

PERTUSSIS IN NEVADA, 2003-2012

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Edition 1.1

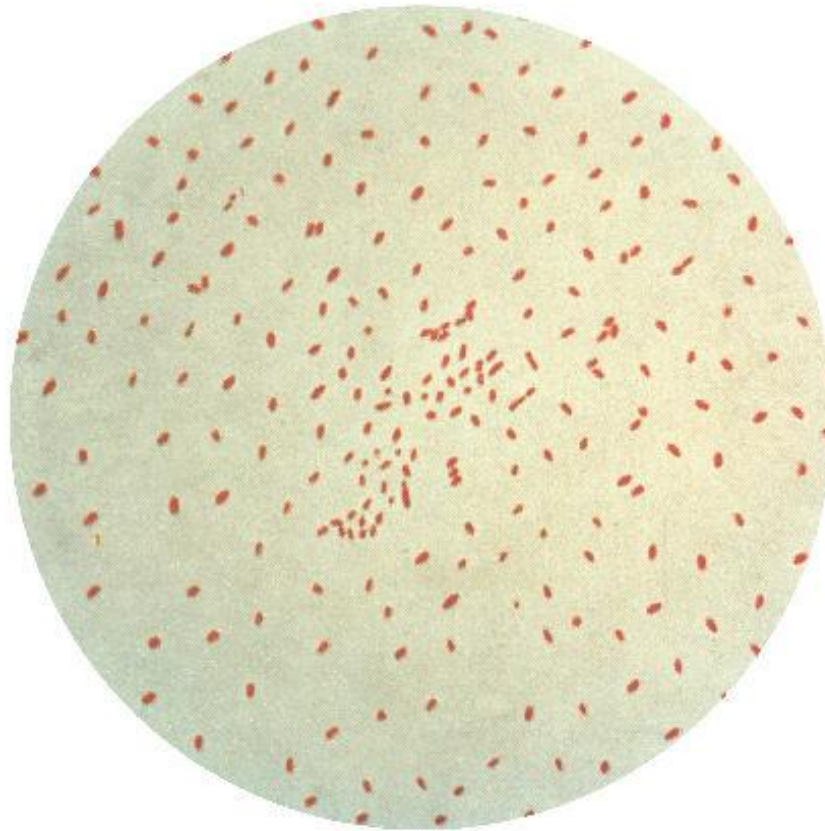


Photo: Centers for Disease Control and Prevention



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Purpose

The purpose of this report is to provide a general overview of the incidence and recent trends of pertussis among Nevada residents. The report also includes Nevada data collected from cases of pertussis from 2003 to 2012. Pertussis is listed as one of Nevada's reportable diseases pursuant to [NRS 441A](#) (1). Pertussis reporting is further regulated by [NAC 441A.630](#) (2).

Pertussis

Pertussis, commonly known as whooping cough, is a highly contagious bacterial infection of the respiratory system. Recently, the United States has seen a significant increase in the number of pertussis cases. The bacteria which cause the disease, *Bordetella pertussis*, spread from person to person, usually when an infected person sneezes or coughs and the bacteria are dispersed into the air. The bacteria attach to the cilia (hair-like extensions) that line the upper respiratory system and release toxins, damaging the cilia and causing inflammation. Pertussis is highly contagious; one person can infect up to 15 other people. Infants are most susceptible to pertussis and are most likely to have severe complications associated with the infection. About half of infants younger than one year old who get pertussis are hospitalized, and of those, 1-2% die due to this infection. Pertussis is fatal in about 1% of cases for the overall population (3).

Symptoms of pertussis usually appear within 7-10 days of being exposed, and patients may exhibit mild cough, runny nose, mild fever, and even sleep apnea (a pause in breathing) in infants. After one to two weeks, severe coughing may begin. It is described as a rapid, violent, paroxysmic repeated cough. It is typically followed by a loud inhalation of air that sounds like a high pitched "whooping," from which whooping cough gained its name. This coughing fit can cause vomiting and extreme exhaustion. The cough has been associated with hemorrhages, broken ribs, urinary incontinence, hernias, broken blood vessels of the eyes, and facial bruising, due to the force of the coughs. Complications from the disease may include pneumonia, dehydration, earache, and seizures (3).

Pertussis is diagnosed by considering the history of exposure to other cases, evaluating characteristic signs and symptoms, physical examination, and collecting samples involving secretions from the back of the throat for laboratory testing. Early treatment with appropriate antibiotics is important; however, pertussis infections are often not diagnosed until after coughing fits begin. Late treatment—three weeks or so after infection—is typically not as effective as early treatment because the body has already eliminated or cleared the bacteria and ongoing coughing is probably due to lingering inflammation and damage that the bacteria has already caused (3).

Pertussis can be prevented by vaccination. It is recommended that children receive five doses of the combined vaccination for diphtheria, tetanus, and pertussis (DTaP), one dose each at ages 2, 4, 6, and 15-18 months, and 4-6 years. The DTaP vaccine is not intended for adolescents, adults, or children 7 years of age and older (4). Adolescents and adults are recommended to receive the Tdap (tetanus, diphtheria, and pertussis) vaccine, and one dose is routinely given between the ages 11 and 12. Regardless of age, people who have not already received the Tdap vaccine are recommended to get the vaccination as soon as possible (5). To protect infants, it is recommended that families with infants and others with close contact to infants ensure that they are up-to-date with their own pertussis vaccination, a secondary prevention strategy known as cocooning. It is important to stress that in infant infections, when the source of pertussis infection was identified, mothers were responsible for 30-40% of the infections and household members, including mothers, were responsible for 80% of infections (3).

Summary

From 2003 to 2012, the annual number of reported pertussis cases in Nevada ranged from a low of 24 cases in 2009 to a high of 112 cases in 2012. Over the ten years, a total of 482 cases were reported. The annual crude incidence rate of pertussis ranged from a low of 0.9 cases per 100,000 population in 2009 to a high of 4.1 cases per 100,000 population in 2012, a rate that was statistically significantly higher than the previous five years. The direct cause of this increase is not known. Pertussis incidence has been rising across the nation, and some suspect that the increase in incidence may be related to waning immunity, as the pertussis vaccine may not provide lifelong immunity as it was previously believed. The crude incidence rate from 2003 to 2012 was 1.9 cases per 100,000 population.

The Healthy People 2020 objective for pertussis is not to exceed 2,500 confirmed and probable cases among children under 1 year of age (2010 objective: not to exceed 2,000 cases) and 2,000 confirmed and probable cases among adolescents 11 to 18 years of age (no objective for this age group for Healthy People 2010), in the United States. There is no objective set in the form of a rate to compare Nevada's progress with the national target (6, 7).

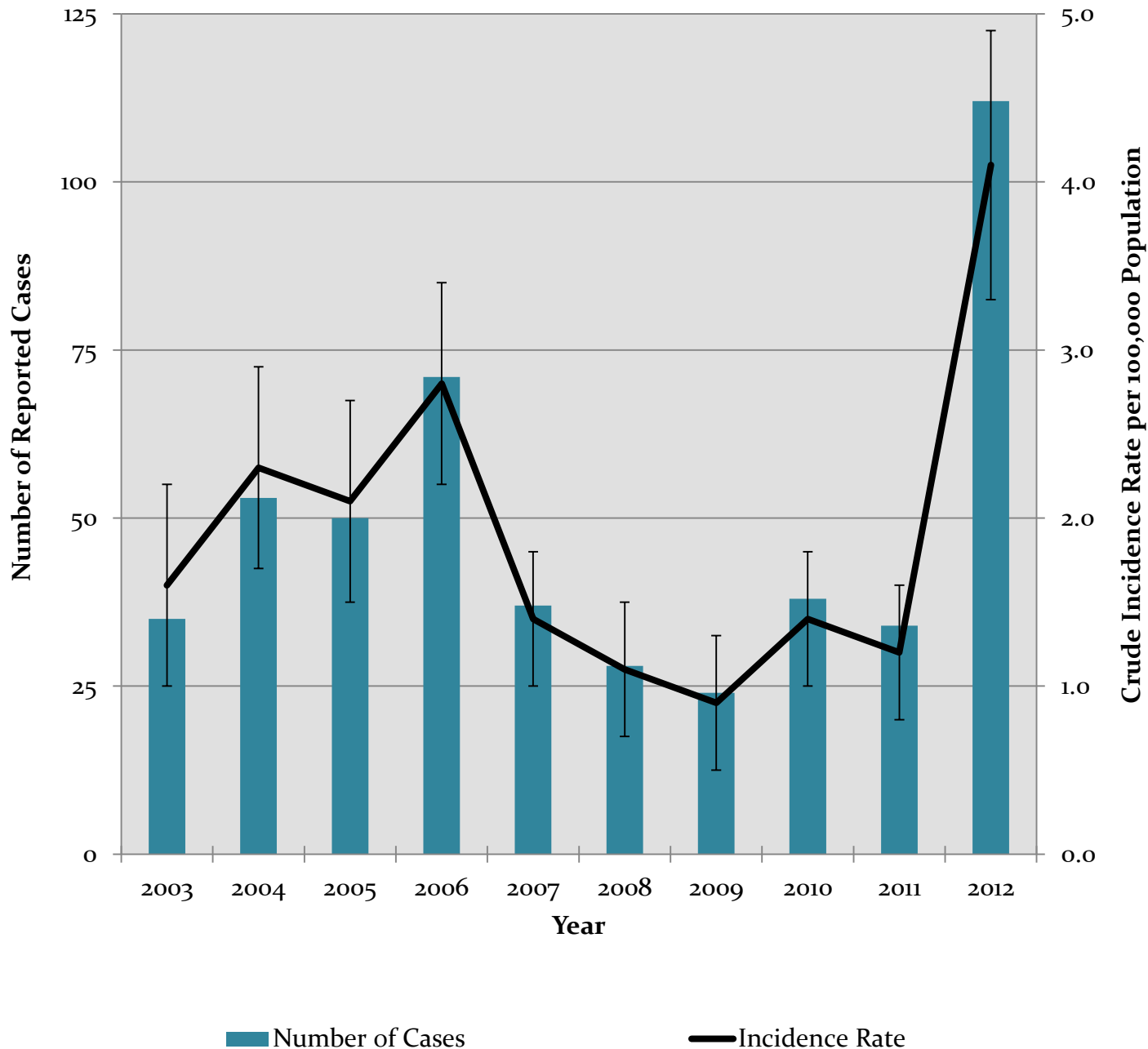
The rural and frontier counties had a significantly higher age-adjusted incidence rate (6.2 cases per 100,000 population) than all other health districts and the overall age-adjusted incidence rate for the entire state (1.8 cases per 100,000 population). Washoe County Health District also had a significantly higher age-adjusted incidence rate (2.7 cases per 100,000 population) than the state rate. In contrast, both Southern Nevada Health District and Carson City Health and Human Services had significantly lower age-adjusted incidence rates than the state rate (1.3 and 0.9 cases per 100,000 population, respectively). Differences in vaccination rates may contribute to higher susceptibility of infection in some areas, or differences in reporting may be responsible for the observed differences in rates. However, the underlying cause of the differences in incidence between health districts is not known and warrants further investigation. The rise in crude incidence for the entire state in 2012 was largely driven by a significant increase in cases in Southern Nevada Health District (from an age-adjusted incidence rate of 1.0 cases per 100,000 population in 2011 to 4.1 cases per 100,000 population in 2012).

Between 2008 and 2012 (years for which monthly data is available), there was no discernable monthly or seasonal trend for reported pertussis infections. The number of reported cases ranged between 0 and 16 cases per month, depending on the year.

From 2003 to 2012, a significantly higher age-adjusted incidence rate (2.2 cases per 100,000 population) was observed among residents of Hispanic origin compared to Blacks and Asian/Pacific Islanders (1.0 and 0.8 cases per 100,000 population, respectively). During the same time period, Blacks and Asian/Pacific Islanders had a significantly lower age-adjusted incidence rate than Whites (1.9 cases per 100,000 population). There were no other significant differences between other race/ethnic groups.

Infants are most susceptible to pertussis (3). From 2003 to 2012, the highest case count of pertussis in Nevada was among infants under 1 year of age with a total of 131 reported cases during the 10-year time period, although the highest case count during a single year was in children 5-14 years of age with 29 cases in 2012. Infants under 1 year of age had a significantly higher incidence rate (34.2 cases per 100,000 population) compared to all other age groups, and as age increased, the incidence rates for reported pertussis infections decreased (from 3.1 cases per 100,000 population in the 1-4 year-old age group to 0.4 per 100,000 population in the 65 and older age group).

Figure 1. Number of Reported Cases and Crude Incidence Rates of Pertussis in Nevada: 2003-2012



The crude incidence rate in Nevada from 2003 to 2012 was 1.9 cases per 100,000 population.

Figure 2. Age-Adjusted Incidence Rates of Pertussis in Nevada and Nevada Health Districts: 2003-2012

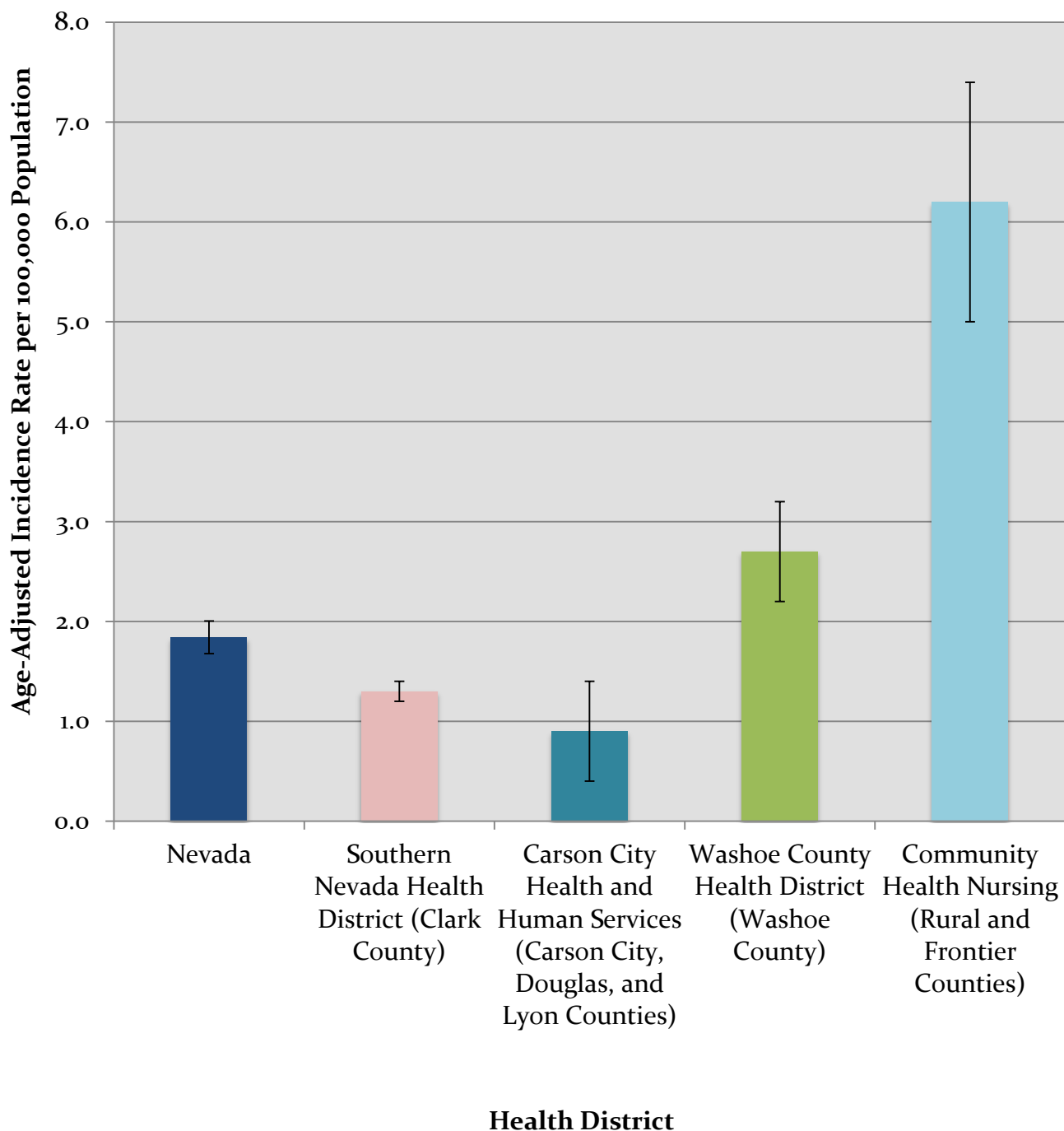


Figure 3. Number of Pertussis Cases Reported in Nevada by Month: 2008-2012

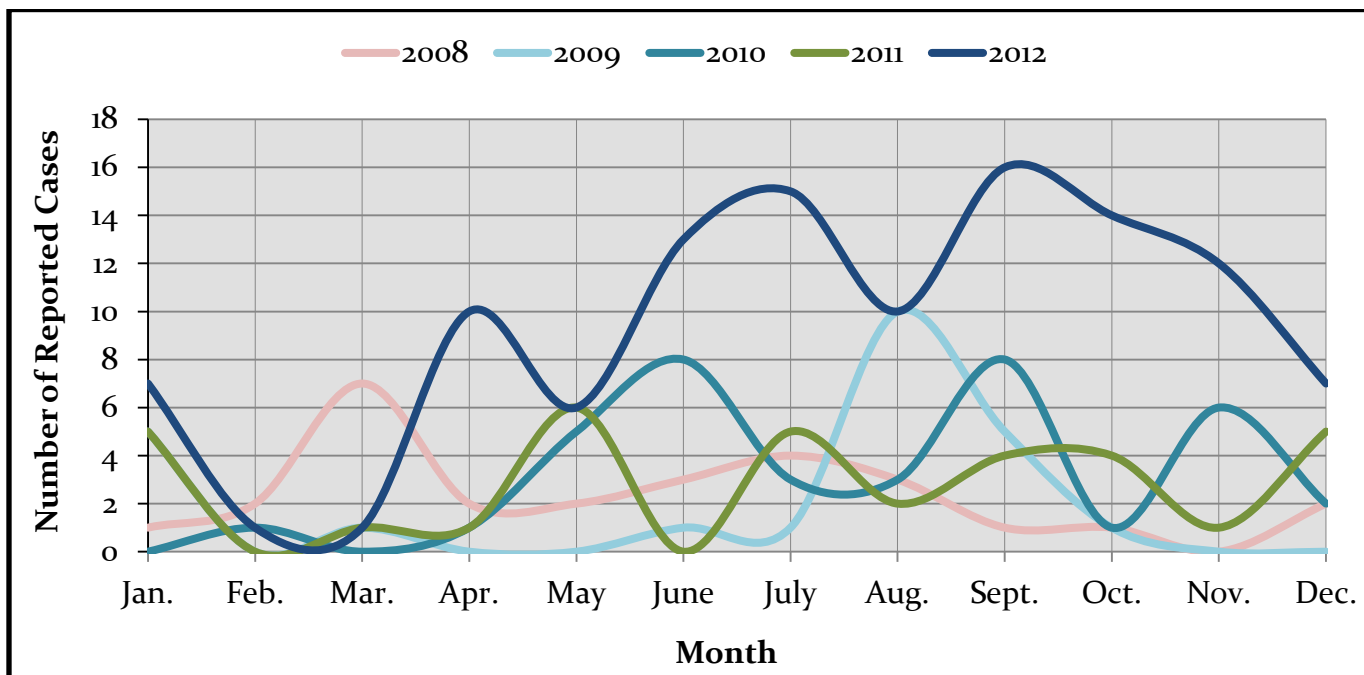
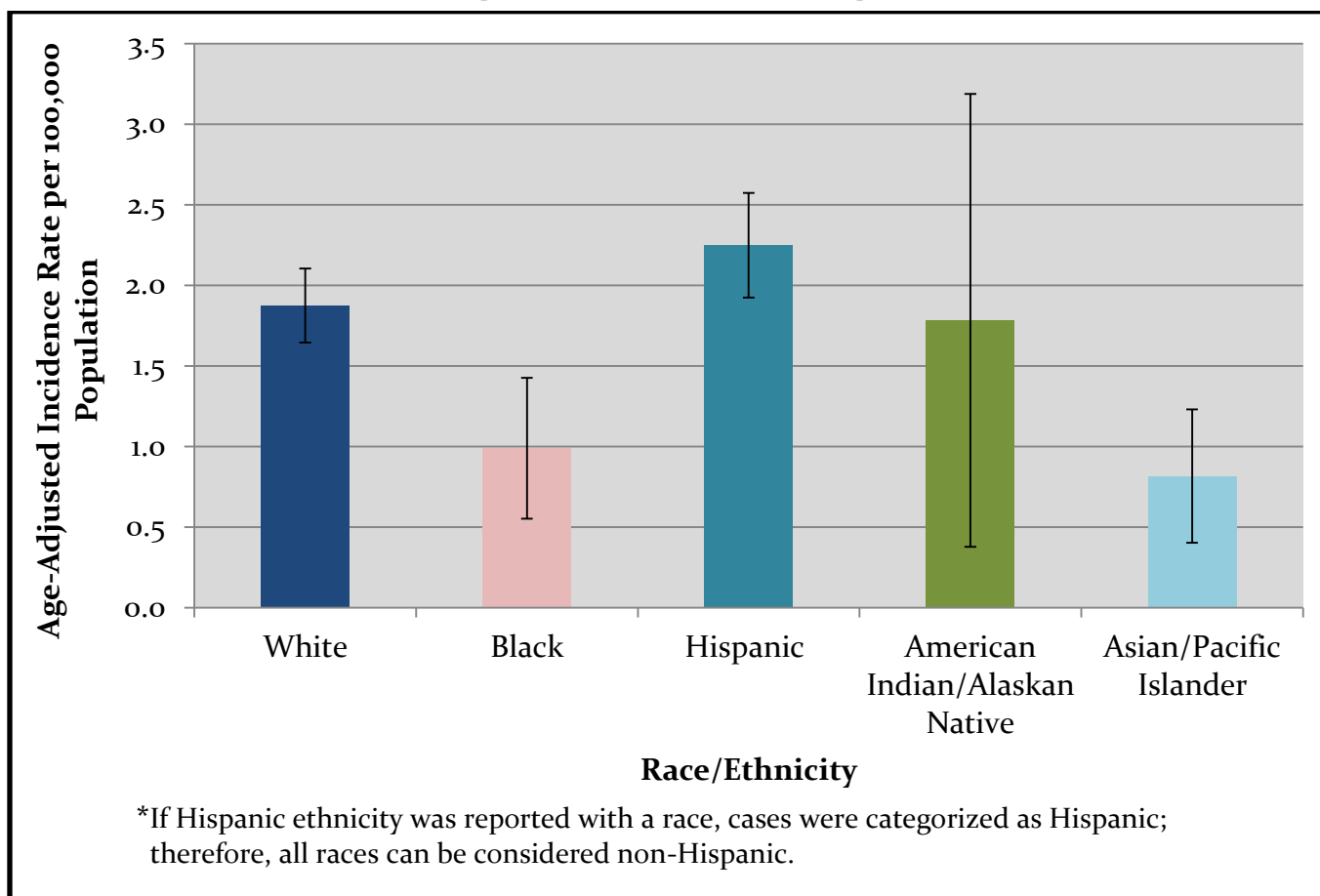


Figure 4. Age-Adjusted Incidence Rates of Pertussis in Nevada by Race/Ethnicity*: 2003-2012



Figures 5A-G. Number of Reported Cases and Crude Incidence Rates of Pertussis in Nevada by Age Group: 2003-2012

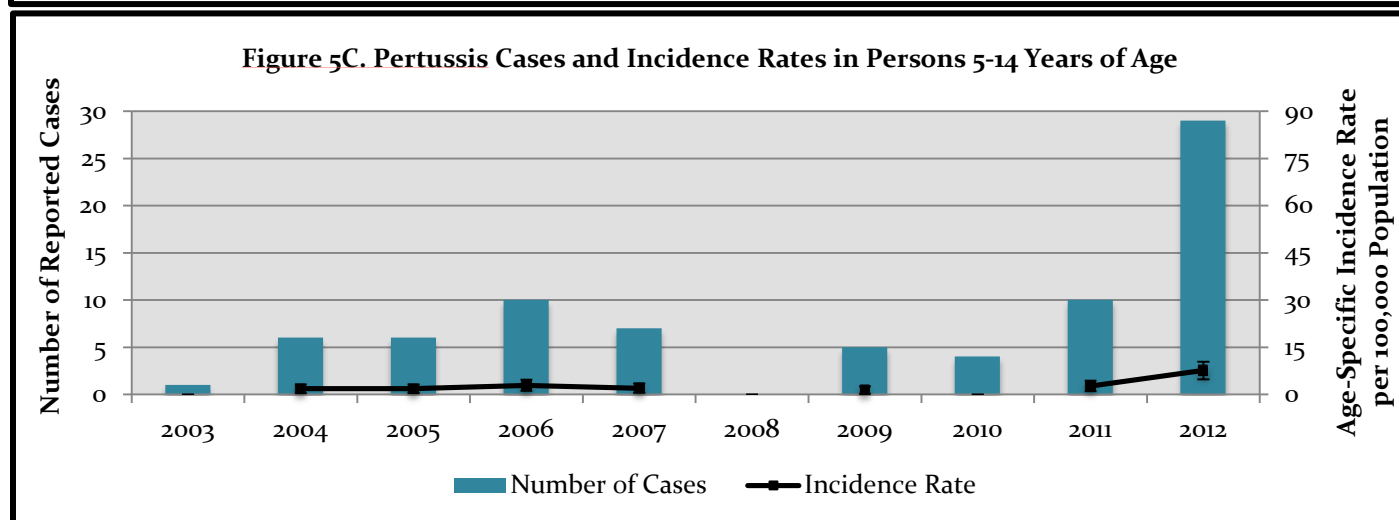
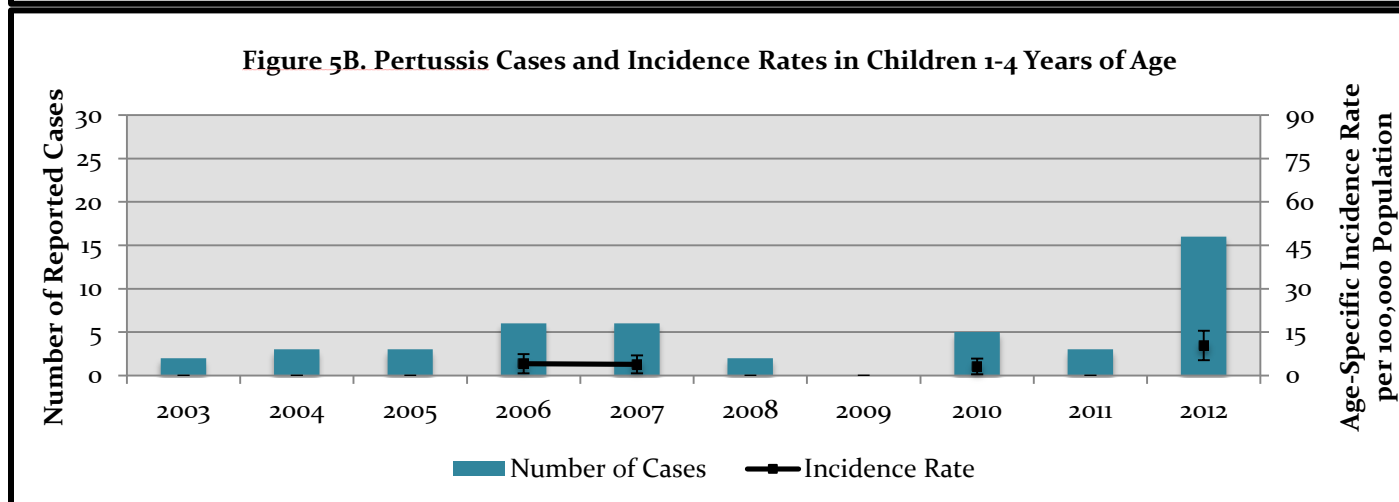
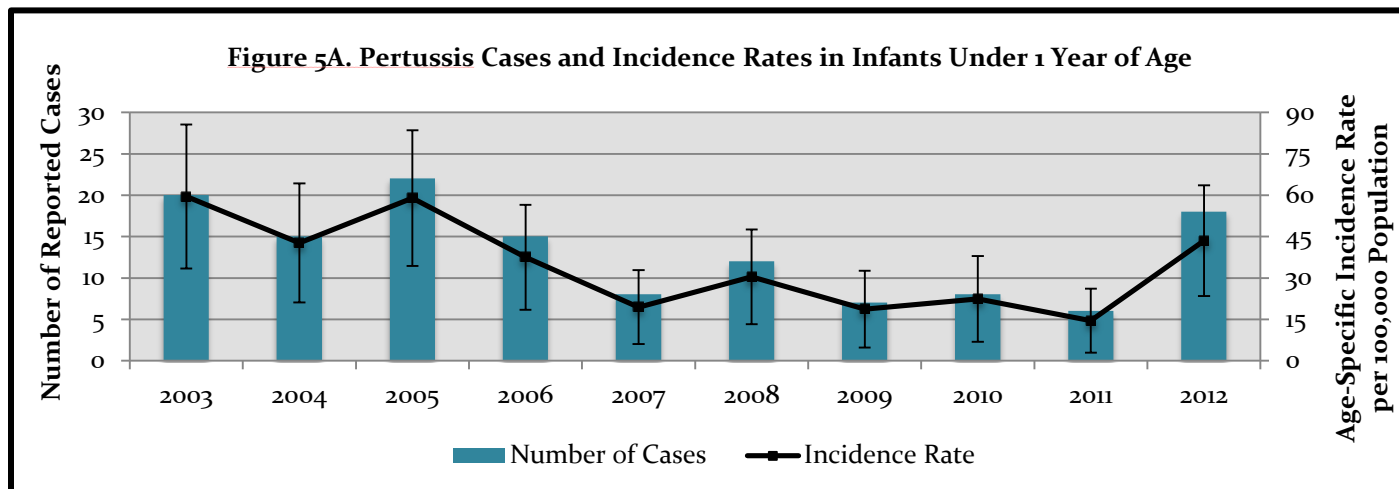


Figure 5D. Pertussis Cases and Incidence Rates in Persons 15-24 Years of Age

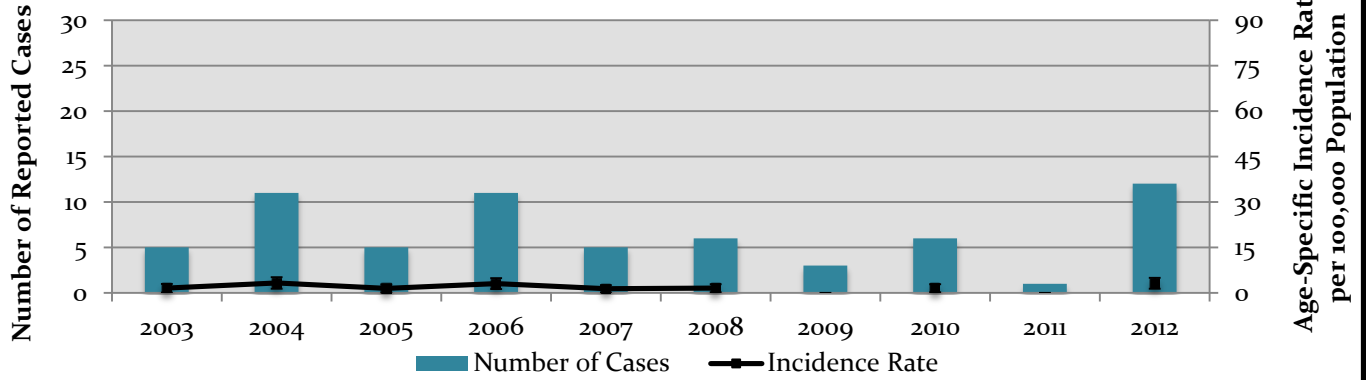


Figure 5E. Pertussis Cases and Incidence Rates in Persons 25-39 Years of Age

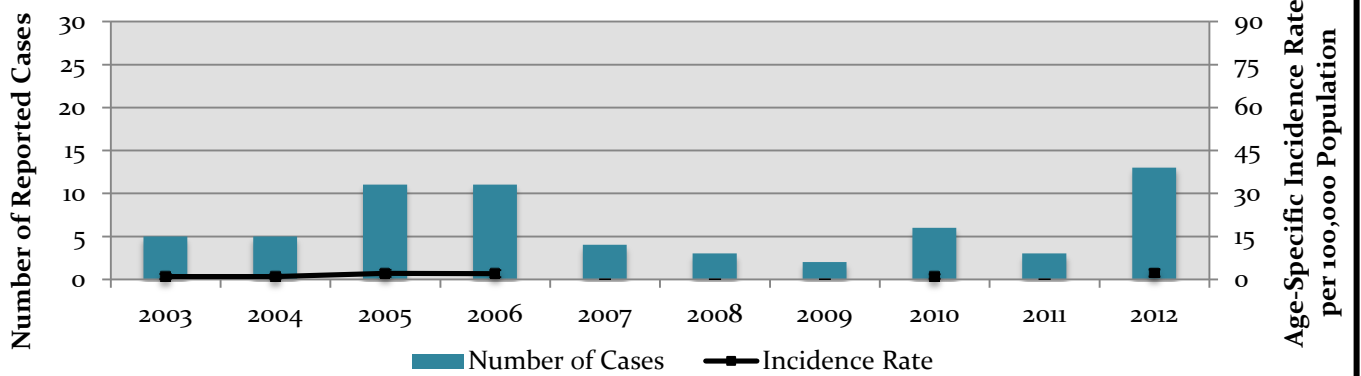


Figure 5F. Pertussis Cases and Incidence Rates in Persons 40-64 Years of Age

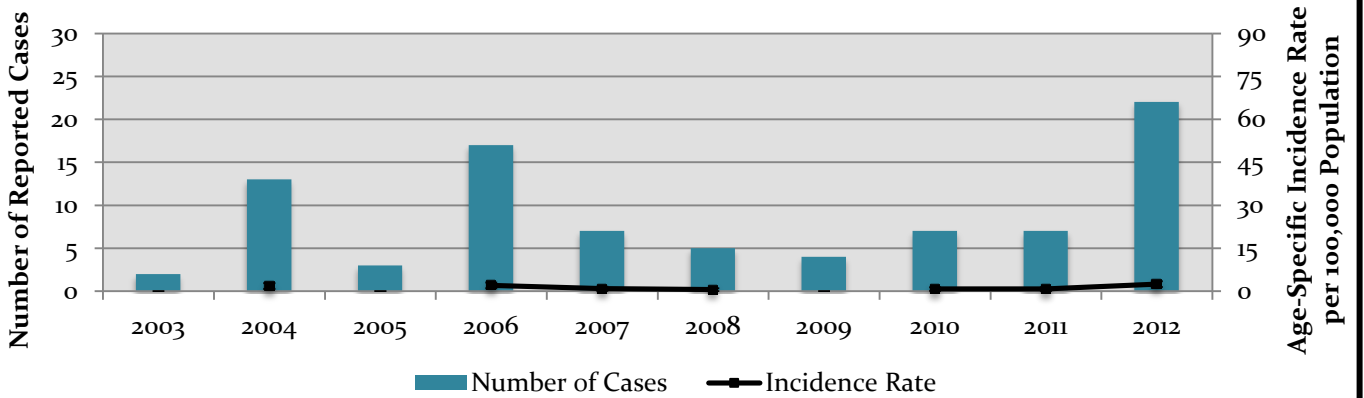
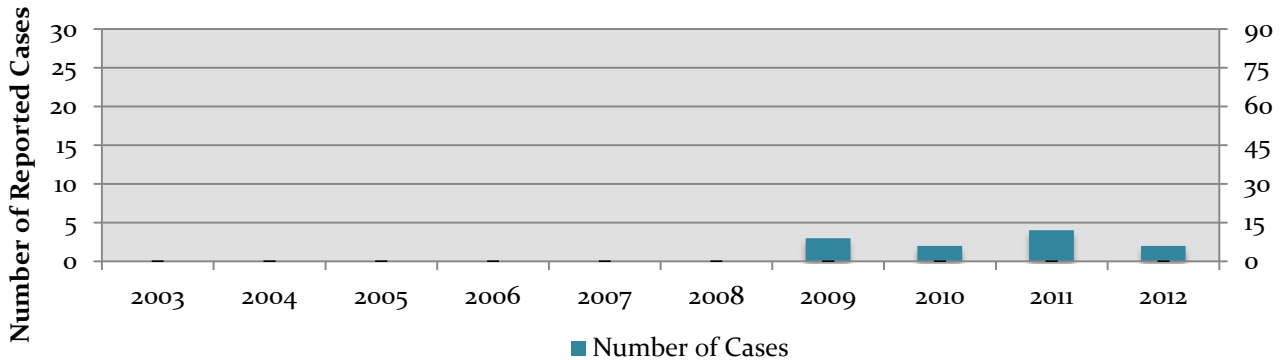


Figure 5G. Pertussis Cases in Persons 65+ Years of Age



Technical Notes

All Nevada data from 2003 to 2012 came from reported pertussis infections within the state (8,9). The CDC and the Council of State and Territorial Epidemiologists case definition of pertussis encompasses all cases classified as probable or confirmed; all cases of pertussis used for this report follow this definition (10). Population estimates were obtained from Nevada State Demographer's Office (11). Age-adjusted rates per 100,000 population were calculated using the 2000 U.S. standard population. Cases with unknown ages were excluded from the age-adjusted rate calculations; 2 such cases had to be excluded. Cases with unknown race/ethnicity (88 cases) were imputed among racial/ethnic groups based upon the distribution of each racial/ethnic group within the general population. Cases with race and ethnicity listed as "other" or those with multiple races were excluded from Figure 4; one such case was excluded. When used for rates, error bars represent 95% confidence intervals. The Keyfitz method was used to calculate confidence intervals of age-adjusted rates (12). Due to their inherent unreliability, rates were not calculated for case counts lower than five.

Sources

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