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Provincial Health Services Authority

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Immunization Coverage in Grade 6 Students

2015-2024

August 2025

Provincial Health Services Authority
Province-wide solutions. Better health.

A research and teaching centre affiliated with UBC

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Acknowledgements

We gratefully acknowledge the residents of BC whose data were integrated in the information presented here and all BC health authorities for the contribution of information for this report.

We acknowledge the Title and Rights of BC First Nations who have cared for and nurtured the lands, air and waters for all time, including the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh Úxwumixw (Squamish Nation), and səl̓ílwətaʔ (Tsleil-Waututh Nation) on whose unceded, occupied, and ancestral territory BCCDC is located. As a provincial organization, we also recognize and acknowledge the inherent Title and Rights of BC First Nations whose territories stretch to every inch of the lands colonially known as “British Columbia”.

BC is also home to many First Nations, Métis, and Inuit people from homelands elsewhere in Canada. We recognize the distinct rights of First Nations, Inuit, and Métis people and BCCDC is beginning its work to uphold a distinctions-based approach to Indigenous data sovereignty and self-determination. All Indigenous Peoples who live in BC have rights to self-determination, health and wellness, and respectful use of their data in alignment with Indigenous data governance principles, including but not limited to OCAP®.

BCCDC is working to address the consequences of settler-colonial policies, which continue to have effects on all Indigenous Peoples living in the province. Consistent with the Coast Salish teaching of Thee eat (truth) gifted to PHSA by Coast Salish Knowledge Keeper Sulksun, we recognize that ongoing settler colonial harms and ideology in BC undermine the inherent rights of Indigenous Peoples who live in BC and significantly contributes to health inequities and data gaps. For further information, please see “In Plain Sight: Addressing Indigenous-specific Racism and Discrimination in B.C. Health Care”. We also recognize the direct impact of colonial policies, which led to violations of patient autonomy and consent, resulting in vaccine hesitancy and mistrust among Indigenous Peoples in Canada:

- TB vaccine experimentation in Saskatchewan in the 1930s and 1940s
- Medical experimentation and the roots of COVID-19 vaccine hesitancy among Indigenous Peoples in Canada
- Vaccine mistrust: A legacy of colonialism

While the data shown in this report represent BC residents, there is no stratification by Indigeneity and as such, the results are not reflective of the situation for First Nations, Métis and Inuit Peoples and communities. First Nations children may also be disproportionately under-represented in the immunization registry data. Please see the Limitations section of the Data Notes for further information.

Abbreviations

Health Authorities

IH	Interior Health
FH	Fraser Health
VCH	Vancouver Coastal Health
ISLH	Island Health
NH	Northern Health

Additional abbreviations

BC	British Columbia
MoE	Ministry of Education
HA	Health Authority
HSDA	Health Service Delivery Area
MyEdBC	MyEducation BC
PIR	Provincial Immunization Registry
PARIS	Primary Access Regional Information System
HPV	Human papillomavirus

For an explanation of BC Health Authorities, please visit this website.

Executive Summary

This report outlines immunization coverage among grade 6 students from 2015 to 2024 for six antigens: hepatitis B, varicella, measles, mumps, rubella, and human papillomavirus (HPV). In 2024, data reflects coverage as of the 2023/2024 school year. The hepatitis B and varicella vaccine series are based on completion of a primary series in early childhood, and any missing doses may be re-offered in grade 6. The HPV series is routinely initiated and completed in grade 6. Measles, mumps, and rubella coverage are being included in the grade 6 immunization coverage report for the first time in the 2024 report, and include coverage estimates from 2021 (2020/2021 school year) to 2024 (2023/2024 school year). Similar to hepatitis B and varicella, the vaccine series for measles, mumps, and rubella are based on completion of a primary series in early childhood, and missing doses may be re-offered in grade 6.

Overall, provincial coverage in 2024 (2023/2024 school year) was highest for rubella (92.3%), followed by hepatitis B (88.3%), measles (88.0%), mumps (87.9%), varicella (85.7%), and HPV (64.6% in females; 62.5% in males). Coverage for all antigens has increased from lows in 2021, when prioritization of the COVID-19 pandemic response affected public health resources available for school-based immunization clinics. Coverage estimates for 2024 were generally similar to 2023 (2022/2023 school year); however, compared to 2022 (2021/2022 school year), coverage has decreased for hepatitis B, varicella, measles, mumps, and rubella (1.5-2.3%), and increased for HPV (4.0% increase in females; 3.5% increase in males). A similar trend was seen across health authorities, with coverage decreasing from 2022 by 0.6-4.9% for all antigens except HPV. Coverage of HPV increased from 2022 across health authorities and gender by 0.8-8.4%, except in Island Health (ISLH) where it decreased in females by 0.8% and in males by 1.0%.

Reasons for non-immunization (i.e., documented refusals, exemptions, or contraindications) were assessed for each antigen. For all antigens, grade 6 students in Interior Health (IH) were mostly unimmunized due to a documented refusal. Across all other health authorities, and provincially, students were mostly unimmunized for unknown reasons, except for varicella in ISLH, where an equal proportion of students were unimmunized with a documented refusal as for an unknown reason. Grade 6 students who are unimmunized, or partially immunized, for unknown reasons can include children who have missed the immunization clinics, those who deferred, or those who have not had their refusal, contraindication, or immunization doses recorded.

Please refer to the data notes for additional information and data limitations. Data tables used to create the figures in this report can be downloaded here.

Immunization coverage by Antigen

In the following coverage by antigen sections, the 'Unknown' subcategories of partially immunized and unimmunized includes all children who do not have a documented refusal or contraindication for the antigen of interest and were therefore partially immunized or unimmunized for a reason not recorded.

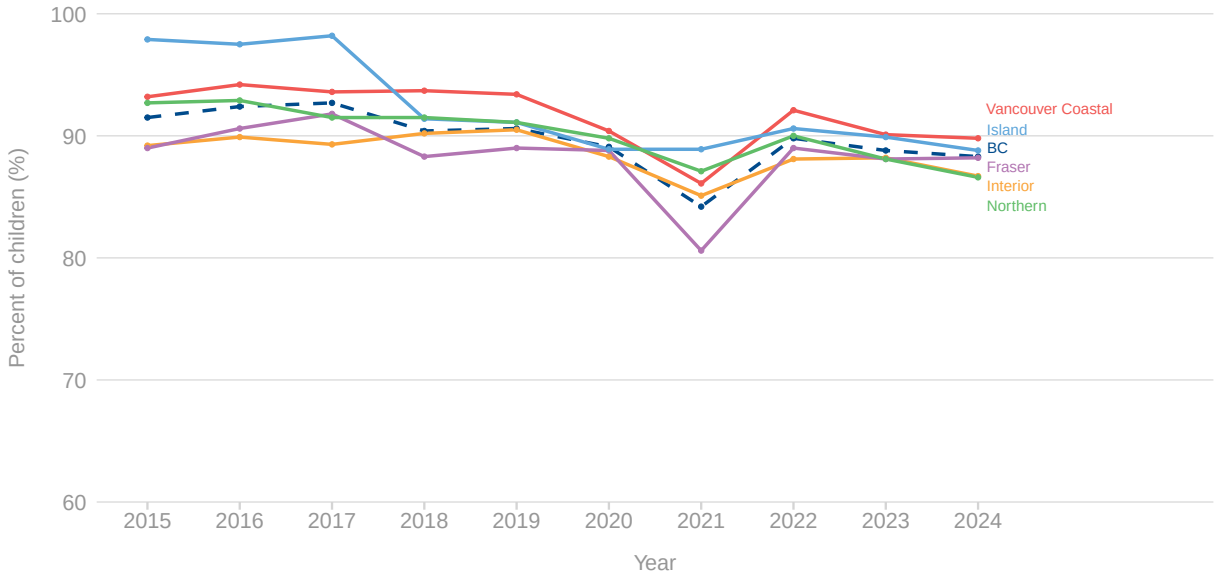
The 'Unimmunized - Unknown' subcategory further divides those who are unimmunized for the antigen of interest without a known reason into two additional categories: 'Immunization Record' for those who have any records (documented immunization, refusal, contraindication and/or exemption) for routine childhood immunizations, and 'No Immunization Record' for those that have no documented records for any routine childhood immunization. See data notes for further information.

Hepatitis B

While most grade 6 students complete their hepatitis B series in infancy, the school program aims to catch-up any remaining students. Hepatitis B coverage at the provincial level has decreased from 89.8% in 2022 (2021/2022 school year) to 88.3% in 2024 (2023/2024 school year), similar to the 2023 (2022/2023 school year) estimate of 88.8% (Figure 1). Across the health authorities, coverage in 2024 had decreased by 0.8-3.4% since 2022, with the largest decrease in NH (3.4%). In 2024, coverage ranged from 86.6% in NH to 89.8% in VCH (Figure 2). At the level of HSDA, coverage in 2024 was lowest in Kootenay Boundary, at 79.0%, and highest in Richmond, at 94.1% (Figure 2 and 3).

At the provincial level, 2.2% of BC grade 6 students were unimmunized with a documented refusal in 2024, while 3.2% and 5.7% were partially immunized and unimmunized for unknown reasons, respectively (Figure 4). Among health authorities, IH had the highest proportion of students unimmunized with a refusal (5.7%), while NH had the highest proportion of students unimmunized for unknown reasons (7.5%), and VCH the highest proportion of students partially immunized for unknown reasons (3.7%). At the HSDA level, Kootenay Boundary had the highest proportion of students unimmunized with a documented refusal (9.7%).

Immunization coverage



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 1. Hepatitis B coverage by year and health authority, Grade 6 students, British Columbia

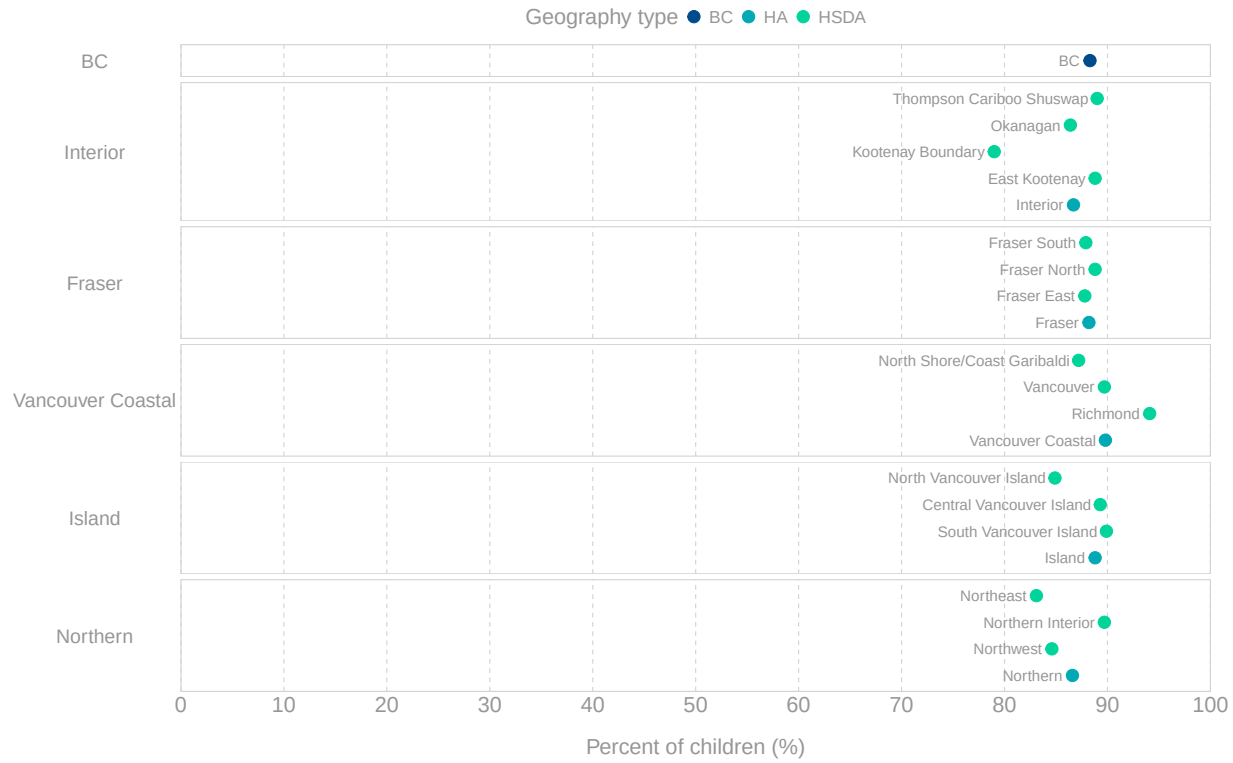
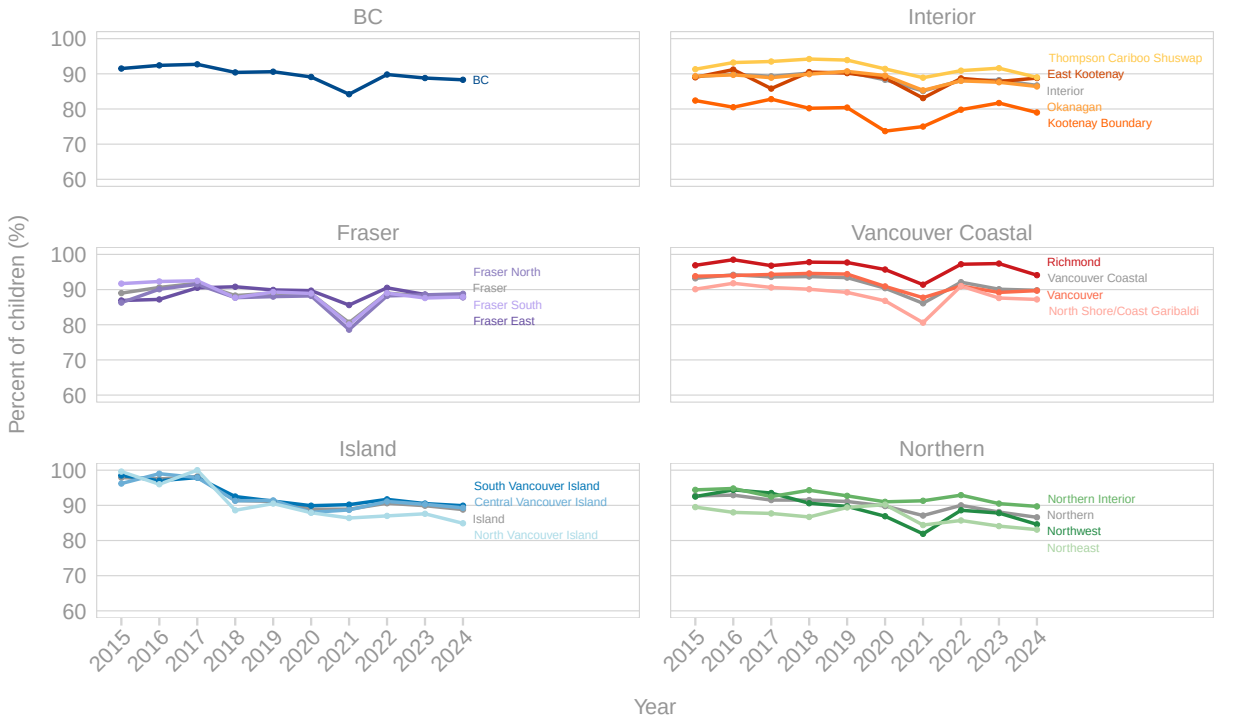


Figure 2. Hepatitis B coverage by geographic region, Grade 6 students, British Columbia, 2024



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 3. Hepatitis B coverage by year and geographic region, Grade 6 students, British Columbia

Reasons for non-immunization

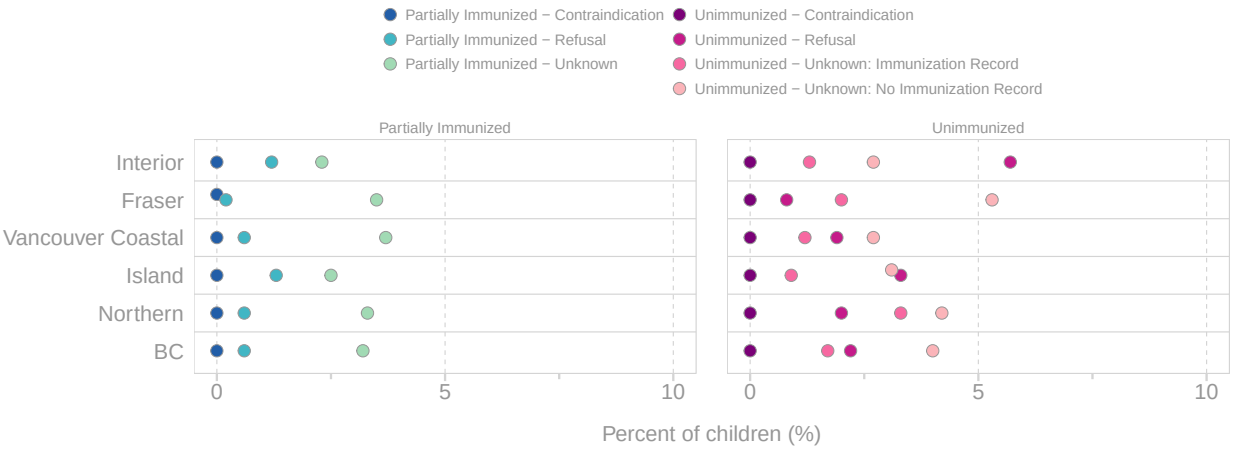


Figure 4. Reasons for non-immunization by health authority, Hepatitis B, Grade 6 students, British Columbia, 2024

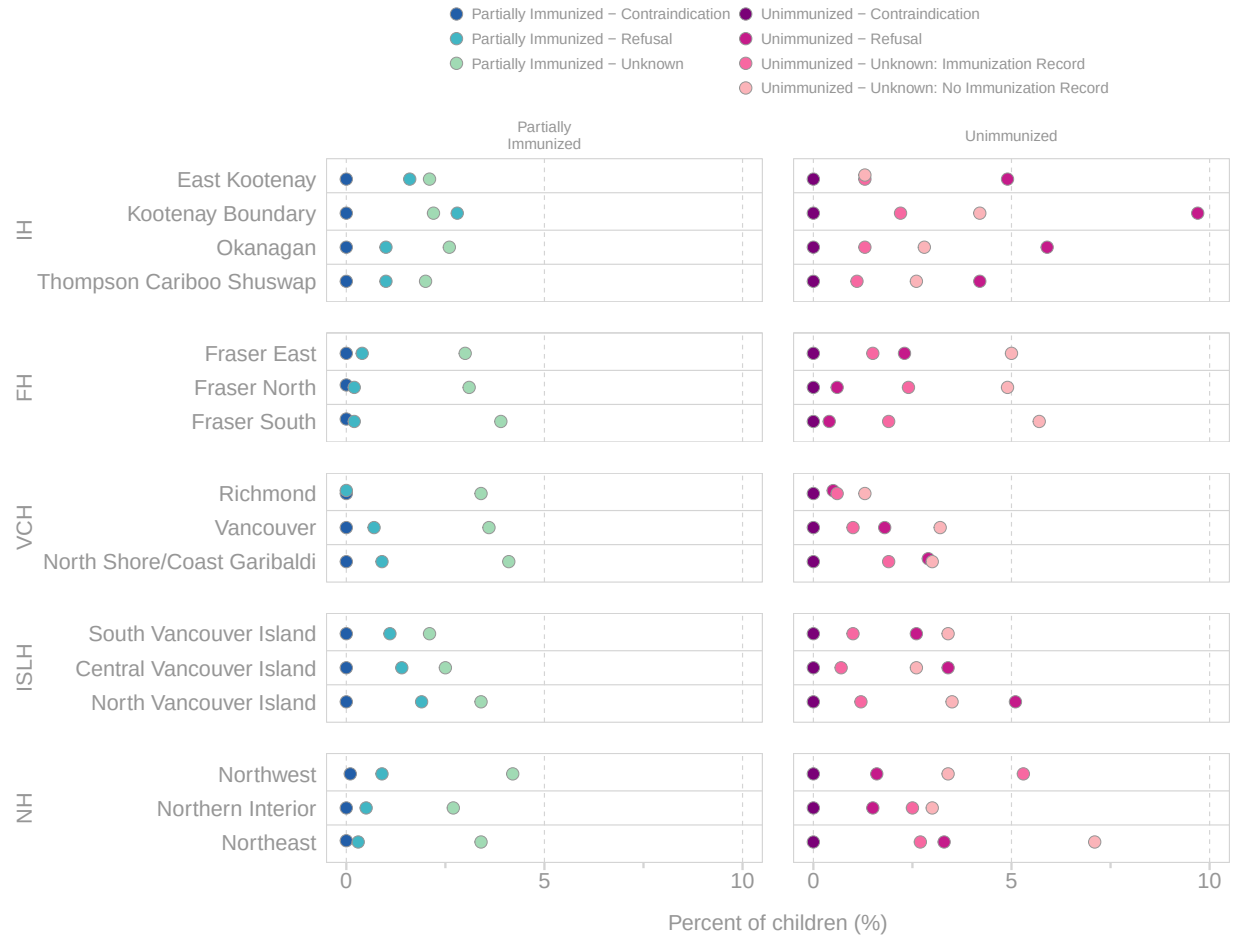


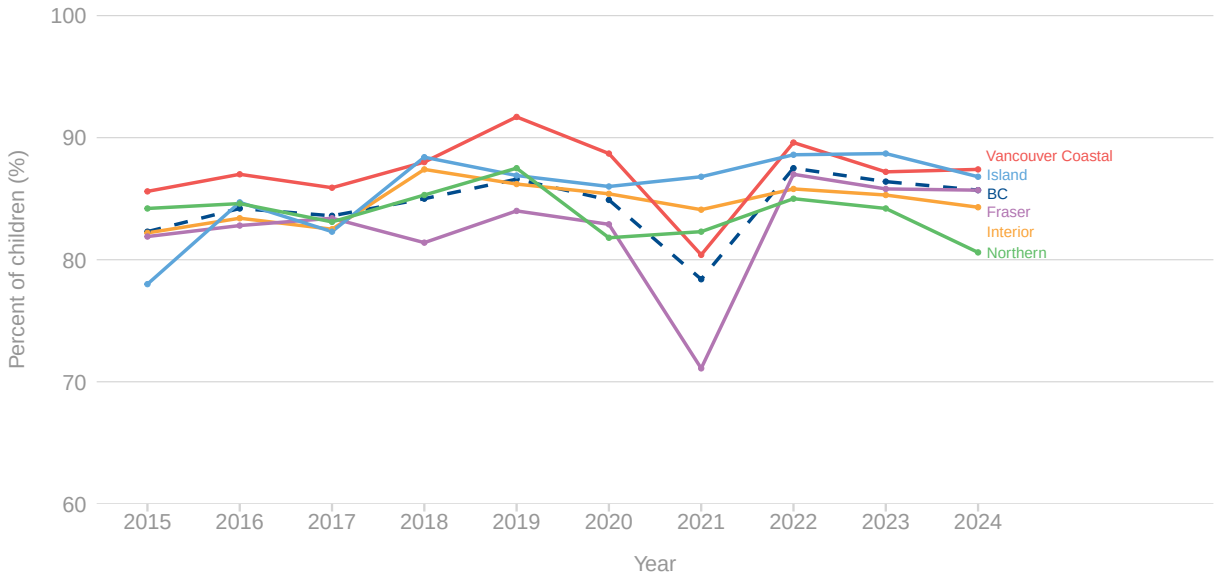
Figure 5. Reasons for non-immunization by health service delivery area, Hepatitis B, Grade 6 students, British Columbia, 2024

Varicella

In BC, varicella immunization coverage in grade 6 students decreased slightly from the previous year (86.4% in 2023 for the 2022/2023 school year) to 85.7% (2023/2024 school year), though coverage has overall increased slightly over the past decade from 82.3% in 2015 (Figure 6). Across the health authorities, varicella coverage ranged from 80.6% in NH to 87.4% in VCH in 2024 (Figure 7). Coverage rates at the HSDA level in 2024 ranged from 76.5% in Northeast to 93.5% in Richmond (Figure 7 and 8).

In the 2023/2024 school year, 2.9% of grade 6 students in BC were unimmunized for varicella due to a documented refusal, while an additional 6.3% were unimmunized for unknown reasons (Figure 9). Province-wide, 310 children (0.6%) had documented evidence of previous disease or immunity in 2024. IH had the highest proportion of grade 6 students unimmunized due to a documented refusal (6.6%), and at the HSDA level, Kootenay Boundary had the highest proportion of students unimmunized due to a documented refusal (9.9%) (Figure 10).

Immunization coverage



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 6. Varicella coverage by year and health authority, Grade 6 students, British Columbia

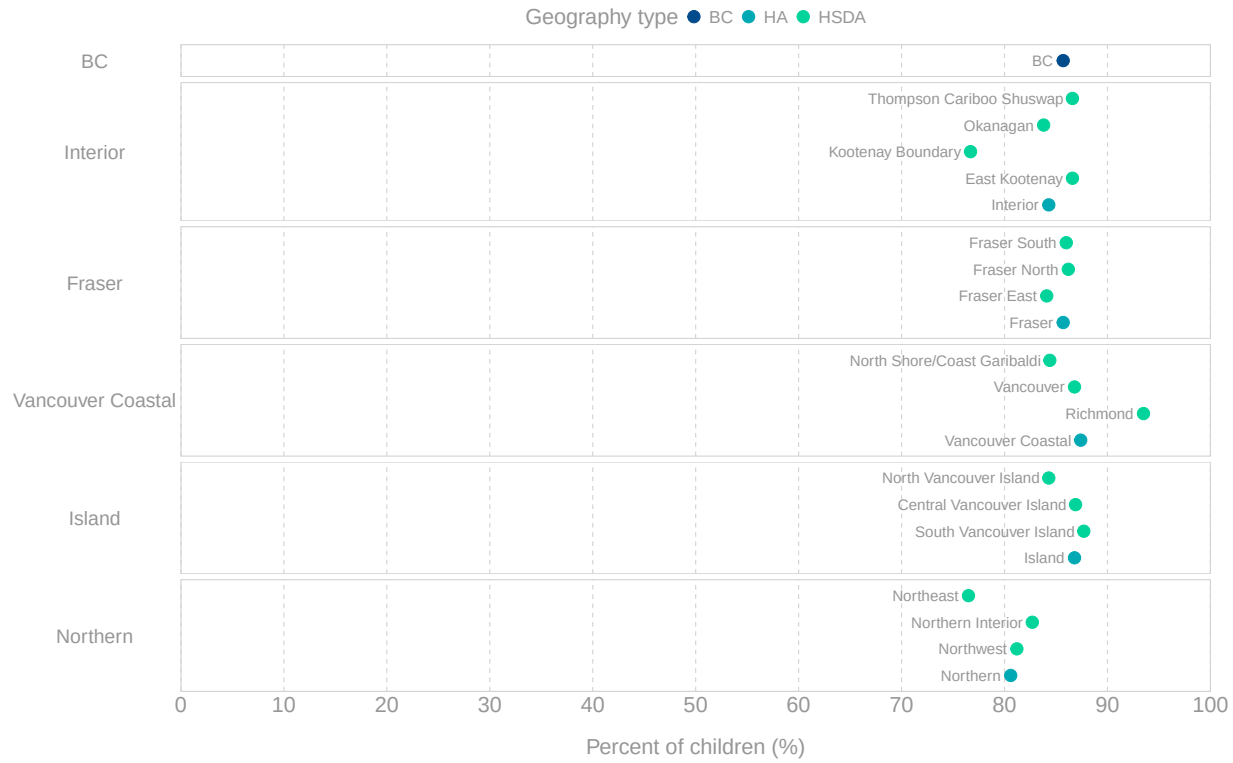
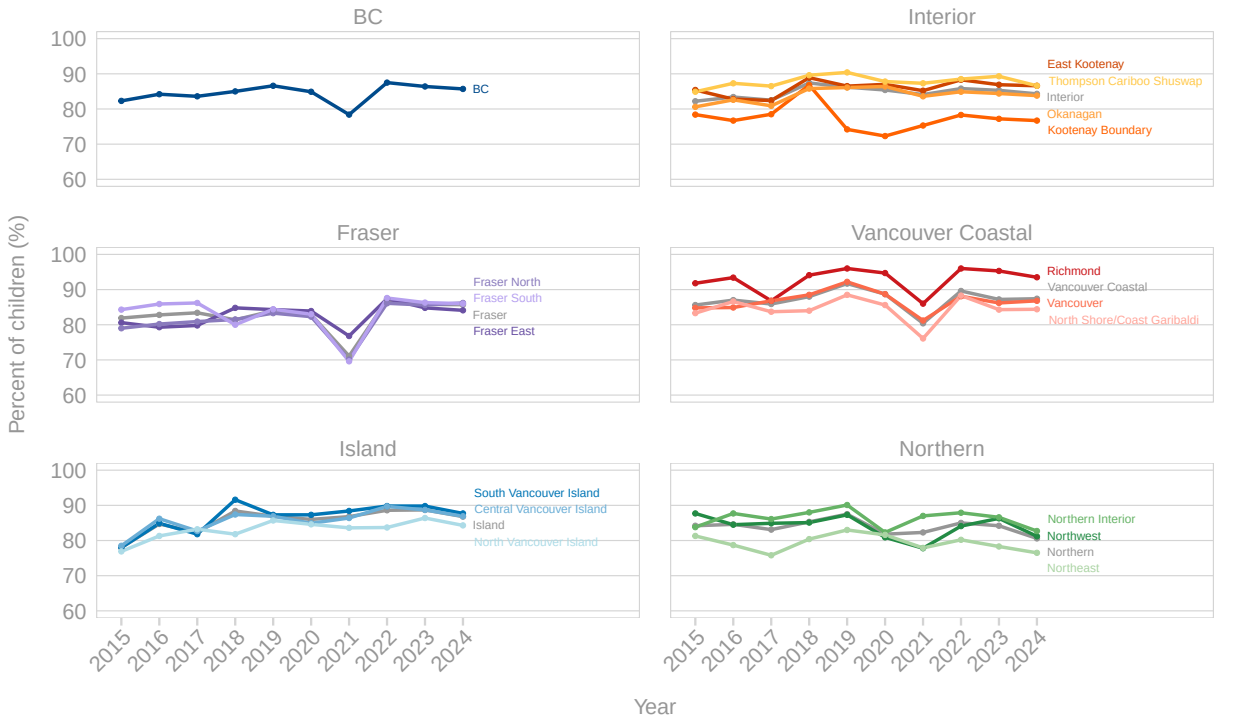


Figure 7. Varicella coverage by geographic region, Grade 6 students, British Columbia, 2024



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 8. Varicella coverage by year and geographic region, Grade 6 students, British Columbia

Reasons for non-immunization

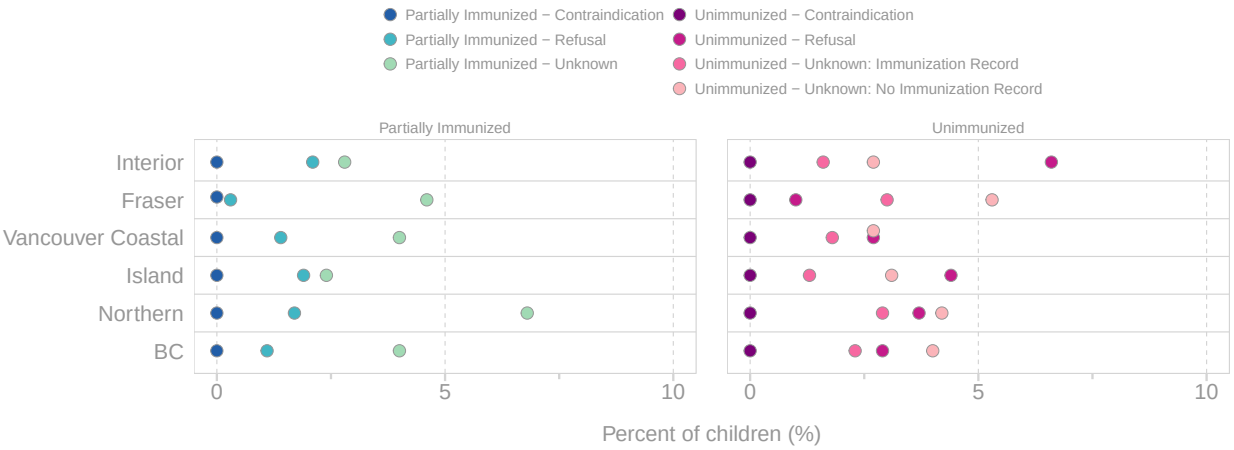


Figure 9. Reasons for non-immunization by health authority, Varicella, Grade 6 students, British Columbia, 2024

Figure 10. Reasons for non-immunization by health service delivery area, Varicella, Grade 6 students, British Columbia, 2024

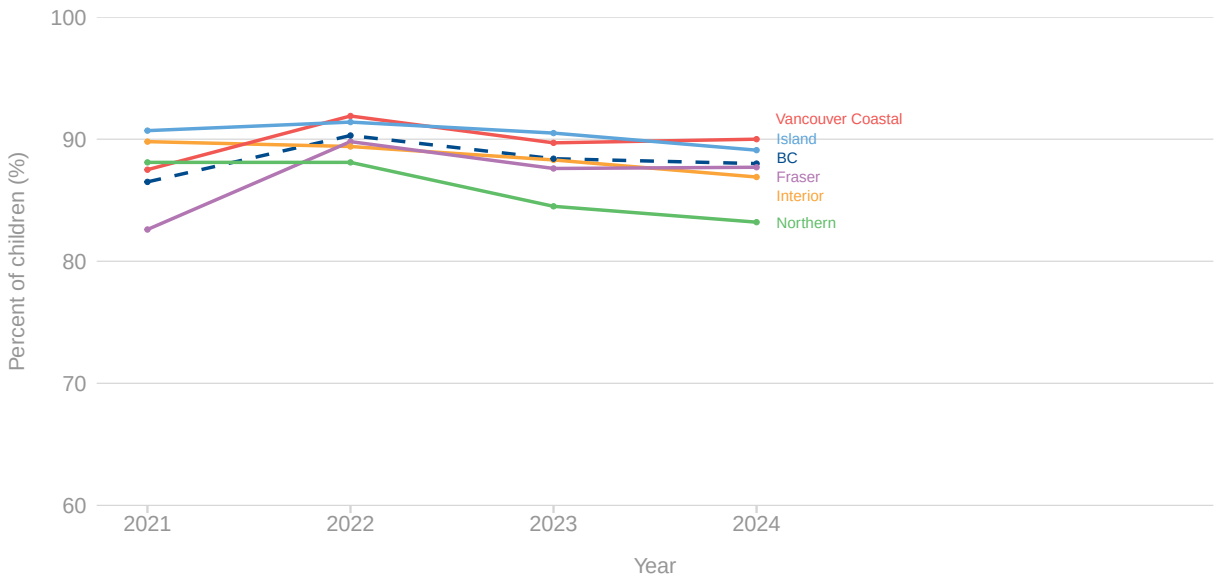
Measles

Measles immunization coverage is being included in the grade 6 coverage report for the first time in 2024 and includes coverage estimates from 2021 (2020/2021 school year) through to 2024 (2023/2024 school year). At the provincial level, measles coverage (two doses of measles vaccine or laboratory evidence of immunity/prior disease) was similar to 2023 (88.4%) but decreased 2.3% since 2022, from 90.3% in 2022 to 88.0% in 2024, though this represents a slight increase from 86.5% in 2021 (Figure 11). Across health authorities, measles immunization coverage has decreased 1.9-4.9% since 2022, with the largest decrease in NH (4.9%) (Figure 11). In 2024, measles immunization coverage ranged from 83.2% in NH to 90.0% in VCH (Figure 12). At the HSDA level, coverage ranged from 79.7% in Northeast to 95.4% in Richmond in 2024 (Figure 12 and 13).

The efficacy of a single dose of measles vaccine given at 12 to 15 months of age is estimated to be 85-95%, while a second dose raises efficacy to nearly 100% (see here). Considering both one- or two-dose coverage, 92.3% of grade 6 students in BC had received at least one dose of measles-containing vaccine (or had laboratory evidence of immunity/prior infection) in 2024, while coverage across health authorities ranged from 90.9% in NH to 94.5% in VCH. At the HSDA level, coverage of one or two doses in 2024 ranged from 86.3% in Kootenay Boundary to 97.7% in Richmond (Figure 12).

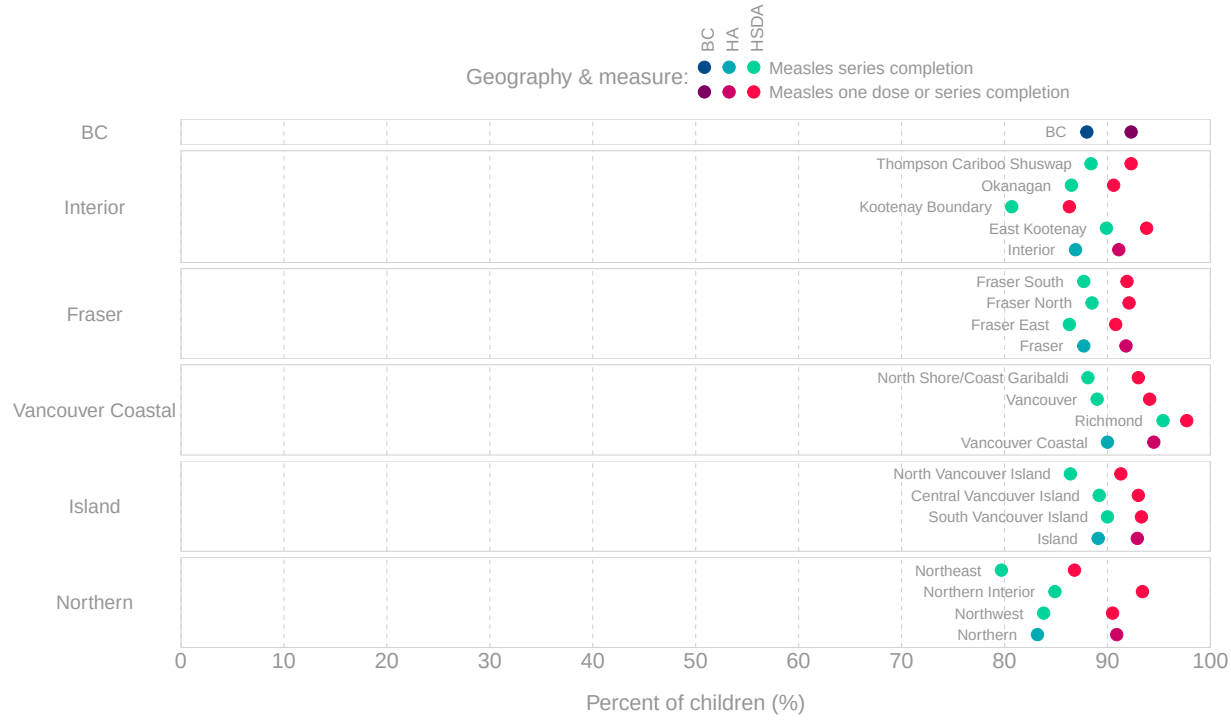
At the provincial level, 2.1% of grade 6 students in BC were unimmunized for measles due to a documented refusal, while 5.5% were unimmunized for unknown reasons (Figure 14). In 2024, 8 children had documented laboratory evidence of immunity to measles in the province. IH had the largest proportion of grade 6 students who were unimmunized due to a documented refusal (5.3%), while FH had the largest proportion of students who were unimmunized for unknown reasons (7.4%). At the HSDA level, Kootenay Boundary had the largest proportion of grade 6 students who were unimmunized due to a documented refusal (8.6%) (Figure 15). The largest proportion of grade 6 students who were unimmunized for unknown reasons was in Northeast HSDA (10.0%).

Immunization coverage



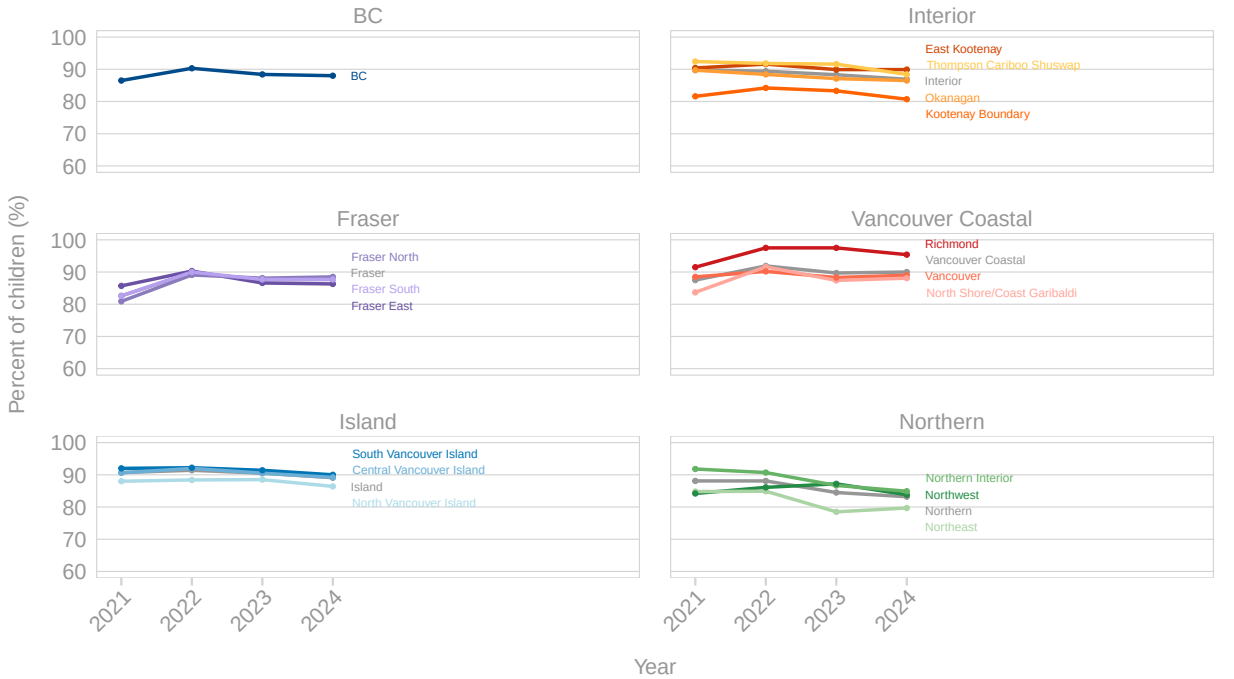
Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 11. Measles coverage by year and health authority, Grade 6 students, British Columbia



Note: Measles series completion includes children with lab evidence of immunity/prior disease.

Figure 12. Measles one dose or series completion coverage by geographic region, Grade 6 students, British Columbia, 2024



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 13. Measles coverage by year and geographic region, Grade 6 students, British Columbia

Reasons for non-immunization

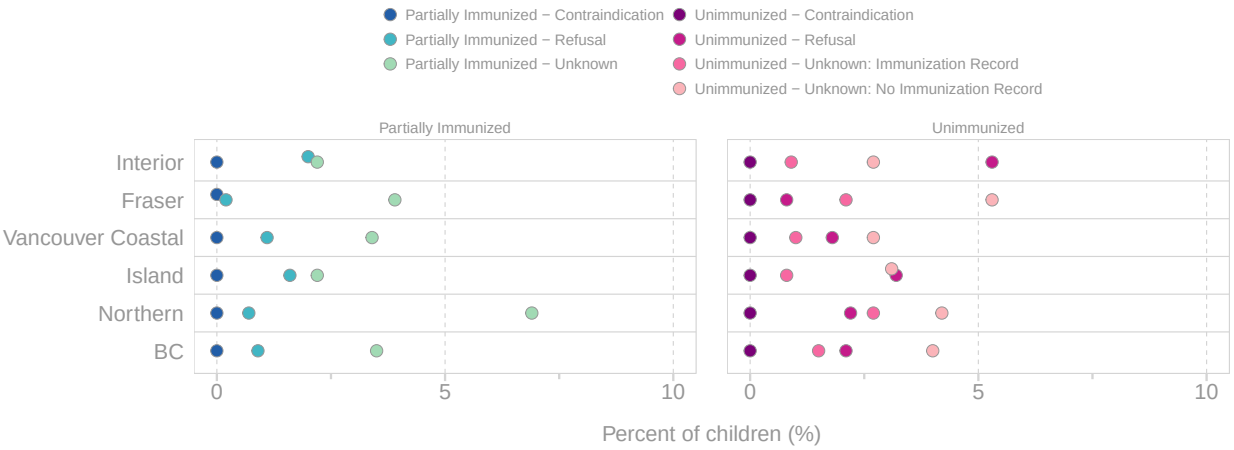


Figure 14. Reasons for non-immunization by health authority, Measles, Grade 6 students, British Columbia, 2024

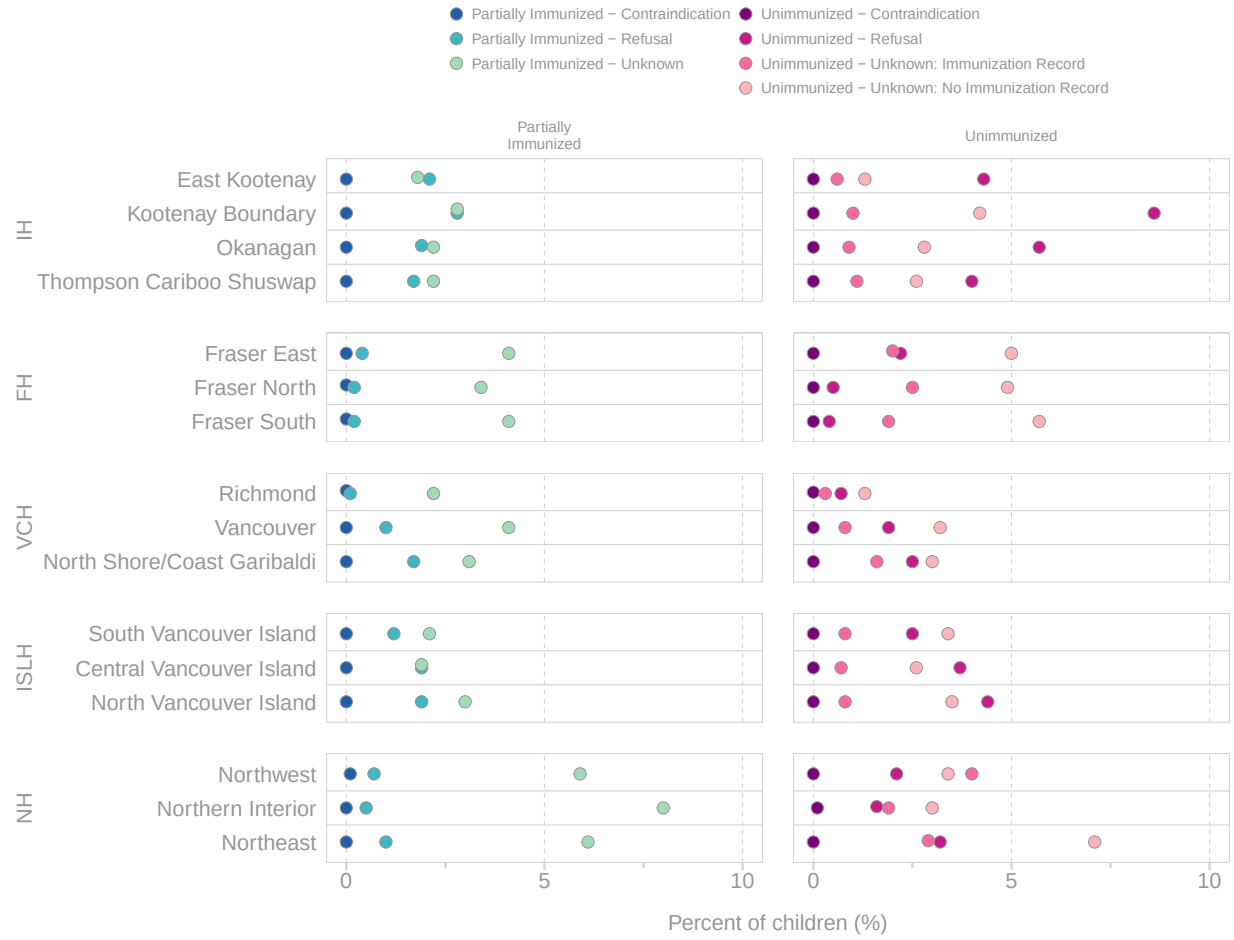


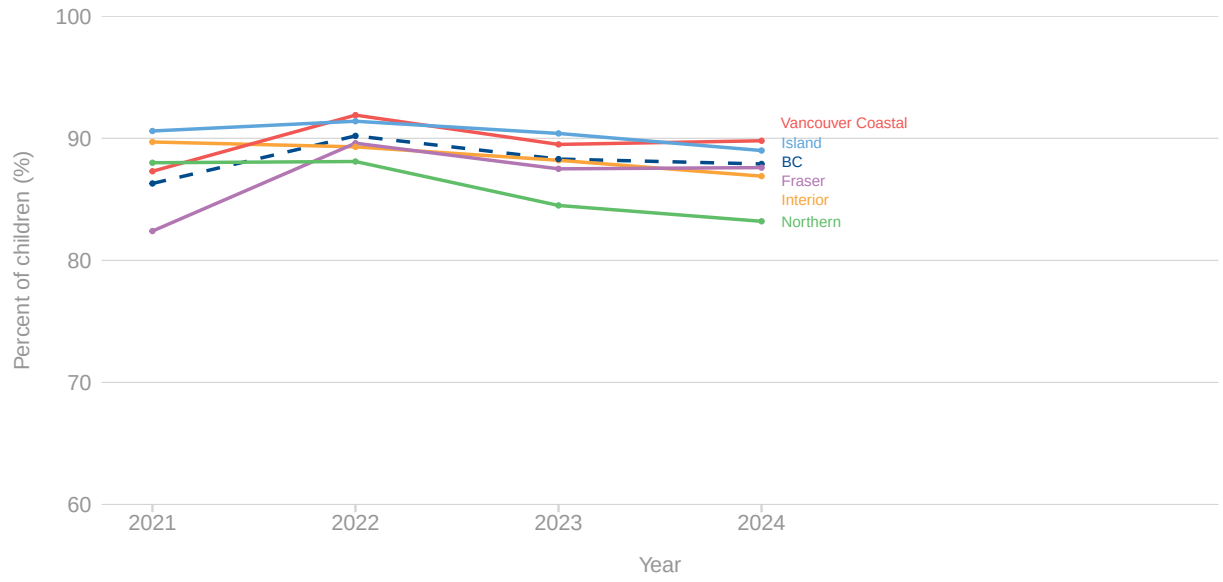
Figure 15. Reasons for non-immunization by health service delivery area, Measles, Grade 6 students, British Columbia, 2024

Mumps

Mumps immunization coverage is being included in the grade 6 coverage report for the first time in 2024 and includes coverage estimates from 2021 (2020/2021 school year) through to 2024 (2023/2024 school year). As with measles coverage, mumps coverage in BC was similar to 2023 (88.3%) but has decreased 2.3% since 2022, from 90.2% in 2022 to 87.9% in 2024, though represents a slight increase from 86.3% in 2021. (Figure 16). Across health authorities, mumps coverage declined since 2022 by 2.0-4.9%, with coverage ranging from 83.2% in NH to 89.8% in VCH (Figure 16 and 17). At the HSDA level in 2024, coverage ranged from 79.7% in Northeast to 95.2% in Richmond (Figure 17 and 18).

At the provincial level, 2.1% of grade 6 students in BC were unimmunized for mumps due to a documented refusal, while 3.5% and 5.6% were partially immunized and unimmunized, respectively, for unknown reasons (Figure 19). At the health authority level, the largest proportion of grade 6 students partially immunized for unknown reasons was in NH (7.0%), while IH had the largest proportion of students unimmunized with a refusal (5.3%). Among HSDAs, Northern Interior had the largest proportion of grade 6 students partially immunized for unknown reasons (8.1%), and Kootenay Boundary had the largest proportion of students unimmunized with a refusal (8.6%) (Figure 20).

Immunization coverage



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 16. Mumps coverage by year and health authority, Grade 6 students, British Columbia

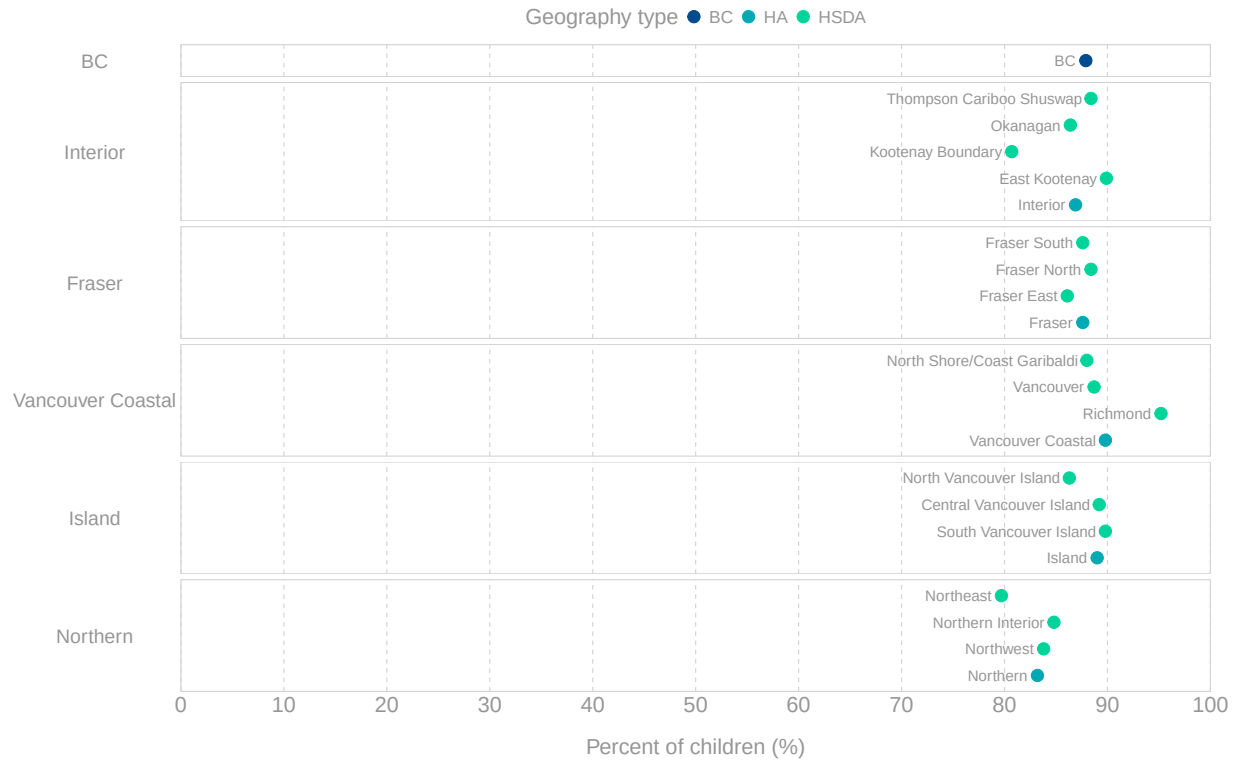
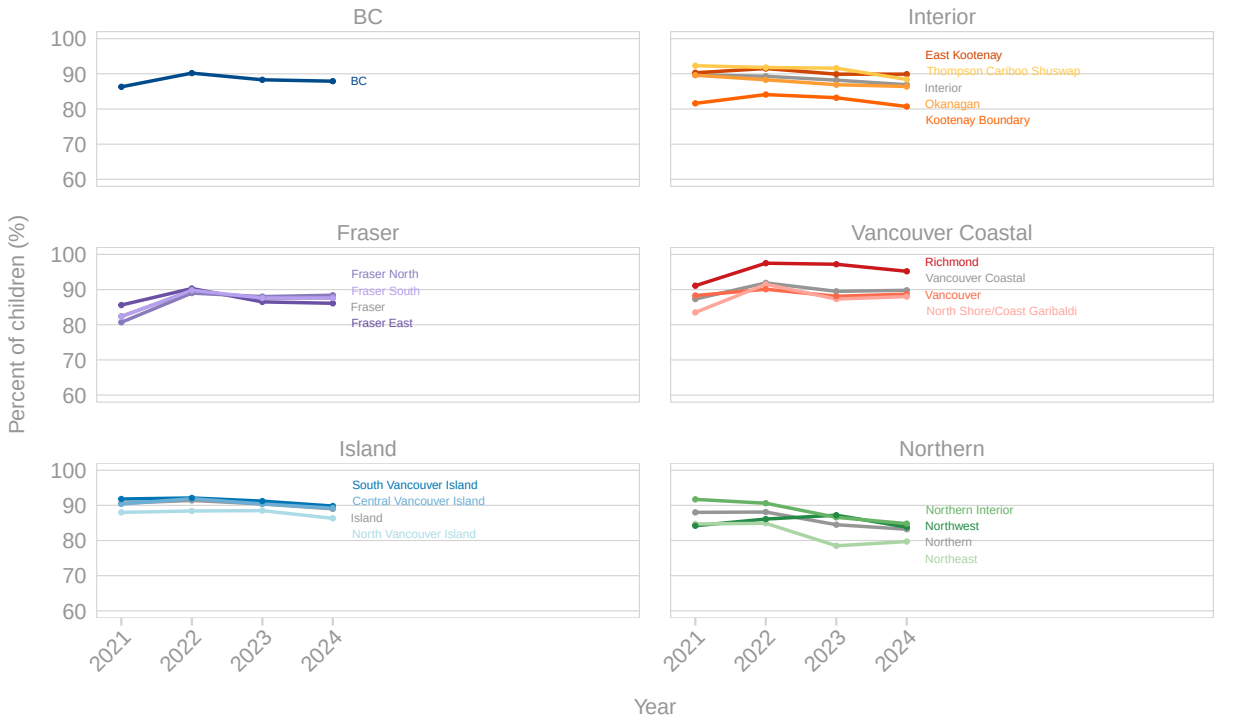


Figure 17. Mumps coverage by geographic region, Grade 6 students, British Columbia, 2024



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 18. Mumps coverage by year and geographic region, Grade 6 students, British Columbia

Reasons for non-immunization

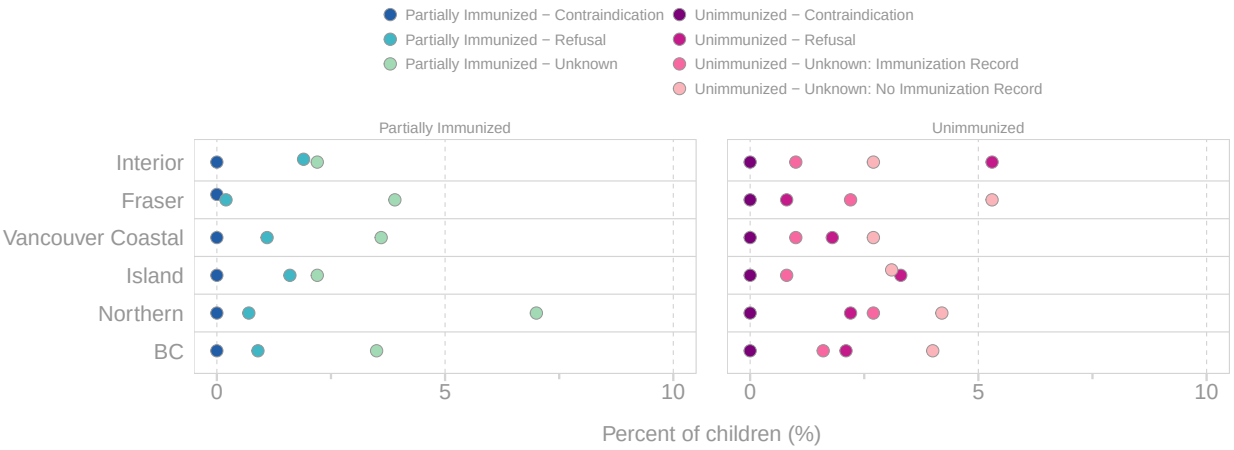


Figure 19. Reasons for non-immunization by health authority, Mumps, Grade 6 students, British Columbia, 2024

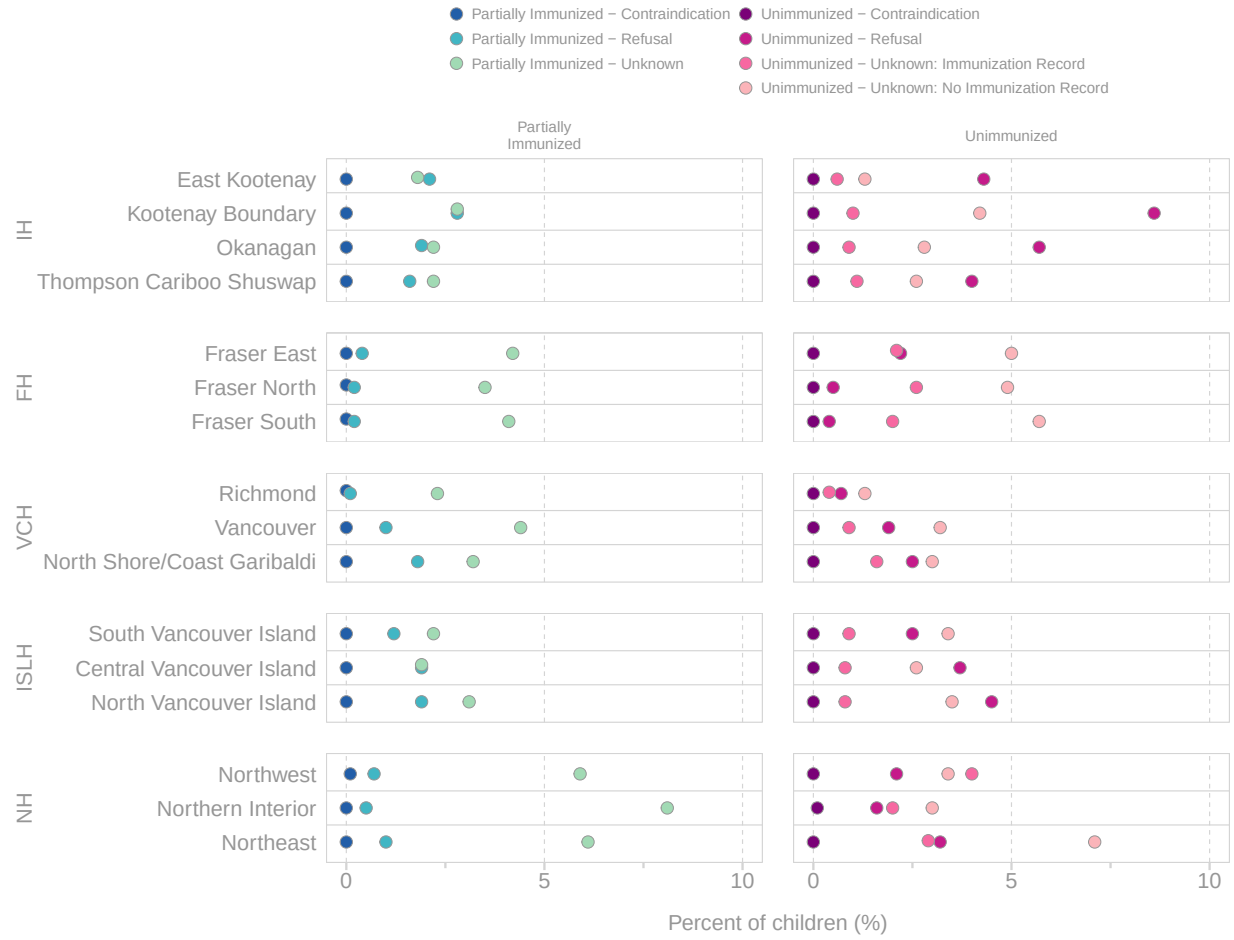


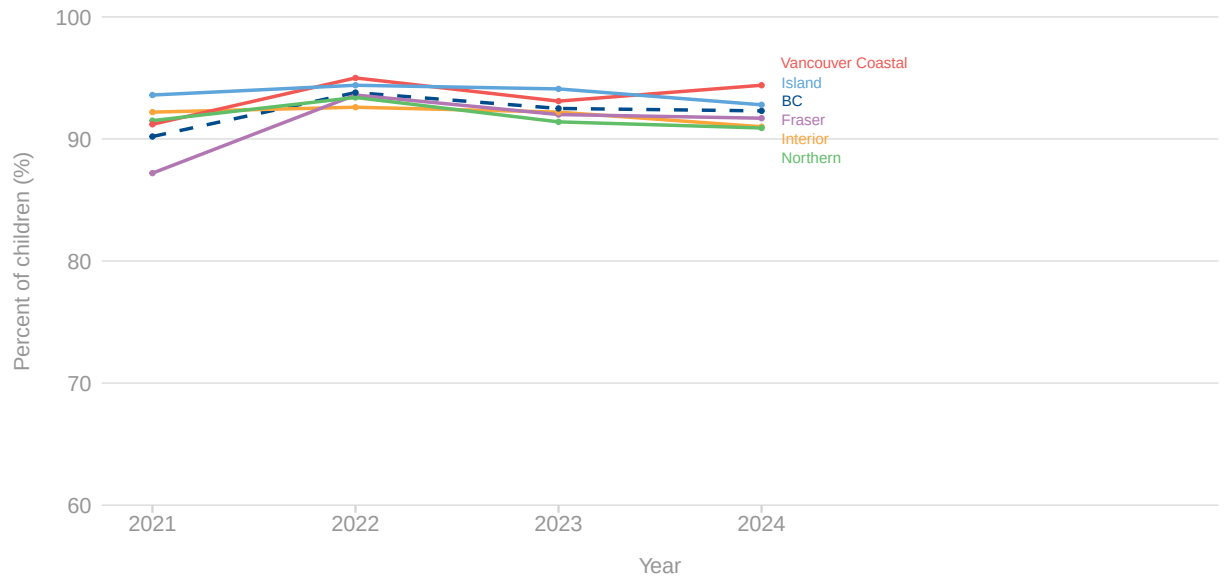
Figure 20. Reasons for non-immunization by health service delivery area, Mumps, Grade 6 students, British Columbia, 2024

Rubella

Rubella immunization coverage is being included in the grade 6 coverage report for the first time in 2024 and includes coverage estimates from 2021 (2020/2021 school year) through to 2024 (2023/2024 school year). At the provincial level, coverage was similar to 2023 (92.5%) but has decreased from 93.8% in 2022 to 92.3% in 2024, though represents an increase from 90.2% in 2021 (Figure 21). Across health authorities, rubella coverage has decreased 0.8-2.5% from 2022, with the greatest decrease in NH (2.5%). In 2024, rubella coverage ranged from 90.9% in NH to 94.4% in VCH (Figure 22). Within HSDAs, coverage for rubella ranged from 86.2% in Kootenay Boundary to 97.7% in Richmond (Figure 22 and 23). Although rubella is generally given as a single vaccine product with measles and mumps, only one dose of rubella is required to be considered up-to-date, explaining the higher coverage for rubella in comparison to measles and mumps.

At the provincial level, 2.1% of grade 6 students in BC were unimmunized for rubella due to a documented refusal, while 5.6% were unimmunized due to unknown reasons (Figure 24). In 2024, five children had documented lab evidence of immunity to rubella. Among health authorities, the highest proportion of grade 6 students who were unimmunized due to a documented refusal were in IH (5.3%) and FH had the highest proportion of unimmunized due to unknown reasons (7.5%) (Figure 24). In line with this, among HSDAs, Kootenay Boundary had the highest proportion of unimmunized due to a documented refusal (8.6%) and Northeast had the highest proportion of grade 6 students unimmunized due to unknown reasons (10%) (Figure 25).

Immunization coverage



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 21. Rubella coverage by year and health authority, Grade 6 students, British Columbia

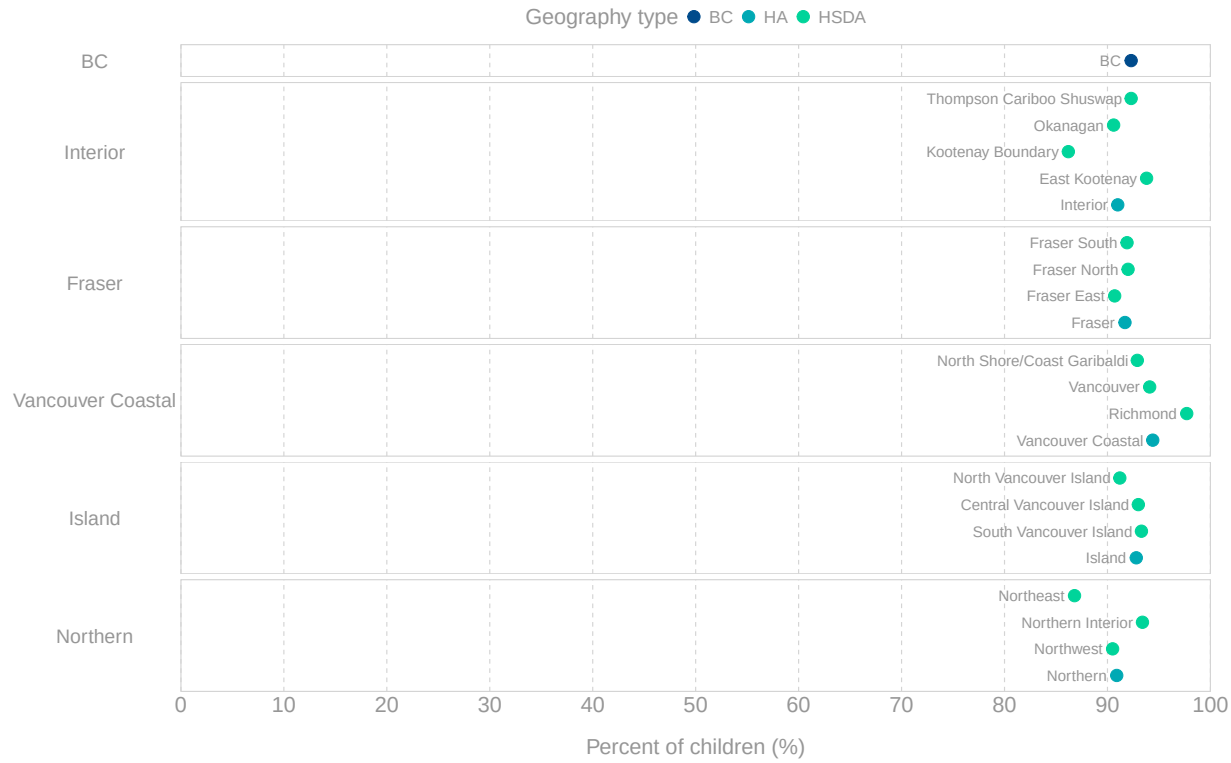
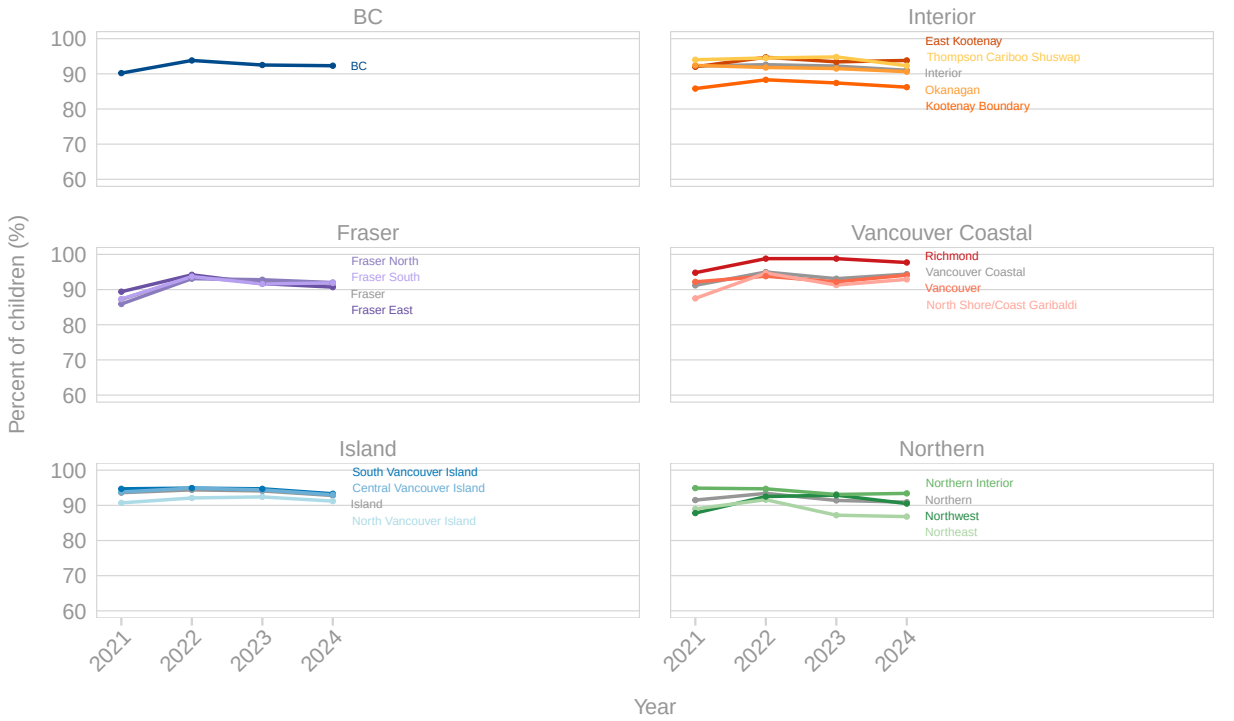


Figure 22. Rubella coverage by geographic region, Grade 6 students, British Columbia, 2024



Note: The y−axis for this figure starts at 60% for clearer data visualization.

Figure 23. Rubella coverage by year and geographic region, Grade 6 students, British Columbia

Reasons for non-immunization

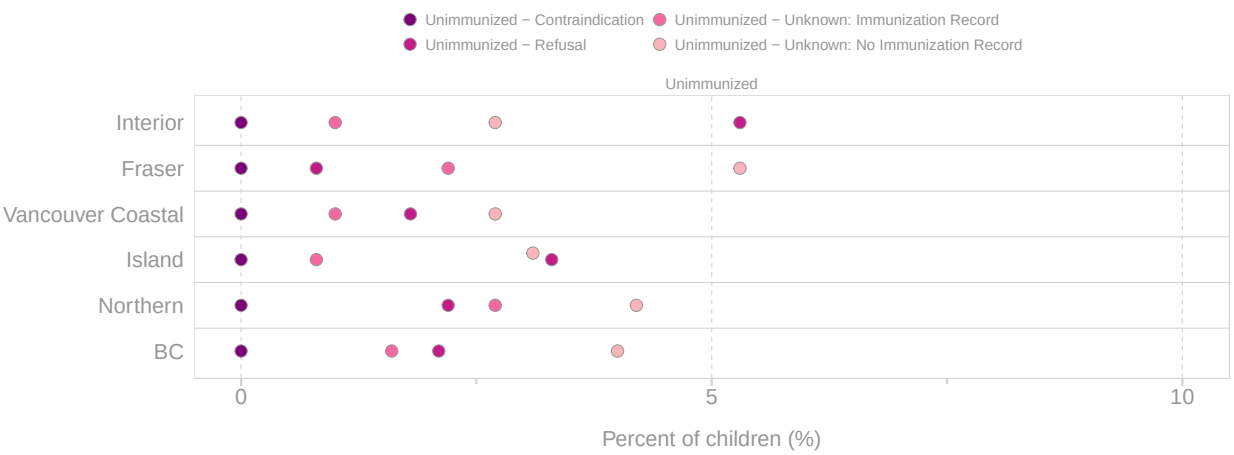


Figure 24. Reasons for non-immunization by health authority, Rubella, Grade 6 students, British Columbia, 2024

Figure 25. Reasons for non-immunization by health service delivery area, Rubella, Grade 6 students, British Columbia, 2024

Human Papillomavirus (HPV)

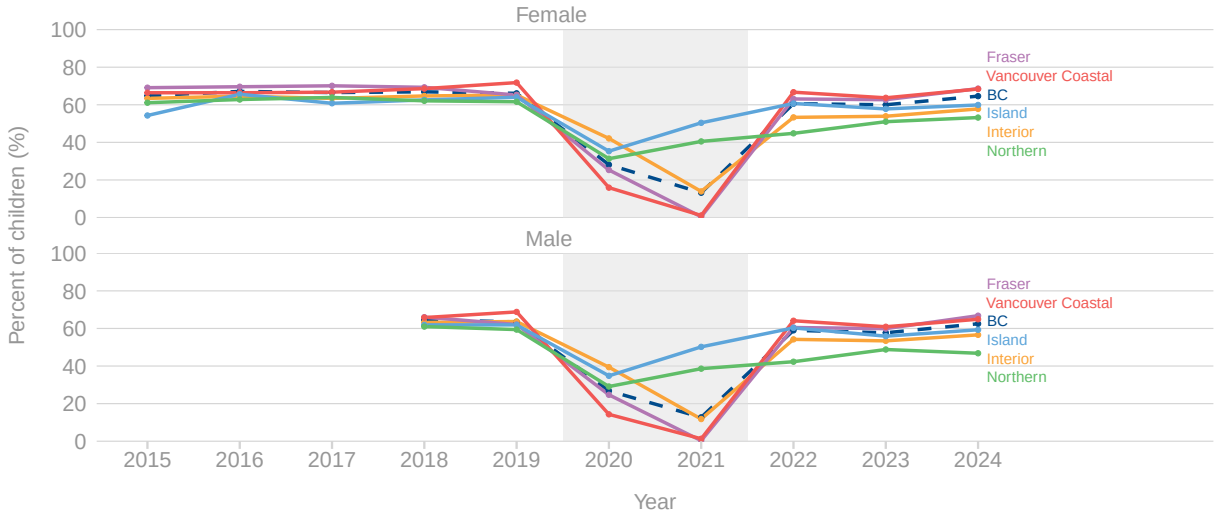
In 2024 (2023/2024 school year), 68.6% of female and 59.0% of male students in grade 6 received two doses of HPV vaccine, an overall increase in coverage rates from both 2023 (2022/2023 school year) and 2022 (2021/2022 school year) (Figure 26). A similar increase in coverage was seen across health authorities, except in ISLH, where the coverage rate in 2024 had overall declined 0.8% in females and 1.0% in males since 2022. In 2024, HPV coverage in females ranged from 53.2% in NH to 68.6% in FH, and in males from 46.8% in NH to 66.8% in FH (Figure 27). At the HSDA level, HPV coverage in females and males was lowest in Northeast, at 37.9% and 36.8%, respectively, and highest in Richmond, at 74.6% and 73.9% (Figure 27 and 28).

Available evidence shows that the efficacy of a single dose of HPV vaccine is greater than 95% against included HPV types (see here). Considering both one (series initiation) or two doses (series completion), 76.5% of female students and 74.3% of male students in grade 6 had received at least one dose of HPV vaccine in 2024 (2023/2024 school year) (Figure 27). HPV coverage of one or two doses across health authorities ranged in females from 67.6% in NH to 81.1% in VCH, and in males from 61.6% in NH to 78.3% in VCH. At the HSDA level, coverage of one or two doses in females and males in 2024 ranged from a low in Northeast, at 53.0% and 46.4%, respectively, to a high in Richmond of 86.5% and 86.6% (Figure 27).

In the 2023/2024 school year, 6.3% of female and 6.2% of male grade 6 students in BC were unimmunized for HPV with a documented refusal (Figure 29). Within health authorities, IH had the largest proportion of both female (17.2%) and male (17.3%) students unimmunized with a documented refusal (Figure 29). NH had the highest proportion of female (30.2%) and male (36.0%) students unimmunized for unknown reasons. At the HSDA level, the highest proportion of female and male students unimmunized with a documented refusal was in Kootenay Boundary, at 21.3% and 24.4%, respectively (Figure 30). The largest proportion of students unimmunized for unknown reasons was in Northeast HSDA, at 42.2% of females and 49.5% of males.

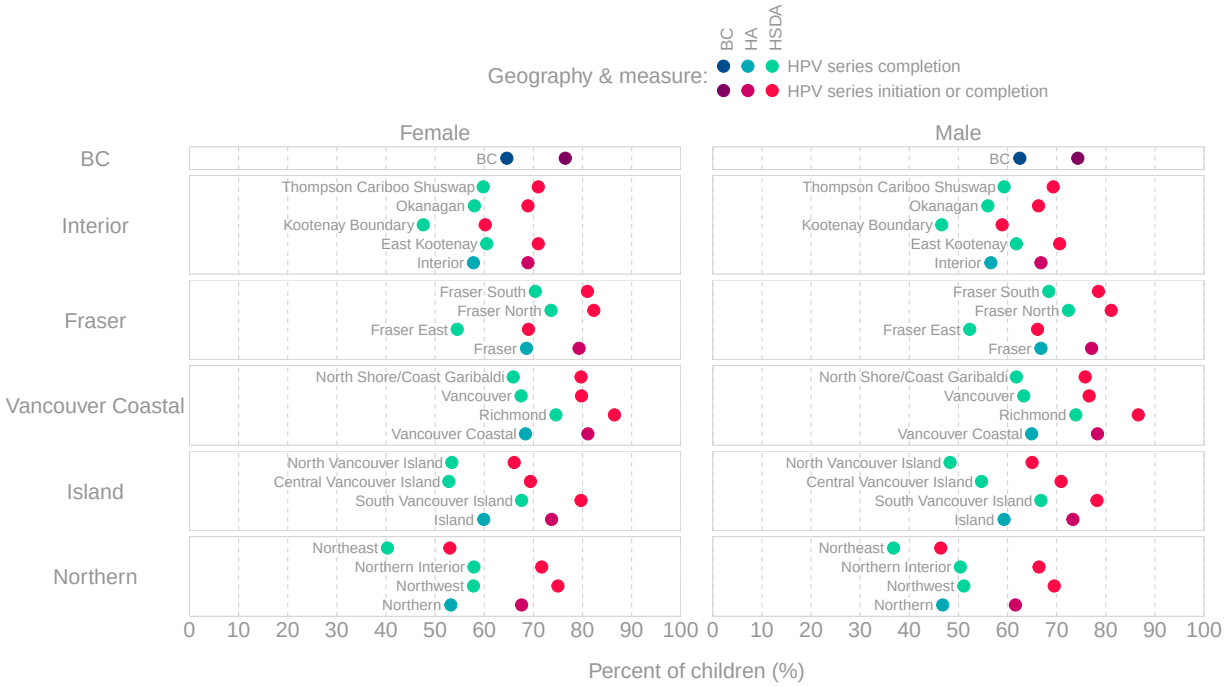
Data tables containing overall, female, and male HPV series completion and HPV series initiation (one dose) coverage estimates for current and prior school year cohorts can be found here.

Immunization coverage



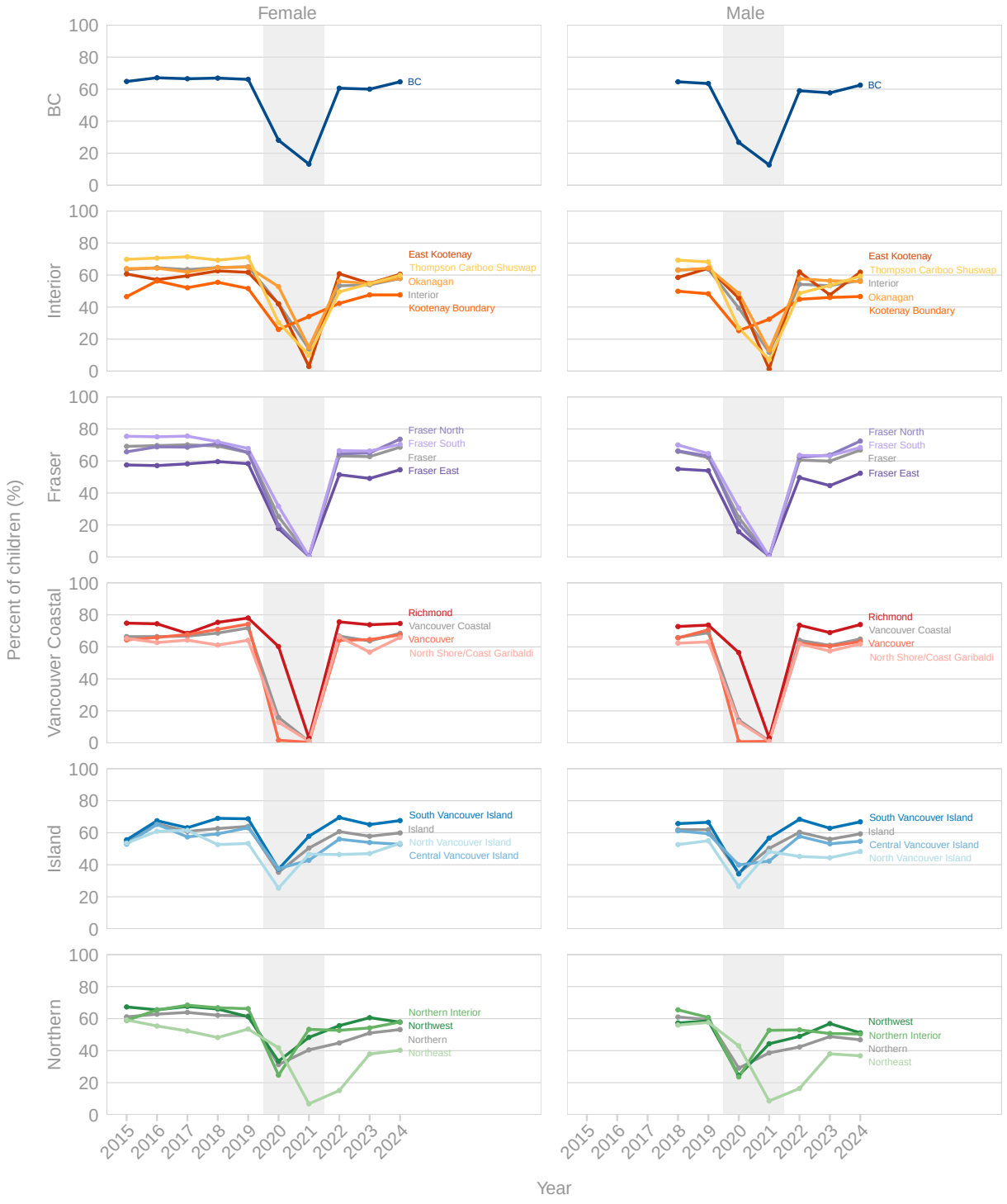
Note: The grey shaded area highlights the impact of the COVID−19 pandemic on school−based HPV immunization programming. Assessment of HPV coverage in grade 6 males began in 2018. The data presented in this figure do not include individuals where gender is reported as undifferentiated or unknown. See 'Other data notes', pg 33.

Figure 26. HPV coverage by year, health authority and sex, Grade 6 students, British Columbia



Note: The data presented in this figure do not include individuals where gender is reported as undifferentiated or unknown. See 'Other data notes', pg 33.

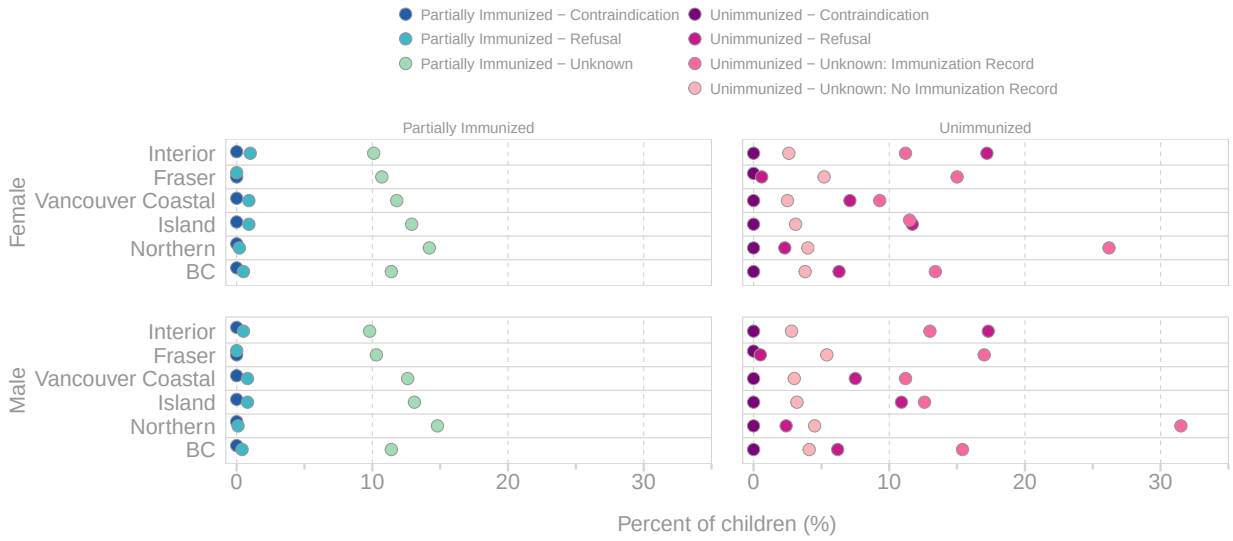
Figure 27. HPV initiation or series completion coverage by geographic region and sex, Grade 6 students, British Columbia, 2024



Note: The grey shaded area highlights the impact of the COVID−19 pandemic on school−based HPV immunization programming. Assessment of HPV coverage in grade 6 males began in 2018. The data presented in this figure do not include individuals where gender is reported as undifferentiated or unknown. See 'Other data notes', pg 33.

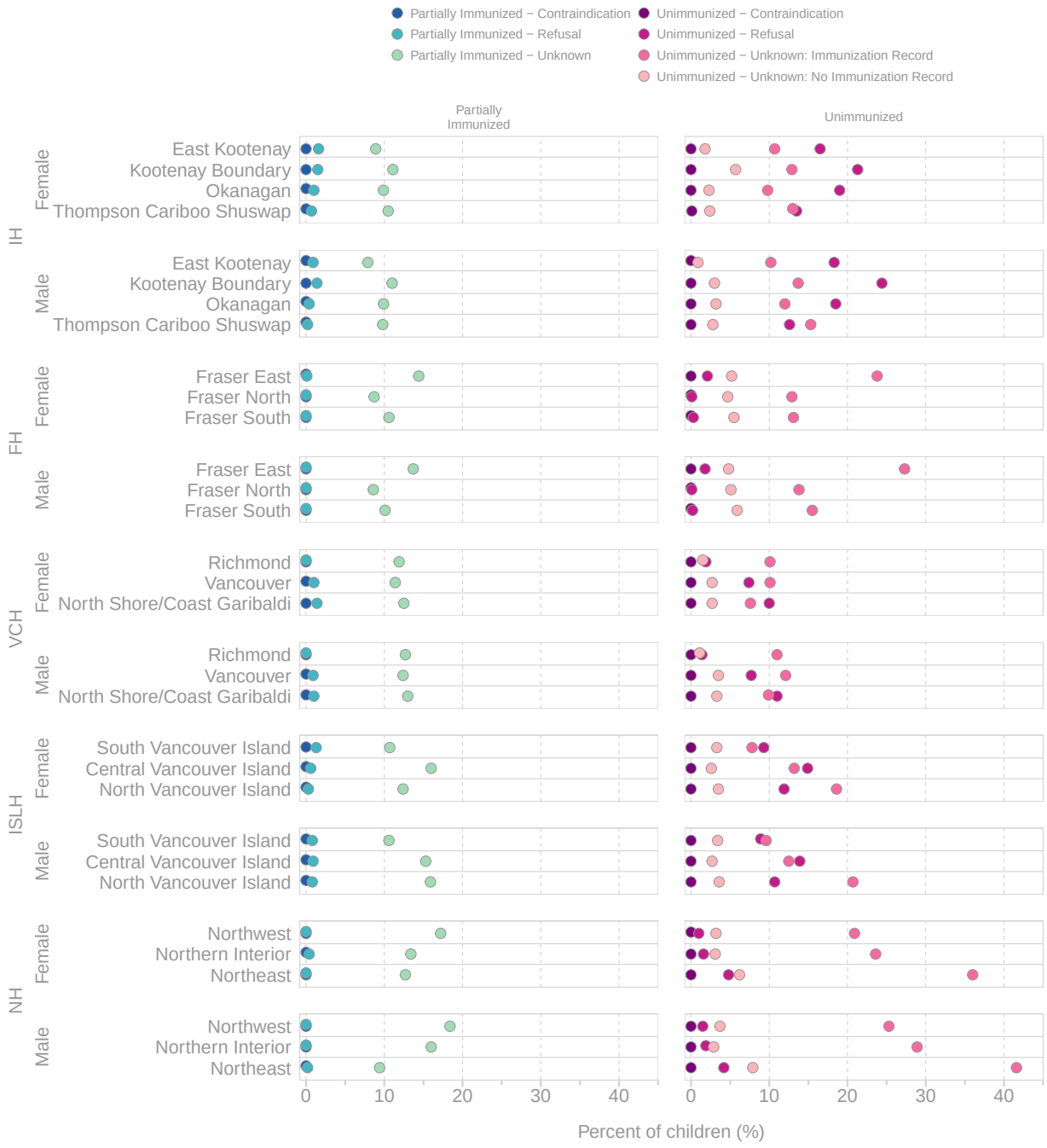
Figure 28. HPV coverage by year, geographic region and sex, Grade 6 students, British Columbia

Reasons for non-immunization



Note: The data presented in this figure do not include individuals where gender is reported as undifferentiated or unknown. See 'Other data notes', pg 33.

Figure 29. Reasons for non-immunization by health authority and sex, HPV, Grade 6 students, British Columbia, 2024



Note: The data presented in this figure do not include individuals where gender is reported as undifferentiated or unknown. See 'Other data notes', pg 33.

Figure 30. Reasons for non-immunization by health service delivery area and sex, HPV, Grade 6 students, British Columbia, 2024

Data Notes

Data Sources

In 2024, coverage estimates for all health authorities are based on records extracted from the Provincial Immunization Registry (PIR) (including records transmitted from regional clinical systems) on July 31, 2024.

All immunization doses are recorded in PIR if administered by public health, reported by a parent/guardian to public health (e.g., for children arriving from outside of BC), or if reported by a primary care provider to public health. Additionally, doses administered by pharmacists and entered in PharmaNet are also recorded in PIR. In 2024, coverage estimates are based on immunizations recorded as administered by July 31, 2024; in report years prior to this, coverage reflected doses recorded as administered up to June 30th of the report year.

Data sources used for each of the health authorities have changed over time as follows:

<table>
<tr><th rowspan="2">Health Authority</th><th colspan="10">Year</th></tr>
<tr><th>2015</th><th>2016</th><th>2017</th><th>2018</th><th>2019</th><th>2020</th><th>2021</th><th>2022</th><th>2023</th><th>2024</th></tr>
<tr><td>IH</td><td colspan="3">Health Authority Summary Reports *</td><td colspan="7">Pan-Grade*</td></tr>
<tr><td>FH</td><td colspan="3">Health Authority Summary Reports</td><td colspan="7">Pan-Grade</td></tr>
<tr><td>VCH</td><td colspan="9">Health Authority Summary Reports</td><td>Pan-Grade</td></tr>
<tr><td>ISLH</td><td colspan="3">Pan-Year/MoE</td><td colspan="7">Pan-Grade</td></tr>
<tr><td>NH</td><td colspan="5">Health Authority Summary Reports</td><td colspan="5">Pan-Grade</td></tr>
</table>

*In 2017, the Rutland Branch in the Okanagan HSDA used Pan-Grade, while the rest of IH used Health Authority Summary Reports.

Numerators and denominators are defined as follows:

Data source	Numerator	Denominator
Pan-Grade	Number of children from the denominator who were up-to-date for age for the specified agent(s) by June 30th of the indicated year, based on PIR immunization records.	Number of students with active records in PIR that indicated they were in grade 6 as of June 30th of the school year of interest. For HPV coverage stratified by gender, only the number of female or male students enrolled in grade 6 as of June 30th was used.
Health Authority Summary Reports	Number of children from the denominator who were up-to-date for age for the specified agent(s) by June 30th of the indicated year, usually based on HA records of immunizations given.	Number of students in grade 6 during the school year of interest, usually based on class lists provided by schools. For HPV coverage stratified by gender, only the number of female or male students enrolled in grade 6 as of June 30th was used.

Pan-Year/MoE	Number of children in the birth cohort for which the majority of children attended grade 6 during the school year of interest with active records in PIR who were up-to-date for age for the specified agent(s).	Number of children in the birth cohort of interest attending grade 6 within the health authority, based on estimates derived from BC MoE enrollment statistics

School and grade information is attached to student's records in the PIR in two ways:

- For schools using either the MyEdBC or CIMS information system and who have signed a letter of agreement, information is uploaded from a MoE extract into PIR using a tool called STIX. As of September 2023 and for the 2022/2023 school year, this process included 95% of students in schools registered with the BC MoE. Health authority staff reconcile the school information against the PIR record when discrepancies occur. Efforts to onboard additional schools to MyEdBC continue.
- For schools using other information systems, health authority staff may manually enter or upload school and grade information. The process of adding enrollment details may not be completed for all health authorities and grades. Most health authorities prioritize milestone grades (kindergarten, grade 6 and grade 9) and a small number of schools may not make their class lists available.

The use of different data sources for numerators and denominators can impact coverage rates and comparability of data across years:

- ISLH (2014-2017): Due to the use of different data sources for numerator and denominator, ISLH results, and the corresponding provincial data for 2014 to 2017, are not directly comparable to previous or later years. Related to implementation of the Panorama public health information system in July 2013, ISLH was unable to reconcile all records of students enrolled in schools. Therefore, coverage was calculated using numerator data from Panorama on active records for those born in 2002 (for 2014), 2003 (for 2015), 2004 (for 2016) and 2005 (for 2017) without the ability to confirm school/grade 6 enrolment; denominators were aggregate data from the BC MoE's data on enrolment in grade 6 to attempt to account for those who have moved out of ISLH. As different data sources were used for the numerators and denominators, immunization coverage rates approaching 100% in ISLH from 2014-2017 are likely over-estimates. This artifact was rectified when the same data source was used for numerators and denominators.
- IH (2017): Due to the difference in methods used to calculate coverage in the Rutland branch in the Okanagan HSDA in 2017, the Okanagan and IH results, and corresponding provincial data for 2017 are not directly comparable to previous years.
- All health authorities: Due to changes in data sources used to calculate coverage in IH, ISLH, and FH from 2018, NH from 2020, and VCH from 2024, the corresponding provincial data are not directly comparable to previous years.

Cohort

The grade 6 cohort is defined as students whose records indicated they attended school within the region's service area based on Ministry of Education enrolment data as recorded in the online MyEdBC system and on student records obtained from schools not participating in MyEdBC. When using PIR data, students were included in the numerator and denominator if they had a value of 'Grade 6', 'Home Schooled', or 'Elementary ungraded' in the Grade variable, and met the required birth date range. For the 2024 report, students in 'Grade 6' were included when born between January 1, 2011 and December 31, 2013, while students 'Home Schooled' or in 'Elementary ungraded' were included when born between January 1, 2012 and December 31, 2012.

Coverage reported for any given year reflects children enrolled in grade 6 as of June 30th of that year (e.g., 2024 results are for children enrolled in grade 6 as of June 30, 2024).

Calculations

All analyses were conducted using business rules which calculated ages and time intervals at receipt of immunization. Each dose was counted as a valid dose only if given at or after the earliest eligible age and/or at a time interval greater than or equal to the shortest acceptable interval. Beginning in 2024, coverage reported for any given year reflects doses recorded as administered up to July 31st of that year (e.g., 2024 coverage is for doses administered by July 31, 2024). Prior to 2024, coverage reported reflected doses recorded as administered up to June 30th of that report year.

For HPV, series completion and series initiation but not completion are mutually exclusive categories. Where HPV coverage is stratified by gender, the denominator includes the number of female or male students enrolled in grade 6.

Coverage results by health authority and HSDA are reported based on the location of the child's school.

Limitations

Data included in this report need to be interpreted with caution for the following reasons:

- All calculations are based on vaccine doses recorded in the provincial immunization registry or regional clinical systems and school enrollment records maintained by regional health authorities using electronic enrollment records from the Ministry of Education, or records received directly from schools. To be considered up-to-date for age, documentation of every dose in an immunization registry (PIR) or clinical system (PARIS) is required. Doses administered by providers other than public health and not reported to public health or the registry, including doses administered outside of BC to newly arrived students whose records have not yet been received by public health, may not be documented in the registry. All regions make their best efforts to obtain vaccination records pertaining to immunizations given by providers other than public health.
- There can be a delay in obtaining immunization records, which can result in delay of data entry.
- First Nations children may not be completely captured in the registries. On-reserve birth records and immunizations may not be reported to the regional health authorities.
- The PIR includes the following school types: Alternate, Distance, Distance Learning, Independent, Long Term Program, Self-Directed, Short Term Program, and Standard. Students attending First Nations schools may be under-represented in this dataset because some First Nations schools are not registered with the BC Ministry of Education and are therefore not captured in the provincial list of schools.

- Data may not be comparable by HSDA from year to year due to ongoing changes in data collection methods and changes in geographic health area boundaries. However, assuming consistency in reporting practices, overall trends in immunization coverage can be assessed by examining these data.

Definitions

Up-to-date for age

Measure	Definition
Hepatitis B	3 doses if series was started before grade 6; 2 doses if series was started in Grade 6.
Varicella	2 doses of varicella vaccine (first immunization occurred on or after first birthday), or recorded exemption for varicella due to previous disease or protective antibody levels. The evidence required to be recorded as having a previous history of varicella disease or shingles has changed over time. See data notes.
Measles	2 doses measles-containing vaccine or recorded exemption due to laboratory evidence of immunity/previous disease
Mumps	2 doses mumps-containing vaccine
Rubella	At least 1 dose rubella-containing vaccine or recorded exemption due to laboratory evidence of immunity/previous disease
HPV (up-to-date/series completion)	2 doses of HPV vaccine in grade 6 (with at least 5 months between doses).
HPV (series initiation, but not completion)	At least 1 dose of HPV vaccine, but did not complete a 2-dose series.

Reasons for non-immunization

Measure	Definition
Exemption: Lab Evidence of Immunity	*For varicella, measles and rubella only.* For the agent/antigen of interest, does not meet the criteria for up-to-date and has an active exemption due to lab evidence of immunity/disease recorded prior to June 30th.
Exemption: Previous Disease (varicella)	*For varicella only* Does not meet any of the previous definitions and has an active exemption due to previous disease for varicella recorded prior to June 30th.

Partially Immunized with Contraindication	*For agents/antigens requiring more than one dose.* For the agent/antigen of interest, does not meet any of the previous definitions and has received at least one valid dose and has an active contraindication recorded prior to June 30th.
Partially Immunized with Refusal	*For agents/antigens requiring more than one dose.* For the agent/antigen of interest, does not meet any of the previous definitions and has received at least one valid dose and has an active or inactive refusal recorded prior to vaccine administration cutoff date.
Partially Immunized - Unknown	*For agents/antigens requiring more than one dose.* For the agent/antigen of interest, does not meet any of the previous definitions and has received at least one valid dose. **Note:** These children may have invalid doses or inactive refusals, exemptions, or contraindications for the agent/antigen of interest. They may also have valid/invalid doses or active or inactive refusals, exemptions, or contraindications that do not apply to the agent/antigen of interest, or no recorded refusals, exemptions, or contraindications for any agent/antigen.
Unimmunized with Contraindication	For the agent/antigen of interest, does not meet any of the previous definitions and has no recorded valid dose(s) and has an active contraindication recorded prior to June 30th.
Unimmunized with Refusal	For the agent/antigen of interest, does not meet any of the previous definitions and has no recorded valid dose(s) and has an active or inactive refusal recorded prior to vaccine administration cutoff date.
Unimmunized - Unknown	For the agent/antigen of interest, does not meet any of the previous definitions and has no recorded valid dose(s) at any time up to/including the data extract date. **Note:** These children may have invalid doses or inactive refusals, exemptions, or contraindications for the agent/antigen of interest. They may also have valid/invalid doses or active/inactive refusals, exemptions, or contraindications that do not apply to the agent/antigen of interest, or no recorded refusals, exemptions, or contraindications for any agent/antigen.
2024 report: Unimmunized – Unknown: Immunization Record	Meets the 'Unimmunized - Unknown' definition and has recorded invalid doses or inactive contraindications or exemptions for the agent/antigen of interest or has active or inactive refusals, contraindications or exemptions that do not apply to the agent/antigen of interest at any time up to/including the data extract date. The antigens considered include diphtheria, tetanus, pertussis, polio, hepatitis B, meningococcal C, measles, mumps, rubella, varicella, and human papillomavirus.

Unimmunized – Unknown: No Immunization Record	Meets the ’Unimmunized - Unknown’ definition and has no recorded valid or invalid doses or active or inactive refusals, exemptions, or contraindications for any of diphtheria, tetanus, pertussis, polio, hepatitis B, meningococcal C, measles, mumps, rubella, varicella, and human papillomavirus.

Minimum Intervals and Ages Between Doses

Antigen/Agent	Minimum Age or Minimum Time Interval Between Eligible Doses		
	Dose 1[A]	Dose 2	Dose 3
Hepatitis B			
Series started at any age:			
received 3rd dose before June 2007	0 days	28 days	28 days
received 3rd dose between June 2007 and May 2014	0 days	28 days	56 days[B]
received 3rd dose in June 2014 or later	0 days	28 days	56 days[B,C]
Series started on or after 10 years and 8 months of age	10 years + 8 months	16 weeks[D]	
Varicella[E]	12 months	28 days	
Measles	12 months	28 days	
Mumps	12 months	28 days	
Rubella[F]	12 months		
HPV			
2 dose schedule (for dose 1 given age 9 to 14)	9 years	150 days	

A. Dose 1 refers to the earliest age a child can receive the initial dose.
B. Dose 3 must be given at least 16 weeks (112 days) after dose 1.
C. Dose 3 must be given on or after 24 weeks of age.
D. Dose 2 must be given at least 24 weeks after dose 1 if either dose 1 or dose 2 is Engerix®-B.
E. To be counted as valid, varicella vaccine must be administered on or after 12 months of age.
F. Schedule for measles/mumps should be followed when rubella provided in combination vaccine with measles/mumps.

Other data notes

New changes to the 2024 grade 6 immunization coverage report:

- Coverage estimates for measles, mumps and rubella are now included in the grade 6 immunization coverage report with data from 2021 (2020/2021 school year) through to 2024 (2023/2024 school year).
- Coverage estimates are based on immunization doses recorded as administered by July 31, 2024. In prior years, coverage estimates reflected doses recorded as administered up to June 30th of the report year.

Historical changes to the grade 6 immunization coverage report:

- In 2015, three schools with grade 6 students in the Kootenay Boundary HSDA did not provide public health with class lists. As the children attending these schools could not be identified, they could not be included in the immunization coverage analysis. Based on information posted on the BC MoE's website, these schools accounted for approximately 3% of grade 6 students in Kootenay Boundary.

Immunization program and coverage assessment rule changes:

COVID-19 pandemic impacts：

- In the 2021/2022 school year, school-based clinics were offered in all HAs with some providing catch-ups for grade 7 students to receive the grade 6 milestone vaccines. Additional catch-up was offered during subsequent years, as required. Where coverage did not return to pre-pandemic levels it may reflect ongoing operational impacts of the COVID-19 response (e.g., increases in absenteeism among schoolchildren due to illness, lack of staffing resources in remote and rural areas, or competing priorities in public health departments) or changes in data sources between pre- and post-pandemic periods.
- In the 2020/2021 school year, ongoing prioritization of the COVID-19 pandemic response affected some public health resources available for school-based immunization programs. This was most significant in FH, which did not complete any school-based clinics in the 2020/2021 school year.
- In March 2020, the COVID-19 pandemic was declared and initially resulted in a province-wide shut down that impacted the provision of public health services including routine immunization services. As a result, some coverage rates were lower in 2020 and 2021 than previous years, particularly for the doses scheduled to be received in the last few months of the 2019/2020 school year or the first few months of the 2020/2021 school year.

Varicella：

- The evidence required to be recorded as having a previous history of varicella disease or shingles has changed over time:
  - Beginning in December 2013, a varicella susceptible person was defined as having no history of varicella disease or shingles after 1 year of age and no history of age-appropriate varicella vaccination.
  - A self-reported history of disease was adequate for those born before 2004, while a health care provider diagnosed history was required for those born in 2004 or later. Most children born in 2004 were in grade 6 during the 2015/2016 school year.

  - Since June 2018, a varicella susceptible person is defined as one without a history of lab confirmed varicella or shingles after 1 year of age and without a history of age-appropriate varicella vaccination. As such, the current definition requires lab evidence of prior disease on or after 1 year of age for proof of immunity.

- The date of varicella disease onset is not systematically entered into PIR, therefore, for the purposes of this assessment, any child with a varicella exemption is considered protected, regardless of their age at the time of illness.
- Prior to 2013, only one dose of varicella vaccine (on or after the first birthday) was required in order to be considered up-to-date for varicella vaccine. This change in definition reflects a change in immunization policy that was implemented during the 2012/2013 school year, when a second dose of varicella vaccine was offered to susceptible students in grade 6.

Human papillomavirus (HPV)：

The HPV adolescent immunization program has had several iterations in BC:

- The first cohort to receive HPV vaccination in grade 6 were females in the 2008/2009 school year, with a three-dose series (with at least 4 weeks between doses 1 and 2 and at least 12 weeks between doses 2 and 3).
- Starting in the 2010/2011 school year, the HPV immunization schedule in grade 6 changed to a 2 dose schedule requiring at least 6 months between doses.
- Starting in the 2014/2015 school year, the minimum acceptable interval between doses changed to 5 months (150 days) apart, with the first dose given before 15 years old.
- Starting in the 2017/2018 school year, the HPV immunization program was extended to include males in grade 6.
- See the History of Immunization in BC for further information on the HPV immunization program.

PIR notes:

- Due to ongoing development of the interface between the FH information system and PIR, supplementary information on reasons for non-immunization (i.e., exemptions, refusals and contraindications) is not complete. Therefore, the proportion of partially immunized and unimmunized grade 6 students with unknown reasons for non-immunization is likely to be overestimated. The number of children partially immunized or unimmunized due to refusals or contraindications, as well as the number of children with protection against varicella, measles, and rubella due to previous infection and/or lab evidence of immunity would be underestimated.
- The gender variable in the PIR contains the following values: Male, Female, Undifferentiated, and Unknown. For the purpose of this report, only stratified coverage for males and females were reported in the HPV figures as the proportion of those in the Undifferentiated and Unknown categories comprise <0.01% of the total population. Those in the Undifferentiated and Unknown categories are included in the figures and supplementary data tables that report coverage values for the total population.
- International students who attend school in BC are classified into two categories in the PIR based on their length of stay: 1) short stay (<6 months) and 2) long stay (≥6 months). Health authorities attempt to collect immunization records for all long stay students in the province, however the length of stay is unknown for the majority of international students in the registry. Thus, immunization records may be incomplete for international students and coverage is likely underestimated for this population. As international students are included in the analyses, coverage estimates may be slightly underestimated.