HAEMOPHILUS INFLUENZAE IN NEVADA, 2003-2012

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Edition 1.3

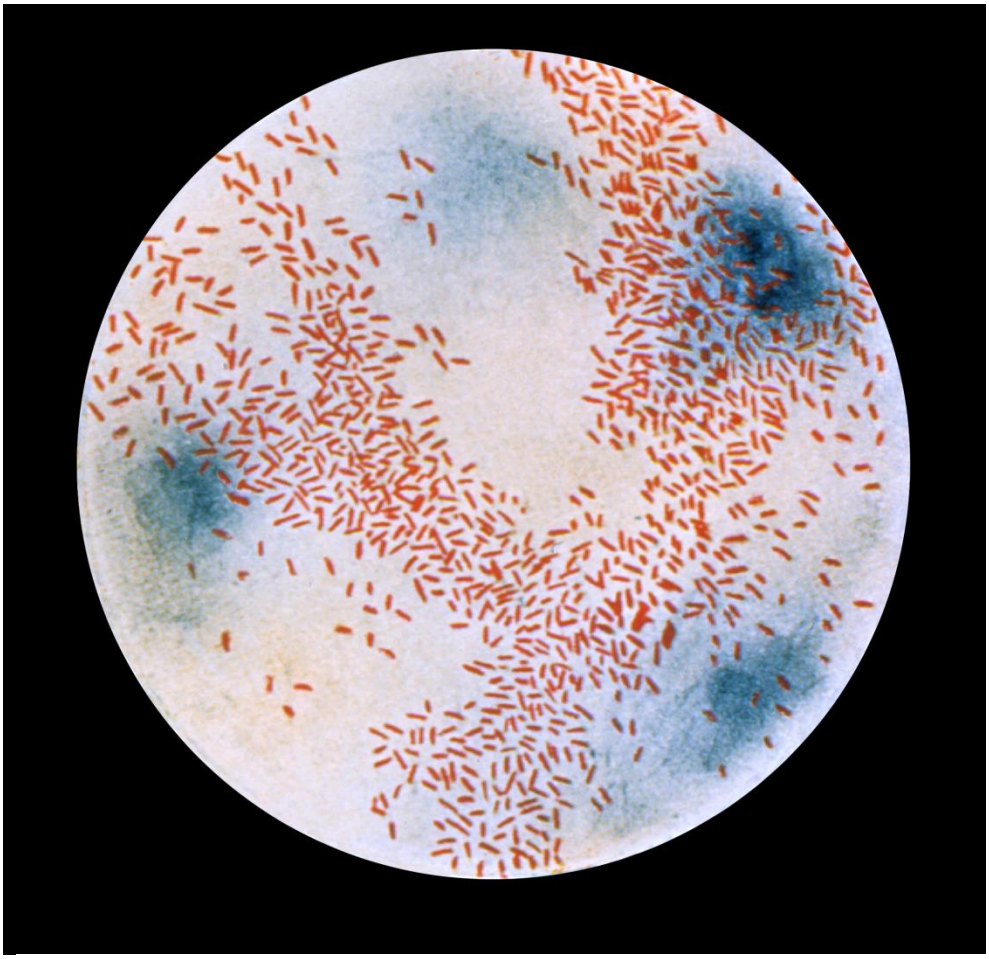

Photo: Centers for Disease Control and Prevention

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Purpose

The purpose of this report is to provide a general overview of the incidence and recent trends of invasive *Haemophilus influenzae* type b among Nevada residents. The report also includes Healthy People 2010 objectives, Healthy People 2020 objectives, and Nevada data collected from cases of invasive *H influenzae* from 2003 to 2012. *H influenzae* type b is listed as one of Nevada's reportable diseases pursuant to NRS 441A (1). *H influenzae* type b reporting is further regulated by NAC 441A.550 (2).

Haemophilus influenzae

Haemophilus influenzae, also called Pfeiffer's bacillus or *Bacillus influenzae*, is a bacterial infection that can have various clinical presentations. *H influenzae* often causes pneumonia but can also cause ear, eye, sinus, and bone (osteomyelitis) infections. When the bacteria invade parts of the body that are normally free from germs, like blood or spinal fluid, *H influenzae* becomes invasive. Invasive types of *H influenzae* include bacteremia (blood infection), meningitis (infection of brain and spinal cord membranes), epiglottitis (inflammation of the windpipe), cellulitis (skin infection), and infectious arthritis. Despite its name, *H influenzae* is unrelated to influenza (the "flu") (3).

There are six identifiable subtypes of *H influenzae* (a through f), but the most common strain is *H influenzae* type b (Hib). *H influenzae* is considered an opportunistic pathogen because the bacteria typically live in the nose and throat without causing disease until another condition arises in the host (such as a viral infection or an immune response from allergies) that provides an opportunity for *H influenzae* to complicate the immune response. *H influenzae*, including Hib, is transmitted person-to-person by direct contact or through respiratory droplets produced by coughing or sneezing (3).

Symptoms of *H influenzae* differ depending on the part of the body that is infected. The most common severe types of *H influenzae* disease are pneumonia, bacteremia, and meningitis. Patients with pneumonia may exhibit fever, cough, shortness of breath, chills, sweating, chest pain, headache, muscle pain, and excessive tiredness. Symptoms of bacteremia include fever, chills, excessive tiredness, pain in the belly, nausea, vomiting, diarrhea, anxiety, shortness of breath, and confusion. Patients with meningitis may exhibit fever, headache, neck stiffness, nausea, vomiting, increased sensitivity to light, and confusion (3).

H influenzae, including Hib, is diagnosed by collecting a sample of infected body fluid, such as blood or spinal fluid, for laboratory testing. Treatment for the disease usually involves antibiotics over a course of 10 days. Most cases of invasive disease require hospitalization, and even with antibiotic treatment, 3-6% of Hib meningitis cases among children are fatal (3).

For prevention, a vaccine for Hib was developed in 1985 but not the other strains of *H influenzae*. The Hib vaccine can prevent Hib meningitis, pneumonia, epiglottitis, and other Hib bacterial infections. The vaccine is recommended for all children younger than 5 years of age and is usually given to infants starting at 2 months of age. Before the Hib vaccine was introduced, Hib was the leading cause of bacterial meningitis among children less than 5 years of age in the United States. Prior to the vaccine, about 20,000 children less than 5 years of age developed severe Hib disease and about 1,000 children died annually. Thanks to the vaccine, by 2010 fewer than 50 cases of Hib disease have occurred annually in children (3).

Despite these gains, Hib still continues to be a problem in certain populations of the US. Infants and children younger than 5 years of age are at high risk, especially if they have not completed the full series of vaccine dosages or have developed insufficient levels of the protective antibodies. According to the Centers for Disease Control and Prevention (CDC), other groups at higher risk of developing Hib disease include under-immunized individuals, adults 65 years of age and older, American Indians/Alaska Natives, and people with certain medical conditions such as sickle cell disease, asplenia (no spleen), HIV/AIDS, antibody and complement deficiency syndromes, or malignant neoplasms (tumor) (3).

Summary

From 2003 to 2012, the annual number of reported invasive *H influenzae* type b cases in Nevada ranged from a low of 10 cases in both 2003 and 2010 to a high of 21 cases in 2012. Over the ten years, a total of 148 cases were reported. Nevada's crude incidence rate showed very minimal changes over the 10-year time span. The annual crude incidence rate of *H influenzae* type b ranged from a low of 0.4 cases per 100,000 population in 2010 to a high of 0.8 cases per 100,000 population in 2012, but this difference was not statistically significant. The crude incidence rate from 2003 to 2012 was 0.6 cases per 100,000 population.

Healthy People objectives were set for children under 5 years of age rather than for the entire population. The Healthy People 2010 objective for invasive *H influenzae* type b was 0 cases among children under 5 years of age (4). Nevada exceeded the objective from 2003 to 2009 with 1 to 5 cases reported per year, but the objective was met in 2010 with no reported cases. The Healthy People 2020 objective for invasive *H influenzae* type b was changed to an incidence rate of 0.27 laboratory confirmed and probable cases per 100,000 children under 5 years of age (5). Nevada was significantly below this objective for 2011 and 2012 with rates of 0.11 and 0.07 cases per 100,000 population, respectively.

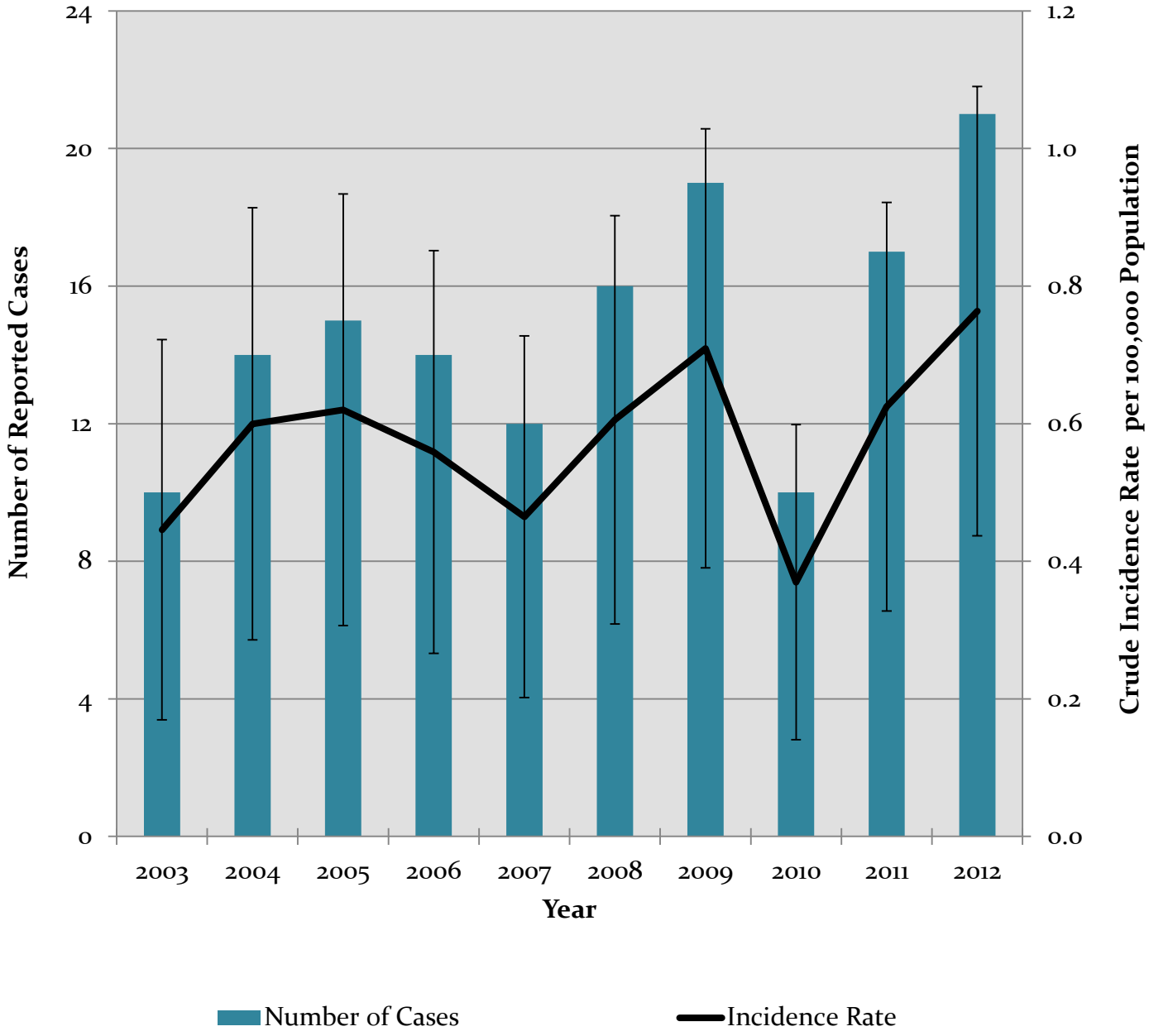
When comparing age-adjusted incidence rates, there were no significant differences seen between the health districts or between health districts and the entire state.

Like most respiratory illnesses such as seasonal influenza, *H influenzae* type b cases typically increase during winter and early spring and decline in the summer. Between 2008 and 2012 (years for which monthly data is available), the months of December through April generally had more reported cases of *H influenzae* type b compared to other months. The number of reported cases ranged between 0 and 5 cases per month, depending on the year.

From 2003 to 2012, there were no significant differences in age-adjusted incidence rates among the racial/ethnic groups; however, 40 cases (27% of the total cases reported) were of unknown race/ethnicity, which suggests that race- and ethnicity-specific incidence rates may not be reliable due to incomplete data. Therefore, this statement should be considered with caution until the data for future years is sufficient to support statistically sound conclusions without the potential of bias.

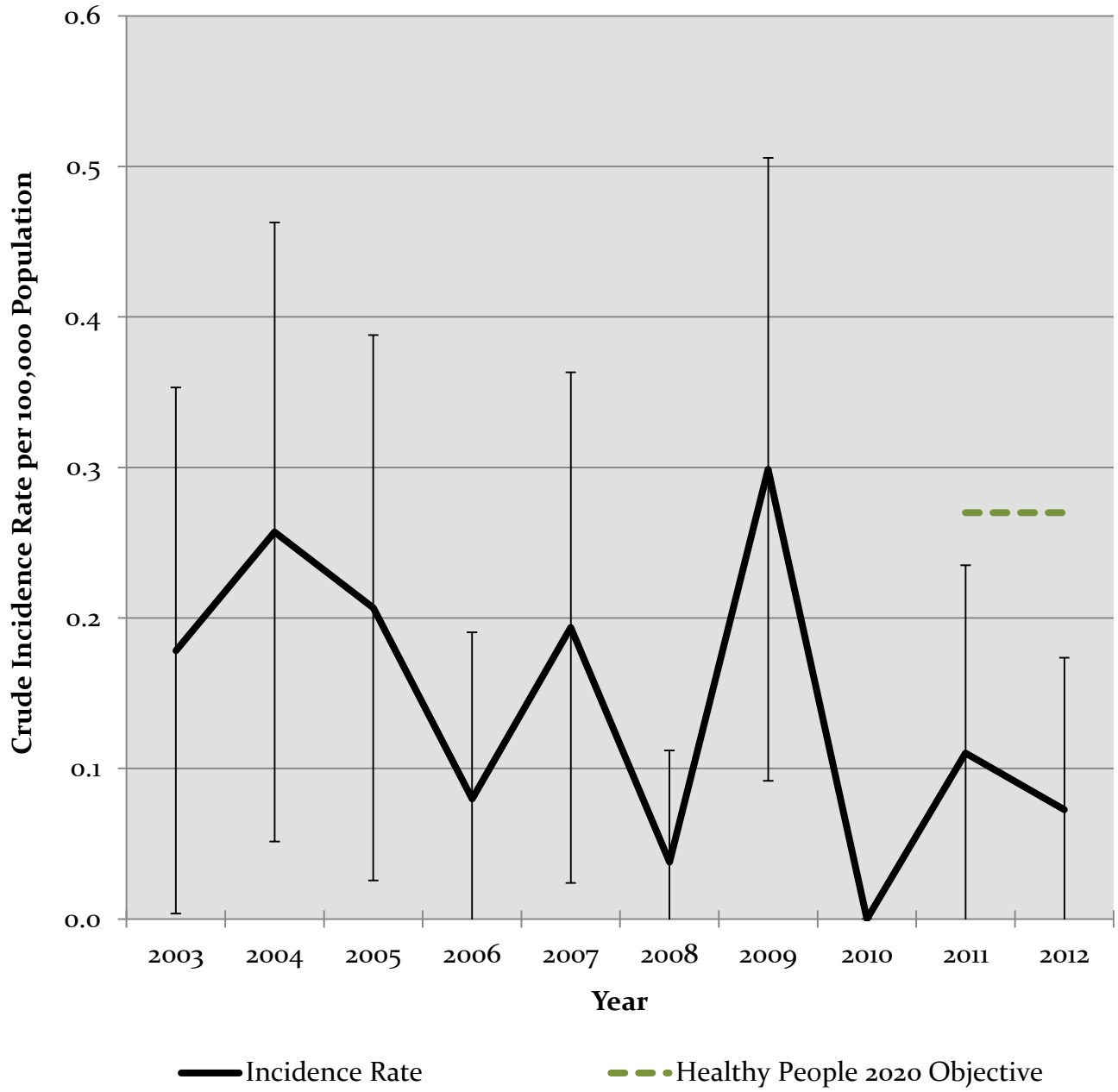
Infants and children younger than 5 years of age and adults 65 years of age and older are at high risk of Hib infection (3). From 2003 to 2012, the 40-64 year old age group and the 65 year and older age group had the highest case count of Hib in Nevada with 47 reported cases each during the 10-year time period, although the highest case count during a single year was in persons 65 years and older with 10 reported cases in 2012. During this time period, infants under 1 year of age and children 1-4 years old had a total of 26 and 10 reported cases, respectively. Infants under 1 year of age had a significantly higher incidence rate (6.8 cases per 100,000 population) compared to all other age groups. Persons 65 years of age and older also had a significantly higher incidence rate (1.6 cases per 100,000 population) than the other age groups, with the exception of infants under 1 year of age.

Figure 1. Number of Reported Cases and Crude Incidence Rates of Invasive *Haemophilus influenzae* Type B in Nevada: 2003-2012



The crude incidence rate in Nevada from 2003 to 2012 was 0.6 cases per 100,000 population.

Figure 2. Crude Incidence Rates of Invasive *Haemophilus influenzae* Type B Cases in Nevada, Children Under Age 5 Years*, Compared to Healthy People Objectives: 2003-2012



* Probable and laboratory confirmed cases

Figure 3. Age-Adjusted Incidence Rates of Invasive *Haemophilus influenzae* Type B in Nevada and Nevada Health Districts: 2003-2012

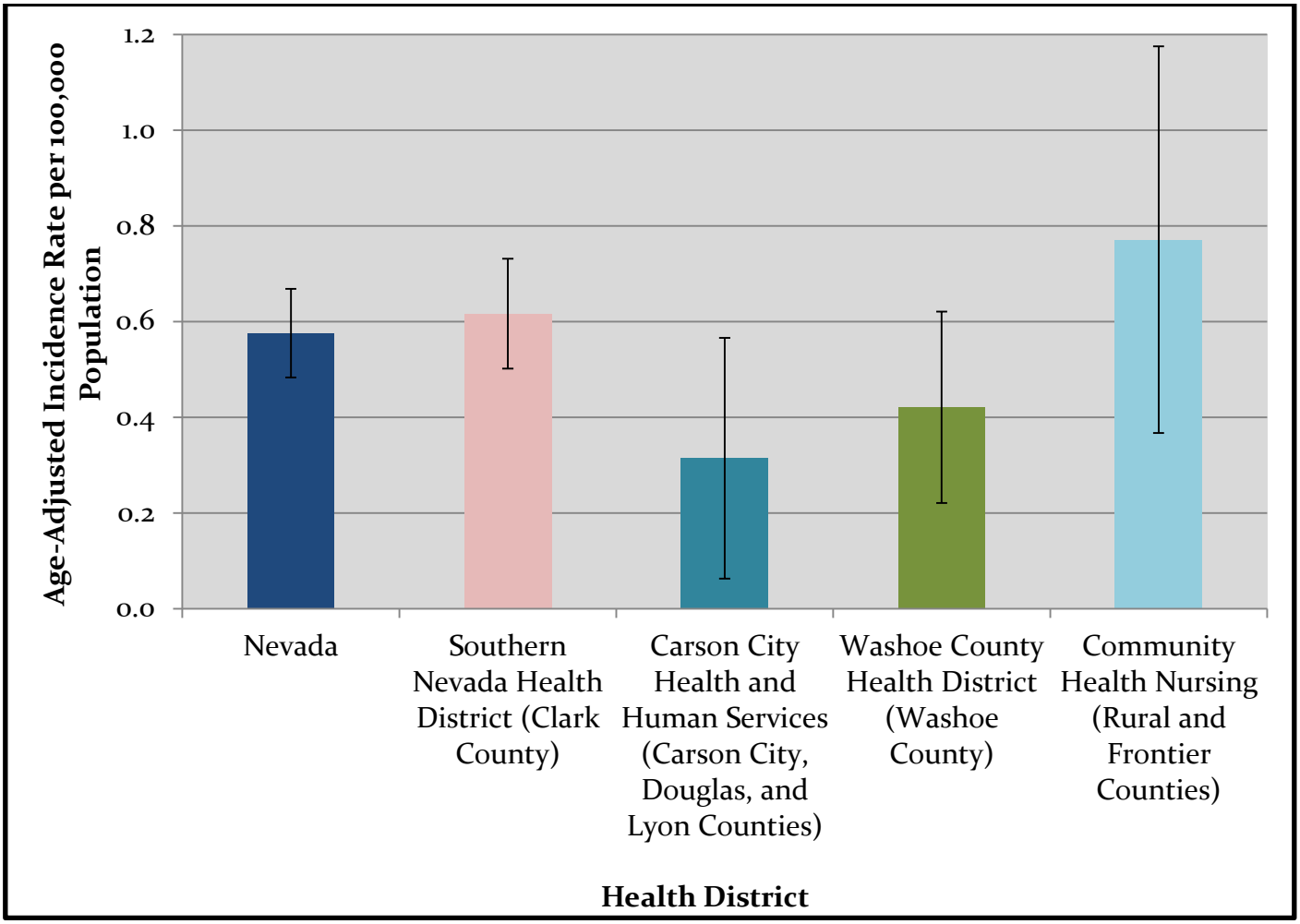
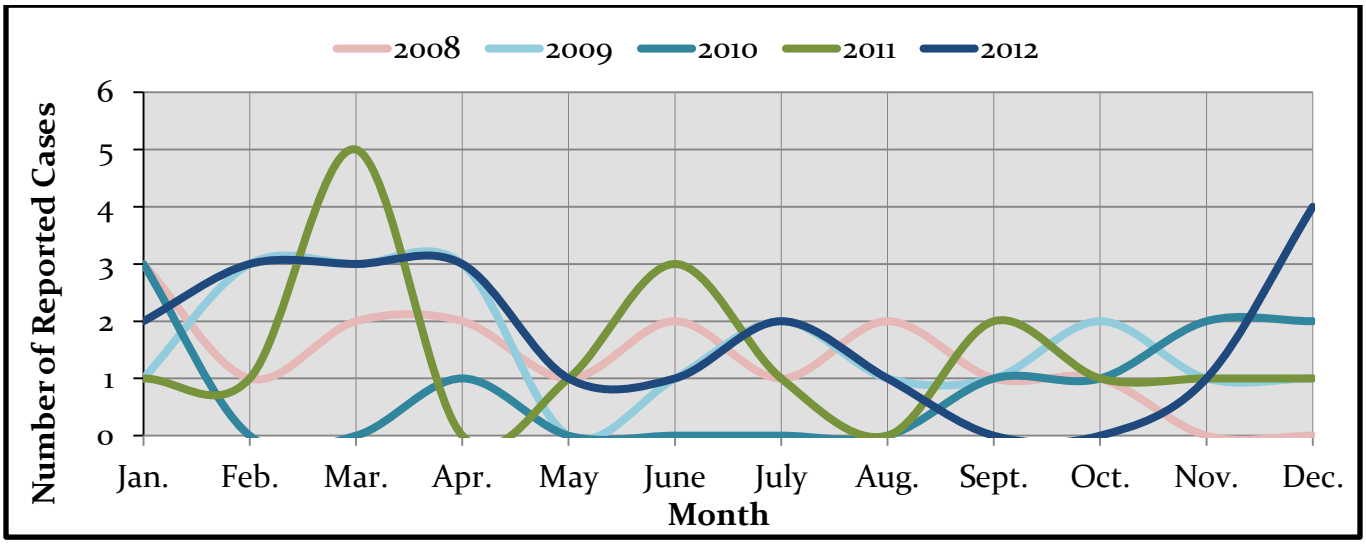


Figure 4. Number of Invasive *Haemophilus influenzae* Type B Cases Reported in Nevada by Month: 2008-2012



Figures 5A-G. Number of Reported Cases and Crude Incidence Rates of Invasive *Haemophilus influenzae* Type B in Nevada by Age Group: 2003-2012

Figure 5A. *Haemophilus influenzae* Type B Cases and Incidence Rates in Infants Under 1 Year of Age

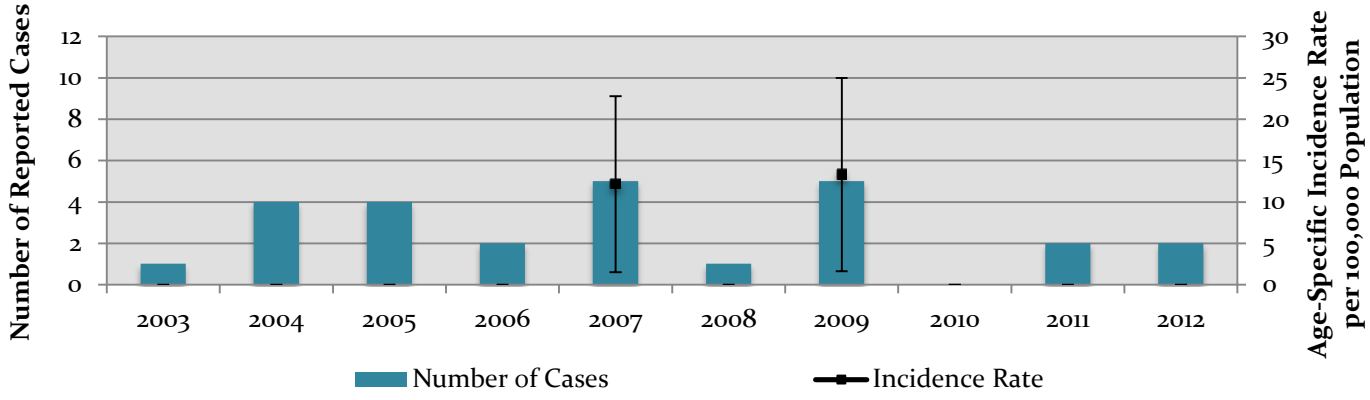


Figure 5B. *Haemophilus influenzae* Type B Cases in Children 1-4 Years of Age

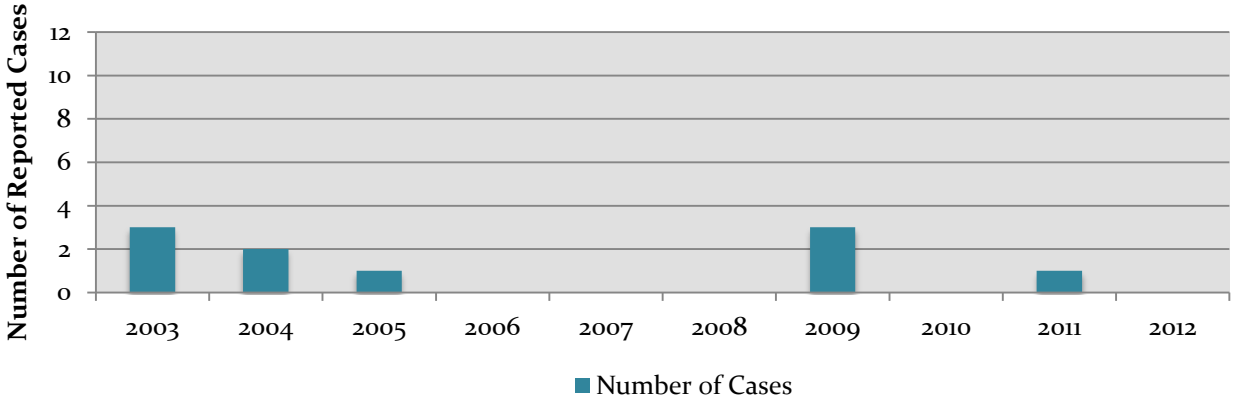


Figure 5C. *Haemophilus influenzae* Type B Cases in Persons 5-14 Years of Age

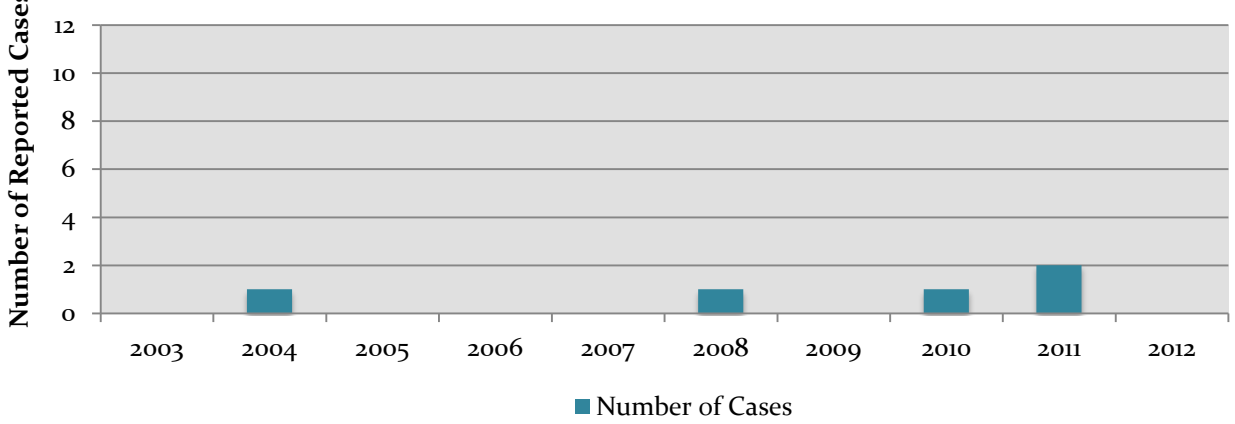


Figure 5D. *Haemophilus influenzae* Type B Cases in Persons 15-24 Years of Age

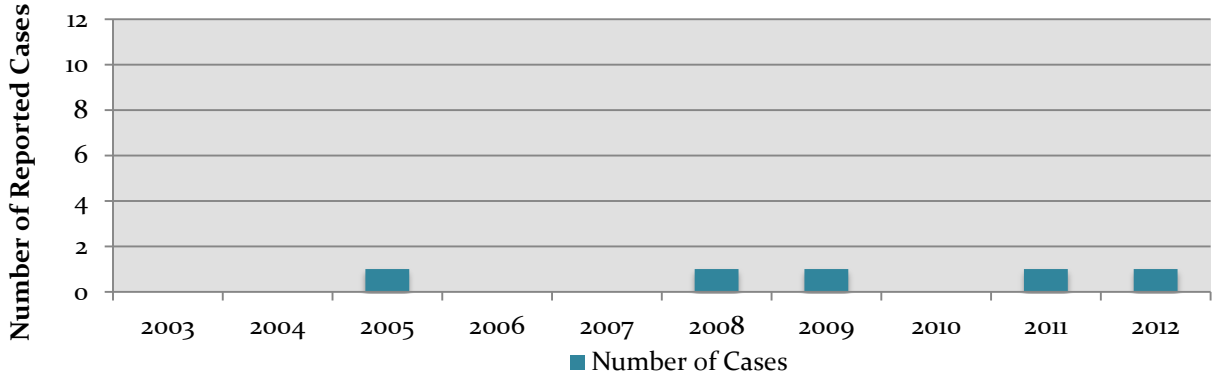


Figure 5E. *Haemophilus influenzae* Type B Cases in Persons 25-39 Years of Age

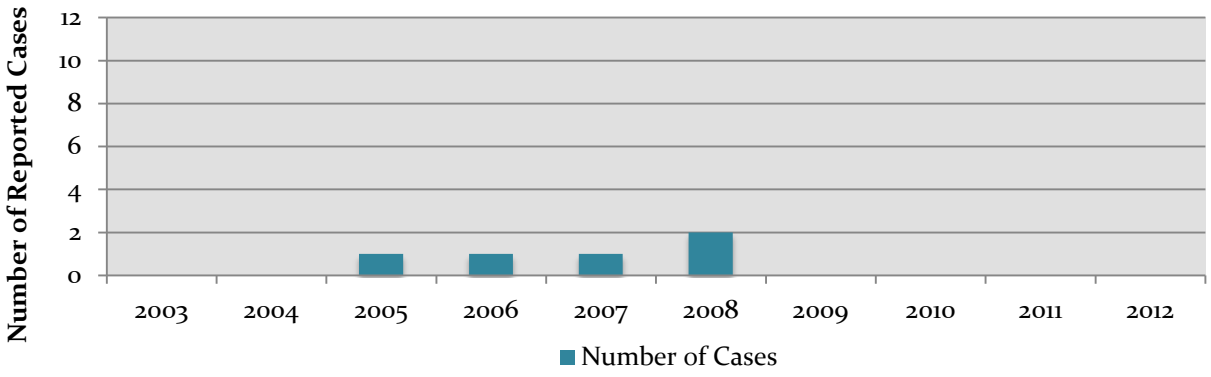


Figure 5F. *Haemophilus influenzae* Type B Cases and Incidence Rates in Persons 40-64 Years of Age

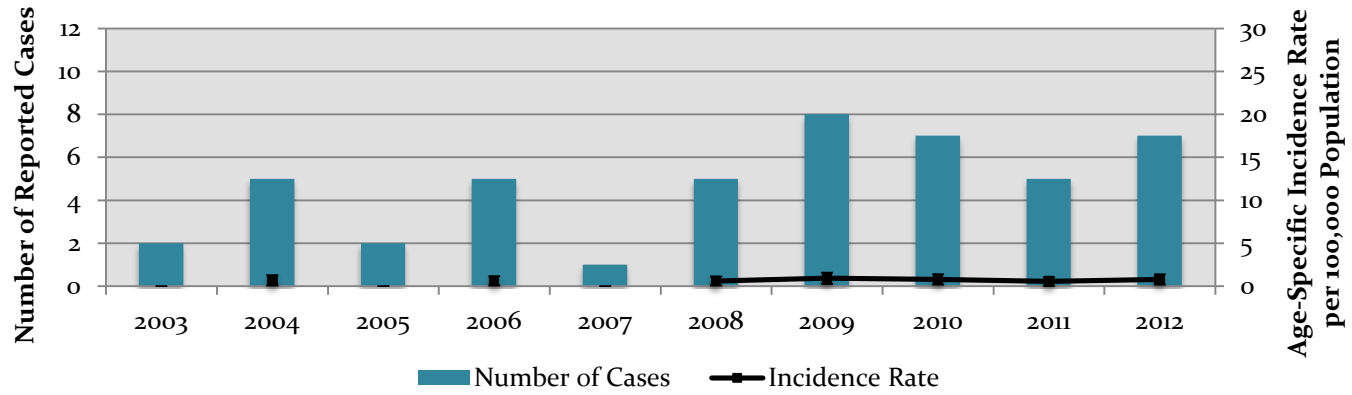
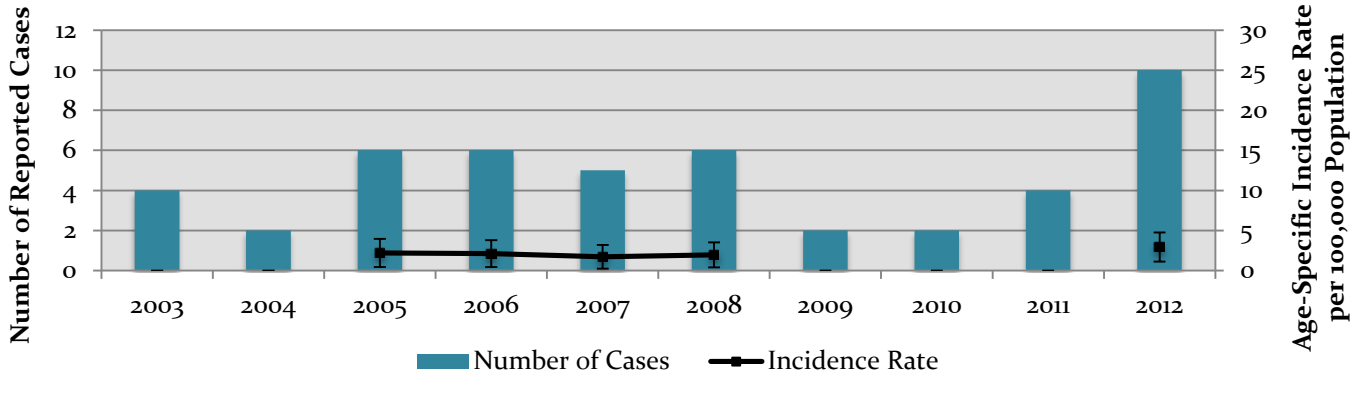


Figure 5G. *Haemophilus influenzae* Type B Cases and Incidence Rates in Persons 65+ Years of Age



Technical Notes

All Nevada data from 2003 to 2012 came from reported invasive *H influenza*e type b infections among Nevada residents (6, 7). The CDC and the Council of State and Territorial Epidemiologists case definition of invasive *Haemophilus influenzae* encompasses all cases as probable or confirmed cases; all cases of *H influenzae* used for this report follow this definition (8). Population estimates were obtained from Nevada State Demographer's Office (9). 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; 3 such cases had to be excluded. Due to the high number of cases of unknown race/ethnicity (40 cases), imputing the unknown cases to produce race/ethnicity-specific incidence rates would risk allowing potential selection bias to distort the measures, resulting in unreliable conclusions; therefore, racial/ethnic break-outs are not presented in this report. When used for rates, error bars represent 95% confidence intervals. The Keyfitz method was used to calculate confidence intervals of age-adjusted rates (10). Due to their inherent unreliability, rates were not calculated for case counts lower than five.

Sources

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