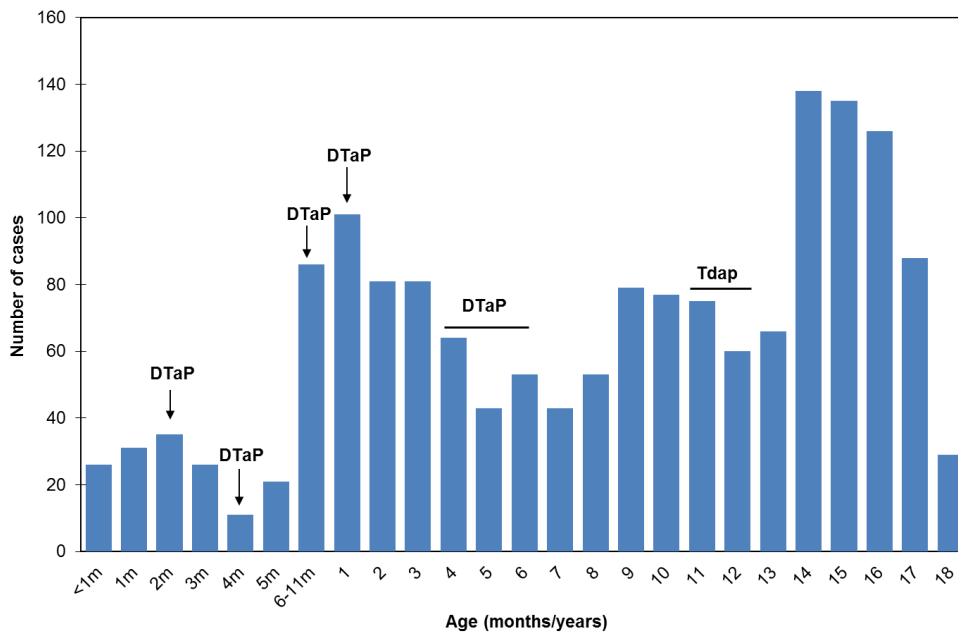


Incidence rates were highest for Hispanic and non-Hispanic white infants less than 4 months of age (Figure 7). Among older infants, children and adolescents, the highest rates were in non-Hispanic whites.

Of the 1,938 cases reported in 2016, 1,282 (66%) were classified as confirmed, 238 (12%) as probable, and 418 (22%) as suspect. Among cases with complete information, the most commonly reported symptoms were paroxysmal coughing (77%), post-tussive vomiting (41%), inspiratory “whoop” (27%) and apnea (15%).

For more information about pertussis, please visit the [CDPH Pertussis Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/pertussis.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/pertussis.aspx>).

Figure 6. Pediatric pertussis cases by age – California, 2016

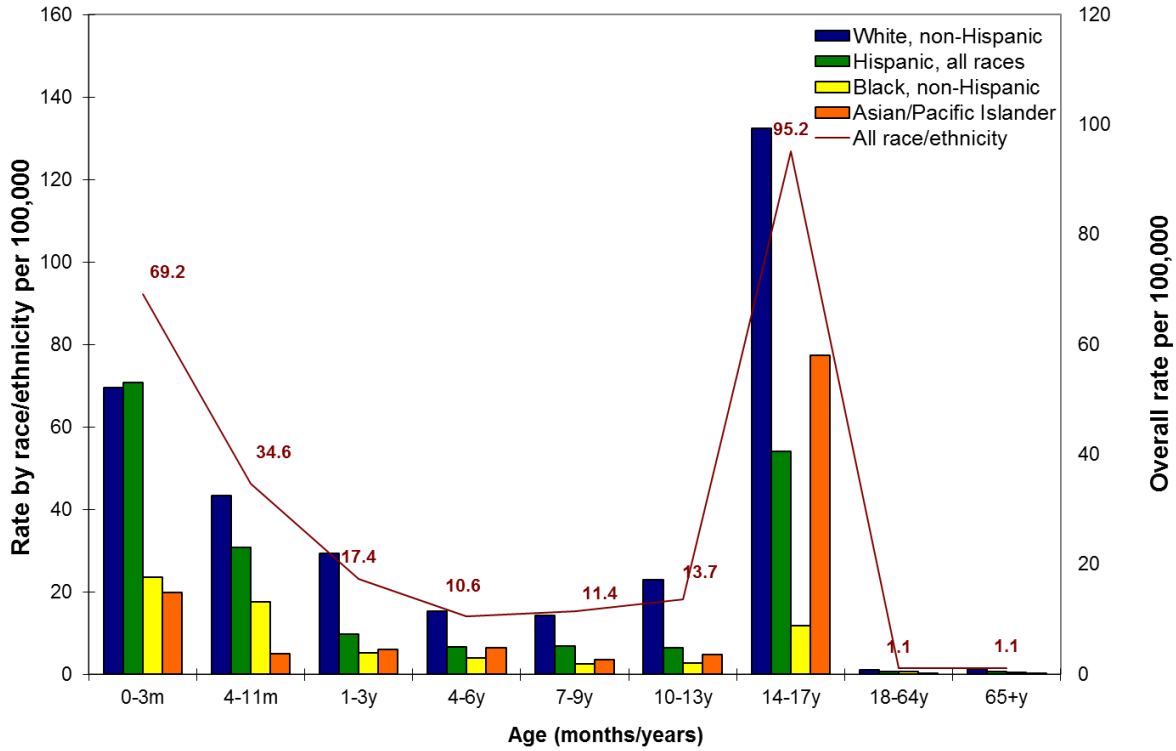


Annotations in black indicate recommended vaccine doses  
 DTaP=Diphtheria, tetanus, and acellular pertussis vaccine  
 Tdap=Tetanus, diphtheria, and acellular pertussis vaccine

Table 16. Number and proportion of pertussis hospitalizations and deaths reported among cases <4 months of age – California, 2014–2016

	2014		2015		2016	
	Cases	Percent of Cases	Cases	Percent of Cases	Cases	Percent of Cases
<b>Total</b>						
California	534		326		118	
<b>Hospitalizations</b>	282	53	179	55	51	43
<b>Deaths</b>	3	<1	1	<1	2	2

Figure 7. Pertussis incidence rates by age and race/ethnicity – California, 2016\*



\*Denominators adjusted to account for partial birth cohort

## Polio

Although poliovirus has been eradicated from most of the world, small numbers of wild polio cases are still being identified in Afghanistan, Nigeria, and Pakistan.

### Surveillance Case Definitions (2010)

California healthcare providers and laboratories are required to report known or suspected cases of poliovirus infection to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all probable and confirmed poliovirus infection cases to CDPH using the following case definition:

#### Case Definition (Nonparalytic poliovirus infection)

##### Case Classification

###### **Confirmed:**

Any person without symptoms of paralytic poliomyelitis in whom a poliovirus isolate was identified in an appropriate clinical specimen, with confirmatory typing and sequencing performed by the CDC Poliovirus Laboratory, as needed.

#### Case Definition (Paralytic poliovirus infection)

##### Case Classification

###### **Confirmed:**

- Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss; AND in which the patient has:
- A neurologic deficit 60 days after onset of initial symptoms; OR
- Died; OR
- Unknown follow-up status.

###### **Probable:**

Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss.

### Epidemiologic Summary

No cases of poliovirus infection were reported in California in 2016. There has been no indigenous transmission of wild poliovirus in California since at least 1978. The last imported wild poliovirus case in California occurred in 1986 and the last indigenous vaccine-associated paralytic poliomyelitis (VAPP) case in California occurred in 1998.

For more information about poliovirus infection, please visit the [CDPH Polio Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/polio.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/polio.aspx>).

## Rubella and Congenital Rubella Syndrome

Rubella was eliminated from the United States in 2004. In 2015, the Pan-American Health Organization of the World Health Organization announced that endemic transmission of rubella in the Americas had ended and that the Americas are rubella-free. However, rubella continues to circulate in other parts of the world and susceptible travelers may become infected. One dose of rubella containing vaccine is sufficient to confer protection to rubella infection. The two-dose MMR vaccine series is recommended as part of the routine U.S. childhood immunization schedule.

### Rubella Surveillance Case Definition (2013)

California healthcare providers are required to report known or suspected cases of rubella to the LHD, in accordance with Title 17 of the California Code of Regulations using the following case definition:

#### Case Classification

##### **Confirmed:**

- A case with or without symptoms who has laboratory evidence of rubella infection confirmed by one or more of the following laboratory tests:
  - Isolation of rubella virus; OR
  - Detection of rubella-virus specific nucleic acid by polymerase chain reaction; OR
  - IgG seroconversion<sup>†</sup> or a significant rise between acute- and convalescent-phase titers in serum rubella IgG antibody level by any standard serologic assay; OR
  - Positive serologic test for rubella IgM antibody<sup>†\*</sup>; **OR**
- An illness characterized by all of the following:
  - Acute onset of generalized maculopapular rash; AND
  - Temperature greater than 99.0°F or 37.2°C; AND
  - Arthralgia, arthritis, lymphadenopathy, or conjunctivitis; AND
  - Epidemiologic linkage to a laboratory-confirmed case of rubella.

##### **Probable:**

In the absence of a more likely diagnosis, an illness characterized by all of the following:

- Acute onset of generalized maculopapular rash; AND
- Temperature greater than 99.0°F or 37.2°C, if measured; AND
- Arthralgia, arthritis, lymphadenopathy, or conjunctivitis; AND
- Lack of epidemiologic linkage to a laboratory-confirmed case of rubella; AND
- Noncontributory or no serologic or virologic testing.

##### **Suspected:**

Any generalized rash illness of acute onset that does not meet the criteria for probable or confirmed rubella or any other illness.

<sup>†</sup> Not explained by MMR vaccination during the previous 6-45 days.

\* Not otherwise ruled out by more specific testing in a public health laboratory.

### Congenital Rubella Syndrome Case Definition (2010)

#### Case Classification

##### **Confirmed:**

- An infant with at least one symptom (listed below) that is clinically consistent with congenital rubella syndrome; and laboratory evidence of congenital rubella infection as demonstrated by:
  - Isolation of rubella virus; OR

- Detection of rubella-specific immunoglobulin M (IgM) antibody; OR
- Infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e., rubella titer that does not drop at the expected rate of a twofold dilution per month); OR
- A specimen that is PCR positive for rubella virus

**Probable:**

- An infant without an alternative etiology that does not have laboratory confirmation of rubella infection but has at least 2 of the following\*:
  - Cataracts or congenital glaucoma\*;
  - Congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis);
  - Hearing impairment; OR
  - Pigmentary retinopathy; **OR**
- An infant without an alternative etiology that does not have laboratory confirmation of rubella infection but has at least one or more of the following:
  - Cataracts or congenital glaucoma\*;
  - Congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis);
  - Hearing impairment; OR
  - Pigmentary retinopathy; **AND one or more of the following:**
    - Purpura
    - Microcephaly
    - Meningoencephalitis
    - Hepatosplenomegaly
    - Developmental delay
    - Radiolucent bone disease
    - Jaundice

**Suspected:**

- An infant that does not meet the criteria for a probable or confirmed case but who has one or more of the following clinical findings:
  - Cataracts or congenital glaucoma
  - Pigmentary retinopathy
  - Microcephaly;
  - Purpura
  - Developmental delay
  - Congenital heart disease
  - Hepatosplenomegaly
  - Meningoencephalitis
  - Hearing impairment
  - Jaundice
  - Radiolucent bone disease

**Other Criteria (Infection Only):**

- An infant without any clinical symptoms or signs but with laboratory evidence of infection as demonstrated by:
  - Isolation of rubella virus; OR
  - Detection of rubella-specific IgM antibody; OR
  - Infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e. rubella titer that does not drop at the expected rate of a twofold dilution per month); OR
  - A specimen that is PCR positive for rubella virus.

\* In probable cases, either or both of the eye-related findings (cataracts and congenital glaucoma) count as a single complication. In cases classified as infection only, if any compatible signs or symptoms (e.g., hearing loss) are identified later, the case is reclassified as confirmed.

**Epidemiologic Summary**

In 2016, there were no reports of rubella infection or congenital rubella syndrome.

For more information about rubella, please visit the [CDPH Rubella Webpage](http://www.cdph.ca.gov/HealthInfo/discond/Pages/Rubella.aspx) (<http://www.cdph.ca.gov/HealthInfo/discond/Pages/Rubella.aspx>).

## Tetanus

Since the introduction of tetanus vaccines in the 1930s and 1940s, the number of tetanus cases reported in the U.S. has declined significantly. However, sporadic cases continue to be reported among adults, especially those who are unimmunized or who have not received a booster dose of tetanus toxoid containing vaccine within the prior 10 years.

### Surveillance Case Definition (2010)

California healthcare providers are required to report known or suspected cases of tetanus to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all probable tetanus cases to CDPH using the following case definition:

#### Case Classification

##### **Probable:**

In the absence of a more likely diagnosis, an acute illness with:

- Muscle spasms or hypertonia; AND
- Diagnosis of tetanus by a healthcare provider;

OR:

- Death, with tetanus listed on the death certificate as the cause of death or a significant condition contributing to death

### Epidemiologic Summary

One probable tetanus case was reported in California in 2016, in an unvaccinated child from Riverside County.

For more information about tetanus, please visit the [CDPH Tetanus Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Tetanus.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Tetanus.aspx>).

## Varicella Hospitalizations and Deaths

Although the incidence of varicella and varicella hospitalizations have decreased markedly since widespread use of varicella vaccine, hospitalizations and deaths due to varicella continue to occur, most often in children too young to be vaccinated or in susceptible, often immunocompromised, adults.

### Surveillance Case Definition (2010)

California healthcare providers are required to report known or suspected varicella hospitalizations and deaths to the LHD, in accordance with Title 17 of the California Code of Regulations. The LHDs report all confirmed and probable cases to CDPH using the following case definition:

#### **Case Classification**

##### **Confirmed:**

An acute illness with diffuse (generalized) maculo-papulovesicular rash, AND

- Epidemiologic linkage to another probable or confirmed case; OR
- Laboratory confirmation by any of the following:
  - Isolation of varicella-zoster virus (VZV) from a clinical specimen; OR
  - Varicella antigen detected by direct fluorescent antibody test (DFA); OR
  - Varicella-specific nucleic acid detected by polymerase chain reaction (PCR); OR
  - Significant rise in serum anti-varicella immunoglobulin G (IgG) antibody level by any serologic assay.

##### **Probable:**

An acute illness with diffuse (generalized) maculo-papulovesicular rash; AND

- Lack of laboratory confirmation; AND
- Lack of epidemiologic linkage to another probable or confirmed case.

### Epidemiologic Summary

In 2016, 48 probable and confirmed varicella-associated hospitalizations including two deaths were reported statewide (Table 17).

Of the 48 hospitalized cases in 2016, 15 (31%) were in persons aged 19 years and younger. Seven cases occurred in infants less than one year of age (Table 18) who were too young to be vaccinated.

Ten outbreaks, which are defined by CDPH as the occurrence of  $\geq 5$  varicella cases that are related in place and epidemiologically linked, were reported in the state in 2016.

For more information about varicella, please visit the [CDPH Varicella Webpage](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Varicella.aspx) (<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/Varicella.aspx>).

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 17. Reported varicella hospitalizations and deaths by local health jurisdiction – California, 2015–2016

	2015	2016
CALIFORNIA	60	48
Alameda*	10	0
City of Berkeley*	2	0
Alpine	0	0
Amador	0	0
Butte	1	0
Calaveras	0	0
Colusa	0	0
Contra Costa	0	2
Del Norte	0	0
El Dorado	0	0
Fresno	0	3
Glenn	0	0
Humboldt	0	0
Imperial	0	2
Inyo	0	0
Kern	0	0
Kings	0	0
Lake	1	0
Lassen	0	0
Los Angeles*	12	12
City of Long Beach*	0	1
City of Pasadena*	0	0
Madera	0	0
Marin	1	0
Mariposa	0	0
Mendocino	0	0
Merced	0	0
Modoc	0	0
Mono	0	0
Monterey	1	1
Napa	0	0
Nevada	0	0
Orange	10	5
Placer	0	1
Plumas	0	1
Riverside	5	0
Sacramento	2	5
San Benito	0	0
San Bernardino	3	4
San Diego	1	1
San Francisco	0	0
San Joaquin	0	2
San Luis Obispo	0	0
San Mateo	4	1
Santa Barbara	0	0
Santa Clara	3	4
Santa Cruz	1	0
Shasta	0	0
Sierra	0	0
Siskiyou	0	0
Solano	2	0
Sonoma	0	0
Stanislaus	0	0
Sutter	0	0
Tehama	0	0
Trinity	0	0
Tulare	0	1
Tuolumne	0	0
Ventura	0	2
Yolo	0	0
Yuba	1	0

\*City health jurisdictions not included in county total.

Table 18. Number of reported varicella hospitalizations and deaths by age and sex – California, 2016

	Cases	Percent of Cases
<b>Total</b>		
Hospitalizations	48	100
Deaths	2	4
<b>Age, in years</b>		
< 1	7	15
1-4	2	4
5-19	6	13
20-29	8	17
30-39	11	23
40-49	5	10
≥ 50	9	19
<b>Sex</b>		
Female	19	40
Male	29	60



## SELECTED RESOURCES

### The California Department of Public Health Immunization Branch's Website

<https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/immunize.aspx>

Visit the Immunization Branch website for information related to immunizations or vaccine-preventable diseases.

### CDC Pink Book

<http://www.cdc.gov/vaccines/pubs/pinkbook/index.html>

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Hamborsky J, Kroger A, Wolfe S, eds. 13<sup>th</sup> ed. Washington D.C. Public Health Foundation, 2015.

This CDC resource provides comprehensive information on routinely used vaccines and the diseases they prevent.

### CDC Yellow Book

<https://wwwnc.cdc.gov/travel/page/yellowbook-home>

Centers for Disease Control and Prevention. CDC Yellow Book 2018: Health Information for International Travel. New York: Oxford University Press; 2017.

This CDC resource provides helpful guidance about health risks associated with international travel and travel vaccines.

### CDC Manual for the Surveillance of Vaccine-Preventable Diseases

<http://www.cdc.gov/vaccines/pubs/surv-manual/index.html>

Centers for Disease Control and Prevention. Manual for the surveillance of vaccine-preventable diseases. Centers for Disease Control and Prevention, Atlanta, GA, 2008.

This CDC resource provides current guidelines for those directly involved in surveillance of vaccine-preventable diseases, including local health department personnel.

VACCINE-PREVENTABLE DISEASE SUMMARY TABLES

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 19. Hepatitis A infection cases and incidence rates per 100,000 population, by local health jurisdiction and year of disease onset – California, 2012–2016

Jurisdiction	2012		2013		2014		2015		2016	
	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates
CALIFORNIA	210	0.55	254	0.66	146	0.38	181	0.46	232	0.59
Alameda	2	0.14	6	0.41	9	0.61	6	0.40	9	0.59
City of Berkeley*	1	0.86	1	0.86	0	0.00	0	0.00	0	0.00
Alpine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Amador	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Butte	0	0.00	0	0.00	2	0.89	1	0.45	2	0.89
Calaveras	0	0.00	0	0.00	0	0.00	1	2.23	1	2.23
Colusa	0	0.00	1	4.55	0	0.00	0	0.00	0	0.00
Contra Costa	5	0.46	10	0.92	3	0.27	6	0.54	6	0.53
Del Norte	0	0.00	0	0.00	0	0.00	1	3.69	0	0.00
El Dorado	1	0.55	5	2.74	0	0.00	1	0.55	1	0.54
Fresno	3	0.32	3	0.31	0	0.00	0	0.00	10	1.01
Glenn	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Humboldt	1	0.74	3	2.22	1	0.74	1	0.74	1	0.73
Imperial	5	2.79	0	0.00	0	0.00	1	0.54	3	1.60
Inyo	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Kern	5	0.58	4	0.46	3	0.34	5	0.57	0	0.00
Kings	1	0.67	0	0.00	0	0.00	1	0.67	0	0.00
Lake	1	1.54	1	1.54	1	1.53	1	1.53	1	1.54
Lassen	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Los Angeles	47	0.50	60	0.64	42	0.44	33	0.35	67	0.70
City of Long Beach*	1	0.21	6	1.25	5	1.04	3	0.62	4	0.83
City of Pasadena*	0	0.00	0	0.00	3	2.14	1	0.71	2	1.42
Madera	0	0.00	1	0.66	0	0.00	1	0.65	0	0.00
Marin	1	0.39	0	0.00	1	0.38	1	0.38	0	0.00
Mariposa	0	0.00	1	5.51	0	0.00	0	0.00	0	0.00
Mendocino	0	0.00	2	2.27	0	0.00	0	0.00	0	0.00
Merced	2	0.76	0	0.00	0	0.00	0	0.00	1	0.37
Modoc	0	0.00	1	10.41	0	0.00	0	0.00	0	0.00
Mono	0	0.00	0	0.00	1	7.18	0	0.00	1	7.25
Monterey	0	0.00	2	0.47	0	0.00	1	0.23	0	0.00
Napa	0	0.00	0	0.00	0	0.00	9	6.36	0	0.00
Nevada	1	1.02	2	2.05	1	1.02	0	0.00	0	0.00
Orange	25	0.81	24	0.77	14	0.45	17	0.54	26	0.82
Placer	1	0.28	0	0.00	0	0.00	3	0.81	2	0.53
Plumas	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Riverside	10	0.44	9	0.40	7	0.30	13	0.56	9	0.38
Sacramento	7	0.48	4	0.27	3	0.20	3	0.20	12	0.80
San Benito	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
San Bernardino	5	0.24	10	0.48	2	0.09	4	0.19	5	0.23
San Diego	38	1.20	40	1.25	14	0.43	22	0.67	26	0.79
San Francisco	5	0.60	4	0.47	6	0.70	5	0.58	3	0.34
San Joaquin	4	0.57	3	0.43	2	0.28	7	0.96	3	0.41
San Luis Obispo	4	1.47	2	0.73	0	0.00	0	0.00	2	0.72
San Mateo	1	0.14	9	1.20	1	0.13	2	0.26	1	0.13
Santa Barbara	1	0.23	1	0.23	2	0.45	2	0.45	1	0.22
Santa Clara	9	0.49	7	0.38	10	0.53	6	0.31	8	0.41
Santa Cruz	2	0.75	7	2.59	3	1.10	0	0.00	1	0.36
Shasta	0	0.00	3	1.68	2	1.12	0	0.00	1	0.56
Sierra	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Siskiyou	1	2.23	1	2.24	0	0.00	0	0.00	1	2.25
Solano	2	0.48	3	0.71	0	0.00	1	0.23	5	1.15
Sonoma	2	0.41	2	0.40	1	0.20	3	0.60	4	0.79
Stanislaus	2	0.38	4	0.76	3	0.56	3	0.56	3	0.55
Sutter	0	0.00	0	0.00	1	1.03	1	1.02	0	0.00
Tehama	0	0.00	0	0.00	0	0.00	1	1.56	0	0.00
Trinity	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Tulare	0	0.00	4	0.88	1	0.22	5	1.08	1	0.21
Tuolumne	1	1.82	0	0.00	0	0.00	0	0.00	0	0.00
Ventura	13	1.55	7	0.83	2	0.24	3	0.35	8	0.94
Yolo	0	0.00	1	0.48	0	0.00	4	1.88	1	0.46
Yuba	0	0.00	0	0.00	0	0.00	2	2.65	0	0.00

\* City health jurisdictions not included in county total.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 20. Acute hepatitis B infection cases and incidence rates per 100,000 population, by local health jurisdiction and year of disease onset – California, 2012–2016

Jurisdiction	2012		2013		2014		2015		2016	
	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates
CALIFORNIA	141	0.37	139	0.36	109	0.28	159	0.41	118	0.30
Alameda	6	0.42	6	0.41	5	0.34	2	0.13	11	0.73
City of Berkeley*	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Alpine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Amador	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Butte	2	0.90	2	0.90	1	0.45	3	1.34	1	0.44
Calaveras	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Colusa	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Contra Costa	2	0.19	2	0.18	2	0.18	7	0.63	6	0.53
Del Norte	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
El Dorado	1	0.55	0	0.00	0	0.00	2	1.09	1	0.54
Fresno	2	0.21	4	0.42	3	0.31	4	0.41	4	0.40
Glenn	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Humboldt	1	0.74	0	0.00	0	0.00	0	0.00	1	0.73
Imperial	0	0.00	2	1.11	1	0.55	0	0.00	0	0.00
Inyo	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Kern	10	1.17	3	0.35	3	0.34	7	0.79	3	0.34
Kings	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Lake	0	0.00	0	0.00	1	1.53	0	0.00	0	0.00
Lassen	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Los Angeles†	39	0.42	54	0.57	41	0.43	51	0.53	42	0.44
City of Long Beach*	0	0.00	4	0.84	3	0.62	4	0.83	3	0.62
City of Pasadena*	1	0.71	3	2.15	1	0.71	1	0.71	2	1.42
Madera	0	0.00	2	1.31	1	0.65	2	1.29	0	0.00
Marin	1	0.39	0	0.00	0	0.00	0	0.00	1	0.38
Mariposa	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mendocino	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Merced	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Modoc	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mono	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Monterey	4	0.94	0	0.00	0	0.00	3	0.69	0	0.00
Napa	0	0.00	1	0.72	0	0.00	0	0.00	0	0.00
Nevada	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Orange	7	0.23	12	0.39	7	0.22	10	0.32	5	0.16
Placer	0	0.00	2	0.55	0	0.00	2	0.54	0	0.00
Plumas	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Riverside	17	0.75	3	0.13	4	0.17	2	0.09	2	0.08
Sacramento	5	0.35	4	0.27	0	0.00	3	0.20	9	0.60
San Benito	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
San Bernardino	12	0.58	7	0.33	9	0.43	13	0.61	4	0.19
San Diego	14	0.44	9	0.28	7	0.22	12	0.37	3	0.09
San Francisco	2	0.24	4	0.47	0	0.00	4	0.46	2	0.23
San Joaquin	3	0.43	2	0.28	4	0.56	4	0.55	3	0.41
San Luis Obispo	1	0.37	0	0.00	1	0.36	0	0.00	0	0.00
San Mateo	1	0.14	2	0.27	1	0.13	5	0.65	1	0.13
Santa Barbara	1	0.23	1	0.23	1	0.23	0	0.00	1	0.22
Santa Clara	5	0.27	4	0.21	4	0.21	4	0.21	4	0.21
Santa Cruz	0	0.00	0	0.00	1	0.37	0	0.00	0	0.00
Shasta	0	0.00	1	0.56	1	0.56	0	0.00	0	0.00
Sierra	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Siskiyou	0	0.00	0	0.00	1	2.24	0	0.00	1	2.25
Solano	0	0.00	0	0.00	0	0.00	1	0.23	1	0.23
Sonoma	0	0.00	0	0.00	1	0.20	2	0.40	2	0.40
Stanislaus	1	0.19	5	0.95	2	0.38	4	0.74	0	0.00
Sutter	0	0.00	0	0.00	0	0.00	1	1.02	0	0.00
Tehama	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Trinity	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Tulare	2	0.44	0	0.00	3	0.65	1	0.22	0	0.00
Tuolumne	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ventura	1	0.12	0	0.00	0	0.00	3	0.35	4	0.47
Yolo	0	0.00	0	0.00	0	0.00	1	0.47	1	0.46
Yuba	0	0.00	0	0.00	0	0.00	1	1.32	0	0.00

\* City health jurisdictions not included in county total.

† One 2014 acute hepatitis B case was identified retrospectively in 2015.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 21. Confirmed measles cases, by local health jurisdiction† and year of disease onset – California, 2012–2016

Jurisdiction	2012	2013	2014	2015	2016
CALIFORNIA	8	18	75	125	24
Alameda	0	0	5	5	0
City of Berkeley*	0	1	1	1	0
Alpine	0	0	0	0	0
Amador	0	0	0	0	0
Butte	0	0	0	0	0
Calaveras	0	0	0	0	0
Colusa	0	0	0	0	0
Contra Costa	0	0	4	1	0
Del Norte	0	0	0	0	0
El Dorado	0	0	0	0	0
Fresno	0	0	0	0	0
Glenn	0	0	0	0	0
Humboldt	0	0	1	0	0
Imperial	0	0	0	0	0
Inyo	0	0	0	0	0
Kern	0	0	0	0	0
Kings	0	0	0	0	0
Lake	0	0	0	0	0
Lassen	0	0	0	0	0
Los Angeles	6	3	13	28	18
City of Long Beach*	0	0	0	2	0
City of Pasadena*	0	0	1	3	0
Madera	0	0	0	0	0
Marin	0	0	0	2	0
Mariposa	0	0	0	0	0
Mendocino	0	1	0	0	0
Merced	0	0	0	1	0
Modoc	0	0	0	0	0
Mono	0	0	0	0	0
Monterey	0	1	2	0	0
Napa	0	0	0	0	0
Nevada	0	0	0	0	3
Orange	0	2	24	33	0
Placer	0	0	0	0	0
Plumas	0	0	0	0	0
Riverside	1	1	6	7	0
Sacramento	0	0	0	0	0
San Benito	0	0	0	0	0
San Bernardino	0	0	1	11	0
San Diego	0	2	6	12	0
San Francisco	0	3	0	0	0
San Joaquin	0	0	1	0	0
San Luis Obispo	0	0	0	0	0
San Mateo	1	0	4	4	0
Santa Barbara	0	0	0	0	1
Santa Clara‡	0	0	2	3	1
Santa Cruz	0	3	0	0	0
Shasta	0	0	1	0	0
Sierra	0	0	0	0	0
Siskiyou	0	0	0	0	0
Solano	0	0	0	1	0
Sonoma	0	0	0	0	0
Stanislaus	0	0	0	0	0
Sutter	0	0	0	0	0
Tehama	0	0	0	0	0
Trinity	0	0	0	0	0
Tulare	0	0	0	0	1
Tuolumne	0	0	0	0	0
Ventura	0	1	3	10	0
Yolo	0	0	0	1	0
Yuba	0	0	0	0	0

† County of residence or county where case was identified.

\* City health jurisdictions not included in county total.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 22. Invasive meningococcal disease cases and incidence rates per 100,000 population, by local health jurisdiction and year of disease onset – California, 2012–2016

	2012		2013		2014		2015†		2016	
	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates
CALIFORNIA	89	0.23	111	0.29	55	0.14	49	0.13	82	0.21
Alameda	8	0.56	5	0.34	5	0.34	2	0.13	5	0.33
City of Berkeley*	2	1.72	0	0.00	0	0.00	0	0.00	0	0.00
Alpine	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Amador	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Butte	1	0.45	0	0.00	0	0.00	0	0.00	1	0.44
Calaveras	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Colusa	0	0.00	1	4.55	0	0.00	1	4.49	0	0.00
Contra Costa	2	0.19	4	0.37	1	0.09	1	0.09	1	0.09
Del Norte	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
El Dorado	0	0.00	0	0.00	1	0.55	0	0.00	0	0.00
Fresno	6	0.63	4	0.42	2	0.21	1	0.10	1	0.10
Glenn	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Humboldt	0	0.00	0	0.00	0	0.00	1	0.74	0	0.00
Imperial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Inyo	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Kern	9	1.05	1	0.12	4	0.46	0	0.00	1	0.11
Kings	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Lake	1	1.54	0	0.00	1	1.53	0	0.00	0	0.00
Lassen	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Los Angeles	12	0.13	18	0.19	12	0.13	12	0.13	20	0.21
City of Long Beach*	0	0.00	1	0.21	0	0.00	0	0.00	8	1.65
City of Pasadena*	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Madera	1	0.66	3	1.97	0	0.00	0	0.00	1	0.64
Marin	0	0.00	2	0.77	0	0.00	0	0.00	0	0.00
Mariposa	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mendocino	2	2.27	3	3.41	1	1.13	1	1.13	1	1.12
Merced	0	0.00	3	1.13	0	0.00	0	0.00	0	0.00
Modoc	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Mono	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Monterey	0	0.00	1	0.23	1	0.23	2	0.46	1	0.23
Napa	0	0.00	0	0.00	0	0.00	1	0.71	0	0.00
Nevada	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Orange	4	0.13	5	0.16	3	0.10	2	0.06	11	0.35
Placer	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Plumas	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Riverside	2	0.09	3	0.13	2	0.09	2	0.09	0	0.00
Sacramento‡	6	0.42	4	0.27	3	0.20	2	0.13	7	0.46
San Benito	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
San Bernardino	2	0.10	9	0.43	1	0.05	2	0.09	1	0.05
San Diego	8	0.25	15	0.47	9	0.28	3	0.09	2	0.06
San Francisco	4	0.48	4	0.47	2	0.23	5	0.58	3	0.34
San Joaquin	2	0.29	1	0.14	0	0.00	1	0.14	1	0.14
San Luis Obispo	2	0.73	0	0.00	0	0.00	1	0.36	1	0.36
San Mateo§	3	0.41	1	0.13	1	0.13	2	0.26	2	0.26
Santa Barbara	1	0.23	6	1.38	0	0.00	1	0.22	2	0.45
Santa Clara	3	0.16	3	0.16	4	0.21	1	0.05	3	0.16
Santa Cruz	0	0.00	2	0.74	0	0.00	0	0.00	0	0.00
Shasta	1	0.56	1	0.56	0	0.00	0	0.00	2	1.12
Sierra	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Siskiyou	1	2.23	1	2.24	0	0.00	0	0.00	1	2.25
Solano	0	0.00	0	0.00	1	0.24	1	0.23	1	0.23
Sonoma	0	0.00	3	0.61	0	0.00	0	0.00	1	0.20
Stanislaus	1	0.19	0	0.00	0	0.00	1	0.19	0	0.00
Sutter	0	0.00	2	2.07	0	0.00	0	0.00	0	0.00
Tehama	1	1.57	0	0.00	0	0.00	0	0.00	0	0.00
Trinity	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Tulare	1	0.22	3	0.66	1	0.22	1	0.22	0	0.00
Tuolumne	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ventura	3	0.36	1	0.12	0	0.00	1	0.12	2	0.23
Yolo	0	0.00	1	0.48	0	0.00	1	0.47	1	0.46
Yuba	0	0.00	0	0.00	0	0.00	0	0.00	1	1.31

\* City health jurisdictions not included in county total.

† In 2015, CSTE changed the meningococcal disease case definition.

‡ One 2014 meningococcal disease case was identified as not a case retrospectively in 2016.

§ One 2012 meningococcal disease case was identified retrospectively in 2016.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 23. Confirmed and probable mumps cases, by local health jurisdiction and year of disease onset – California, 2012–2016

	2012†	2013	2014	2015	2016
CALIFORNIA	34	30	37	31	94
Alameda	1	1	1	0	4
City of Berkeley*	0	0	0	0	4
Alpine	0	0	0	0	0
Amador	0	0	0	0	0
Butte	1	0	1	0	0
Calaveras	0	1	0	0	0
Colusa	0	0	0	0	0
Contra Costa	0	2	1	3	3
Del Norte	0	0	0	0	0
El Dorado	0	0	0	0	3
Fresno	0	1	1	0	0
Glenn	0	0	0	0	0
Humboldt	1	0	0	0	1
Imperial	0	0	0	0	1
Inyo	0	0	0	0	0
Kern	0	0	0	0	0
Kings	0	0	0	0	0
Lake	0	0	0	0	0
Lassen	0	0	0	0	0
Los Angeles	13	9	9	14	18
City of Long Beach*	1	0	0	2	1
City of Pasadena*	0	0	1	0	0
Madera	0	0	0	0	0
Marin	1	0	0	0	0
Mariposa	0	0	0	0	0
Mendocino	0	0	0	0	0
Merced	0	0	0	0	0
Modoc	0	0	0	0	0
Mono	0	0	0	0	0
Monterey	1	0	0	1	1
Napa	0	0	0	0	0
Nevada	0	0	0	0	0
Orange	3	2	8	5	6
Placer	1	1	0	0	0
Plumas	0	0	0	0	0
Riverside	1	2	4	0	3
Sacramento	2	0	1	0	2
San Benito	0	0	0	0	0
San Bernardino	0	1	3	4	1
San Diego	1	2	2	0	23
San Francisco	0	2	0	2	9
San Joaquin	0	1	0	0	0
San Luis Obispo	0	0	0	0	1
San Mateo	1	1	0	0	1
Santa Barbara	1	1	0	0	2
Santa Clara	3	0	1	0	3
Santa Cruz	0	0	1	0	0
Shasta	0	0	0	0	0
Sierra	0	0	0	0	0
Siskiyou	0	0	0	0	0
Solano	2	0	0	0	1
Sonoma	0	0	0	0	1
Stanislaus	0	1	1	0	0
Sutter	0	0	0	0	0
Tehama	0	0	0	0	0
Trinity	0	0	0	0	0
Tulare	0	0	0	0	0
Tuolumne	0	0	0	0	0
Ventura	0	1	2	0	5
Yolo	0	1	0	0	0
Yuba	0	0	0	0	0

† In 2012, CSTE changed the mumps case definition.

\* City health jurisdictions not included in county total.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 24. Pertussis disease cases and incidence rates per 100,000 population, by local health jurisdiction and year of disease onset – California, 2012–2016

	2012		2013		2014		2015		2016	
	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates	Cases	Rates
CALIFORNIA	1025	2.7	2535	6.6	11208	28.9	4706	12.0	1938	4.9
Alameda	62	4.3	124	8.5	364	24.6	179	11.9	78	5.1
City of Berkeley*	6	5.2	13	11.1	55	46.5	10	8.4	4	3.3
Alpine	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Amador	1	2.6	2	5.3	1	2.7	2	5.4	2	5.4
Butte	3	1.4	33	14.8	33	14.7	8	3.6	2	0.9
Calaveras	0	0.0	2	4.4	17	37.8	1	2.2	2	4.5
Colusa	0	0.0	0	0.0	0	0.0	4	18.0	0	0.0
Contra Costa	24	2.2	69	6.3	474	43.0	181	16.2	49	4.3
Del Norte	0	0.0	0	0.0	2	7.3	0	0.0	0	0.0
El Dorado	3	1.7	4	2.2	36	19.7	27	14.7	9	4.9
Fresno	16	1.7	43	4.5	392	40.4	57	5.8	16	1.6
Glenn	0	0.0	0	0.0	1	3.5	2	6.9	1	3.4
Humboldt	1	0.7	5	3.7	149	110.6	56	41.5	1	0.7
Imperial	8	4.5	3	1.7	10	5.5	10	5.4	4	2.1
Inyo	1	5.4	0	0.0	0	0.0	0	0.0	0	0.0
Kern	2	0.2	30	3.5	167	19.0	146	16.5	27	3.0
Kings	0	0.0	2	1.3	16	10.7	6	4.0	7	4.7
Lake	2	3.1	3	4.6	3	4.6	6	9.2	1	1.5
Lassen	0	0.0	0	0.0	5	15.7	0	0.0	0	0.0
Los Angeles	211	2.3	344	3.6	2003	21.1	1141	11.9	310	3.2
City of Long Beach*	4	0.8	16	3.3	181	37.6	36	7.4	13	2.7
City of Pasadena*	1	0.7	2	1.4	22	15.7	7	5.0	4	2.8
Madera	0	0.0	10	6.6	47	30.5	6	3.9	3	1.9
Marin	5	2.0	183	70.8	273	104.6	53	20.2	30	11.4
Mariposa	0	0.0	0	0.0	0	0.0	0	0.0	1	5.5
Mendocino	1	1.1	6	6.8	10	11.3	9	10.2	8	9.0
Merced	0	0.0	1	0.4	9	3.4	13	4.8	1	0.4
Modoc	0	0.0	0	0.0	6	62.7	0	0.0	0	0.0
Mono	21	148.7	2	14.4	0	0.0	0	0.0	0	0.0
Monterey	17	4.0	49	11.5	129	30.0	76	17.4	16	3.6
Napa	6	4.3	13	9.3	137	97.4	49	34.6	5	3.5
Nevada	5	5.1	71	72.7	16	16.3	3	3.1	42	42.6
Orange	74	2.4	114	3.7	447	14.2	162	5.1	69	2.2
Placer	11	3.1	83	22.8	120	32.6	49	13.2	17	4.5
Plumas	0	0.0	1	5.1	1	5.1	2	10.2	0	0.0
Riverside	46	2.0	80	3.5	469	20.3	182	7.8	82	3.5
Sacramento	34	2.4	71	4.9	446	30.3	287	19.3	71	4.7
San Benito	1	1.8	1	1.8	11	19.2	7	12.2	9	15.5
San Bernardino	54	2.6	38	1.8	206	9.8	91	4.3	32	1.5
San Diego	161	5.1	408	12.7	2019	62.2	896	27.4	390	11.8
San Francisco	30	3.6	59	7.0	131	15.3	69	8.0	9	1.0
San Joaquin	15	2.1	26	3.7	214	29.8	81	11.1	4	0.5
San Luis Obispo	14	5.1	17	6.2	45	16.3	22	7.9	29	10.4
San Mateo	23	3.1	104	13.9	128	16.9	40	5.2	109	14.2
Santa Barbara	11	2.6	29	6.7	120	27.3	66	14.8	10	2.2
Santa Clara	45	2.4	252	13.5	538	28.5	149	7.8	233	12.1
Santa Cruz	13	4.9	54	20.0	166	61.1	79	28.8	46	16.7
Shasta	2	1.1	7	3.9	33	18.4	15	8.4	25	14.0
Sierra	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Siskiyou	2	4.5	5	11.2	7	15.7	6	13.5	0	0.0
Solano	10	2.4	15	3.6	144	33.8	42	9.8	14	3.2
Sonoma	18	3.7	51	10.3	704	141.4	34	6.8	42	8.3
Stanislaus	11	2.1	16	3.0	92	17.3	38	7.1	13	2.4
Sutter	0	0.0	2	2.1	8	8.2	2	2.0	1	1.0
Tehama	0	0.0	0	0.0	38	59.5	5	7.8	4	6.2
Trinity	0	0.0	0	0.0	6	44.1	6	44.2	1	7.4
Tulare	27	6.0	25	5.5	37	8.0	86	18.6	13	2.8
Tuolumne	1	1.8	2	3.6	16	29.3	9	16.5	0	0.0
Ventura	15	1.8	37	4.4	347	40.9	107	12.6	35	4.1
Yolo	6	2.9	4	1.9	147	70.1	83	39.0	43	19.8
Yuba	1	1.4	4	5.4	10	13.3	3	4.0	1	1.3

\* City health jurisdictions not included in county total.



## Vaccine-Preventable Disease Surveillance in California, 2016

Table 25. Confirmed rubella cases, by local health jurisdiction and year of disease onset – California, 2012–2016

	2012	2013	2014	2015	2016
CALIFORNIA	1	0	2	0	0
Alameda	0	0	1	0	0
City of Berkeley*	0	0	0	0	0
Alpine	0	0	0	0	0
Amador	0	0	0	0	0
Butte	0	0	0	0	0
Calaveras	0	0	0	0	0
Colusa	0	0	0	0	0
Contra Costa	0	0	0	0	0
Del Norte	0	0	0	0	0
El Dorado	0	0	0	0	0
Fresno	0	0	0	0	0
Glenn	0	0	0	0	0
Humboldt	0	0	0	0	0
Imperial	0	0	0	0	0
Inyo	0	0	0	0	0
Kern	0	0	0	0	0
Kings	0	0	0	0	0
Lake	0	0	0	0	0
Lassen	0	0	0	0	0
Los Angeles	0	0	0	0	0
City of Long Beach*	0	0	0	0	0
City of Pasadena*	0	0	0	0	0
Madera	0	0	0	0	0
Marin	0	0	0	0	0
Mariposa	0	0	0	0	0
Mendocino	0	0	0	0	0
Merced	0	0	0	0	0
Modoc	0	0	0	0	0
Mono	0	0	0	0	0
Monterey	0	0	0	0	0
Napa	0	0	0	0	0
Nevada	0	0	0	0	0
Orange	0	0	0	0	0
Placer	0	0	0	0	0
Plumas	0	0	0	0	0
Riverside	0	0	0	0	0
Sacramento	0	0	0	0	0
San Benito	0	0	0	0	0
San Bernardino	0	0	0	0	0
San Diego	0	0	0	0	0
San Francisco	0	0	0	0	0
San Joaquin	0	0	0	0	0
San Luis Obispo	0	0	0	0	0
San Mateo	0	0	0	0	0
Santa Barbara	0	0	0	0	0
Santa Clara	1	0	1	0	0
Santa Cruz	0	0	0	0	0
Shasta	0	0	0	0	0
Sierra	0	0	0	0	0
Siskiyou	0	0	0	0	0
Solano	0	0	0	0	0
Sonoma	0	0	0	0	0
Stanislaus	0	0	0	0	0
Sutter	0	0	0	0	0
Tehama	0	0	0	0	0
Trinity	0	0	0	0	0
Tulare	0	0	0	0	0
Tuolumne	0	0	0	0	0
Ventura	0	0	0	0	0
Yolo	0	0	0	0	0
Yuba	0	0	0	0	0

\* City health jurisdictions not included in county total.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 26. Probable tetanus cases, by local health jurisdiction and year of disease onset – California, 2012–2016

	2012	2013	2014	2015	2016
CALIFORNIA	4	4	4	3	1
Alameda	0	0	0	0	0
City of Berkeley*	0	0	0	0	0
Alpine	0	0	0	0	0
Amador	0	0	0	0	0
Butte	0	0	0	0	0
Calaveras	0	0	0	0	0
Colusa	0	0	0	0	0
Contra Costa	1	0	0	0	0
Del Norte	0	0	0	0	0
El Dorado	0	0	0	0	0
Fresno	0	0	0	0	0
Glenn	0	0	0	0	0
Humboldt	0	0	0	0	0
Imperial	0	0	1	0	0
Inyo	0	0	0	0	0
Kern	0	0	0	0	0
Kings	0	0	0	0	0
Lake	0	0	0	0	0
Lassen	0	0	0	0	0
Los Angeles	0	1	0	1	0
City of Long Beach*	0	0	1	0	0
City of Pasadena*	0	0	0	0	0
Madera	0	0	0	0	0
Marin	0	0	0	0	0
Mariposa	0	0	0	0	0
Mendocino	0	0	0	0	0
Merced	0	1	0	0	0
Modoc	0	0	0	0	0
Mono	0	0	0	0	0
Monterey	0	0	0	0	0
Napa	0	0	0	0	0
Nevada	0	0	0	0	0
Orange	1	0	2	1	0
Placer	0	0	0	0	0
Plumas	0	0	0	0	0
Riverside	0	0	0	1	1
Sacramento	1	0	0	0	0
San Benito	0	0	0	0	0
San Bernardino	1	0	0	0	0
San Diego	0	0	0	0	0
San Francisco	0	0	0	0	0
San Joaquin	0	0	0	0	0
San Luis Obispo	0	0	0	0	0
San Mateo	0	0	0	0	0
Santa Barbara	0	0	0	0	0
Santa Clara	0	1	0	0	0
Santa Cruz	0	0	0	0	0
Shasta	0	0	0	0	0
Sierra	0	0	0	0	0
Siskiyou	0	0	0	0	0
Solano	0	0	0	0	0
Sonoma	0	0	0	0	0
Stanislaus	0	0	0	0	0
Sutter	0	0	0	0	0
Tehama	0	0	0	0	0
Trinity	0	0	0	0	0
Tulare	0	0	0	0	0
Tuolumne	0	0	0	0	0
Ventura	0	1	0	0	0
Yolo	0	0	0	0	0
Yuba	0	0	0	0	0

\* City health jurisdictions not included in county total.

## Vaccine-Preventable Disease Surveillance in California, 2016

Table 27. Confirmed and probable varicella hospitalizations and deaths, by local health jurisdiction and year of disease onset – California, 2012–2016

	2012†	2013	2014	2015†	2016‡
CALIFORNIA	37	31	41	60	48
Alameda	2	1	5	10	0
City of Berkeley*	0	0	0	2	0
Alpine	0	0	0	0	0
Amador	0	0	0	0	0
Butte	0	0	0	1	0
Calaveras	0	0	0	0	0
Colusa	0	0	0	0	0
Contra Costa	2	2	1	0	2
Del Norte	0	0	0	0	0
El Dorado	0	0	0	0	0
Fresno	0	2	5	0	3
Glenn	0	0	0	0	0
Humboldt	0	0	1	0	0
Imperial	1	0	0	0	2
Inyo	0	0	0	0	0
Kern	0	0	1	0	0
Kings	0	0	0	0	0
Lake	0	0	0	1	0
Lassen	0	0	0	0	0
Los Angeles	11	8	9	12	12
City of Long Beach*	0	0	0	0	1
City of Pasadena*	1	1	0	0	0
Madera	0	0	0	0	0
Marin	0	0	0	1	0
Mariposa	0	0	0	0	0
Mendocino	0	0	0	0	0
Merced	1	0	0	0	0
Modoc	0	0	0	0	0
Mono	0	0	0	0	0
Monterey	0	0	0	1	1
Napa	0	0	0	0	0
Nevada	0	0	0	0	0
Orange	6	5	4	10	5
Placer	1	0	0	0	1
Plumas	0	0	0	0	1
Riverside	2	2	3	5	0
Sacramento	0	1	1	2	5
San Benito	0	0	0	0	0
San Bernardino	0	1	3	3	4
San Diego	5	2	2	1	1
San Francisco	1	2	1	0	0
San Joaquin	1	0	2	0	2
San Luis Obispo	0	0	1	0	0
San Mateo	2	1	0	4	1
Santa Barbara	0	1	0	0	0
Santa Clara	1	0	0	3	4
Santa Cruz	0	0	0	1	0
Shasta	0	0	0	0	0
Sierra	0	0	0	0	0
Siskiyou	0	0	0	0	0
Solano	0	1	0	2	0
Sonoma	0	0	1	0	0
Stanislaus	0	0	0	0	0
Sutter	0	0	0	0	0
Tehama	0	0	0	0	0
Trinity	0	0	0	0	0
Tulare	0	0	1	0	1
Tuolumne	0	1	0	0	0
Ventura	0	0	0	0	2
Yolo	0	0	0	0	0
Yuba	0	0	0	1	0

\* City health jurisdictions not included in county total.

† Includes one death.

‡ Includes two deaths.