BC Centre for Disease Control
Provincial Health Services Authority

Immunization Programs
and Vaccine Preventable
Diseases Service

655 West 12th Avenue
Vancouver, BC V5Z 4R4

Tel 604-707-2548
Fax 604-707-2515

www.bccdc.ca

Immunization Coverage in Children by the Seventh Birthday

2015-2024

August 2025

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

ACCREDITED · AGRÉÉ · CCHSA · CCASS

A research and teaching centre affiliated with UBC

Table of Contents

Authors

Immunization Programs and Vaccine Preventable Diseases Service

BC Centre for Disease Control, 655 West 12th Avenue, Vancouver, BC Canada V5Z 4R4

vpd.epi@bccdc.ca | Phone: 604-707-2548

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

Additional abbreviations

BC	British Columbia	DTaP	Diphtheria, tetanus, acellular pertussis
MoE	Ministry of Education	DTap-IPV	Diphtheria, tetanus, acellular pertussis, polio
HA	Health Authority		
HSDA	Health Service Delivery Area	MMRV	Measles, mumps, rubella, varicella
MyEdBC	MyEducation BC	Tdap-IPV	Tetanus, diphtheria, acellular pertussis, polio
PIR	Provincial Immunization Registry		
PARIS	Primary Access Regional Information System		

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

Executive Summary

Immunization coverage is routinely assessed at milestone ages for children in British Columbia (BC). This report outlines immunization coverage among seven-year-olds from 2015 to 2024 for nine antigens: diphtheria, tetanus, pertussis, polio, hepatitis B, measles, mumps, rubella, and varicella; as well as overall up-to-date coverage (i.e., those up-to-date for all antigens). Infants in BC are currently recommended to receive thirteen doses of seven different vaccines. In addition to infant vaccines, children in BC are recommended to receive a single booster dose of two different vaccines (Tdap-IPV and MMRV) between the ages of 4-6 years which protect against tetanus, diphtheria, pertussis, polio and measles, mumps, rubella, and varicella.

The proportion of seven-year-olds who are up-to-date for all routine immunizations has declined for the last three consecutive years of reporting, from 72.5% in 2021 to 63.8% in 2024. These year-over-year declines bring the 2024 rate of overall up-to-date coverage to below the rate observed in 2016. Up-to-date coverage also declined from 2021 to 2024 across all regional health authorities, except Island Health (ISLH), which saw a slight increase in 2024 from the previous year. Provincial coverage was highest for rubella (85.7%) and hepatitis B (81.1%), while coverage for DTaP, DTaP-IPV, polio, measles, mumps, and varicella ranged from 68.1% to 69.9%. Coverage of meningococcal C has been excluded from the up-to-date for age and by antigen coverage measures for seven-year-olds. For further information regarding this change, please see data notes.

Similar to 2023, the most significant declines in immunization coverage this year continue to be observed for those antigens contained in the school-entry (4-6 years) booster doses, including DTaP, polio, measles, mumps, and varicella. These declines may be partially explained by the COVID-19 pandemic, which impacted both receipt of school-entry booster doses and immunization record collection for children born between 2014 and 2016, who turned 4 to 6 years of age in 2020. Up-to-date immunization status at the seven-year-old milestone was assessed for these children in 2022 (2014 birth cohort), 2023 (2015 birth cohort), and the present 2024 report (2016 birth cohort).

Since 2021, the proportion of seven-year-olds in BC with documented refusals to all vaccines has been relatively stable, slightly decreasing from 1.3% in 2023 to 1.1% in 2024. At the health authority level, refusal rates ranged from 0.8-1.9%, with the highest refusal rate observed in Interior Health (IH) (1.9%). Reasons for non-immunization (i.e., documented refusals, exemptions, or contraindications) were assessed for each individual agent/antigen. For those antigens with the lowest coverage rates, a large proportion of children were either partially immunized (15.1-17.6%) or unimmunized (11.3-14.0%) for unknown reasons (ie., no documented refusal, exemption, or contraindication for the agent(s)/antigen(s) of interest).

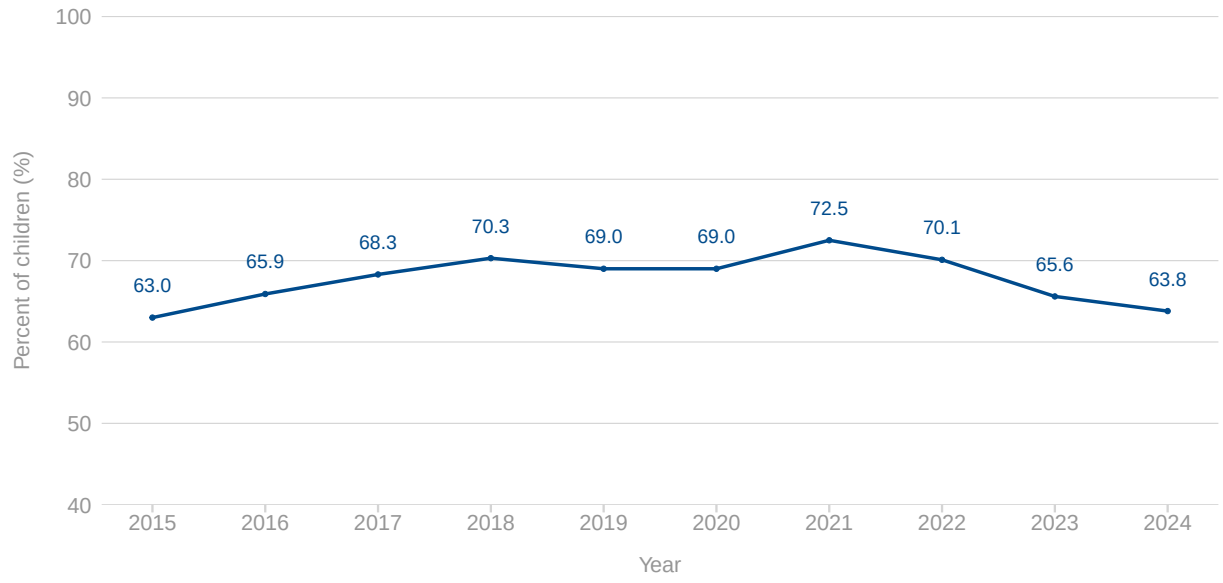
Please refer to the data notes for additional information and data limitations. Data tables used to create the figures in this report can be downloaded here.

Immunization Coverage in BC

Between 2015 and 2024, up-to-date for age coverage at the provincial level increased to a peak of 72.5% in 2021, before steadily declining from 2022 to 2024 (Figure 1). In 2024, the overall percentage of seven-year-olds up-to-date for age in BC was 63.8%, a decrease of 1.8% compared to the previous year.

Coverage for individual antigens declined in 2024 by 1.2-2.9%, with the largest decreases seen in DTaP-IPV and polio (2.9%), followed by mumps (2.6%), and measles (2.5%) (Figure 2). Up-to-date coverage in BC continued to be highest for rubella (85.7%) and hepatitis B (81.1%). The lowest coverage was observed for DTaP-containing agents, measles, mumps, polio, and varicella (68.1-69.9%).

Up-to-date for age



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 1. Up-to-date for age coverage by year, 7-year-olds, British Columbia

Coverage by antigen

Note: The y−axis for this figure starts at 40% for clearer data visualization.

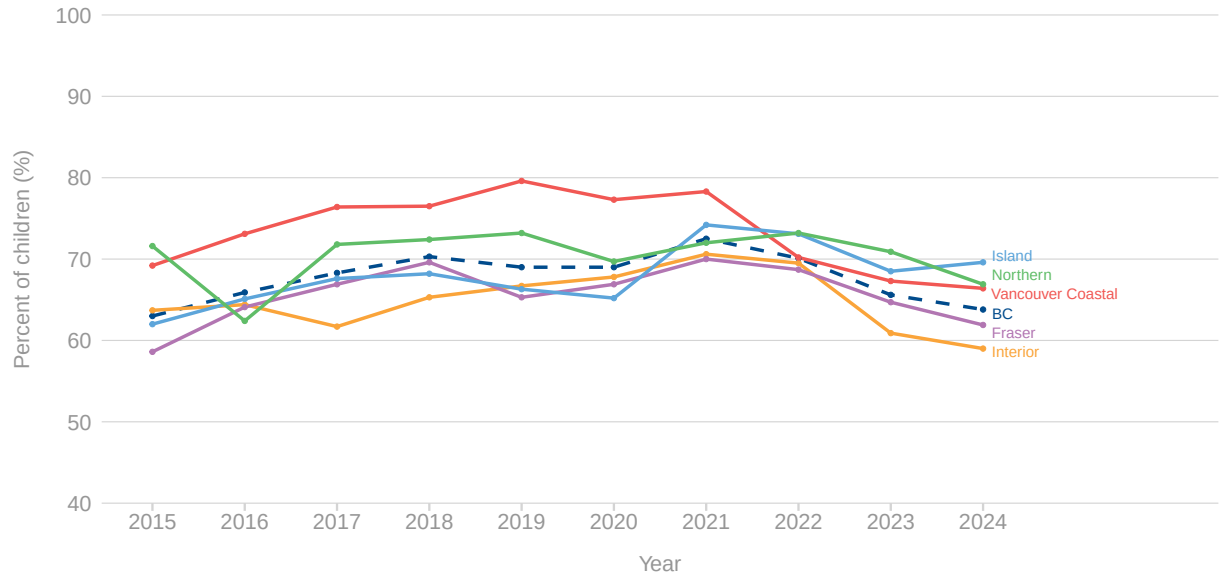
Figure 2. Coverage by year and antigen, 7-year-olds, British Columbia

Immunization Coverage by Regional Health Authority

Summary

At the health authority level, up-to-date for age immunization coverage ranged from 59.0-69.6%. Island Health (ISLH) had the highest coverage at 69.6%, followed by Northern Health (NH) at 66.9% and Vancouver Coastal Health (VCH) at 66.4% (Figure 3). These were followed by Fraser Health (FH) at 61.9% and Interior Health (IH) had the lowest coverage at 59.0%. Compared to 2023, up-to-date for age immunization coverage increased in ISLH by 1.1% and decreased in all other health authorities by 0.9-4.0%, with the largest decrease (4.0%) in NH. Within health service delivery areas (HSDAs), up-to-date for age coverage ranged from 56.6% in the Okanagan and Kootenay Boundary to 77.5% in Richmond (Figure 4).

Rubella and hepatitis B had the highest coverage among individual antigens across health authorities (Figure 5). Coverage declined for all antigens in IH, FH, VCH, and NH relative to the prior year, with decreases ranging from 0.6-5.0%. In ISLH, compared to 2023, immunization coverage increased for DTaP (0.6%) and DTaP-IPV (0.4%), while polio, varicella, measles, and mumps coverage remained relatively stable, within 0.2% of the prior year, and hepatitis B and rubella coverage decreased, by 1.4% and 2.3%, respectively.



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 3. Up-to-date for age by year and health authority, 7-year-olds, British Columbia

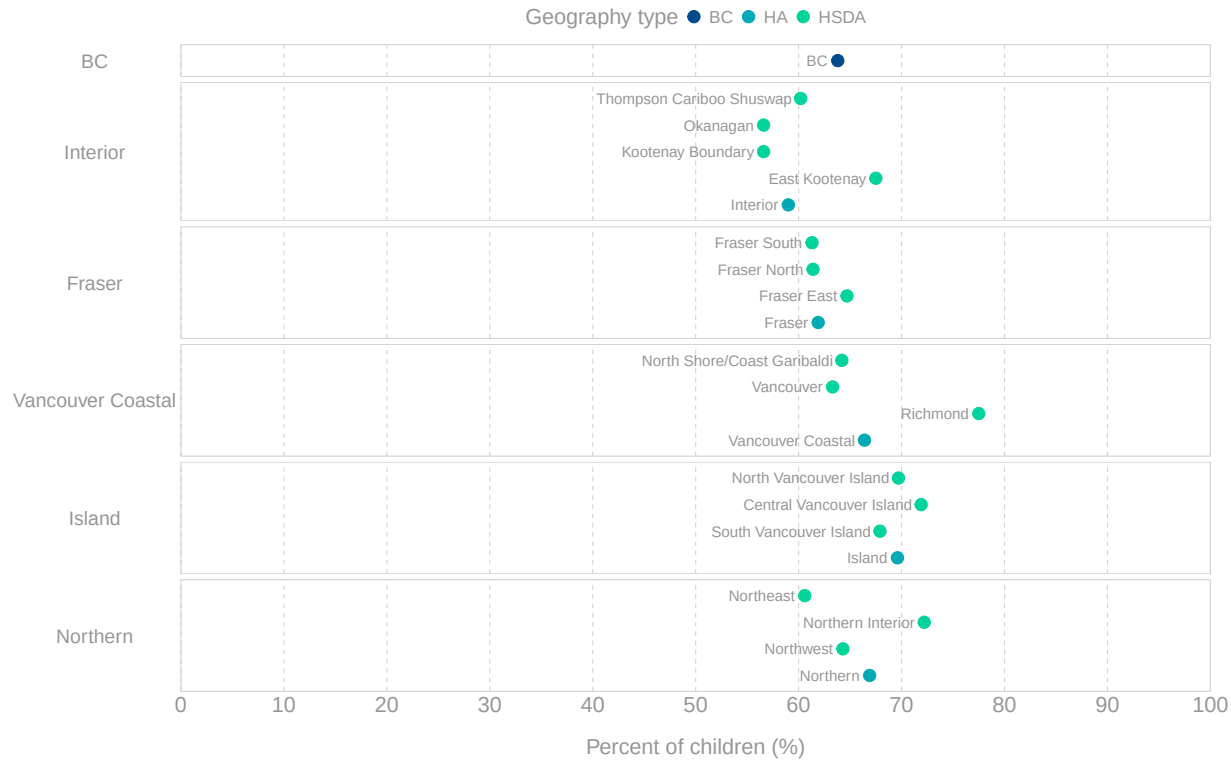
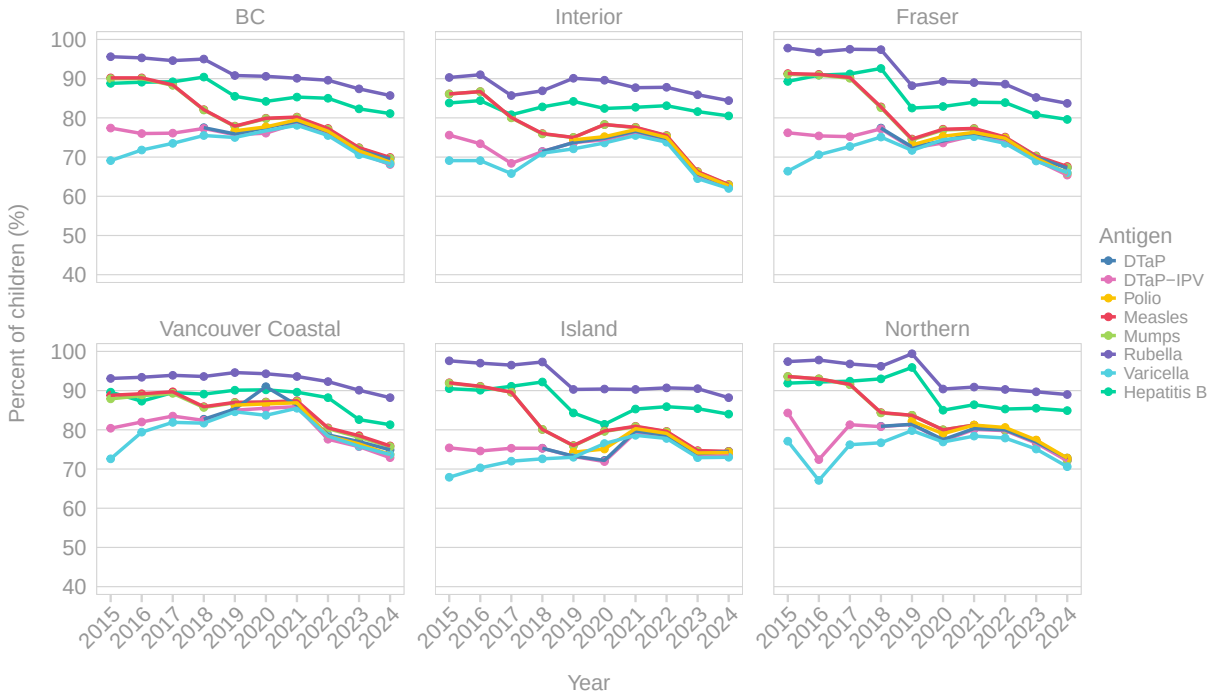


Figure 4. Up-to-date for age by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization. Coverage estimates overlap for measles and mumps, and for DTaP, DTaP−IPV, and Polio, and the individual antigens may be difficult to differentiate.

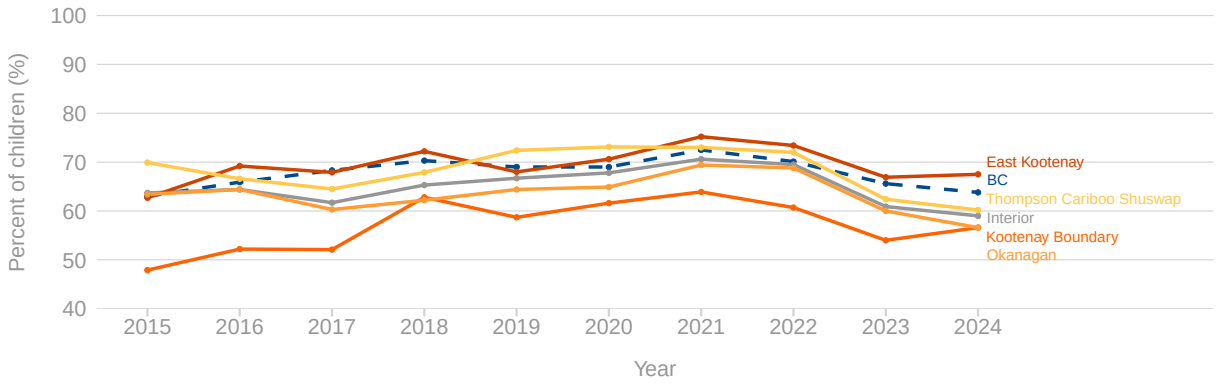
Figure 5. Antigen coverage by year and health authority, 7-year-olds, British Columbia

Interior Health

In IH, up-to-date for age coverage ranged from 56.6% in Kootenay Boundary and Okanagan to 67.5% in East Kootenay (Figure 6). Compared to 2023, coverage increased in East Kootenay (0.6%) and Kootenay Boundary (2.6%), while decreasing in Thompson Cariboo Shuswap (2.2%) and Okanagan (3.4%).

Rubella (80.2-88.7%) had the highest coverage in 2024, followed by hepatitis B (74.1-83.5%) (Figure 7). Coverage rates of the remaining antigens were lower and similar to each other within an HSDA. Compared to 2023, coverage for all antigens in Thompson Cariboo Shuswap and Okanagan decreased 1.1-4.7%. In East Kootenay and Kootenay Boundary, coverage of all antigens was within 1.1% of the prior year, except for varicella coverage in Kootenay Boundary, which increased by 2.9%.

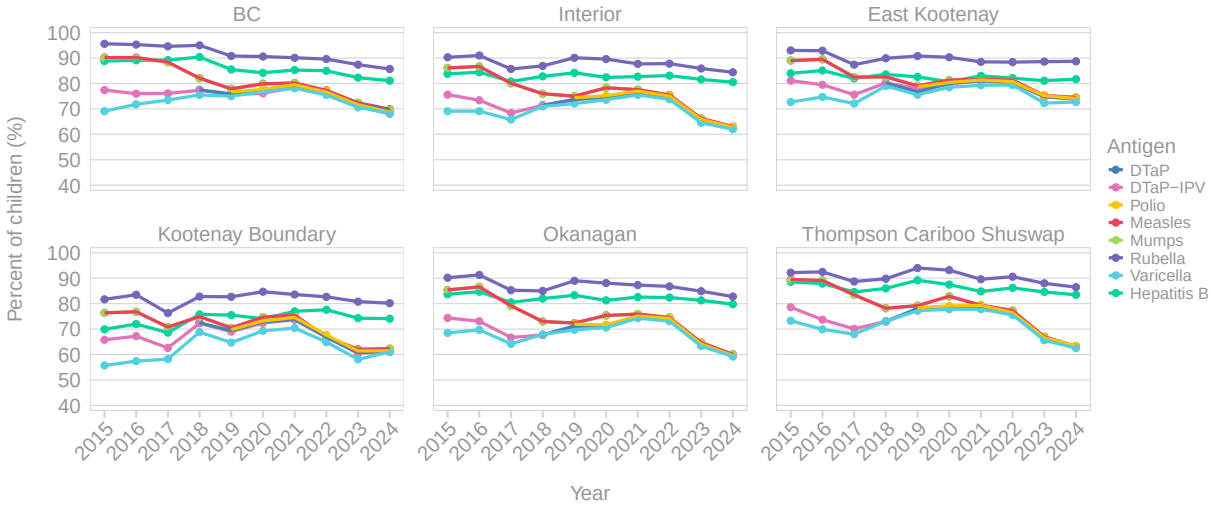
Up-to-date for age



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 6. Up-to-date for age by year and health service delivery area, 7-year-olds, Interior Health

Coverage by antigen



Note: The y−axis for this figure starts at 40% for clearer data visualization. Coverage estimates overlap for measles and mumps, and for DTaP, DTaP−IPV, and Polio, and the individual antigens may be difficult to differentiate.

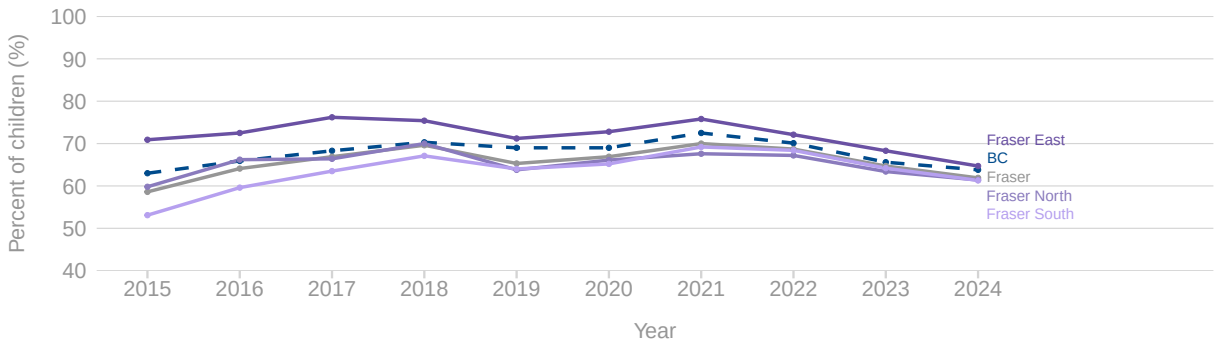
Figure 7. Antigen coverage by year and health service delivery area, 7-year-olds, Interior Health

Fraser Health

In FH, up-to-date for age coverage ranged from 61.3% in Fraser South to 64.7% in Fraser East (Figure 8). Coverage decreased 2.0-3.6% across all HSDAs as compared to 2023.

In 2024, rubella (82.6-87.7%) and hepatitis B (78.1-85.1%) had the highest coverage in each HSDA, while coverage for the remaining antigens were lower and clustered together (Figure 9). Compared to 2023, coverage for all antigens decreased between 0.4-4.3%.

Up-to-date for age



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 8. Up-to-date for age by year and health service delivery area, 7-year-olds, Fraser Health

Coverage by antigen

Note: The y−axis for this figure starts at 40% for clearer data visualization. Coverage estimates overlap for measles and mumps, and for DTaP, DTaP−IPV, and Polio, and the individual antigens may be difficult to differentiate.

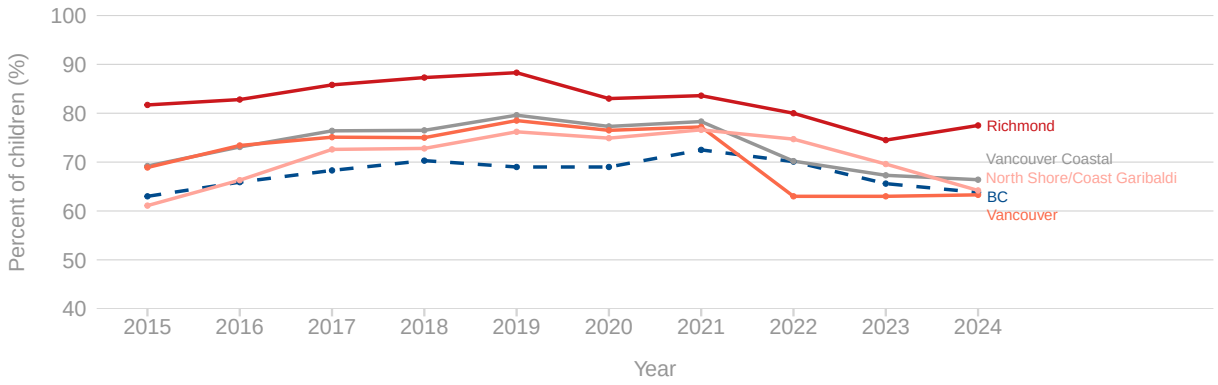
Figure 9. Antigen coverage by year and health service delivery area, 7-year-olds, Fraser Health

Vancouver Coastal Health

Up-to-date for age coverage in VCH ranged from 63.3% in Vancouver to 77.5% in Richmond (Figure 10). Compared to 2023, coverage increased in Richmond (3.0%), decreased in North Shore/Garibaldi Coast (5.4%) and stayed relatively stable in Vancouver (increased 0.3%).

In 2024, rubella had the highest antigen-specific coverage (84.5-95.5%) across VCH's HSDAs (Figure 11). This was followed by hepatitis B coverage (77.6-90.8%) and then the remaining antigens were lower and similar within an HSDA. Coverage of all antigens in Richmond and Vancouver were within 2.0% of the prior year. In contrast, North Shore/Coast Garibaldi coverage decreased 4.3-6.7% across antigens, relative to 2023.

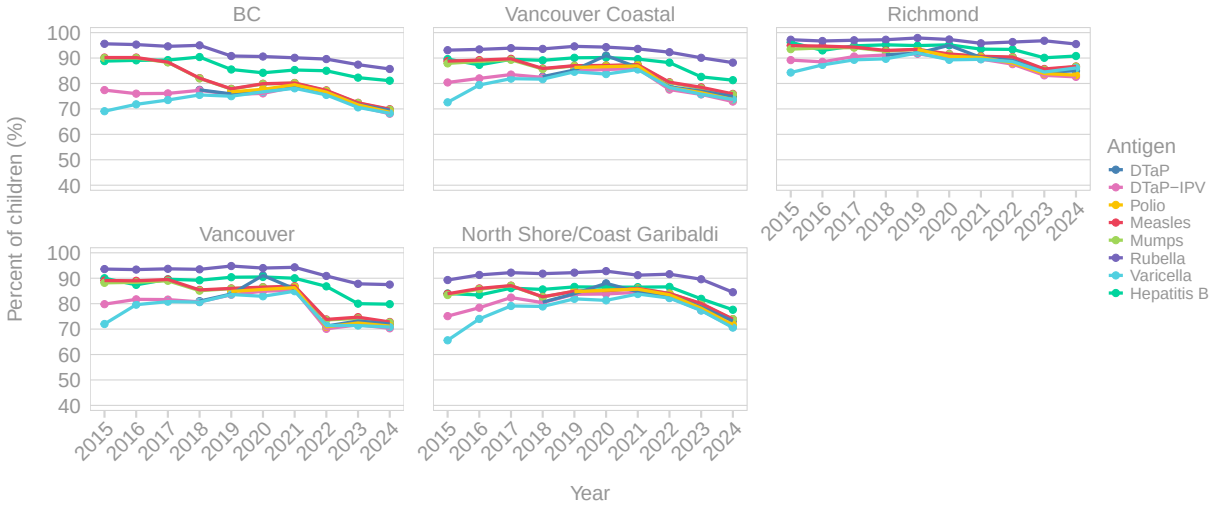
Up-to-date for age



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 10. Up-to-date for age by year and health service delivery area, 7-year-olds, Vancouver Coastal Health

Coverage by antigen



Note: The y−axis for this figure starts at 40% for clearer data visualization. Coverage estimates overlap for measles and mumps, and for DTaP, DTaP−IPV, and Polio, and the individual antigens may be difficult to differentiate.

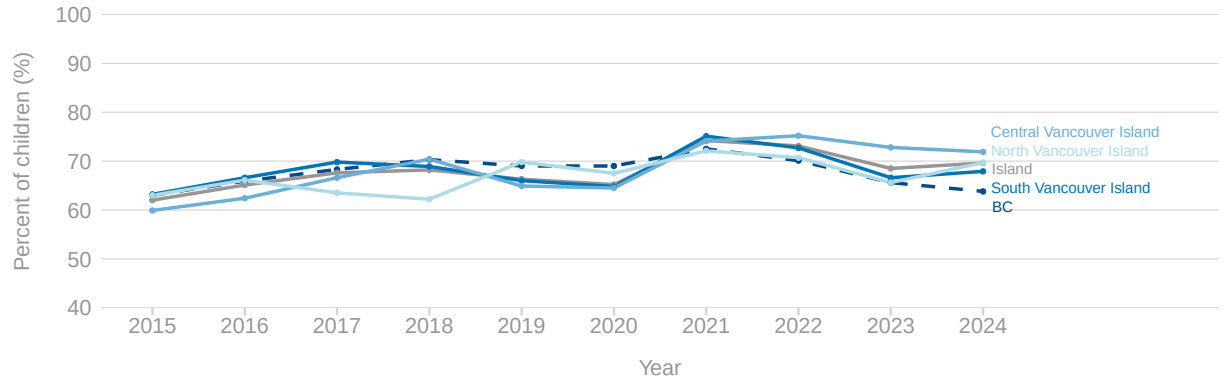
Figure 11. Antigen coverage by year and health service delivery area, 7-year-olds, Vancouver Coastal Health

Island Health

In ISLH, up-to-date for age coverage ranged from 67.9% in South Vancouver Island to 71.9% in Central Vancouver Island (Figure 12). Compared to 2023, coverage increased in North Vancouver Island (4.1%) and South Vancouver Island (1.3%) and decreased in Central Vancouver Island (0.9%).

In 2024, rubella (87.0-89.7%) and hepatitis B (82.6-85.5%) had the highest coverage, while the remaining antigens were lower and similar within an HSDA (Figure 13). Compared to 2023, coverage for all antigens in Central Vancouver Island decreased by 1.2-2.4%. In South Vancouver Island, rubella and hepatitis B coverage decreased from 2023 to 2024 by 2.7% and 2.0%, respectively. Coverage of the remaining antigens in South Vancouver Island were relatively stable, with no change (mumps and varicella), or slight increases of 0.1-0.7% (DTaP-containing products, polio and measles). In contrast, coverage in North Vancouver Island increased 2.8-3.6% across DTaP-containing products, measles, mumps, and varicella, while decreasing for rubella (1.4%) and remained stable for hepatitis B, relative to 2023.

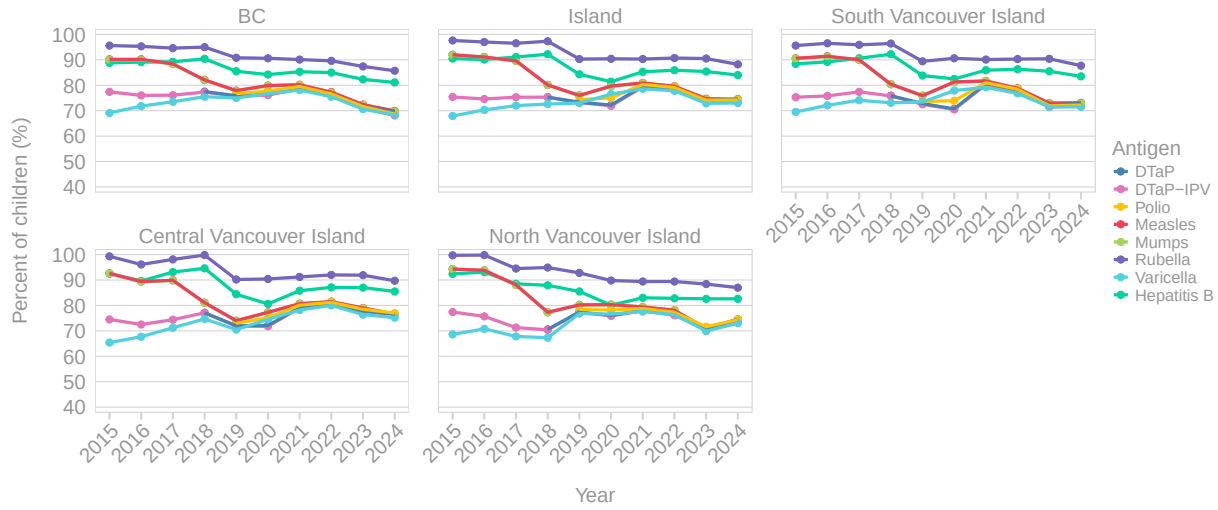
Up-to-date for age



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 12. Up-to-date for age by year and health service delivery area, 7-year-olds, Island Health

Coverage by antigen



Note: The y−axis for this figure starts at 40% for clearer data visualization. Coverage estimates overlap for measles and mumps, and for DTaP, DTaP−IPV, and Polio, and the individual antigens may be difficult to differentiate.

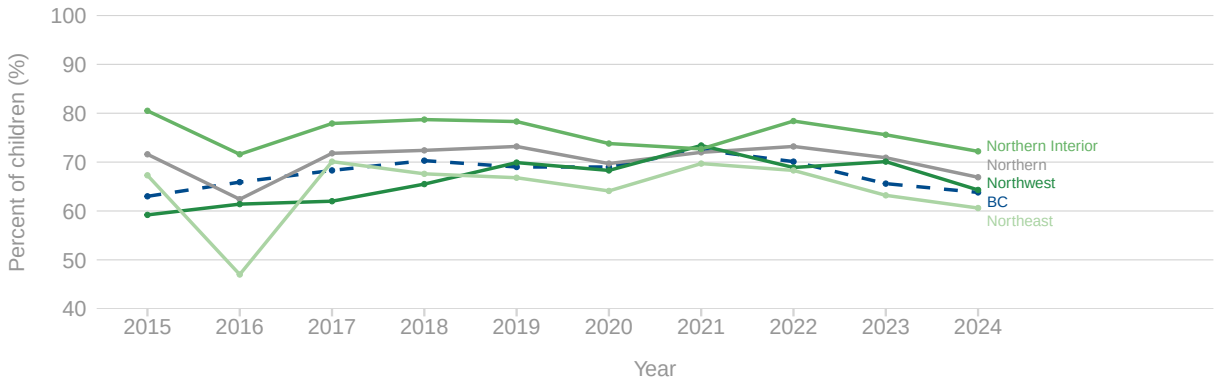
Figure 13. Antigen coverage by year and health service delivery area, 7-year-olds, Island Health

Northern Health

Up-to-date for age coverage in NH ranged from 60.6% in Northeast to 72.2% in Northern Interior (Figure 14). Compared to 2023, coverage decreased 2.6-5.8% across all HSDAs.

In 2024, rubella had the highest coverage (86.4-90.9%) followed by hepatitis B (82.2-87.5%), while rates of the remaining antigens were lower and clustered together within an HSDA (Figure 15). Compared to 2023, coverage for all antigens decreased by 2.4-9.0% across HSDAs, except for hepatitis B and rubella, which increased in Northeast (0.6% and 1%, respectively) and stayed relatively stable in Northern Interior (decreased 0.2% and 0.4%, respectively). Notably, coverage in Northwest had the largest declines for measles, mumps, varicella, and DTaP-containing products, decreasing by 6.7-9.0% relative to 2023.

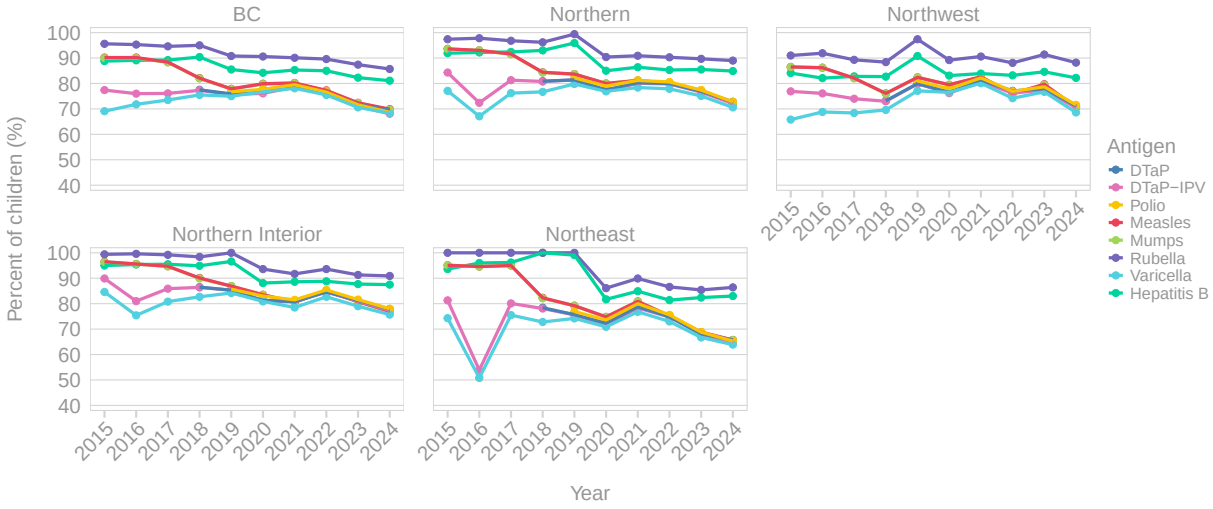
Up-to-date for age



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 14. Up-to-date for age by year and health service delivery area, 7-year-olds, Northern Health

Coverage by antigen



Note: The y−axis for this figure starts at 40% for clearer data visualization. Coverage estimates overlap for measles and mumps, and for DTaP, DTaP−IPV, and Polio, and the individual antigens may be difficult to differentiate.

Figure 15. Antigen coverage by year and health service delivery area, 7-year-olds, Northern Health

Immunization Coverage by Antigen

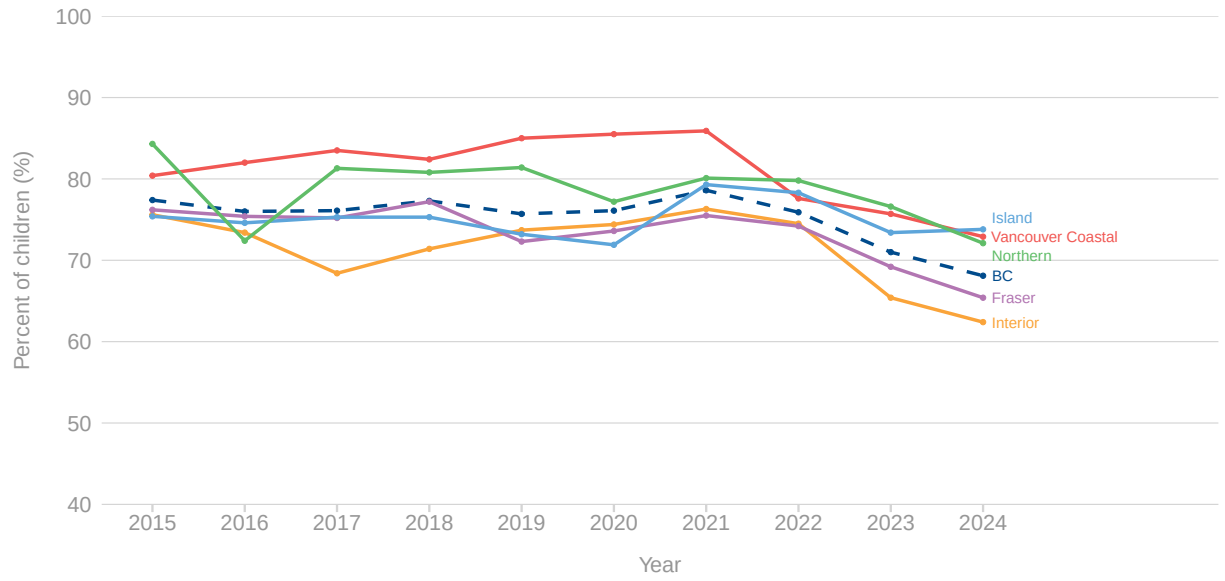
In the following coverage by antigen sections, the 'Unknown' subcategories of partially immunized and unimmunized includes all children who do not have a documented refusal or contraindication for the antigen/agent of interest and were therefore partially immunized or unimmunized for a reason not recorded.

The 'Unimmunized - Unknown' subcategory further divides those who are unimmunized for the antigen/agent 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.

Diphtheria, Tetanus, Pertussis, and Polio (DTaP-IPV)

Coverage for DTaP-IPV has declined for the third consecutive year from 2021 to 2024 at both the provincial level (decreased 10.5% from 2021) and health authority level (decreased 8.0-13.9% from 2021), except in ISLH where coverage declined from 2021 to 2023 and remained relatively stable to 2024, with an overall decline of 5.5% from 2021 to 2024 (Figure 16). Coverage at the provincial level in 2024 was 68.1%, while across the health authorities, coverage ranged from 62.4% in IH to 73.8% in ISLH. At the level of HSDA, coverage was lowest in Okanagan at 59.4% and highest in Richmond at 82.6% (Figure 17 and 18).

Immunization coverage



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 16. DTaP-IPV coverage by year and health authority, 7-year-olds, British Columbia

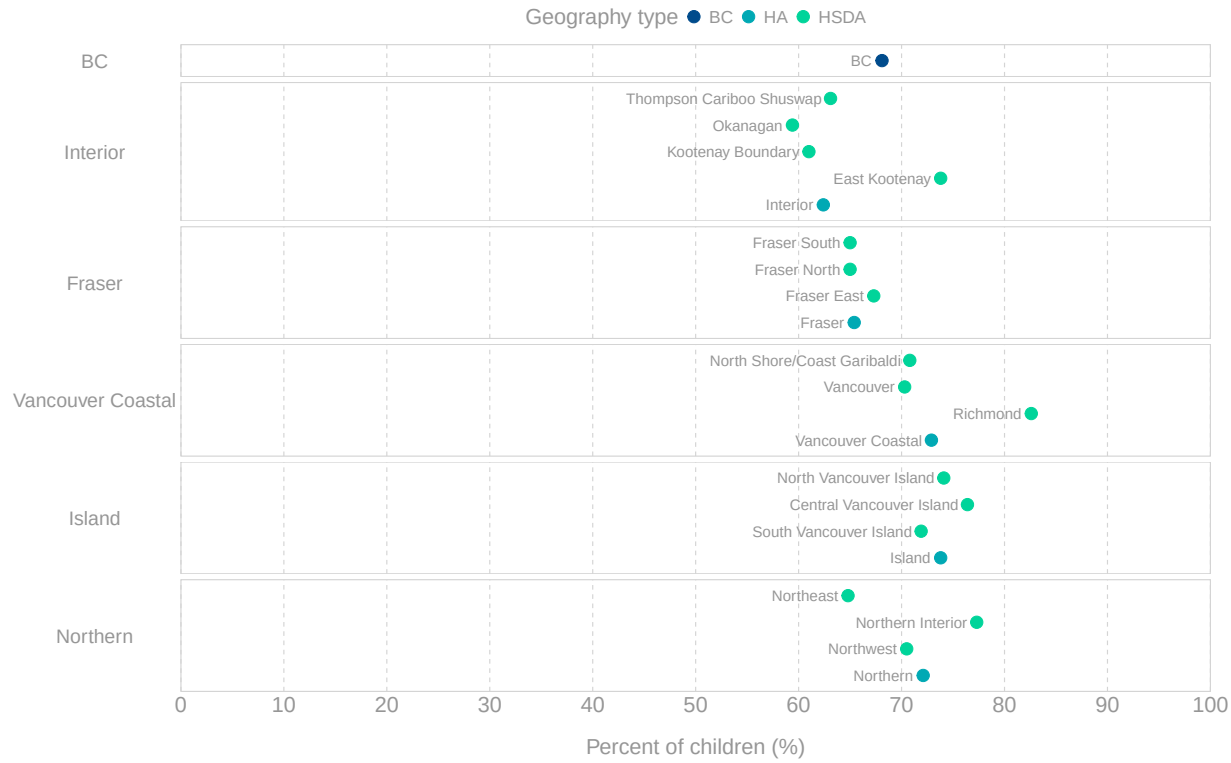
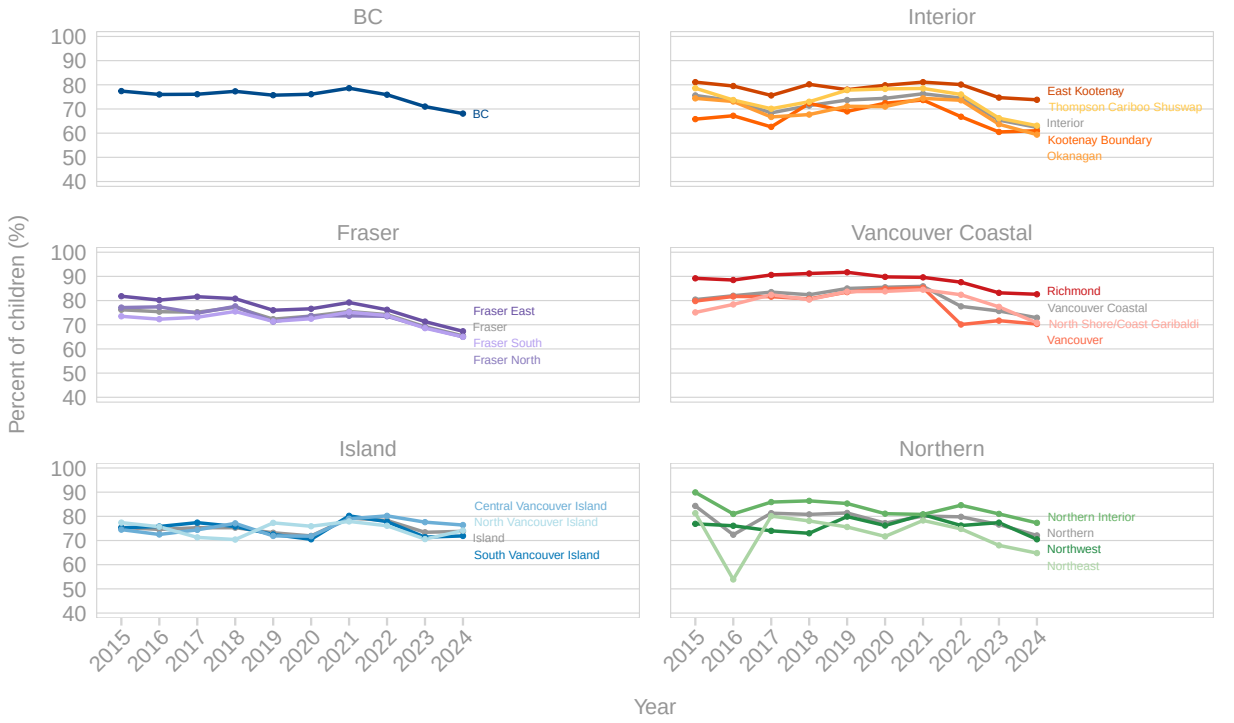


Figure 17. DTaP-IPV coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

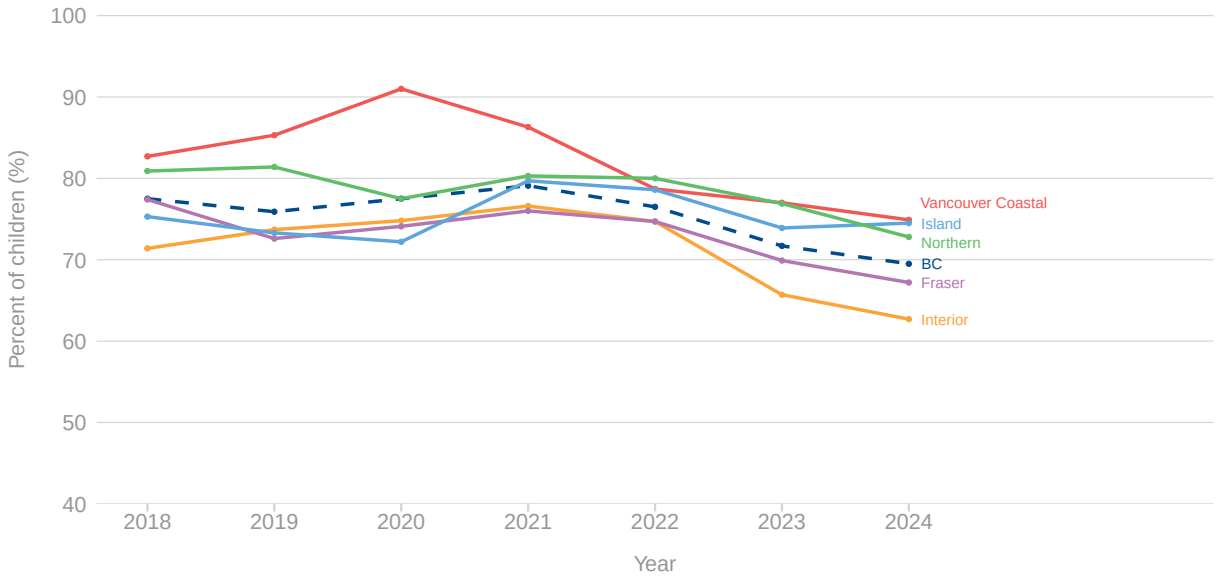
Figure 18. DTaP-IPV coverage by year and geographic region, 7-year-olds, British Columbia

Diphtheria, Tetanus, Pertussis (DTaP)

DTaP has been assessed separately from polio since 2018. In 2024, coverage at the provincial level was 69.5% and across health authorities ranged from 62.7% in IH to 74.9% in VCH (Figure 19). DTaP coverage has declined for the third consecutive year at both the provincial level (decreased 9.6% from 2021) and health authority level (decreased 7.5-13.9% from 2021), except in ISLH where coverage declined from 2021 to 2023 and slightly increased in 2024 for an overall decrease of 5.2% from 2021 to 2024. At the level of HSDA, coverage was lowest at 59.8% in Okanagan and highest at 85.0% in Richmond (Figure 20 and 21).

At the provincial level, 1.3% of seven-year-olds were unimmunized for DTaP due to a documented refusal, while 11.3% were unimmunized due to unknown reasons (Figure 22). A large proportion of seven-year-olds were partially immunized (18.0%). Among the health authorities, IH had the highest proportion (23.7%) of partially immunized seven-year-olds. This was also reflected at the HSDA level, as Thompson Cariboo Shuswap had the highest proportion of partially immunized children, at 25.3% (Figure 23).

Immunization coverage



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 19. DTaP coverage by year and health authority, 7-year-olds, British Columbia

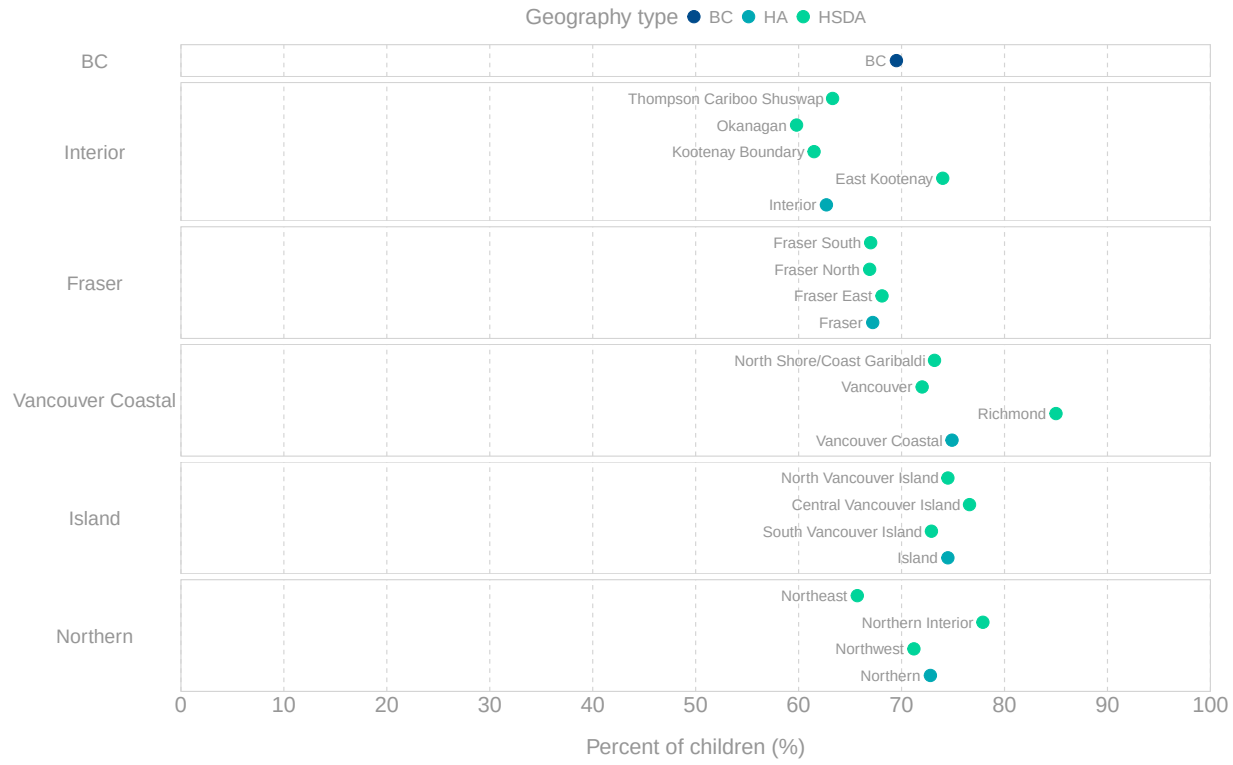
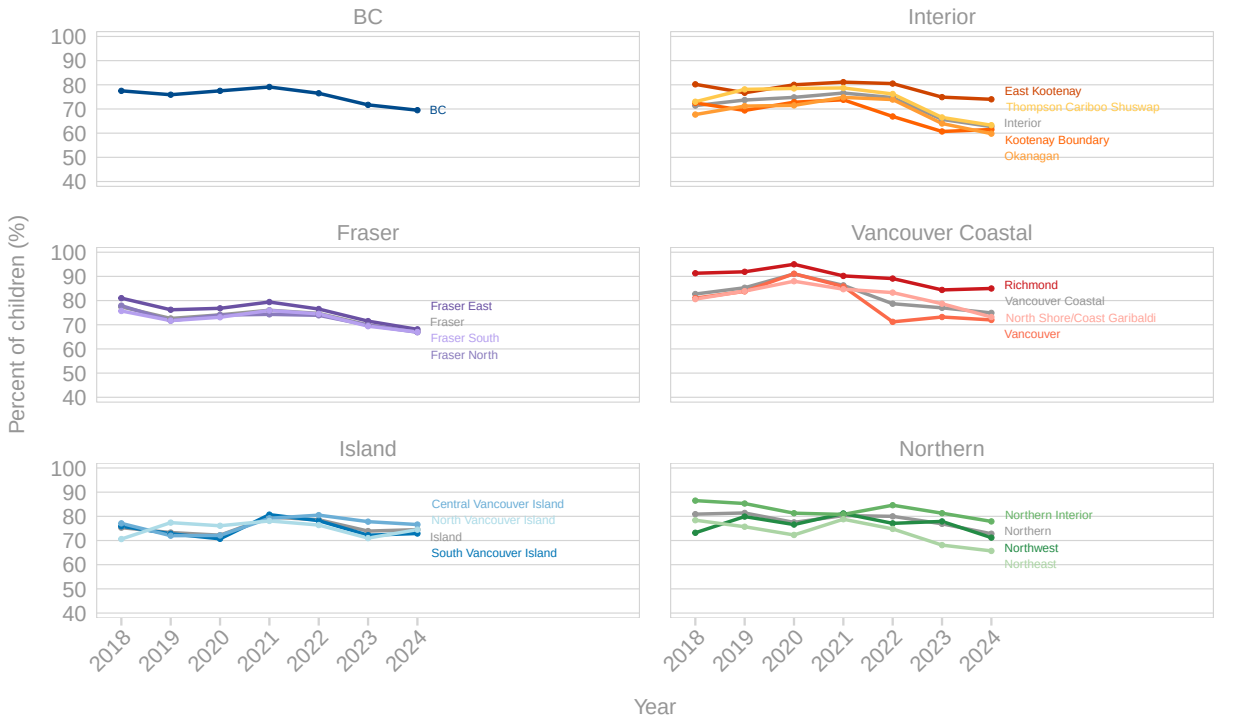


Figure 20. DTaP coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 21. DTaP coverage by year and geographic region, 7-year-olds, British Columbia

Reasons for non-immunization

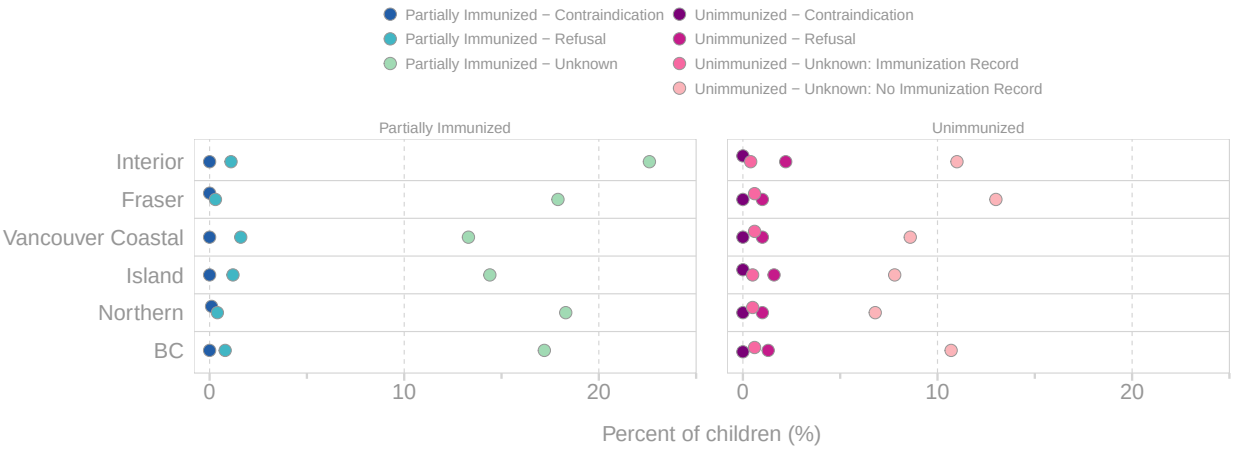


Figure 22. Reasons for non-immunization by health authority, DTaP, 7-year-olds, British Columbia, 2024

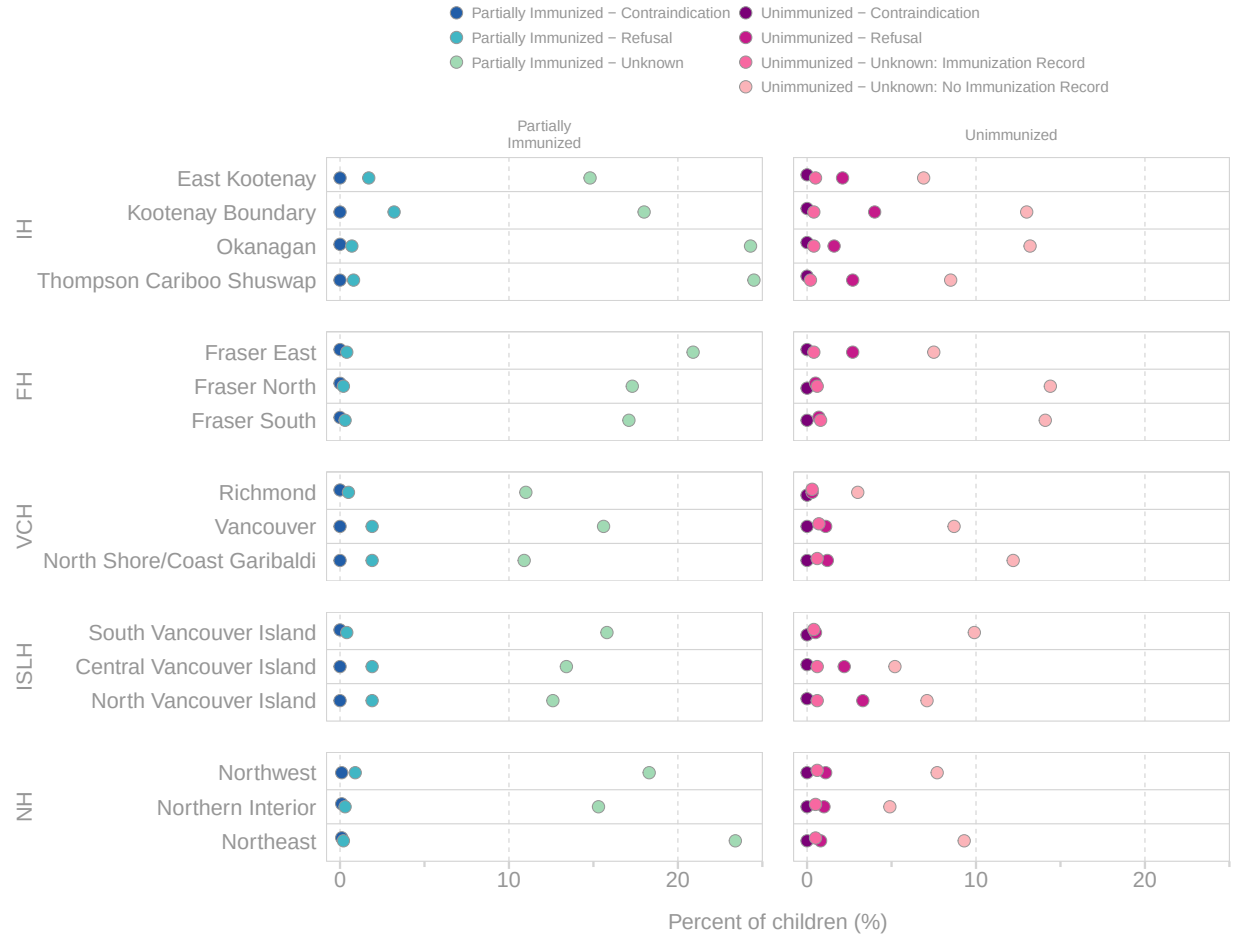


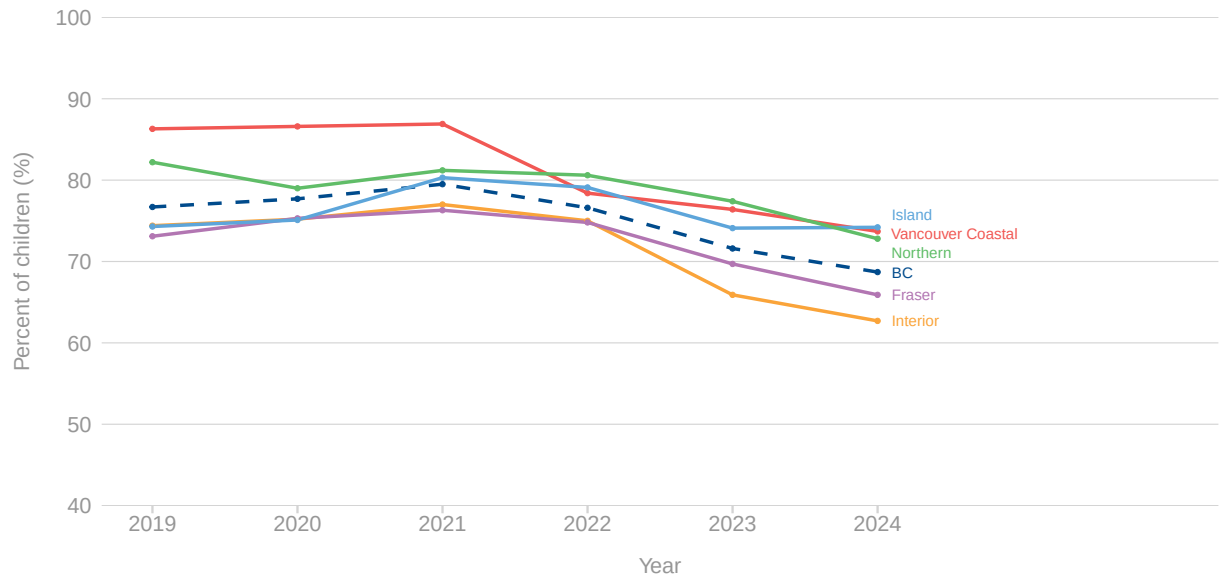
Figure 23. Reasons for non-immunization by health service delivery area, DTaP, 7-year-olds, British Columbia, 2024

Polio

Since 2019, polio has been assessed separately from DTaP. In 2024, coverage at the provincial level was 68.7% and across health authorities ranged from 62.7% in IH to 74.2% in ISLH. Polio coverage has decreased for the last three consecutive years across the province (decreased 10.8% from 2021) and health authorities (decreased 8.4-14.3% from 2021), except for ISLH, where coverage decreased from 2021 to 2023 before remaining stable in 2024 for an overall decrease of 6.1% from 2021 to 2024 (Figure 24). At the HSDA level, coverage in the Okanagan was the lowest at 59.6% and the highest in Richmond at 83.3% (Figure 25 and 26).

At the provincial level, the proportion of seven-year-olds in BC unimmunized for polio due to a documented refusal or for unknown reasons was 1.3% and 11.7%, respectively (Figure 27). As well, a large proportion (17.6%) were partially immunized for unknown reasons. At the health authority level, IH had the highest proportion of seven-year-olds partially immunized for unknown reasons (22.5%) or unimmunized due to a documented refusal (2.3%). Kootenay Boundary had the highest proportion (4.5%) of unimmunized seven-year-olds with a documented refusal among all the HSDAs (Figure 28).

Immunization coverage



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 24. Polio coverage by year and health authority, 7-year-olds, British Columbia

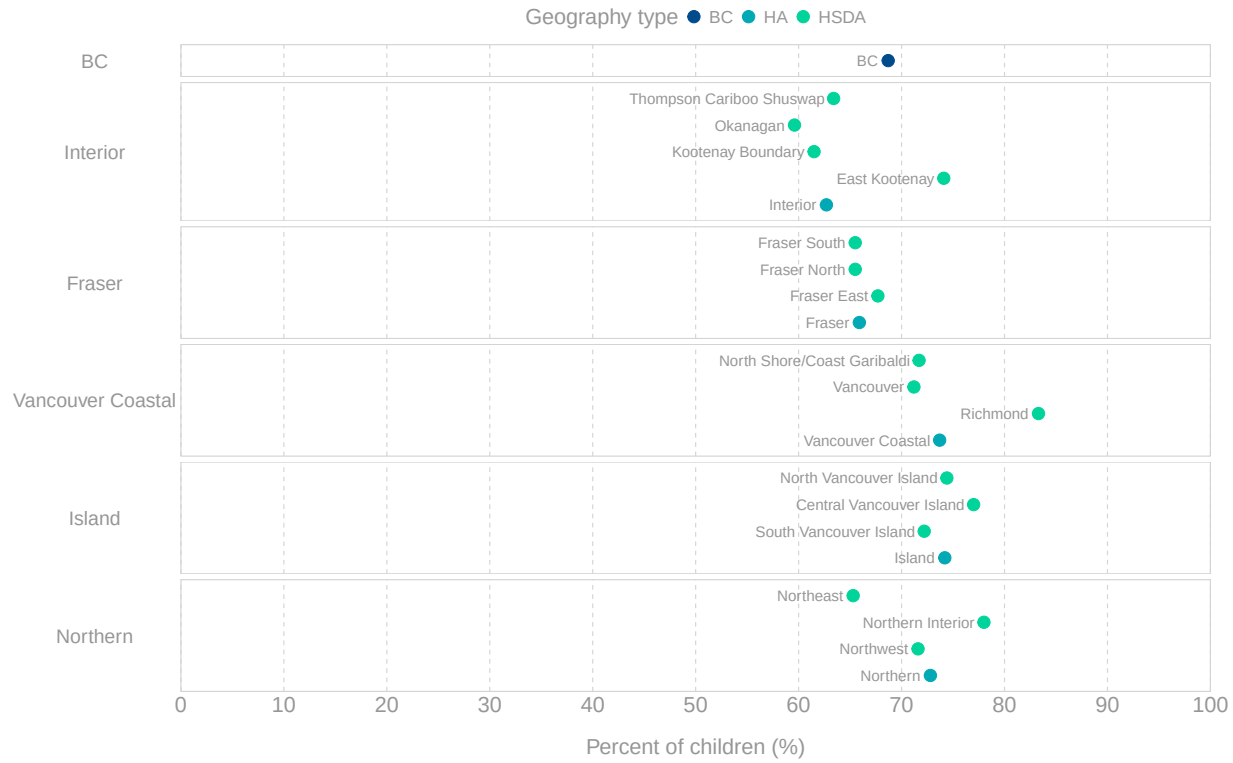
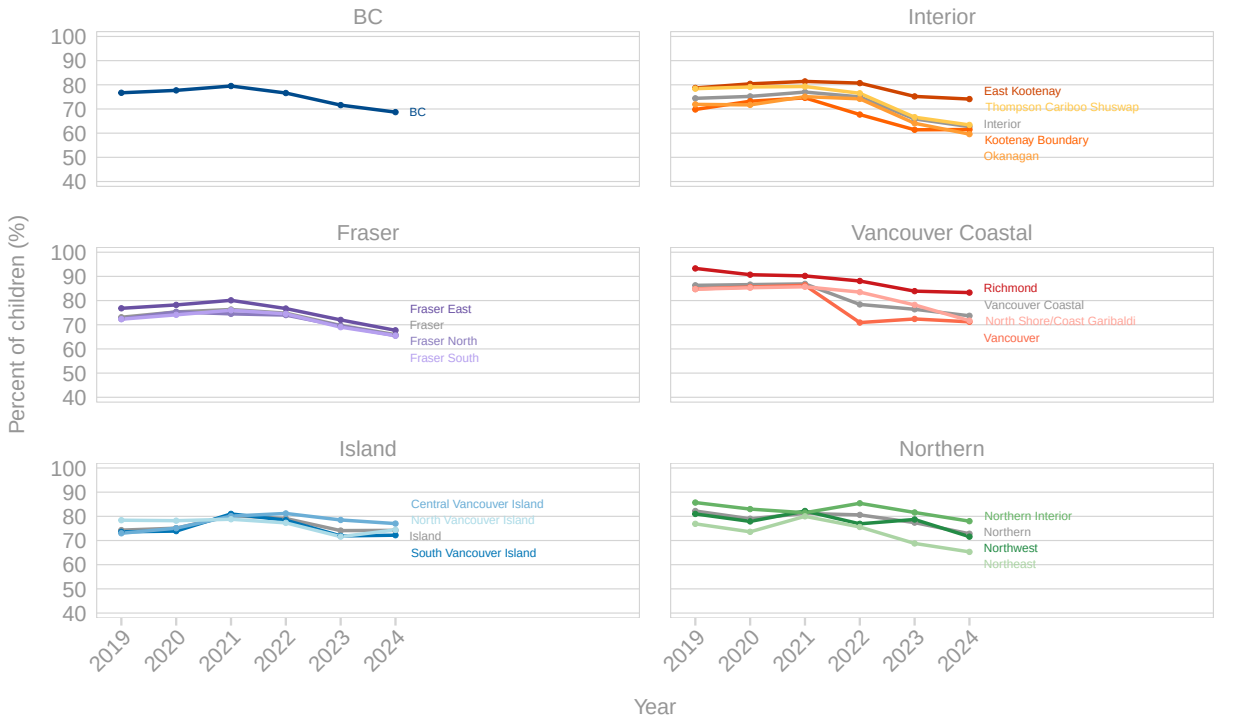


Figure 25. Polio coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 26. Polio coverage by year and geographic region, 7-year-olds, British Columbia

Reasons for non-immunization

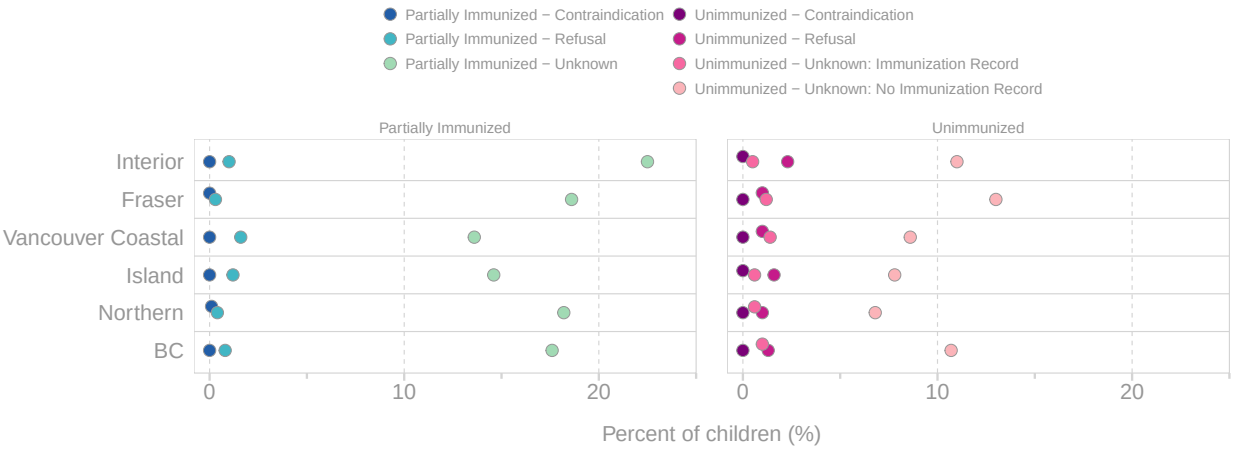


Figure 27. Reasons for non-immunization by health authority, Polio, 7-year-olds, British Columbia, 2024

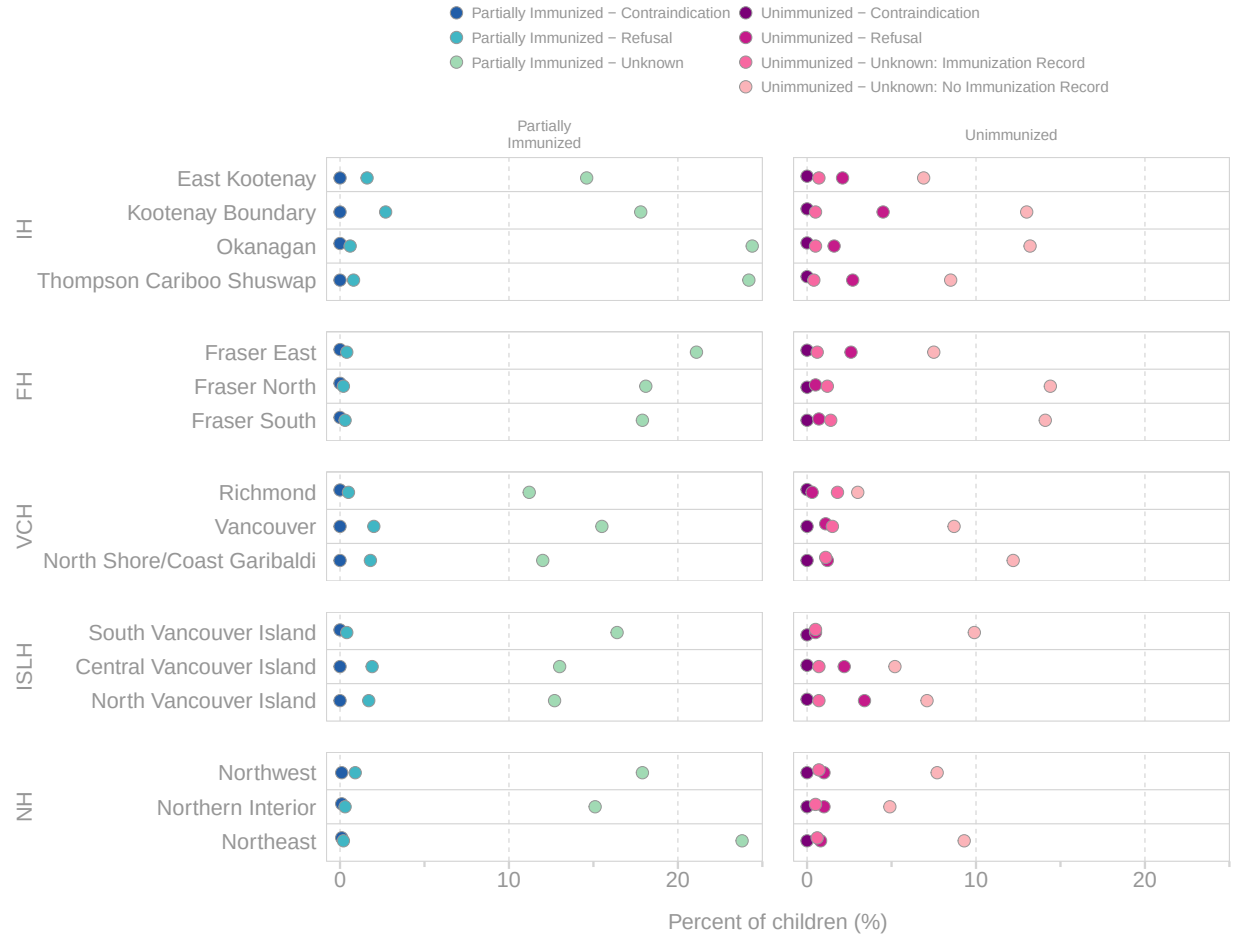


Figure 28. Reasons for non-immunization by health service delivery area, Polio, 7-year-olds, British Columbia, 2024

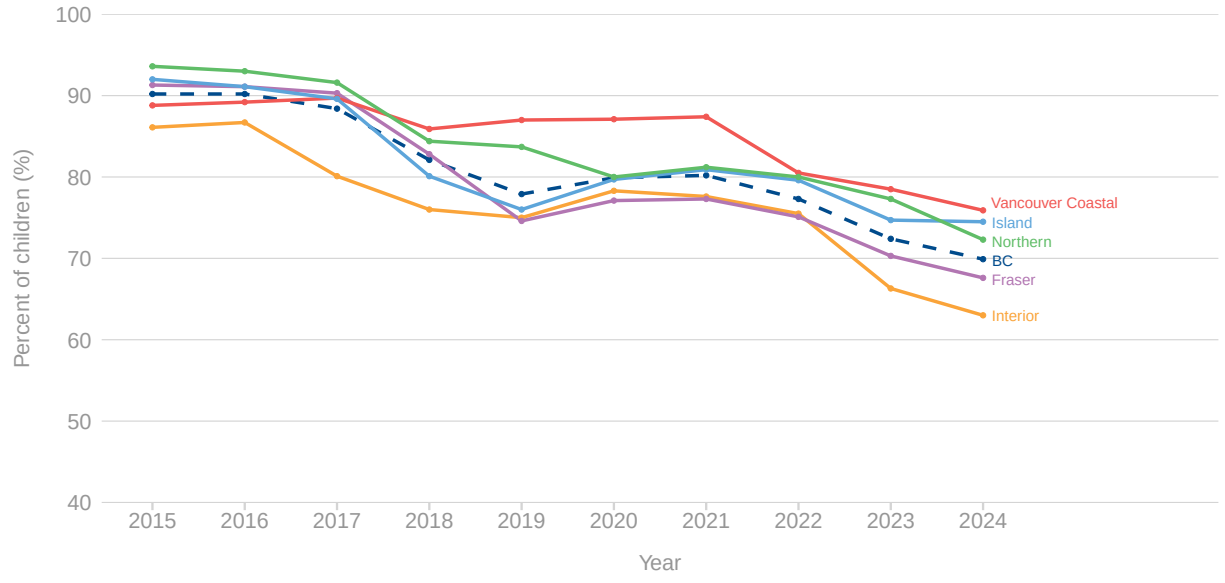
Measles

In BC, up-to-date status for measles vaccine coverage (two doses of measles vaccine or laboratory evidence of immunity/prior disease) among seven-year-olds has decreased 10.3% over the last three years, from 80.2% in 2021 to 69.9% in 2024 (Figure 29). Measles coverage has also decreased over the last three years across the regional health authorities, with the greatest decrease seen in IH (14.6%). In 2024, coverage ranged from 63.0% in IH to 75.9% in VCH. At the HSDA level, coverage ranged from 60.1% in Okanagan to 86.7% in Richmond (Figure 30 and 31).

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 (series completion) raises efficacy to nearly 100% (see here). Considering both one- or two-dose coverage, 85.8% of seven-year-olds in BC had received at least one dose of measles-containing vaccine (or had laboratory evidence of immunity/prior infection) in 2024, ranging across the health authorities from 83.8% in FH to 89.1% in NH. At the HSDA level, coverage of one dose or series completion in 2024 ranged from 80.3% in Kootenay Boundary to 95.7% to Richmond (Figure 30).

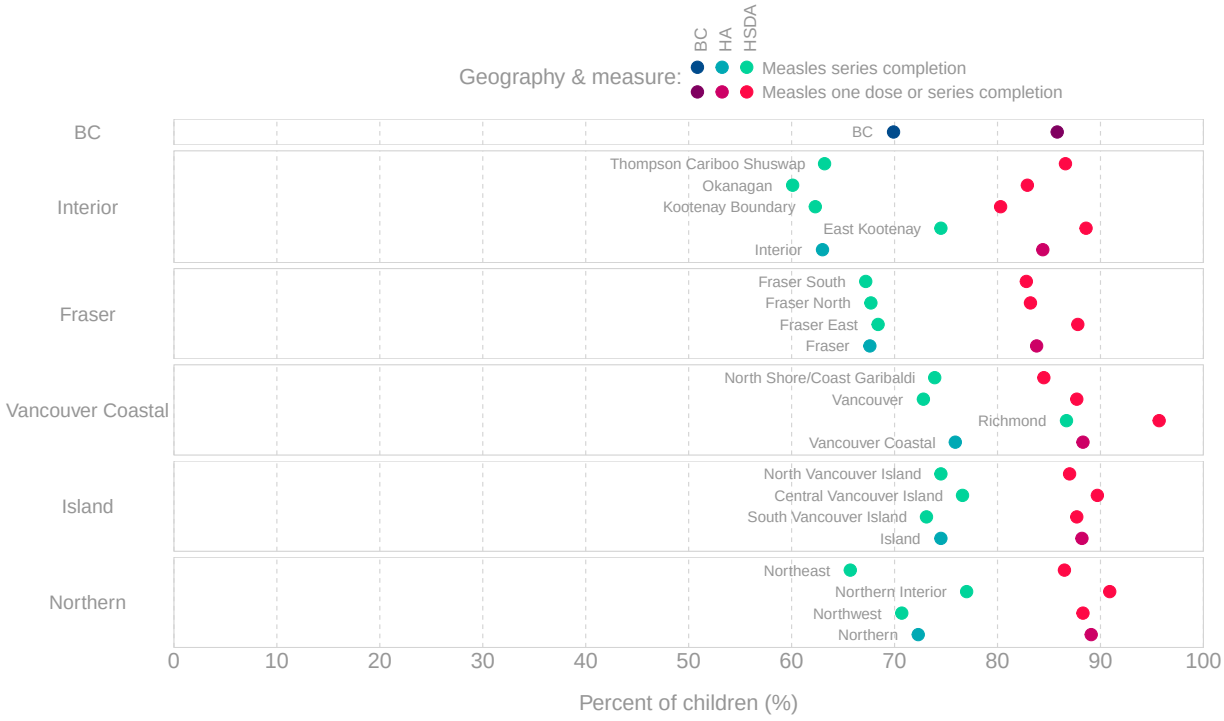
At the provincial level, 1.5% of seven-year-olds in BC were unimmunized for measles due to a documented refusal, while 12.8% were unimmunized due to unknown reasons (includes children with no recorded immunization) (Figure 32). A large proportion of seven-year-olds had received only one measles immunization (partially immunized; 15.9%), largely for unknown reasons. In 2024, two children had documented laboratory evidence of immunity to measles in the province. IH had the largest proportion (2.5%) of seven-year-olds who were unimmunized due to a documented refusal, while FH had the largest proportion (15.1%) of seven-year-olds who were unimmunized for unknown reasons. At the HSDA level, Kootenay Boundary had the largest proportion (4.6%) of seven-year-olds who were unimmunized due to a documented refusal. The largest proportion of seven-year-olds who were unimmunized for unknown reasons were in Fraser South and Fraser North, at 16.4% and 16.2%, respectively (Figure 33).

Immunization coverage



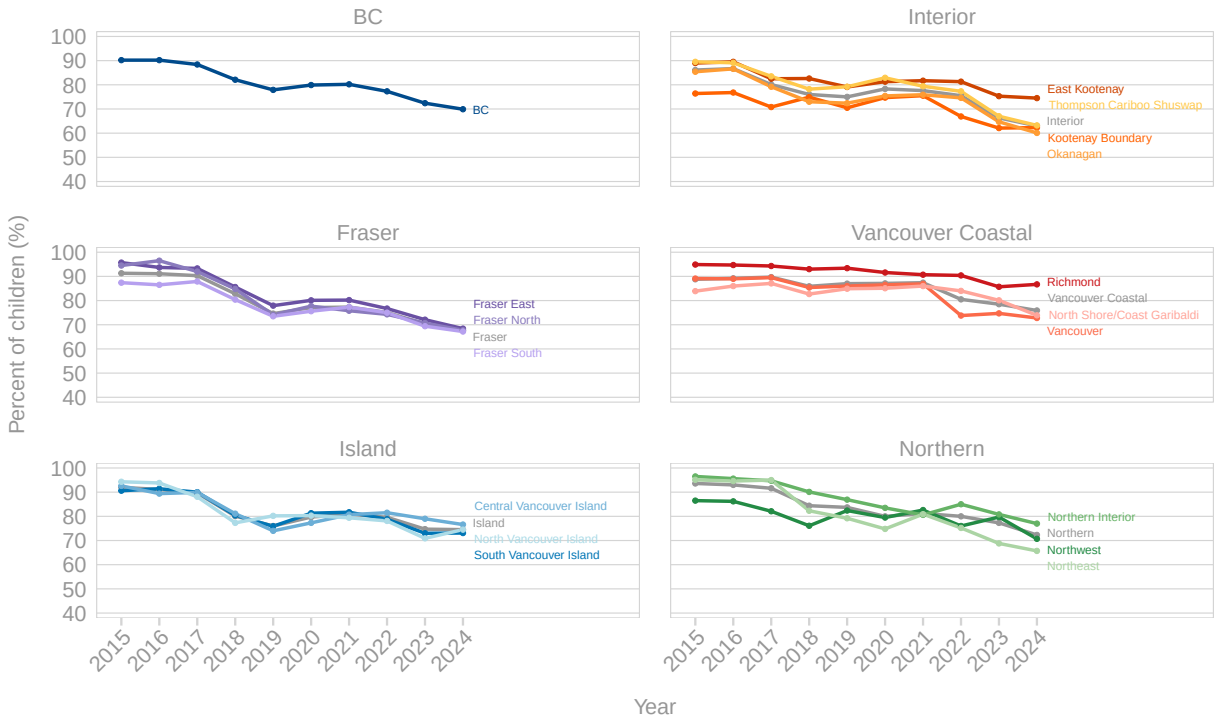
Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 29. Measles coverage by year and health authority, 7-year-olds, British Columbia



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

Figure 30. Measles one dose or series completion coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 31. Measles coverage by year and geographic region, 7-year-olds, British Columbia

Reasons for non-immunization

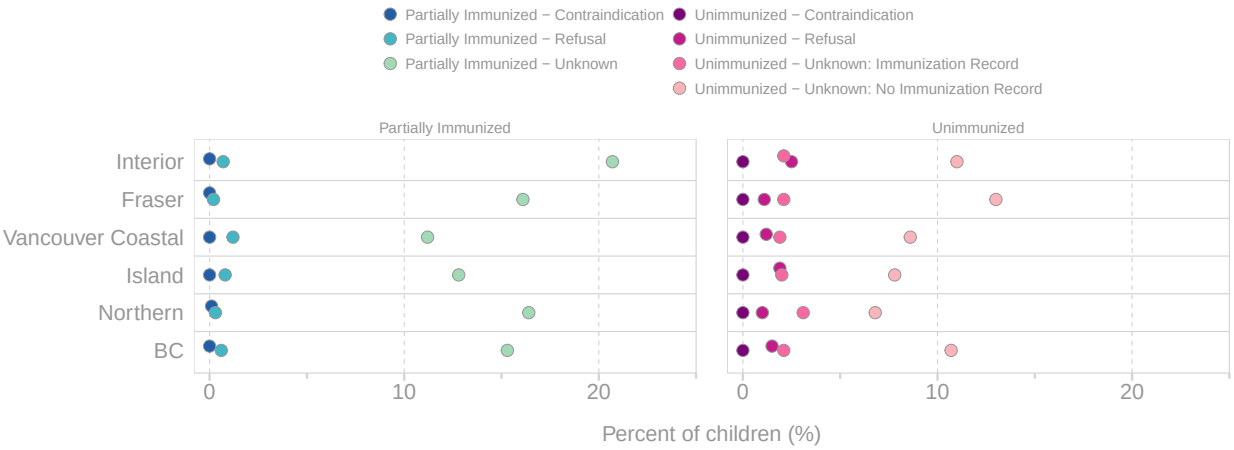


Figure 32. Reasons for non-immunization by health authority, Measles, 7-year-olds, British Columbia, 2024

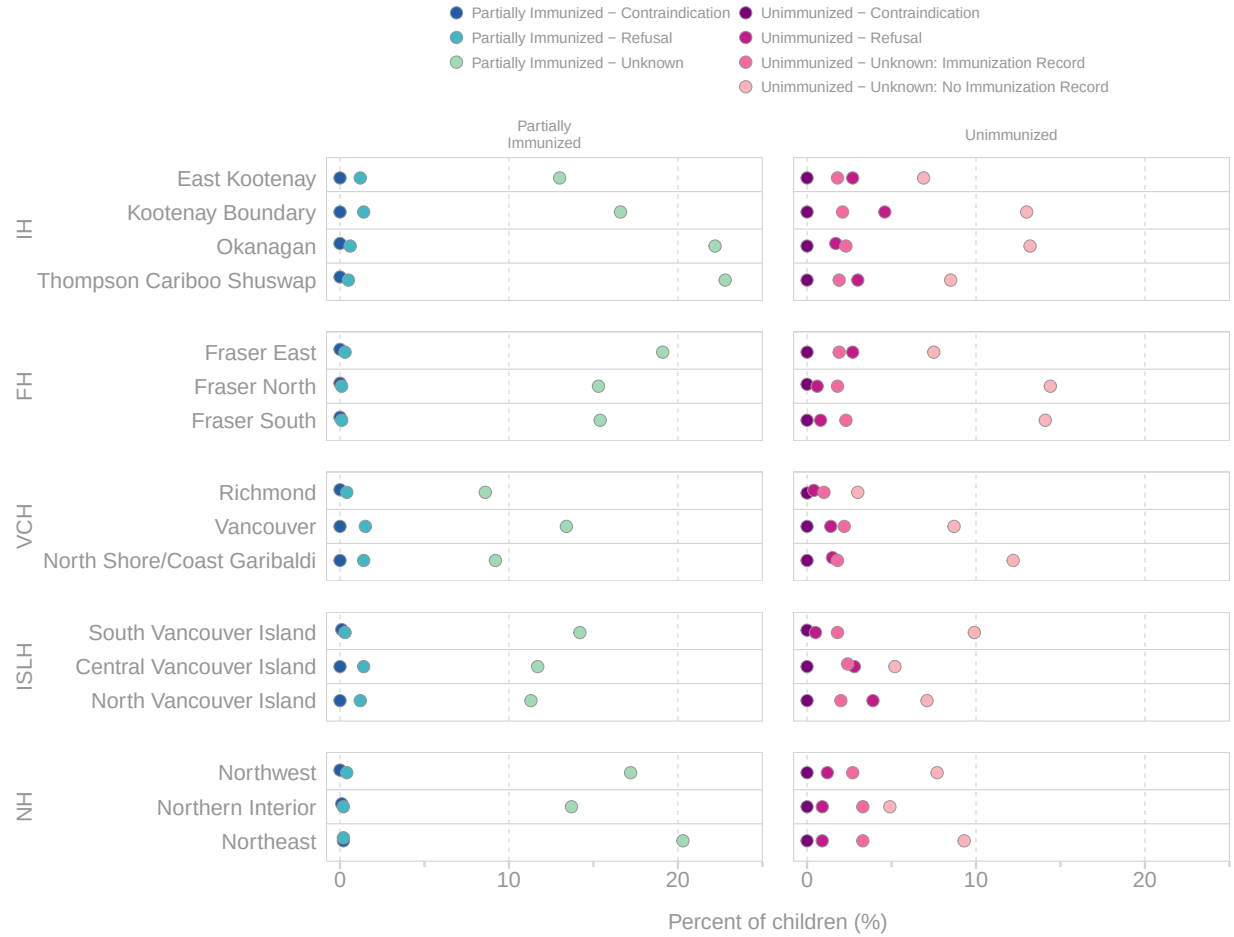


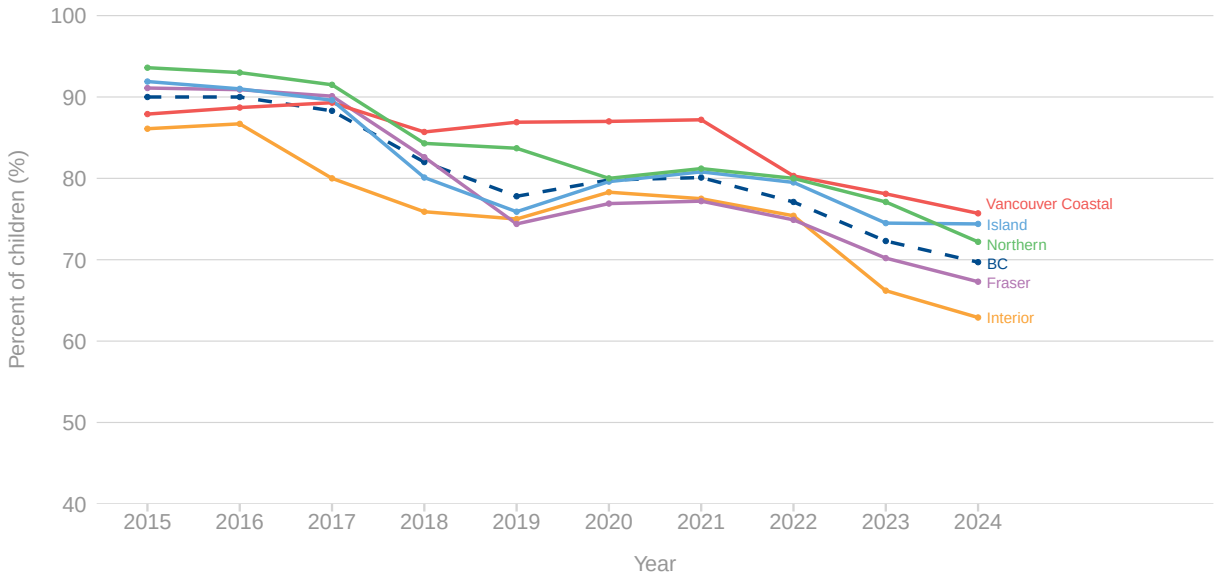
Figure 33. Reasons for non-immunization by health service delivery area, Measles, 7-year-olds, British Columbia, 2024

Mumps

Mumps coverage follows the trend of measles coverage at both the provincial and health authority levels. At the provincial level, vaccine coverage for mumps declined for the third consecutive year, from 80.1% in 2021 to 69.7% in 2024 (Figure 34). Coverage has declined across all regional health authorities, with the largest decline over the past three years in IH (14.6%). In 2024, coverage ranged from 62.9% in IH to 75.7% in VCH. At the HSDA level, the lowest coverage was in Okanagan at 60.0% and the highest in Richmond at 86.6% (Figure 35 and 36).

At the provincial level, 1.5% of seven-year-olds in BC were unimmunized due to a documented refusal, while 15.3% and 13.0% were partially immunized and unimmunized, respectively, due to unknown reasons (Figure 37). In IH, 20.6% of seven-year-olds were partially immunized for unknown reasons. Among HSDAs, Thompson Cariboo Shuswap had the largest proportion of seven-year-olds partially immunized for unknown reasons, at 22.8% (Figure 38).

Immunization coverage



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 34. Mumps coverage by year and health authority, 7-year-olds, British Columbia

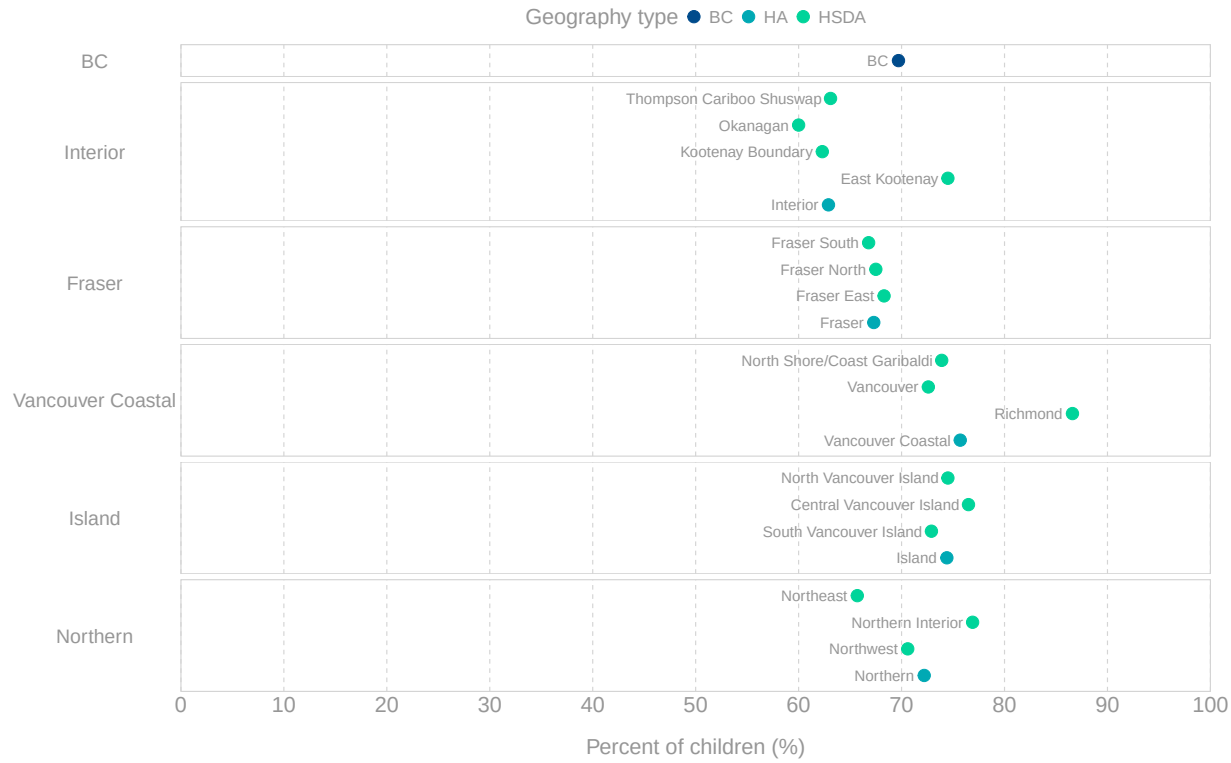
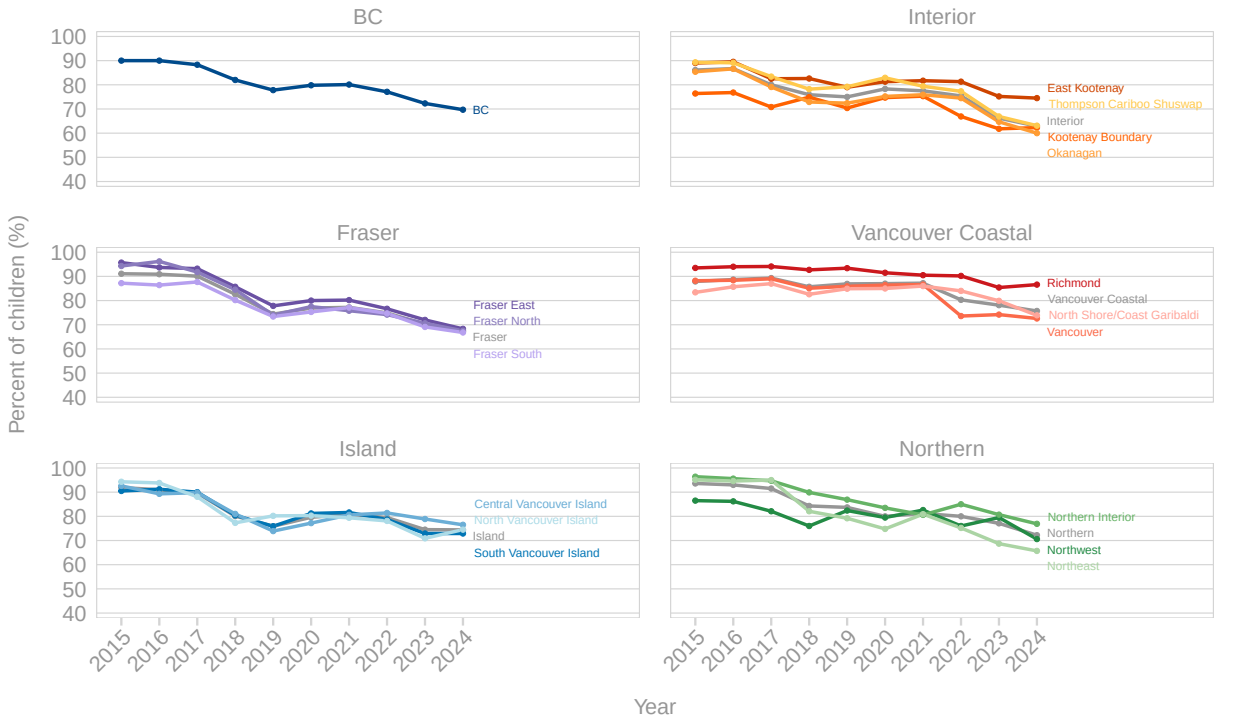


Figure 35. Mumps coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 36. Mumps coverage by year and geographic region, 7-year-olds, British Columbia

Reasons for non-immunization

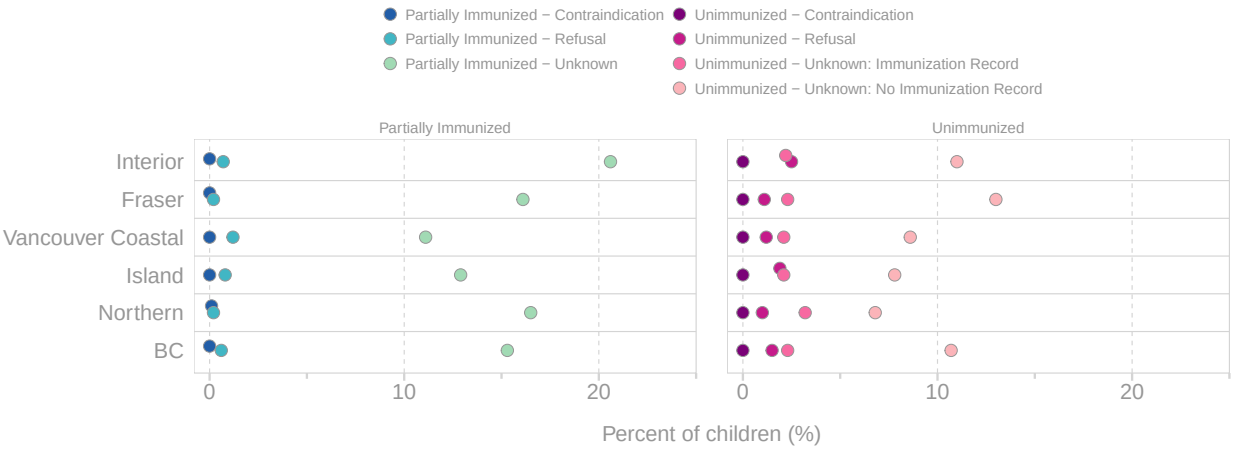


Figure 37. Reasons for non-immunization by health authority, Mumps, 7-year-olds, British Columbia, 2024

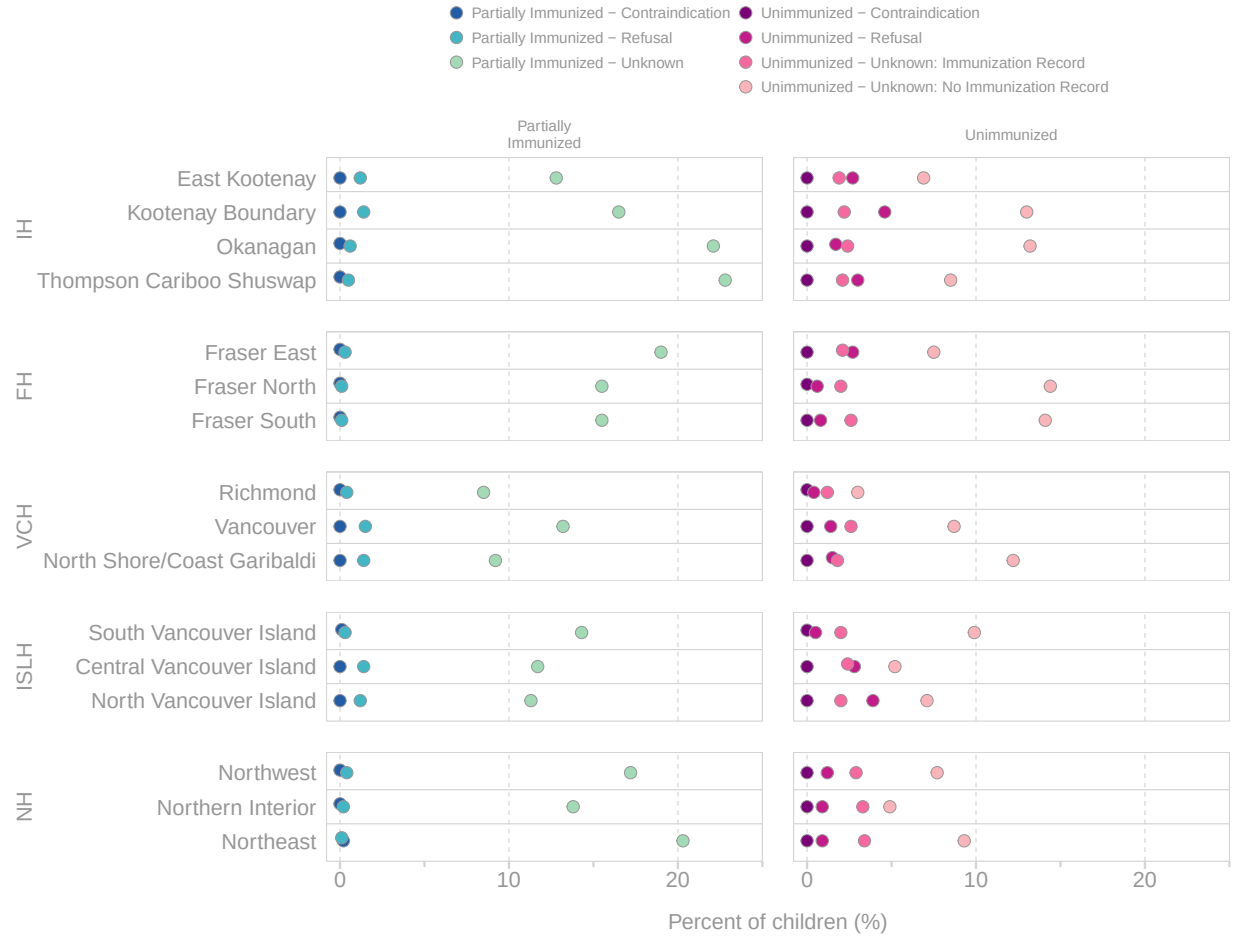


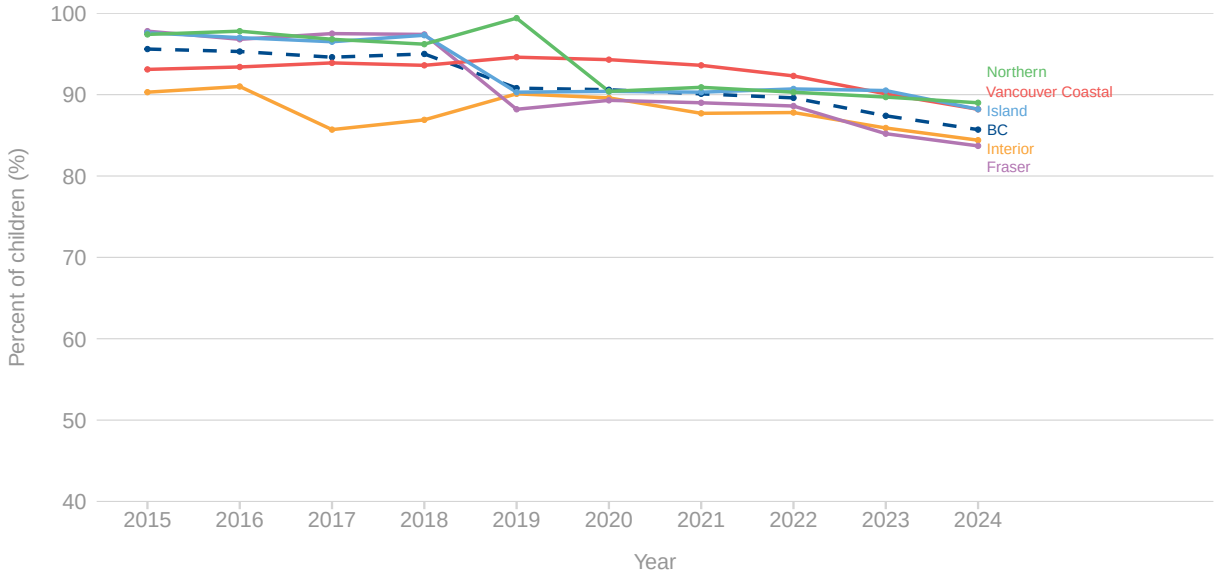
Figure 38. Reasons for non-immunization by health service delivery area, Mumps, 7-year-olds, British Columbia, 2024

Rubella

In 2024, rubella coverage in BC was 85.7%, a decrease of 4.4% over the past three years (90.1% in 2021). At the health authority level, a similar declining trend over the past three years was observed (Figure 39). FH had the lowest rubella coverage in 2024, at 83.7%, while NH had the highest, at 89.0%. At the HSDA level, Kootenay Boundary had the lowest coverage, 80.2%, and Richmond the highest, 95.5% (Figure 40 and 41). Although rubella is generally given as a single vaccine product with measles and mumps, only one dose of rubella is required by age seven to be considered up-to-date, explaining the higher coverage for rubella in comparison to measles and mumps.

At the provincial level, 1.5% of seven-year-olds in BC were unimmunized due to a documented refusal, while 12.9% were unimmunized due to unknown reasons (Figure 42). In 2024, one child had documented lab evidence of immunity to rubella. Among health authorities, the highest proportion of seven-year-olds who were unimmunized due to a documented refusal were in IH (2.5%) and FH had the highest proportion of unimmunized due to unknown reasons (15.2%). In line with this, Kootenay Boundary had the highest proportion of unimmunized due to a documented refusal (4.6%) and Fraser South had the highest proportion of unimmunized due to unknown reasons (16.5%) (Figure 43).

Immunization coverage



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 39. Rubella coverage by year and health authority, 7-year-olds, British Columbia

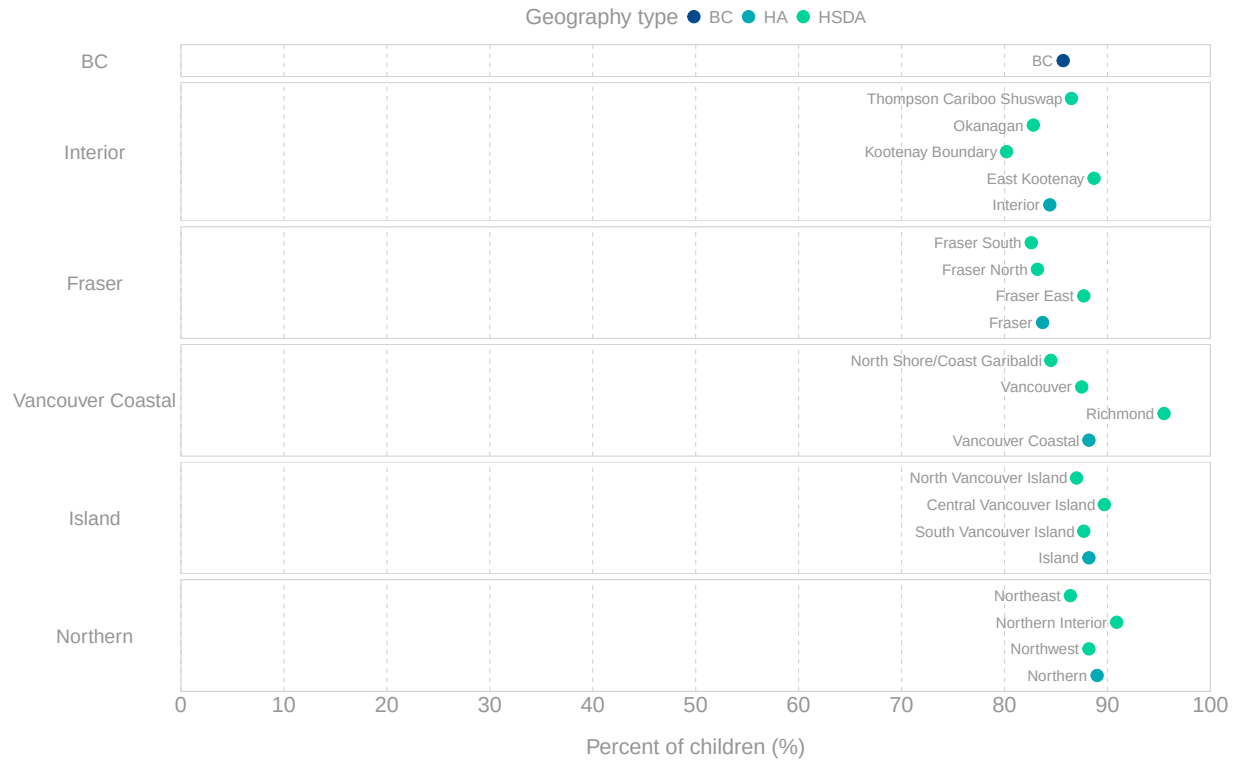
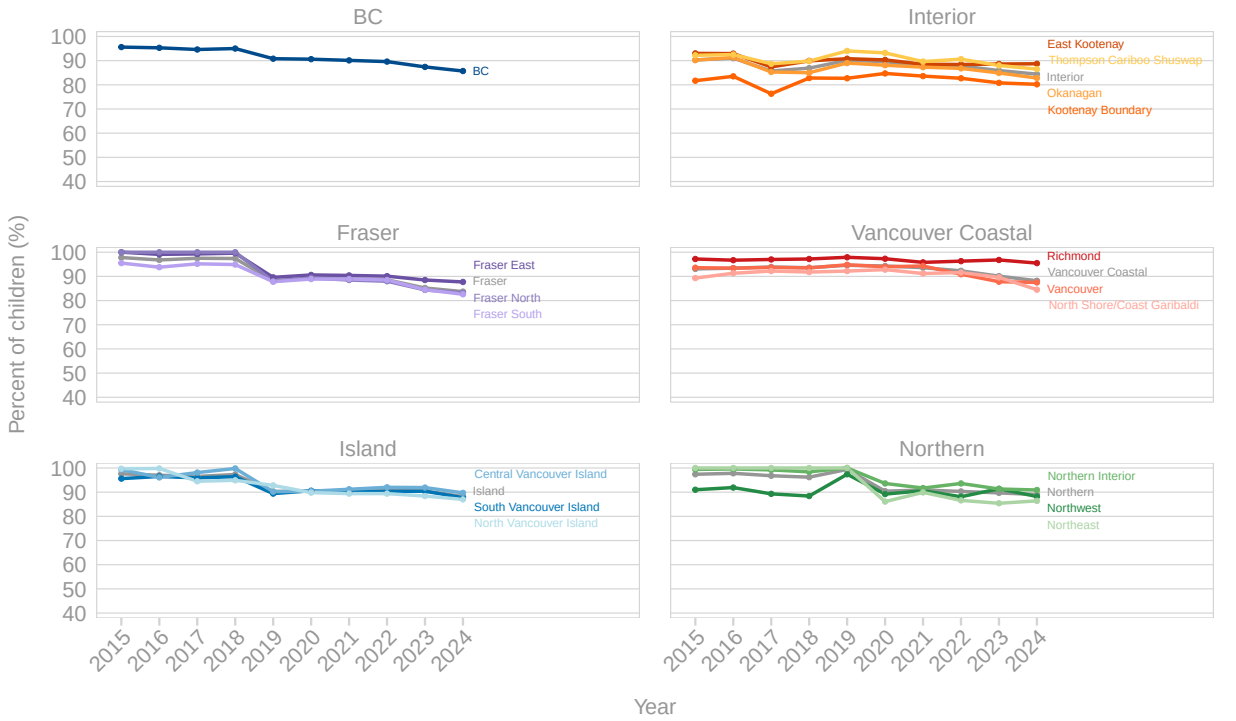


Figure 40. Rubella coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 41. Rubella coverage by year and geographic region, 7-year-olds, British Columbia

Reasons for non-immunization

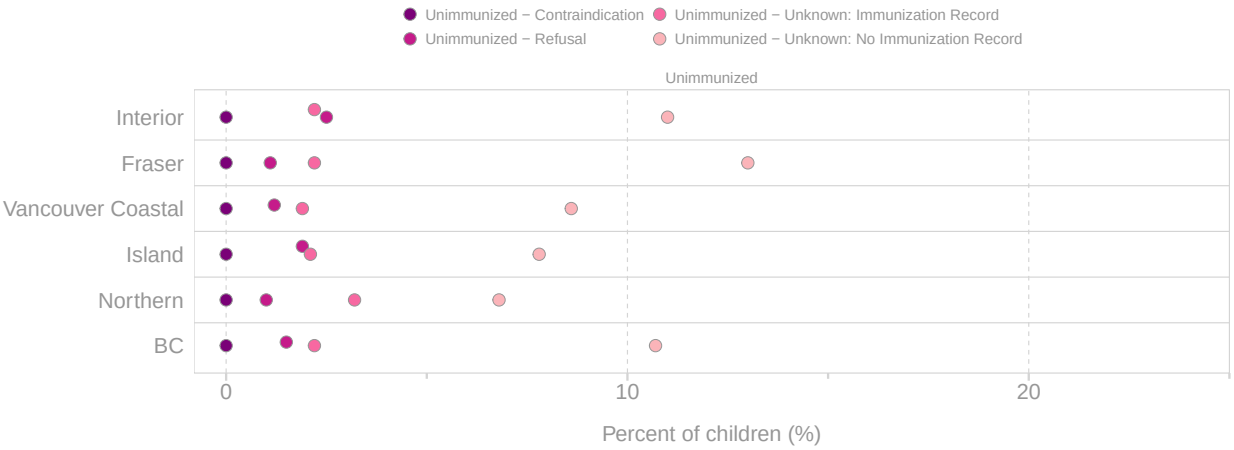


Figure 42. Reasons for non-immunization by health authority, Rubella, 7-year-olds, British Columbia, 2024

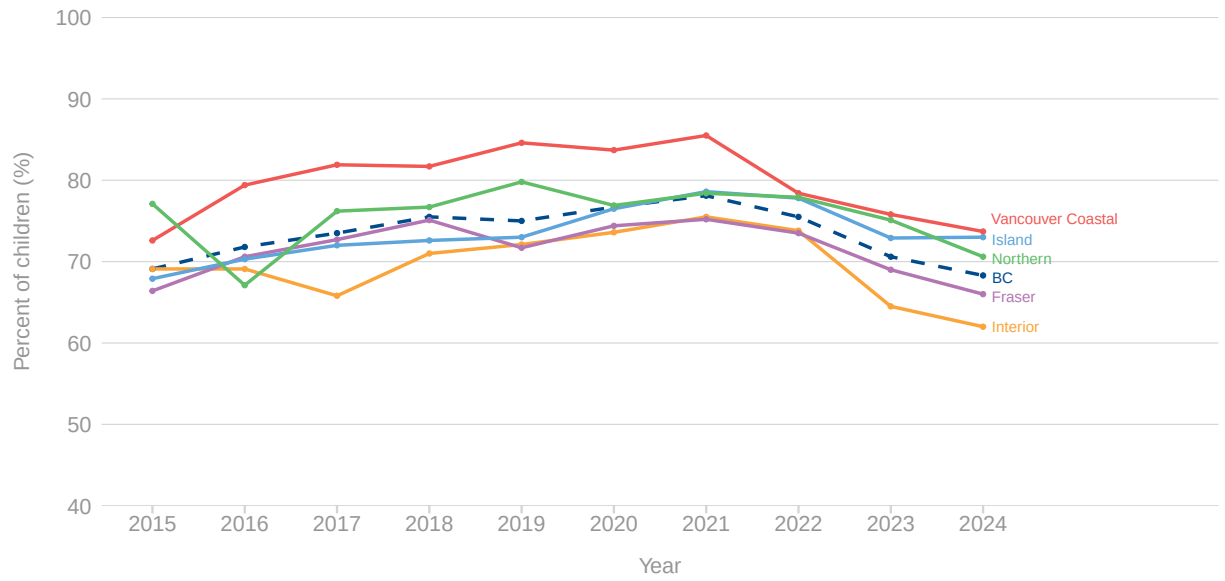
Figure 43. Reasons for non-immunization by health service delivery area, Rubella, 7-year-olds, British Columbia, 2024

Varicella

Up-to-date coverage for varicella has decreased 9.8% over the past three consecutive years, from 78.1% in 2021 to 68.3% in 2024 (Figure 44). Coverage in VCH, NH, FH and IH have followed a similar declining trend, with the largest decline over the past three years in IH (13.5%). Coverage in ISLH has overall decreased since 2021, but was relatively stable from 2023 to 2024. Varicella coverage ranged from 62.0% in IH to 73.7% in VCH. At the HSDA level, Okanagan has the lowest coverage at 59.2% and Richmond the highest at 86.1% (Figure 45 and 46).

At the provincial level, 1.9% of seven-year-olds in BC were unimmunized due to a documented refusal while an additional 14.0% were unimmunized for unknown reasons (Figure 47). Province-wide, a total of 32 children had documented evidence of previous disease or immunity in 2024. IH had the highest proportion of seven-year-olds unimmunized due to a documented refusal (3.5%). In line with this, among HSDAs, Kootenay Boundary had the highest proportion of seven-year-olds unimmunized due to a documented refusal (6.5%) (Figure 48).

Immunization coverage



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 44. Varicella coverage by year and health authority, 7-year-olds, British Columbia

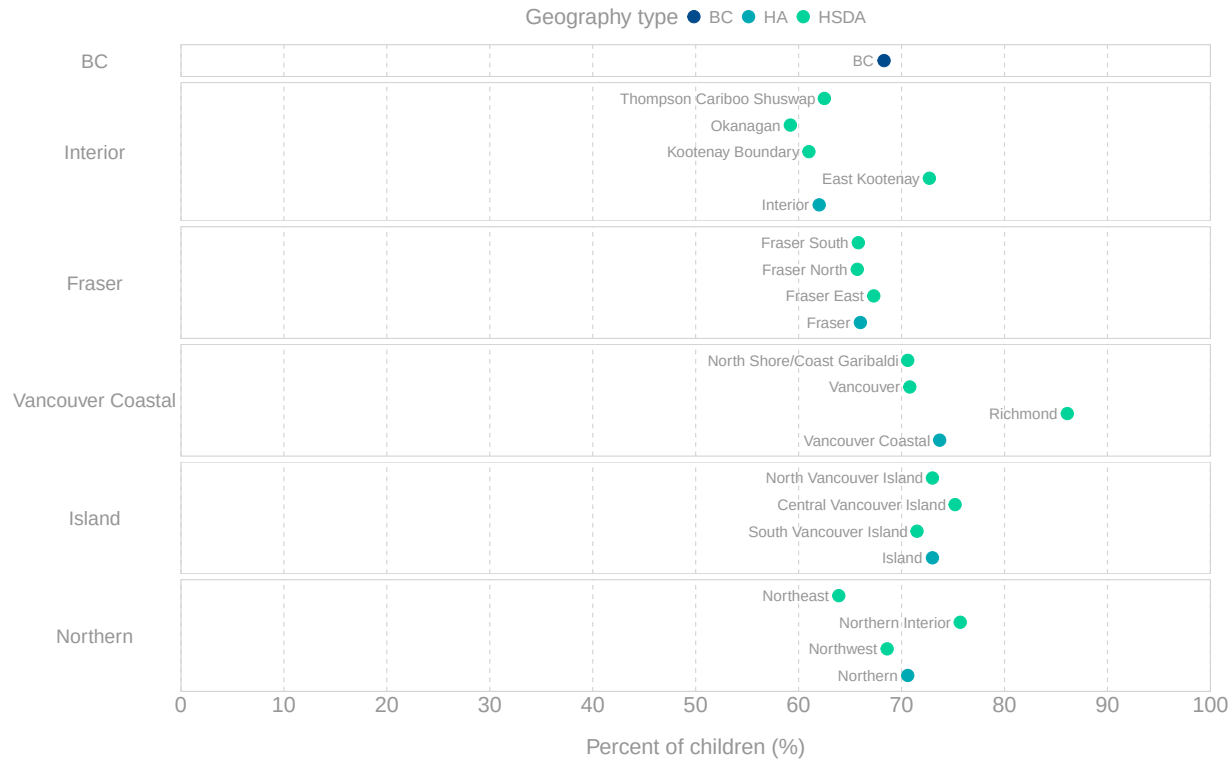
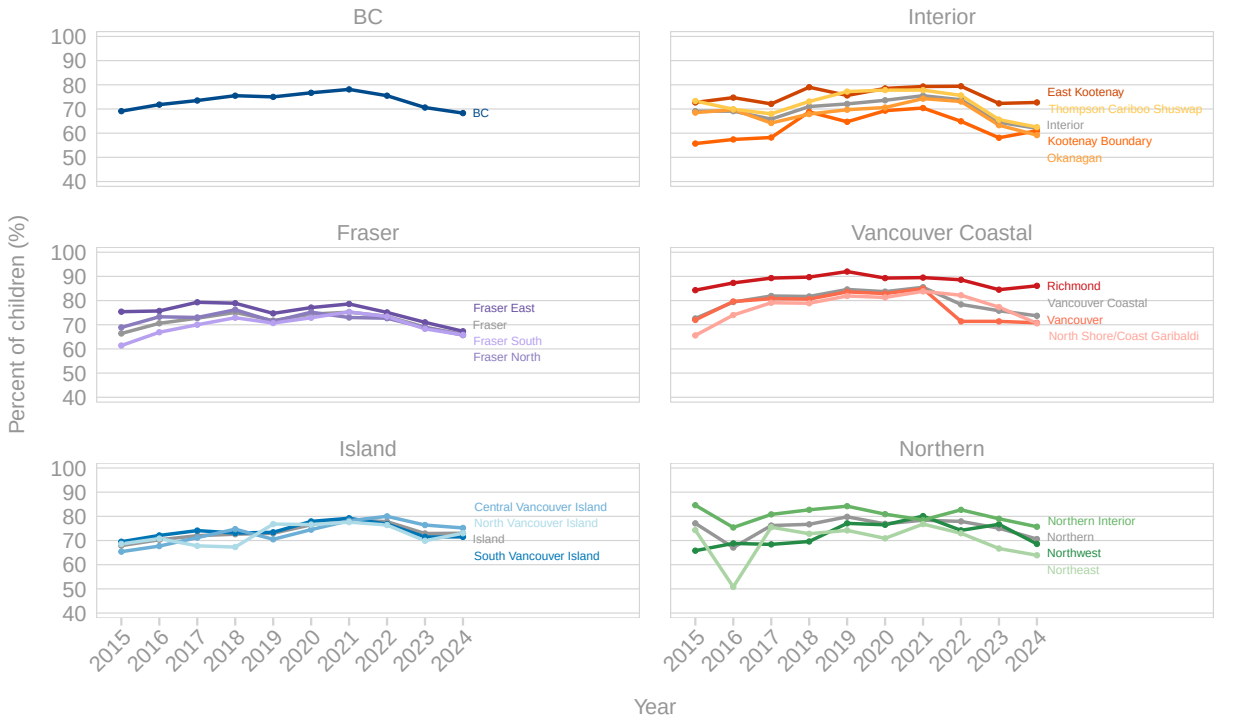


Figure 45. Varicella coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 46. Varicella coverage by year and geographic region, 7-year-olds, British Columbia

Reasons for non-immunization

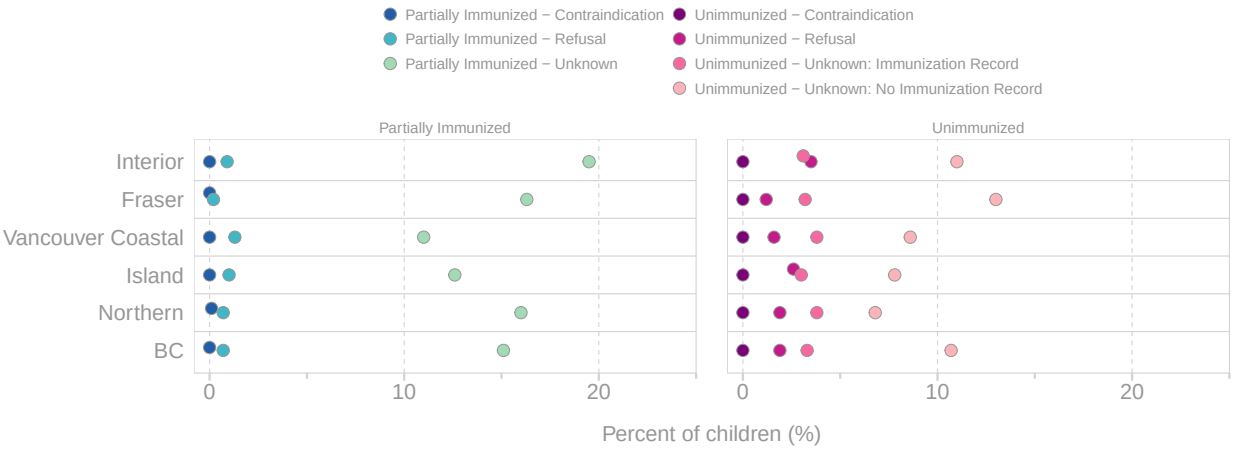


Figure 47. Reasons for non-immunization by health authority, Varicella, 7-year-olds, British Columbia, 2024

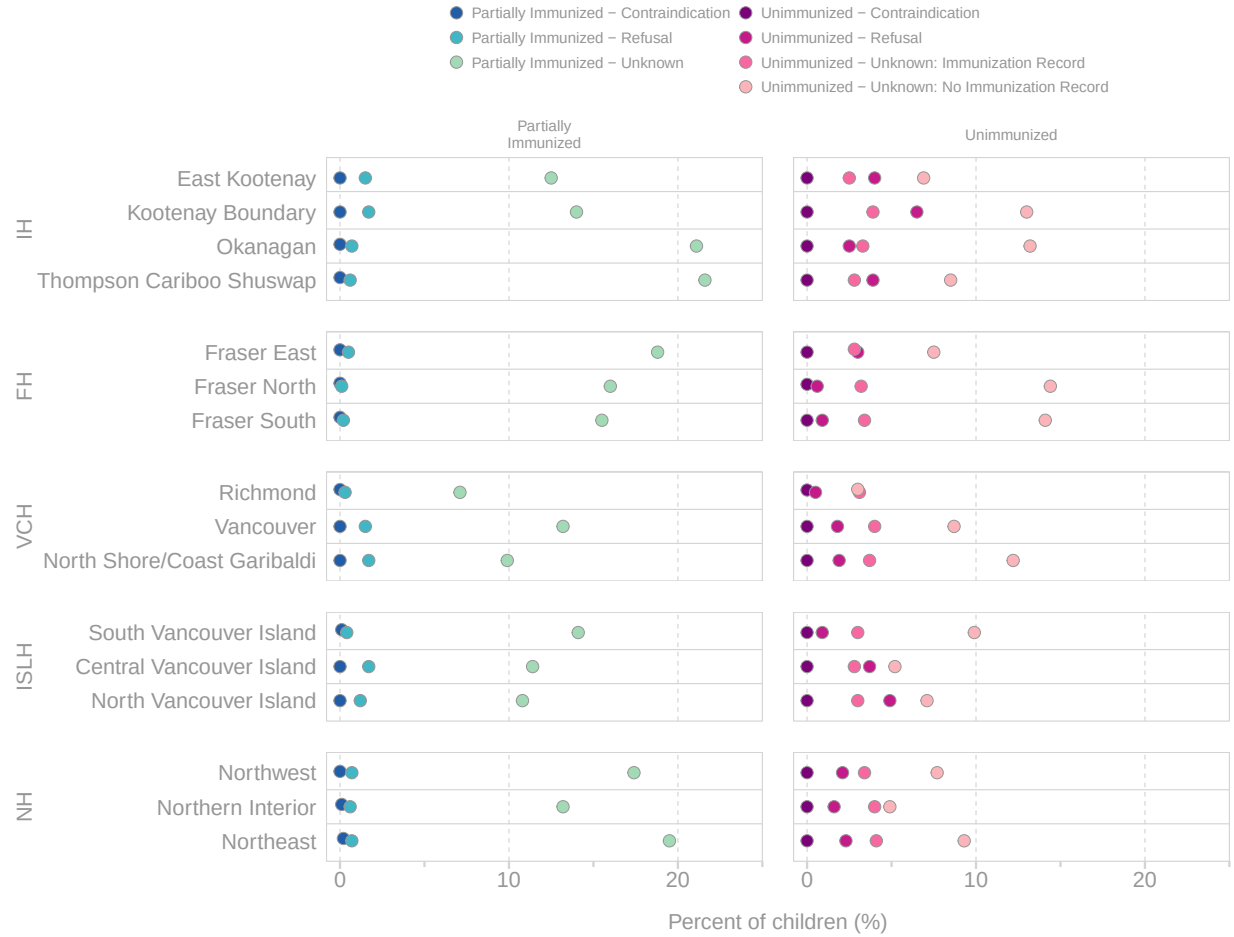


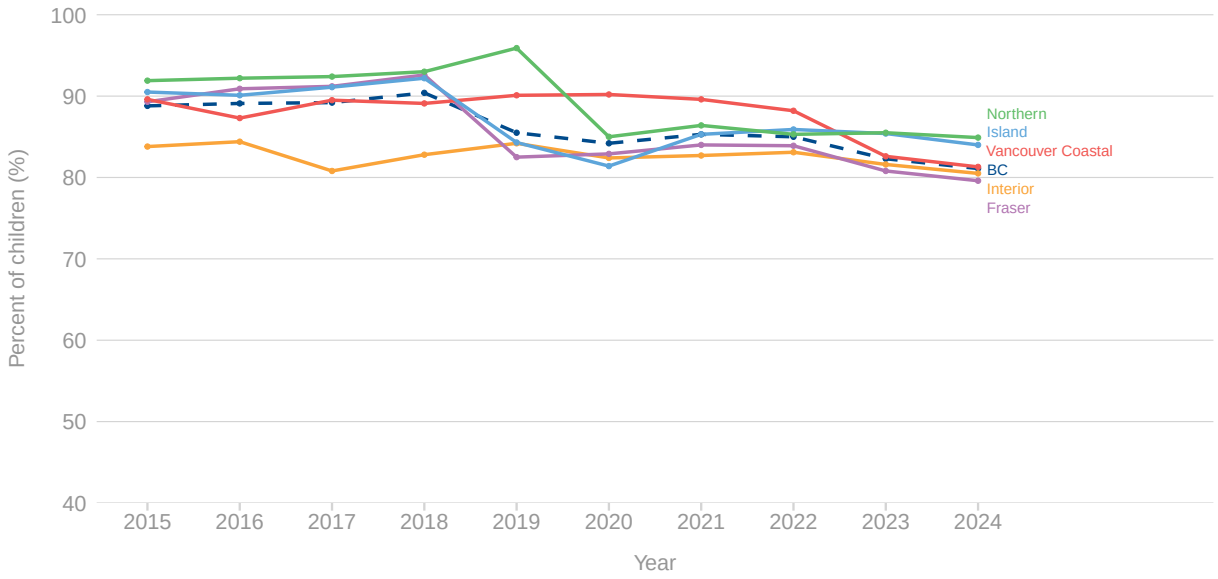
Figure 48. Reasons for non-immunization by health service delivery area, Varicella, 7-year-olds, British Columbia, 2024

Hepatitis B

Hepatitis B vaccine coverage has remained relatively stable at the provincial level in recent years, decreasing from 85.3% in 2021 to 81.1% in 2024 (Figure 49). Among health authorities, coverage has decreased 1.3-8.3% over the last three consecutive years, with the greatest decrease seen in VCH. In 2024, coverage ranged from 79.6% in FH to 84.9% in NH. Coverage at the level of HSDA ranged from 74.1% in Kootenay Boundary to 90.8% in Richmond (Figure 50 and 51).

At the provincial level, 1.5% of seven-year-olds in BC were unimmunized due to a documented refusal while an additional 12.5% were unimmunized due to unknown reasons (Figure 52). Only 4.9% of seven-year-olds were partially immunized. FH had the highest proportion (16.0%) of seven-year-olds unimmunized for hepatitis B, largely for unknown reasons. Kootenay Boundary had the highest proportion of unimmunized seven-year-olds (20.9%), also mostly for unknown reasons (Figure 53).

Immunization coverage



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 49. Hepatitis B coverage by year and health authority, 7-year-olds, British Columbia

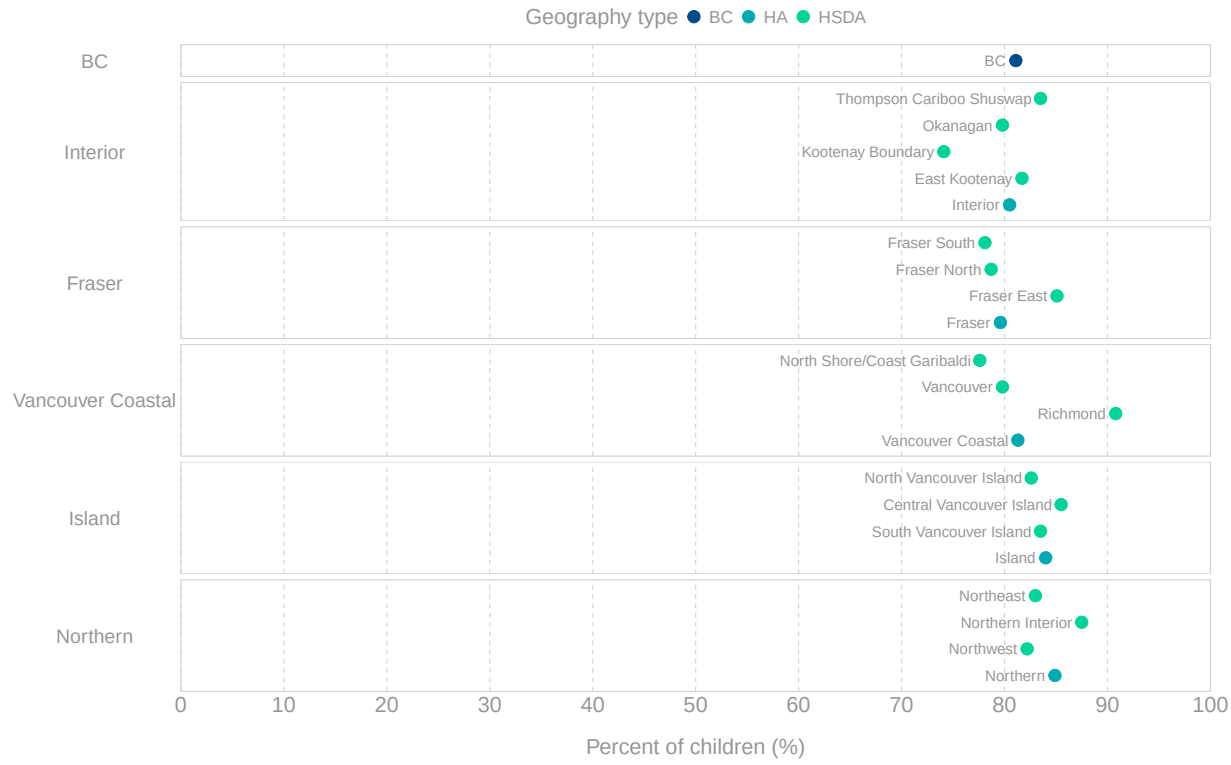
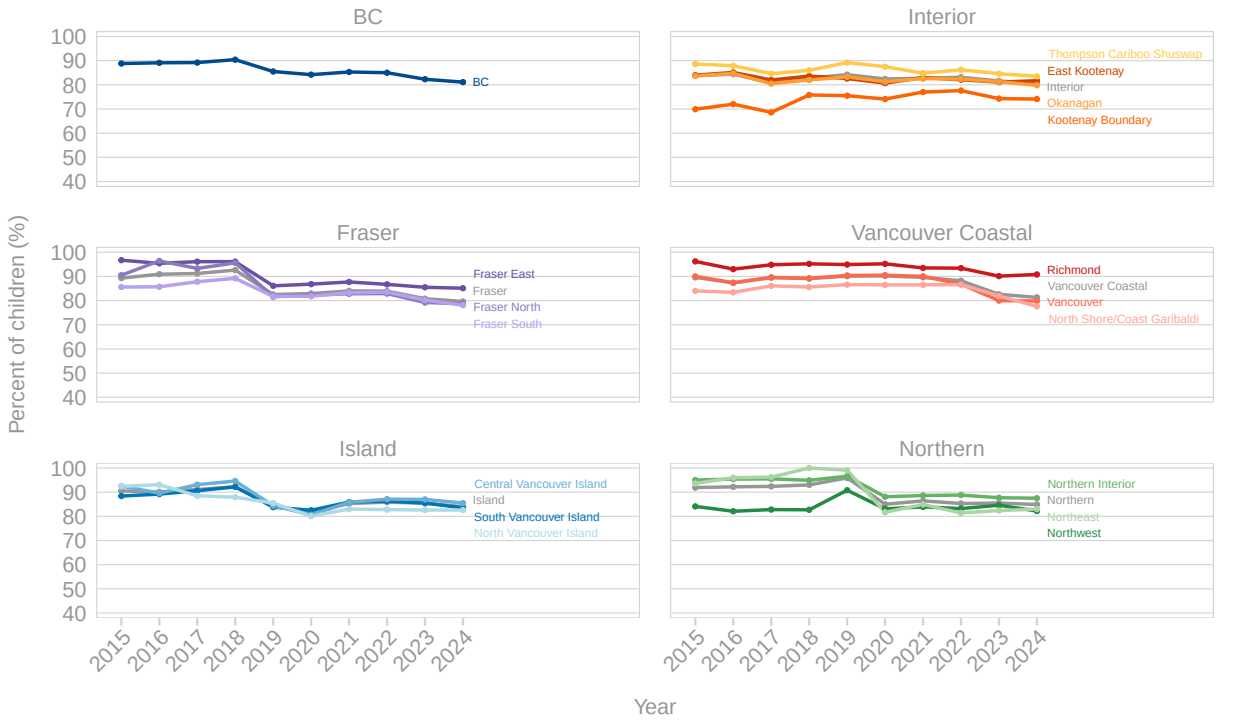


Figure 50. Hepatitis B coverage by geographic region, 7-year-olds, British Columbia, 2024



Note: The y−axis for this figure starts at 40% for clearer data visualization.

Figure 51. Hepatitis B coverage by year and geographic region, 7-year-olds, British Columbia

Reasons for non-immunization

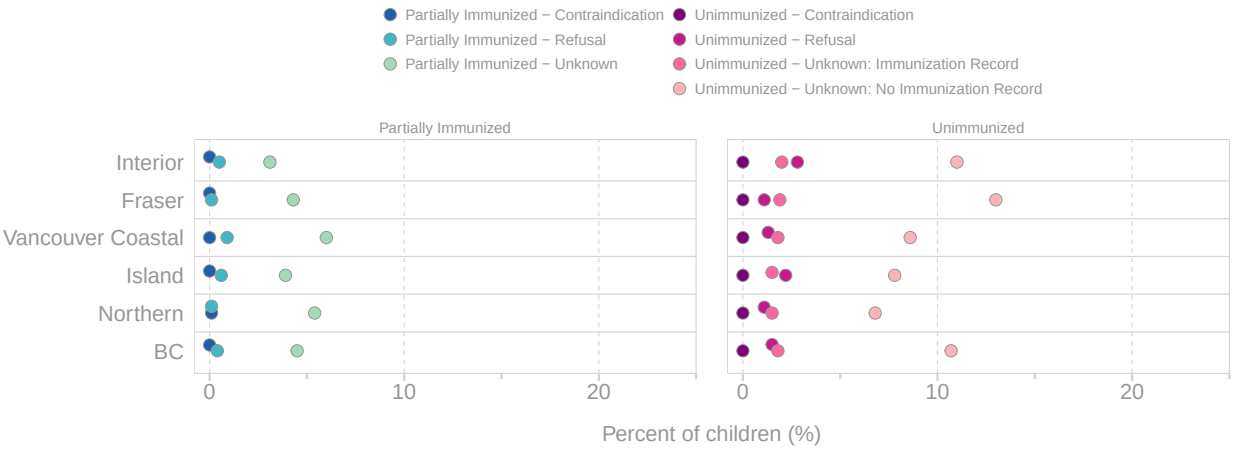


Figure 52. Reasons for non-immunization by health authority, Hepatitis B, 7-year-olds, British Columbia, 2024

Figure 53. Reasons for non-immunization by health service delivery area, Hepatitis B, 7-year-olds, British Columbia, 2024

Vaccine Refusals

The proportion of seven-year-olds in BC with documented refusals to all vaccines in 2024 decreased from 2023 by 0.2% but remained comparable to recent years (Figure 54). At the health authority level, NH, FH and IH saw a decrease in refusals compared to 2023 (0.1-0.4%), while VCH and ISLH remained stable. Since 2019, IH has had the highest rate of documented refusals to all vaccines each year, and was at 1.9% in 2024. At the HSDA level, Kootenay Boundary (3.0%) had the highest refusal rate and Richmond (0.2%) the lowest (Figure 55 and 56).

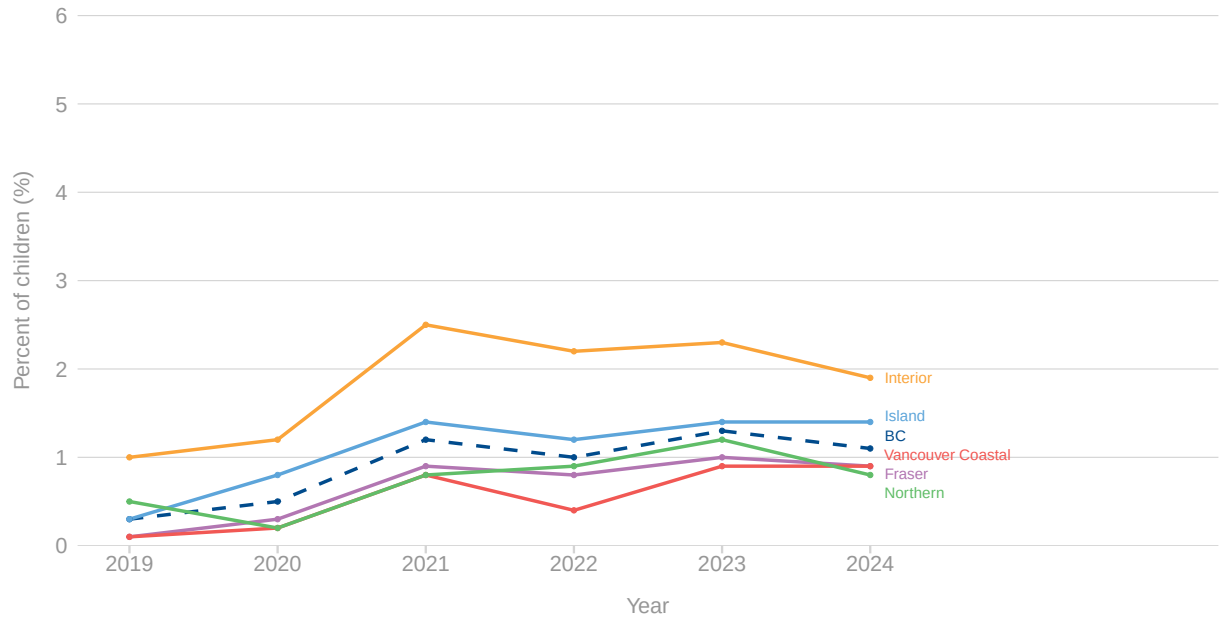


Figure 54. Refusal to all vaccines by year and health authority, 7-year-olds, British Columbia

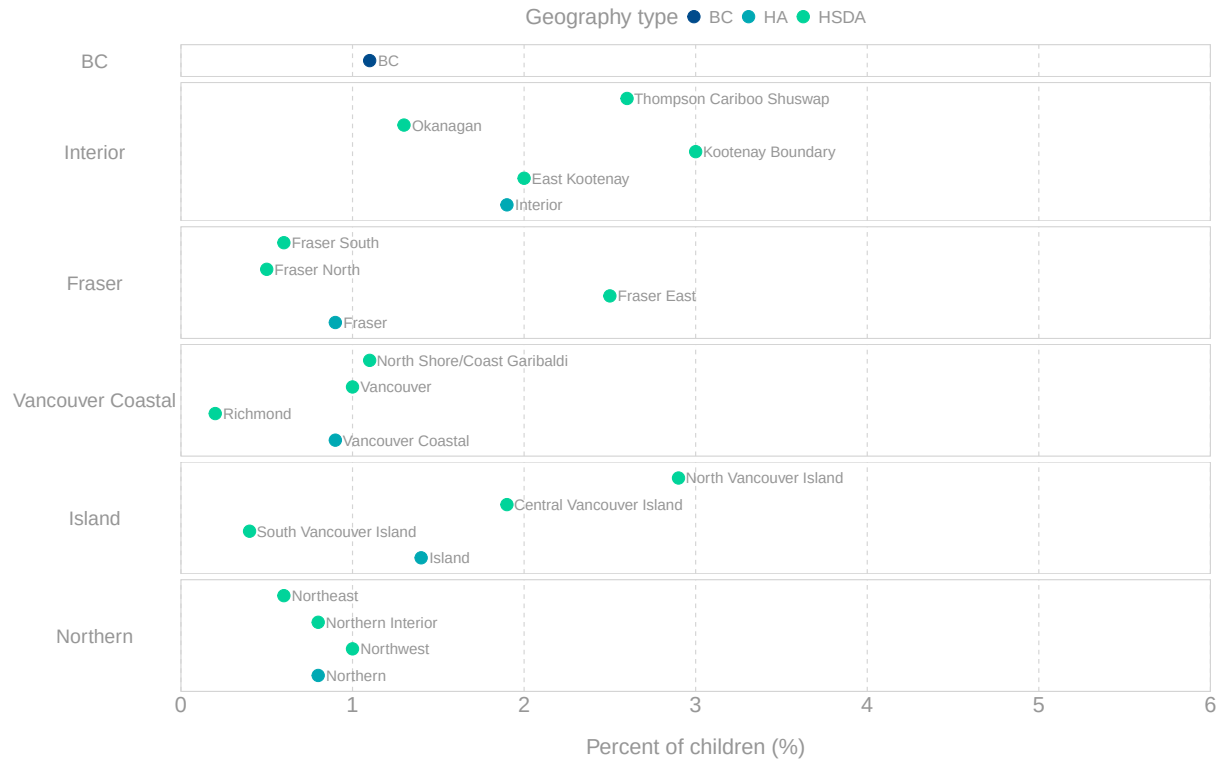


Figure 55. Refusal to all vaccines by geographic region, 7-year-olds, British Columbia, 2024

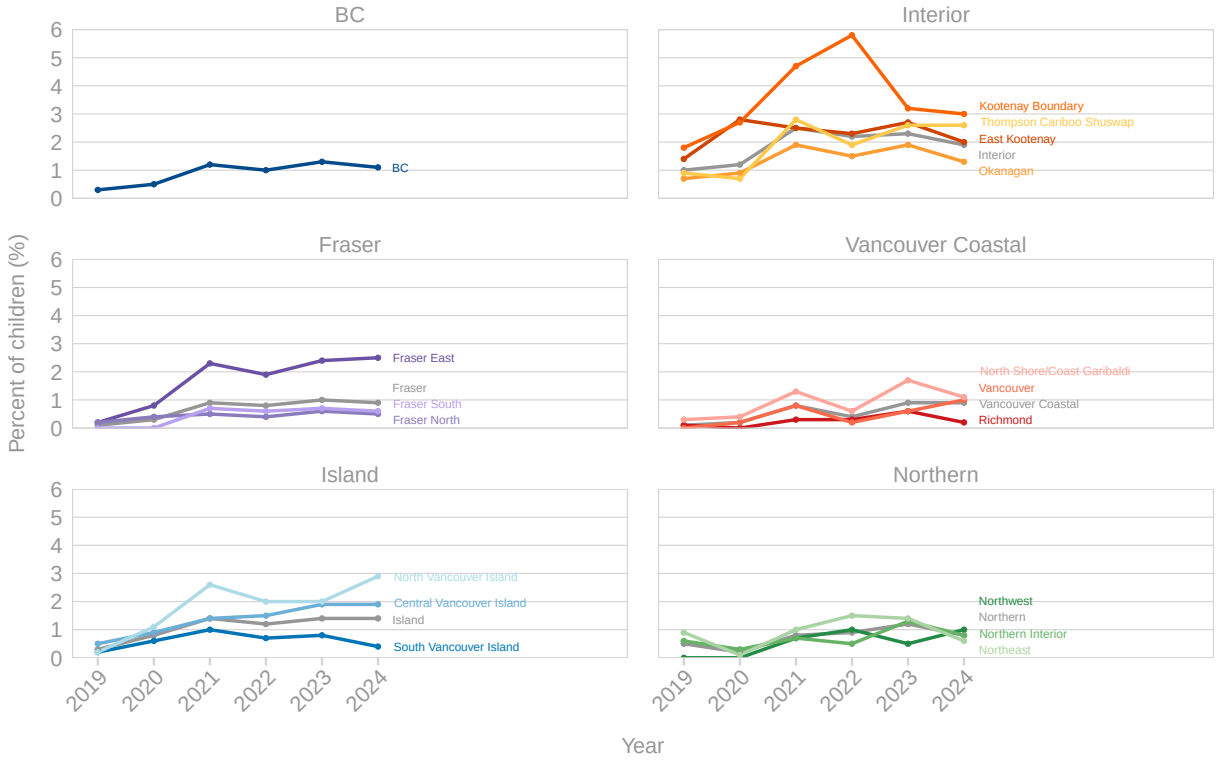


Figure 56. Refusal to all vaccines by year and geographic region, 7-year-olds, British Columbia

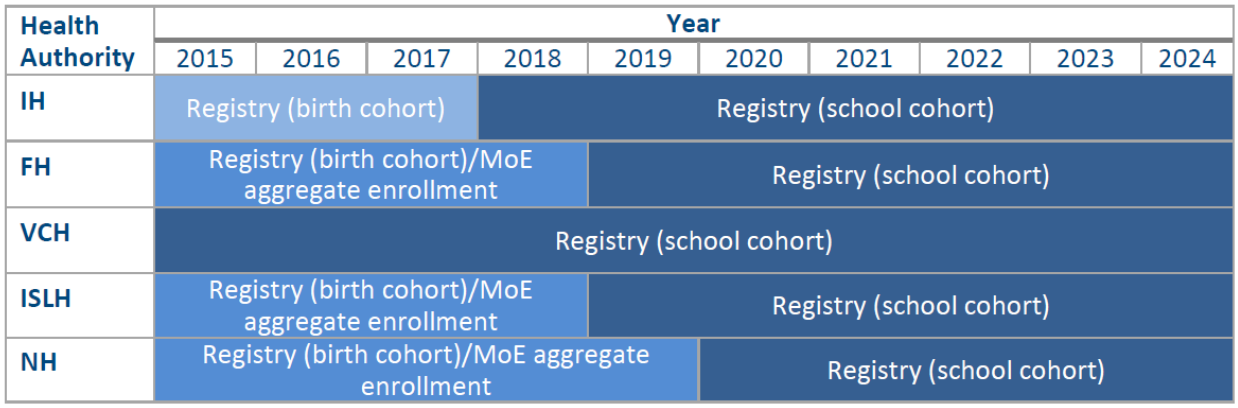
Data Notes

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 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.

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



*Numerators and denominators are defined as follows:

Data source	Numerator	Denominator
Registry (birth cohort)	Number of children from the denominator who were up-to-date for the specified agent(s) by their seventh birthday	Number of children in the birth cohort of interest with active records in the health authority's immunization registry or clinical system (PIR or PARIS).
Registry (school cohort)	Number of children from the denominator who were up-to-date for the specified agent(s) by their seventh birthday	Number of children in the birth cohort of interest with active records in the health authority's immunization registry or clinical system (PIR or PARIS) indicating they were enrolled in a BC school as of June 30th of the most recent school year
Registry (birth cohort)/ MoE aggregate enrollment	Number of children in the birth cohort of interest with active records in the health authority's immunization registry or clinical system (PIR or PARIS) who were up-to-date for the specified agent(s) by their seventh birthday	Number of children in the birth cohort of interest attending schools 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 Septem-

ber 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.

To maintain accurate denominators in an immunization registry, health authorities need to be aware of every child who moves into and out of the health region. Prior to 2020, not all health regions had been able to fully establish these processes. BC MoE enrollment data were considered more accurate estimates of the number of children in a health region than Panorama for ISLH (2015-2018), FH (2015-2018), and NH (2015-2019), while IH (2015-2017) used estimates based on birth cohort for both numerator and denominator. Between 2018 and 2020, the data sources for IH, FH, ISLH, and NH changed to more accurately reflect the population of the region, which may explain some differences observed in coverage rates when compared to previous years.

When different data sources are used for numerators and denominators, coverage results may appear as greater than 100%. When this occurred, the coverage rates were adjusted to 100%. Immunization coverage rates approaching 100% in FH (2015-2018), ISLH (2015-2018) and NH (2015-2019) are likely overestimates resulting from the use of different data sources for numerators and denominators. This artefact was rectified when the health authorities used the same data source for numerators and denominators.

Cohort

Coverage reported for any given year reflects uptake among children who turned seven years old during the previous calendar year (i.e., 2024 results are for children born in 2016 and who turned seven-years-old in 2023).

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. Only doses given prior to the seventh birthday are included in this assessment.

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, 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
Up-to-date for age	Children who met the up-to-date requirements for DTaP-IPV, hepatitis B, measles, mumps, rubella, and varicella as defined below.
DTaP-IPV	4th or 5th dose of diphtheria/acellular pertussis/tetanus and 3rd or 4th dose of polio on or after 4 years of age
DTaP	4th or 5th dose of diphtheria/acellular pertussis/tetanus on or after 4 years of age
Polio	3rd or 4th dose of polio on or after 4 years of age
Hepatitis B	3rd dose of hepatitis B vaccine on or after 24 weeks of age
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
Varicella	1 (to 2014) or 2 (2015 onward) doses of varicella vaccine, 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.
Refusal to all vaccines	Documented refusals for all of the following antigens: diphtheria, tetanus, pertussis, polio, hepatitis B, meningococcal C, measles, mumps, rubella, and varicella, and no recorded immunizations administered prior to the seventh birthday for any of the listed antigens. Refusals that are effective any time on or before the seventh birthday are counted, regardless of a documented end date, as long as the child is unimmunized.

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 the milestone birthday.

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 the milestone birthday.
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 the milestone birthday.
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 the milestone birthday.
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 the milestone birthday.
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 the milestone birthday.
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, and varicella.
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, and varicella.

Minimum Intervals and Ages Between Doses

Antigen/Agent	Minimum Age or Minimum Time Interval Between Eligible Doses			
	Dose 1[A]	Dose 2	Dose 3	Dose 4
Diphtheria, tetanus, acellular pertussis (DTaP or Tdap)	42 days	28 days	28 days	24 weeks[B]
Polio[C]	42 days	28 days	24 weeks[B]	
Hepatitis B				
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[D]	
received 3rd dose in June 2014 or later	0 days	28 days	56 days[D,E]	
Measles	12 months	28 days		
Mumps	12 months	28 days		
Rubella[F]	12 months			
Varicella[G]	12 months	28 days		

A. Dose 1 refers to the earliest age a child can receive the initial dose.
B. Last dose must be given on or after 4 years of age.
C. Schedule for DTaP should be followed when poliomyelitis provided in combination vaccine.
D. Dose 3 must be given at least 16 weeks (112 days) after dose 1.
E. Dose 3 must be given on or after 24 weeks of age.
F. Schedule for measles/mumps should be followed when rubella provided in combination vaccine with measles/mumps.
G. Dose must be given at least 8 weeks after any previous meningococcal C conjugate dose (if previous dose given).

Other data notes

New changes to the 2024 seven-year-old immunization coverage report:

- Meningococcal C vaccine coverage was excluded from the up-to-date for age and by antigen coverage measures for seven-year-olds in this report. Receipt of meningococcal-containing vaccine(s) is assessed at the 2nd birthday. While meningococcal C is not included as part of the up-to-date for age measure, it is considered when assessing for refusal to all vaccines, as children remain eligible to receive the vaccine.

Historical changes to the seven-year-old immunization coverage report:

- In 2023 (2015 birth cohort), minor adjustments for VCH antigen coverage calculations were made to improve alignment with provincial coverage surveillance definitions. As such, caution is warranted when comparing 2023 VCH estimates to previous years.
- In 2016 (2008 birth cohort), the in-Panorama coverage report was used to assess immunization coverage, because the routine method (analysis using an external analysis program) could not be applied. The in-Panorama reports allow for doses to be counted as adequate even if these do not meet the minimum age/interval criteria through a manual validation process at the user and record level. An assessment of the differences between estimates produced by the two reporting methods indicated that these produce very similar results. For the 2007 birth cohort, the difference in coverage results between the two reporting methods were less than 0.7% for all measures at the provincial level.
- In 2012 (2004 birth cohort), the seven-year-old coverage assessment became an official measure. Prior to this, assessment of school-entry immunization coverage was conducted at the end of kindergarten. This did not allow for complete capture of on-time immunizations since 'school-entry' doses are recommended at 4-6 years of age and the kindergarten assessment would not capture doses administered after kindergarten but before the seventh birthday. Due to the use of different data sources, seven-year old coverage results cannot be directly compared to kindergarten coverage results.

Immunization program and coverage assessment rule changes:

VCH 2015 birth cohort：

- In VCH, the COVID-19 pandemic closed clinics during the 2020/21 school year. Due to this, the 2015 birth cohort (2023 estimates) did not receive their planned immunizations during kindergarten. As a result, catch-up efforts were implemented in subsequent years, leading to many immunizations occurring beyond the 7th birthday.

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. 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 effective as of the 7th birthday is considered protected, regardless of their age at the time of illness.

- In January 2012, the BC immunization schedule introduced a second dose of varicella at school entry (4-6 years) (offered as combined MMRV beginning in 2014), thus the varicella requirement changed from requiring one to two doses for a child to be considered up-to-date. Children born in 2007 (2015 report) were the first cohort to be affected by this change. As a result of this change, the percent of children born in 2007 who were considered up-to-date for varicella decreased considerably compared to previous years. If only one dose of varicella vaccine had been required for the 2007 birth cohort, the percent of children up-to-date for varicella would have been 24% higher (93%) and the percent of up-to-date for age would have been 6% higher (69%). See the History of Immunization in BC.
- Starting in 2015, only exemptions for previous varicella disease that were effective at the time of the 7th birthday were considered as proof of immunity, while in previous years all recorded exemptions for previous disease in Panorama were considered as proof of immunity. This change only applied to a small number of children and did not have an appreciable effect on overall coverage rates.

Measles, mumps, and rubella :

- In 2019, BC launched a measles catch-up immunization program for school-age children. This program ran between April 1 and June 30, 2019. This program resulted in the collection of measles-related immunization records that were not previously reported to public health and some catch-up immunization with measles/mumps/rubella (MMR) or measles/mumps/rubella/varicella vaccine (MMRV). The impact of this program cannot be assessed using the routine seven-year-old immunization coverage data due to the change in data sources and other program changes.
- In January 2012, the second dose of MMR vaccine was moved from 18-months to school entry (4-6 years of age) (offered as combined MMRV beginning in 2014). The first group of children affected by this change was those born in July 2010, or those receiving their second dose of MMR-containing vaccine in 2012 or later. The change in immunization schedule may have resulted in fewer opportunities to provide the second dose of MMR-containing vaccine prior to the seventh birthday, explaining the drop in measles and mumps coverage in 2018. The impact of this program change could not be assessed in 2019 due to changes in data sources and the measles catch-up immunization program for school-age children (see above). For further information, see the History of Immunization in BC.

PIR notes:

- In 2020, the proportion of children with refusals to all vaccines increased over the prior year, in all health authorities, except NH. This is likely related to improved documentation of refusals as a result of the implementation of the Vaccination Status Reporting Regulation, which supports the collection of immunization records (including refusals) of school-age children by public health.
- 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 seven-year-olds 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.
- Between June 2015 and January 2018 the Panorama records of children born in 2008-2013 that had been inactivated because they received the majority of their immunizations from First Nations Health Services Organizations (FNHSOs), were reactivated to facilitate Panorama use by those FNHOs that had adopted this system. Historically, records of these clients would not be included in provincial immunization estimates as their immunizations were recorded in other systems and therefore expected to be incomplete within Panorama. The overall effect of activating the Panorama records was an increase of up to 0.1% in the provincial immunization coverage estimate for children up-to-date for

age in 2015-2018. This ranged from a decrease of 0.5% to an increase of 1.5% at the health authority level and a decrease of 1.1% to an increase of 2.1% at the HSDA level. When the school enrollment denominators were used for the coverage calculations, the denominators remained the same. As such, any change in the proportion up-to-date for age reflected the fact that additional children were being counted in the numerator. When Panorama data were used for both the numerators and denominators, the inclusion of the records that had previously been inactivated resulted in small declines in coverage, likely due to the inclusion of children with incomplete Panorama records.

- Starting in 2015, doses marked invalid in Panorama due to vaccine interactions and manual invalidation were excluded from counts, while in previous years these invalid doses in Panorama had been counted. At the provincial level, this change resulted in a decrease in coverage rates that ranged 0.0% to 0.5% for all measures.