

**Vaccine Preventable Diseases in Colorado:
2018 Surveillance Report**

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Introduction

This report is published by the Vaccine Preventable Disease Unit, part of the Communicable Disease Branch within the division of Disease Control and Public Health Response of Colorado Department of Public Health and Environment (CDPHE). The tables and graphs in this report summarize 2018 surveillance data for confirmed and probable cases of select vaccine preventable diseases (VPD) in Colorado. This report also describes the burden and distribution of VPDs and trends over time.

Surveillance

Colorado Board of Health regulations require health care providers and laboratories to report cases of diphtheria, invasive *Haemophilus influenzae*, measles, meningococcal disease, mumps, pertussis, invasive pneumococcal disease, polio, rubella, tetanus, and varicella, among others, to CDPHE. Health care providers include physicians, nurses, physician assistants, or other persons knowing of or suspecting a case (including but not limited to coroners, infection preventionists, school nurses, or licensed daycare providers). Laboratories include Colorado laboratories, out-of-state laboratories that maintain a physical presence in Colorado, and in-state laboratories which send specimens to out-of-state referral laboratories.

CDPHE receives funding to conduct enhanced statewide surveillance for *Haemophilus influenzae*, meningococcal disease, mumps, and varicella. In addition, CDPHE receives funding to conduct active, population-based surveillance for invasive *Haemophilus influenzae*, invasive pneumococcal disease, pertussis and several other invasive bacterial infections in the five county metro area (Adams, Arapahoe, Denver, Douglas, and Jefferson) as part of the Emerging Infections Program Active Bacterial Core Surveillance System. Enhanced surveillance involves additional data collection and validation.

All cases are to be reported with patient's name, date of birth, sex, race, ethnicity, and address (including city and county), as well as name and address of responsible physician or other health care provider in order to locate the patient for follow up.

Data Sources

The data that form the basis of this report are principally reports of VPD among people living in Colorado at the time their illness was reported to CDPHE. Most cases of VPD are reported via electronic laboratory reporting (ELR) and are triaged by the Integrated Disease Reporting Program (IDRP) and entered into the Colorado Electronic Disease Reporting System (CEDRS). Other reports are called or faxed to CDPHE or a local public health agency (LPHA). The VPD unit also requests death certificate matches from the CDPHE Office of Vital Statistics twice a year to detect VPD-related deaths not reported by providers or laboratories.

Laboratory and clinical data are obtained from health care providers directly, from review of medical records, or from patient interviews. Data on immunization history are obtained from the

Colorado Immunization Information System (CIIS) and from cases and providers. For diseases for which we provide proportion of cases who are vaccinated, we use patient interview, CIIS, and medical records. For cases where vaccine administration dates are not available but the patient verbally reports having received the vaccine in the past, vaccination status is recorded as unknown.

Colorado rates were calculated as cases per 100,000 population using final 2018 population estimates from the Demography Section, Colorado Division of Local Government, Colorado Department of Local Affairs.

Reported Cases of Select Vaccine Preventable Diseases, Colorado 2013-2018

Report Year	Invasive H. Influenzae type b (Hib)	Measles	Meningococcal Disease	Mumps	Pertussis (Whooping cough)	Invasive Pneumococcal Disease	Varicella
2018	3	0	7	33	616	592	259
Five-Year Average (2013-2017)	<1	1	6	23	998	529	330
2017	0	0	6	83	672	655	272
2016	0	1	4	18	716	513	330
2015	2	1	6	6	914	506	311
2014	1	1	7	4	1,259	459	386
2013	0	2	9	4	1,431	511	352

Note: During 2013-2018 no congenital rubella, diphtheria, polio, or rubella cases were reported. Two cases of tetanus were reported during 2015 and one during 2018. Case counts for hepatitis A, hepatitis B, and influenza are available in other CDPHE surveillance reports, as described below. Five year averages were rounded to the closest whole number.

Diphtheria

Diphtheria, a rare disease in the United States, is caused by infection with toxigenic (toxin-producing) strains of the bacterium *Corynebacterium diphtheriae*. Important sites of infection are the respiratory mucosa (respiratory diphtheria) and skin (cutaneous diphtheria).

No cases of diphtheria were reported in Colorado during 2018. The last case of diphtheria reported in Colorado was in 1985.

CDC's Advisory Committee on Immunization Practice (ACIP) recommends routine vaccination with diphtheria-containing vaccine, DTaP (diphtheria, tetanus, and acellular pertussis vaccination) at two, four, six, and 15 through 18 months and four through six years,¹ followed by a dose of Tdap at 11-12 years of age. pregnant people are recommended a single dose of Tdap during every pregnancy. Adults should receive a single dose of Td or Tdap vaccine every 10 years. Adults who have never received Tdap also are recommended to receive a dose of Tdap.²

Haemophilus influenzae (Hi)

Haemophilus influenzae (*H. influenzae*) is a bacteria that can cause many different kinds of infections from mild ear infections to severe disease. Only *H. influenzae* infections in sterile sites of the body such as blood, spinal fluid, and joint fluid are considered invasive and reported to CDPHE. These infections are usually severe, require treatment in a hospital, and can sometimes result in death. The most common types of invasive disease caused by *H. influenzae* are: pneumonia (infection in the lungs), bacteremia (infection in the blood), meningitis (infection of the tissue covering of the brain and spinal cord), and infectious arthritis (inflammation of the joint). CDPHE does not track noninvasive *H. influenzae* disease, such as ear infections.

There are six serotypes, or strains, of *H. influenzae* (identified as a, b, c, d, e and f), depending on the outer covering of the bacteria, or polysaccharide capsule. There is also a strain of *H. influenzae* called non-typeable because this strain lacks a capsule around the bacteria. CDPHE requires labs to send isolates from all invasive *H. influenzae* cases to determine the serotype and track trends in disease. Occasionally, a laboratory discards an isolate before submitting it for serotyping, resulting in a few cases every year with an unknown serotype

Before the introduction of effective vaccines, *H. influenzae* type b (Hib) caused more than 95% of invasive disease in children less than five-years-old³. In the post-vaccine era, non-typeable *H. influenzae* causes the majority of invasive disease in all age groups. Hib is rare in Colorado. Only Hib is preventable by vaccination; other types of *H. influenzae* are not.

¹ CDC. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2018 Apr 27; 67 (2); 1-44

² CDC. Use of Tetanus Toxoid, Reduced Diphtheria Toxoid, and Acellular Pertussis Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP)- United States, 2019. MMWR 2020 Jan 24; 69(3);77-83

³ CDC. Prevention and Control of *Haemophilus influenzae* Type b Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2014 Feb 28 ; 63 (RR01); 1-14.

In Colorado, invasive *H. influenzae* infection is most common in children under five years of age and in adults 60 years and older.

ACIP recommends routine vaccination with a conjugate Hib vaccine series beginning at two months of age, in either a two dose or a three-dose series, depending on the vaccine chosen. A booster of any licensed conjugate Hib vaccine at age 12 through 15 months is recommended.⁴

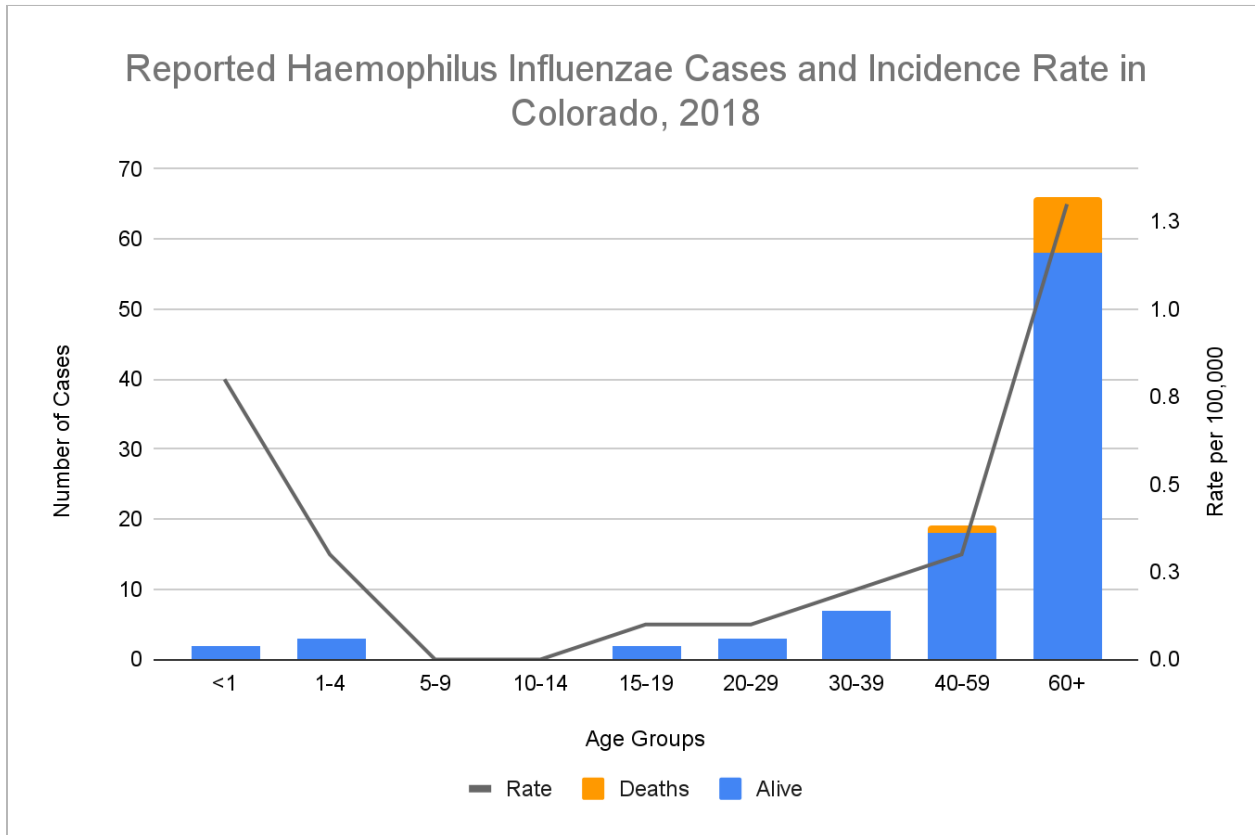


Figure 1: There were 96 total cases of *Haemophilus influenzae* reported in 2018. The outcome of three cases was unknown.

⁴ CDC. Prevention and Control of *Haemophilus influenzae* Type b Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2014 Feb 28 ; 63 (RR01); 1-14.

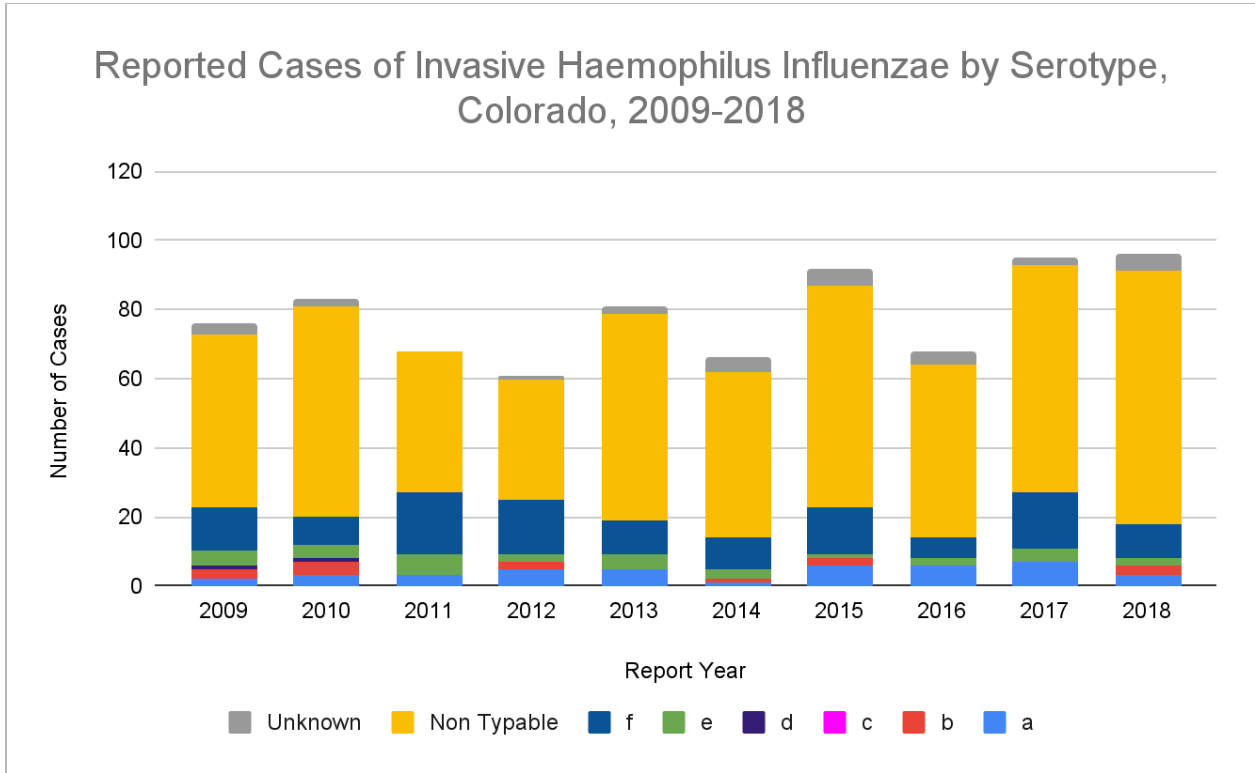


Figure 2.

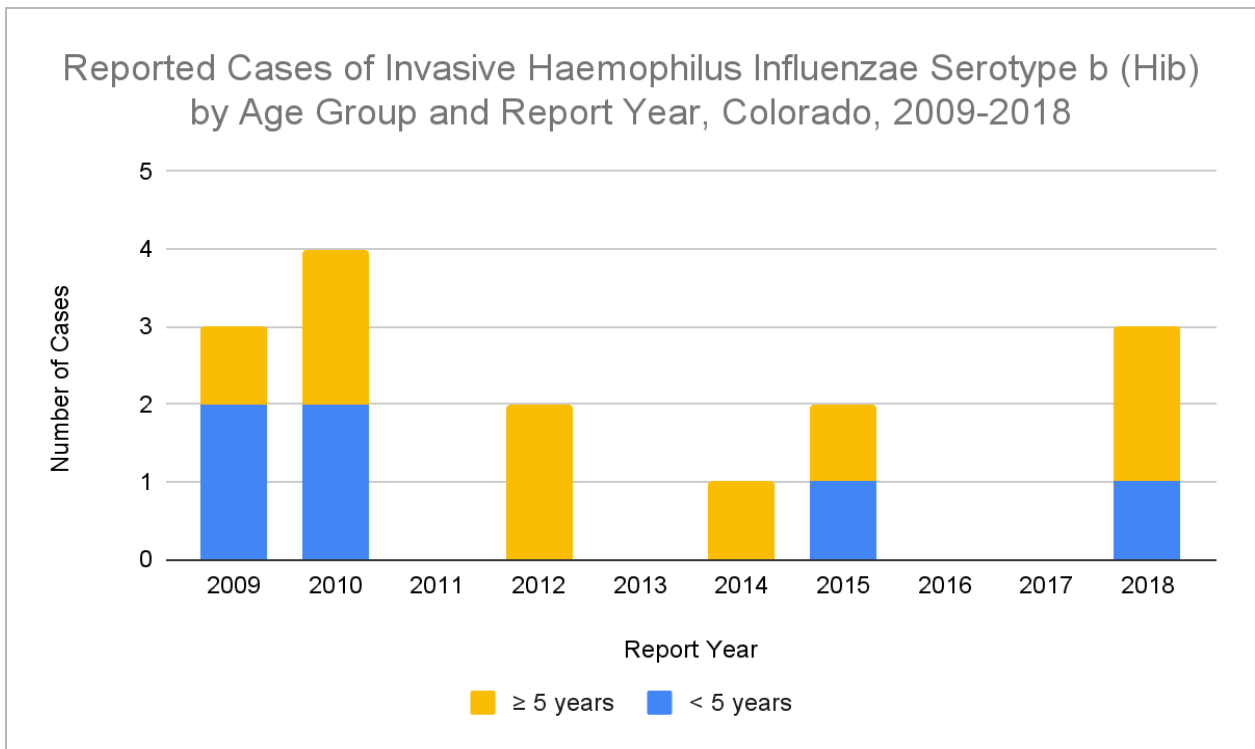


Figure 3: Of the six cases of Hib <five years of age reported 2009-2018, Four were unvaccinated, One case was not appropriately vaccinated for their age, and one was partially vaccinated.

Hepatitis A and B

Hepatitis A (HAV) and hepatitis B (HBV) viral infections are reportable in Colorado. Hepatitis A is typically a foodborne or person-to-person illness that appears only as an acute (newly occurring) infection that does not become chronic. The virus is transmitted by eating or drinking contaminated food or water, or by contact with an infected person. People with hepatitis A infection can have a mild illness lasting a few weeks to a more severe illness requiring hospitalization. Infected people usually improve without treatment.

A vaccine to prevent hepatitis A infection was introduced in 1995. The ACIP recommends that all children receive two doses of hepatitis A vaccine beginning at one year of age or older, with a minimum of six months between doses.⁵ A two-dose series of hepatitis A vaccine with a minimum interval of six months, or a three-dose series of combined hepatitis A and hepatitis B vaccine are recommended for adults who want protection from hepatitis A or who are at risk for infection.⁶

Hepatitis B is typically a bloodborne illness that can occur as an acute or chronic infection. It can range in severity from a mild illness that clears on its own within a few weeks, to a serious chronic illness that can result in death. The virus can replicate in the liver for years, oftentimes without obvious symptoms, until severe, irreparable damage has occurred.

The ACIP recommends infants receive a three-dose series of hepatitis B vaccines at ages zero, one to two months, and between six and 18 months.⁷ Children not previously vaccinated with hepatitis B vaccine should receive a three dose series, to include an interval of at least four weeks between the first and second dose, an interval of at least eight weeks between the second and third dose AND an interval of at least 16 weeks between the first and third doses.⁸ Hepatitis B vaccination is recommended for all unvaccinated adults at risk for HBV infection and for all adults requesting protection from HBV infection. Acknowledgment of a specific risk factor should not be a requirement for vaccination.⁹

Adults age 18 years or older may receive the combined HAV and HBV vaccine as a three-dose series with one and six month intervals between doses (zero, one, and six months) or four-dose, accelerated series (three doses at zero, seven, and 21–30 days, followed by a booster dose at 12 months.)¹⁰

In late 2018, Colorado experienced an increase in hepatitis A cases that were eventually linked to an outbreak impacting people experiencing homelessness and people with substance use issues. At least 30 other states were impacted by similar outbreaks. CDPHE partnered with local

⁵ CDC. Recommended Immunization Schedules for Persons Aged 0 Through 18 Years, United States, 2021

⁶ Prevention of Hepatitis A Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, 2020. *Recommendations and Reports* / July 3, 2020 / 69(5);1–38.

⁷ CDC. Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2021.

⁸ CDC. Catch-up immunization schedule for persons aged 4 months–18 years who start late or who are more than 1 month behind, United States, 2021.

⁹ CDC. Epidemiology and Prevention of Vaccine-Preventable Disease. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

¹⁰ Prevention of Hepatitis A Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, 2020

public health agencies and community organizations to support outreach, immunization, and education efforts.¹¹

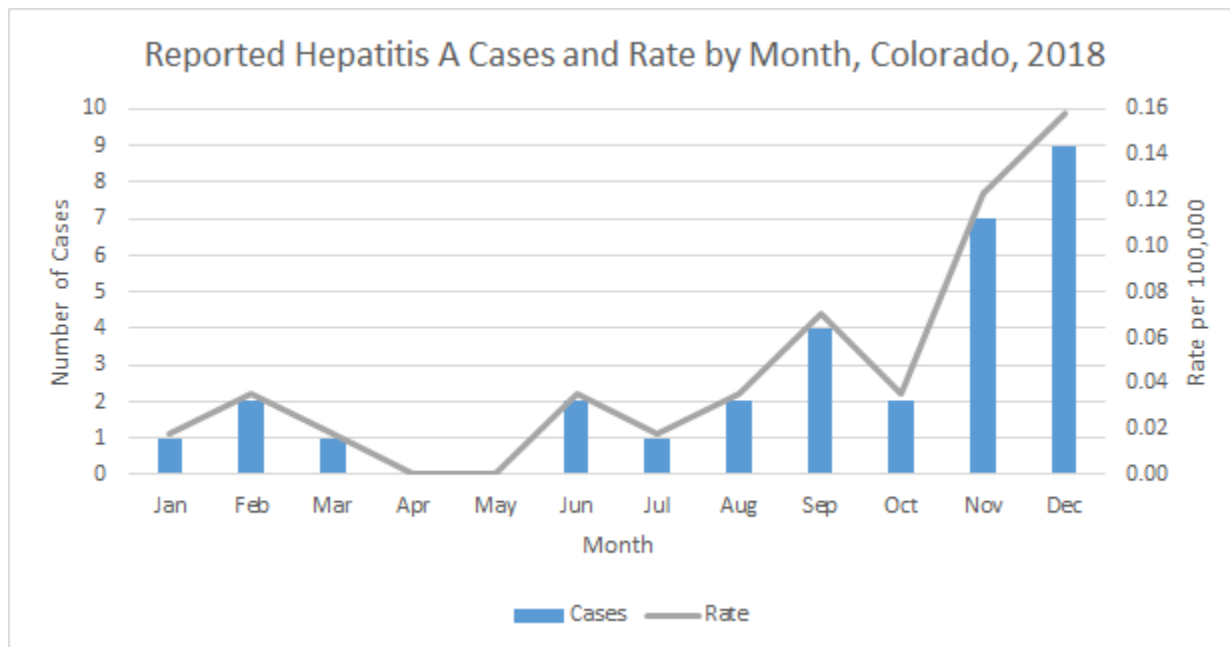


Figure 4: Of the 31 cases of HAV reported in 2018, more than half (16) were reported in November and December.

See the full viral hepatitis reports at: <https://cdphe.colorado.gov/hepatitis-data>

Influenza

Influenza (also known as flu) is a contagious respiratory illness caused by influenza viruses. Infection can cause mild to severe illness, and at times can lead to death. Most people who get flu will recover in a few days to less than two weeks, but some people will develop complications, such as pneumonia, inflammation of the heart (myocarditis), or brain (encephalitis), and multi-organ failure.

Hospitalizations due to influenza and influenza-associated deaths in children less than 18 years of age are reportable in Colorado. CDPHE conducts additional influenza surveillance activities including: reporting of influenza-like illness visits by selected clinical sites, reporting of influenza testing activity by sentinel hospital labs, monitoring circulating influenza viruses through molecular typing at the CDPHE laboratory, and reporting of outbreaks of influenza in schools and group residential settings.

¹¹ Immunize Colorado. Hepatitis A Prevention. <https://www.immunizecolorado.org/healthcare-professionals/hepatitis-a-prevention>.

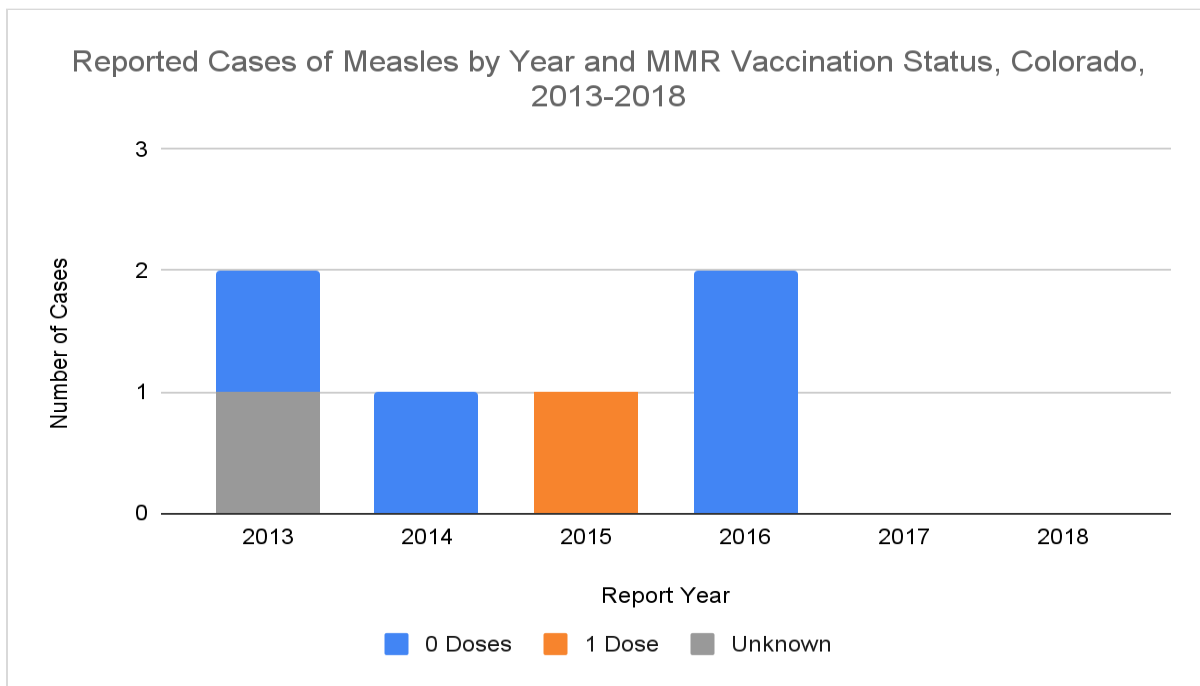
ACIP recommends routine annual influenza vaccination for all persons aged six months and older who do not have contraindications.¹²

See the full influenza summary report at: <https://www.colorado.gov/pacific/cdphe/influenza>

Measles

Measles is an acute viral illness. The classic symptoms of measles are a generalized rash lasting more than three days, a temperature of greater than 101°F/38.3°C and the onset of a cough, runny nose and/or red swollen eyes. In 2000, measles was declared eliminated from the United States. Although endemic (acquired in the United States) measles has been eliminated in the United States, importation of measles continues to occur as measles remains active in many other parts of the world. Current measles epidemiology in the United States and Colorado is determined by characteristics of the imported cases and their susceptible contacts.

ACIP recommends routine vaccination with the measles, mumps, and rubella (MMR) vaccine between ages 12 and 15 months and a second dose between ages four and six years. Adults with no evidence of immunity should get at least one dose of MMR vaccine. People who attend college, travel internationally, or who work in healthcare settings should have two doses of MMR vaccine.¹³



¹² MMWR. Prevention and Control of Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices, United States, 2015-2016 Influenza Season. 2015 Aug 7; 64(30): 818-825.

¹³ CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2013 Jun 14; 62 (RR04); 1-34.

Figure 5: The unvaccinated case reported 2014 and one of the unvaccinated cases from 2016 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. The second unvaccinated case in 2016 was an adult eligible for vaccination. No cases of measles were reported in 2017 or 2018.

Meningococcal Disease

Meningococcal disease is a serious and often life-threatening infection caused by the bacterium *Neisseria meningitidis* (*N. meningitidis*). When this bacteria invades sterile sites of the body like blood or spinal fluid, meningococcal disease occurs. Of the several types of *N. meningitidis*, serogroups A, B, C, W, and Y are the main causes of invasive meningococcal disease.

Invasive *N. meningitidis* infection can cause several types of illness, including meningitis (inflammation of the membrane around the brain and spinal cord), sepsis (infection of the blood), or pneumonia (infection of the lungs). Meningococcal disease develops rapidly, even among previously healthy people. Despite appropriate antibiotic treatment, about 15% of cases of meningococcal disease are fatal. Among those who survive, 10%–20% have long term effects that may include limb loss, extensive skin scarring, hearing loss, cognitive defects, or seizure disorders.¹⁴

N. meningitidis is spread via small droplets or mucus by coughing, sharing drinks or vaping devices, or by being in close or lengthy contact with someone who carries the bacteria. Many people carry the bacteria in their nose or throat, but most do not develop invasive disease.¹⁵ Invasive meningococcal disease occurs throughout the year in Colorado.

ACIP recommends routine vaccination with a quadrivalent meningococcal conjugate vaccine (MenACWY) for children ages 11 to 12 years with a booster dose at 16 years. The ACIP also recommends routine vaccination for people at increased risk of developing meningococcal disease. In the fall of 2015, the ACIP began recommending that children and young adults aged 16 to 23 years may be vaccinated with a serogroup B meningococcal (MenB) vaccine based on shared clinical decision-making to provide short-term protection against most strains of serogroup B meningococcal disease.¹⁶

¹⁴ Meningococcal Vaccination: Recommendations of the Advisory Committee on Immunization Practices, United States, 2020 Recommendations and Reports / September 25, 2020 / 69(9);1–41.

¹⁵ VPD Surveillance Manual, Meningococcal Disease: Chapter 8: Meningococcal Disease. Lucy A. McNamara, PhD, MS; Amy Blain, MPH.

¹⁶ Meningococcal Vaccination: Recommendations of the Advisory Committee on Immunization Practices, United States, 2020 Recommendations and Reports / September 25, 2020 / 69(9);1–41

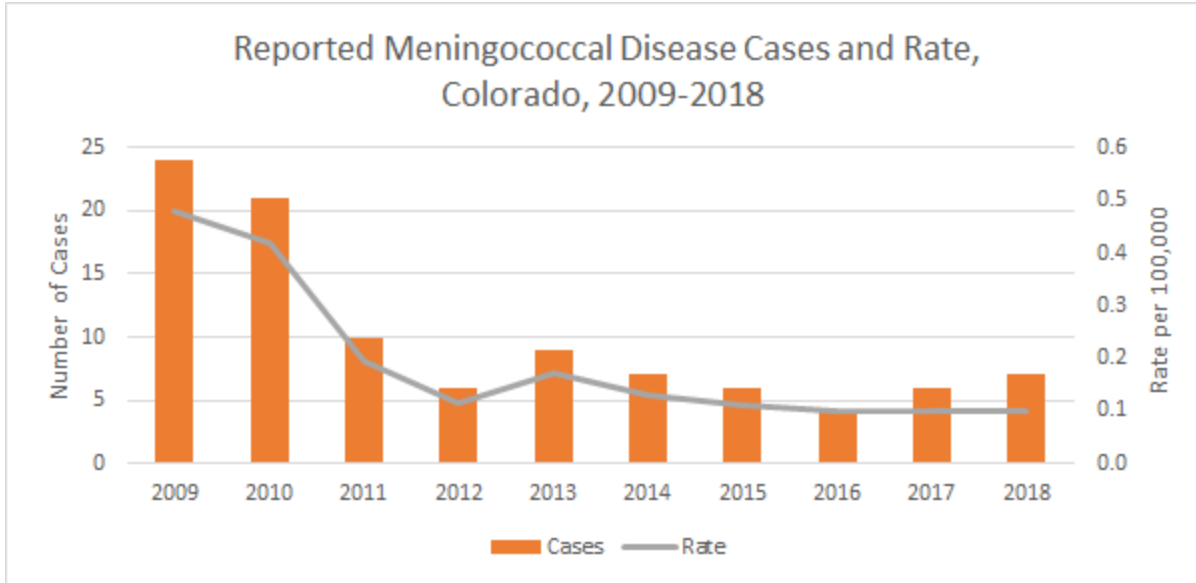


Figure 6: Over the last ten years, the incidence of Meningococcal disease has declined in Colorado. In 2018, a total of seven people, or 0.12 people per 100,000, in Colorado experienced Meningococcal disease.

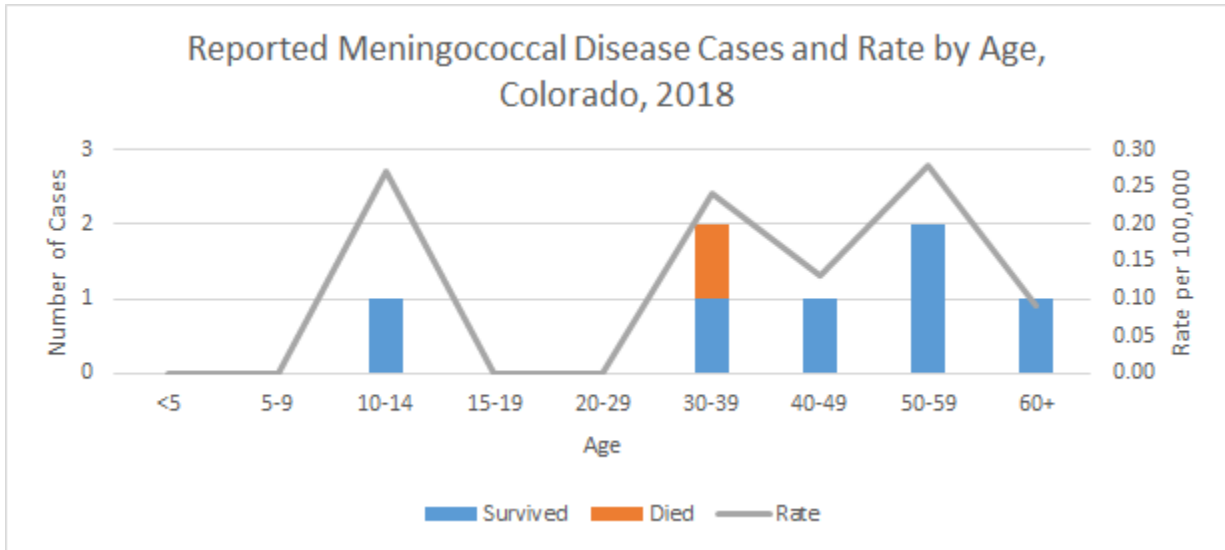


Figure 7: During 2018, seven people were diagnosed with Meningococcal disease in Colorado; six survived and one died.

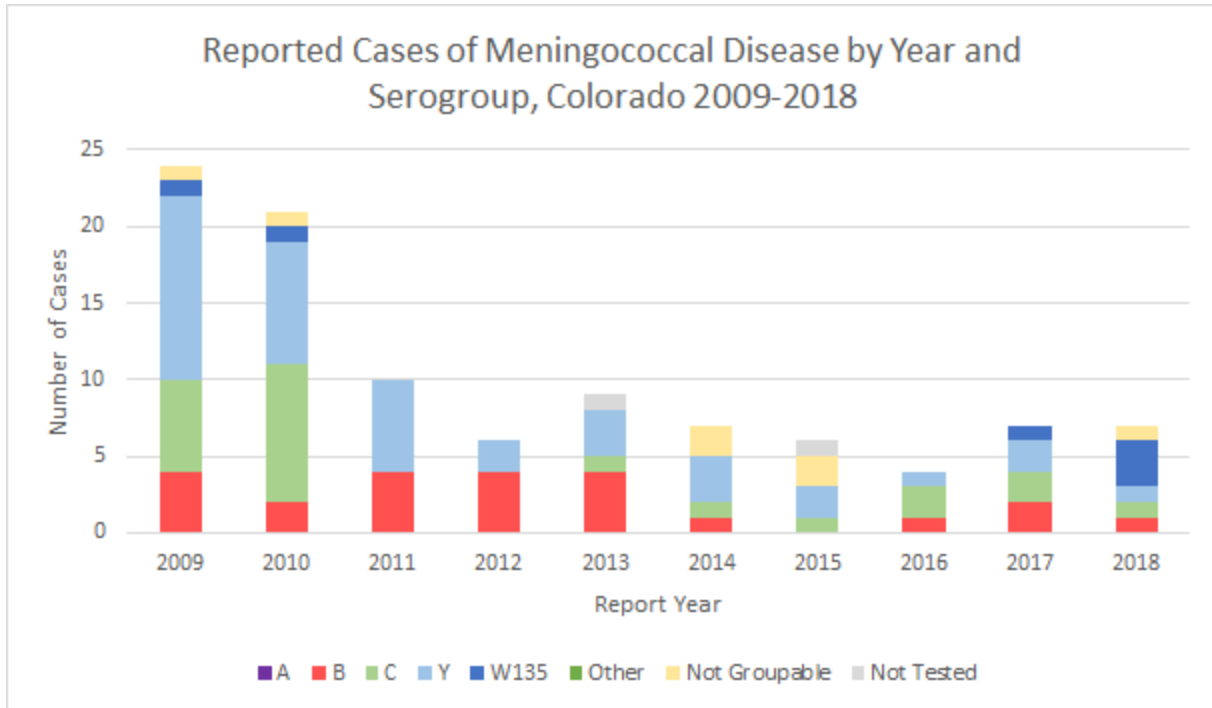


Figure 8: Overall incidence and proportion of each serogroup have shifted over the last ten years.

Mumps

Mumps is an acute viral illness. The classic symptom of mumps is swelling of the parotid gland (parotitis) or other salivary glands along the jaw. Swelling usually lasts at least two days, but may last up to 10 days. Other symptoms of mumps include jaw pain, fatigue or tiredness, and swelling of the testicles or ovaries. Some people with mumps only have respiratory symptoms or no symptoms at all.

Results from several outbreak investigations showed that hospitalizations and overall complications are lower in people who were fully vaccinated compared with people who were unvaccinated. Severe complications of mumps are uncommon, but occur more often in adults than children. Among all persons infected with mumps, reported rates of pancreatitis, deafness, meningitis, and encephalitis were less than 1%.¹⁷

ACIP recommends routine vaccination with the measles, mumps, and rubella (MMR) vaccine at age 12 through 15 months and a second dose at age four through six years. Adults with no evidence of immunity should get at least one dose of MMR vaccine. People who attend college,

¹⁷ Centers for Disease Control and Prevention. (2018, January 31). *Mumps - Vaccine Preventable Diseases Surveillance Manual*. Centers for Disease Control and Prevention. <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt09-mumps.html>.

travel internationally, or who work in healthcare settings should receive two doses of MMR vaccine.¹⁸

Between January 2016 and June of 2017, 150 mumps outbreaks were recorded by health departments across the United States. Outbreak settings included households, workplaces, schools, universities, sports teams and their facilities, and church groups.¹⁹ Colorado also saw an increase in mumps cases and outbreaks during 2017. One large Colorado outbreak during 2017 was found to be linked to a large outbreak in Arkansas with nearly 3,000 cases.

Nationwide, 2018 saw a decrease in the number of mumps cases and outbreaks; however, there were still more than 2,500 cases of mumps nationwide, many of which were found among adults held in immigration detention centers.¹⁸ In Colorado, there was an outbreak within a close-knit religious community starting in late September and lasting through the end of the year.

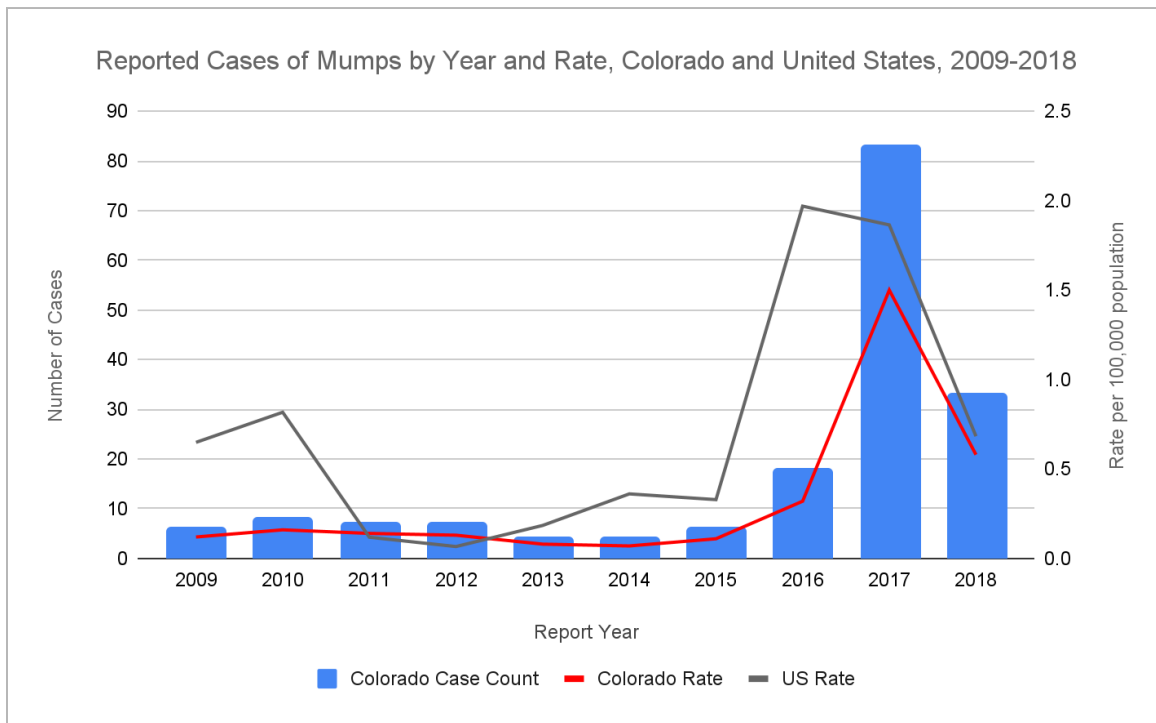


Figure 9: In 2017, a large outbreak in a close-knit community in northwest Arkansas resulted in nearly 3,000 cases nationwide. Colorado and other states experienced outbreaks linked to the Arkansas outbreak in 2017.

¹⁸ CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2013 Jun 14; 62 (RR04); 1-34.

¹⁹ Centers for Disease Control and Prevention. (2021, July 12). *Mumps*. Centers for Disease Control and Prevention. <https://www.cdc.gov/mumps/outbreaks.html>.

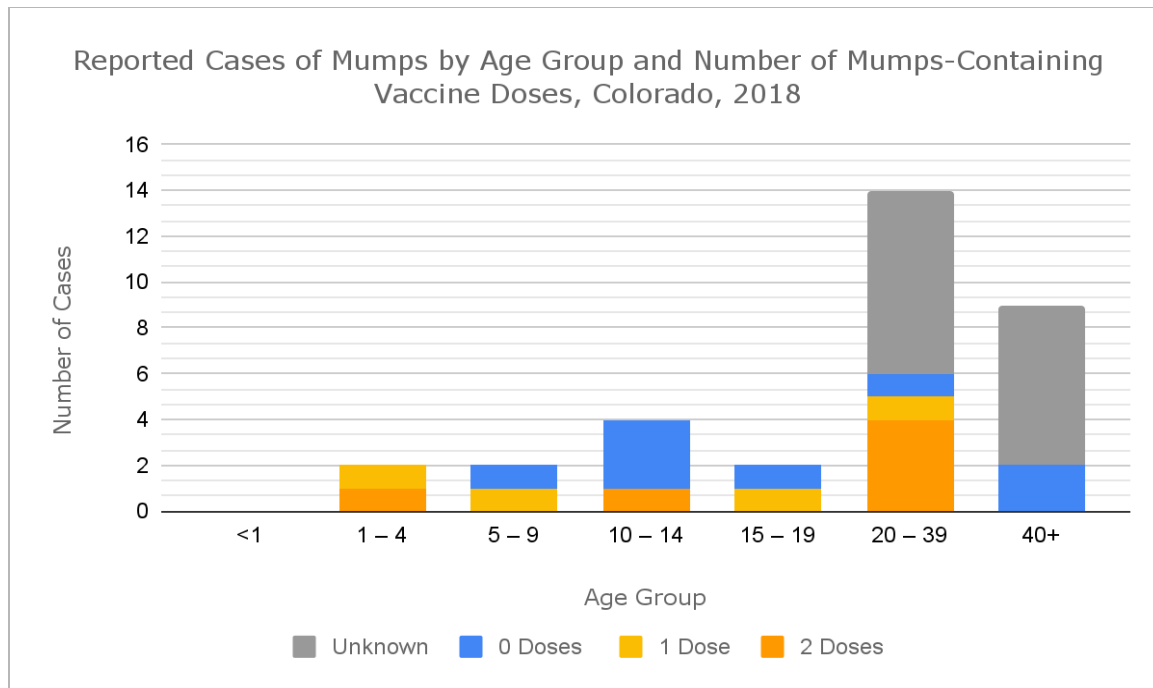


Figure 10: It is uncommon for adult vaccination records to be available, hence the higher numbers of unknown doses among those over age 20.

Pertussis (Whooping cough)

Pertussis, or “whooping cough,” is a respiratory disease caused by the bacterium *Bordetella pertussis* and spreads easily from person-to-person. The illness is characterized by a severe cough lasting more than two weeks with coughing fits followed by a high-pitched intake of breath that creates a “whooping” sound.

Pertussis rarely causes severe complications in healthy, vaccinated people. However, infants are at greatest risk for pertussis-related complications and death. Pneumonia is the most common complication in all age groups; seizures and encephalopathy (brain swelling) are rare and generally occur only among very young infants. Death is infrequent and most likely to occur in unvaccinated infants, although deaths occasionally occur in older children and adults with serious underlying health conditions.

Laboratory surveillance to monitor changes in *B. pertussis* is important. Isolates of *B. pertussis* collected through enhanced surveillance is vital to understanding the evolution of *B. pertussis* and how those changes may impact the current pertussis vaccination program and other prevention strategies.

Starting in 2012, Colorado and the United States experienced epidemic levels of pertussis. While cases have decreased since 2012, levels remain high compared to the annual average number of cases in the 1980s and 1990s. Multiple factors have likely contributed to the increase

including waning immunity from acellular pertussis vaccines; heightened provider and public awareness; improved testing; and possibly molecular changes within the pertussis bacterium. The incidence of pertussis remains highest among young infants.

Pertussis cases are classified as confirmed or probable. Confirmed cases have symptoms consistent with pertussis and test positive by polymerase chain reaction (PCR), culture, or are linked to someone who tested positive. Cases classified as probable have symptoms consistent with pertussis and either absent laboratory results or non-contributory laboratory results, such as serology.

ACIP recommends routine vaccination with pertussis-containing vaccine, DTaP (diphtheria, tetanus, and acellular pertussis vaccination) at two, four, six, and 15 through 18 months and four through six years, followed by a dose of Tdap at 11-12 years of age. pregnant people are recommended a single dose of Tdap during every pregnancy. For adults who have never received Tdap, a dose of Tdap can replace one of the 10-year Td booster doses.²⁰

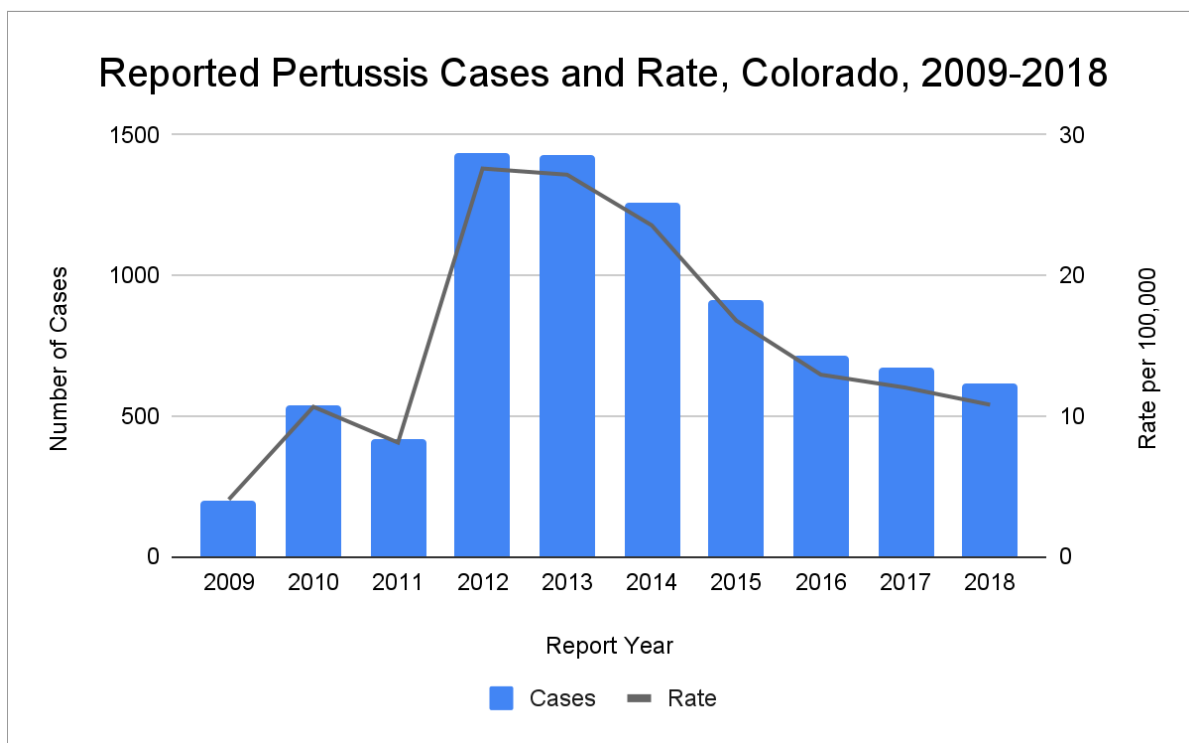


Figure 11. Cases of pertussis have been declining since 2012. During 2018, 10.8 people per 100,000 had pertussis in Colorado.

²⁰ CDC. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2018 Apr 27; 67(2):1-44

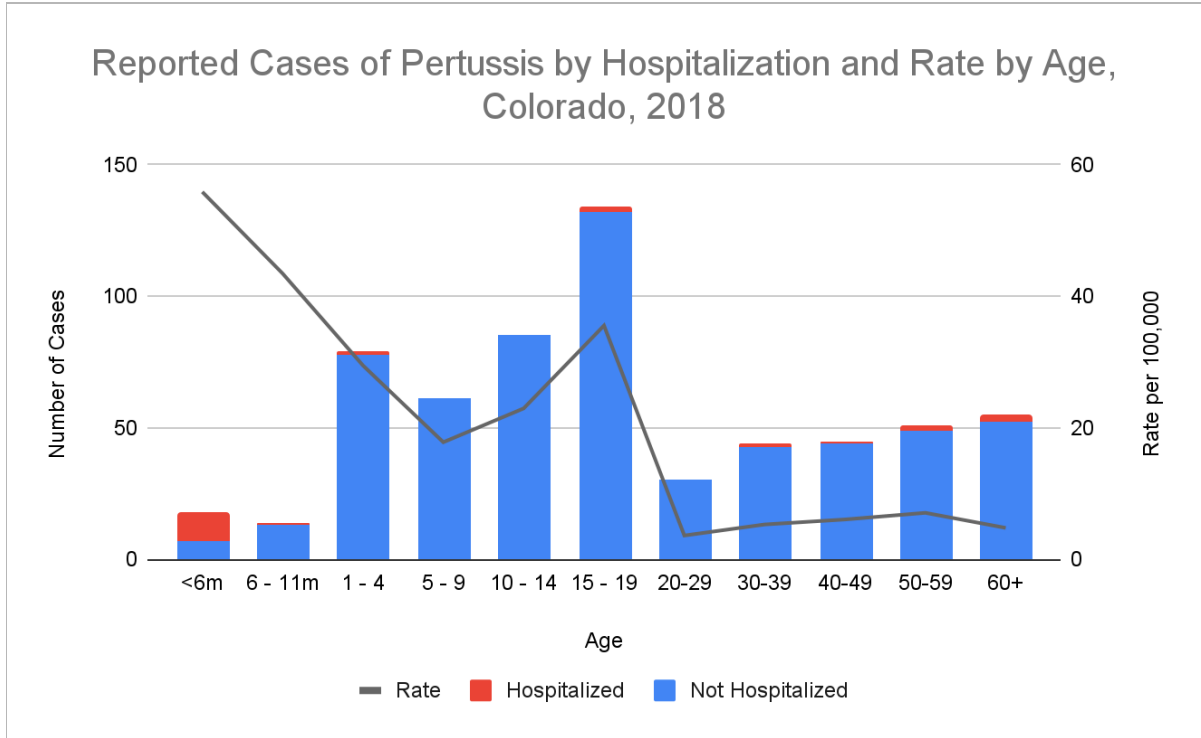


Figure 12. Cases and rate of pertussis by age in Colorado. Of the 616 cases reported in 2018, 407 were classified as confirmed and 209 were probable. The average number of days hospitalized in 2018 was 4.2 days with the maximum being 18 days. The rate of pertussis is highest among infants.

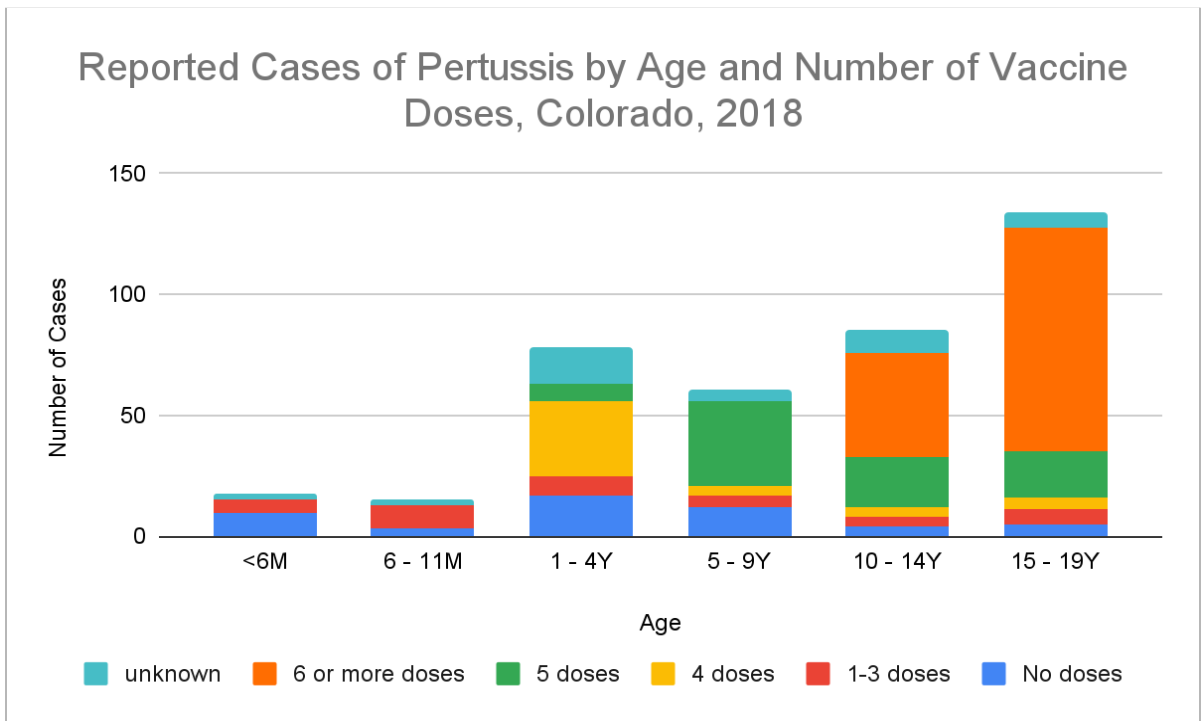


Figure 13. Cases of pertussis among individuals aged 0-19 years by number of vaccine doses. Compared to the vaccine the United States used in the past (known as DTP), DTaP does not protect against whooping cough for as long. In general, DTaP is effective for eight or nine in 10 children who get it. Among children who get all five shots of DTaP on schedule, effectiveness is very high. About 7 in 10 kids are fully protected 5 years after getting their last shot of DTaP. The other three in 10 kids are partially protected and are less likely to have serious disease if they do get whooping cough.

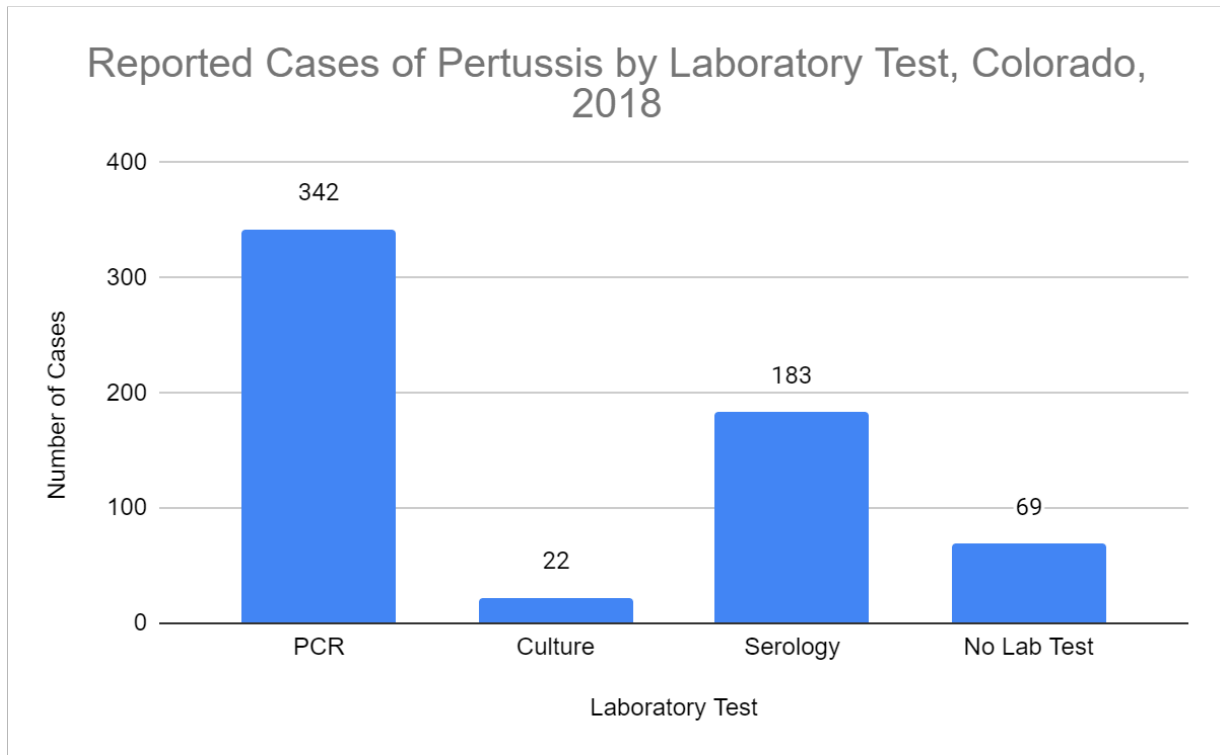


Figure 14. Cases of pertussis by reported laboratory test. Note: In some cases, multiple laboratory tests were performed.

Pneumococcal Disease, Invasive

Invasive pneumococcal disease (IPD) is an infection in the blood, spinal fluid, or other sterile body site with the bacteria *Streptococcus pneumoniae*, or pneumococcus. Pneumococcus is the most common cause of bloodstream infections, pneumonia, meningitis, and middle ear infections in young children. Adults older than 65 years are also at increased risk, especially if they have certain chronic illnesses such as asthma, heart disease, or cancer. Two types of vaccines are available (PCV13 or Prevnar and PPSV23 or Pneumovax23) to prevent against the most common strains of pneumococcal disease.

Following the introduction of the pneumococcal conjugate vaccines in children in the United States (PCV7 in 2000 and PCV13 in 2010), dramatic declines in invasive pneumococcal disease among those younger than five years-old were reported nationwide. All children two through 59 months of age should be routinely vaccinated with PCV13 following ACIP guidelines.

The primary series beginning in infancy consists of three doses routinely given at two, four, and six months of age. A fourth (booster) dose is recommended at 12–15 months of age.²¹ PCV13 was introduced in 2012 for use among adults 19 years or older with immunocompromising conditions and in 2014 for all adults 65 years or older. However, declines in invasive pneumococcal disease were seen as early as 2001 among adults because of the use of pneumococcal conjugate vaccines in children (herd protection). Adults 65-years-old or older who have not previously received pneumococcal vaccine or whose previous vaccination history is unknown should receive a dose of PCV13. A dose of PPSV23 should be given 6-12 months after the dose of PCV13.²²

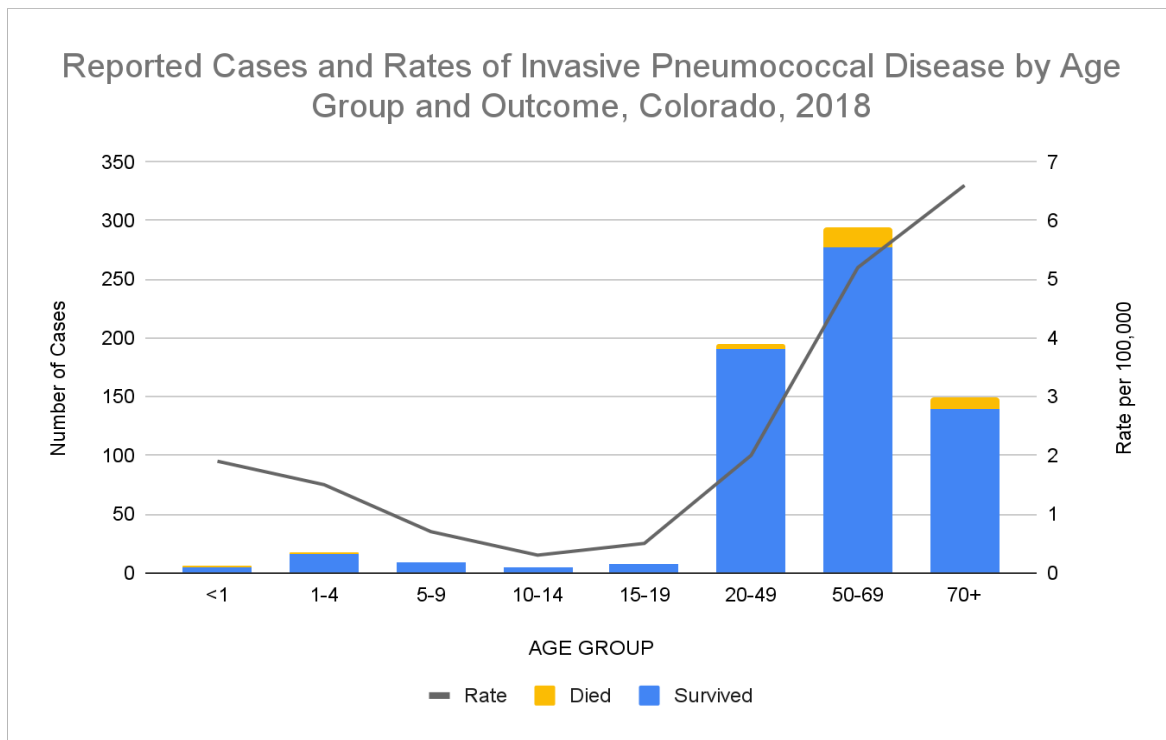


Figure 15: There were 592 total cases of Invasive pneumococcal disease reported in Colorado in 2018.

²¹ CDC. Epidemiology and Prevention of Vaccine-Preventable Disease. Hamboroksy J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

²² CDC. Epidemiology and Prevention of Vaccine-Preventable Disease. Hamboroksy J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015

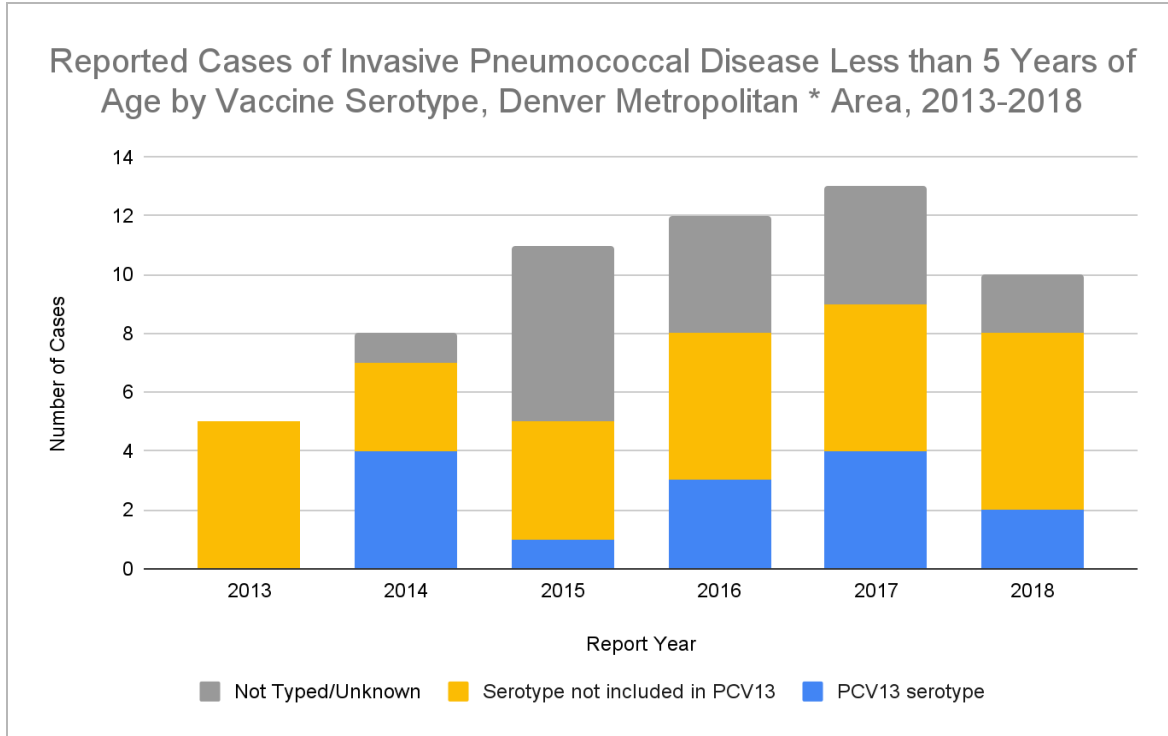


Figure 16: *Isolates from residents in the Denver Metro Area (Adams, Arapahoe, Denver, Douglas, and Jefferson County) with invasive pneumococcal disease are serotyped at CDC as part of the Emerging Infections Program (EIP). Serotypes included in PCV13 are 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 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.

ACIP recommends routine immunization with inactivated poliovirus vaccine (IPV) at ages two, four, six through 18 months, and four through six years.²³

Rubella

No rubella cases were reported in Colorado during 2018. The last reported case of rubella in Colorado was in 2003.

ACIP recommends routine vaccination with the measles, mumps, and rubella (MMR) vaccine at age 12 through 15 months and a second dose at age four through six years. Adults with no evidence of immunity should get at least one dose of MMR vaccine. People who attend college,

²³ CDC. Updated Recommendations of the Advisory Committee on Immunization Practices (ACIP) Regarding Routine Poliovirus Vaccination. 2009 Aug 7; 58 (30); 829-830.

travel internationally, or who work in healthcare settings should have two doses of MMR vaccine.²⁴

Tetanus

During 2009-2018, there were three cases of tetanus reported in Colorado (two in 2015 and one in 2018). One of the 2015 cases had not received a tetanus vaccine in more than 25 years and the vaccination status of the second 2015 case is unknown. The 2018 case had unknown vaccination status. All three cases recovered from the illness.

ACIP recommends routine vaccination with tetanus toxoid-containing vaccine, DTaP (diphtheria, tetanus, and acellular pertussis vaccination) at two, four, 6, and 15 through 18 months and four through six years, followed by a dose of Tdap at 11-12 years of age. pregnant people are recommended a single dose of Tdap during every pregnancy. Adults should receive a single dose of Td vaccine every 10 years. A dose of Tdap can replace one of the 10-year Td booster doses. Adults who have never received Tdap also are recommended to receive a dose of Tdap.²⁵

Varicella (chickenpox)

Chickenpox is caused by the varicella-zoster virus (VZV). Primary infection with VZV causes varicella (chickenpox). VZV has the ability to persist in the body as a latent infection. Shingles, also known as herpes zoster, results from the reactivation of the VZV infection. In Colorado, only cases of primary varicella (chickenpox) are reported to CDPHE. Providers are not required to report shingles cases in Colorado.

Varicella (chickenpox) causes a blister-like rash, itching, fatigue, and fever. The rash may first appear on the stomach, back and face and can spread over the entire body causing hundreds of itchy blisters. Varicella (chickenpox) is highly contagious and can be serious, especially in babies, pregnant people, and people with weakened immune systems. It is transmitted via respiratory airborne droplets or contact with fluids from the mouth, nose, or the blister-like rash. People with varicella (chickenpox) should not attend childcare, school, or work.

ACIP recommends a first varicella vaccine dose for children between 12 and 15 months of age with a second dose administered between four and six years of age. A second dose of varicella vaccine is also recommended for persons older than six years of age who have received only one dose.²⁶ Adults and adolescents who have not received any varicella vaccination and do not have evidence of immunity should receive two doses, four to eight weeks apart. The vaccine may be given to anyone regardless of prior history of varicella.²⁷

²⁴ CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2013 Jun 14; 62 (RR04); 1-34.

²⁵ CDC. Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2018 Apr 27; 67(2);1-44

²⁶ CDC. Epidemiology and Prevention of Vaccine-Preventable Disease. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

²⁷ CDC. Recommendations of the Advisory Committee on Immunization Practices (ACIP). 2007 June 22; 56 (RR04); 1-40.

In Colorado, children are required to have received two doses of varicella vaccination or a positive titer to attend childcare or school.²⁸

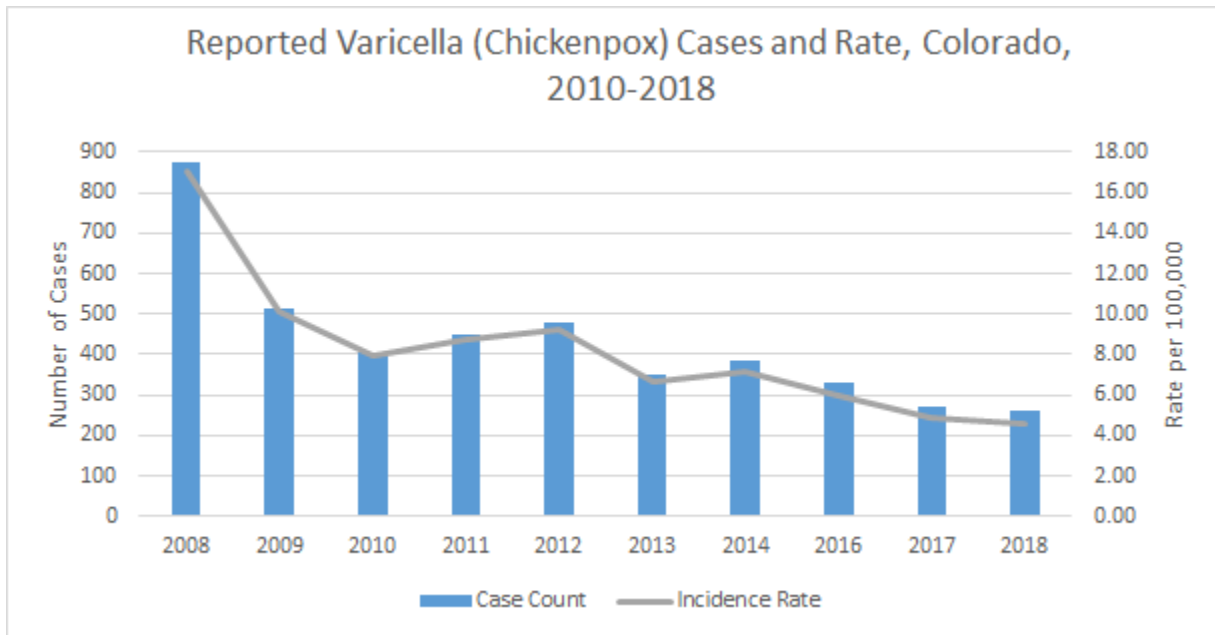
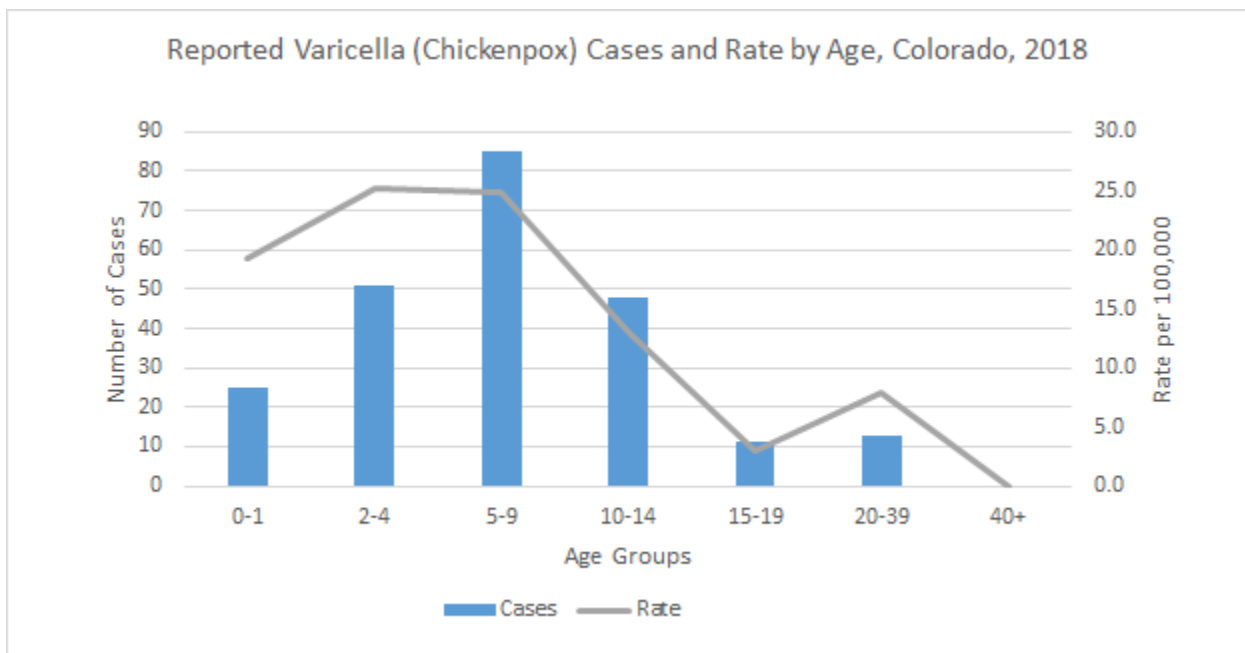


Figure 17: Varicella (chicken pox) case counts and rate have continued to decline. In 2018, 259 chickenpox cases were reported in Colorado.



²⁸ Colorado Board of Health (2007), 6 CCR 1009-2: 2006-01238 Rules of the Colorado Board of Health Pertaining to the Infant Immunization Program and the Immunization Of Students Attending School <https://www.sos.state.co.us/CCR/eDocketDetails.do?trackingNum=2006-01238>

Figure 18: Most primary varicella cases occur in elementary school aged children. Due to educational privacy laws, some cases of varicella are reported anonymously. Of the 259 cases of varicella reported in 2018, 26 were reported with unknown age.