# 2018-2019 School Immunization Assessment Results

## Introduction

The annual school immunization assessment is conducted by the Montana Immunization Program each fall to evaluate compliance with state immunization requirements outlined in Montana Code Annotated (MCA) 20-5-403. Administrative Rules of Montana (ARM) 37.114.720 require all public and private schools' governing authority or designee to submit the immunization status of all enrolled students to state and local public health authorities. Results from this survey are used to measure vaccination coverage among children enrolled in Montana schools and to identify areas where children may be under immunized.

School vaccination requirements are important for maintaining high levels of immunization and reducing the occurrence of vaccine preventable diseases among school-aged children. In addition to protecting children who are immunized, vaccinations are necessary to protect children and staff who are unable to receive vaccination for medical reasons. At the discretion of the local health department, children who are not vaccinated may be excluded from child care, school, sporting events, or other organized activities during disease outbreaks or because of illness.

The School Immunization Assessment documents immunization coverage for vaccines required for school entry by ARM 37.114.705 including: Diphtheria, Tetanus, Pertussis (DTaP/DTP/Tdap/DT/Td), Polio (IPV), Measles, Mumps, Rubella (MMR) and Varicella (VAR). The number of students without immunization records and the number of students reporting medical or religious exemptions from vaccination are also collected.

Medical or religious exemptions may be submitted in lieu of the required immunization per MCA 20-5-405 for students enrolled in preschool through 12th grade. Medical exemptions may be granted if a child has medical condition that is a contraindication to receiving the required vaccine. The medical exemption form must be signed by a Doctor of Medicine (MD) or a Doctor of Osteopathy (DO) or Advanced Practice Registered Nurse (APRN) licensed in Montana and includes a designated expiration date for the exemption. Religious exemptions require a parent, guardian, or an emancipated minor to complete and sign a religious exemption form in the presence of a notary, stating a religious objection to one or more vaccines, allowing the child to be exempted from vaccine requirements. Religious exemptions must be completed each academic year.

The majority of required vaccines includes multiple doses. For students who have received at least one dose of a required vaccine, ARM 37.114.710 allows conditional school enrollment if the student continues to receive the remaining vaccine doses on a defined schedule. Subsequently, school staff are required to monitor the progress of conditionally enrolled students until they are fully vaccinated.

## Methods

The purpose of this report is to describe school vaccination coverage levels among students enrolled in public and private schools in Montana during the 2018–2019 school year. An updated list of all accredited active schools registered with the Montana Office of Public Instruction (OPI) was compiled in August 2018. Additional preschools and private schools not registered with OPI were confirmed by local health jurisdiction contacts and notified via mail. Reminders to comply with ARM 37.114.720 were mailed directly to all schools in early October 2018 informing them to complete the school immunization assessment on or before December 1, 2018. Survey respondents were typically school nurses or other school administrators with access to student immunization records. Each school had the option to directly enter their results into an online database or fax a report to DPHHS to enter the results. Results were compiled and reviewed for completeness. Individual respondents were contacted regarding inconsistent data or information requiring clarification.

School vaccination requirements for the 2018–2019 academic year included: 4 doses of DTaP/DTP; 3 doses of IPV; 2 doses of MMR; 2 doses of varicella and a Tdap booster for students in 7$^{th}$ grade and above. Students in preschool were required to have: 4 doses of DTaP/DTP; 3 doses of IPV; 1 dose of MMR; 1 dose of varicella and at least 1 dose of *Haemophilus influenzae* type b (Hib). A verified history of chickenpox was also included as a measure of compliance for varicella.

The assessment collected cross-sectional data at a single point in time so changes in vaccination coverage after initial submission of the survey were not captured.

## Results

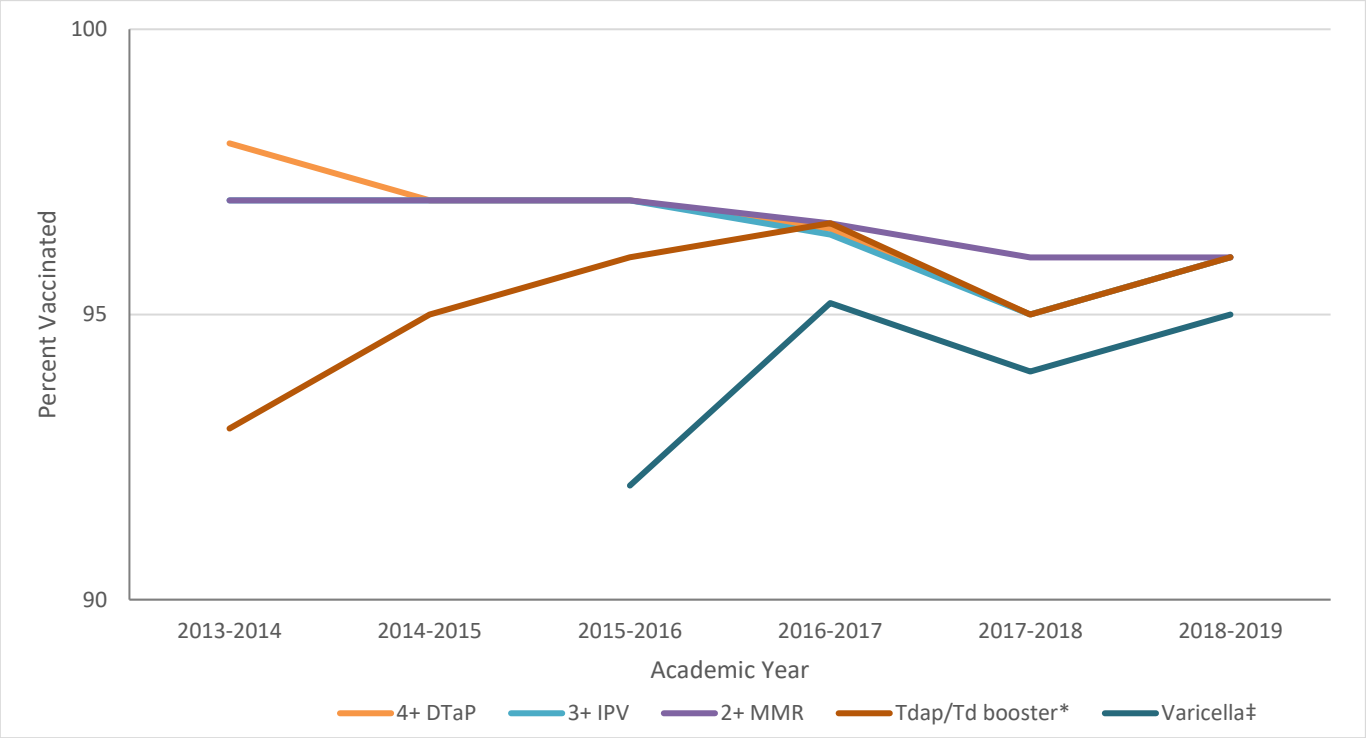
A total of 845 of 860 public preK-12$^{th}$ grade schools (98.3%) submitted an immunization survey. Of the 166 private schools serving preK-12$^{th}$ grade students that were identified, 142 (85.5%) submitted a school immunization survey (Table 1).

**Table 1.** Number and percent of public and private schools submitting the School Immunization Survey, Montana 2018–2019 academic year.

| Type | Number Reported | Did not Report | Total | Percent Reported |
|---|---|---|---|---|
| Public | 845 | 15 | 860 | 98.3 |
| Private | 142 | 24 | 166 | 85.5 |

Over the past six academic years, statewide vaccination rates for DTaP, IPV and MMR have remained above 90%. The statewide Tdap/Td booster vaccination rate has increased from a low of 72% in 2011–2012 to a high of 96.6% in 2016–2017 (Figure 1). The varicella compliance rate includes those students reported as having verification of history of disease.

**Figure 1.** Vaccination coverage rates among public and private school students enrolled in kindergarten–12th grade by antigen and academic year, Montana 2013-2014 to 2018–2019 academic years. Note the "Percentage Vaccinated" axis starts at 90%.




*For the 2015-2016 academic year forward, only students who received the Tdap vaccination are counted as compliant. In previous years, students with Tdap or Td booster were counted as compliant.
‡Varicella was added to school vaccination requirements beginning in the 2015-2016 academic year. The rate includes those reported as having a verified history of disease.
Abbreviations: DTaP =diphtheria, tetanus toxoid, and acellular pertussis vaccine; IPV = inactivated poliovirus vaccine; MMR = measles, mumps, and rubella vaccine; Td = tetanus and diphtheria vaccine; Tdap = tetanus toxoid, diphtheria, and acellular pertussis for 7-12th grades.

During the 2018–2019 academic year, 95.1% of students in prekindergarten through 12th grade received the varicella vaccine or had a verified report of history of disease. The lowest percentage (92.9%) of varicella vaccination/disease history was among prekindergarten students (Table 2).

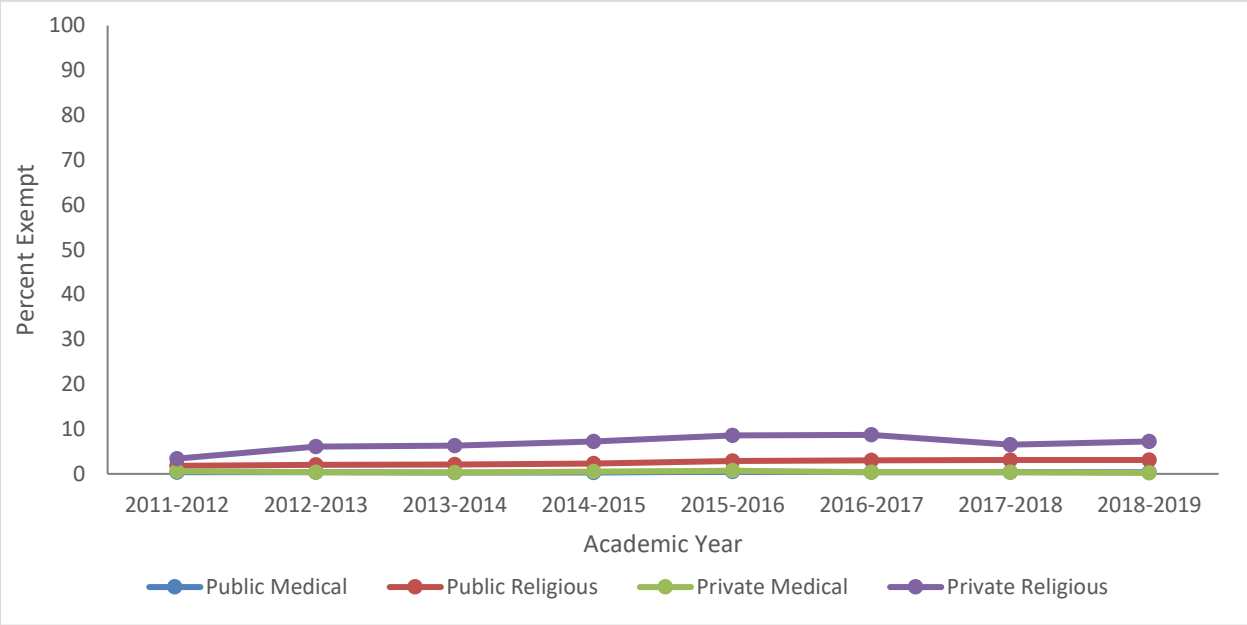
**Table 2.** Vaccination coverage percent by grade and antigen among public and private school students, Montana, 2018–2019 academic year.

| Grade | No. students | Conditional Exemptions (%) | Medical Exemptions (%) | Religious Exemptions (%) | 1 Dose Hib (%) * | 1 or 2 doses Varicella (%) ‡ | 2+ doses MMR (%) | 3+ doses IPV (%) | 4+ doses DTaP (%) | 1+ dose Tdap (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Pre-K under 59 months | 4,039* | 62 (1.9) | 9 (0.2) | 138 (4.2) | 3736 (92.5) | 4,754 (92.9) | 4,785 (93.3) | 4,924 (93.7) | 4,866 (93.0) | |
| Pre-K 59 months+ | 5,380 | | | | | | | | | |
| K | 12,480 | 238 (.5) | 27 (0.4) | 529 (3.4) | | 11,588 (95.4) | 11,683 (96.1) | 11,698 (96.0) | 11,607 (95.6) | |
| 1 | 12,088 | 60 (0.5) | 27 (0.2) | 482 (4.0) | | 11,481 (95.0) | 11,515 (95.3) | 11,531 (95.4) | 11,459 (94.8) | |
| 2 | 12,007 | 31 (0.3) | 35 (0.3) | 409 (3.4) | | 11,506 (95.8) | 11,534 (96.1) | 11,526 (96.0) | 11,455 (95.4) | |
| 3 | 11,878 | 37 (0.3) | 35 (0.3) | 429 (3.6) | | 11,353 (95.6) | 11,391 (95.9) | 11,378 (96.0) | 11,305 (95.2) | |
| 4 | 12,257 | 45 (0.4) | 39 (0.3) | 426 (3.5) | | 11,752 (95.9) | 11,823 (96.5) | 11,792 (96.2) | 11,716 (95.6) | |
| 5 | 12,714 | 55 (0.4) | 47 (0.4) | 423 (3.3) | | 12,143 (95.5) | 12,242 (96.3) | 12,213 (96.1) | 12,129 (95.4) | |
| 6 | 12,386 | 43 (0.3) | 51 (0.4) | 355 (2.9) | | 11,936 (96.4) | 12,008 (96.9) | 11,996 (96.9) | 11,982 (96.7) | |
| 7 | 12,470 | 77 (0.6) | 54 (0.4) | 450 (3.6) | | 12,008 (96.3) | 12,081 (96.9) | 12,070 (96.8) | 12,067 (96.8) | 11,679 (93.7) |
| 8 | 11,727 | 37 (0.3) | 65 (0.6) | 380 (3.2) | | 11,304 (96.4) | 11,385 (97.1) | 11,382 (97.1) | 11,368 (96.9) | 11,211 (95.6) |
| 9 | 11,839 | 20 (0.2) | 47 (0.4) | 388 (3.3) | | 11,359 (95.9) | 11,485 (97.0) | 11,470 (96.9) | 11,444 (96.7) | 11,343 (95.8) |
| 10 | 11,314 | 18 (0.2) | 57 (0.5) | 341 (3.0) | | 10,857 (96.0) | 10,957 (96.8) | 10,885 (96.2) | 10,861 (96.0) | 10,881 (96.2) |
| 11 | 10,595 | 22 (0.2) | 61 (0.6) | 309 (2.9) | | 10,154 (95.8) | 10,312 (97.3) | 10,257 (96.8) | 10,229 (96.5) | 10,218 (96.4) |
| 12 | 9,912 | 13 (0.1) | 73 (0.7) | 293 (3.0) | | 9,481 (95.7) | 9,707 (97.9) | 9,640 (97.3) | 9,622 (97.1) | 9,630 (97.2) |

*Students in Pre-K are required to have at least on dose of Hib vaccine administered on or after their first birthday, unless the student is older than 59 months.
**Tdap = tetanus toxoid, diphtheria, and acellular pertussis for 7-12th grades.
‡Varicella was added to school vaccination requirements beginning in the 2015-2016 academic year. The rate includes those reported as having a verified history of disease

The statewide percentage of Montana students enrolled in prekindergarten through 12th grade who had medical exemptions to one or more vaccine(s) has remained at or below 0.5% between the 2011–2012 and 2018–2019 academic years among public school students, and at or below 0.7% among private school students (Figure 2). Over the same period, the statewide percentage of Montana students enrolled in prekindergarten through 12th grade with a religious exemption to one or more vaccine(s) increased from 1.8% during the 2011–2012 academic year to 3.1% during the 2018–2019 academic year among public school students, and from 3.4% to a high of 8.7% among private school students in 2016–2017. The rate decreased to 7.2% for private school students in 2018–2019. Figures 3 and 4 describe county level medical and religious exemption percentages, respectively.

**Figure 2**. Percentage of public and private school students enrolled in kindergarten–12th grade with medical* or religious exemptions to required vaccines by exemption and school type, Montana 2011–2012 to 2018–2019 academic years.




*No significant difference was noted between public and private medical exemption rates.

## Limitations

The school immunization assessment is subject to several limitations. Data was collected from reports submitted by school nurses, administrators, and teachers. The accuracy and completeness of the data cannot be verified because reviews of individual immunization records for students were not completed. A review of selected schools is planned in the future. Furthermore, the survey is a snapshot collecting cross-sectional data at a single point in time. Variations in immunization coverage related to changes in student enrollment or vaccines administered after the initial submission were not captured by the survey. Finally, a child with

an exemption to one vaccine may be vaccinated for other antigens. As a result, it is not possible to determine precise coverage at the individual student level using current survey methods.

Private schools and preschools are required to report the immunization status of all enrolled students; however, many are not accredited, and a comprehensive master list of schools is not available. Typically, county health officials compile a list of schools annually, but frequent changes in the opening and closing of private schools make this list difficult to maintain, despite annual cleanup efforts. This leads to the potential inclusion of schools that are closed in the denominator resulting in an inflated percentage of private schools not reporting.

## Discussion

Herd immunity is a type of community wide protection against disease that occurs when a significant proportion of a population is vaccinated. Not only does it provide protection for the individuals who receive a vaccine, it also protects others in the community around them who are not able to receive one. Herd immunity is an important measure in the determination of a population's ability to stave off a vaccine preventable disease outbreak. The higher the herd immunity, the better protected a community is against disease. While optimal herd immunity levels tend to vary by disease, in general schools with immunization coverage below 90% for at least one required vaccine may be at risk for disease outbreaks. More infectious diseases such as measles require higher levels to ensure heard immunity (95%).

Measured immunization coverage levels for students in Montana are above estimated herd immunity levels for diphtheria, measles, mumps, pertussis, polio, rubella, tetanus, and varicella. A small percentage of children have medical or religious exemptions to required vaccines. Statewide, less than 0.5% of students had medical exemptions and 3.4% of students reported a religious exemption for the 2018–2019 academic year.

Based on the results of the 2018–2019 School Immunization Assessment the Montana Immunization Program suggests the following recommendations to improve school immunization rates in Montana:

- The statewide varicella vaccination/history of disease rate increased from 92% to 95% since being implemented in 2015. Analysis of varicella vaccination rates by grade level determined that group with the lowest rate was in prekindergarten students (92.9%). This group will continue to be targeted for improvement.
- The Immunization Program will continue to monitor medical and religious exemptions for increases or decreases in rates across academic years and at the county level.
- School districts and local health departments should continue the collaborative effort to track students excluded for failing to meet the requirements of a conditional enrollment and notify the Montana Immunization Program when the child has met the immunization requirements.

**Table 3.** Medical and religious exemption rates by county – Montana, 2017– 2018 vs. 2018–2019 academic years

| COUNTY | Medical Exemptions (%) | | | Religious Exemptions (%) | | |
|---|---|---|---|---|---|---|
| | 2017-2018 | 2018-2019 | Change from 2017-2018 | 2017-2018 | 2018-2019 | Change from 2017-2018 |
| BEAVERHEAD | 0.09 | 0.08 | ▼ | 2.30 | 2.61 | ▲ |
| BIG HORN | 0.03 | 0.00 | ▼ | 0.16 | 0.13 | ▼ |
| BLAINE | 0.16 | 0.19 | ▲ | 1.48 | 1.28 | ▼ |
| BROADWATER | 0.14 | 0.15 | ▲ | 1.28 | 1.83 | ▲ |
| CARBON | 0.00 | 0.00 | ■ | 6.41 | 3.27 | ▼ |
| CARTER | 1.56 | 1.44 | ▼ | 1.56 | 1.44 | ▼ |
| CASCADE | 0.34 | 0.31 | ▼ | 1.60 | 1.82 | ▲ |
| CHOUTEAU | 0.30 | 0.15 | ▼ | 4.59 | 3.69 | ▼ |
| CUSTER | 0.30 | 0.35 | ▲ | 1.44 | 1.49 | ▲ |
| DANIELS | 0.00 | 0.00 | ■ | 1.41 | 1.46 | ▲ |
| DAWSON | 0.22 | 0.36 | ▲ | 5.07 | 4.59 | ▼ |
| DEER LODGE | 0.00 | 1.40 | ▲ | 0.59 | 0.53 | ▼ |
| FALLON | 0.18 | 0.56 | ▲ | 0.18 | 0.37 | ▲ |
| FERGUS | 1.03 | 1.02 | ▼ | 1.81 | 1.74 | ▼ |
| FLATHEAD | 0.80 | 0.64 | ▼ | 7.12 | 7.23 | ▲ |
| GALLATIN | 0.49 | 0.33 | ▼ | 3.96 | 4.00 | ▲ |
| GARFIELD | 0.00 | 0.00 | ■ | 1.28 | 1.18 | ▼ |
| GLACIER | 0.00 | 0.12 | ▲ | 0.35 | 0.34 | ▼ |
| GOLDEN VALLEY | 0.74 | 0.00 | ▼ | 2.96 | 7.26 | ▲ |
| GRANITE | 0.30 | 0.00 | ▲ | 6.36 | 4.07 | ▼ |
| HILL | 0.96 | 0.10 | ▼ | 1.18 | 1.06 | ▼ |
| JEFFERSON | 0.17 | 0.06 | ▼ | 5.44 | 4.75 | ▼ |
| JUDITH BASIN | 0.00 | 0.00 | ■ | 2.23 | 2.74 | ▲ |
| LAKE | 0.30 | 0.23 | ▼ | 2.53 | 2.98 | ▲ |
| LEWIS & CLARK | 0.25 | 0.16 | ▼ | 2.70 | 2.78 | ▲ |
| LIBERTY | 0.00 | 0.00 | ■ | 4.94 | 6.88 | ▲ |
| LINCOLN | 1.20 | 1.86 | ▲ | 10.77 | 9.88 | ▼ |
| MADISON | 0.34 | 0.46 | ▲ | 4.25 | 4.48 | ▲ |
| MCCONE | 0.00 | 0.00 | ■ | 7.51 | 5.88 | ▼ |
| MEAGHER | 0.00 | 0.00 | ■ | 4.05 | 5.43 | ▲ |
| MINERAL | 0.18 | 0.17 | ▼ | 4.73 | 5.75 | ▲ |
| MISSOULA | 0.38 | 0.39 | ▲ | 2.56 | 2.82 | ▲ |
| MUSSELSHELL | 0.00 | 0.00 | ■ | 3.62 | 4.88 | ▲ |
| PARK | 0.89 | 0.45 | ▼ | 4.77 | 4.74 | ▼ |
| PETROLEUM | 0.00 | 0.00 | ■ | 2.63 | 1.47 | ▼ |
| PHILLIPS | 1.03 | 4.07 | ▲ | 0.44 | 1.87 | ▲ |
| PONDERA | 0.82 | 0.41 | ▼ | 2.45 | 1.92 | ▼ |
| POWDER RIVER | 0.00 | 0.00 | ■ | 2.69 | 1.93 | ▼ |
| POWELL | 0.14 | 0.14 | ■ | 2.87 | 4.49 | ▲ |

| COUNTY | Medical Exemptions (%) | | | Religious Exemptions (%) | | |
|---|---|---|---|---|---|---|
| | 2017-2018 | 2018-2019 | Change from 2017-2018 | 2017-2018 | 2018-2019 | Change from 2017-2018 |
| PRAIRIE | 0.00 | 0.00 | ■ | 2.80 | 3.01 | ▲ |
| RAVALLI | 0.85 | 1.19 | ▲ | 11.74 | 10.89 | ▼ |
| RICHLAND | 0.10 | 0.21 | ▲ | 2.37 | 2.99 | ▲ |
| ROOSEVELT | 0.07 | 0.08 | ▲ | 1.04 | 1.05 | ▲ |
| ROSEBUD | 0.15 | 0.21 | ▲ | 0.41 | 0.53 | ▲ |
| SANDERS | 0.22 | 0.22 | ▼ | 7.83 | 9.10 | ▲ |
| SHERIDAN | 0.00 | 0.00 | ■ | 1.59 | 2.36 | ▲ |
| SILVER BOW | 0.47 | 0.67 | ▲ | 0.95 | 1.14 | ▲ |
| STILLWATER | 0.63 | 1.05 | ▲ | 2.03 | 2.11 | ▲ |
| SWEET GRASS | 0.00 | 0.00 | ■ | 1.86 | 1.33 | ▼ |
| TETON | 0.09 | 0.18 | ▲ | 3.13 | 2.83 | ▼ |
| TOOLE | 0.00 | 0.16 | ▲ | 0.91 | 2.22 | ▲ |
| TREASURE | 0.00 | 0.00 | ■ | 0.00 | 0.00 | ■ |
| VALLEY | 0.29 | 0.15 | ▼ | 2.32 | 2.28 | ▼ |
| WHEATLAND | 0.69 | 0.00 | ▼ | 3.10 | 2.79 | ▼ |
| WIBAUX | 0.00 | 0.00 | ■ | 2.82 | 0.70 | ▼ |
| YELLOWSTONE | 0.26 | 0.23 | ▼ | 1.59 | 1.83 | ▲ |
| **MONTANA** | 0.40 | 0.39 | ▼ | 3.30 | 3.37 | ▲ |

▲ = increase; ▼ = decrease; ■ = no change

**Figure 3**. Percentage of public and private school students enrolled in prekindergarten through 12th grade with a medical exemption to required vaccines, Montana 2018–2019 academic year.

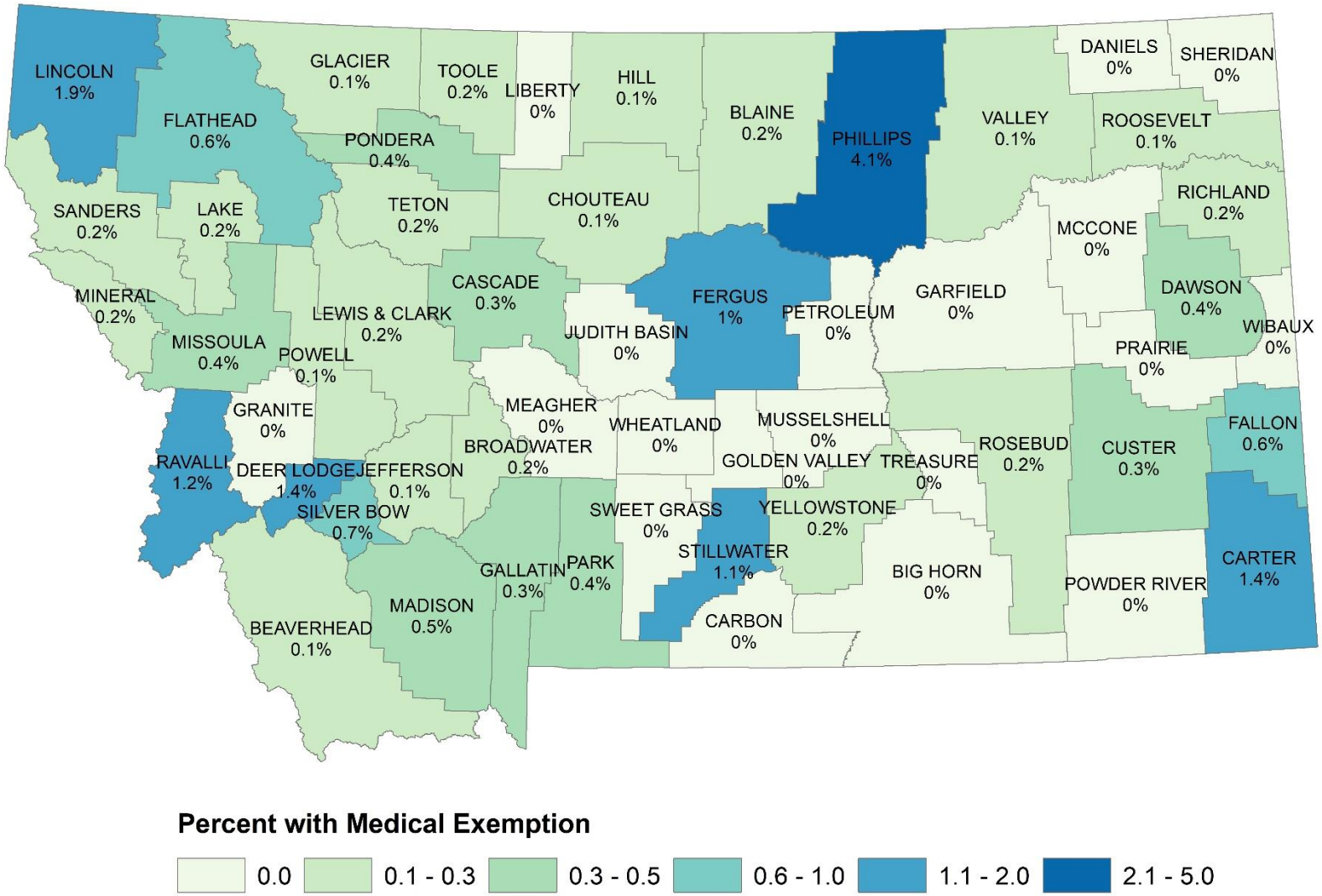
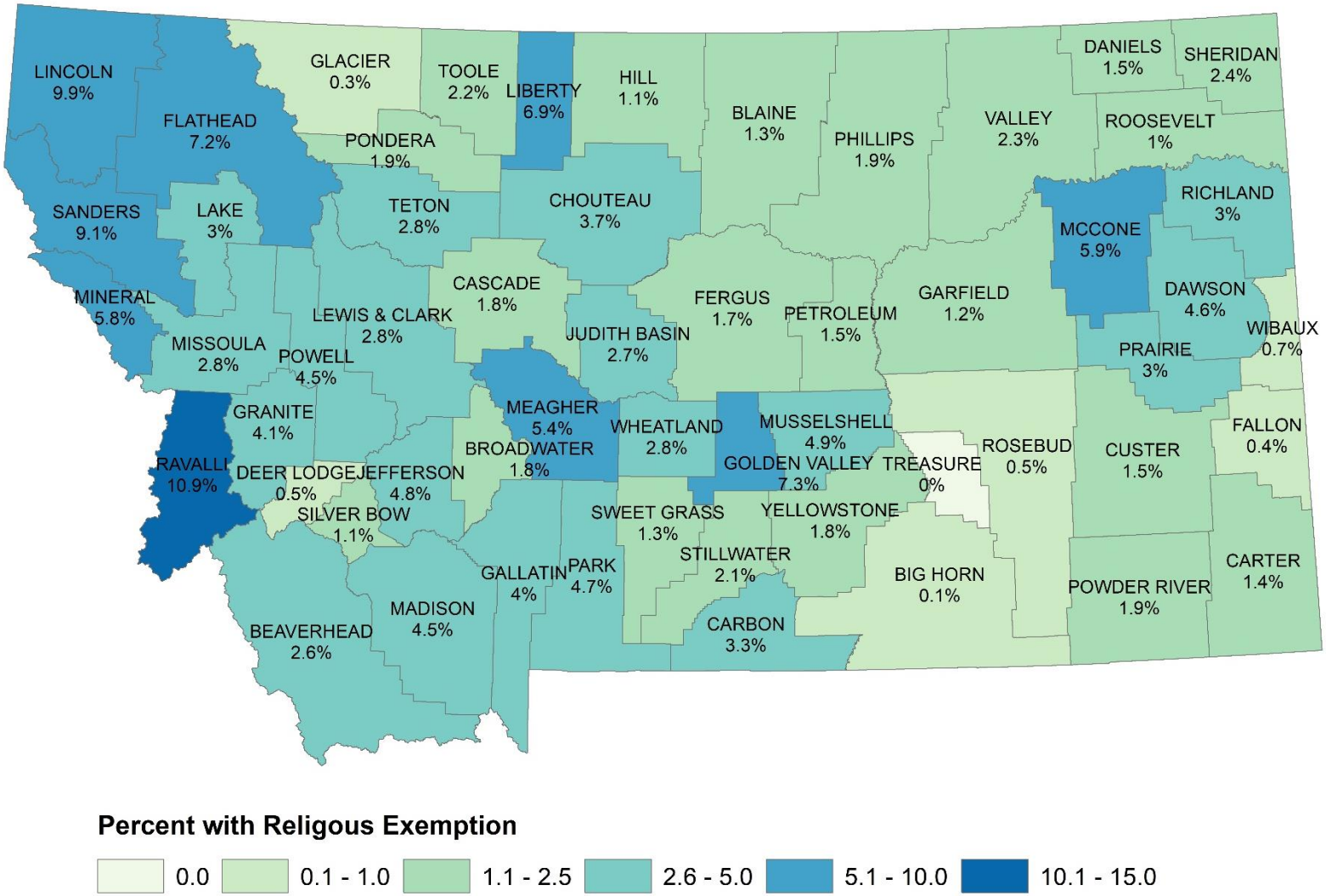



**Figure 4.** Percentage of public and private school students enrolled in prekindergarten through 12th grade with a religious exemption to required vaccines, Montana 2018–2019 academic year.