

2012 Montana Pertussis Summary

This report was prepared by the Communicable Disease Epidemiology section (CDEpi) at the Montana Department of Health and Human Services (DPHHS). Data in this report reflect events through December 31, 2012 that were reported to DPHHS as of March 1, 2013. Communicable disease data are maintained by the Montana Infectious Disease Information System (MIDIS). Please contact CDEpi at 406-444-0273 or hhsepi@mt.gov with questions or comments.

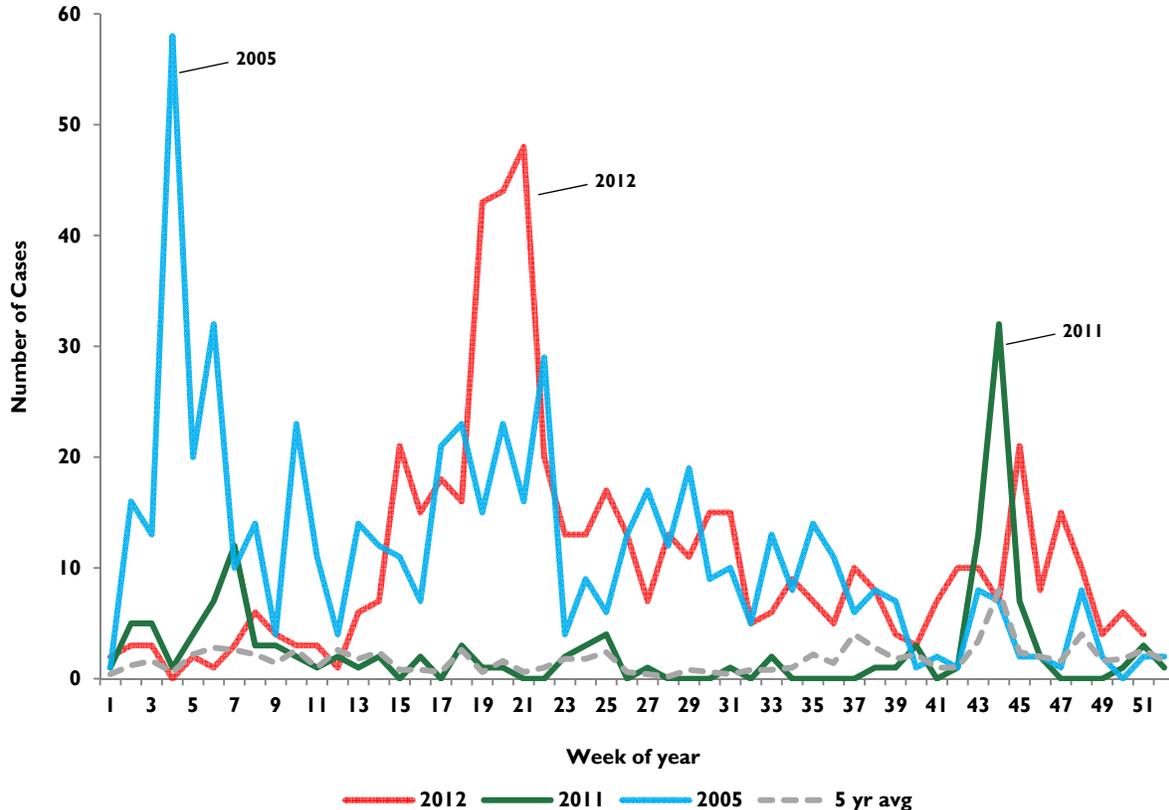
In 2012, 549 cases of pertussis were reported to DPHHS, compared with 134 cases in 2011. This is the highest number of pertussis cases since 2005 when 586 cases were reported (Figure 1). The overall incidence rate in 2012 was 55.0 per 100,000 Montana residents compared with a provisional rate of 13.4 per 100,000 in the United States.

Case counts increased in early April and continued above baseline for the remainder of the year. Among the 29 counties reporting cases of pertussis in 2012, the number of cases ranged from 1 to 138 with incidence rates ranging from 5.8 to 328.4 per 100,000 population (Table 1).

Of the 549 cases, 51% were female. Sixty-one percent of pertussis cases occurred among children aged 5–17 years (Figure 3). Thirty-three infants less than one year of age were reported as having pertussis and six were hospitalized. All of the hospitalized infants were less than three months of age. There were no reported deaths due to pertussis in 2012.

Several pertussis outbreaks were reported in tribal jurisdictions in Montana as well. Of the cases with a documented status for race (n=524), 17% were identified as Native American; only 6.4% of the Montana population is classified as Native American.¹

Figure 1. Reported pertussis cases by week: Montana, selected years



Pertussis cases were reported in 29 counties across Montana in 2012 (Figure 2). The map below represents case counts by county. In addition, each county is shaded according to the incidence of disease (per 100,000 population).

Figure 2. Number and incidence of reported cases of pertussis by county of residence, Montana 2012

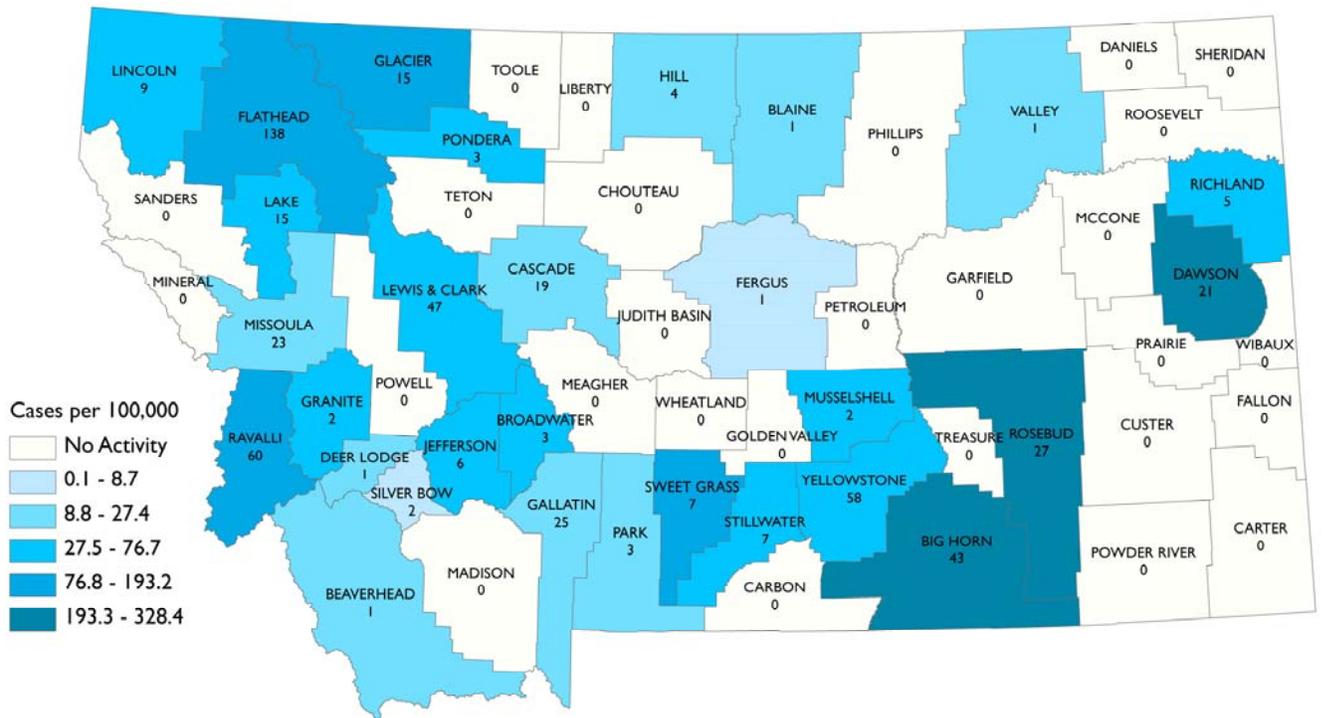
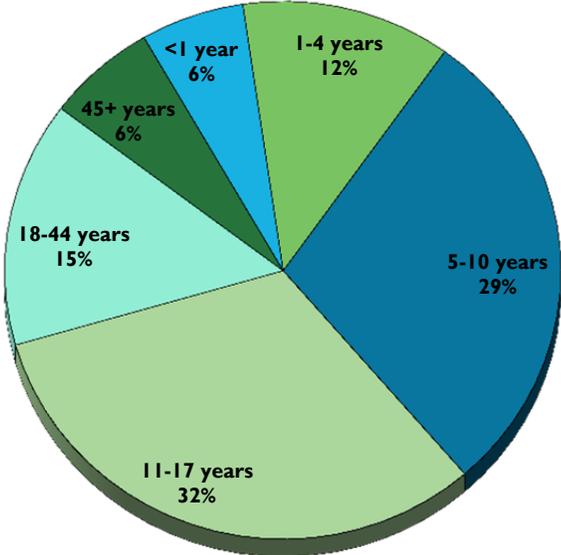


Table 1. Reported pertussis cases by county, Montana 2012

County	Case Count	Population ²	Incidence per 100,000
BEAVERHEAD	1	9,198	10.9
BIG HORN	43	13,093	328.4
BLAINE	1	6,565	15.2
BROADWATER	3	5,752	52.2
CASCADE	19	81,837	23.2
DAWSON	21	8,989	233.6
DEER LODGE	1	9,299	10.8
FERGUS	1	11,506	8.7
FLATHEAD	138	91,301	151.1
GALLATIN	25	91,377	27.4
GLACIER	15	13,624	110.1
GRANITE	2	3,068	65.2
HILL	4	16,397	24.4
JEFFERSON	6	11,381	52.7
LAKE	15	28,947	51.8
LEWIS & CLARK	47	64,318	73.1
LINCOLN	9	19,566	46.0
MISSOULA	23	110,138	20.9
MUSSELSHELL	2	4,701	42.5
PARK	3	15,469	19.4
PONDERA	3	6,257	47.9
RAVALLI	60	40,450	148.3
RICHLAND	5	10,128	49.4
ROSEBUD	27	9,379	287.9
SILVER BOW	2	34,233	5.8
STILLWATER	7	9,131	76.7
SWEET GRASS	7	3,623	193.2
VALLEY	1	7,487	13.4
YELLOWSTONE	58	150,069	38.6
STATE	549	998,199	55.0

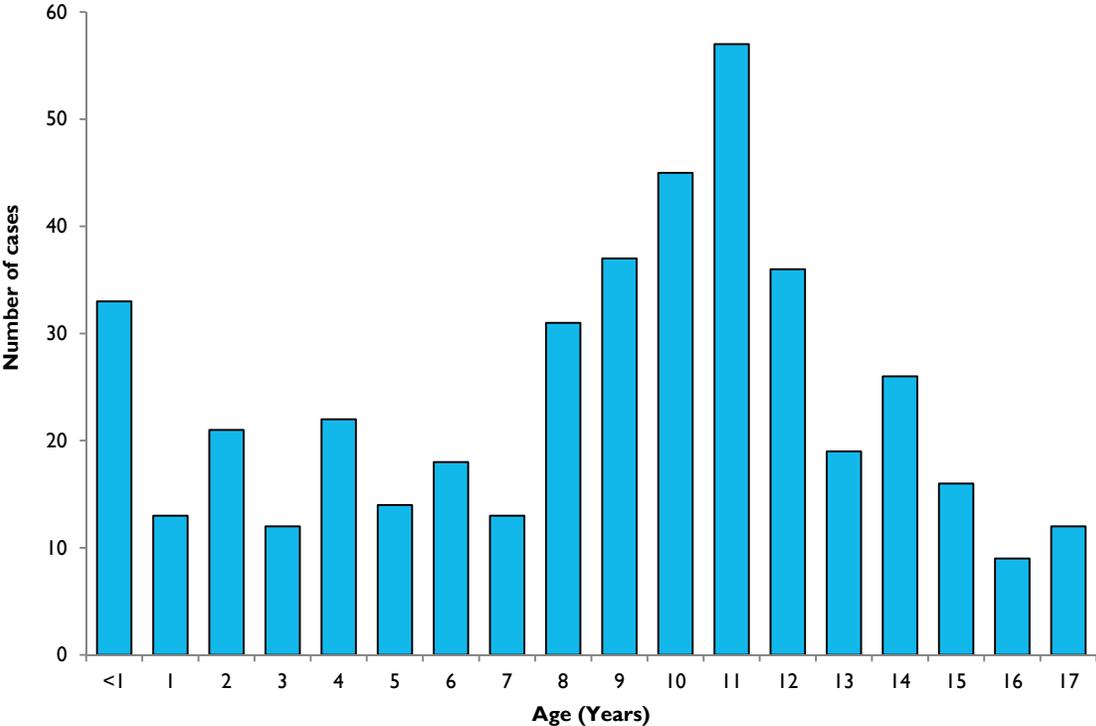
The majority of pertussis cases occurred among school-aged children. Sixty-one percent of cases were between 5–17 years of age at diagnosis (Figure 3). Less than one quarter of cases (21%) were in adults 18 years of age and older; 35(6%) cases were in adults greater than 45 years.

Figure 3. Reported pertussis cases by age group. Montana, 2012



Further analyses of pediatric cases (aged 0–17 years) determined that approximately one quarter of these cases were between ages 11 to 12 years (Figure 4).

Figure 4. Distribution of pediatric pertussis cases by year of age, Montana 2012



Immunization records for 421 pediatric cases eligible by age for pertussis-containing vaccine (aged 2 months – 17 years) were assessed for vaccination status per the Advisory Committee on Immunization Practices (ACIP) Recommendations (Table 2, Figure 5).³ Overall, 68(16%) cases eligible by age had not received any doses of pertussis-containing vaccine. Of these, the greatest percentage of unvaccinated cases (36%) occurred among children aged 4–6 years. In addition, 134(32%) of cases in all age groups had not received the total recommended number of doses of pertussis-containing vaccine appropriate for age.

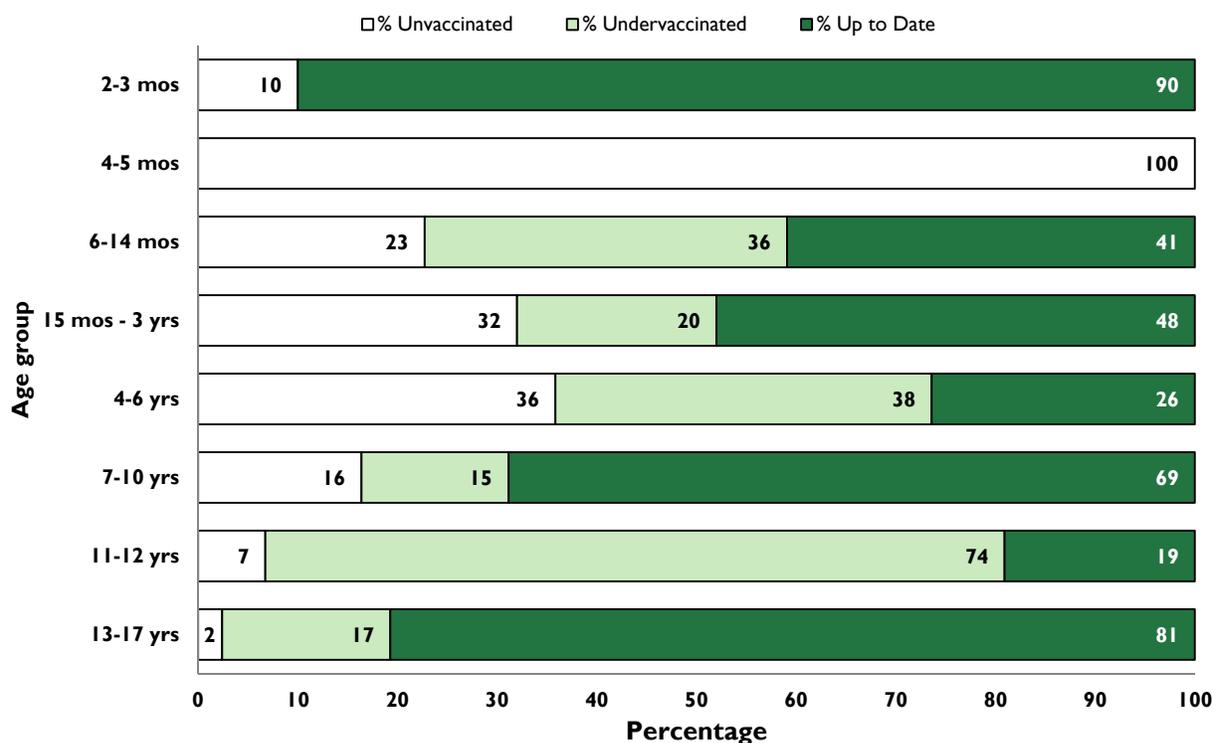
ACIP recommends the administration of tetanus, diphtheria, acellular pertussis vaccine (Tdap) at age 11–12 years. In this age group, which includes 21% of all pediatric cases, only 19% had received a Tdap before diagnosis (Figure 4). Cases that were in the 13–17 year age group had a higher percentage of Tdap vaccination (81%). The increased incidence of disease in this age group suggests a waning immunity in the years following Tdap administration; however, this and other potential factors are currently being evaluated at the national level (discussed below).⁴

Table 2. Vaccination history of pertussis cases* aged 2 months –17 years, Montana, 2012

Age/ACIP doses [†]	Case count	Unvaccinated	Incomplete [‡]	Complete
2-3 months/1 dose	10	1	0	9
4-5 months/2 doses	2	2	0	0
6-14 months/3 doses	22	5	8	9
15 months - 3 years/4 doses	40	13	8	19
4-6 years/5 doses	53	19	20	14
7-10 years/5 doses	122	20	18	84
11-12 years/6 doses	89	6	66	17
13-17 years/6 doses	83	2	14	67

*Vaccination records were not available for 10 of the 435 pediatric (aged 0-17years) cases. In addition, 4 cases were underage for pertussis vaccine and not included in this table. [†]Number of doses per the ACIP recommendations for pertussis-containing vaccine. [‡]Under vaccinated.

Figure 5. Vaccination history of pertussis cases aged 2 months – 17 years, Montana 2012



In 2012, Montana reported the largest number of pertussis cases since 2005 with an incidence rate considerably higher than that of the United States. Factors contributing to the increased incidence in the U.S. are currently being evaluated and several potential factors have been identified. These include increased awareness of the disease, improved diagnostic testing, enhanced surveillance and case reporting, waning immunity of the diphtheria, tetanus, acellular pertussis vaccine (DTaP), and possibly, genetic changes in circulating strains of the bacteria.⁵

As indicated in Figure 5, approximately 50% of Montana's 2012 pediatric cases were considered "up-to-date": vaccinated in accordance with current ACIP recommendations. However, the estimated efficacy of pertussis-containing vaccines is approximately 80–90%. As a result, for every 100 individuals vaccinated, 10–20 will not produce an adequate immune response and therefore remain susceptible to disease. Recent evidence suggests that the efficacy of DTaP decreases in children in the years following the last dose of pertussis-containing vaccine; by five years after the last dose, only 70% of children are fully protected against the disease.⁴ Additional evidence suggests a greater waning of immunity in those who received the acellular pertussis vaccine (DTaP) compared with those who received whole-cell pertussis vaccine (DTP). The transition from DTP to DTaP occurred in mid-1990s. These factors may have contributed to the increased incidence in cases observed in the 13–17 year age group in 2012.

Tdap efficacy in adults is estimated to be approximately 70% (the evaluation is ongoing as the vaccine was not licensed for use in adults until 2005). It is also estimated that fewer than 10% of adults have received a Tdap.⁶

Vaccination remains the best measure to protect against pertussis. It is important to protect those who are most vulnerable to the disease and its complications, especially newborns. CDC and DPHHS recommend that all pregnant women receive a single dose of Tdap during each pregnancy and that everyone around an infant be adequately immunized. This recommendation includes all household members, caretakers, and grandparents. In addition, children should be vaccinated on time and according to schedule, and those who are incomplete should be brought up to date per the ACIP recommendations. Last, Tdap should be considered for those aged 11 years and older to meet state requirements for seventh-grade entry.

Additional information regarding pertussis is available at the DPHHS website:
<http://www.dphhs.mt.gov/publichealth/immunization/pertussis.shtml>

References:

¹U.S. Census Bureau: State and County QuickFacts. (2011) Available at: <http://quickfacts.census.gov/qfd/states/30000.html>

²National Center for Health Statistics <http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm>

³Centers for Disease Control and Prevention (CDC). (1997) Pertussis Vaccination: Use of Acellular Pertussis Vaccines Among Infants and Young Children Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 46(RR-7). Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/00048610.htm>

⁴Klein, NP, Bartlett, J, Rowhani-Rahbar, A, Fireman, B, Baxter, R. (2012) Waning Protection after Fifth Dose of Acellular Pertussis Vaccine in Children. *New England Journal of Medicine* 367:1012-1019. Available at: <http://www.nejm.org/doi/full/10.1056/NEJMoa1200850#t=article>

⁵Cherry, JD. (2012) Epidemic Pertussis in 2012 – The Resurgence of a Vaccine-Preventable Disease. *New England Journal of Medicine* 367:785-787. Available at: <http://www.nejm.org/doi/full/10.1056/NEJMp1209051>

⁶CDC (2013) Pertussis (Whooping Cough). Available at: <http://www.cdc.gov/pertussis/vaccines.html#vaccination-coverage>