



**COLORADO**  
Department of Public  
Health & Environment

# Vaccine Preventable Diseases in Colorado: Surveillance Report 2015

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## Introduction

This report contains tables and graphs that summarize 2015 surveillance data for vaccine preventable diseases in Colorado. Colorado rates were calculated as cases per 100,000 population using 2015-based population final estimates from the Demography Section, Colorado Division of Local Government.

Table 1. Reported Cases of Vaccine Preventable Diseases\*, Colorado, 2010 - 2015

Report Year	Invasive <i>H. influenzae</i> type b (Hib)	Hepatitis A	Acute Hepatitis B	Measles	Meningococcal Disease	Mumps	Pertussis	Invasive Pneumococcal Disease	Varicella
2010	4	36	53	0	21	8	538	545	403
2011	0	21	27	0	10	7	415	494	447
2012	2	30	25	0	6	7	1,432	432	479
2013	0	50	25	2	9	4	1,431	511	352
2014	1	23	29	1	7	4	1,259	459	386
5-Year Average	1.4	32.0	31.8	0.6	10.6	6.0	1,015	406.8	413.4
2015	2	24	32	1	6	6	914	506	311

\*During 2010-2015 no congenital rubella, diphtheria, polio, or rubella cases were reported. One tetanus case was reported during 2012 and 2 during 2015.

Table 2. Reported Cases and Rates of Selected Vaccine Preventable Diseases, Colorado and United States, 2015

Disease	Colorado		United States	
	Cases	Rate <sup>§</sup>	Cases*	Rate <sup>§</sup>
<i>H. influenzae</i> type b, invasive disease	2	<0.1	23	<0.1
Hepatitis A	24	0.4	1,294	0.4
Acute Hepatitis B	32	0.6	3,032	0.9
Measles	1	<0.1	189	0.1
Meningococcal Disease	6	0.1	348	0.1
Mumps	6	0.1	1,057	0.3
Pertussis	914	17.1	18,166	5.6
Invasive Pneumococcal Disease	506	9.5	14,595	4.5
Tetanus	2	<0.1	25	<0.1
Varicella	311	5.8	8,370	2.6

\*Source, MMWR 2015;63(53);ND-733-ND-746. US rates calculated using US Census Bureau Population Estimate.

§ Per 100,000 population.

## Diphtheria

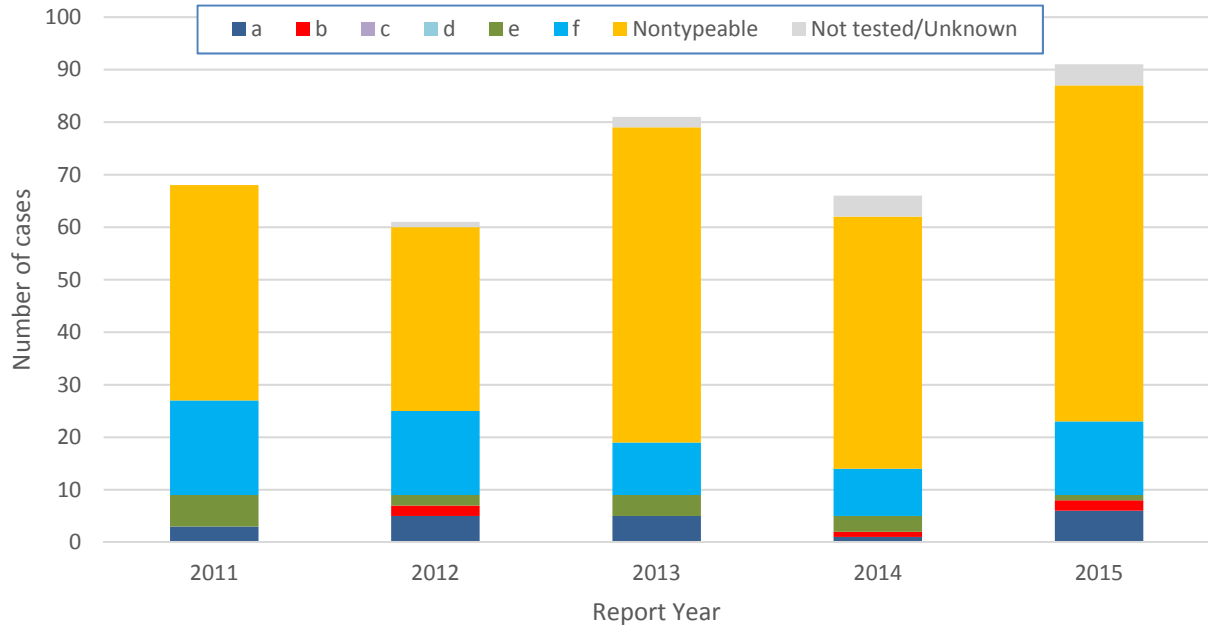
No cases of diphtheria were reported in Colorado or the United States during 2015. The last case of diphtheria reported in Colorado was in 1985.

## Invasive *Haemophilus influenzae*

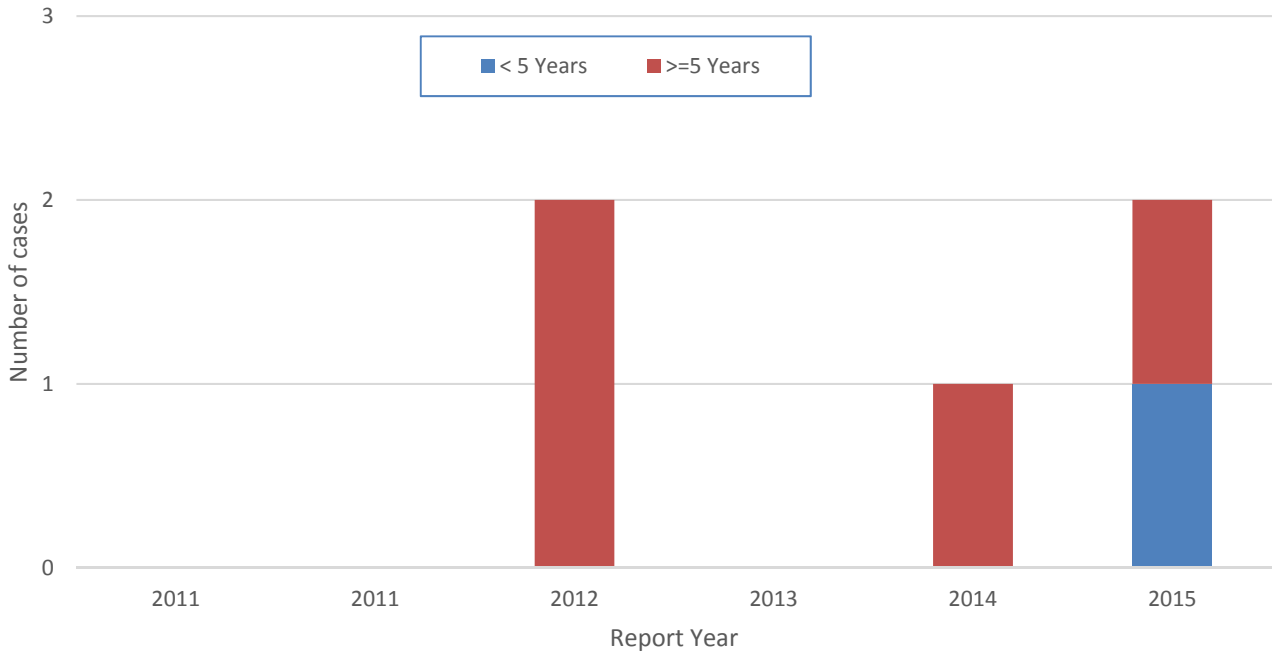
Table 3. Reported Cases, Rates, and Case Fatality of Invasive <i>Haemophilus influenzae</i> (all serotypes) by Age Group, Colorado, 2015				
Age Group (Years)	Cases	Rate*	Deaths	
			Number	Percent of Cases
<1	3	4.5	0	.
1-4	2	0.7	0	.
5-9	1	0.3	0	.
10-14	1	0.3	0	.
15-19	1	0.3	0	.
20-29	4	0.5	1	25.0
30-39	2	0.3	0	.
40-59	19	1.3	3	15.8
60+	54	5.2	3	5.6
Total	91	1.7	7	7.7

\*Per 100,000 population.

**Figure 1. Reported Cases of Invasive *Haemophilus influenzae* by Report Year and Serotype, Colorado, 2011 - 2015**



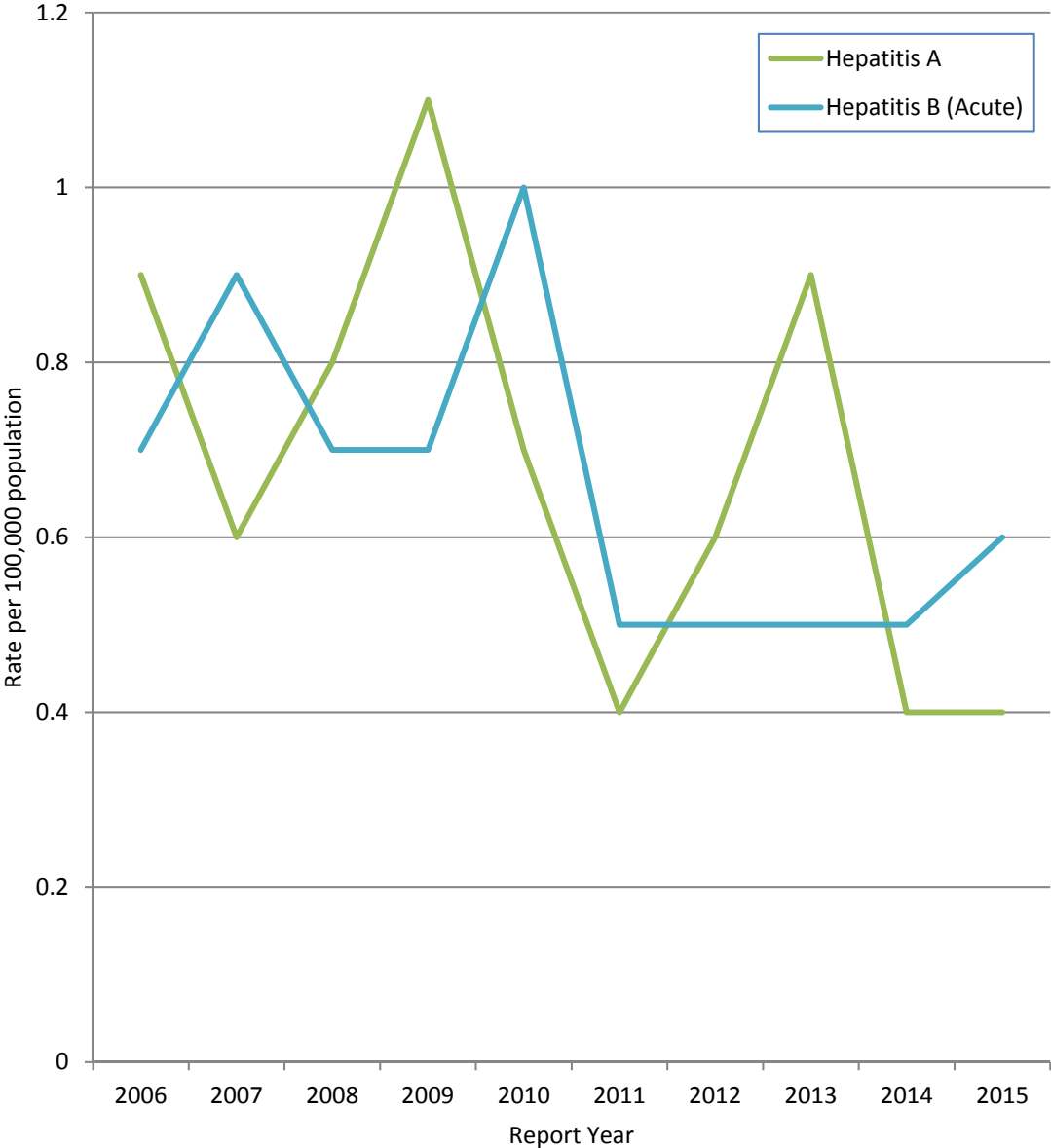
**Figure 2. Reported Cases of Invasive *Haemophilus influenzae* type b (Hib) by Age Group, Colorado, 2011-2015**



Note: The one case of Hib <5 years of age reported 2011-2015 was unvaccinated.

# Hepatitis

**Figure 3. Rates of Reported Hepatitis A and B, Colorado, 2006 - 2015**



## Hepatitis A

Table 4. Reported Cases and Rates* of Hepatitis A by Age Group & Gender, Colorado 2015						
Age Group (years)	Male		Female		Total	
	Cases	Rate*	Cases	Rate*	Cases	Rate*
< 1	0	.	0	.	0	.
1-4	0	.	0	.	0	.
5-9	0	.	0	.	0	.
10-14	0	.	1	0.5	1	0.3
15-19	0	.	0	.	0	.
20-39	5	0.6	2	0.3	7	0.5
40+	6	0.5	10	0.8	16	0.6
<b>Total</b>	<b>11</b>	<b>0.4</b>	<b>13</b>	<b>0.5</b>	<b>24</b>	<b>0.4</b>

\*Per 100,000 population.

## Acute Hepatitis B

Table 5. Reported Cases and Rates* of Acute Hepatitis B Cases by Age Group & Gender, Colorado, 2015						
Age Group (years)	Male		Female		Total	
	Cases	Rate*	Cases	Rate*	Cases	Rate*
< 15	0	.	0	.	0	.
15-19	0	.	0	.	0	.
20-29	1	0.3	4	1.1	5	0.7
30-39	5	1.3	1	0.3	6	0.8
40-49	10	2.7	1	0.3	11	1.5
50-59	3	0.8	1	0.3	4	0.5
60+	5	1.0	1	0.2	6	0.6
<b>Total</b>	<b>24</b>	<b>0.9</b>	<b>8</b>	<b>0.3</b>	<b>32</b>	<b>0.6</b>

\* Per 100,000 population.

Detailed surveillance summaries of hepatitis A and hepatitis B in Colorado are posted at: <https://www.colorado.gov/cdphe/hepatitis>

### Influenza

See influenza summary report at:

<https://www.colorado.gov/cdphe/influenza-data>



## Measles

Report Year	0 Doses	1 Dose	2 Doses	Unknown	Total Number of Cases
2006	1	0	0	0	1
2007	0	0	0	0	0
2008	0	0	0	0	0
2009	0	0	0	0	0
2010	0	0	0	0	0
2011	0	0	0	0	0
2012	0	0	0	0	0
2013	0	1	0	1	2
2014	1	0	0	0	1
2015	0	1	0	0	1

Note: Both of the unvaccinated cases reported 2006 - 2015 were too young to receive measles vaccination. The case in 2015 had one recorded vaccine, but it was administered prior to the recommended age for vaccination.

## Meningococcal disease

**Figure 4. Rate of Meningococcal Disease by Report Year, Colorado, 2006 - 2015**

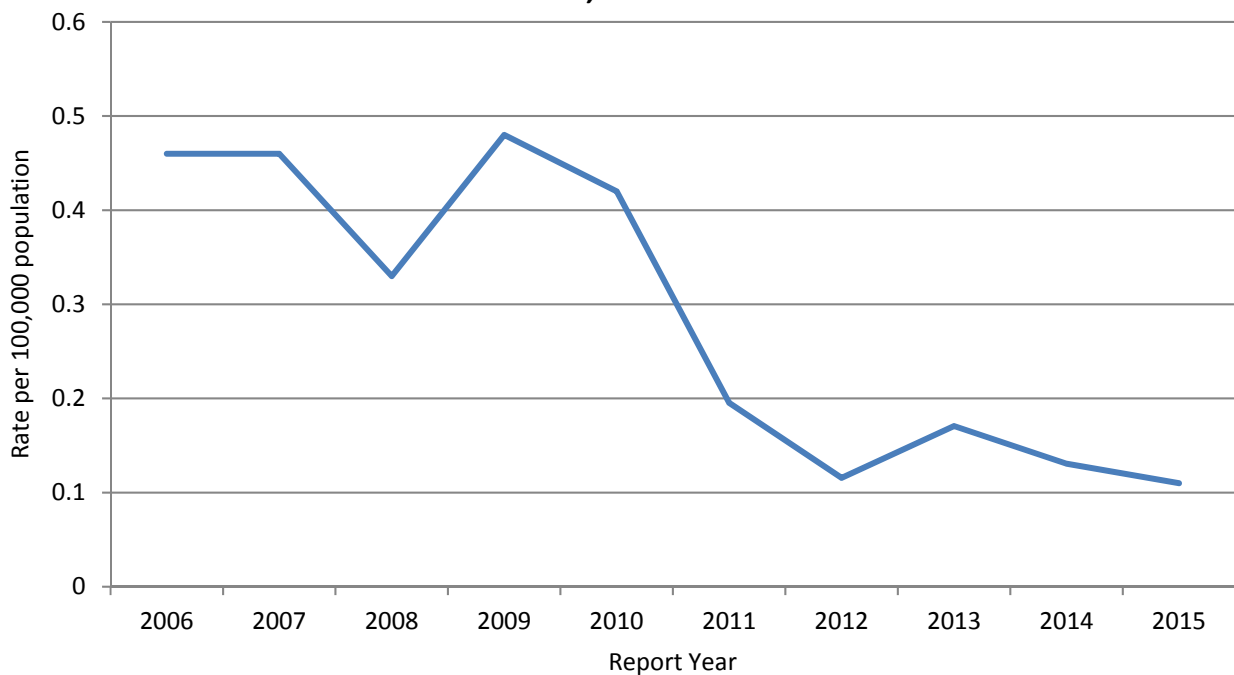
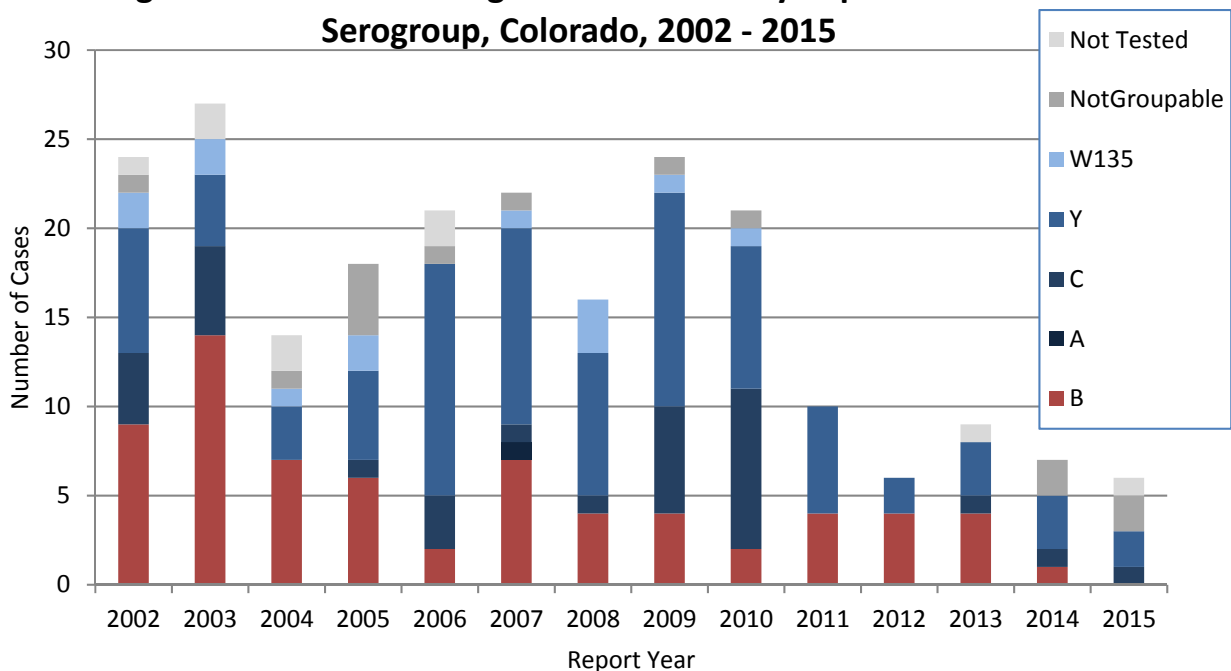


Table 7. Reported Cases, Rates\*, and Case Fatality of Meningococcal Disease by Age Group, Colorado, 2015

Age Group (Years)	Cases		Deaths	
	Number	Rate*	Number	Percent of Cases
<1	0	.	.	.
1-4	0	.	.	.
5-10	0	.	.	.
11-17	0	.	.	.
18-21	1	0.3	0	0.0
22-29	0	.	.	.
30-39	0	.	.	.
40-59	3	0.2	1	33.3
60+	2	0.2	0	0.0
<b>Total</b>	<b>6</b>	<b>0.1</b>	<b>1</b>	<b>16.7</b>

\*Per 100,000 population.

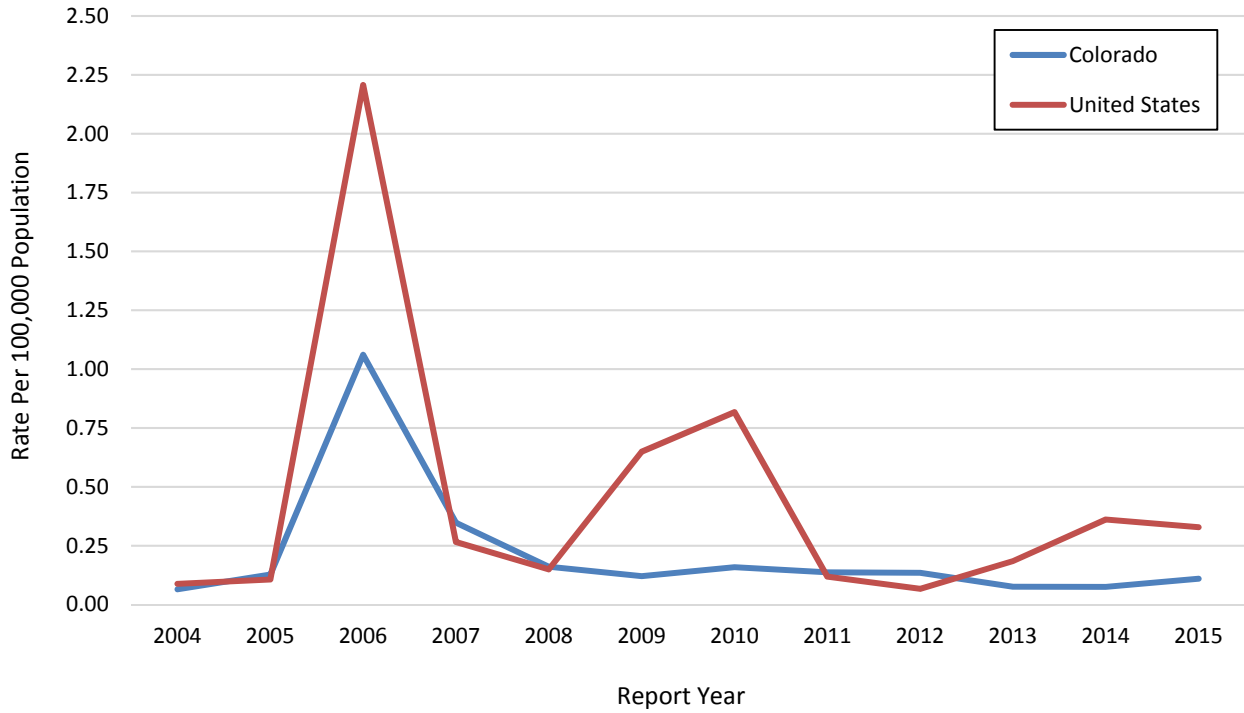
Figure 5. Cases of Meningococcal Disease by Report Year and Serogroup, Colorado, 2002 - 2015



Note: Meningococcal conjugate vaccines routinely available during 2015 contain antigens from serogroups A, C, Y and W-135. Of the three cases with disease caused by a vaccine-preventable serogroup, none were vaccinated against meningococcal disease.

# Mumps

**Figure 6. Rates of Reported Mumps Cases by Report Year, Colorado and United States, 2004 - 2015**

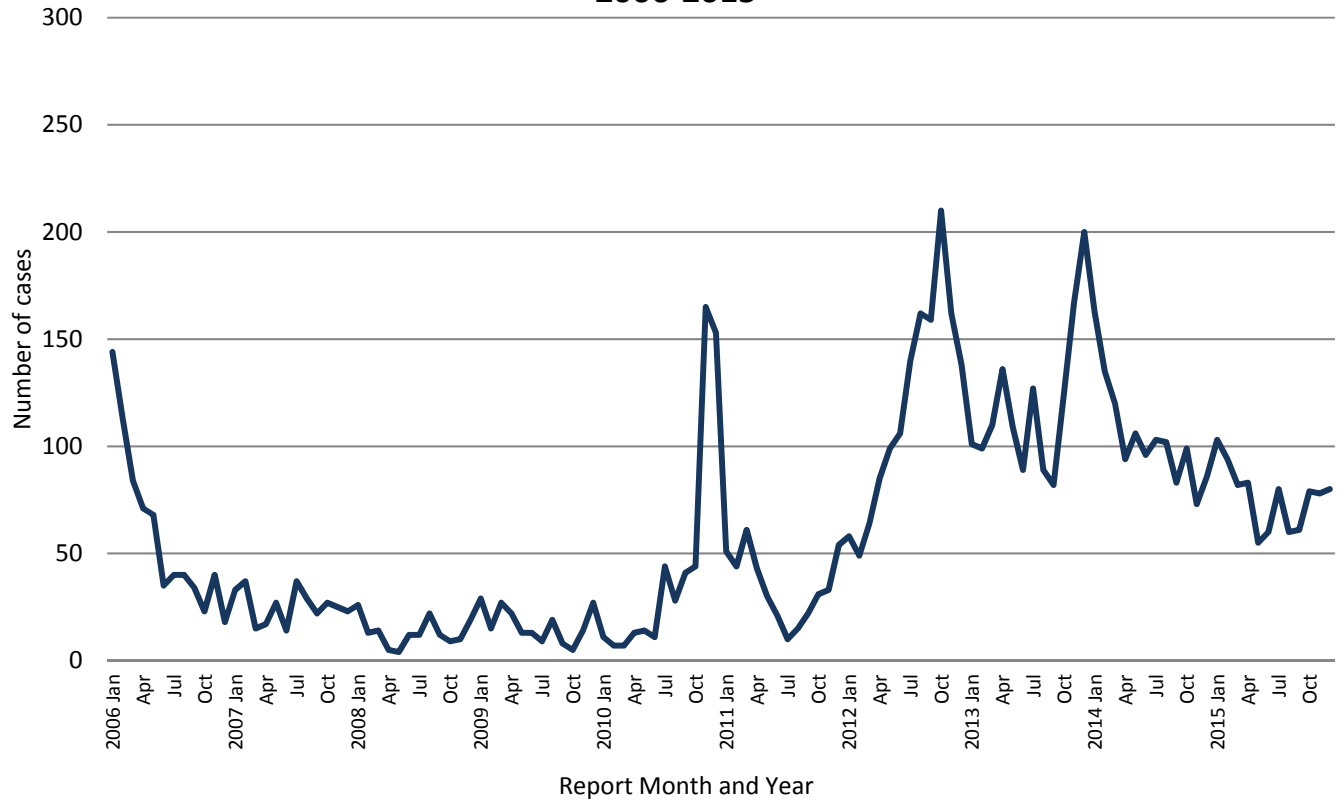


**Table 8. Reported Cases of Mumps by Age Group and Number of Mumps-Containing Vaccine Doses, Colorado, 2015**

Age Group (Years)	0 Doses	1 Dose	2 Doses	Unknown	Total Number of Cases
<1	0	0	0	0	0
1 - 4	0	0	0	0	0
5 - 9	1	0	0	0	1
10 - 14	0	0	0	0	0
15 - 19	0	0	0	0	0
20 - 39	0	0	1	0	1
40+	1	0	0	3	4
<b>TOTAL</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>6</b>

# Pertussis

**Figure 7. Reported Pertussis Cases by Month and Year, Colorado, 2006-2015**

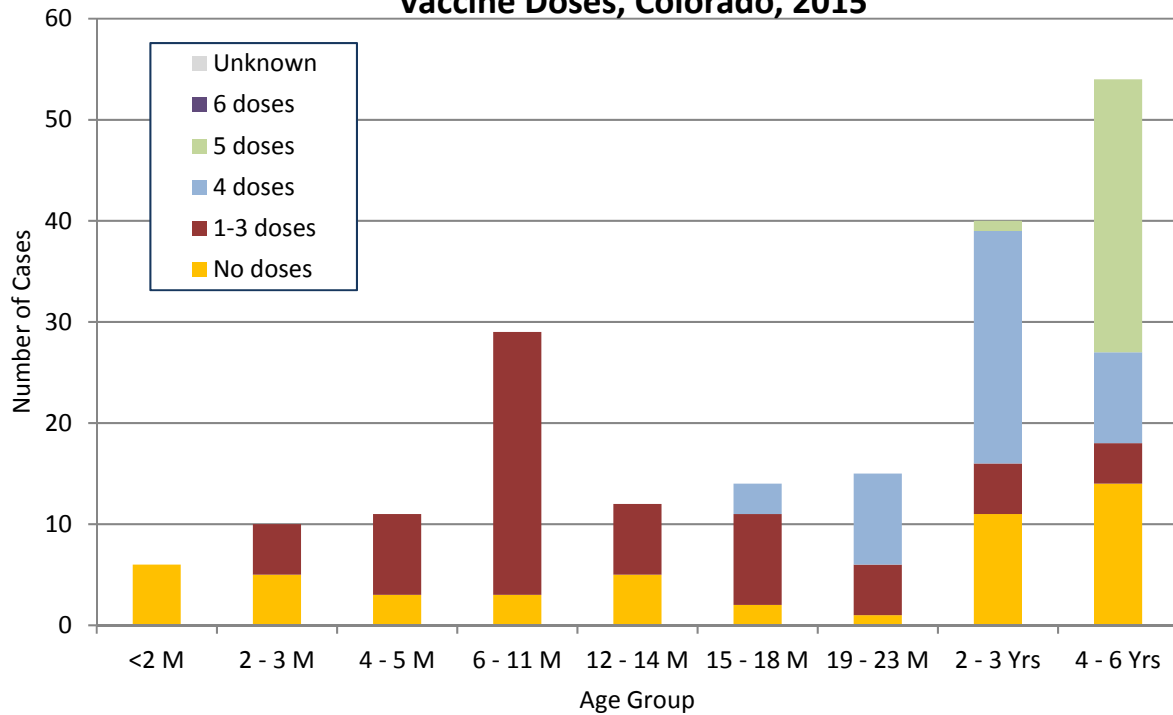


AGE GROUP (Years)	CASES	RATE*	Hospitalized Cases	
			Number	Percent of Cases
<6M	27	80.2	13	48.1
6 - 11M	29	86.2	3	10.3
1 - 4	99	36.6	3	3.0
5 - 9	113	31.2	1	0.9
10 - 14	184	49.8	1	0.5
15 - 19	169	46.5	1	0.6
20 - 29	42	5.6	1	2.4
30 - 39	61	7.8	1	1.6
40 - 59	108	7.4	4	3.7
60+	82	7.9	7	8.5
<b>Total</b>	<b>914</b>	<b>16.5</b>	<b>35</b>	<b>3.8</b>

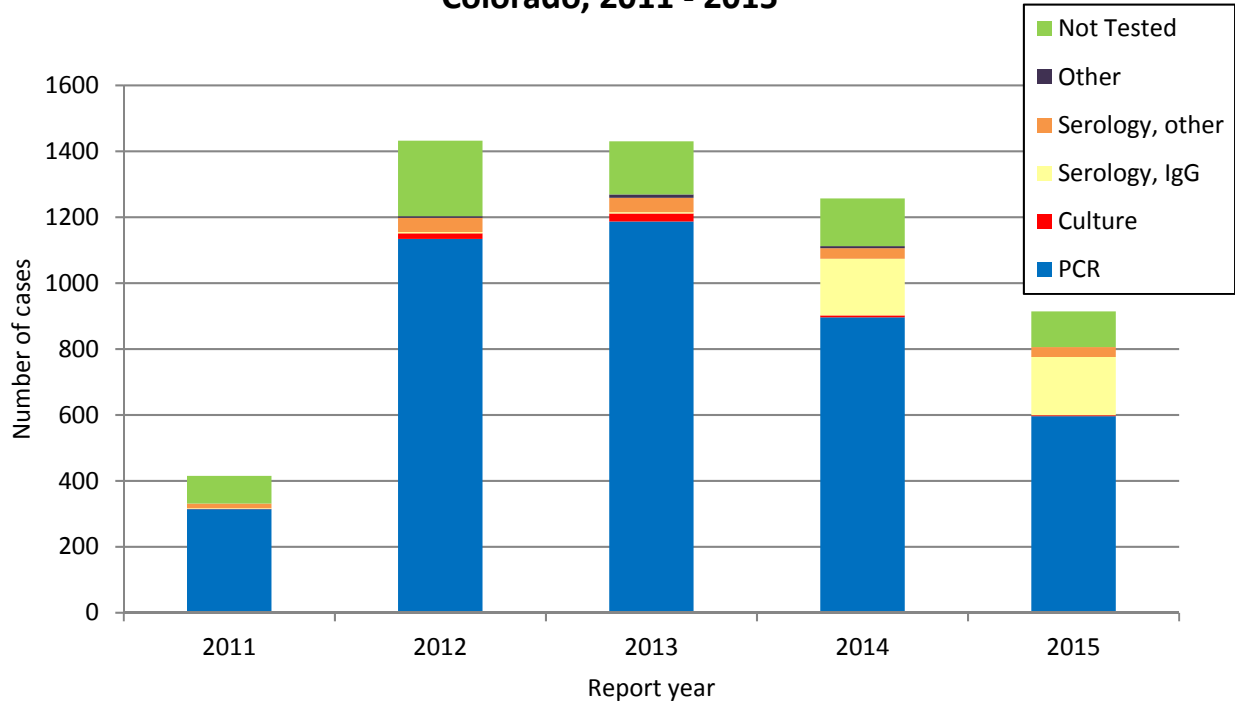
\*Per 100,000 population.

Note: The average number of days hospitalized in 2015 was 3.5 days, median 2.0 days, with the maximum hospital stay being 12 days.

**Figure 8. Reported Pertussis Cases by Age Group and Number of Vaccine Doses, Colorado, 2015**



**Figure 9. Reported Cases of Pertussis by Laboratory Test, Colorado, 2011 - 2015**



**Note:** Reports from patients with IgG positive tests were not investigated prior to 2014. Cases “not tested” include cases who had clinically compatible symptoms and may or may not be epidemiologically-linked to a lab-confirmed case. “Other” test category includes DFA+ and total antibody; “Serology, other” category includes cases who were positive for IgM or IgA antibodies.

Table 10. Classification of Reported Pertussis Cases,  
Colorado, 2015

Case Classification	Number	Percent
<u>Confirmed</u> *: Culture or PCR positive	566	61.9
<u>Confirmed</u> *: Epidemiologically-linked to a culture or PCR positive case	105	11.5
<u>Probable</u> **: Meets clinical case definition only <sup>§</sup>	236	25.8
<u>Probable</u> **: Infant case with cough duration <14 days, PCR positive or epidemiologically-linked to a PCR positive case	7	0.8
TOTAL	914	100.0

\***Confirmed** cases must be laboratory-confirmed by a positive PCR or culture and meet the clinical case definition, **OR** be epidemiologically-linked to a laboratory-confirmed case and meet the clinical case definition.

\*\***Probable** cases must meet the clinical case definition only. This includes cases that are IgG, IgM, or IgA antibody positive, as these tests are not confirmatory. **Probable** cases also include infants who are laboratory confirmed or epidemiologically-linked to a laboratory-confirmed case, with a cough duration <14 days.

<sup>§</sup>**Clinical Case Definition** = cough illness lasting 14 days or more, with at least one of the following: paroxysms of coughing, inspiratory "whoop", post-tussive vomiting.

Table 11. Reported Cases and Rates\* of Pertussis by County, Colorado, 2010 - 2015

County <sup>s</sup>	Number of Cases by Year of Report							
	2010	2011	2012	2013	2014	5 Year Average	2015	2015 Rate*
ADAMS	56	54	206	139	164	123.8	102	20.8
ALAMOSA	1	0	0	1	0	0.4	1	*
ARAPAHOE	64	83	170	184	135	127.2	108	17.1
ARCHULETA	1	6	0	3	0	2.0	5	40.4
BACA	2	0	1	0	4	1.4	0	*
BENT	0	1	0	3	2	1.2	8	137.0
BOULDER	19	16	153	217	92	99.4	46	14.4
BROOMFIELD	6	4	35	28	12	17.0	7	10.8
CHAFFEE	2	0	5	3	0	2.0	1	*
CHEYENNE	0	0	0	0	8	1.6	0	*
CLEAR CREEK	3	2	1	0	0	1.2	0	*
CONEJOS	2	0	0	1	0	0.6	0	*
COSTILLA	0	0	0	3	0	0.6	0	*
CROWLEY	0	0	0	0	3	0.6	1	*
CUSTER	0	0	0	0	2	0.4	0	*
DELTA	7	1	8	0	0	3.2	9	30.1
DENVER	58	37	210	145	146	119.2	88	12.9
DOUGLAS	23	29	85	63	63	52.6	48	14.9
EAGLE	0	0	0	0	5	1.0	1	*
ELBERT	1	0	2	6	2	2.2	4	16.2
EL PASO	21	37	89	77	54	55.6	69	10.2
FREMONT	14	1	6	3	1	5.0	3	6.4
GARFIELD	4	0	0	19	7	6.0	12	20.7
GILPIN	0	3	1	0	0	0.8	0	*
GRAND	1	0	2	2	7	2.4	1	*
GUNNISON	4	0	0	0	0	0.8	10	61.9
HUERFANO	0	0	0	0	1	0.2	0	*
JEFFERSON	165	103	267	238	183	191.2	133	23.5
KIT CARSON	1	0	2	0	1	0.8	0	*

Table11. continues on next page



Table 11. Reported Cases and Rates\* of Pertussis by County, Colorado, 2010 - 2015

County <sup>§</sup>	Number of Cases by Year of Report							
	2010	2011	2012	2013	2014	5 Year Average	2015	2015 Rate*
LA PLATA	0	6	3	21	22	10.4	25	45.5
LAKE	0	0	0	0	1	0.2	0	*
LARIMER	8	7	75	79	74	48.6	89	26.7
LAS ANIMAS	1	0	0	0	0	0.2	0	*
LINCOLN	0	0	1	0	0	0.2	0	*
LOGAN	0	0	1	0	1	0.4	2	*
MESA	7	4	14	10	19	10.8	9	6.0
MOFFAT	1	2	1	1	0	1.0	1	*
MONTEZUMA	4	0	0	8	0	2.4	0	*
MONTROSE	1	2	5	6	0	2.8	0	*
MORGAN	0	0	1	3	7	2.2	12	42.4
OTERO	1	1	1	4	17	4.8	24	131.2
PARK	1	2	0	1	3	1.4	0	*
PHILLIPS	1	0	0	12	1	2.8	0	*
PITKIN	1	0	0	1	3	1.0	0	*
PROWERS	1	0	3	26	0	6.0	1	*
PUEBLO	18	8	8	19	33	17.2	24	14.7
RIO BLANCO	0	0	0	4	0	0.8	0	*
RIO GRANDE	2	0	1	2	0	1.0	4	34.9
ROUTT	1	0	1	1	1	0.8	0	*
SAGUACHE	0	0	1	0	1	0.4	0	*
SAN MIGUEL	0	0	0	0	1	0.2	0	*
SEDGWICK	0	0	0	0	0	0.0	1	*
SUMMIT	1	0	1	3	0	1.0	0	*
TELLER	21	0	6	0	1	5.6	6	25.6
WASHINGTON	2	1	0	0	0	0.6	1	*
WELD	10	5	67	94	181	71.4	57	20.0
YUMA	1	0	0	1	1	0.6	1	*
<b>Total</b>	<b>538</b>	<b>415</b>	<b>1433</b>	<b>1431</b>	<b>1259</b>	<b>1015.2</b>	<b>914</b>	<b>16.8</b>

\*Per 100,000 population. Rates were not calculated for counties with < 3 pertussis cases during 2015. Caution should be used when interpreting rates based on small numbers of cases.

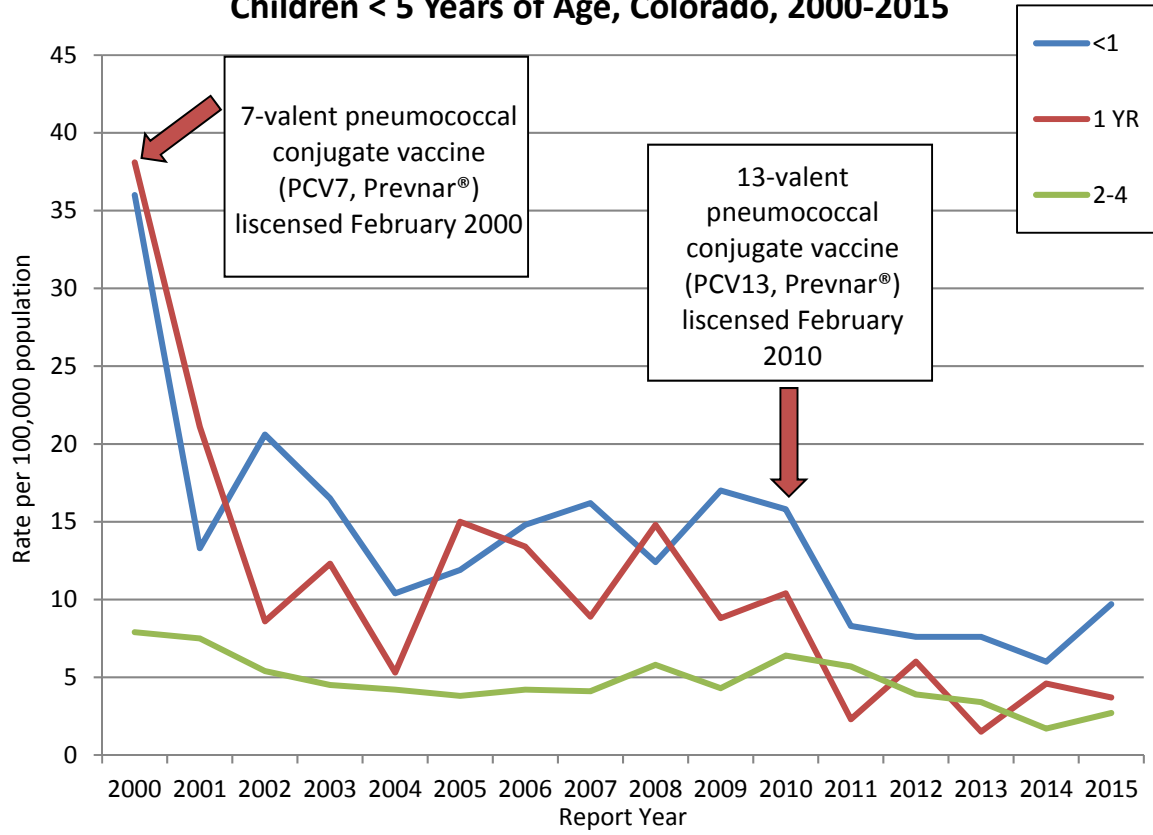
<sup>§</sup>There were no reported cases of pertussis in 2010-2015 in the following counties: Dolores, Hinsdale, Jackson, Kiowa, Mineral, Ouray, and San Juan.

## Pneumococcal disease

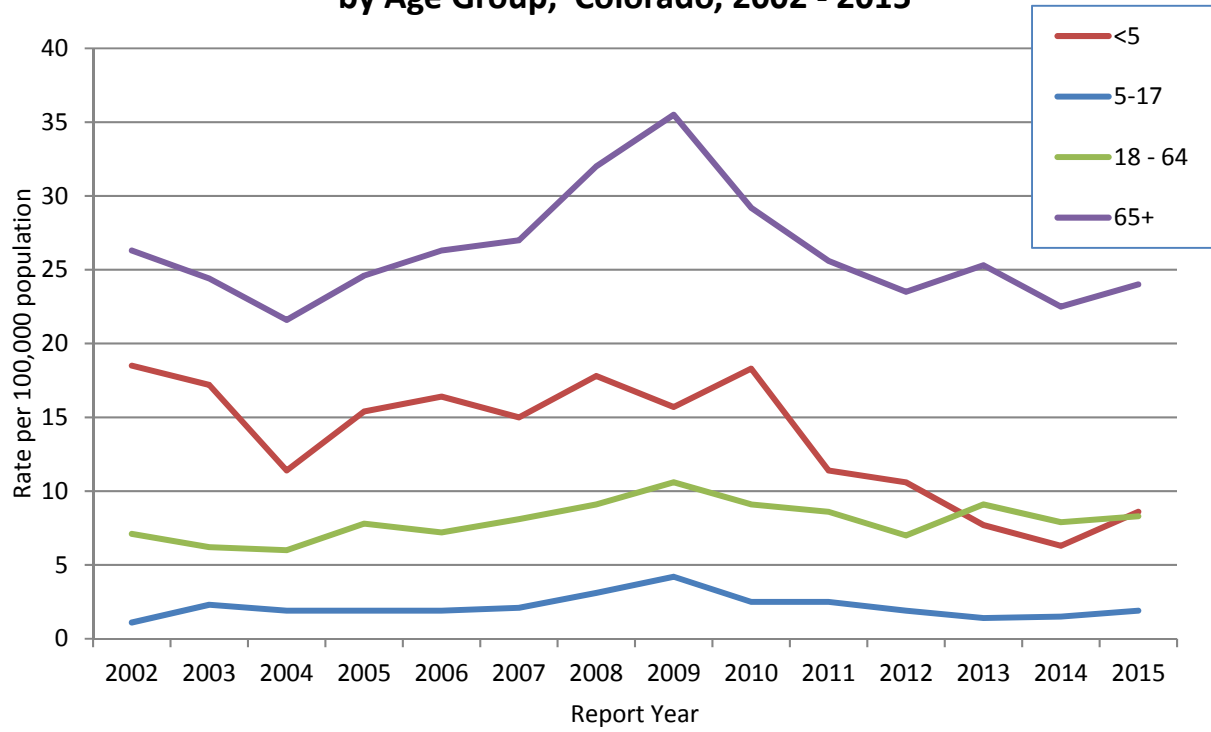
Table 12. Reported Cases, Rates*, and Case Fatality of Invasive Pneumococcal Disease by Age Group, Colorado, 2015				
Age Group (Years)	Cases	Rate*	Deaths	
			Number	Percent of Cases
<1	13	19.3	2	15.4
1-4	16	5.9	0	.
5-9	13	3.6	0	.
10-14	3	0.8	0	.
15-19	6	1.7	0	.
20-29	26	3.5	0	.
30-39	44	5.6	0	.
40-59	151	10.3	15	9.9
60+	234	22.6	14	6.0
<b>Total</b>	<b>506</b>	<b>9.3</b>	<b>31</b>	<b>6.1</b>

\*Per 100,000 population.

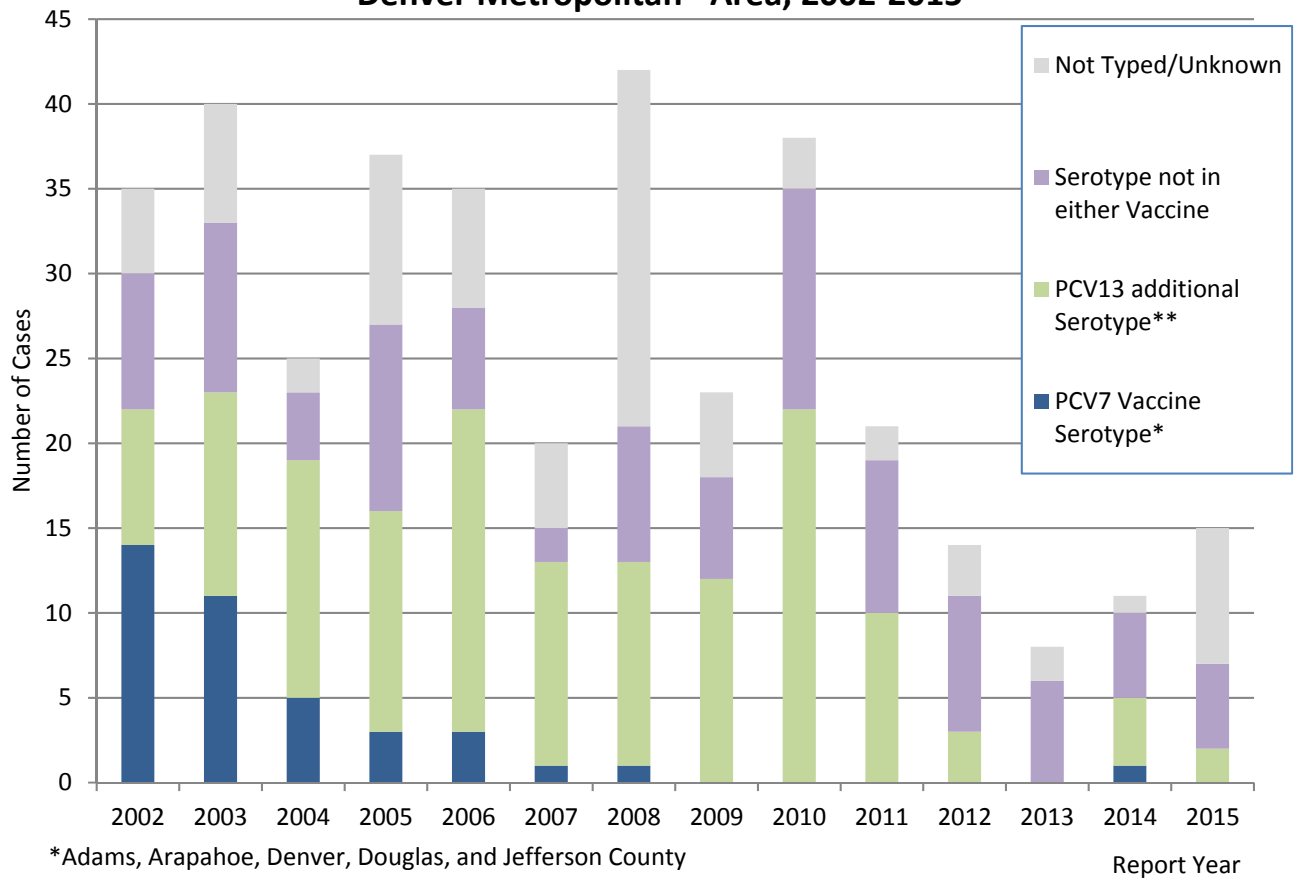
**Figure 10. Rates of Reported Invasive Pneumococcal Disease in Children < 5 Years of Age, Colorado, 2000-2015**



**Figure 11. Rates of Reported Invasive Pneumococcal Disease by Age Group, Colorado, 2002 - 2015**



**Figure 12. Reported Cases of Invasive Pneumococcal Disease Less Than 5 Years of Age by Vaccine Serotype, Denver Metropolitan\* Area, 2002-2015**



\*Adams, Arapahoe, Denver, Douglas, and Jefferson County

\*\*Additional serotypes included in PCV13 and not PCV7 (1, 3, 5, 6A, 7F, 19A).

\*\*\*Serotypes included in PCV7 (4, 6B, 9V, 14, 18C, 19F, 23F).

## Polio

In the United States, the last polio case caused by wild poliovirus was identified in 1979. In 1994, the World Health Organization certified the Western Hemisphere as free of wild poliovirus.

## Rubella

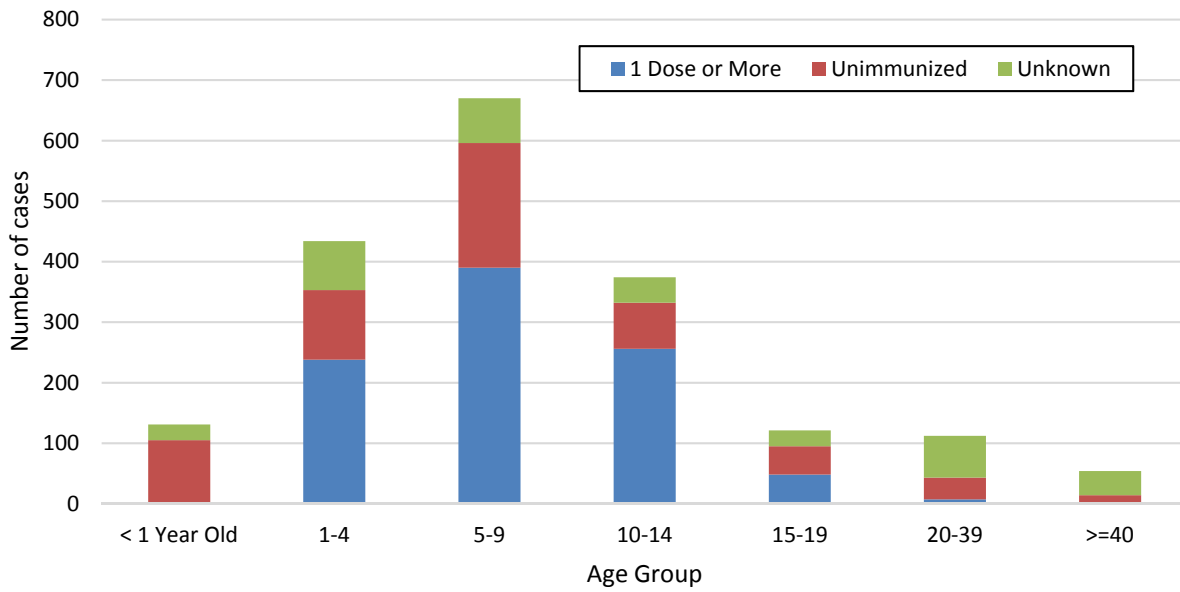
There were no rubella cases reported in Colorado during 2015. The last reported case of rubella in Colorado was in 2003.

## Tetanus

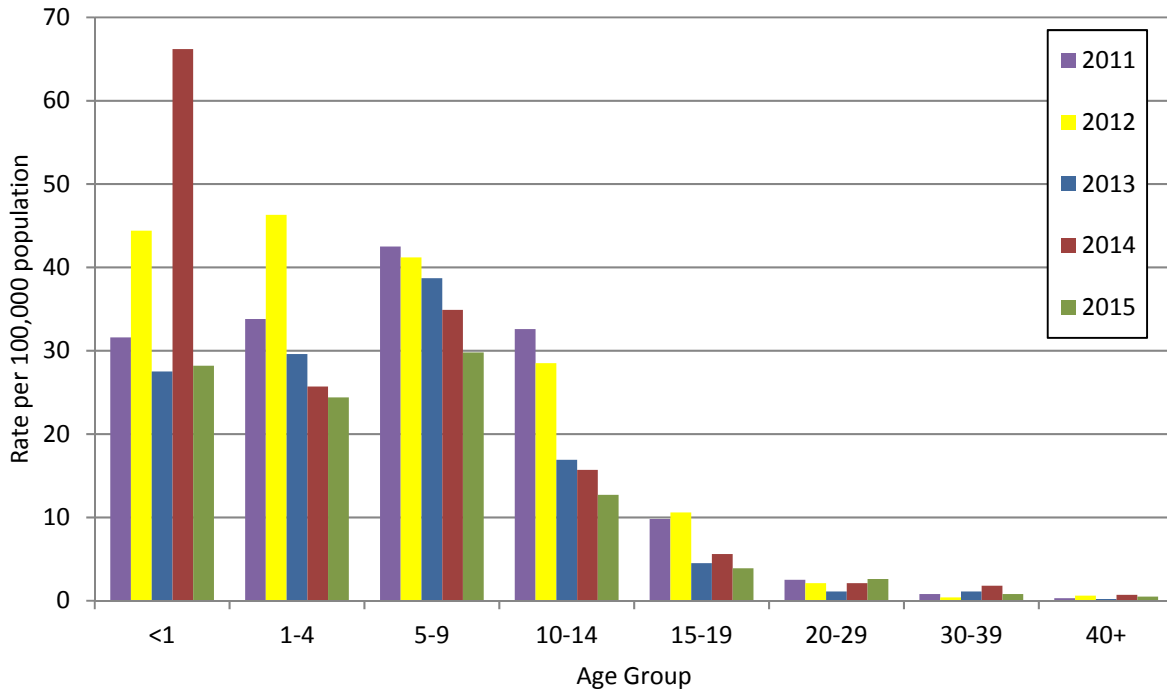
During the previous ten years (2006-2015), there were three cases of tetanus reported in Colorado (one in 2012 and two in 2015). The 2012 case was an adult who received 5 doses of DTaP as a child and a Tdap in 2008. One of the 2015 cases had not received a tetanus vaccine in over 25 years and the vaccination status of the second 2015 case is unknown. All three cases recovered from the illness.

## Varicella (Chickenpox)

**Figure 13. Cases of Varicella (Chickenpox) Reported 2011 - 2015 by Age Group and Vaccination Status, Colorado**



**Figure 14. Rates of Reported Varicella (Chickenpox) Cases by Age Group and Report Year, Colorado, 2011 - 2015**



**Table 13. Reported Cases, Rates\*, and Hospitalization of Varicella (Chickenpox) by Age Group, Colorado, 2015**

Age Group (Years)	Cases	Rate*	Hospitalized Cases	
			Number	Percent of Cases
<1	19	28.2	0	0
1-4	66	24.4	0	0
5-9	108	29.8	0	0
10-14	47	12.7	0	0
15-19	14	3.9	0	0
20-29	19	2.6	0	0
30-39	6	0.8	1	16.7
40-59	10	0.7	0	0
60+	3	0.3	1	33.3
<b>Total</b>	<b>311</b>	<b>5.7</b>	<b>2</b>	<b>0.6</b>

\*Per 100,000 population.