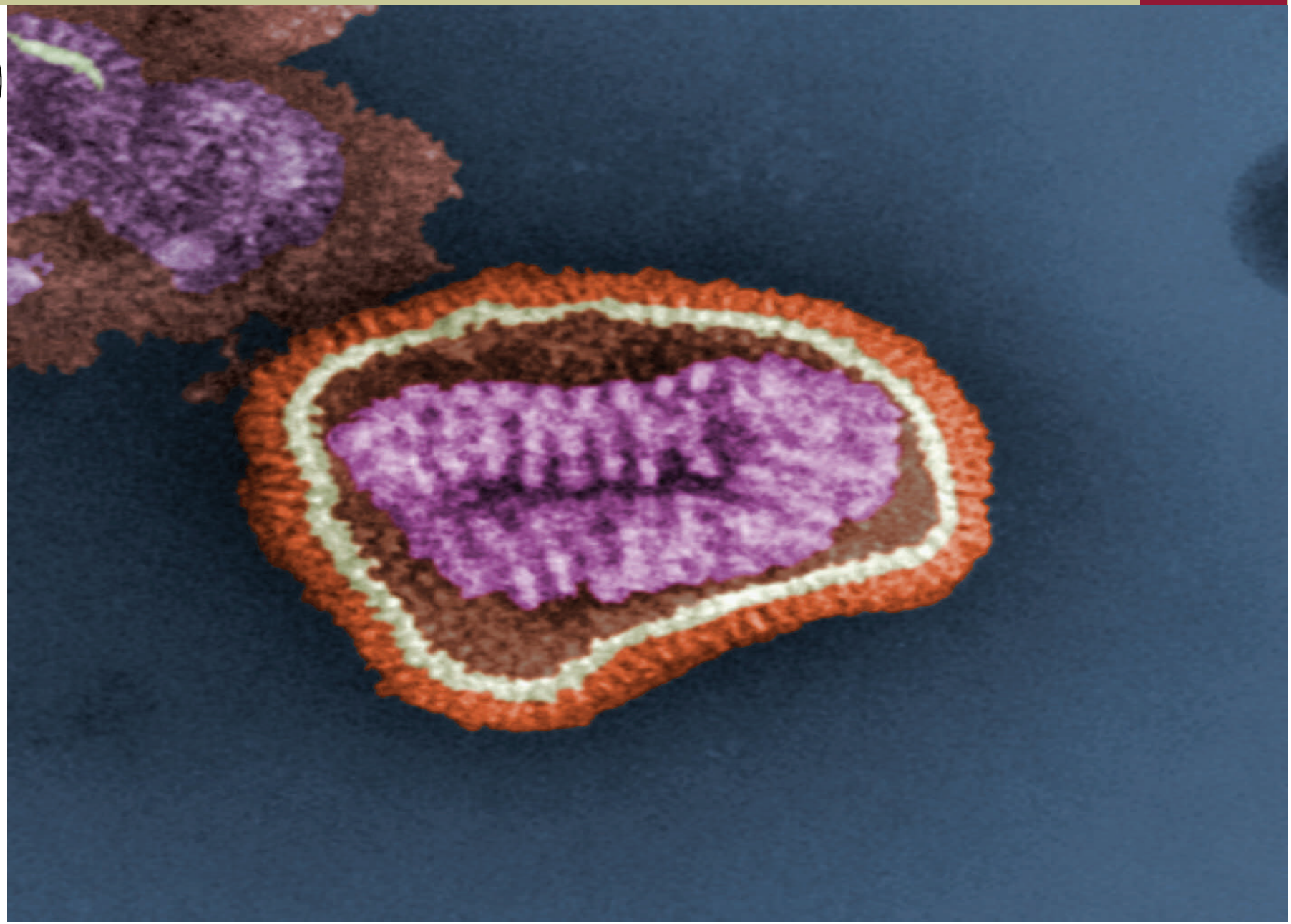
Communicable Disease Epidemiology Program Annual Report
Montana — 2009

MONTANA
Department of Public Health & Human Services



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During 2009, the H1N1 influenza pandemic consumed public health experts at every level. It seemed that H1N1 was the only illness impacting the public's health for much of the year. However, many other pathogens causing a variety of diseases were circulating in Montana causing serious illness and outbreaks. This report outlines and discusses reportable communicable disease rates and distributions for 2009, and provides a tool to assess preventative measures for the future.

Highlights of 2009

2009 H1N1 Influenza

The first influenza pandemic of the 21st century was officially declared by the World Health Organization (WHO) in June 2009. The virus causing the pandemic, the 2009 H1N1 Influenza A virus (H1N1), was first isolated and characterized in April 2009. In the U.S. the first wave of H1N1 infections occurred in the spring with cases continuing throughout the summer. In the autumn a second wave of H1N1 infections occurred. Cases finally subsided in April of 2010.

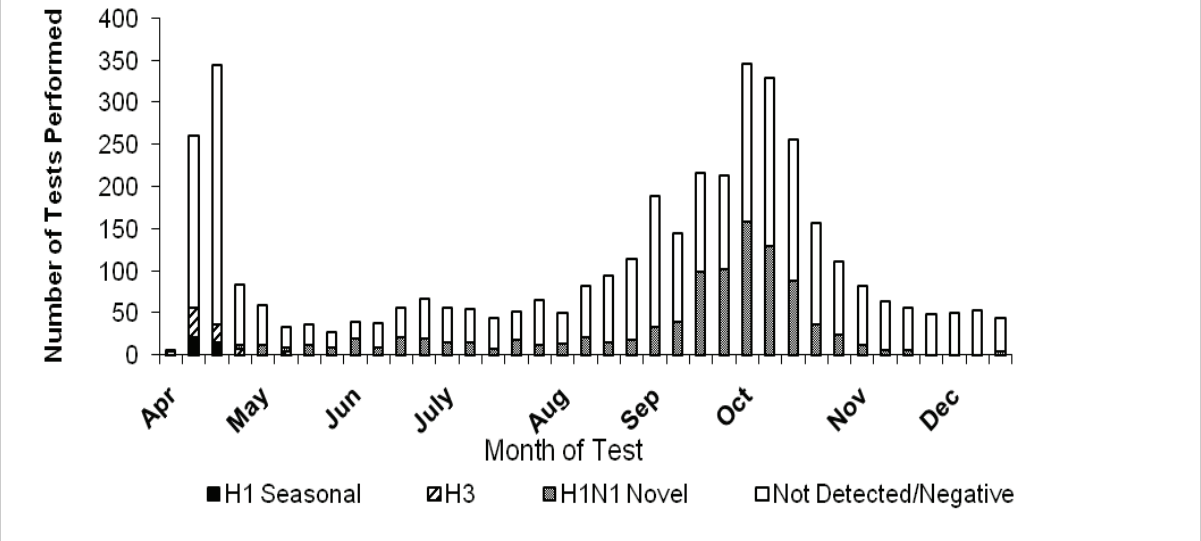
In Montana the first confirmed case of H1N1 was identified in May 2009, and reporting of additional cases, including clusters of cases continued through the remainder of the year. By the end of 2009, over 12,000 confirmed or suspected cases of H1N1 influenza were reported to DPHHS from around the state. More than 3000 specimens were submitted to the Montana Public Health Laboratory (MTPHL) for additional testing. Of these specimens, nearly one-half were confirmed as the 2009 H1N1 Influenza A virus (Figure 1). Confirmed and suspected cases of H1N1 infection represent only those cases that sought treatment and were reported to local health departments (LHDs). Applying the national estimate of 1 in 5 persons being infected with H1N1 to Montana would result in approximately 200,000 cases of illness during the outbreak and provide a more realistic estimate of the morbidity impact of the H1N1 pandemic in Montana.

Based on available data reflecting hospitalizations related to H1N1 infections, Montana's hospitalization rate during 2009 was highest in children aged 0–4 years (27.5/100,000) and lowest in persons aged ≥65 years (6.8/100,000). Overall, more than 200 residents were hospitalized; the median age of hospitalized patients was 42 years (range: 1 month–88 years). Of those, more than half reported the presence of underlying health conditions that might have contributed to hospitalization.

Eighteen deaths, including one child, related to infection with H1N1 were reported during August–November 2009. At least 13 (70%) of the adult deaths occurred in persons with pre-existing medical conditions. One death was reported in a child aged <13 years with no recognized underlying medical conditions. During 2009, the mortality rate related to H1N1 in Montana was markedly higher for American Indians (5 deaths; 7.6/100,000) than for whites (13 deaths; 1.5/100,000). Although it is important to interpret rates based on a small number of events with caution, the excess mortality reported for American Indians in Montana is consistent with aggregate results reported from 12 other states. The data from Montana and the 12 state aggregate indicated that high proportions of American Indian deaths occurred in persons with underlying medical conditions that increased the risk of influenza complications. The total number of deaths related to the 2009 H1N1 influenza pandemic was far fewer than the number of influenza deaths that had occurred in other influenza seasons in Montana since 2000.

County and tribal health agencies, schools, medical facilities and others responded admirably to the pandemic. Over 200,000 doses of vaccine were administered in a variety of settings ranging from private offices to schools to large mass immunization clinics. In addition, a variety of surveillance and prevention activities were implemented during the season.

FIGURE 1. Influenza A testing, Montana Public Health Laboratory, April through December, 2009



While the severity of illness caused by the 2009 H1N1 virus was ultimately less than feared, many of the steps taken to address it were practiced successfully for the first time. As a result, public health authorities, clinicians and other partners will be in a much better position to address the next potential health threat.

Diarrheal Outbreaks

During 2009, several Montana counties reported cases of enteric illness that were part of disease clusters or outbreaks. Some clusters of illness were apparent immediately, but others that first appeared to be isolated events, proved to be part of national or international outbreaks. The scenarios below exemplify the need for thorough follow-up investigations of enteric illnesses that might initially appear isolated. A seemingly isolated event may indeed be linked to an outbreak involving many other ill persons locally, nationally, or internationally. The following summary highlights the enteric illness outbreaks and clusters of 2009.

In May 2009, one case of *E. coli* O157:H7 infection that occurred in Flathead County resulted in a hospitalization and post-diarrheal hemolytic uremic syndrome (HUS). This case was linked by pulsed-field gel electrophoresis (PFGE) to an outbreak that as of June 30, 2009, had sickened 72 persons from 30 states. An investigation was conducted by the Centers for Disease Control and Prevention (CDC), in conjunction with state and LHDs, including Montana DPHHS Communicable Disease Epidemiology (CDEpi) Program and the Flathead City-County Health Department. Results indicated that the source of illness was raw prepackaged Nestle Toll House cookie dough products. A national recall of these products was initiated and the outbreak subsided.

In August 2009, Missoula County experienced an *Escherichia coli* O157:H7 cluster that included eight ill persons, two (25%) of which were hospitalized. Six (75%) of the ill persons were laboratory confirmed with *E. coli* O157:H7 infections. The remaining two patients were each epidemiologically linked to a confirmed case. Examination of the bacterial DNA by PFGE revealed similar DNA patterns indicating these infections originated from a common source. The LHD staff performed patient interviews and created line-lists to help identify a common exposure. All eight case-patients reported eating at the same fast food restaurant 1–3 days prior to illness onset; how-

ever, no specific food item could be associated with this cluster.

In addition to *E. coli* O157:H7, many types of *Salmonella* were circulating in Montana during 2009, causing clusters of illness linked to a variety of sources.

On November 25, 2008, CDC, state, and local health professionals began an epidemiologic assessment of a growing cluster of *Salmonella* serotype Typhimurium isolates that shared the same PFGE pattern. By January 28, 2009, 529 cases from 43 states and one case from Canada yielding the outbreak strain had been reported to the CDC. Shortly thereafter, peanut butter produced by the Peanut Corporation of America (PCA) in Blakely, GA, which sold their product for use in many peanut butter containing products, was implicated as the source. By April 2009 a total of 714 cases with nine deaths had been reported from 49 states, including two cases from Montana. The two ill persons from Montana were Hill County residents who reported consuming prepackaged peanut butter filled crackers that they had carried as snacks in their car.

One *Salmonella* isolate from a Yellowstone County resident yielded a PFGE pattern matching several other isolates in the national PFGE pattern database associated with a pistachio recall in March 2009. On March 26, 2009, the US Food and Drug Administration (FDA) informed CDC that multiple samples of pistachio nuts and pistachio-containing products collected over several months from a single company were contaminated with several serotypes of *Salmonella*, including Montevideo, Newport, and Senftenberg. Some patients yielding *Salmonella* isolates matching the pistachio *Salmonella* DNA fingerprint reported consuming pistachio-containing products, but the epidemiologic association between consuming pistachios and human illness was weak. Nevertheless, the pistachio company issued a voluntary recall of its raw pistachios and raw pistachios containing products.

In November 2009, an additional cluster of three cases of *Salmonella* Typhimurium infection occurred in Ravalli County. Two (67%) cases were interviewed using a "shot-gun questionnaire" approach and reported eating at the same restaurant. No action was taken as no additional cases were reported.

In addition to the salmonellosis cases linked to national and local outbreaks where an infective source was identified, several cases of enteric illnesses in Montana were linked by PFGE to national clusters for which no source was identified. These included two cases from Cascade County, four cases from Gallatin County, and one case each from Lake, Yellowstone, and Custer Counties. One case of *Salmonella* Typhimurium infection from Flathead, one from Missoula, and two from Lewis and Clark counties were linked to an international outbreak in which lettuce was a suspected source; however, no significant association could be made between consumption of lettuce and human illness for this outbreak.

Bats, Rabies, and Summer Camp

Bats are naturally occurring animals in Montana and are beneficial in controlling insect populations and acting as pollinators. Sometimes bats (and some other animals) can carry the rabies virus. Humans can be exposed to the virus through a bite or scratch from an infected animal. In Montana, human rabies exposures most often occur during bat encounters. Ideally, when a human is bitten or scratched by a bat, the bat is captured and a test is performed to determine the presence of rabies virus in the bat. If rabies virus was present, the exposed person is routinely treated with post-exposure prophylaxis (PEP) to prevent rabies. Sometimes it is difficult to capture and test wild bats, and to determine if a person was exposed to a bat's saliva. These factors complicate the assessment and appropriate administration of PEP. This challenge became apparent during the 2009 summer season when bats were observed inside some of the cabins at a camp in Lewis and Clark County where hundreds of children attend camp every year. Bats were

reported in at least one of the cabins where campers slept. Therefore, it was important for the LHDs throughout the state to notify persons of the potential for exposure to rabies through direct, close contact with a bat, and to determine whether rabies exposure might have occurred. In this instance a notice was sent to families of all campers so parents could determine if their child noticed a bat inside their cabin and if the child had direct, close contact with a bat while staying at this camp. As a result, several campers with possible exposure were identified and each exposed child received PEP.

For resources on rabies prevention and PEP, visit http://www.dphhs.mt.gov/PHSD/epidemiology/cdepi-rabies.shtml, or call the Montana CDEpi Program at 406-444-0473 to order an informational packet.

You're Kidding! An Outbreak of Cryptosporidiosis Associated with Exposure to Goats

Cryptosporidiosis is the leading cause of recreational water-associated outbreaks; however, outbreaks have been associated with animal contact in public settings. In April 2009, the CDEpi program investigated an outbreak of cryptosporidiosis associated with baby goats at a goat farm. Three clusters of cryptosporidiosis were associated with exposure to goats. To determine exposure and on-going risk, interviews were conducted on persons ill with cryptosporidiosis that were reported to local health officials April 1–6, 2009. Information gathered through interviewing patients was used to conduct additional case finding. Confirmed cases had laboratory evidence of cryptosporidiosis; probable cases had clinically compatible illness and were epidemiologically linked to a confirmed case.

Three confirmed cases (all female; age range=27–38 years) and 29 probable cases were identified; each confirmed case represented the index case for distinct clusters of illness. Cluster one was a group of persons that visited a dairy goat farm on March 16; 16 (89%) of 18 children (age 5–14 years) and five (83%) of six adult staff who visited the farm were probable cases. Members of clusters two and three each adopted two goat kids from the goat farm. All four goat kids exhibited diarrheal illness but without a confirmed diagnosis, and three died. In Cluster two, ill goat kids were handled by the adopter and persons in a public venue. In Cluster three, ill goat kids were handled extensively. Other risk factors were not identified. Educational meetings were conducted with the owners of the goat farm who allowed public visitation. Farm owners stopped giving away ill goat kids and implemented measures to prevent disease among visitors.

A First for Montana

During the spring of 2009, the first human case of Jamestown Canyon virus (JCV) was detected in Montana. Jamestown Canyon virus is a mosquito-borne zoonotic pathogen belonging to the California serogroup of Bunyaviruses. Although JCV is widely distributed throughout temperate North America, reports of human JCV infections in the U.S. are rare. In May 2009, a Fallon County resident with no history of travel outside of Montana presented to the emergency department with fever, severe acute frontal headache, elevated blood pressure, and neurologic symptoms. Six days post-onset, the patient visited his primary care physician complaining of continued neurologic symptoms. A workup was initiated to evaluate the patient for a stroke or an arboviral infection. Acute and convalescent serum samples tested positive for West Nile virus (WNV) -specific IgM and IgG antibodies; however, the results were consistent with a previous WNV exposure. Subsequent testing using a JCV-specific test indicated the patient was infected with JCV. This finding represents a previously unrecognized JCV focus in Montana and clinicians should consider JCV infection when assessing patients with an unexplained

febrile or neurologic illness in spring or early summer and a history of mosquito exposure.

Invasive Disease

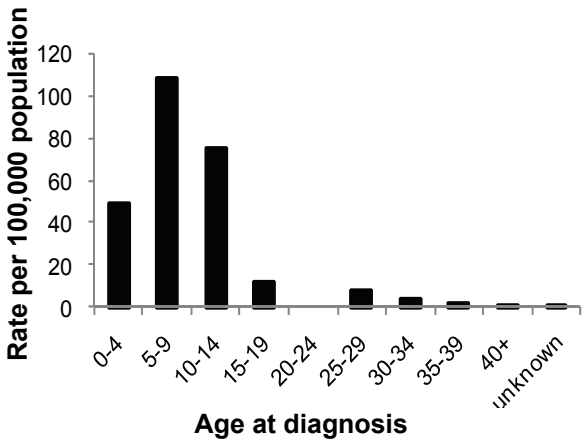
Meningococcal Disease. Meningococcal disease is caused by the gram-negative aerobic diplococcus bacterium *Neisseria meningitidis*. The bacterial species *N. meningitidis* consists of 13 different serotypes that reside primarily in humans on the surface of mucosal membranes such as those found in the respiratory tract. Occasionally, *N. meningitidis* bacteria invade the human blood stream, cross the blood-brain barrier, and cause serious invasive disease including meningitis and septicemia. In 2009, six *N. meningitidis* cases were reported in Montana. None of the cases reported was associated with a meningococcal disease cluster or outbreak. One isolate was identified as serogroup C, two as serogroup Y, and one as serogroup B. The remaining two isolates could not be classified. The six cases ranged in age from 15–83 years (median 43 years) and half of the cases occurred in males. In Montana, the 2009 incidence rate of 0.62/100,000 was identical to the rate in 2008, and slightly higher than the national 2008 rate of 0.34/100,000.

Other Reported Bacterial Invasive Diseases. Several other species of bacteria besides *N. meningitidis* cause invasive disease. During 2009, cases caused by *Staphylococcus aureus* (1), *Streptococcus pneumoniae* (24), and other *Streptococcus* bacteria (2), were reported in Montana. Two cases of invasive *Haemophilus influenzae* type B infection were also reported, one in an infant aged three days and one in a female aged 65 years. See Appendix 1 for invasive disease case counts reported by county.

Vaccine Preventable Diseases

Varicella. In 2007 varicella (chickenpox) became a reportable condition in Montana. In 2009, 164 cases of varicella were reported, down from 337 cases in 2008, and 439 cases in 2007. The decrease in varicella cases might be the result of improved varicella prevention through vaccination, under reporting, or both. The highest incidence rate in 2009 occurred among children aged 5–9 years (Figure 2), which was consistent with previous years.

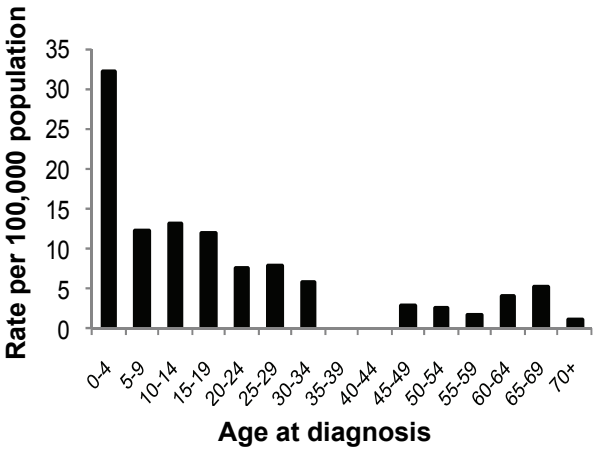
FIGURE 2. Varicella incidence by age group, Montana, 2009



Pertussis. Pertussis is a bacterial respiratory tract infection caused by the bacterium *Bordetella pertussis.* Pertussis can cause serious illness in infants, children and adults, but is most severe for infants aged <1 year. In 2009, 61 cases of pertussis were reported in Montana (6.3/100,000). The rate of pertussis cases decreased slightly from 2008 when 84 cases of pertussis (8.7/100,000) were reported. The rate in Montana has remained below 15/100,000 over the last five years with the exception of a 2005 outbreak, when the rate was 63 cases/100,000. Although Montana had a lower incidence of pertussis in 2009 compared with 2008, the rate remains higher compared with the 2009 national rate, which was approximately 5/100,000. In Montana during 2009, 25 (41%) pertussis cases occurred in males and 36 (59%) in females. The highest rate was in those aged 0–4 years (Figure 3). In order to protect this age group, teenagers and adults, especially those providing care to infants, should be vaccinated with the Tetanus-

diphtheria-acellular Pertussis (Tdap) vaccine per current Advisory Committee for Immunization Practices (ACIP) Guidelines (http://www.cdc.gov/vaccines/recs/schedules/default.htm). See Appendix 1 for vaccine preventable diseases case counts by county.

FIGURE 3. Pertussis incidence by age group, Montana, 2009



Viral Hepatitis

Hepatitis A. Hepatitis A virus (HAV) infection is primarily transmitted by the fecal-oral route, either by person-to-person contact or consumption of contaminated food or water. Although viremia occurs early in infection and can persist for several weeks after onset of symptoms, blood-borne transmission of HAV is uncommon. In 2009, six cases of acute HAV infection were reported in Montana.

Hepatitis B. In contrast to HAV, hepatitis B virus (HBV) is transmitted through activities that involve percutaneous (puncture through the skin) or mucosal contact with infectious blood or body fluids like semen or saliva. In 2009, one acute HBV infection was reported in an adult from Stillwater County. In 2008, two acute cases were reported. In 2008, the national rate for acute HBV infection was 1.3/100,000 compared with 0.1/100,000 in Montana during 2009. Hepatitis B virus infections have decreased over time with increased use of the HBV vaccine.

Hepatitis C. Hepatitis C virus (HCV) is transmitted through contact with the blood of an infected person, primarily through sharing contaminated needles used to inject drugs, needle stick injuries in healthcare settings, and to infants born to HCV-infected mothers. Hepatitis C virus infection sometimes results in an acute illness that generally occurs within 4–12 weeks after exposure, but can occur in as little as two weeks or as long as 24 weeks after infection. Approximately 75–85% of those infected with HCV develop chronic disease that can lead to cirrhosis of the liver and liver cancer. In Montana during 2009, 707 cases of HCV infection were reported in Montana, a decrease from the 943 cases reported in 2008. In 2009, cases ranged in age from 16–85 years with a median of 48 years. During 2008 and 2009, the most common age group for newly reported cases of HCV infection was 45–54 years. Of the 707 cases reported in 2009, only one case was reported as acute (0.1 case/100,000). The number of acute cases of HCV infection has decreased from the six acute cases reported in 2008 (0.6/100,000). See Appendix 2 for number of HCV cases reported by county.

Enteric Diseases

During 2009, over 500 cases of enteric illness were reported in Montana. While some were included in the diarrheal disease outbreaks described on pages 2–4, many reported cases of diarrheal disease in Montana, appeared sporadic. Diarrheal diseases are often caused by ingesting food or water contaminated with fecal matter. Transmission can also occur through contact with animals, ill persons, or surfaces contaminated with feces. This can occur when hands become contaminated and are not washed before handling food, eating, drinking, or touching the face.

Campylobacteriosis. Bacteria belonging to the *Campylobacter* species are the leading cause of bacterial acute gastroenteritis in Montana. In 2009, 164 cases (16.8/100,000) of campylobacteriosis were reported in Montana. The number of reported cases has increased from 144 cases (14.9/100,000) in 2008. Rates of campylobacteriosis are typically higher in the summer months. The 2009 rates in Montana ranged from 2.0–3.1 cases per month/100,000 during May–August, compared to 0.4–1.3 cases per month/100,000 for the remaining months (Figure 4A). Although *Campylobacter* infections are usually thought to be associated with exposure to raw or undercooked chicken, many of the patients interviewed in Montana in 2009 did not report having had exposure to chicken. This lack of reported exposure to chicken strongly suggests that other environmental sources pose *Campylobacter* infection risk to humans. To determine additional risk factors that might exist, thorough case follow-up and investigations into possible exposure routes are of upmost importance.

Salmonellosis. The second leading cause of bacterial acute gastroenteritis in Montana is *Salmonella*. *Salmonella* bacteria are an extremely diverse group consisting of around 2500 different serotypes. About 60–80% of reported salmonellosis cases appear sporadic, but are likely linked to unreported cases. Large outbreaks of salmonellosis occurring in hospitals, institutions, restaurants, or from contaminated commercially available food sources are common in the U.S. The MTPHL performs PFGE on all *Salmonella* isolates submitted by Montana healthcare providers, and uses the resultant "DNA fingerprints" to help identify outbreaks and link human cases to specific sources. During 2009 in Montana, 110 cases (11.3/100,000) of salmonellosis were reported, a decrease from 131 cases (13.5/100,000) in 2008. As with campylobacteriosis, most salmonellosis cases typically occur during the summer months. However, in 2009, reported cases of salmonellosis were reported at a steady rate throughout the year with 0.7–1.1 cases per month/100,000 during January–October, and during December. Rates of salmonellosis dropped below 0.7 cases per month/100,000 during November, when only one case was reported (0.1 case/100,000) (Figure 4A). In 2009, at least 16 (15%) cases were linked to national or local outbreaks. Patient interviews and systematic collection of possible exposures early in the course of illness greatly improves diarrheal disease outbreak investigation outcomes.

STEC and Shigellosis. Other bacterial enteric illnesses reported during 2009 included 13 cases caused by non-O157 STEC (1.3/100,000), 22 cases (2.3/100,000) caused by STEC O157:H7, and 11 cases (1.1/100,000) caused by *Shigella* (Figure 4A). While, these infections are seen less frequently than those caused by *Campylobacter* and *Salmonella*, they can be serious and result in hospitalization, hemolytic uremic syndrome (HUS), and even death.

HUS. Two cases of HUS occurred in Montana in 2009 as a result of O157:H7 STEC infections. One case occurred in a female aged 11 years and one in a male aged one year. In

2009, at least four patients diagnosed with O157:H7 STEC infection were hospitalized.

Cryptosporidiosis and Giardiasis. The protozoan parasites of the *Cryptosporidium* and *Giardia* spp are typically considered to be waterborne pathogens, but direct contact with animals, sick persons, and contaminated food can also serve as transmission routes. In Montana during 2009, 58 cases of cryptosporidiosis (6.0/100,000) and 136 cases of giardiasis (14.0/100,000) were reported (Figure 4B). The 2009 rate of infection increased considerably from 2008 when there were 45 cases of cryptosporidiosis (4.7/100,000) and 94 cases of giardiasis (9.7/100,000). While the increase in cryptosporidiosis cases during 2009 might be attributed to a cryptosporidiosis outbreak associated with goats that affected at least 32 persons, it is difficult to determine why an increase in giardiasis cases occurred during 2009, as no clusters or outbreaks of giardiasis were detected.

Norovirus. Outbreaks of acute gastroenteritis are often caused by viruses. Norovirus infections are caused by a diverse group of viruses previously called "Norwalk-like" viruses. Several different genetic types (genotypes) of norovirus can cause disease in humans. In Montana, genotypes I and II cause most of the recognized norovirus infections. Surveillance for outbreak-related norovirus genotypes helps determine how the virus is circulating in

FIGURE 4A. Incidence of most commonly reported bacterial-caused diarrheal illness, Montana, 2009

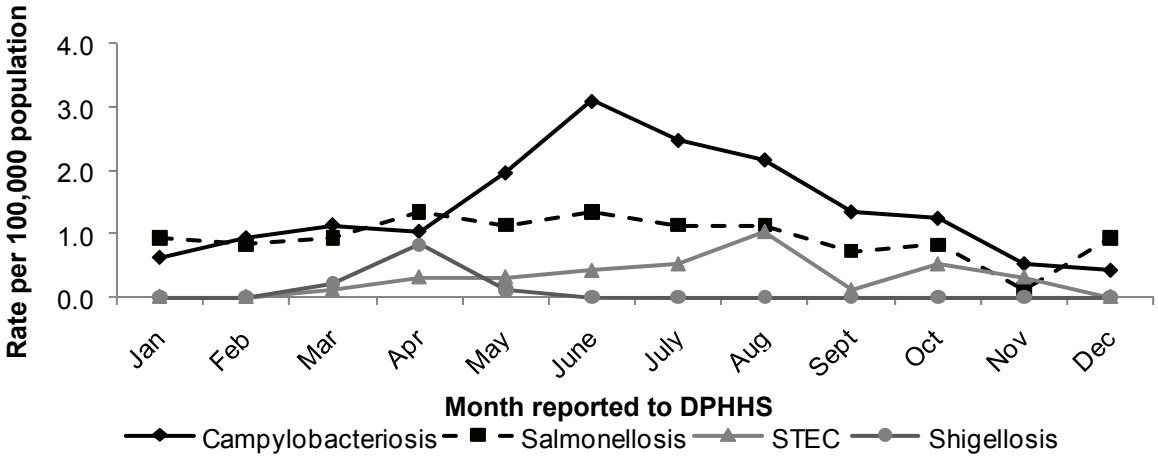


FIGURE 4B. Incidence of most commonly reported protozoan-caused diarrheal illness, Montana, 2009

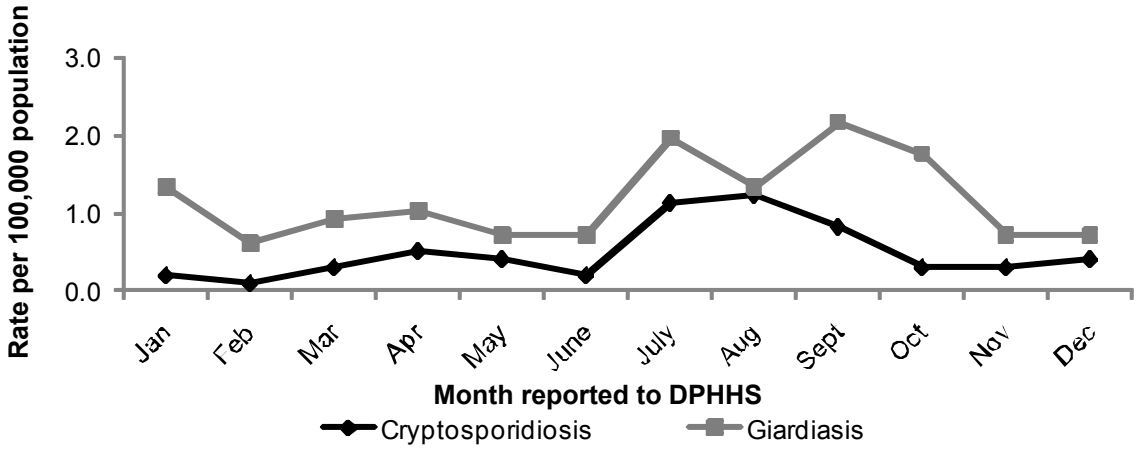
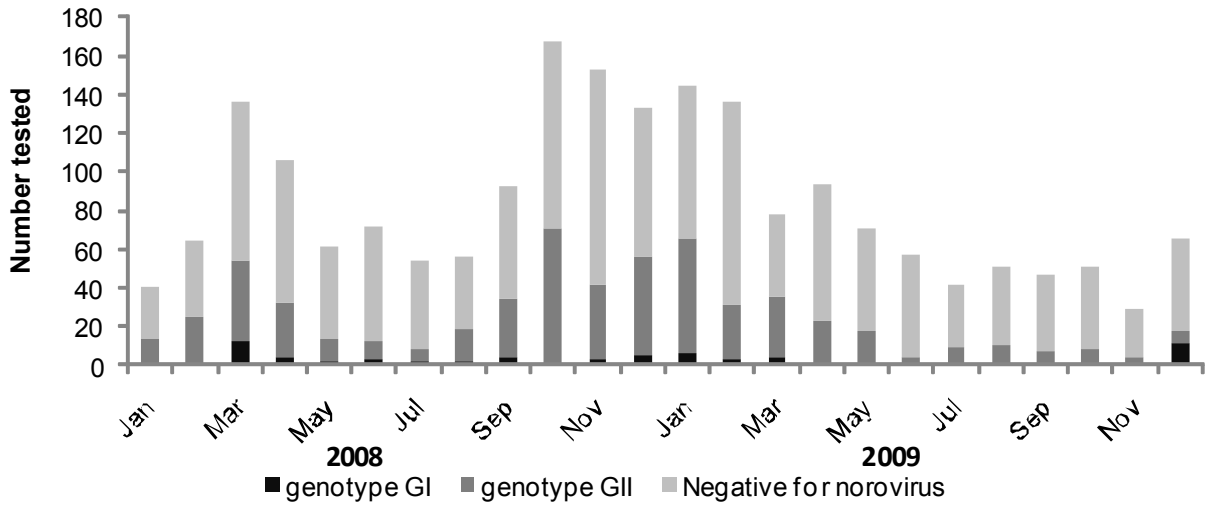


FIGURE 4C. Number of fecal samples tested and results of norovirus testing, Montana, 2008– 2009



Montana. Noroviruses are a leading etiology of non-bacterial gastroenteritis outbreaks in adults and children. Outbreaks in institutional settings and group events can result in large numbers of cases and can persist for several weeks. In Montana, norovirus gastroenteritis outbreaks are most common during the winter months; however, sporadic illness occurs year round. In 2009, confirmed norovirus outbreaks were reported from six Montana long-term care facilities and hospitals, and sickened 22–74 persons per outbreak. Six additional outbreaks were reported, from which 149 ill persons were identified. No pathogen was identified in these outbreaks. See Appendix 3 for Montana case counts of diarrheal diseases by county.

Zoonotic and Vector-borne Diseases

Rabies. Rabies is a vaccine-preventable viral disease of mammals most often transmitted through the bite of a rabid animal. The vast majority of rabies cases reported to DPHHS each year occur in wild animals like skunks and bats. Occasionally domestic animals like cats, dogs, and horses are also infected. Human exposure can occur through contact with the saliva of an infected wild or domestic animal. A bite from an infected animal is the most common route of human exposure. Rabies in humans is preventable through prompt appropriate medical care and use of PEP. During 2009, 25 animals in Montana consisting of bats, skunks, and one domestic cat, tested positive for the rabies virus (Figure 5A). Among those animals tested for rabies, one (0.7%) of 149 cats tested positive, 10 (8%) of 126 bats tested positive, and 14 (54%) of 26 skunks tested positive. In Montana, the number of animals testing positive for rabies virus increased in 2009 compared with past years (Figure 5B).

FIGURE 5A. The proportion by species of animals testing positive for rabies, Montana, 2009

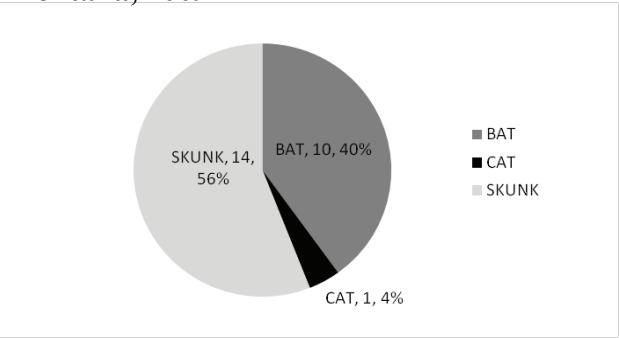
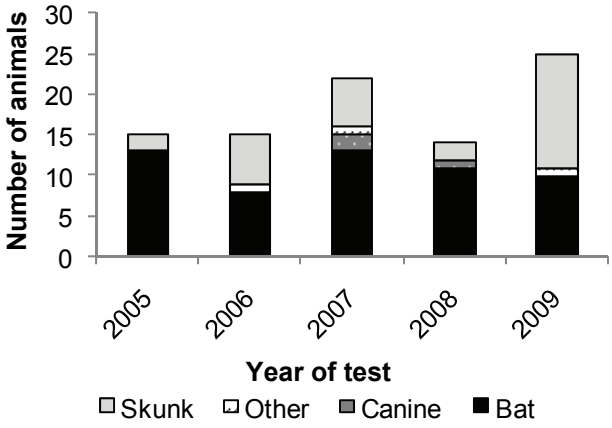


FIGURE 5B. Number of animals testing positive for rabies virus by year and animal species, Montana, 2005-2009



West Nile Virus. Five human cases of West Nile virus (WNV) infection were reported in Montana during each of 2008 and 2009 (0.5/100,000). During 2009, three cases were reported from Sanders County, and one each from Lake and Garfield Counties. Of the five cases confirmed in 2009, three (60%) were reported as West Nile fever (WNF) and two (20%) as West Nile neuroinvasive disease (WNND). No WNV-related deaths occurred in 2009. While the incidence of WNV disease has dropped dramatically since 2007, appropriate precautions should still be used to minimize mosquito exposure, predominantly from the time mosquitoes emerge until the first frost, generally June–September in Montana. Associations have been shown between WNV activity and environmental conditions like temperature that commonly fluctuate year-to-year. Therefore, the amount of WNV activity during one year has not been indicative of WNV activity during following years. Favorable environmental conditions can cause increases in WNV transmission. Each summer should be approached with mosquito-bite prevention in mind.

Other vector-borne pathogens. Pathogens causing Colorado Tick fever (CTF) (*Coltivirus* spp), Rocky Mountain spotted fever (RMSF) (*Rickettsia rickettsii*), tick-borne relapsing fever (TBRF) (*Borrelia hermsii*), tularemia (*Francisella tularensis*), and plague (*Yersinia pestis*) are also present in Montana. In addition to vector-borne transmission, the pathogens that cause tularemia and plague can be transmitted through direct contact with blood or tissues from infected wild animals like rabbits and rodents.

Total numbers of tick-borne illnesses in Montana increased over the past four years. Most of this increase can be attributed to RMSF infections, which increased over two-fold during 2009 compared with 2008, and three-fold when compared to the average from 2005–2008. One reported case of TBRF was associated with tick exposure while sleeping in a cabin on Wild Horse Island on Flathead Lake. In Montana, while *B. hermsii* infections have been identified in wildlife on the mainland near Flathead Lake, human *B. hermsii* infections have been exclusively reported from exposures on Wild Horse Island. Two cases of tularemia were also reported during 2009, both associated with tick bites. During 2009, no reports of plague occurred in Montana. Three cases of Lyme disease were confirmed during 2009. These cases were acquired out of state and the Lyme disease tick vector is yet to be found in Montana. See Table 1 and Appendix 4 for zoonotic and vector-borne disease case counts by county.

Table 1. Vector-borne disease cases reported in Montana, 2009

Vector-borne Disease	Number of cases
Colorado tick fever	1
Jamestown Canyon virus	1
Lyme disease*	3
Spotted Fever Rickettsiosis	10
Tickborne Relapsing Fever	1
Tularemia	2
West Nile Fever	5

*Lyme disease is not endemic to MT. Cases confirmed in MT were reported in MT but acquired out of state

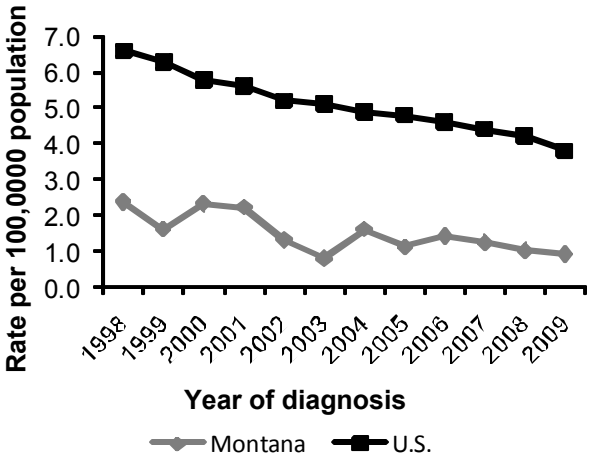
Tuberculosis

In Montana during 2009, eight new cases of tuberculosis (TB) were reported, a decrease from nine in 2008, 11 in 2007 and 13 in 2006. The 2009 TB case rate was 0.9/100,000, slightly below the U.S. goal of 1.0/100,000 by 2015. By comparison, the national 2009 TB rate was 3.8/100,000, representing an 11.4% decrease from 4.2/100,000 reported for 2008 (Figure 6). Of the eight patients diagnosed with TB during 2009, the reported race was Asian (3), American Indian (2), white (2), and black (1). Five (63%) cases occurred in foreign-born persons, including one pediatric case. In Montana during 2009, the rate of TB in American Indians was 3.6/ 100,000, compared with a 5-year state average of 7.2/100,000.

For the first time, more than 50% of the cases (five) reported in Montana occurred in foreign-born persons. Three foreign-born persons were immigrants, one had a student visa, and one had a work visa. Two (67%) of the U.S.-born cases were known to have previously tested positive on tuberculin skin testing (aged 70 and 85 years), but had not completed effective treatment for latent TB infection. One case died because of a co-existing diagnosis before completing TB treatment. All remaining patients completed treatment for TB; six (75%) patients were treated using directly observed therapy (all medicine doses are observed by a trained healthcare provider.). None of the patients were known to be infected with a drug-resistant strain of *Mycobacterium tuberculosis*.

The goals of local and state TB programs include: (1) completion of therapy for each TB patient; (2) for each case of potentially infectious TB, perform a thorough contact investigations to identify and treat possible contacts, and; (3) find and treat persons at high-risk of having latent TB infection to prevent additional cases of disease from occurring. See Appendix 5 for tuberculosis case counts by county.

FIGURE 6. Tuberculosis incidence, Montana and U.S., 1998–2009



Sexually Transmitted Diseases, including HIV/AIDS

Sexually transmitted disease (STD) cases were reported from nearly every county in 2009. Commonly reported STDs include chlamydia, gonorrhea and less commonly human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) and syphilis.

Chlamydia. Chlamydia is caused by the bacterium *Chlamydia trachomatis*, which can damage a woman's reproductive organs. Chlamydia infections are usually asymptomatic and, in women, might result in pelvic inflammatory disease (PID), a major cause of infertility, ectopic pregnancy, and chronic pelvic pain. As with other inflammatory STDs, chlamydia infection can facilitate the transmission of HIV. In addition, pregnant women infected with chlamydia can pass the infection to their infants during delivery, potentially resulting in neonatal ophthalmia and pneumonia. Because of the large burden of disease and risks associated with infection, CDC recommends annual chlamydia screening of all sexually active women aged 26 years or less.

Chlamydia is the most commonly reported notifiable disease in the U.S. and in Montana. In 2009, 2993 cases were reported in Montana from 47 counties. This case count corresponds to a rate of 309/100,000. For comparison, the most recent national rate of chlamydia infections was 401/100,000 in 2008. Since 2000, the rate of chlamydia infections in Montana has doubled (Figure 7). This might be because of increased screening, improved test sensitivity and reporting, and increased burden of disease. In 2009, the majority of chlamydia cases were diagnosed in persons aged 20–24 years (42%) and 2137 cases (71.4%) occurred in females. The 15–19 years and 20–24 years age groups had the highest incidence rates (Figure 8). This may be the result of more STD screening in these age groups compared with other age groups.

FIGURE 7. Chlamydia incidence rate, Montana, 2000–2009

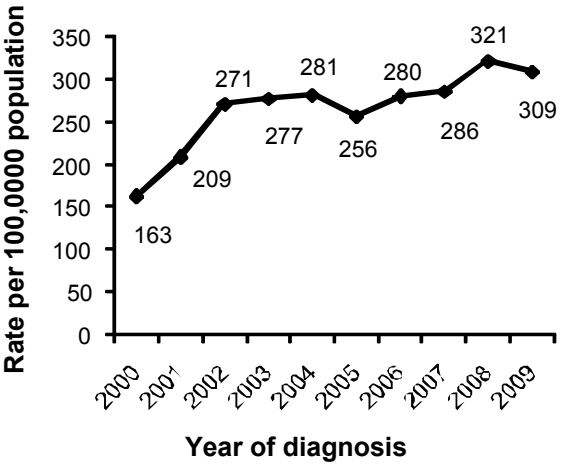
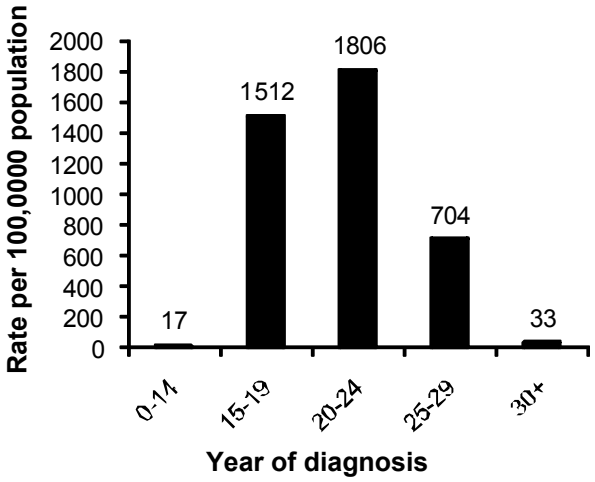
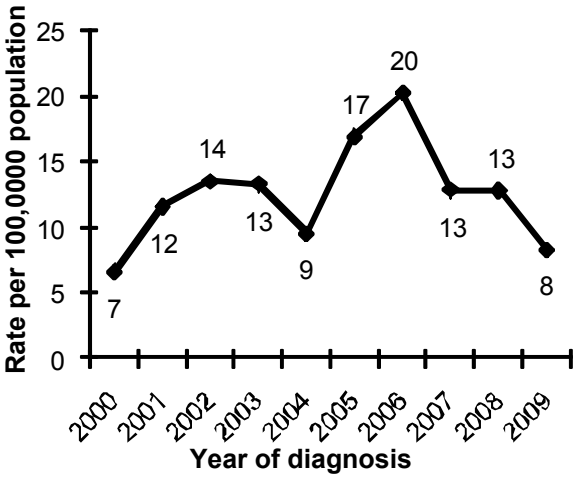


FIGURE 8. Chlamydia incidence by age group, Montana, 2009



Gonorrhea. In the U.S., *Neisseria gonorrhoeae* infections, like those resulting from *C. trachomatis*, are a major cause of PID. In addition, epidemiologic and biologic studies provide strong evidence that gonococcal infections facilitate the transmission of HIV.
In 2009, Montana reported 80 cases of gonorrhea from 19 counties. This count corresponds to a rate of 8/100,000. The latest national incidence rate available for gonorrhea was 112/100,000 in 2008. Besides a small increase in incidence in 2005 and 2006, Montana's rate of gonorrhea infections has remained between

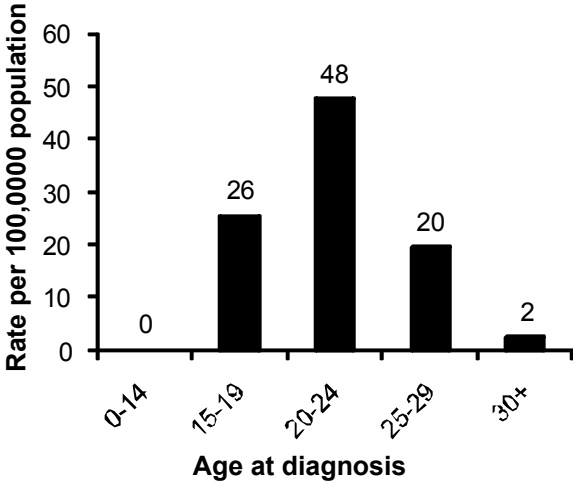
FIGURE 9. Gonorrhea incidence, Montana, 2000–2009



7–14/100,000 since 2000 (Figure 9).

In 2009, the majority of gonorrhea cases were reported among persons aged 20–24 years; the age category which also had the highest rate per population (Figure 10). As with chlamydia, this might be indicative of more screening in this age category. Of the 33 cases of gonorrhea diagnosed in the 20–24 age category, 21 (64%) occurred in females.

FIGURE 10. Gonorrhea incidence by age group, Montana, 2009

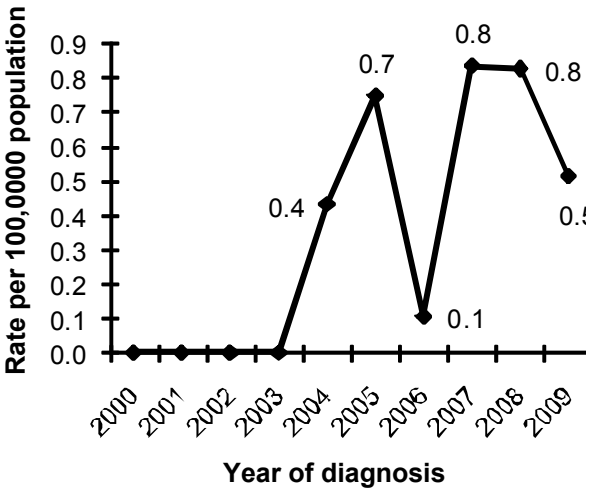


Syphilis. Syphilis is caused by the bacterium *Treponema pallidum*. It has often been called "the great imitator" because so many of the signs and symptoms of illness are indistinguishable from those of other diseases. *T. pallidum* are passed from person to person through direct contact with a syphilis sore. Infected pregnant women can transmit syphilis to the fetus. Without treatment, *T. pallidum* infection can lead to stillbirth, neonatal death, or infant disorders such as deafness, neurologic impairment, and bone deformities.

In 2009, Montana reported five cases of syphilis. All occurred during September–December in men ranging in age from 29–36 years. Four (80%) occurred in men who have sex with men (MSM) and were infected with HIV. Two (40%) cases were diagnosed at the primary stage, two (40%) at the secondary stage, and one (20%) at tertiary (neurosyphilis) stage. In 2009, Montana's rate of primary and secondary syphilis was 0.4/100,000. In the U.S. in 2008, the incidence rate for syphilis was 4.5/100,000 while Montana's was 0.8/100,000 (eight cases reported).

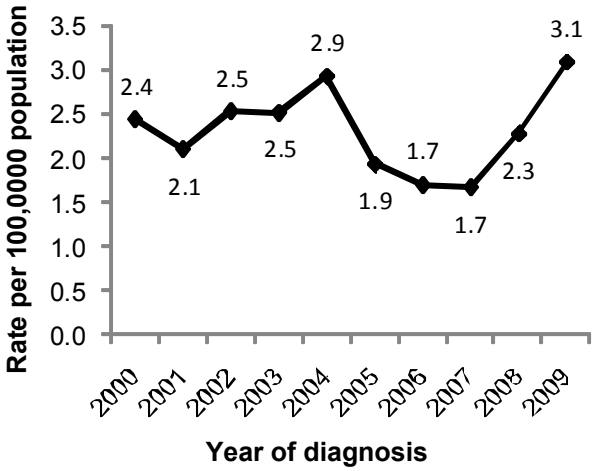
As in the U.S., the incidence rate of syphilis has increased in Montana since 2000 (Figure 11). See Appendix 6 for STD case counts by county.

FIGURE 11. Syphilis incidence, Montana, 2000–2009



HIV/AIDS. In 2009, 30 newly diagnosed cases of HIV infection were reported, an incidence rate of 3.1/100,000, compared with the incidence rate in the U.S. of 19.4/100,000 in 2008. During 2000–2009, 16–30 cases of HIV infection were reported each year (Figure 13).

FIGURE 13. Rate of newly diagnosed cases of HIV infection, Montana, 2000–2009



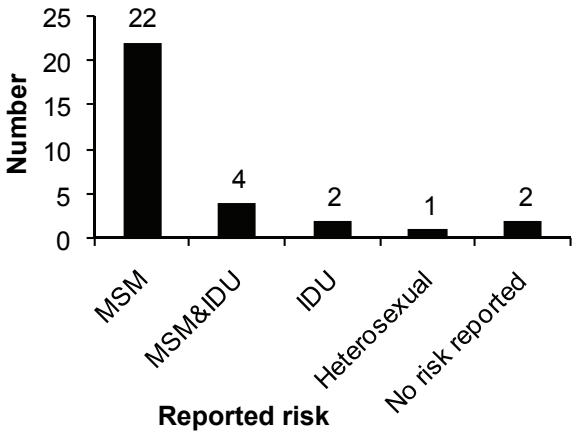
As of December 31, 2009, 435 HIV-infected persons were known to be living in Montana. Of those persons living with HIV infection (PLWH) in Montana, 281 (63%) have been diagnosed with AIDS. As a result of the reporting process, the number of PLWH may not be exact. Since 1985, among the 955 reported cases of HIV infection in Montana, approximately 60% were first diagnosed in-state. The remaining cases were diagnosed out-of-state and the person has returned or moved to Montana. Of those first diagnosed in Montana, over two-thirds resided in one of the seven most populated counties (Yellowstone, Missoula, Gallatin, Flathead, Cascade, Lewis & Clark, and Ravalli) at the time of diagnosis. Selected characteristics of the reported cases of newly diagnosed HIV infection for Montana in 2009 are depicted in Table 2.

TABLE 2. Newly diagnosed HIV cases by selected characteristics, Montana, 2009

Characteristic	2009
Number of newly diagnosed cases	30 cases
Mean age	36 years
Male	97%
Reporting race other than white	10%
Diagnosed with AIDS at time of HIV diagnosis	39%

In 2009, among males infected with HIV, MSM was the most commonly reported risk category (66%), followed by MSM/injection drug user (IDU) (13%) and IDU (10%) (Figure 14).

FIGURE 14. Number of newly diagnosed HIV cases by risk category, Montana, 2009



Additional information on HIV/AIDS in Montana, including background and historical data, can be found in the *Montana 2009 HIV/STD ANNUAL REPORT* available at the DPHHS website: *http://hivdata.hhs.mt.gov/pdf/HIV_STD_2009_Annual_Report_FINAL.pdf*.

End Notes

Communicable diseases that must be reported by diagnostic laboratories and healthcare professionals to public health authorities are specified by Montana Administrative Rules (ARM 37.114.203). However, reported cases represent only a fraction of those that might have occurred. Data are typically skewed because of factors that include underreporting, outbreaks, severity of illness, healthcare accessibility, and media coverage. While these factors place limitations on the quality of disease surveillance data, disease reporting allows state and local communicable disease epidemiologists to detect trends, distribution, and frequency of many diseases in Montana.

Acknowledgments

We would like to thank the local and tribal health departments, Indian Health Service, laboratories and clinicians for providing disease case reports and clinical samples during 2009.

Resources and Core References

Control of Communicable Diseases Manual, 19th Ed., 2008
www.apha.org – Bookstore
The Red Book – Pediatric Infectious Diseases
www.aap.org – Bookstore
The Pink Book – Epidemiology and Prevention of Vaccine Preventable Diseases
http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

CDC Surveillance Case Definitions
http://www.cdc.gov/ncphi/disss/nndss/casedef/case_definitions.htm
Manual for the Surveillance of Vaccine Preventable Diseases
http://www.cdc.gov/vaccines/pubs/surv-manual/

List of Reportable Conditions in Montana

Report Conditions Immediately

Report suspected or confirmed cases by faxing or calling your local health jurisdiciton

- AIDS / HIV Infection[1]
- Amebiasis
- ☎Anthrax[1]
- ☎Botulism (including infant botulism)[1]
- Brucellosis[1]
- Campylobacter enteritis
- Chancroid
- Chickenpox (varicella)
- Chlamydia genital infection
- Cholera[1]
- Colorado Tick Fever
- Cryptosporidiosis
- Cytomegaloviral illness
- Diarrheal disease outbreak[1]
- ☎Diphtheria[1]
- *E. coli* enteritis, e.g., *E. coli* O157:H7
- Encephalitis
- Gastroenteritis epidemic, foodborne illness
- Giardiasis
- Gonococcal infection
- *Granuloma inguinale*
- *Haemophilus influenza* B invasive disease
- Hansen's disease (leprosy)
- Hantavirus Pulmonary Syndrome[1]
- Hemolytic Uremic Syndrome
- Hepatitis A, B and C (acute & chronic)
- Influenza[2]
- Kawasaki disease
- Lead poisoning (≥10 ug/dl)
- Legionellosis
- Listeriosis
- Lyme disease
- *Lymphogranuloma venereum*
- Malaria
- ☎Measles (rubeola)[1]
- Meningitis, bacterial or viral
- Mumps
- Poliomyelitis[1]
- Q-fever
- ☎Rabies or suspected human exposure[1]
- Reye's Syndrome
- Rocky Mountain Spotted Fever
- Rubella(including congenital)[1]
- Salmonellosis
- ☎Severe Acute Respiratory Syndrome (SARS)[1]
- Shigellosis
- Smallpox[1]
- *Streptococcus pneumoniae* invasive disease
- Syphilis[1]
- Tetanus
- Tick-borne relapsing fever
- Transmissible Spongiform Encephalopathies (e.g., Creutzfeldt-Jakob Disease)
- Trichinosis[1]
- Tuberculosis[1]
- ☎Tularemia
- ☎Typhoid Fever[1]
- Viral Hemorrhagic Fever
- Yellow Fever
- Yersiniosis

Illness in a foreign traveler
Any unusual illness or cluster of illnesses

☎Immediate by phone

1. Lab specimen to DPHHS for confirmation

2. Lab specimen to DPHHS first part of season

Contact Phone Numbers for Communicable Disease Reporting to Montana Local Health Jurisdictions

County Public Health Departments

BEAVERHEAD	683-4771
BIG HORN	665-8720
BLAINE	357-2345
BROADWATER	266-5209 x4
CARBON	446-9941
CARTER	775-8738
CASCADE	791-9269
CHOUTEAU	622-3771
CUSTER	874-3377
DANIELS	783-5366
DAWSON	377-5213
DEER LODGE	563-7863
FALLON	778-2824
FERGUS	535-3983
FLATHEAD	751-8108
GALLATIN	582-3146
GARFIELD	557-2050
GLACIER	873-2924
GOLDEN VALLEY	535-3983
GRANITE	288-0330
HILL	265-5481 x266
JEFFERSON	225-4007
JUDITH BASIN	535-3983
LAKE	883-7291
LEWIS & CLARK	457-8945
LIBERTY	759-5517
LINCOLN	293-4121
MCCONE	485-2444
MADISON	843-4295
MEAGHER	547-3234
MINERAL	822-3564
MISSOULA	258-3896
MUSSELSHELL	535-7466
PARK	222-4140
PETROLEUM	538-7466
PHILLIPS	654-2521
PONDERA	271-3247
POWDER RIVER	436-2297
POWELL	846-2420
PRAIRIE	635-2020
RAVALLI	375-6675
RICHLAND	433-2207
ROOSEVELT	653-6227
ROSEBUD	346-2156
SANDERS	827-6925
SHERIDAN	765-3410
SILVER BOW	497-5084
STILLWATER	322-5316 x245
SWEET GRASS	932-5449
TETON	466-2562
TOOLE	424-5169
TREASURE	342-5886
VALLEY	228-6261
WHEATLAND	538-7466
WIBAUX	796-2485
YELLOWSTONE	247-3357

IHS Public Health Nursing

BLACKFEET	338-6194
CROW	638-3479
FORT PECK	
POPLAR	768-2113
WOLF POINT	653-1641

Tribal Public Health Nursing

FLATHEAD	745-3525
FORT BELKNAP	353-3155
NORTHERN CHEYENNE	477-4465
ROCKY BOYS	395-4486

Montana Communicable Disease Epidemiology Program Staff

Bonnie Barnard, MPH, CIC
Epidemiologist 406.444.0274 bbarnard@mt.gov

Jennifer Lowell, PhD
Epidemiologist 406.444.4735 jlowell@mt.gov

Allison Bishop, MPH, BSN
Epidemiologist 406.444.3049 aabishop@mt.gov

Elton Mosher
Surveillance Specialist 406.444.3165 emosher@mt.gov

Denise Ingman
Tuberculosis Program Manager 406.444.0275 dingman@mt.gov

Lydia Bloom
Administrative Assistant 406.444.0273 lbloom@mt.gov

Jim Murphy
Bureau Chief 406.444.4016 jmurphy@mt.gov

Steven Helgerson, MD, MPH
Acting State Epidemiologist 406.444.1216 shelgerson@mt.gov

Cover Photograph:

This negative-stained transmission electron micrograph (TEM) depicts the ultrastructural details of an influenza virus particle, or "virion". A member of the taxonomic family *Orthomyxoviridae*, the influenza virus is a single-stranded RNA organism. This photo wsa borrowed from the CDC Public Health Image Library (PHIL) at http://phil.cdc.gov/Phil/details.asp

APPENDIX 1. Vaccine preventable disease case counts, by county, 2009

County	*Haemophilus influenzae*	Meningococcal disease	*Streptococcus pneumoniae*	Varicella	Pertussis	Meningitis Bacterial*	Meningitis Viral*	Meningitis Aseptic†
Beaverhead				8	1			
Big Horn/Crow				1	3		1	
Blaine			1					
Broadwater			1	1		1		
Cascade		2		2	1			
Chouteau				1				
Custer				6				
Daniels				1				
Dawson			1		1			
Fallon				3				
Fergus				1				
Flathead			1	29	7			3
Gallatin		2		20	9		2	3
Garfield					1			
Granite				6				
Hill/Rocky Boys		1	2	6				
Jefferson			1	3				
Judith Basin				2				
Lake/CSK			2	1			1	
Lewis and Clark	1		9	12	8			
Lincoln			1	1				
Missoula		1	1	1	3	1		
Musselshell					1			
Park				1	2			
Pondera			1	4				
Ravalli			1	2	4			
Richland				12				
Roosevelt/Ft. Peck				4				
Rosebud/N. Chey					1			
Sanders				9				

*Some bacterial and viral infections that cause meningitis are not vaccine preventable.

†Aseptic meningitis indicates no infectious agent was identified

APPENDIX 1. (*Continued*) Vaccine preventable disease case counts, by county, 2009

County	*Haemophilus influenzae*	Meningococcal disease	*Streptococcus pneumoniae*	Varicella	Pertussis	Meningitis Bacterial*	Meningitis Viral*	MeningitisAseptic†
Silver Bow	1		1				1	
Stillwater					1			
Sweet Grass				1				
Teton				19				
Toole				1				
Valley				2				
Yellowstone			1	4	18		2	2
Total	2	6	24	164	61	2	7	8

*Some bacterial and viral infections that cause meningitis are not vaccine preventable.

†Aseptic meningitis indicates no infectious agent was identified

APPENDIX 2. Acute viral hepatitis A, B, and C and chronic hepatitis C case counts, by county, 2009

County	A	B	C	
			Acute	Chronic
Beaverhead				4
Big Horn/Crow				13
Blaine				7
Broadwater				1
Carbon				4
Carter				1
Cascade				72
Custer				5
Dawson				10
Fergus				5
Flathead				40
Gallatin	2			63
Glacier				17
Hill/Rocky Boys				11
Judith Basin				1
Lake/CSK				29
Lewis and Clark				53
Lincoln				1
Missoula				64
Musselshell				1
Park	1			13
Pondera				2
Ravalli				17
Richland				3
Roosevelt/Ft. Peck	1			45
Rosebud/N. Cheyenne				10
Sanders				2
Silver Bow				22
Stillwater		1		
Sweet Grass				1
Teton				1
Toole				1
Valley				3
Yellowstone	2		1	178
Total	6	1	1	706

APPENDIX 3. Diarrheal disease case counts, by county, 2009

County	Campylobacteriosis	Cryptosporidiosis	Giardiasis	Salmonellosis	Shigellosis	STEC*	Typhoid fever	Yersiniosis
Beaverhead				3				
Big Horn/Crow	1		3	1				
Blaine	2							
Broadwater							1	
Carbon	2		2	1				
Cascade	11		3	10				
Chouteau	2		2					
Custer	3		2	5				
Daniels			1					
Dawson	1	1						
Deer Lodge			3			1		
Fallon								
Fergus	5		4	1		1		
Flathead	11	19	6	6	5	4		2
Gallatin	32	18	21	18		1		
Garfield	1							
Glacier	1		1					
Golden Valley	1							
Granite	1		1					
Hill	1		3	4	1	1		
Jefferson	1		1					
Judith Basin								
Lake/C SKT	4	4	7	3				
Lewis and Clark	14		5	12		6		
Lincoln		3	1	3				
Madison	1							
McCone	1							
Mineral			2					
Missoula	25	6	37	12	5	12		1
Musselshell								
Park	1	4	2					
Phillips								

*STEC: Shiga toxin-producing *Escherichia coli*, including O157:H7

APPENDIX 3 (*Continued*). Diarrheal disease case counts by county, 2009

County	Campylobacteriosis	Cryptosporidiosis	Giardiasis	Salmonellosis	Shigellosis	STEC*	Typhoid fever	Yersiniosis
Pondera	1							
Powder River	1							
Powell	1		4	1		1		
Ravalli	7	1	6	5		1		
Richland	1							
Roosevelt/Ft. Peck	2		3			1		
Rosebud/N. Cheyenne				3				
Sanders		1	1					
Sheridan			1					
Silver Bow	3		2	1		1		
Stillwater	4		1	3				
Sweet Grass	3							
Teton	1						1	
Toole				3		1		
Wheatland	1							
Wibaux								
Yellowstone	14	1	11	13		4		
Total	164	58	136	110	11	35	1	3

*STEC: Shiga toxin-producing *Escherichia coli*, including O157:H7

APPENDIX 4. Zoonotic and vector-borne disease case counts, by county, 2009

County	Animal Rabies	Colorado tick fever	Jamestown Canyon virus	Lyme disease	Rocky Mountain spotted fever	West Nile virus	Q fever
Big Horn/Crow					2		
Dawson	2						
Fallon			1				
Fergus	1						
Flathead	3			1			
Gallatin				1	1		
Garfield						1	
Golden Valley							1
Hill/Rocky Boys	1						
Lake						1	
Lewis and Clark	1						
Lincoln	1						
Madison				1			
Mineral	1						
Missoula	2	1			1		
Powell							
Ravalli	1				1		
Rosebud/N. Cheyenne					1		
Sanders					2	3	
Sweet Grass	4						
Valley					1		
Yellowstone	8				1		
Total	25	1	1	3	10	5	1

APPENDIX 5. Tuberculosis case counts, by county, 2009

	Tuberculosis
Big Horn/Crow	1
Blaine/Ft Belknap	1
Broadwater	1
Gallatin	2
Lewis & Clark	1
Park	1
Silver Bow	1
Total	8

APPENDIX 6. Sexually transmitted disease case counts, by county, 2009

	Chlamydia	Gonorrhea	Syphilis	HIV
Beaverhead	20			
Big Horn	128			1
Blaine	33	1		
Broadwater	3			
Carbon	10			1
Carter	1			
Cascade	309	4		
Chouteau	4			
Custer	31	6		
Daniels	1			
Dawson	13	2		
Deer Lodge	26	1		
Fallon	5			
Fergus	24			
Flathead	178	9	1	3
Gallatin	243	4		3
Glacier	139			
Hill	163	5		
Jefferson	19			
Lake	160	2		1
Lewis And Clark	165	3		3
Liberty	2			
Lincoln	26			
Madison	7	1		
McCone	3	1		
Meagher	1			
Mineral	4			
Missoula	429	10	2	9
Musselshell	7			
Park	10			
Phillips	1			
Pondera	5			
Powell	11			
Ravalli	49	1		1
Richland	18	1		
Roosevelt	133			
Rosebud	50	1		
Sanders	15			
Sheridan	2			
Silver Bow	80	5		1
Stillwater	6			
Sweet Grass	5			
Teton	2			
Toole	3			
Valley	16	1		
Wheatland	1			
Yellowstone	66	22	2	7
Total	2993	80	5	30