

ESCHERICHIA COLI IN NEVADA, 2003-2012

May 2014
Edition 1.0

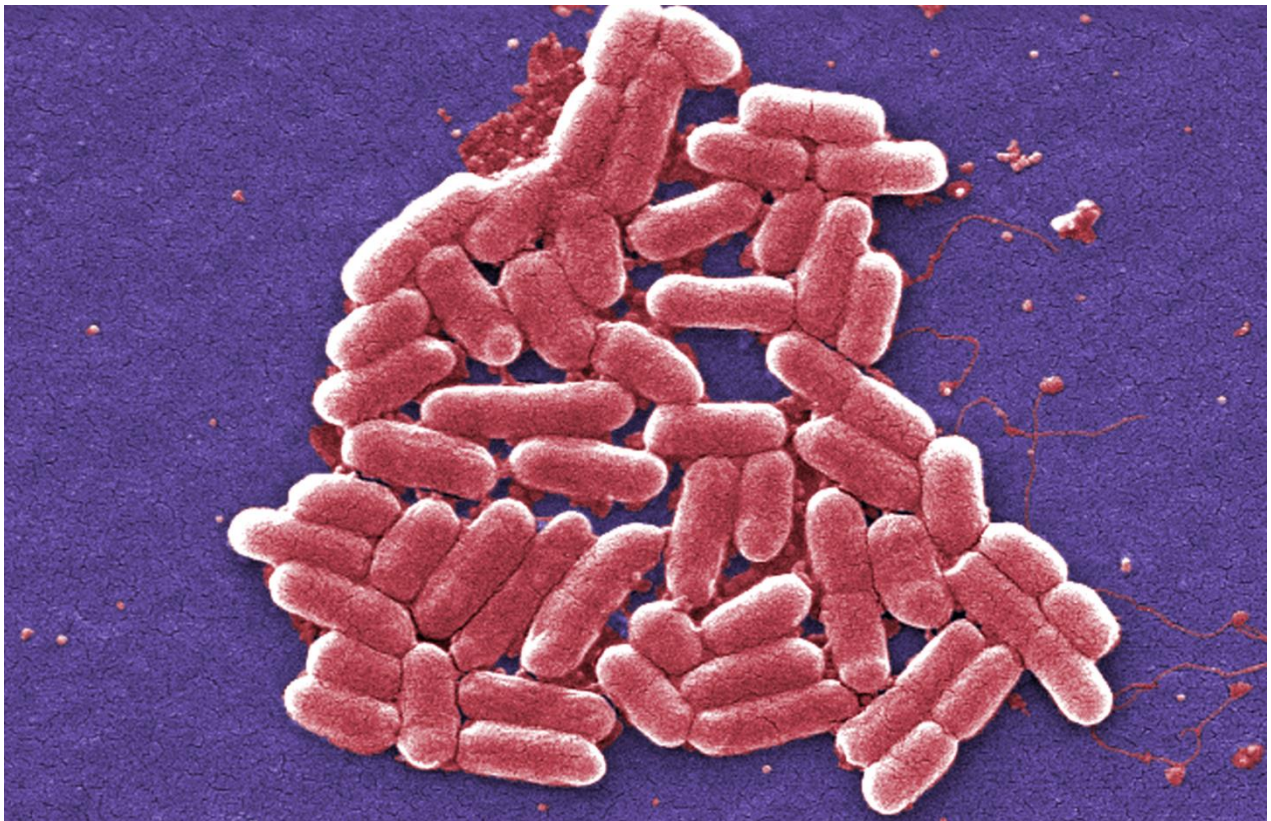


Photo: Centers for Disease Control and Prevention



DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC AND BEHAVIORAL HEALTH
Office of Public Health Informatics and Epidemiology

BRIAN SANDOVAL
Governor

RICHARD WHITLEY, MS
Administrator

MICHAEL J. WILLDEN
Director

TRACEY D. GREEN, MD
Chief Medical Officer

Purpose

The purpose of this report is to provide a general overview of the incidence and recent trends of enterohemorrhagic *Escherichia coli* (*E coli*) among Nevada residents. The report also includes Healthy People 2010 objectives, Healthy People 2020 objectives, and Nevada data collected from cases of enterohemorrhagic *E coli* from 2003 to 2012. Enterohemorrhagic *E coli* is listed as one of Nevada's reportable diseases pursuant to [NRS 441A](#) (1), and reporting is further regulated by [NAC 441A.515](#). "Enterohemorrhagic *E coli*" is defined as Shiga toxin-producing *Escherichia coli*, including *E coli* O157:H7 (2). For this report, the terms enterohemorrhagic *E coli* and Shiga toxin-producing *E coli* are used interchangeably.

Escherichia coli

Escherichia coli (*E coli*) are bacteria that normally live in the intestines of people and animals; most are harmless. However, some strains of *E coli* are pathogenic and cause diarrhea or illness outside the intestines, including urinary tract infections, respiratory illness, and pneumonia. The strains of *E coli* associated with diarrhea are categorized into the 6 following pathotypes: Shiga toxin-producing *E coli* (STEC), enterotoxigenic *E coli* (ETEC), enteropathogenic *E coli* (EPEC), enteroaggregative *E coli* (EAEC), enteroinvasive *E coli* (EIEC), and diffusely adherent *E coli* (DAEC) (3).

The data in this report only includes cases of Shiga toxin-producing *E coli* (STEC); STEC, also known as verocytotoxin-producing *E coli* (VTEC) or enterohemorrhagic *E coli* (EHEC), is most commonly associated with foodborne outbreaks. This pathotype of *E coli* causes disease by producing a toxin, Shiga toxin. The most common STEC in North America is *E coli* O157:H7. About 265,000 STEC infections occur in the United States each year, and about 36% of these infections are caused by *E coli* O157:H7 (3).

Symptoms of an STEC infection can appear within 1-10 days of being exposed, and patients may exhibit severe stomach cramps, vomiting, mild fever, and bloody diarrhea. Most individuals recover within 5-7 days without treatment. However, approximately 5-10% of cases develop hemolytic uremic syndrome (HUS), which is a life-threatening complication. Patients with HUS may exhibit decreased urination frequency, fatigue, and loss of color in the cheeks and lower eyelids. Symptoms of HUS usually appear 7 days after the initial symptoms, when the diarrhea is improving. Patients possibly developing HUS must be immediately hospitalized and closely monitored due to possible kidney failure. Younger children and the elderly are more likely to develop severe illness and HUS than others (3).

STEC infections are diagnosed by collecting stool samples for laboratory testing. Identifying the specific strain of STEC is important for public health purposes, such as finding outbreaks. Hydration is most important to recover from STEC infection. Antibiotics should not be used as a form of treatment for STEC infection; antibiotics and antidiarrheal agents may increase the risk of HUS (3).

Exposure to *E coli* commonly occurs through consuming contaminated food, consuming unpasteurized milk, drinking water that has not been disinfected, or being in contact with cattle or the feces of infected people or animals. The Centers for Disease Control and Prevention (CDC) recommends avoiding food that carries a high risk of infection with *E coli* O157:H7, including unpasteurized milk, unpasteurized apple cider, and soft cheeses made from raw milk. Other prevention methods include: washing hands thoroughly after using the bathroom or changing diapers, before preparing or eating food, and after contact with animals; cooking meats thoroughly (ground beef and meat that has been needle-tenderized should be cooked to an internal temperature of at least 160°F); preventing cross contamination in food preparation areas; and avoiding swallowing water when swimming in lakes, ponds, streams, and pools (3).

Summary

From 2003 to 2012, the annual number of reported enterohemorrhagic *E coli* cases in Nevada ranged from a low of 23 cases in 2008 to a high of 64 cases in 2011. From 2003 to 2012, the annual crude incidence rate of *E coli* ranged from a low of 0.9 cases per 100,000 population in 2008 to a high of 2.4 cases per 100,000 population in 2011. The crude incidence rate from 2003 to 2012 was 1.4 cases per 100,000 population.

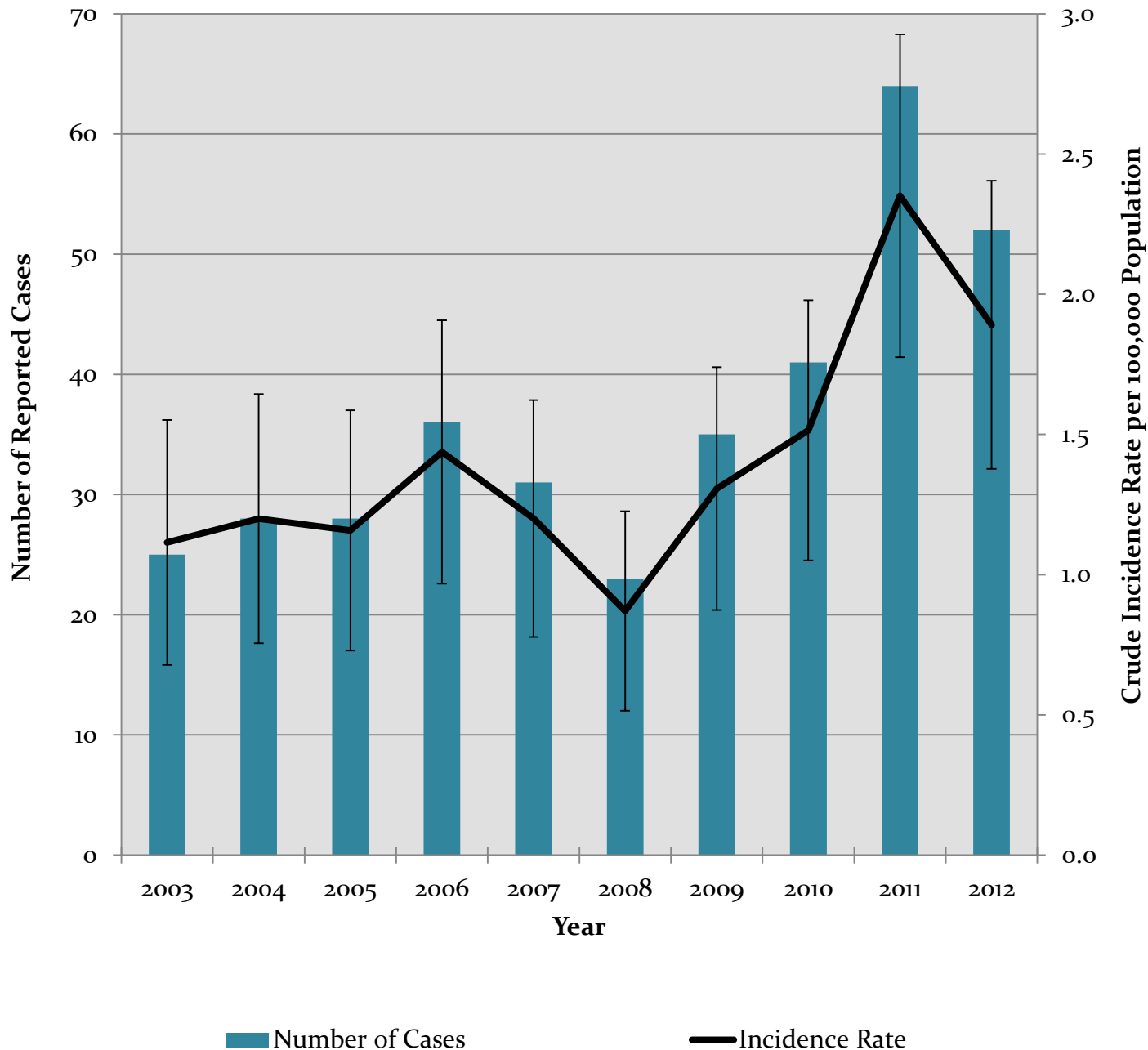
The Healthy People 2010 objective for *E coli* was not to exceed an incidence rate of 1.0 laboratory confirmed *E coli* O157:H7 cases per 100,000 population, and the Healthy People 2020 objective is not to exceed an incidence rate of 0.6 laboratory confirmed *E coli* O157:H7 cases per 100,000 population (4, 5). When breaking down cases of the *E coli* O157:H7 strain from all reported laboratory enterohemorrhagic *E coli* cases in Nevada, case counts of *E coli* O157:H7 become too low to compare Nevada's *E coli* O157:H7 incidence rates to the national objectives.

From 2003 to 2012, Carson City Health and Human Services had a significantly higher age-adjusted incidence rate (2.5 cases per 100,000 population) than Southern Nevada Health District and the overall age-adjusted incidence rate for the entire state (1.2 and 1.4 cases per 100,000 population, respectively). There were no other significant differences between the other health districts.

Like most foodborne illnesses, *E coli* cases typically increase during the summer and decline in fall and winter. Between 2008 and 2012 (years for which monthly data is available), *E coli* infections followed this pattern with the number of reported cases typically peaking between July and October. The number of reported cases ranged between 0 and 12 cases per month, depending on the year, with the largest peak in August 2012 followed by a smaller peak in October 2011.

From 2003 to 2012, the highest case count of *E coli* in Nevada was among children 1-4 years of age with a total of 102 reported cases during the 10-year time period. The highest case count during a single year was in this same age group with 27 reported cases in 2011. Children 1-4 years of age had a significantly higher incidence rate (6.9 cases per 100,000 population) compared to all other age groups with a spike occurring in 2011 of 17.6 cases per 100,000 population for that year. Over the ten years, the 25-39, 40-64, and 65 and older age groups had significantly lower incidence rates (0.7, 0.7, and 0.9 cases per 100,000 population, respectively) than the less than 1, 1-4, and 5-14 age groups (4.2, 6.9, and 2.2 cases per 100,000 population, respectively).

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



The crude incidence rate in Nevada from 2003 to 2012 was 1.4 cases per 100,000 population.

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

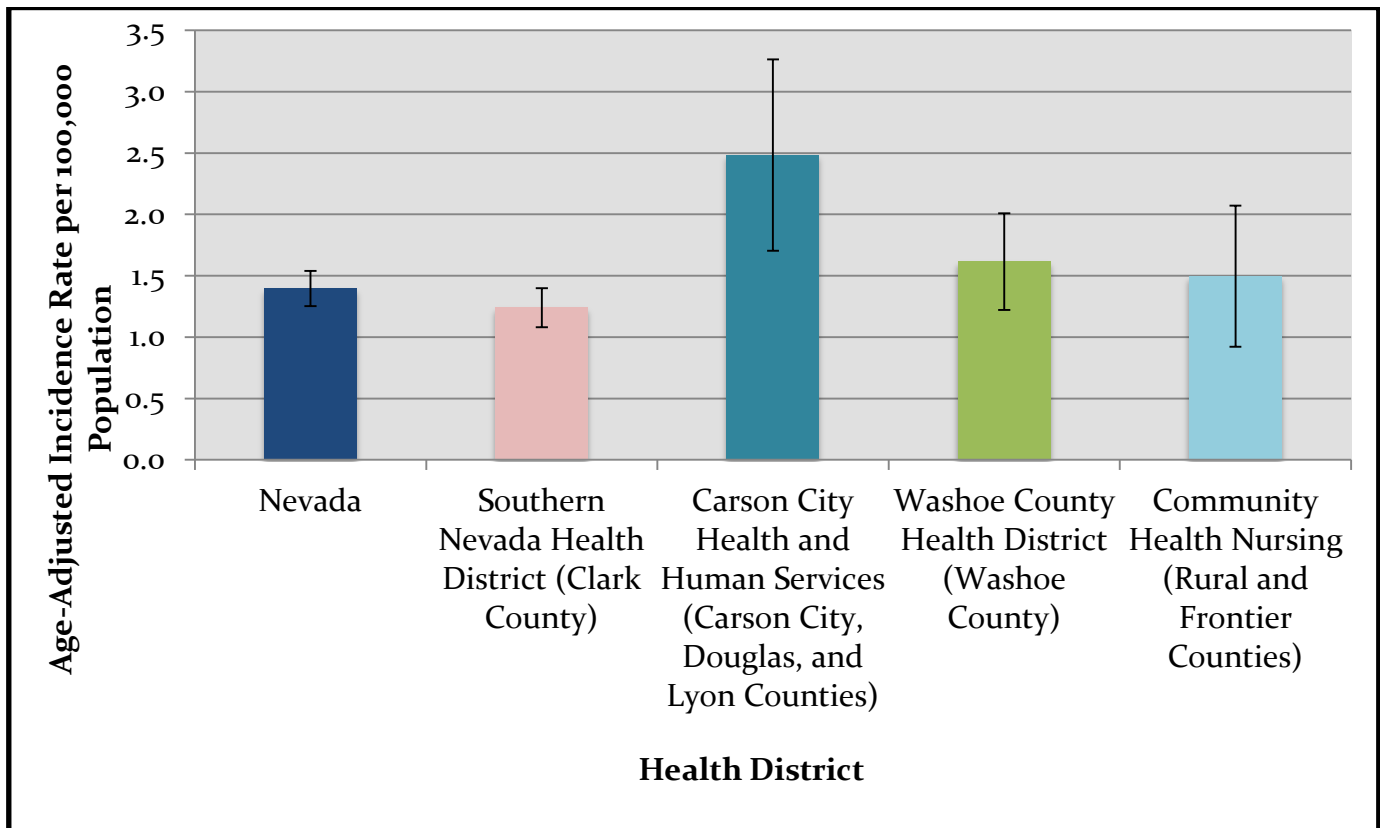
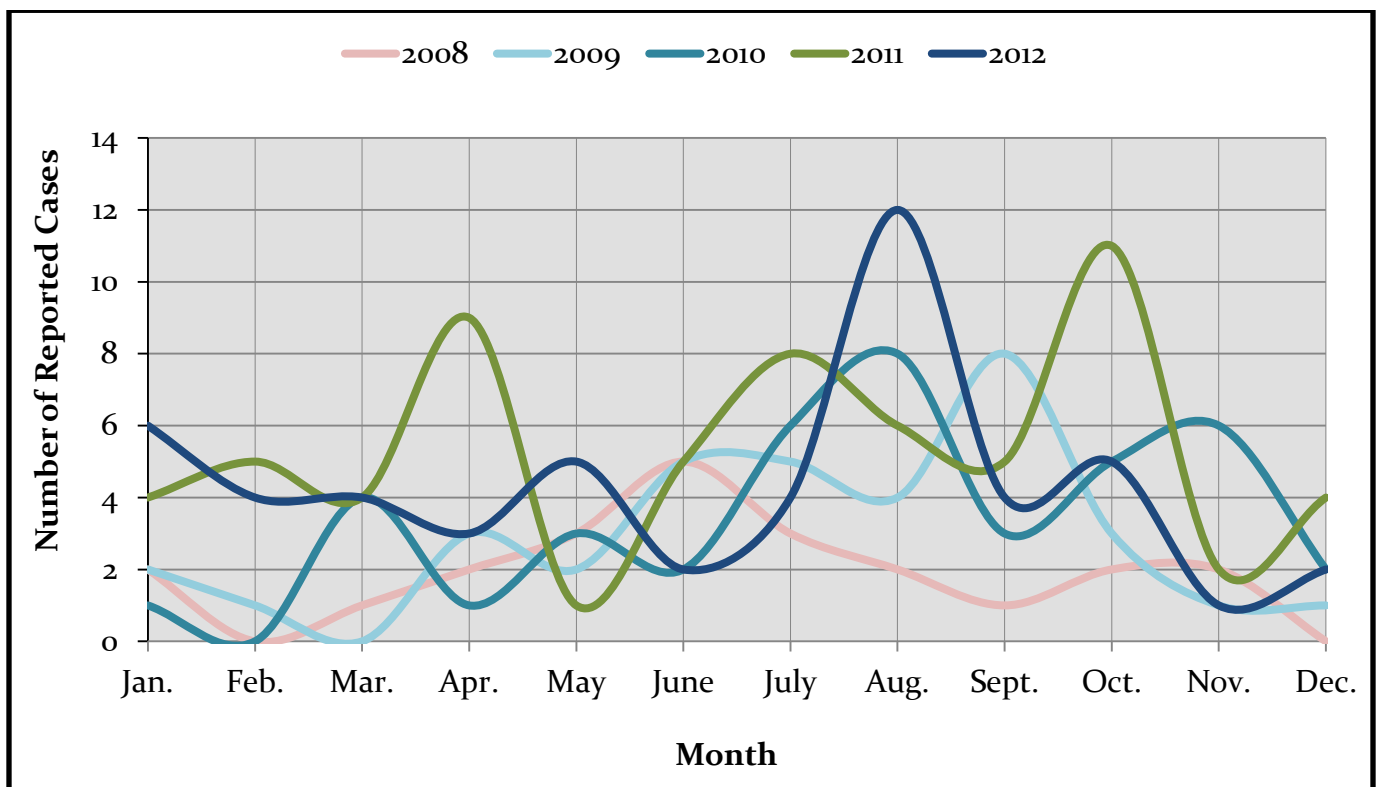


Figure 3. Number of *E coli* Cases Reported in Nevada by Month: 2008-2012



Figures 4A-G. Number of Reported Cases and Crude Incidence Rates of *E coli* in Nevada by Age Group: 2003-2012

Figure 4A. *E Coli* Cases in Infants Under 1 Year of Age

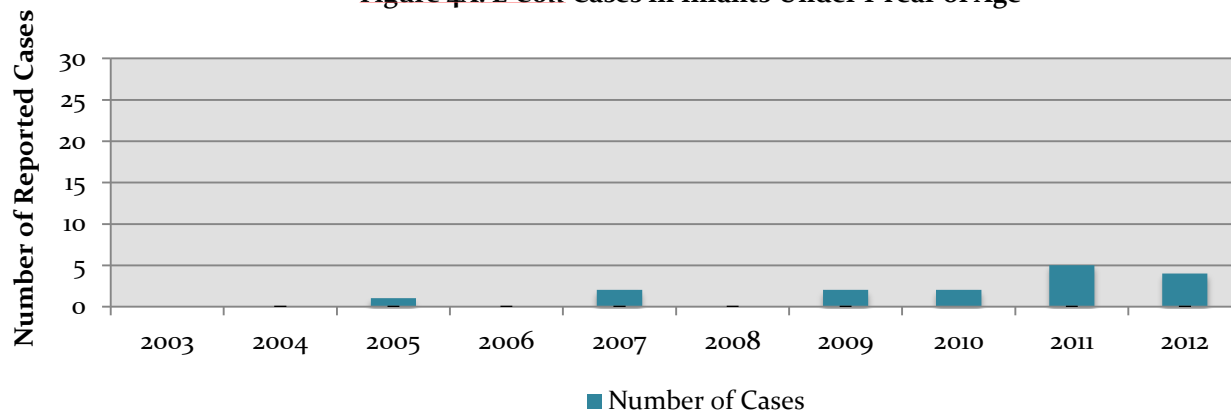


Figure 4B. *E Coli* Cases and Incidence Rates in Children 1-4 Years of Age

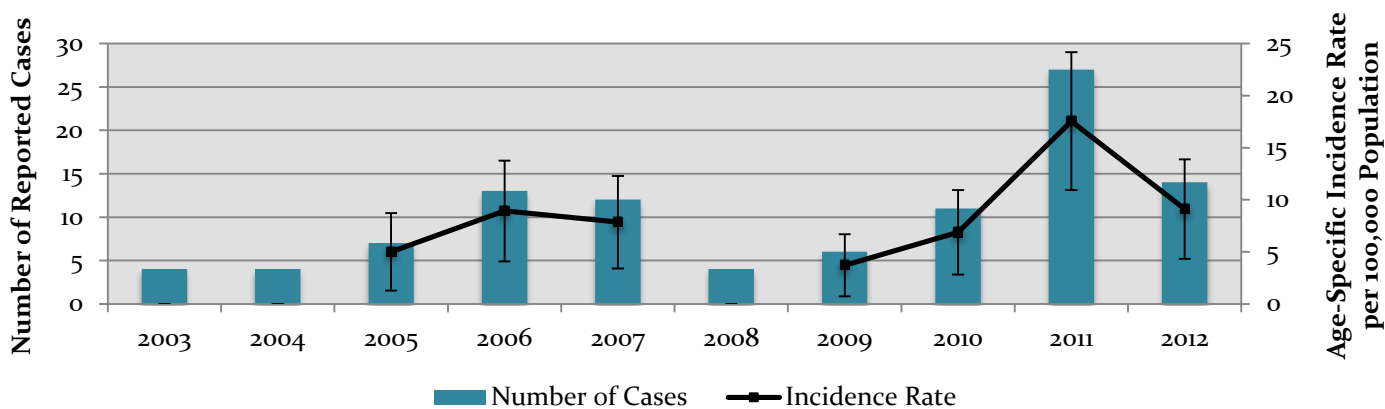


Figure 4C. *E Coli* Cases and Incidence Rates in Persons 5-14 Years of Age

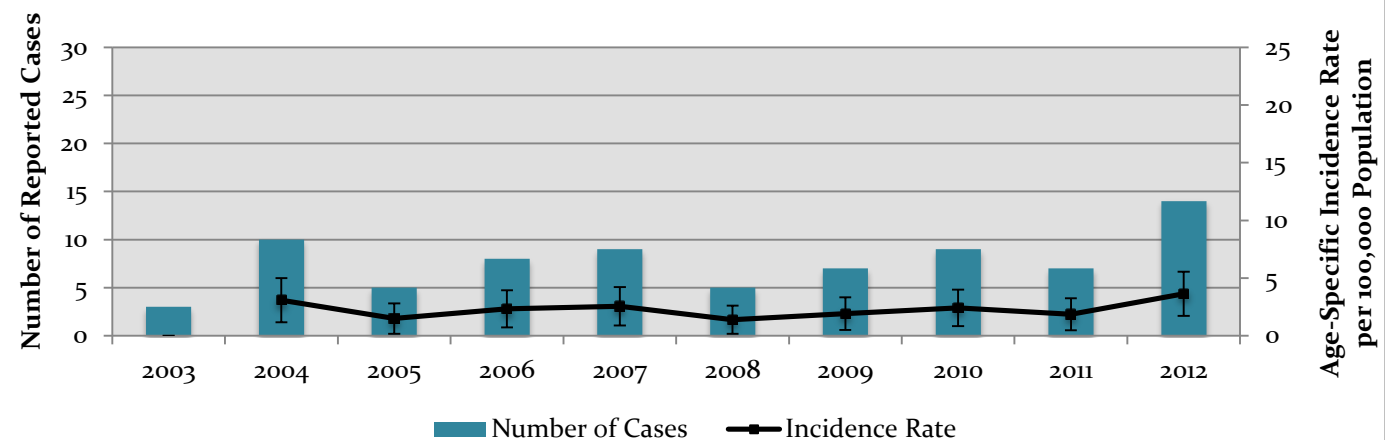


Figure 4D. *E. Coli* Cases and Incidence Rates in Persons 15-24 Years of Age

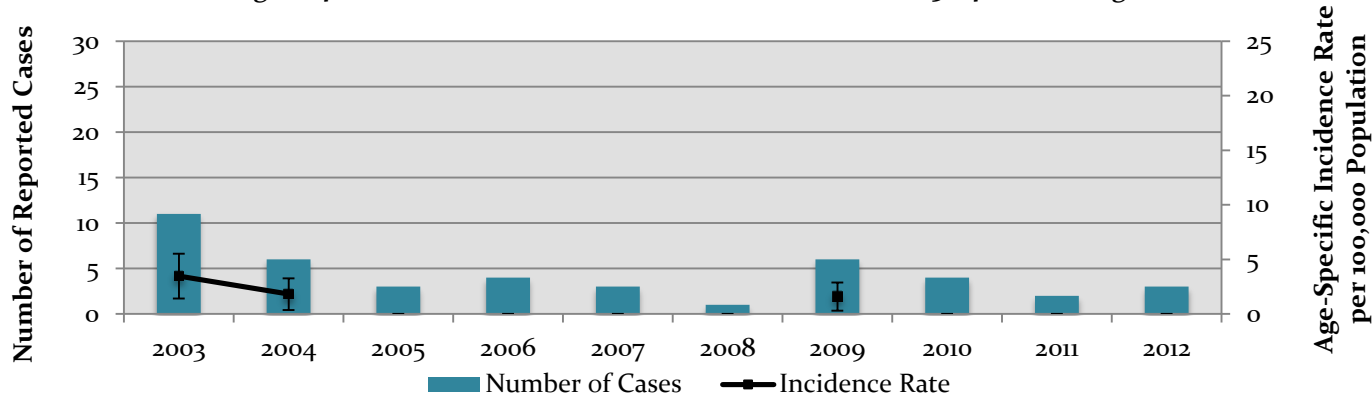


Figure 4E. *E. Coli* Cases and Incidence Rates in Persons 25-39 Years of Age

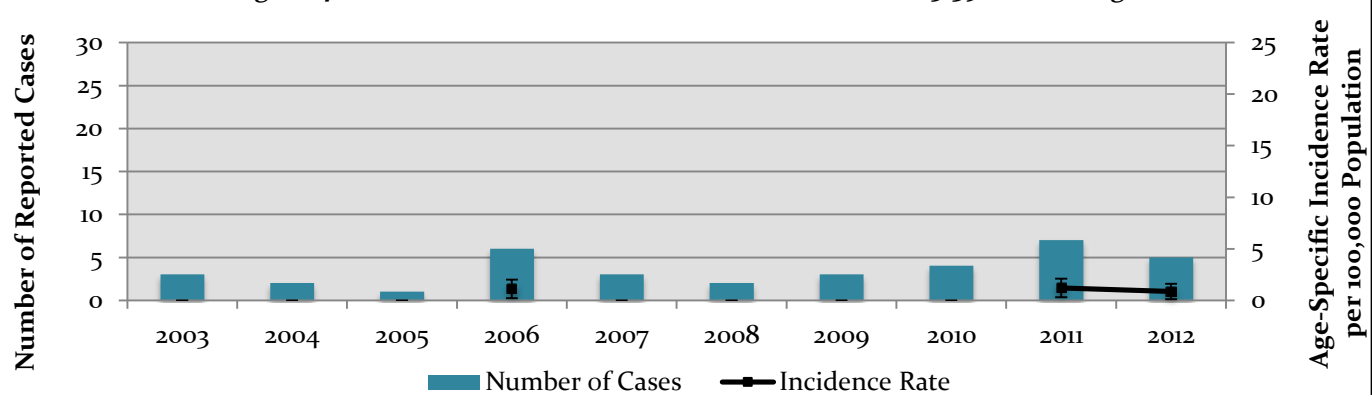


Figure 4F. *E. Coli* Cases and Incidence Rates in Persons 40-64 Years of Age

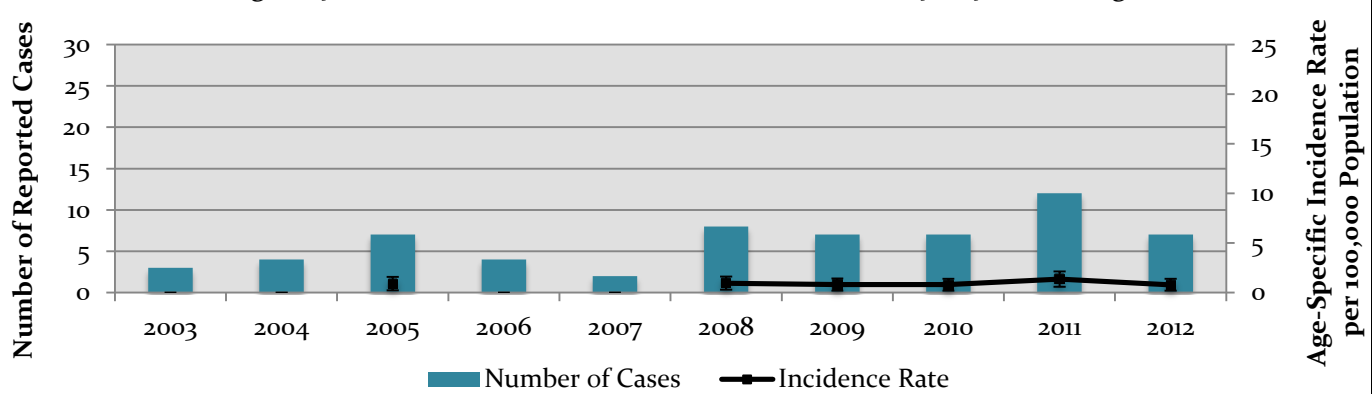
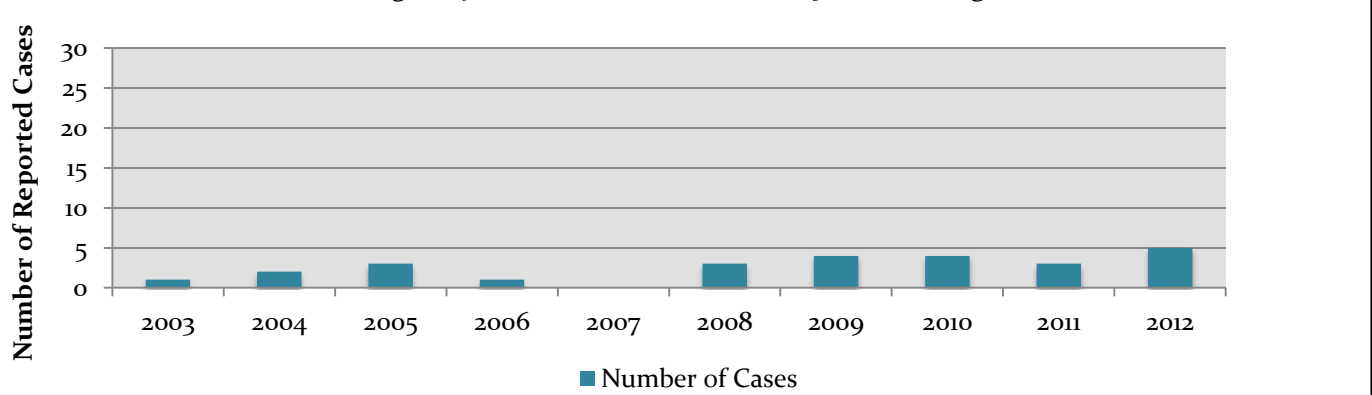


Figure 4G. *E. Coli* Cases in Persons 65+ Years of Age



Technical Notes

All Nevada data from 2003 to 2012 came from reported enterohemorrhagic *E coli* infections among Nevada residents (6,7). The CDC and the Council of State and Territorial Epidemiologists case definition of Shiga toxin-producing *E coli* encompasses all cases classified as suspected, probable, or confirmed; all cases of *E coli* 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; 2 such cases had to be excluded. Due to the high number of cases of unknown race/ethnicity (95 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

1. Nevada Revised Statute (NRS) 441A. <https://leg.statEnv.us/NRS/NRS-441A.html>
2. Nevada Administrative Code (NAC) 441A.480. <http://www.leg.statEnv.us/nac/NAC-441A.html#NAC441ASec515>
3. Centers for Disease Control and Prevention. (2012). E coli. National Center for Emerging and Zoonotic Infectious Diseases. Retrieved 2014-03-12. <http://www.cdc.gov/ecoli/general/index.html>
4. Centers for Disease Control and Prevention. (2012). Healthy People 2010. CDC Wonder Data 2010. Retrieved 2014-03-12. <http://wonder.cdc.gov/data2010/>
5. U.S. Department of Health and Human Services. (2013). Healthy People 2020. Retrieved 2014-03-12. <http://www.healthypeople.gov/2020/default.aspx>
6. NBS. NEDSS. All counties except Clark. 2005 to 2012.
7. NETSS. All counties from 2000 to 2004 and Clark. 2005 to 2012.
8. Centers for Disease Control and Prevention. (2014). Shiga toxin-producing Escherichia coli. National Notifiable Diseases Surveillance System. Retrieved 2014-04-10. <http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=951&DatePub=1/1/2014>
9. Nevada State Demographer's Office. 2003-2012 ASRHO Estimates and Projections. Division of Public and Behavioral Health edition. Vintage 2012.
10. Keyfitz, Nathan. Human Biology. *Sampling variance of standardized mortality rates*. September 1966. 38(3): 309-17.

Recommended Citation

Division of Public and Behavioral Health. Office of Public Health Informatics and Epidemiology. *Escherichia coli in Nevada, 2003-2012*. Carson City, Nevada. May 2014. e 1.0.

Acknowledgements

Thank you to all persons who greatly contributed to this publication:
Jennifer Thompson; Jay Kvam, MSPH; Peter Dieringer; and Stephanie Tashiro, MPH

For additional information regarding this publication, please contact:

Office of Public Health Informatics and Epidemiology
(775) 684-5911
outbreak@health.nv.gov

This publication was supported by Cooperative Agreements 1U50OE000037-01 and 1U50CK000257-01 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers of Disease Control and Prevention.