BC Centre for Disease Control
Provincial Health Services Authority

Immunization Programs and Vaccine Preventable Diseases Service

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Immunization Coverage in Children by the Seventh Birthday

2013-2023

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

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Contents

Abbreviations

Health Authorities

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

Health Service Delivery Areas

EK	East Kootenay	VAN	Vancouver
KB	Kootenay Boundary	NSCG	North Shore / Coast Garibaldi
OK	Okanagan	SVI	South Vancouver Island
TCS	Thompson Cariboo Shuswap	CVI	Central Vancouver Island
FE	Fraser East	NVI	North Vancouver Island
FN	Fraser North	NW	Northwest
FS	Fraser South	NI	Northern Interior
RICH	Richmond	NE	Northeast

Additional abbreviations

BC	British Columbia	MyEdBC	MyEducation BC
MoE	Ministry of Education	PIR	Provincial Immunization Registry
D/T/aP	Diphtheria, tetanus, acellular pertussis	MMRV	Measles, mumps, rubella, varicella
D/T/aP/IPV	Diphtheria, tetanus, acellular pertussis, polio	Tdap-IPV	Tetanus, diphtheria, acellular pertussis, polio

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

The BCCDC Immunization Coverage Dashboard is available online here.

Executive Summary

Immunization coverage is routinely assessed at milestone ages for children in BC. This report outlines immunization coverage among seven-year-olds from 2013 to 2023 for ten antigens: diphtheria, tetanus, pertussis, polio, hepatitis B, measles, mumps, rubella, varicella, and meningococcal C; as well as overall up-to-date coverage. 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.

Since 2021, the proportion of seven-year-olds who are up-to-date for all routine immunizations has declined for two consecutive years from 73% to 66% in 2023. Despite an increase in coverage from 2020 to 2021, these year-over-year declines bring the 2023 rate to below pre-pandemic rates observed in 2019/2020. The decline in overall up-to-date coverage was observed in all regional health authorities. Provincial coverage was highest for rubella (87%), meningococcal C conjugate (84%), and hepatitis B (82%) and lowest for D/T/aP (72%), measles (72%), mumps (72%), polio (72%), and varicella (71%).

The most significant declines in coverage this year have been observed in antigens (D/T/aP, measles, mumps, and polio) contained in the school-entry (4-6 years) booster doses. As this year's seven-year-old cohort (children born in 2015) turned four in 2019, both receipt of these doses after becoming age-eligible and record collection may have been affected by the pandemic and could partially explain the declining rates.

Since 2021, the proportion of seven-year-olds in BC with documented refusals to all vaccines has been relatively stable and was 1.3% in 2023, with the highest refusal rate seen in IH (2.3%).[a] Reasons for non-immunization (i.e., documented refusals, exemptions, or contraindications) were assessed for each individual agent/antigen.[b] For the antigens with the lowest coverage rates, a large proportion of children were either partially immunized (14-16%) or unimmunized (10-12%) for unknown reasons.[c]

Limitations

All calculations are based on vaccine doses recorded in the provincial or regional immunization registry and school enrollment records maintained by regional health authorities using electronic enrollment records from the Ministry of Education, or records received directly from schools. Doses administered by providers other than public health and not reported to public health or the registry, may not be reported in the registry.

Please refer to the Notes for additional information.

[a] The Vaccination Status Reporting Regulation, which supports the collection of immunization records, was enacted July 1, 2019. See Notes.
[b] Categorisation of reasons for non-immunization may be incomplete for FH. See Notes.
[c] Unknown includes children who are partially immunized or unimmunized without a documented refusal/contraindication. See Notes.

Up-to-date for age

Up-to-date for age in British Columbia

Figure 1 displays the time trends for up-to-date for age coverage in BC from 2013 to 2023.[d] In recent years from 2019 to 2023, up-to-date for age coverage at the provincial level increased to a peak of 73% in 2021 before declining for two consecutive years (Table 1). During this same period, coverage in IH and FH followed a similar trend. In ISLH coverage also declined for the past two years, but still exceeds the pre-pandemic rate. NH has seen relatively stable coverage in recent years, though there was a 3% decrease in 2023 compared to the previous year.

In 2023, the overall percentage of seven-year-olds up-to-date for age in BC was 66%, a decrease of 4% compared to 2022. Coverage for individual antigens declined by 2-5%, with the largest decreases seen in D/T/aP/IPV, measles, mumps, and polio. Up-to-date coverage was highest for rubella (87%), meningococcal C conjugate (84%), and hepatitis B (82%) which were also the highest in 2022. The lowest coverage was observed for D/T/aP-containing agents, measles, mumps, polio, and varicella. Compared to 2022, the proportion of seven-year-olds with documented refusals to all vaccines increased from 1.0% to 1.3%.

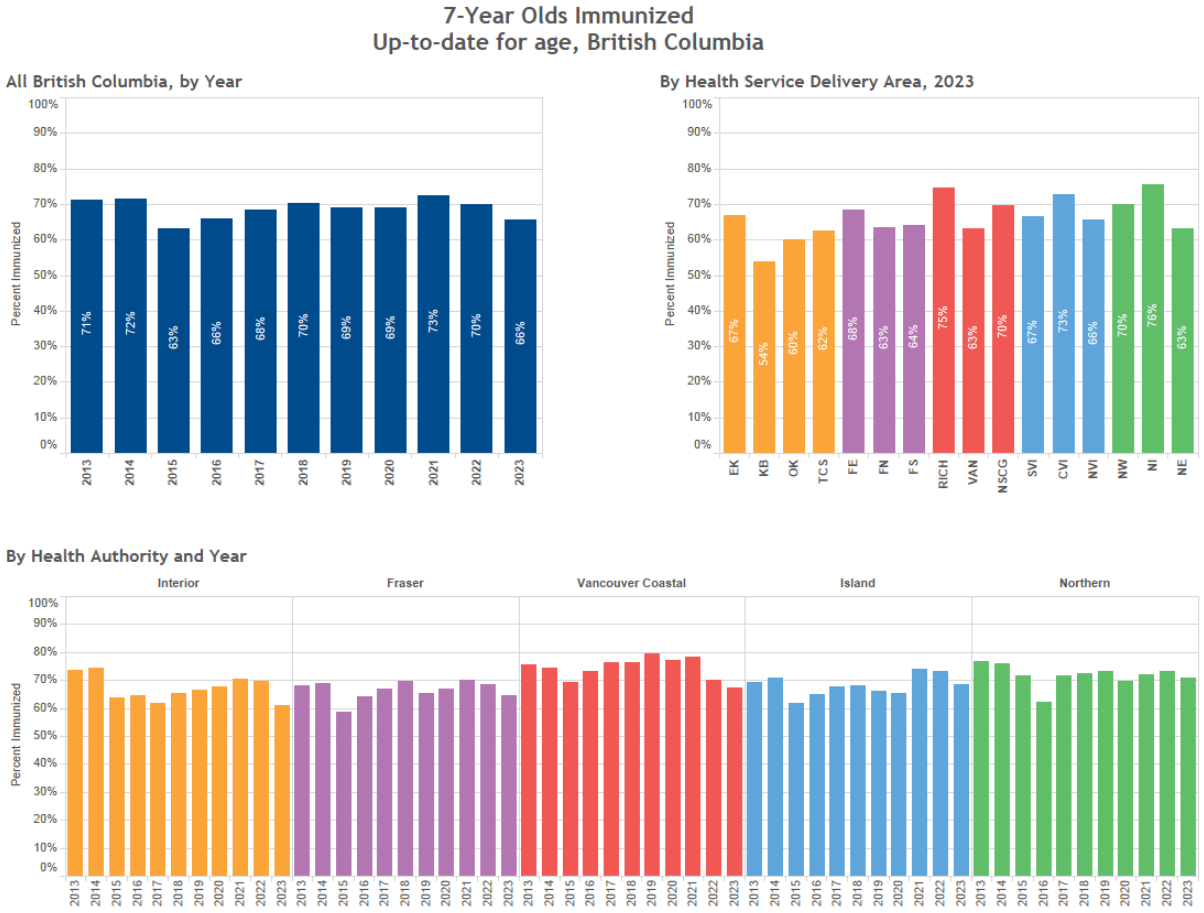

Figure 1. Percent of seven-year-olds immunized up-to-date for age, British Columbia

[d] Caution should be taken in interpreting this data as coverage calculations may be affected by changes in data sources. See Notes 3-5.

Table 1. Percent of seven-year-olds with up-to-date immunizations, British Columbia

Province	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
British Columbia	**Up-to-date for age**	**71%**	**72%**	**63%**	**66%**	**68%**	**70%**	**69%**	**69%**	**73%**	**70%**	**66%**
BC	*Specific Agents*											
	D/T/aP/IPV	79%	78%	77%	76%	76%	77%	76%	76%	79%	76%	71%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	78%	76%	78%	79%	76%	72%
	Hepatitis B	91%	91%	89%	89%	89%	90%	85%	84%	85%	85%	82%
	Measles	91%	90%	90%	90%	88%	82%	78%	80%	80%	77%	72%
	Mumps	91%	90%	90%	90%	88%	82%	78%	80%	80%	77%	72%
	Rubella	96%	95%	96%	95%	95%	95%	91%	91%	90%	90%	87%
	Varicella	91%	92%	69%	72%	74%	76%	75%	77%	78%	75%	71%
	Meningococcal C conjugate	91%	92%	93%	94%	93%	n/a	89%	87%	87%	86%	84%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	77%	78%	79%	77%	72%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.3%	0.5%	1.2%	1.0%	1.3%

Up-to-date for age by Health Authority

At the health authority level, up-to-date for age immunization coverage ranged from 61%-71% (Table 2). NH had the highest coverage at 71% followed by ISLH at 69%. Compared to 2022, coverage declined in all health authorities with the largest decrease (9%) occurring in IH. Rubella, meningococcal C, and hepatitis B had the highest coverage among individual antigens. Coverage for these antigens was similar to 2022 in IH, ISLH, and NH while it slightly declined in FH.

In IH, FH, ISLH, and NH, coverage declined for all antigens excluding hepatitis B in NH (1% increase), and meningococcal C and rubella in NH and ISLH (no change). There were notable declines (9-10%) in coverage for D/T/aP-containing agents, measles, mumps, polio, and varicella in IH. IH also had the highest proportion (2.3%) of seven-year-olds with documented refusals to all vaccines, however the rate is comparable to 2021 and 2022.

Table 2. Percent of seven-year-olds with up-to-date immunizations by Health Authority[e]

Health Authority	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Interior Health	**Up-to-date for age**	**73%**	**74%**	**64%**	**64%**	**62%**	**65%**	**67%**	**68%**	**71%**	**70%**	**61%**
IH	*Specific Agents*											
	D/T/aP/IPV	81%	82%	76%	73%	68%	71%	74%	74%	76%	75%	65%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	71%	74%	75%	77%	75%	66%
	Hepatitis B	88%	88%	84%	84%	81%	83%	84%	82%	83%	83%	82%
	Measles	89%	89%	86%	87%	80%	76%	75%	78%	78%	76%	66%
	Mumps	89%	89%	86%	87%	80%	76%	75%	78%	78%	75%	66%
	Rubella	93%	93%	90%	91%	86%	87%	90%	90%	88%	88%	86%
	Varicella	89%	89%	69%	69%	66%	71%	72%	74%	76%	74%	65%
	Meningococcal C conjugate	88%	89%	88%	90%	85%	n/a	89%	88%	87%	87%	85%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	74%	75%	77%	75%	66%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.7%	1.2%	2.5%	2.2%	2.3%
Fraser Health	**Up-to-date for age**	**68%**	**69%**	**59%**	**64%**	**67%**	**70%**	**65%**	**67%**	**70%**	**69%**	**65%**
FH	*Specific Agents*											
	D/T/aP/IPV	77%	76%	76%	75%	75%	77%	72%	74%	76%	74%	69%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	77%	73%	74%	76%	75%	70%
	Hepatitis B	93%	93%	89%	91%	91%	93%	83%	83%	84%	84%	81%
	Measles	91%	90%	91%	91%	90%	83%	75%	77%	77%	75%	70%
	Mumps	91%	90%	91%	91%	90%	83%	74%	77%	77%	75%	70%
	Rubella	97%	97%	98%	97%	98%	97%	88%	89%	89%	89%	85%
	Varicella	92%	93%	66%	71%	73%	75%	72%	74%	75%	74%	69%

[e] Coverage rates approaching 100% in FH, ISLH and NH are likely over-estimates resulting from the use of different data sources for numerators and denominators. See Notes 3-5.

Health Authority	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	Meningococcal C conjugate	92%	93%	95%	95%	95%	n/a	85%	86%	86%	85%	82%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	73%	75%	76%	75%	70%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.1%	0.3%	0.9%	0.8%	1.0%
Vancouver Coastal Health[f]	**Up-to-date for age**	**76%**	**75%**	**69%**	**73%**	**76%**	**76%**	**80%**	**77%**	**78%**	**70%**	**67%**
VCH	*Specific Agents*											
	D/T/aP/IPV	81%	80%	80%	82%	84%	82%	85%	86%	86%	78%	76%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	83%	85%	91%	86%	79%	77%
	Hepatitis B	89%	89%	90%	87%	90%	89%	90%	90%	90%	88%	83%
	Measles	90%	88%	89%	89%	90%	86%	87%	87%	87%	80%	79%
	Mumps	89%	87%	88%	89%	89%	86%	87%	87%	87%	80%	78%
	Rubella	93%	93%	93%	93%	94%	94%	95%	94%	94%	92%	90%
	Varicella	90%	90%	73%	79%	82%	82%	85%	84%	86%	78%	76%
	Meningococcal C conjugate	90%	91%	91%	92%	92%	n/a	93%	88%	88%	85%	84%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	86%	87%	87%	78%	76%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.1%	0.2%	0.8%	0.4%	0.9%
Island Health	**Up-to-date for age**	**69%**	**71%**	**62%**	**65%**	**68%**	**68%**	**66%**	**65%**	**74%**	**73%**	**69%**
ISLH	*Specific Agents*											
	D/T/aP/IPV	76%	77%	75%	75%	75%	75%	73%	72%	79%	78%	73%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	75%	73%	72%	80%	79%	74%
	Hepatitis B	91%	93%	91%	90%	91%	92%	84%	81%	85%	86%	85%
	Measles	92%	93%	92%	91%	90%	80%	76%	80%	81%	80%	75%
	Mumps	91%	93%	92%	91%	90%	80%	76%	80%	81%	80%	75%
	Rubella	96%	98%	98%	97%	96%	97%	90%	90%	90%	91%	91%
	Varicella	92%	94%	68%	70%	72%	73%	73%	76%	79%	78%	73%
	Meningococcal C conjugate	92%	95%	96%	96%	95%	n/a	89%	88%	89%	89%	89%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	74%	75%	80%	79%	74%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.3%	0.8%	1.4%	1.2%	1.4%
Northern Health	**Up-to-date for age**	**77%**	**76%**	**72%**	**62%**	**72%**	**73%**	**73%**	**70%**	**72%**	**73%**	**71%**
NH	*Specific Agents*											
	D/T/aP/IPV	85%	84%	84%	72%	82%	81%	81%	77%	80%	80%	77%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	81%	81%	78%	80%	80%	77%
	Hepatitis B	94%	92%	92%	92%	93%	94%	96%	85%	86%	85%	86%
	Measles	94%	92%	94%	93%	92%	85%	84%	80%	81%	80%	77%

[f] Caution should be taken in comparing 2023 VCH estimates with previous years due to changes in coverage calculations. See Notes.

Health Authority	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	Mumps	94%	92%	94%	93%	92%	85%	84%	80%	81%	80%	77%
	Rubella	98%	95%	97%	98%	97%	96%	100%	90%	91%	90%	90%
	Varicella	93%	92%	77%	67%	77%	77%	80%	77%	78%	78%	75%
	Meningococcal C conjugate	95%	93%	96%	97%	96%	n/a	99%	88%	87%	88%	88%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	82%	79%	81%	81%	77%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.5%	0.2%	0.8%	0.9%	1.2%

Up-to-date for age by Health Service Delivery Area

Interior Health

Across HSDAs in IH, up-to-date for age coverage ranged from 54% in Kootenay Boundary to 67% in East Kootenay (Table 3). Compared to 2022, declines in up-to-date for age coverage were observed in all HSDAs with the largest decrease (10%) in Thompson Cariboo Shuswap. Coverage for individual antigens in all HSDAs, excluding meningococcal C and rubella in East Kootenay, also declined compared to 2022. In Okanagan and Thompson Cariboo Shuswap, there were notable declines (9-10%) in coverage for D/T/aP-containing antigens, measles, mumps, polio, and varicella. Within each HSDA rubella had the highest coverage followed by meningococcal C and hepatitis B, while rates for the remaining antigens were similar. Documented refusals increased in all HSDAs except for Kootenay Boundary where a 2.6% decline was observed.

Table 3. Percent of seven-year-olds with up-to-date immunizations by Health Service Delivery Area, Interior Health

Health Service Delivery Area (HSDA)	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
East Kootenay	**Up-to-date for age**	**74%**	**73%**	**63%**	**69%**	**68%**	**72%**	**68%**	**71%**	**75%**	**73%**	**67%**
EK	*Specific Agents*											
	D/T/aP/IPV	85%	83%	81%	79%	76%	80%	78%	80%	81%	80%	75%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	80%	77%	80%	81%	81%	75%
	Hepatitis B	89%	87%	84%	85%	82%	84%	83%	81%	83%	82%	81%
	Measles	92%	91%	89%	90%	82%	83%	79%	81%	82%	81%	75%
	Mumps	91%	91%	89%	90%	82%	83%	79%	81%	82%	81%	75%
	Rubella	94%	94%	93%	93%	87%	90%	91%	90%	89%	88%	89%
	Varicella	90%	90%	73%	75%	72%	79%	76%	79%	79%	79%	72%
	Meningococcal C conjugate	87%	87%	89%	91%	86%	n/a	89%	89%	88%	87%	88%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	79%	80%	81	81%	75%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	1.4%	2.8%	2.5%	2.3%	2.7%
Kootenay Boundary	**Up-to-date for age**	**61%**	**61%**	**48%**	**52%**	**52%**	**63%**	**59%**	**62%**	**64%**	**61%**	**54%**
KB	*Specific Agents*											
	D/T/aP/IPV	71%	70%	66%	67%	63%	72%	69%	72%	74%	67%	61%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	72%	69%	73%	74%	67%	61%
	Hepatitis B	77%	76%	70%	72%	69%	76%	76%	74%	77%	78%	74%
	Measles	79%	80%	76%	77%	71%	75%	71%	75%	76%	67%	62%
	Mumps	79%	80%	76%	77%	71%	75%	70%	75%	75%	67%	62%
	Rubella	83%	83%	82%	84%	76%	83%	83%	85%	84%	83%	81%
	Varicella	77%	78%	56%	57%	58%	69%	65%	69%	70%	65%	58%
	Meningococcal C conjugate	78%	79%	79%	80%	74%	n/a	80%	81%	82%	82%	78%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	70%	73%	75%	68%	61%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.4%	2.7%	4.7%	5.8%	3.2%

Health Service Delivery Area (HSDA)	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Okanagan	**Up-to-date for age**	**72%**	**74%**	**63%**	**64%**	**60%**	**62%**	**64%**	**65%**	**69%**	**69%**	**60%**
OK	*Specific Agents*											
	D/T/aP/IPV	81%	81%	74%	73%	67%	68%	71%	71%	74%	74%	64%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	68%	71%	71%	75%	74%	64%
	Hepatitis B	87%	88%	84%	85%	81%	82%	83%	81%	83%	82%	81%
	Measles	89%	88%	85%	87%	79%	73%	72%	75%	76%	75%	65%
	Mumps	89%	88%	85%	87%	79%	73%	72%	75%	76%	75%	65%
	Rubella	93%	93%	90%	91%	85%	85%	89%	88%	87%	87%	85%
	Varicella	89%	90%	68%	70%	64%	68%	70%	71%	74%	73%	63%
	Meningococcal C conjugate	88%	89%	88%	90%	84%	n/a	88%	86%	86%	85%	84%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	72%	72%	75%	74%	64%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.7%	0.9%	1.9%	1.5%	1.9%
Thompson Cariboo Shuswap	**Up-to-date for age**	**80%**	**81%**	**70%**	**67%**	**65%**	**68%**	**72%**	**73%**	**73%**	**72%**	**62%**
TCS	*Specific Agents*											
	D/T/aP/IPV	85%	86%	79%	74%	70%	73%	78%	78%	79%	76%	66%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	73%	78%	78%	79%	76%	67%
	Hepatitis B	92%	92%	89%	88%	85%	86%	89%	87%	85%	86%	85%
	Measles	93%	93%	89%	89%	83%	78%	79%	83%	79%	77%	67%
	Mumps	93%	93%	89%	89%	83%	78%	79%	83%	79%	77%	67%
	Rubella	95%	95%	92%	92%	89%	90%	94%	93%	90%	91%	88%
	Varicella	93%	92%	73%	70%	68%	73%	77%	78%	78%	76%	66%
	Meningococcal C conjugate	93%	93%	91%	92%	88%	n/a	93%	92%	88%	90%	86%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	78%	79%	79%	77%	67%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.9%	0.7%	2.8%	1.9%	2.6%

Fraser Health

In FH, up-to-date for age coverage was highest in Fraser East (68%) with similar coverage observed in Fraser South (64%) and Fraser North (63%) (Table 4). Across HSDAs coverage for individual antigens was comparable except for hepatitis B, meningococcal C, and rubella which were 4-7% higher in Fraser East. Within each HSDA rubella, meningococcal C, and hepatitis B had the highest coverage among individual antigens, ranging from 79% and 89%, while coverage rates for the remaining antigens were similar. Fraser East had the highest proportion (2.4%) of documented refusals to all vaccines.

Table 4. Percent of seven-year-olds with up-to-date immunizations by Health Service Delivery Area, Fraser Health[e]

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Fraser East	**Up-to-date for age**	**75%**	**75%**	**71%**	**72%**	**76%**	**75%**	**71%**	**73%**	**76%**	**72%**	**68%**
FE	*Specific Agents*											
	D/T/aP/IPV	81%	80%	82%	80%	82%	81%	76%	77%	79%	76%	71%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	81%	76%	77%	79%	77%	72%
	Hepatitis B	98%	96%	97%	95%	96%	96%	86%	87%	88%	87%	86%
	Measles	96%	94%	96%	94%	93%	86%	78%	80%	80%	77%	72%
	Mumps	96%	94%	96%	94%	93%	86%	78%	80%	80%	77%	72%
	Rubella	100%	98%	100%	99%	99%	100%	90%	91%	90%	90%	89%
	Varicella	96%	95%	75%	76%	79%	79%	75%	77%	79%	75%	71%
	Meningococcal C conjugate	98%	96%	100%	98%	98%	n/a	88%	89%	89%	89%	87%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	77%	78%	80%	77%	72%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.2%	0.8%	2.3%	1.9%	2.4%
Fraser North	**Up-to-date for age**	**69%**	**69%**	**60%**	**66%**	**66%**	**70%**	**64%**	**66%**	**68%**	**67%**	**63%**
FN	*Specific Agents*											
	D/T/aP/IPV	78%	76%	77%	77%	75%	78%	71%	74%	74%	74%	69%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	78%	72%	74%	74%	74%	70%
	Hepatitis B	95%	96%	90%	96%	93%	96%	82%	82%	83%	83%	79%
	Measles	94%	94%	94%	97%	92%	85%	74%	78%	76%	74%	71%
	Mumps	94%	94%	94%	96%	92%	85%	74%	78%	76%	74%	71%
	Rubella	100%	100%	100%	100%	100%	100%	88%	89%	89%	88%	84%
	Varicella	95%	98%	69%	73%	73%	76%	71%	75%	73%	73%	69%
	Meningococcal C conjugate	95%	96%	98%	100%	96%	n/a	84%	85%	85%	83%	80%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	72%	75%	75%	74%	70%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.2%	0.4%	0.5%	0.4%	0.6%
Fraser South	**Up-to-date for age**	**65%**	**66%**	**53%**	**60%**	**64%**	**67%**	**64%**	**65%**	**69%**	**68%**	**64%**
FS	*Specific Agents*											
	D/T/aP/IPV	75%	74%	73%	72%	73%	76%	71%	73%	75%	74%	69%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	76%	72%	73%	76%	75%	69%

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	Hepatitis B	89%	89%	86%	86%	88%	89%	82%	82%	83%	84%	80%
	Measles	87%	87%	87%	87%	88%	80%	74%	76%	77%	75%	69%
	Mumps	87%	86%	87%	86%	88%	80%	73%	75%	77%	75%	69%
	Rubella	95%	94%	96%	94%	95%	95%	88%	89%	89%	89%	85%
	Varicella	88%	89%	61%	67%	70%	73%	71%	73%	75%	73%	68%
	Meningococcal C conjugate	88%	89%	91%	90%	92%	n/a	85%	85%	86%	85%	82%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	72%	74%	76%	75%	69%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.0%	0.0%	0.7%	0.6%	0.7%

Vancouver Coastal Health

As seen in Table 5, up-to-date for age coverage for HSDAs in VCH ranged from 63% and 75% with the highest coverage in Richmond. Within each HSDA rubella had the highest coverage, ranging from 88% to 97%. Antigens with the lowest coverage were D/T/aP/IPV (83%) in Richmond, varicella (71%) in Vancouver, while in North Shore/Coast Garibaldi both D/T/aP/IPV and varicella rates were 77%. North Shore/Coast Garibaldi had the highest proportion (1.7%) of seven-year-olds with documented refusals for all vaccines.

Table 5. Percent of seven-year-olds with up-to-date immunizations by Health Service Delivery Area, Vancouver Coastal Health[f]

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Richmond	**Up-to-date for age**	**85%**	**87%**	**82%**	**83%**	**86%**	**87%**	**88%**	**83%**	**84%**	**80%**	**75%**
RICH	*Specific Agents*											
	D/T/aP/IPV	89%	91%	89%	88%	91%	91%	92%	90%	90%	88%	83%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	91%	92%	95%	90%	89%	84%
	Hepatitis B	94%	95%	96%	93%	95%	95%	95%	95%	94%	93%	90%
	Measles	95%	94%	95%	95%	94%	93%	93%	92%	91%	90%	86%
	Mumps	93%	93%	94%	94%	94%	93%	93%	91%	91%	90%	85%
	Rubella	97%	97%	97%	97%	97%	97%	98%	97%	96%	96%	97%
	Varicella	95%	95%	84%	87%	89%	90%	92%	89%	90%	89%	85%
	Meningococcal C conjugate	93%	95%	95%	95%	96%	n/a	96%	90%	90%	88%	88%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	93%	91%	90%	88%	84%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.1%	0.0%	0.3%	0.3%	0.6%
Vancouver	**Up-to-date for age**	**78%**	**76%**	**69%**	**73%**	**75%**	**75%**	**78%**	**76%**	**77%**	**63%**	**63%**
VAN	*Specific Agents*											
	D/T/aP/IPV	82%	81%	80%	82%	82%	81%	84%	85%	85%	70%	72%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	81%	84%	91%	86%	71%	73%
	Hepatitis B	90%	90%	90%	87%	90%	89%	90%	90%	90%	87%	80%
	Measles	91%	90%	89%	89%	90%	85%	86%	87%	87%	74%	75%
	Mumps	90%	89%	88%	88%	89%	85%	86%	86%	87%	74%	74%
	Rubella	94%	94%	94%	93%	94%	94%	95%	94%	94%	91%	88%
	Varicella	91%	91%	72%	80%	81%	81%	84%	83%	85%	71%	71%
	Meningococcal C conjugate	91%	92%	92%	91%	91%	n/a	93%	87%	89%	83%	82%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	85%	86%	86%	71%	72%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.0%	0.2%	0.8%	0.2%	0.6%
North Shore / Coast Garibaldi	**Up-to-date for age**	**63%**	**63%**	**61%**	**66%**	**73%**	**73%**	**76%**	**75%**	**77%**	**75%**	**70%**
NSCG	*Specific Agents*											
	D/T/aP/IPV	71%	71%	75%	78%	82%	80%	84%	84%	84%	82%	77%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	81%	84%	88%	85%	83%	79%

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	Hepatitis B	82%	83%	84%	83%	86%	86%	87%	86%	87%	87%	82%
	Measles	84%	81%	84%	86%	87%	83%	85%	85%	86%	84%	80%
	Mumps	84%	81%	83%	86%	87%	83%	85%	85%	86%	84%	80%
	Rubella	90%	88%	89%	91%	92%	92%	92%	93%	91%	92%	90%
	Varicella	85%	84%	66%	74%	79%	79%	82%	81%	84%	82%	77%
	Meningococcal C conjugate	86%	87%	89%	90%	91%	n/a	91%	89%	86%	86%	85%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	85%	85%	86%	83%	78%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.3%	0.4%	1.3%	0.6%	1.7%

Island Health

Up-to-date for age coverage for HSDAs in ISLH ranged from 66-73%, with the highest coverage in Central Vancouver Island (Table 6). Compared to 2022, up-to-date for age coverage declined in all HSDAs with the largest decrease (6%) in South Vancouver Island. Within each HSDA rubella had the highest coverage among individual antigens followed by meningococcal C and hepatitis B, while rates for the remaining antigens were similar. Coverage for rubella, meningococcal C and hepatitis B were largely unchanged compared to 2022 while declines were observed for all other antigens. North Vancouver Island had the highest proportion of seven-year-olds with documented refusals (2.0%).

Table 6. Percent of seven-year-olds with up-to-date immunizations by Health Service Delivery Area, Island Health[e]

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
South Vancouver Island SVI	**Up-to-date for age**	**71%**	**73%**	**63%**	**67%**	**70%**	**69%**	**66%**	**65%**	**75%**	**73%**	**67%**
	Specific Agents											
	D/T/aP/IPV	77%	78%	75%	76%	77%	76%	73%	70%	80%	78%	71%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	76%	73%	71%	81%	78%	72%
	Hepatitis B	91%	94%	88%	89%	91%	92%	84%	83%	86%	86%	86%
	Measles	92%	94%	91%	91%	90%	80%	76%	81%	82%	79%	73%
	Mumps	91%	94%	91%	91%	90%	80%	76%	81%	82%	79%	73%
	Rubella	95%	97%	96%	97%	96%	96%	89%	91%	90%	90%	90%
	Varicella	91%	94%	69%	72%	74%	73%	73%	78%	79%	77%	72%
	Meningococcal C conjugate	92%	95%	94%	95%	94%	n/a	87%	88%	89%	88%	88%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	74%	74%	81%	78%	72%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.2%	0.6%	1.0%	0.7%	0.8%
Central Vancouver Island CVI	**Up-to-date for age**	**69%**	**69%**	**60%**	**62%**	**67%**	**70%**	**65%**	**64%**	**74%**	**75%**	**73%**
	Specific Agents											
	D/T/aP/IPV	75%	74%	75%	73%	74%	77%	72%	72%	79%	80%	78%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	77%	72%	72%	79%	81%	78%
	Hepatitis B	92%	92%	92%	90%	93%	95%	84%	81%	86%	87%	87%
	Measles	91%	92%	93%	89%	90%	81%	74%	77%	81%	82%	79%
	Mumps	91%	92%	93%	89%	90%	81%	74%	77%	81%	81%	79%
	Rubella	95%	97%	99%	96%	98%	100%	90%	90%	91%	92%	92%
	Varicella	92%	93%	65%	68%	71%	75%	71%	75%	78%	80%	76%
	Meningococcal C conjugate	92%	94%	97%	95%	97%	n/a	89%	88%	90%	90%	90%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	73%	75%	80%	81%	79%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.5%	0.9%	1.4%	1.5%	1.9%
North Vancouver Island NVI	**Up-to-date for age**	**65%**	**71%**	**63%**	**66%**	**64%**	**62%**	**70%**	**68%**	**72%**	**71%**	**66%**
	Specific Agents											
	D/T/aP/IPV	75%	79%	77%	76%	71%	70%	77%	76%	78%	76%	71%

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	D/T/aP	n/a	n/a	n/a	n/a	n/a	71%	77%	76%	78%	76%	71%
	Hepatitis B	91%	95%	92%	93%	88%	88%	86%	80%	83%	83%	83%
	Measles	93%	96%	94%	94%	88%	77%	80%	80%	79%	78%	71%
	Mumps	93%	96%	94%	94%	88%	77%	80%	80%	79%	78%	71%
	Rubella	99%	100%	100%	100%	95%	95%	93%	90%	89%	89%	88%
	Varicella	93%	96%	69%	71%	68%	67%	77%	77%	78%	76%	70%
	Meningococcal C conjugate	93%	97%	98%	99%	94%	n/a	92%	88%	88%	87%	87%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	78%	78%	79%	77%	72%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.2%	1.1%	2.6%	2.0%	2.0%

Northern Health

As shown in Table 7, up-to-date for age coverage for NH HSDAs was highest in Northern Interior (76%) followed by Northwest (70%) and Northeast (63%). Compared to 2022, Northeast saw the largest decline (5%) in up-to-date for age coverage while Northwest increased by 1%. In Northern Interior and Northeast coverage for individual antigens, excluding hepatitis B in Northeast, decreased compared to 2022. Conversely, coverage for individual antigens in Northwest was comparable or slightly higher than 2022. Within individual HSDAs, coverage was highest for rubella, meningococcal C, and hepatitis B. There were notable declines (6-7%) in coverage for D/T/aP-containing agents, measles, mumps, varicella, and polio in Northeast. Despite a 0.8% increase in refusals in Northern Interior compared to 2022, Northeast still had the highest proportion (1.4%) of seven-year-olds with refusals to all vaccines.

Table 7. Percent of seven-year-olds with up-to-date immunizations by Health Service Delivery Area, Northern Health[e]

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Northwest	**Up-to-date for age**	**73%**	**70%**	**59%**	**61%**	**62%**	**65%**	**70%**	**68%**	**73%**	**69%**	**70%**
NW	*Specific Agents*											
	D/T/aP/IPV	83%	78%	77%	76%	74%	73%	80%	76%	81%	76%	77%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	73%	80%	77%	81%	77%	78%
	Hepatitis B	89%	85%	84%	82%	83%	83%	91%	83%	84%	83%	85%
	Measles	90%	85%	86%	86%	82%	76%	82%	79%	83%	76%	80%
	Mumps	89%	85%	86%	86%	82%	76%	82%	79%	83%	76%	80%
	Rubella	94%	88%	91%	92%	89%	88%	97%	89%	91%	88%	91%
	Varicella	89%	83%	66%	69%	68%	70%	77%	76%	80%	74%	77%
	Meningococcal C conjugate	90%	85%	90%	91%	88%	n/a	95%	86%	88%	85%	89%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	81%	78%	82%	77%	79%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.0%	0.0%	0.7%	1.0%	0.5%
Northern Interior	**Up-to-date for age**	**82%**	**80%**	**81%**	**72%**	**78%**	**79%**	**78%**	**74%**	**73%**	**78%**	**76%**
NI	*Specific Agents*											
	D/T/aP/IPV	90%	88%	90%	81%	86%	86%	85%	81%	81%	85%	81%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	86%	85%	81%	81%	85%	81%
	Hepatitis B	98%	94%	95%	95%	96%	95%	97%	88%	89%	89%	88%
	Measles	97%	94%	97%	96%	95%	90%	87%	84%	81%	85%	81%
	Mumps	97%	94%	96%	96%	95%	90%	87%	83%	81%	85%	81%
	Rubella	100%	97%	99%	100%	99%	98%	100%	94%	92%	94%	91%
	Varicella	95%	94%	85%	75%	81%	83%	84%	81%	79%	83%	79%
	Meningococcal C conjugate	98%	94%	98%	98%	98%	n/a	99%	91%	87%	92%	89%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	86%	83%	82%	85%	82%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.6%	0.3%	0.7%	0.5%	1.3%
Northeast	**Up-to-date for age**	**70%**	**74%**	**67%**	**47%**	**70%**	**68%**	**67%**	**64%**	**70%**	**68%**	**63%**
NE	*Specific Agents*											

HSDA	Vaccination Details	Year										
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	D/T/aP/IPV	78%	84%	81%	54%	80%	78%	76%	72%	78%	75%	68%
	D/T/aP	n/a	n/a	n/a	n/a	n/a	78%	76%	72%	79%	75%	68%
	Hepatitis B	92%	95%	94%	96%	96%	100%	99%	82%	85%	81%	82%
	Measles	93%	97%	95%	95%	95%	82%	79%	75%	81%	75%	69%
	Mumps	93%	97%	95%	95%	95%	82%	79%	75%	81%	75%	69%
	Rubella	99%	100%	100%	100%	100%	100%	100%	86%	90%	87%	85%
	Varicella	93%	98%	74%	51%	75%	73%	74%	71%	77%	73%	67%
	Meningococcal C conjugate	93%	98%	99%	100%	100%	n/a	100%	84%	87%	85%	84%
	Polio	n/a	n/a	n/a	n/a	n/a	n/a	77%	74%	80%	76%	69%
	Refused all vaccines	n/a	n/a	n/a	n/a	n/a	n/a	0.9%	0.1%	1.0%	1.5%	1.4%

Diphtheria, Tetanus, Pertussis and Polio (D/T/aP/IPV)

Figure 2 displays the time trends for D/T/aP/IPV coverage in BC from 2013 to 2023.[d,f] At the provincial level, D/T/aP/IPV coverage declined for the second consecutive year to 71% in 2023. Rates in FH, IH, NH, and ISLH followed a similar trend as provincial coverage with two consecutive years of declines, with coverage dropping most significantly (10%) in IH compared to 2022.

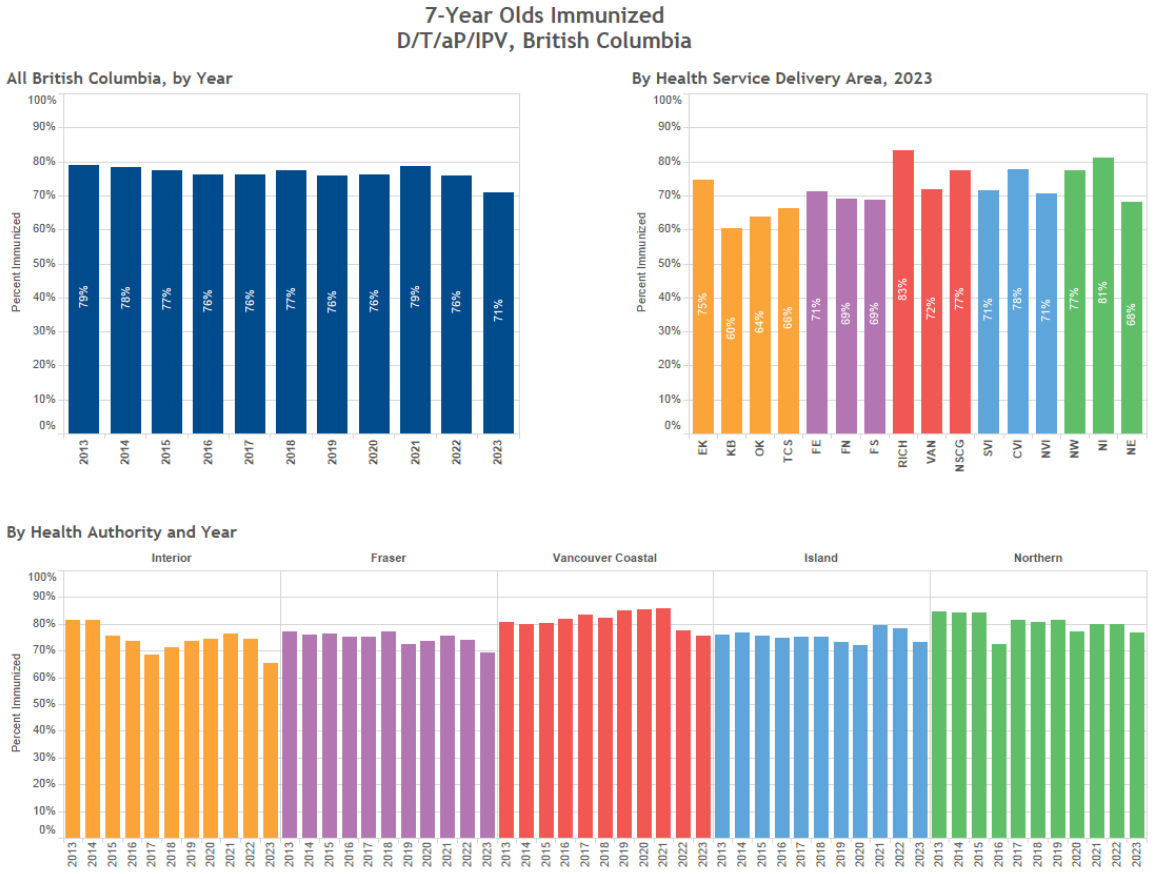

Figure 2. Percent of seven-year-olds immunized, D/T/aP/IPV, British Columbia

Diphtheria, Tetanus and Pertussis (D/T/aP)

Assessment of D/T/aP, separate from polio, was introduced in 2018. Figure 3 displays the time trends for D/T/aP coverage in BC from 2018 to 2023.[d,f] At the provincial level, D/T/aP coverage declined by 4% for the second consecutive year to 72% in 2023. Coverage trends have varied across the health authorities however, IH, FH, ISLH, and NH all saw declines in coverage in 2023 compared to the previous year with the largest decrease in IH (9%).

Reasons for being partially or unimmunized for D/T/aP are displayed in Table 8 and Figure 4. At the provincial level, 1% of seven-year-olds were unimmunized due to a documented refusal, while 10% were unimmunized due to unknown reasons. A large proportion of seven-year-olds were partially immunized (17%). Among the health authorities, IH had the highest proportion (3%) of unimmunized seven-year-olds with a documented refusal.

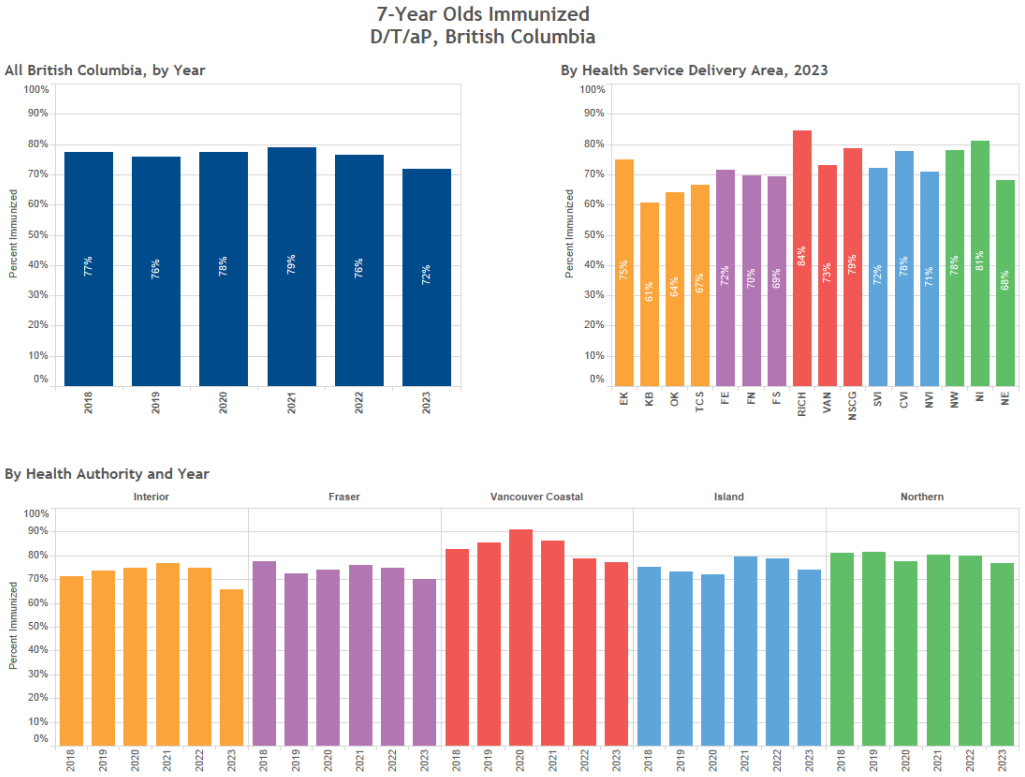

Figure 3. Percent of seven-year-olds immunized, D/T/aP, British Columbia

Table 8. Reasons for non-immunization, D/T/aP, British Columbia, 2023

Region	Population	Count (Percent)					
		Partially Immunized			Unimmunized		
		Refusal	Contraindication	Unknown[g]	Refusal	Contraindication	Unknown[g]
British Columbia	**48,239**	**362 (1%)**	**3 (0%)**	**7,867 (16%)**	**656 (1%)**	**1 (0%)**	**4,745 (10%)**
Interior	**7,744**	**72 (1%)**	**0 (0%)**	**1,629 (21%)**	**202 (3%)**	**0 (0%)**	**755 (10%)**
East Kootenay	859	15 (2%)	0 (0%)	116 (14%)	23 (3%)	0 (0%)	62 (7%)
Kootenay Boundary	759	7 (1%)	0 (0%)	163 (22%)	28 (4%)	0 (0%)	100 (13%)
Okanagan	3,723	27 (1%)	0 (0%)	815 (22%)	84 (2%)	0 (0%)	413 (11%)
Thompson Cariboo Shuswap	2,403	23 (1%)	0 (0%)	535 (22%)	67 (3%)	0 (0%)	180 (8%)
Fraser[h]	**20,260**	**60 (0%)**	**1 (0%)**	**3,309 (16%)**	**207 (1%)**	**0 (0%)**	**2,513 (12%)**
Fraser East	3,796	17 (0%)	0 (0%)	672 (18%)	93 (2%)	0 (0%)	298 (8%)
Fraser North	6,706	15 (0%)	1 (0%)	1,047 (16%)	41 (1%)	0 (0%)	921 (14%)
Fraser South	9,758	28 (0%)	0 (0%)	1,590 (16%)	73 (1%)	0 (0%)	1,294 (13%)
Vancouver Coastal	**9,655**	**148 (2%)**	**0 (0%)**	**1,214 (13%)**	**86 (1%)**	**0 (0%)**	**768 (8%)**
Richmond	1,919	4 (0%)	0 (0%)	248 (13%)	11 (1%)	0 (0%)	37 (2%)
Vancouver	4,869	85 (2%)	0 (0%)	681 (14%)	29 (1%)	0 (0%)	511 (10%)
North Shore/Coast Garibaldi	2,867	59 (2%)	0 (0%)	285 (10%)	46 (2%)	0 (0%)	220 (8%)
Island	**7,398**	**59 (1%)**	**0 (0%)**	**1,276 (17%)**	**113 (2%)**	**0 (0%)**	**486 (7%)**
South Vancouver Island	3,467	11 (0%)	0 (0%)	651 (19%)	30 (1%)	0 (0%)	272 (8%)
Central Vancouver Island	2,514	36 (1%)	0 (0%)	362 (14%)	53 (2%)	0 (0%)	108 (4%)
North Vancouver Island	1,417	12 (1%)	0 (0%)	263 (19%)	30 (2%)	0 (0%)	106 (8%)
Northern	**3,182**	**23 (1%)**	**2 (0%)**	**439 (14%)**	**48 (2%)**	**1 (0%)**	**223 (7%)**
Northwest	755	6 (1%)	2 (0%)	108 (14%)	5 (1%)	0 (0%)	46 (6%)
Northern Interior	1,558	9 (1%)	0 (0%)	165 (11%)	24 (2%)	1 (0%)	93 (6%)
Northeast	869	8 (1%)	0 (0%)	166 (19%)	19 (2%)	0 (0%)	84 (10%)

[g] Unknown includes all children who are partially immunized or unimmunized who do not have a documented refusal or contraindication. See Notes.
[h] PIR does not contain complete supplementary information on reasons for non-immunization for FH. See Notes.

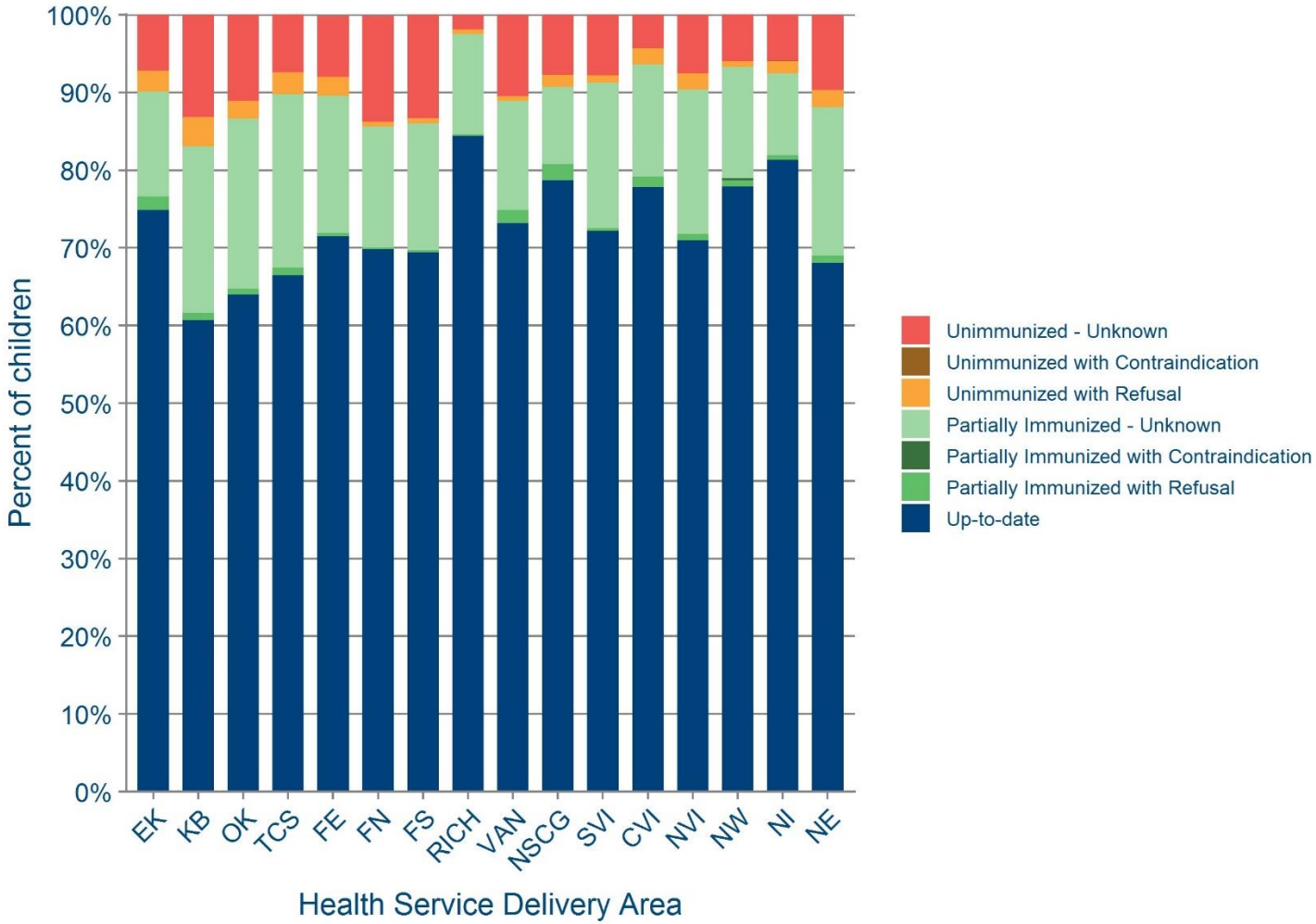

Figure 4. Reasons for non-immunization by Health Service Delivery Area, D/T/aP, British Columbia, 2023

Hepatitis B

Figure 5 displays the time trends for hepatitis B coverage in BC from 2013 to 2023.[d,f] In recent years from 2019 to 2023, coverage for hepatitis B has remained relatively stable at the provincial level, though it declined by 3% in 2023 to 82%. Compared to 2022, rates declined in all regions, excluding NH where coverage has been stable since 2020 with a slight increase (1%) observed in 2023. In ISLH, coverage has surpassed pre-pandemic levels despite a slight decline in 2023.

Reasons for being partially or unimmunized for hepatitis B are displayed in Table 9 and Figure 6. At the provincial level, 2% of seven-year-olds in BC were unimmunized due to a documented refusal while an additional 11% were unimmunized due to unknown reasons. Only 4% of seven-year-olds were partially immunized. FH had the highest proportion (15%) of seven-year-olds unimmunized for hepatitis B, largely for unknown reasons.[h]

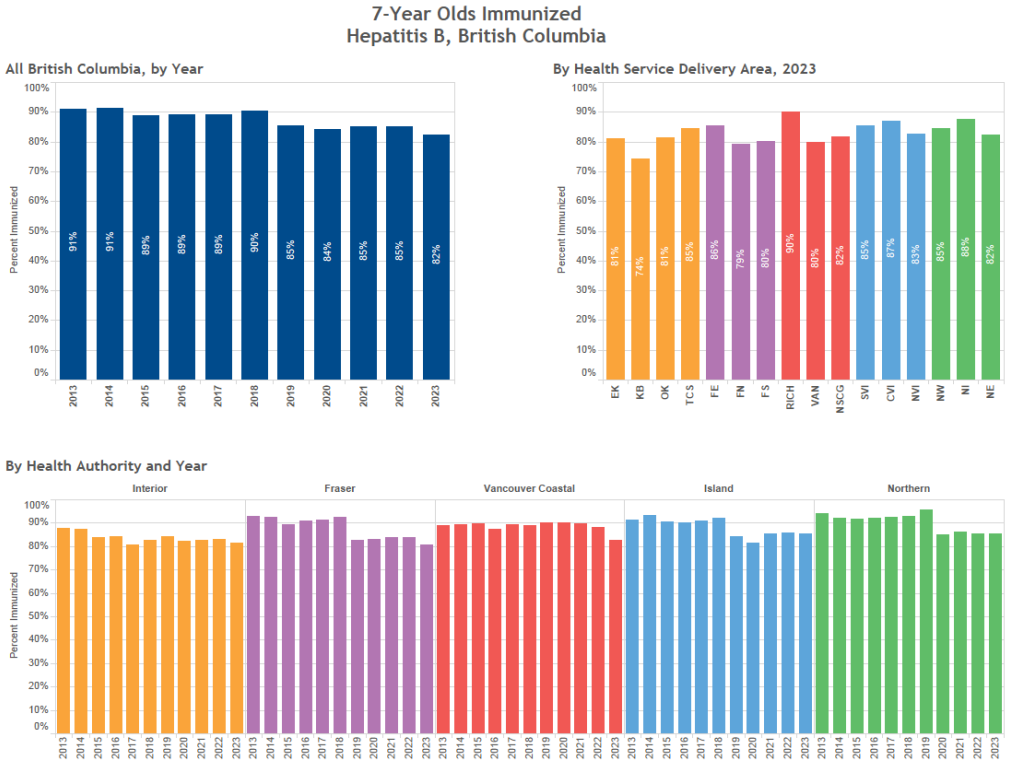

Figure 5. Percent of seven-year-olds immunized, Hepatitis B, British Columbia

Table 9. Reasons for non-immunization, Hepatitis B, British Columbia, 2023

Region	Population	Count (Percent)					
		Partially Immunized			Unimmunized		
		Refusal	Contraindication	Unknown[g]	Refusal	Contraindication	Unknown[g]
British Columbia	**48,239**	**184 (0%)**	**1 (0%)**	**2,139 (4%)**	**804 (2%)**	**2 (0%)**	**5,400 (11%)**
Interior	**7,744**	**35 (0%)**	**0 (0%)**	**262 (3%)**	**248 (3%)**	**0 (0%)**	**880 (11%)**
East Kootenay	859	4 (0%)	0 (0%)	34 (4%)	36 (4%)	0 (0%)	88 (10%)
Kootenay Boundary	759	6 (1%)	0 (0%)	33 (4%)	38 (5%)	0 (0%)	118 (16%)
Okanagan	3,723	18 (0%)	0 (0%)	125 (3%)	97 (3%)	0 (0%)	457 (12%)
Thompson Cariboo Shuswap	2,403	7 (0%)	0 (0%)	70 (3%)	77 (3%)	0 (0%)	217 (9%)
Fraser[h]	**20,260**	**37 (0%)**	**1 (0%)**	**876 (4%)**	**221 (1%)**	**0 (0%)**	**2,749 (14%)**
Fraser East	3,796	10 (0%)	0 (0%)	124 (3%)	98 (3%)	0 (0%)	318 (8%)
Fraser North	6,706	9 (0%)	1 (0%)	312 (5%)	47 (1%)	0 (0%)	1,029 (15%)
Fraser South	9,758	18 (0%)	0 (0%)	440 (4%)	76 (1%)	0 (0%)	1,402 (14%)
Vancouver Coastal	**9,655**	**59 (1%)**	**0 (0%)**	**602 (6%)**	**114 (1%)**	**0 (0%)**	**908 (9%)**
Richmond	1,919	2 (0%)	0 (0%)	121 (6%)	12 (1%)	0 (0%)	55 (3%)
Vancouver	4,869	27 (1%)	0 (0%)	319 (7%)	38 (1%)	0 (0%)	589 (12%)
North Shore/Coast Garibaldi	2,867	30 (1%)	0 (0%)	162 (6%)	64 (2%)	0 (0%)	264 (9%)
Island	**7,398**	**43 (1%)**	**0 (0%)**	**278 (4%)**	**165 (2%)**	**0 (0%)**	**591 (8%)**
South Vancouver Island	3,467	16 (0%)	0 (0%)	124 (4%)	47 (1%)	0 (0%)	316 (9%)
Central Vancouver Island	2,514	20 (1%)	0 (0%)	98 (4%)	69 (3%)	0 (0%)	141 (6%)
North Vancouver Island	1,417	7 (0%)	0 (0%)	56 (4%)	49 (4%)	0 (0%)	134 (10%)
Northern	**3,182**	**10 (0%)**	**0 (0%)**	**121 (4%)**	**56 (2%)**	**2 (0%)**	**272 (9%)**
Northwest	755	5 (1%)	0 (0%)	42 (6%)	7 (1%)	1 (0%)	61 (8%)
Northern Interior	1,558	5 (0%)	0 (0%)	41 (3%)	32 (2%)	1 (0%)	113 (7%)
Northeast	869	0 (0%)	0 (0%)	38 (4%)	17 (2%)	0 (0%)	98 (11%)

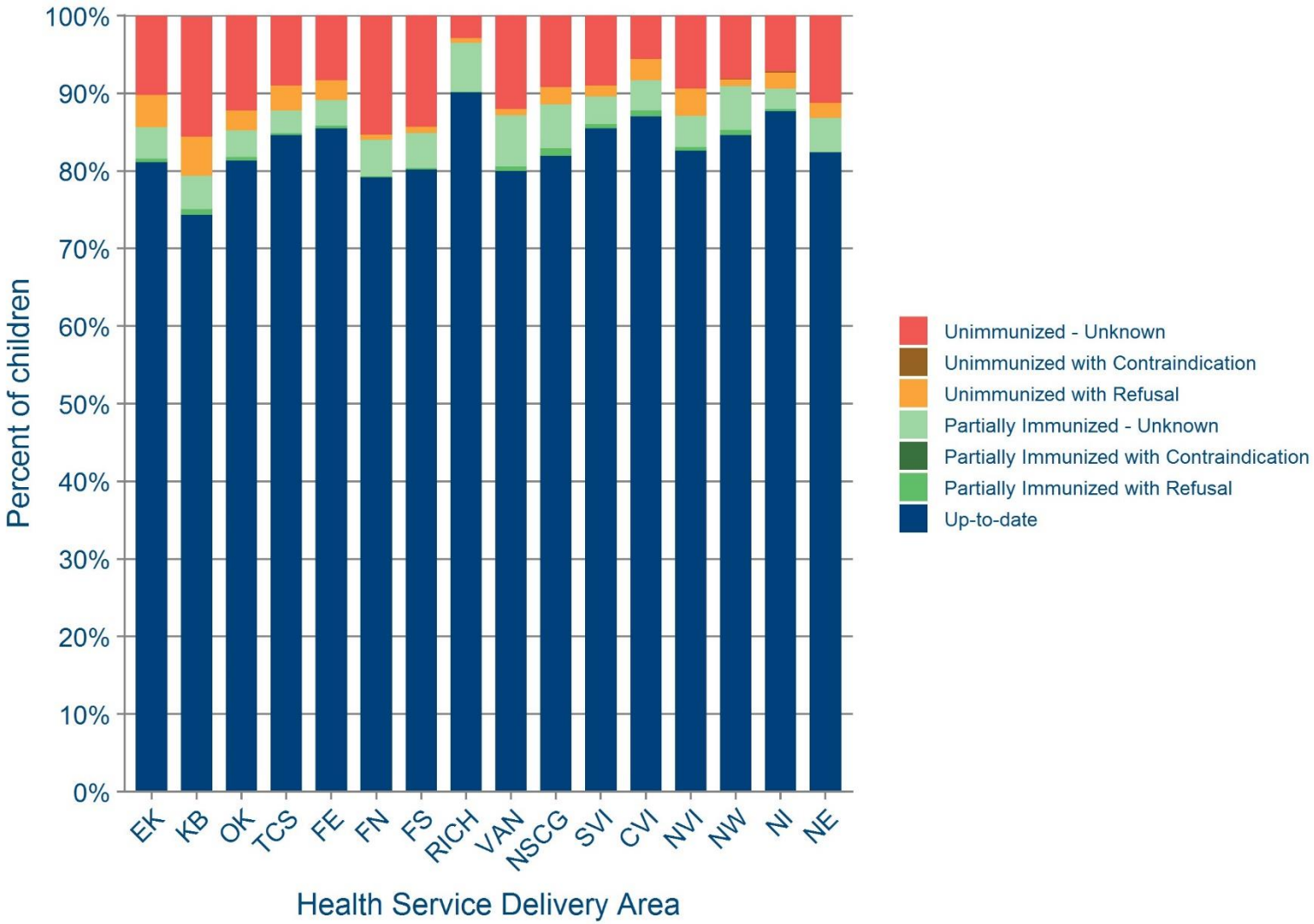

Figure 6. Reasons for non-immunization by Health Service Delivery Area, Hepatitis B, British Columbia, 2023

Measles

Figure 7 displays the time trends for measles coverage in BC from 2013 to 2023.[d,f,i] For the second consecutive year, provincial coverage declined with 72% of seven-year-olds up to date in 2023. Though some regions saw coverage improve after 2019, rates have since dropped to below pre-pandemic levels across all health authorities. Compared to 2022 regional coverage declined by 1-10%, with the most significant decrease in IH.

Reasons for being partially or unimmunized for measles are displayed in Table 10 and Figure 8. At the provincial level, 1% seven-year-olds in BC were unimmunized due to a documented refusal, while 11% were unimmunized due to unknown reasons. A large proportion of seven-year-olds were partially immunized (14%), largely for unknown reasons. Province-wide, six children had documented laboratory evidence of immunity to measles.

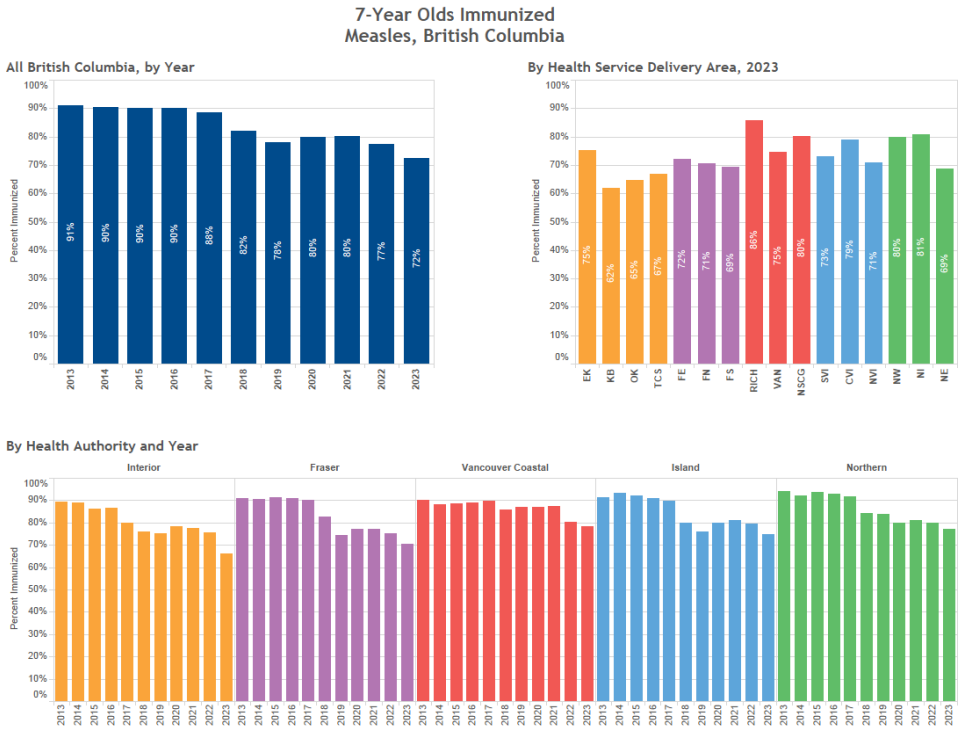

Figure 7. Percent of seven-year-olds immunized, Measles, British Columbia

[i] In January 2012, the second dose of MMR vaccine was moved from 18-months to 4-6 years of age, which may partially explain the drop in coverage in 2018. See Notes.

Table 10. Reasons for non-immunization, Measles, British Columbia, 2023

Region	Population	Count (Percent)						
		Immune: Lab Evidence	Partially Immunized			Unimmunized		
			Refusal	Contraindication	Unknown[g]	Refusal	Contraindication	Unknown[g]
British Columbia	**48,239**	**6 (0%)**	**263 (1%)**	**5 (0%)**	**6,992 (14%)**	**717 (1%)**	**2 (0%)**	**5,320 (11%)**
Interior	**7,744**	**2 (0%)**	**41 (1%)**	**2 (0%)**	**1,473 (19%)**	**222 (3%)**	**1 (0%)**	**870 (11%)**
East Kootenay	859	0 (0%)	5 (1%)	0 (0%)	108 (13%)	31 (4%)	0 (0%)	68 (8%)
Kootenay Boundary	759	1 (0%)	3 (0%)	0 (0%)	140 (18%)	29 (4%)	0 (0%)	116 (15%)
Okanagan	3,723	0 (0%)	15 (0%)	1 (0%)	738 (20%)	89 (2%)	0 (0%)	472 (13%)
Thompson Cariboo Shuswap	2,403	1 (0%)	18 (1%)	1 (0%)	487 (20%)	73 (3%)	1 (0%)	214 (9%)
Fraser[h]	**20,260**	**1 (0%)**	**44 (0%)**	**1 (0%)**	**2,992 (15%)**	**222 (1%)**	**0 (0%)**	**2,754 (14%)**
Fraser East	3,796	0 (0%)	14 (0%)	1 (0%)	610 (16%)	96 (2%)	0 (0%)	339 (9%)
Fraser North	6,706	0 (0%)	10 (0%)	0 (0%)	911 (14%)	45 (1%)	0 (0%)	999 (15%)
Fraser South	9,758	1 (0%)	20 (0%)	0 (0%)	1,471 (15%)	81 (1%)	0 (0%)	1,416 (14%)
Vancouver Coastal	**9,655**	**1 (0%)**	**111 (1%)**	**2 (0%)**	**1,021 (11%)**	**100 (1%)**	**0 (0%)**	**845 (9%)**
Richmond	1,919	0 (0%)	3 (0%)	0 (0%)	212 (11%)	12 (1%)	0 (0%)	47 (2%)
Vancouver	4,869	1 (0%)	65 (1%)	2 (0%)	579 (12%)	36 (1%)	0 (0%)	552 (11%)
North Shore/Coast Garibaldi	2,867	0 (0%)	43 (2%)	0 (0%)	230 (8%)	52 (2%)	0 (0%)	246 (9%)
Island	**7,398**	**1 (0%)**	**53 (1%)**	**0 (0%)**	**1,124 (15%)**	**123 (2%)**	**0 (0%)**	**575 (8%)**
South Vancouver Island	3,467	1 (0%)	12 (0%)	0 (0%)	592 (17%)	33 (1%)	0 (0%)	299 (9%)
Central Vancouver Island	2,514	0 (0%)	34 (1%)	0 (0%)	291 (12%)	54 (2%)	0 (0%)	148 (6%)
North Vancouver Island	1,417	0 (0%)	7 (0%)	0 (0%)	241 (17%)	36 (2%)	0 (0%)	128 (9%)
Northern	**3,182**	**1 (0%)**	**14 (0%)**	**0 (0%)**	**382 (12%)**	**50 (2%)**	**1 (0%)**	**276 (9%)**
Northwest	755	1 (0%)	3 (0%)	0 (0%)	86 (11%)	8 (1%)	0 (0%)	56 (7%)
Northern Interior	1,558	0 (0%)	6 (0%)	0 (0%)	157 (10%)	24 (2%)	1 (0%)	111 (7%)
Northeast	869	0 (0%)	5 (1%)	0 (0%)	139 (16%)	18 (2%)	0 (0%)	109 (12%)

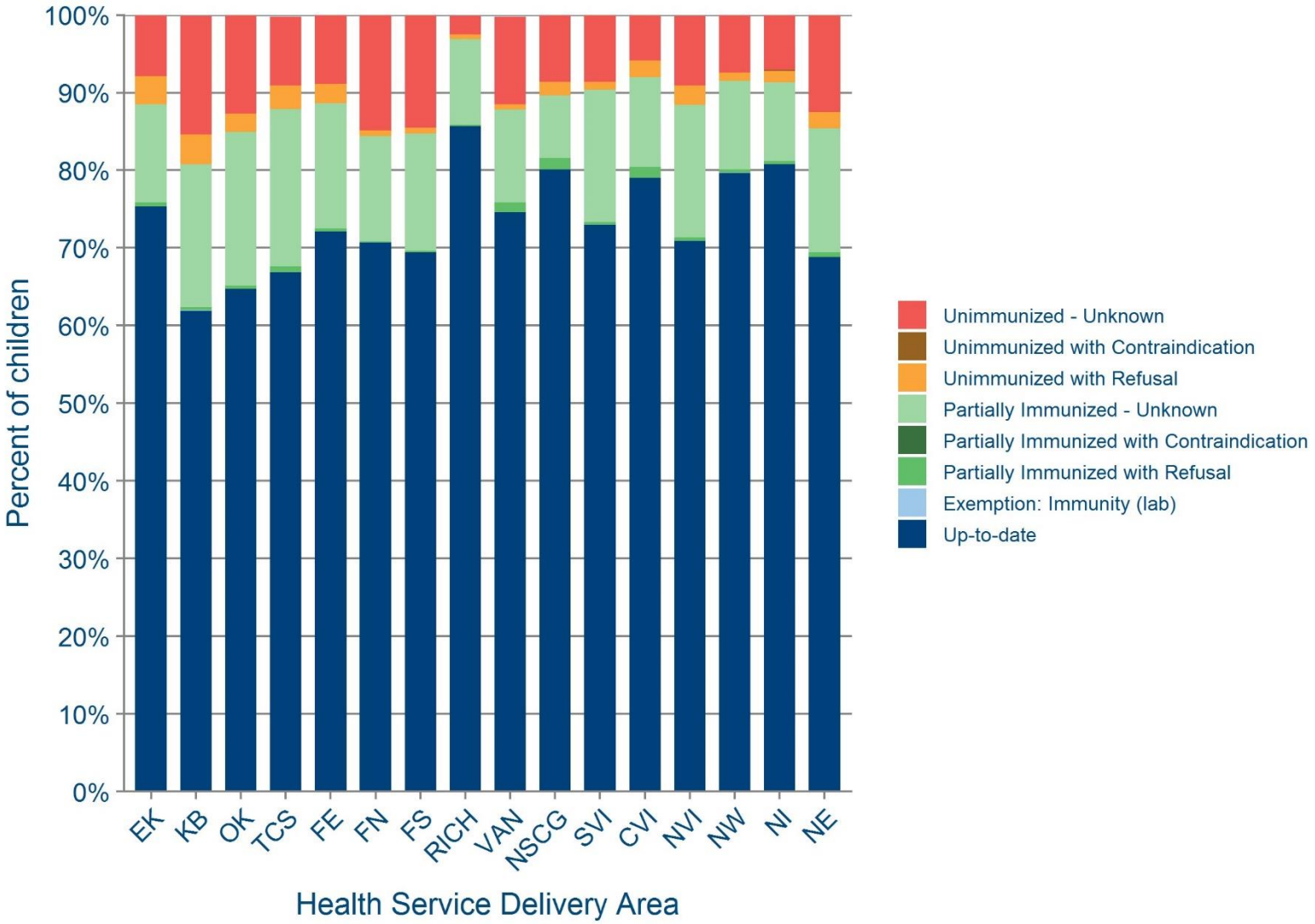

Figure 8. Reasons for non-immunization by Health Service Delivery Area, Measles, British Columbia, 2023

Mumps

Figure 9 displays the time trends for mumps coverage in BC from 2013 to 2023.[d,f,i] Mumps coverage followed the same trends as measles at both the provincial and health authority levels. At the provincial level coverage declined for the second consecutive year to 72%. From 2019 to 2023, the largest decrease in coverage was observed in IH.

Reasons for being partially or unimmunized for mumps are displayed in Table 11 and Figure 10. At the provincial level, 1% of seven-year-olds in BC were unimmunized due to a documented refusal, while 15% and 11% were partially immunized and unimmunized, respectively, due to unknown reasons. Approximately 19% of seven-year-olds in IH were partially immunized with the reason for partial immunization unknown.

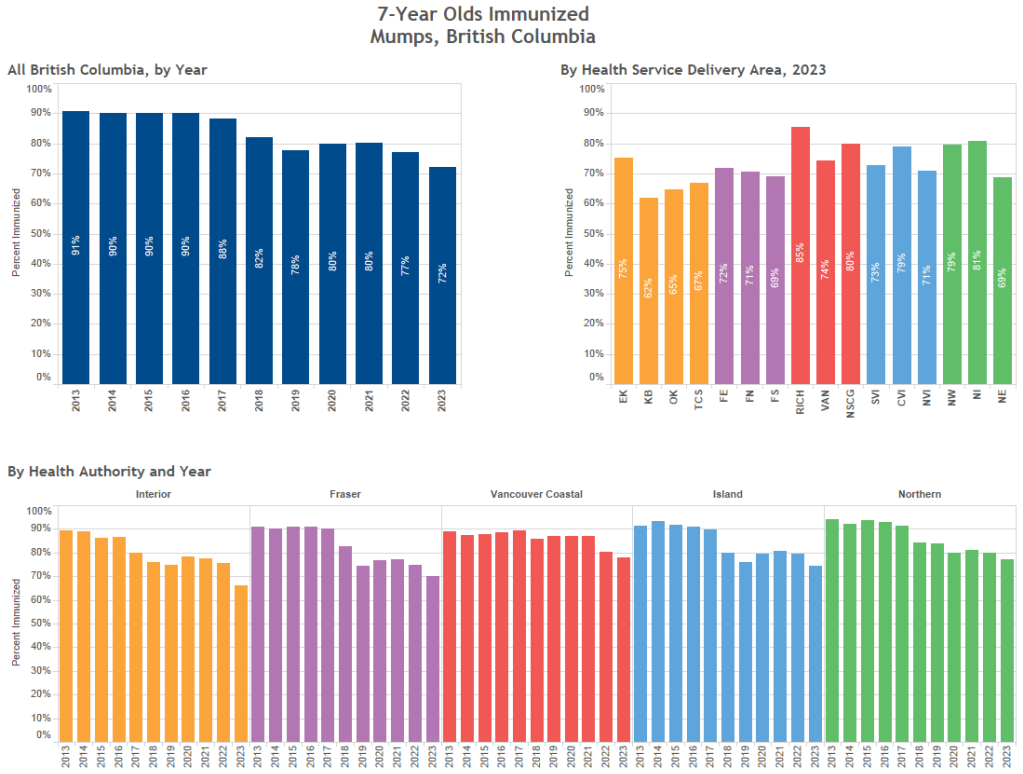

Figure 9. Percent of seven-year-olds immunized, Mumps, British Columbia

Table 11. Reasons for non-immunization, Mumps, British Columbia, 2023

Region	Population	Count (Percent)					
		Partially Immunized			Unimmunized		
		Refusal	Contraindication	Unknown[g]	Refusal	Contraindication	Unknown[g]
British Columbia	**48,239**	**266 (1%)**	**6 (0%)**	**7,021 (15%)**	**719 (1%)**	**3 (0%)**	**5,368 (11%)**
Interior	**7,744**	**41 (1%)**	**3 (0%)**	**1,471 (19%)**	**222 (3%)**	**2 (0%)**	**875 (11%)**
East Kootenay	859	5 (1%)	0 (0%)	109 (13%)	31 (4%)	0 (0%)	68 (8%)
Kootenay Boundary	759	3 (0%)	0 (0%)	140 (18%)	29 (4%)	1 (0%)	117 (15%)
Okanagan	3,723	15 (0%)	1 (0%)	737 (20%)	89 (2%)	0 (0%)	474 (13%)
Thompson Cariboo Shuswap	2,403	18 (1%)	2 (0%)	485 (20%)	73 (3%)	1 (0%)	216 (9%)
Fraser[h]	**20,260**	**44 (0%)**	**1 (0%)**	**3,003 (15%)**	**222 (1%)**	**0 (0%)**	**2,777 (14%)**
Fraser East	3,796	14 (0%)	1 (0%)	613 (16%)	96 (2%)	0 (0%)	340 (9%)
Fraser North	6,706	10 (0%)	0 (0%)	913 (14%)	45 (1%)	0 (0%)	1,004 (15%)
Fraser South	9,758	20 (0%)	0 (0%)	1,477 (15%)	81 (1%)	0 (0%)	1,433 (15%)
Vancouver Coastal	**9,655**	**114 (1%)**	**2 (0%)**	**1,039 (11%)**	**102 (1%)**	**0 (0%)**	**854 (9%)**
Richmond	1,919	3 (0%)	0 (0%)	216 (11%)	12 (1%)	0 (0%)	50 (3%)
Vancouver	4,869	67 (1%)	2 (0%)	590 (12%)	38 (1%)	0 (0%)	557 (11%)
North Shore/Coast Garibaldi	2,867	44 (2%)	0 (0%)	233 (8%)	52 (2%)	0 (0%)	247 (9%)
Island	**7,398**	**53 (1%)**	**0 (0%)**	**1,124 (15%)**	**123 (2%)**	**0 (0%)**	**583 (8%)**
South Vancouver Island	3,467	12 (0%)	0 (0%)	591 (17%)	33 (1%)	0 (0%)	304 (9%)
Central Vancouver Island	2,514	34 (1%)	0 (0%)	292 (12%)	54 (2%)	0 (0%)	151 (6%)
North Vancouver Island	1,417	7 (0%)	0 (0%)	241 (17%)	36 (2%)	0 (0%)	128 (9%)
Northern	**3,182**	**14 (0%)**	**0 (0%)**	**384 (12%)**	**50 (2%)**	**1 (0%)**	**279 (9%)**
Northwest	755	3 (0%)	0 (0%)	85 (11%)	8 (1%)	0 (0%)	59 (8%)
Northern Interior	1,558	6 (0%)	0 (0%)	159 (10%)	24 (2%)	1 (0%)	111 (7%)
Northeast	869	5 (1%)	0 (0%)	140 (16%)	18 (2%)	0 (0%)	109 (12%)

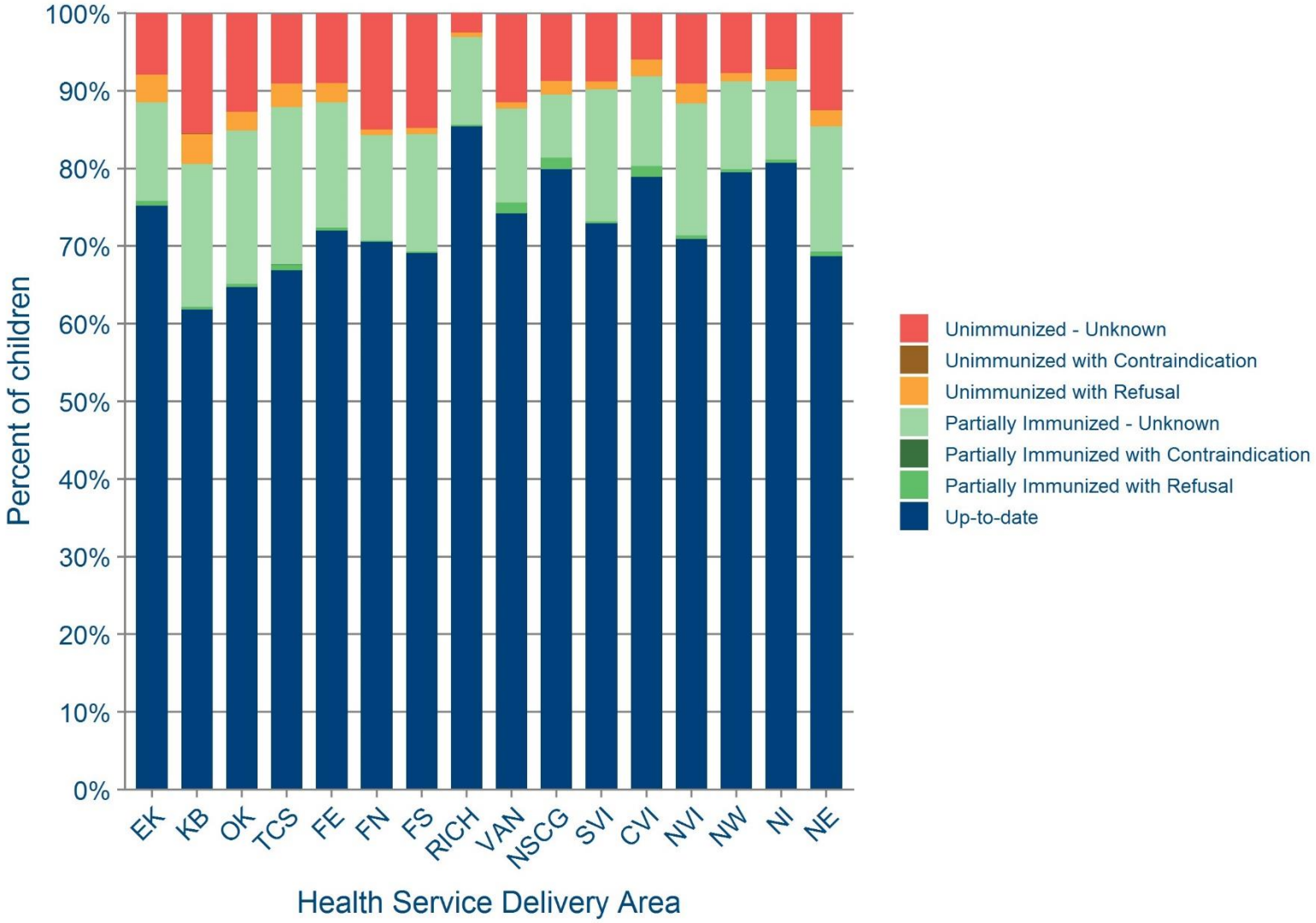

Figure 10. Reasons for non-immunization by Health Service Delivery Area, Mumps, British Columbia, 2022

Rubella

Figure 11 displays the time trends for rubella coverage in BC from 2013 to 2023.[d,f] Since 2019 provincial rubella coverage has been stable with a slight decline (3%) observed in 2023. At the health authority level, coverage has also been relatively stable in NH and ISLH while a declining trend has been observed in IH and FH. Only one dose of rubella is required by age seven to be considered up-to-date in the current coverage assessment, which explains the higher coverage for rubella in comparison to measles and mumps, which are generally given as a single vaccine product.

Reasons for being unimmunized for rubella are displayed in Table 12 and Figure 12. At the provincial level, 1% of seven-year-olds in BC were unimmunized due to a documented refusal, while 11% were unimmunized due to unknown reasons. Only four children had documented lab evidence of immunity to rubella.

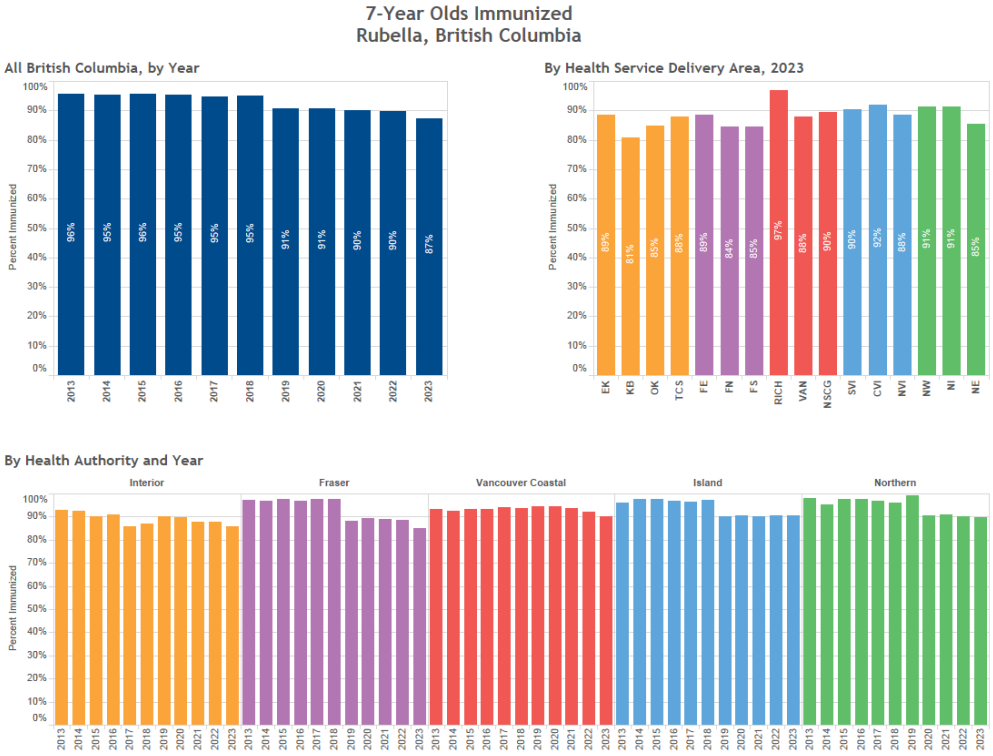

Figure 11. Percent of seven-year-olds immunized, Rubella, British Columbia[e]

Table 12. Reasons for non-immunization, Rubella, British Columbia, 2023

Region	Population	Count (Percent)			
		Immune: Lab Evidence	Unimmunized		
			Refusal	Contraindication	Unknown[g]
British Columbia	**48,239**	**4 (0%)**	**719 (1%)**	**2 (0%)**	**5,348 (11%)**
Interior	**7,744**	**1 (0%)**	**222 (3%)**	**1 (0%)**	**872 (11%)**
East Kootenay	859	0 (0%)	31 (4%)	0 (0%)	67 (8%)
Kootenay Boundary	759	1 (0%)	29 (4%)	0 (0%)	117 (15%)
Okanagan	3,723	0 (0%)	89 (2%)	0 (0%)	474 (13%)
Thompson Cariboo Shuswap	2,403	0 (0%)	73 (3%)	1 (0%)	214 (9%)
Fraser[h]	**20,260**	**1 (0%)**	**222 (1%)**	**0 (0%)**	**2,770 (14%)**
Fraser East	3,796	0 (0%)	96 (2%)	0 (0%)	339 (9%)
Fraser North	6,706	0 (0%)	45 (1%)	0 (0%)	1,002 (15%)
Fraser South	9,758	1 (0%)	81 (1%)	0 (0%)	1,429 (15%)
Vancouver Coastal	**9,655**	**0 (0%)**	**102 (1%)**	**0 (0%)**	**850 (9%)**
Richmond	1,919	0 (0%)	12 (1%)	0 (0%)	50 (3%)
Vancouver	4,869	0 (0%)	38 (1%)	0 (0%)	553 (11%)
North Shore/Coast Garibaldi	2,867	0 (0%)	52 (2%)	0 (0%)	247 (9%)
Island	**7,398**	**1 (0%)**	**123 (2%)**	**0 (0%)**	**579 (8%)**
South Vancouver Island	3,467	1 (0%)	33 (1%)	0 (0%)	301 (9%)
Central Vancouver Island	2,514	0 (0%)	54 (2%)	0 (0%)	150 (6%)
North Vancouver Island	1,417	0 (0%)	36 (2%)	0 (0%)	128 (9%)
Northern	**3,182**	**1 (0%)**	**50 (2%)**	**1 (0%)**	**277 (9%)**
Northwest	755	1 (0%)	8 (1%)	0 (0%)	57 (8%)
Northern Interior	1,558	0 (0%)	24 (2%)	1 (0%)	111 (7%)
Northeast	869	0 (0%)	18 (2%)	0 (0%)	109 (12%)

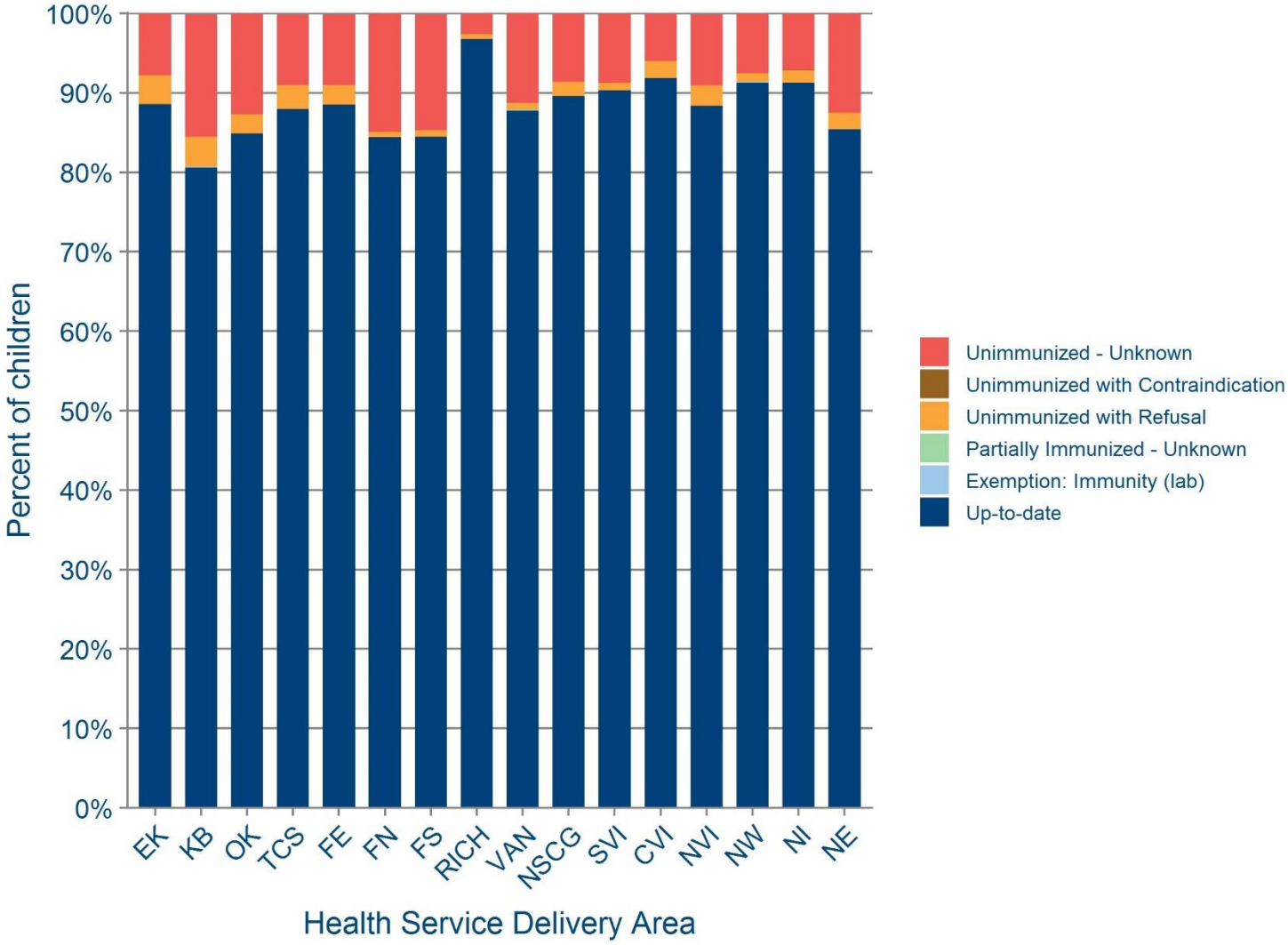

Figure 12. Reasons for non-immunization by Health Service Delivery Area, Rubella, British Columbia, 2023

Varicella

Figure 13 displays the time trends for varicella coverage in BC from 2013 to 2023.[d,f] Prior to 2015, only one dose of varicella was required by age seven to be considered up-to-date which may partially explain the large decline in coverage in 2015.[j] From 2019 to 2023, provincial varicella coverage peaked at 78% in 2021 and has since declined for two consecutive years to 71%. Rates in FH, IH, and ISLH followed a similar pattern, with IH seeing the largest decrease in coverage from 2022 to 2023. In NH, coverage remained relatively stable but also declined in 2023.

Reasons for being partially immunized or unimmunized for varicella are displayed in Table 13 and Figure 14. At the provincial level, 2% of seven-year-olds in BC were unimmunized due to a documented refusal while an additional 12% were unimmunized for unknown reasons. IH had the highest proportion of seven-year-olds unimmunized due to a documented refusal (4%). Province-wide, a total of 56 children had documented evidence of previous disease or immunity.

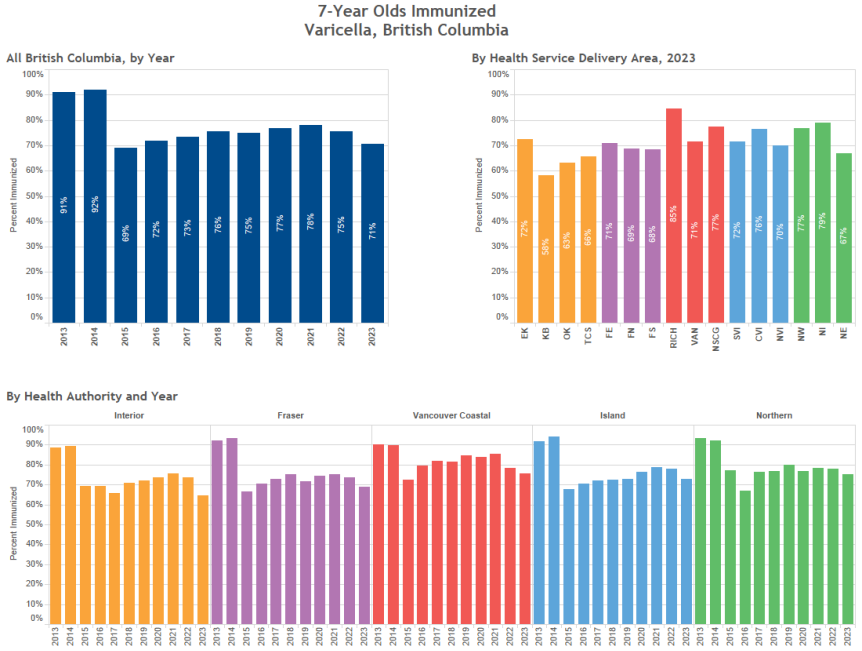

Figure 13. Percent of seven-year-olds immunized, Varicella, British Columbia

[j] In 2015 (2007 birth cohort), the varicella requirement changed from requiring one to two doses for a child to be considered up-to-date. See Note 8

Table 13. Reasons for non-immunization, Varicella, British Columbia, 2023

Region	Population	Count (Percent)							
		Immune: Previous Disease	Immune: Lab Evidence	Partially Immunized			Unimmunized		
				Refusal	Contraindication	Unknown[g]	Refusal	Contraindication	Unknown[g]
British Columbia	**48,239**	**48 (0%)**	**8 (0%)**	**365 (1%)**	**5 (0%)**	**6,972 (14%)**	**1,014 (2%)**	**2 (0%)**	**5,819 (12%)**
Interior	**7,744**	**9 (0%)**	**3 (0%)**	**63 (1%)**	**2 (0%)**	**1,418 (18%)**	**321 (4%)**	**1 (0%)**	**944 (12%)**
East Kootenay	859	1 (0%)	0 (0%)	11 (1%)	0 (0%)	108 (13%)	44 (5%)	0 (0%)	75 (9%)
Kootenay Boundary	759	1 (0%)	0 (0%)	10 (1%)	0 (0%)	137 (18%)	50 (7%)	0 (0%)	121 (16%)
Okanagan	3,723	5 (0%)	3 (0%)	25 (1%)	1 (0%)	704 (19%)	128 (3%)	0 (0%)	508 (14%)
Thompson Cariboo Shuswap	2,403	2 (0%)	0 (0%)	17 (1%)	1 (0%)	469 (20%)	99 (4%)	1 (0%)	240 (10%)
Fraser[h]	**20,260**	**11 (0%)**	**4 (0%)**	**57 (0%)**	**1 (0%)**	**3,034 (15%)**	**270 (1%)**	**0 (0%)**	**2,926 (14%)**
Fraser East	3,796	1 (0%)	1 (0%)	23 (1%)	1 (0%)	594 (16%)	121 (3%)	0 (0%)	362 (10%)
Fraser North	6,706	6 (0%)	2 (0%)	13 (0%)	0 (0%)	958 (14%)	50 (1%)	0 (0%)	1,072 (16%)
Fraser South	9,758	4 (0%)	1 (0%)	21 (0%)	0 (0%)	1,482 (15%)	99 (1%)	0 (0%)	1,492 (15%)
Vancouver Coastal	**9,655**	**14 (0%)**	**0 (0%)**	**136 (1%)**	**1 (0%)**	**1,069 (11%)**	**140 (1%)**	**0 (0%)**	**994 (10%)**
Richmond	1,919	0 (0%)	0 (0%)	2 (0%)	0 (0%)	204 (11%)	13 (1%)	0 (0%)	78 (4%)
Vancouver	4,869	7 (0%)	0 (0%)	86 (2%)	1 (0%)	620 (13%)	46 (1%)	0 (0%)	640 (13%)
North Shore/Coast Garibaldi	2,867	7 (0%)	0 (0%)	48 (2%)	0 (0%)	245 (8%)	81 (3%)	0 (0%)	276 (10%)
Island	**7,398**	**12 (0%)**	**1 (0%)**	**79 (1%)**	**0 (0%)**	**1,081 (15%)**	**196 (3%)**	**0 (0%)**	**652 (9%)**
South Vancouver Island	3,467	6 (0%)	1 (0%)	16 (0%)	0 (0%)	575 (17%)	53 (2%)	0 (0%)	344 (10%)
Central Vancouver Island	2,514	3 (0%)	0 (0%)	47 (2%)	0 (0%)	292 (12%)	90 (4%)	0 (0%)	164 (6%)
North Vancouver Island	1,417	3 (0%)	0 (0%)	16 (1%)	0 (0%)	214 (15%)	53 (4%)	0 (0%)	144 (10%)
Northern	**3,182**	**2 (0%)**	**0 (0%)**	**30 (1%)**	**1 (0%)**	**370 (12%)**	**87 (3%)**	**1 (0%)**	**303 (10%)**
Northwest	755	0 (0%)	0 (0%)	6 (1%)	0 (0%)	90 (12%)	15 (2%)	0 (0%)	65 (9%)
Northern Interior	1,558	0 (0%)	0 (0%)	12 (1%)	1 (0%)	152 (10%)	38 (2%)	1 (0%)	123 (8%)
Northeast	869	2 (0%)	0 (0%)	12 (1%)	0 (0%)	128 (15%)	34 (4%)	0 (0%)	115 (13%)

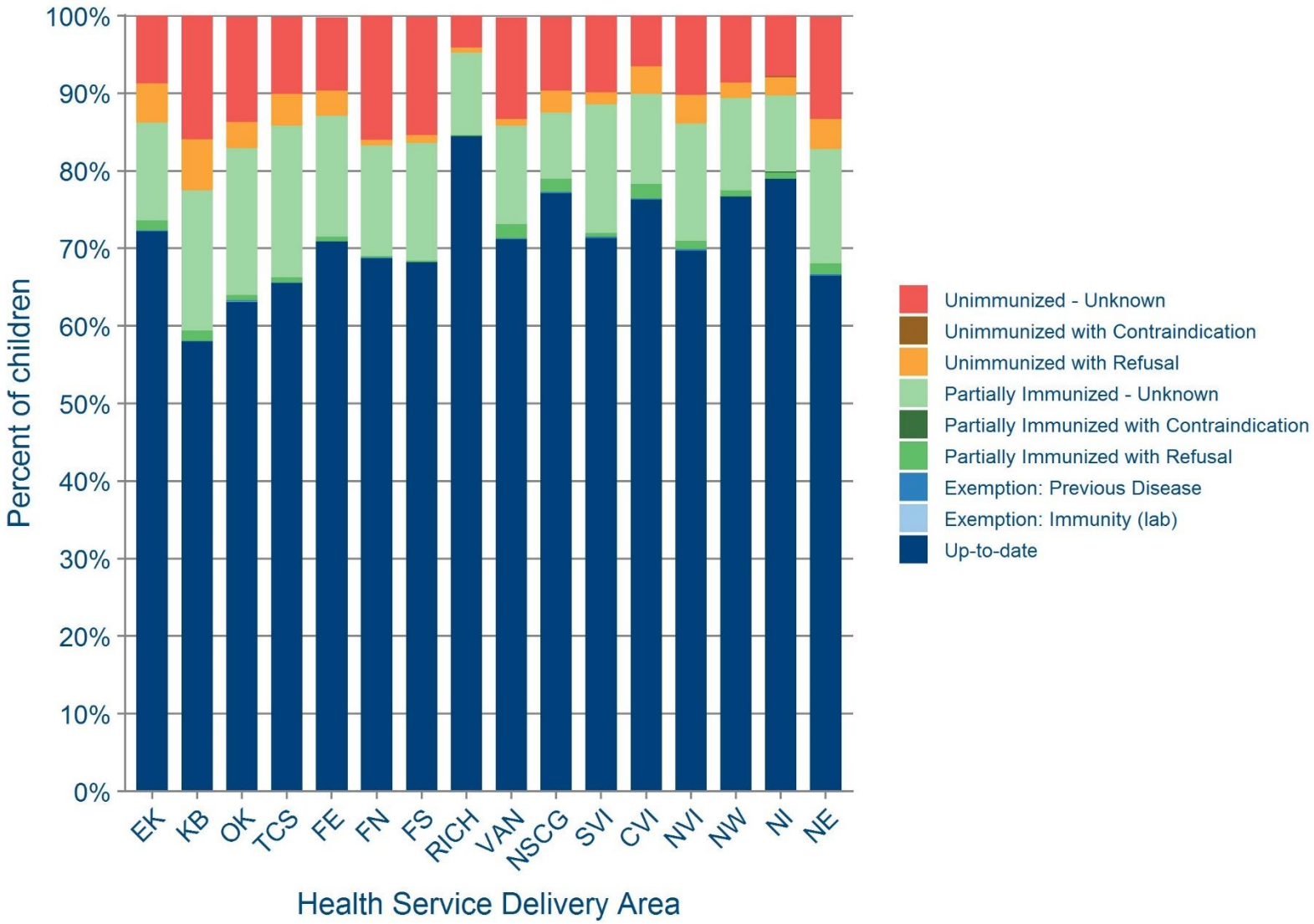

Figure 14. Reasons for non-immunization by Health Service Delivery Area, Varicella, British Columbia, 2023

Meningococcal C Conjugate

Figure 15 displays the time trends for meningococcal C conjugate coverage in BC from 2013 to 2023.[d,f] There was no meningococcal C conjugate assessment in 2018. From 2019 to 2023, provincial coverage declined from 89% to 84%. During the same time period, rates have declined overall in IH and FH while they have remained stable in NH and ISLH.

Reasons for being partially immunized or unimmunized for meningococcal C conjugate are displayed in Table 14 and Figure 16. At the provincial level, 2% of seven-year-olds in BC were unimmunized due to a documented refusal and an additional 13% were unimmunized for unknown reasons.

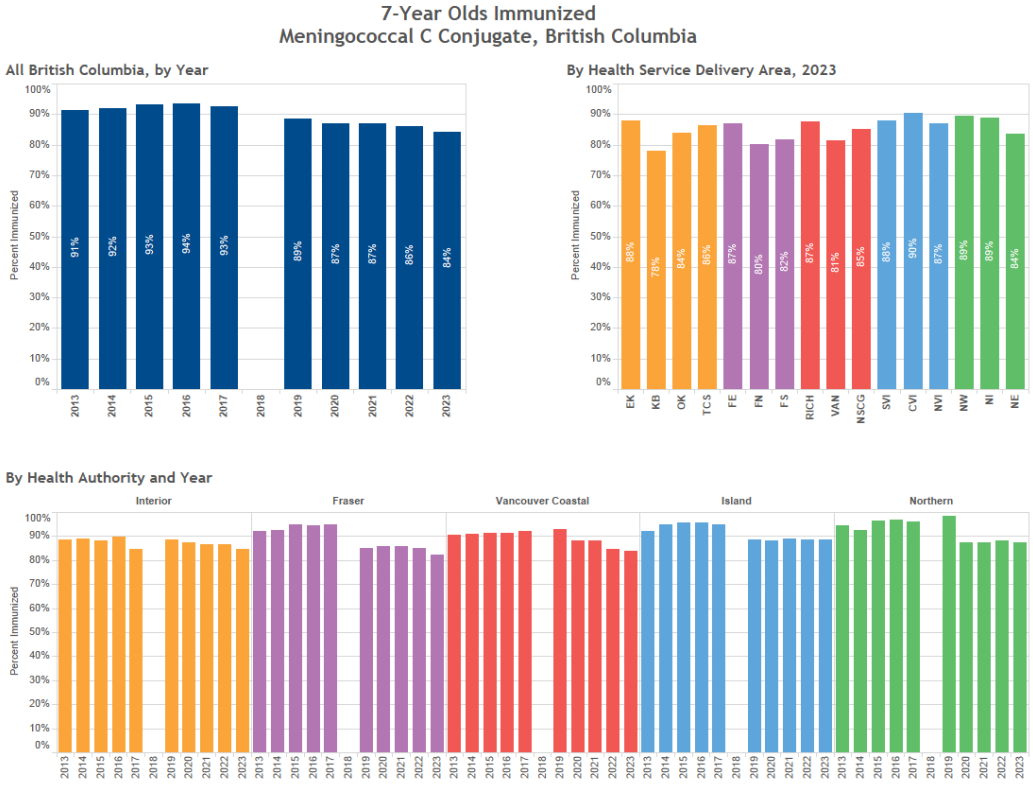

Figure 15. Percent of seven-year-olds immunized, Meningococcal C Conjugate, British Columbia

Table 14. Reasons for non-immunization, Meningococcal C Conjugate, British Columbia, 2023

Region	Population	Count (Percent)			
		Partially Immunized		Unimmunized	
		Refusal	Unknown[g]	Refusal	Unknown[g]
British Columbia	**48,239**	**42 (0%)**	**569 (1%)**	**811 (2%)**	**6,219 (13%)**
Interior	**7,744**	**21 (0%)**	**104 (1%)**	**223 (3%)**	**850 (11%)**
East Kootenay	859	4 (0%)	6 (1%)	27 (3%)	67 (8%)
Kootenay Boundary	759	3 (0%)	12 (2%)	35 (5%)	116 (15%)
Okanagan	3,723	8 (0%)	49 (1%)	89 (2%)	453 (12%)
Thompson Cariboo Shuswap	2,403	6 (0%)	37 (2%)	72 (3%)	214 (9%)
Fraser[h]	**20,260**	**11 (0%)**	**315 (2%)**	**221 (1%)**	**3,080 (15%)**
Fraser East	3,796	1 (0%)	61 (2%)	101 (3%)	334 (9%)
Fraser North	6,706	1 (0%)	115 (2%)	44 (1%)	1,178 (18%)
Fraser South	9,758	9 (0%)	139 (1%)	76 (1%)	1,568 (16%)
Vancouver Coastal Health	**9,655**	**0 (0%)**	**0 (0%)**	**174 (2%)**	**1,398 (14%)**
Richmond	1,919	0 (0%)	0 (0%)	13 (1%)	227 (12%)
Vancouver	4,869	0 (0%)	0 (0%)	72 (2%)	830 (17%)
North Shore/Coast Garibaldi	2,867	0 (0%)	0 (0%)	89 (3%)	341 (12%)
Island	**7,398**	**9 (0%)**	**87 (1%)**	**140 (2%)**	**609 (8%)**
South Vancouver Island	3,467	2 (0%)	30 (1%)	37 (1%)	350 (10%)
Central Vancouver Island	2,514	5 (0%)	36 (1%)	63 (2%)	138 (6%)
North Vancouver Island	1,417	2 (0%)	21 (2%)	40 (3%)	121 (8%)
Northern	**3,182**	**1 (0%)**	**63 (2%)**	**53 (2%)**	**282 (9%)**
Northwest	755	0 (0%)	14 (2%)	6 (1%)	60 (8%)
Northern Interior	1,558	1 (0%)	25 (2%)	30 (2%)	120 (8%)
Northeast	869	0 (0%)	24 (3%)	17 (2%)	102 (12%)

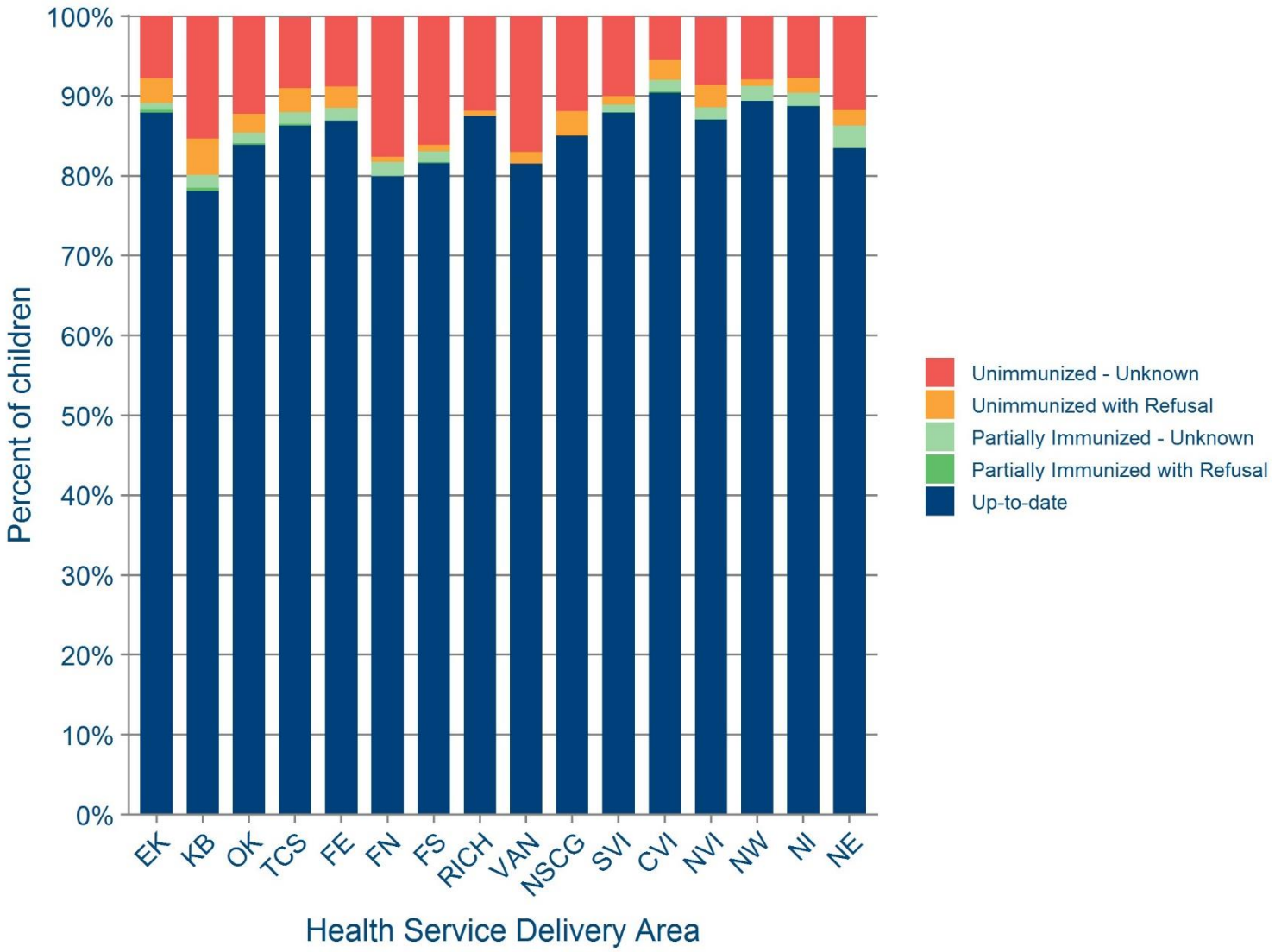

Figure 16. Reasons for non-immunization by Health Service Delivery Area, Meningococcal C Conjugate, British Columbia, 2023

Polio

Reporting on assessment of polio coverage separate from D/T/aP began in 2019. Figure 17 displays the time trends for polio coverage in BC from 2019 to 2023.[d,f] Provincial coverage improved slightly from 2019 to 2021 but has since declined for two consecutive years to 72%. A similar trend was observed in FH, IH, and ISLH with IH seeing a significant decrease in coverage from 2022 to 2023. NH has seen relatively stable coverage, however it also declined compared to 2022.

Reasons for being partially immunized or unimmunized for polio are displayed in Table 15 and Figure 18. At the provincial level, the proportion of seven-year-olds in BC unimmunized due to a documented refusal or for unknown reasons was 1% and 10%, respectively. A large proportion (16%) were partially immunized for unknown reasons. IH had the highest proportion (21%) of seven-year-olds partially immunized for unknown reasons.

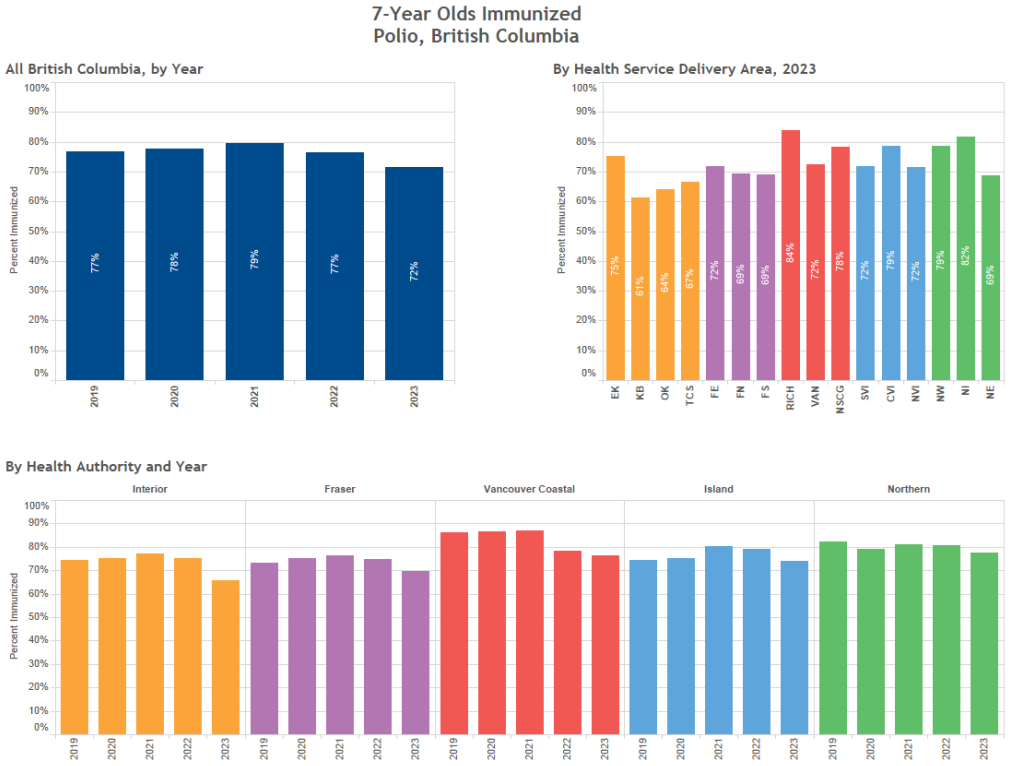

Figure 17. Percent of seven-year-olds immunized, Polio, British Columbia

Table 15. Reasons for non-immunization, Polio, British Columbia, 2023

Region	Population	Count (Percent)				
		Partially Immunized		Unimmunized		
		Refusal	Unknown[g]	Refusal	Contraindication	Unknown[g]
British Columbia	**48,239**	**348 (1%)**	**7,919 (16%)**	**658 (1%)**	**1 (0%)**	**4,764 (10%)**
Interior	**7,744**	**64 (1%)**	**1,619 (21%)**	**202 (3%)**	**0 (0%)**	**759 (10%)**
East Kootenay	859	12 (1%)	116 (14%)	23 (3%)	0 (0%)	62 (7%)
Kootenay Boundary	759	5 (1%)	159 (21%)	28 (4%)	0 (0%)	101 (13%)
Okanagan	3,723	26 (1%)	809 (22%)	84 (2%)	0 (0%)	416 (11%)
Thompson Cariboo Shuswap	2,403	21 (1%)	535 (22%)	67 (3%)	0 (0%)	180 (8%)
Fraser[h]	**20,260**	**58 (0%)**	**3,351 (17%)**	**205 (1%)**	**0 (0%)**	**2,522 (12%)**
Fraser East	3,796	16 (0%)	657 (17%)	92 (2%)	0 (0%)	299 (8%)
Fraser North	6,706	14 (0%)	1,071 (16%)	41 (1%)	0 (0%)	922 (14%)
Fraser South	9,758	28 (0%)	1,623 (17%)	72 (1%)	0 (0%)	1,301 (13%)
Vancouver Coastal Health	**9,655**	**146 (2%)**	**1,267 (13%)**	**91 (1%)**	**0 (0%)**	**772 (8%)**
Richmond	1,919	4 (0%)	254 (13%)	11 (1%)	0 (0%)	39 (2%)
Vancouver	4,869	81 (2%)	718 (15%)	33 (1%)	0 (0%)	512 (10%)
North Shore/Coast Garibaldi	2,867	61 (2%)	295 (10%)	47 (2%)	0 (0%)	221 (8%)
Island	**7,398**	**60 (1%)**	**1,257 (17%)**	**113 (2%)**	**0 (0%)**	**486 (7%)**
South Vancouver Island	3,467	10 (0%)	662 (19%)	30 (1%)	0 (0%)	271 (8%)
Central Vancouver Island	2,514	36 (1%)	342 (14%)	53 (2%)	0 (0%)	109 (4%)
North Vancouver Island	1,417	14 (1%)	253 (18%)	30 (2%)	0 (0%)	106 (8%)
Northern	**3,182**	**20 (1%)**	**425 (13%)**	**47 (1%)**	**1 (0%)**	**225 (7%)**
Northwest	755	6 (1%)	102 (14%)	5 (1%)	0 (0%)	48 (6%)
Northern Interior	1,558	6 (0%)	163 (10%)	24 (2%)	1 (0%)	92 (6%)
Northeast	869	8 (1%)	160 (18%)	18 (2%)	0 (0%)	85 (10%)

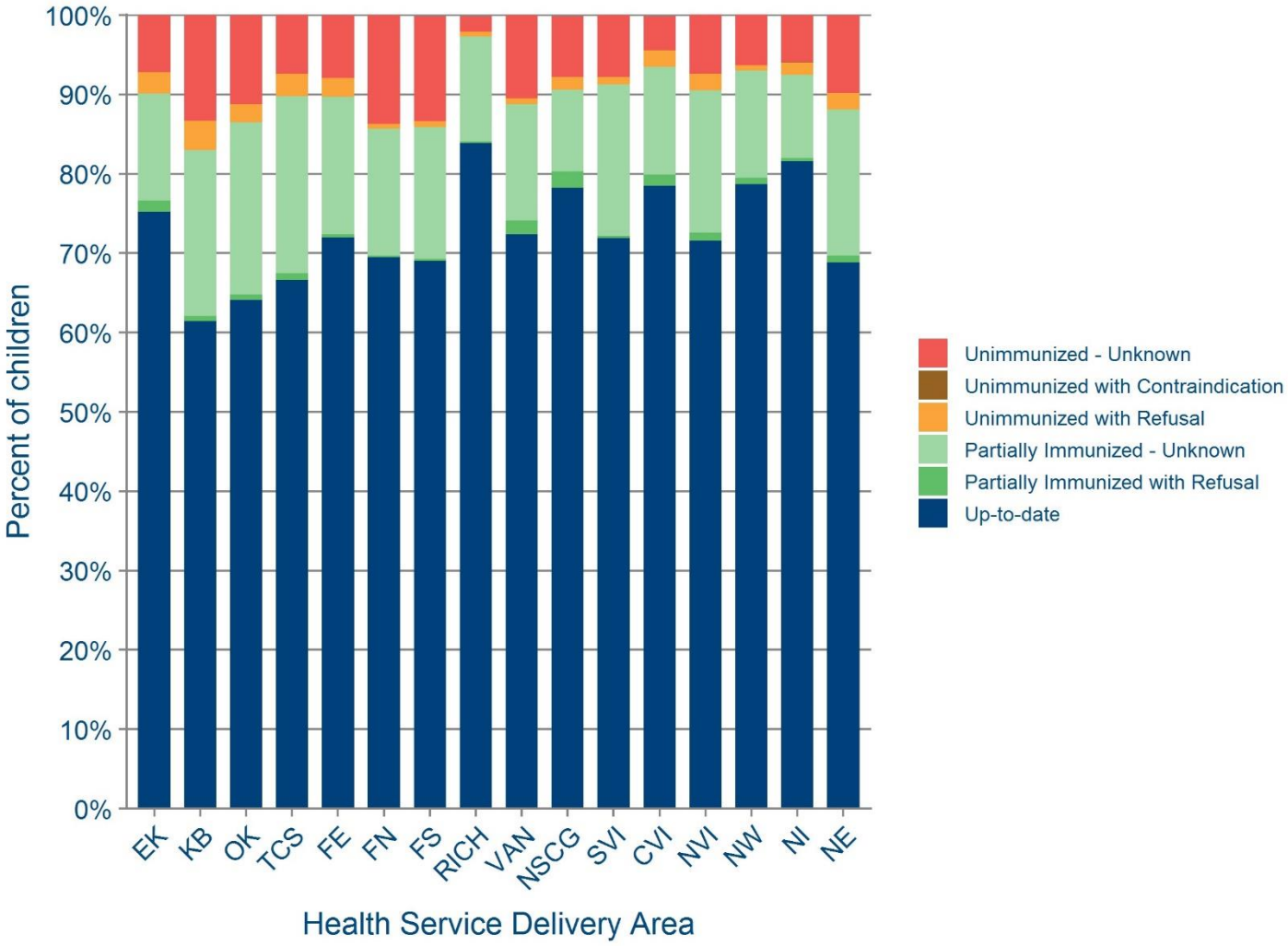

Figure 18. Reasons for non-immunization by Health Service Delivery Area, Polio, British Columbia, 2023

Refusal to all vaccines

Figure 19 shows the proportion of refusals to all routine vaccines among seven-year-olds in BC from 2019 to 2023.[a] The proportion of seven-year-olds in BC with documented refusals to all vaccines in 2023 increased by 0.3% but remains comparable to 2021 and 2022. At the health authority level, all regions saw an increase in refusals compared to 2022. Since 2019, IH has had the highest refusal rate each year.

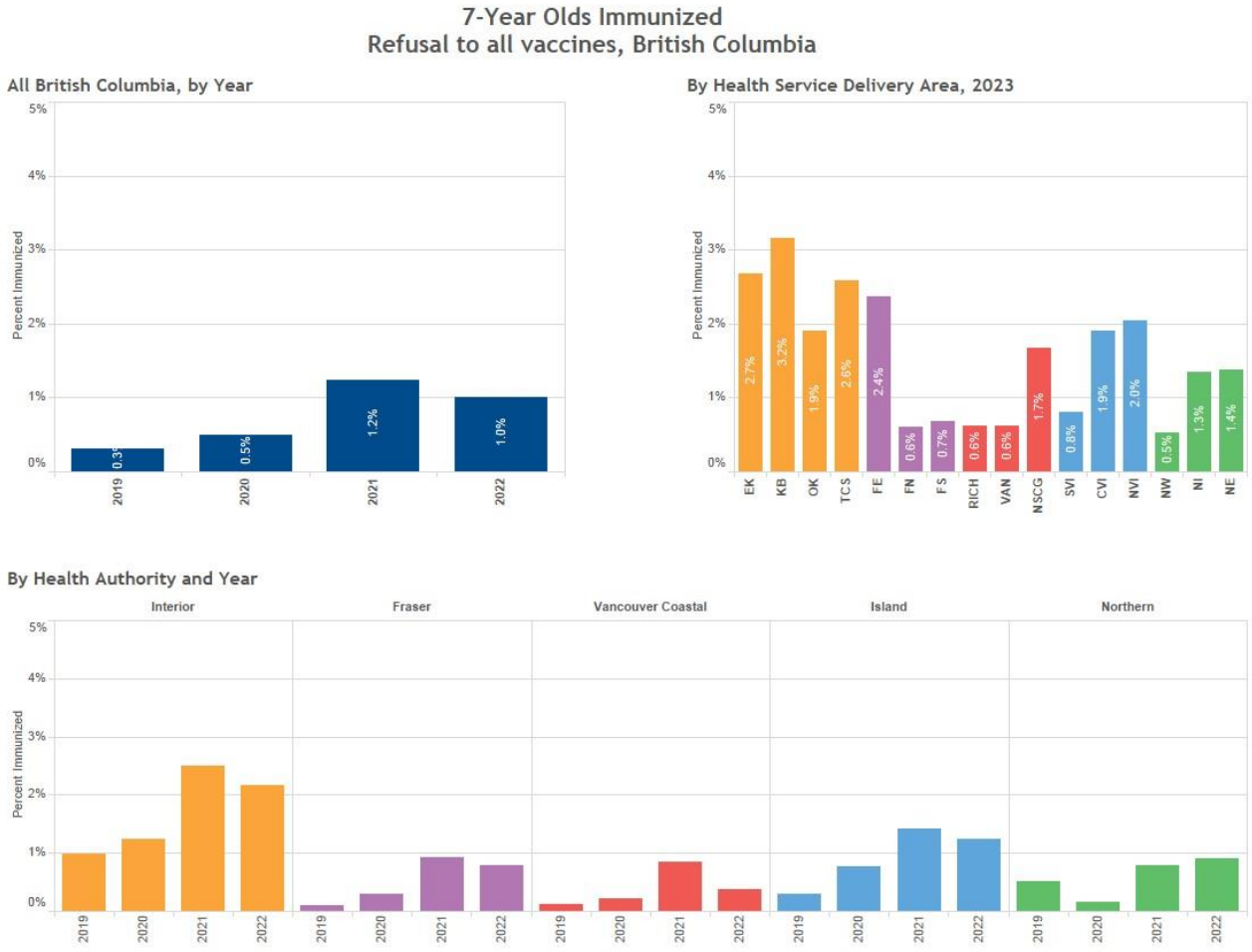

Figure 19. Percent of seven-year-olds unimmunized, Refusal to all vaccines, British Columbia

Notes

1. **Data Sources**

   Coverage estimates for all HAs, excluding VCH, are based on immunization records in the Provincial Immunization Registry (PIR) (2014 onwards) or the Integrated Public Health Information System (iPHIS) (2013). Estimates for VCH are based on immunization records in the Primary Access Regional Information System (PARIS). Coverage estimates are based on records in PIR (including transmission from regional registry systems) as of July 31, 2023.

   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.

2. **Up-to-date for age definitions**

   Coverage reported for any given year reflects uptake among children who turned seven years old during the previous calendar year (i.e., 2023 results are for children born in 2015 and who turned seven years old in 2022). Only doses given prior to the seventh birthday are included in this assessment.

Measure	Definition
Up-to-date for age	Children who met the up-to-date requirements for D/T/aP/IPV, hepatitis B, measles, mumps, rubella, varicella, and meningococcal C as defined below.
D/T/aP/IPV	4th or 5th dose of diphtheria/acellular pertussis/tetanus and 3rd or 4th dose of polio on or after 4 years of age
D/T/aP	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. 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.

Meningococcal C[k]	At least 1 dose of meningococcal C conjugate on or after 12 months of age. For children who receive quadrivalent meningococcal conjugate vaccine, 1-2 doses on or after 12 months of age are required depending on age at first dose.
Refusal to all vaccines	Documented refusals for all of the following antigens: diphtheria, tetanus, pertussis, polio, hepatitis B, measles, mumps, rubella, varicella, and meningococcal C conjugate or meningococcal quadrivalent conjugate, and is not up-to-date 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.

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. See Minimum Intervals.

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

Health Authority	Year										
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
IH	Registry (birth cohort)					Registry (school cohort)					
FH	Registry (birth cohort)/MoE aggregate enrollment						Registry (school cohort)				
VCH	Registry (school cohort)										
ISLH	Registry (birth cohort)/MoE aggregate enrollment						Registry (school cohort)				
NH	Registry (birth cohort)/MoE aggregate enrollment							Registry (school cohort)			

*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 (iPHIS/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 (PIR or PARIS) and with immunization registry records indicating they were enrolled in a BC school as of June 30 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 (iPHIS/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

4. Changes in data sources can impact coverage rates. Between 2018 and 2020, IH, FH, ISLH, and NH changed their data sources to count children in the birth cohort of interest with active records in PIR whose records indicated they were enrolled in school during the most recent school year (see note 3). While this change in measurement is anticipated to more accurately reflect the population of these regions, it may explain some of the differences observed in coverage rates when compared to previous years.

[k] Assessment of uptake of Meningococcal-C conjugate vaccine at the seven-year-old milestone stopped in 2018 and resumed in 2019.

Starting in 2018 for IH, 2019 for FH and ISLH, and 2020 for NH, school and grade information is attached to students' records in the PIR in two ways:

a. 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. HA staff reconcile the school information against the PIR record when discrepancies occur.

b. For schools using other information systems, HA staff may manually enter or upload school and grade information. The process of adding enrollment details may not be completed for all HAs and grades. Most HAs prioritize milestone grades (kindergarten, grade 6 and grade 9) and a small number of schools may not make their class lists available.

5. Ideally, numerators and denominators should be taken from the same data source. In order to maintain accurate denominators in an immunization registry, the health authorities need to be aware of every child who moves into and out of the health region. As not all health regions had been able to fully establish these processes, ISLH (2013-2018), FH (2013-2018) and NH (2013-2019) felt that the BC MoE enrollment data were more accurate estimates of the number of children in each health region than iPHIS/Panorama.

   School district boundaries do not directly line up with health region boundaries. As such, the BC MoE enrollment data are based on a process of identifying the schools that lie within each health service delivery area (with health authority input). The BC MoE enrollment data exclude youth custody, continuing education, early learning and summer schools.

   Using different data sources for numerators and denominators can result in inaccurate results, including coverage results that appear to be greater than 100%. When this occurred, the coverage rates were adjusted to 100%. Immunization coverage rates approaching 100% in FH (2013-2018), ISLH (2013-2018) and NH (2013-2019) are likely over-estimates 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.

6. Unknown includes all children who are partially immunized or unimmunized who do not have a documented refusal or contraindication, based on information in the immunization registry. This includes children who have deferred or inadvertently missed their immunizations, and those who have not had their refusal, contraindication, or immunization doses recorded.

7. 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.

8. 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.

9. Compared to 2019, the proportion of children with refusals to all vaccines increased in 2020 for 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. See more information here.

10. Coverage results by Health Authority and Health Service Delivery Area are reported based on the location of the child's school.
11. The following school types are included in the PIR: 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.
12. BC launched a measles catch-up immunization program for school-age children in 2019. 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 (see notes 3-5 and 9).
13. 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 (see notes 3-5) and the measles catch-up immunization program for school-age children (see note 12). See the History of Immunization in BC.
14. 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.
15. Historically, health regions using the iPHIS immunization registry inactivated the records of clients receiving the majority of their immunizations from First Nations Health Services Organizations (FNHSOs) that did not use the iPHIS immunization registry. The reason for inactivation was because the iPHIS records were likely incomplete as their immunizations were recorded in other systems. Inactivated records were excluded from coverage analyses. Three FNHSOs used the iPHIS immunization registry, and the records of children immunized by these FNHSOs remained active. 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 FNHSOs were reactivated. These records were activated to facilitate the use of Panorama by the FNHSOs that have adopted 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 Health Service Delivery Area 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.
16. Starting in 2015, for varicella assessment, only exemptions for previous 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.

17. 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.
18. For the 2023 report (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.
19. Due to pandemic clinic closures during the 2020/21 school year in VCH, 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.
20. Data need to be interpreted with caution for the following reasons:
    a. To be considered up-to-date for age, documentation of every dose in an immunization registry (PIR/PARIS) is required. Some children may have received doses that have not been documented. All regions make their best efforts to obtain vaccination records pertaining to immunizations given by providers other than public health.
    b. There can be a delay in obtaining immunization records, which can result in delay of data entry.
    c. 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.
21. **Reporting History**

    Seven-year old coverage assessment became an official measure in 2012 (for the 2004 birth cohort). Prior to 2012, assessment of school-entry immunization coverage was conducted at the end of Kindergarten. Kindergarten assessment did not allow for complete capture of on-time immunizations since "school-entry" doses are recommended at 4-6 years of age. Kindergarten assessment does not capture doses administered after Kindergarten but prior to the seventh birthday. Due to the use of different data sources, seven-year old coverage results cannot be directly compared to Kindergarten coverage results.

Acknowledgements

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Appendix

Table A1. Reasons for non-immunization definitions

Measure	Definition
Exemption: Lab Evidence of Immunity	*For varicella, measles and rubella only.* Does not meet criteria for Up-to-Date AND Type of Special Consideration = Exemption AND Reason for Special Consideration = Immunity - Lab Evidence AND Special Consideration Effective From Date ≤ 7th birthday AND Special Consideration Effective To Date > 7th birthday OR <blank>
Exemption: Previous Disease (varicella)	*For varicella only* Does not meet any of the previous definitions AND Type of Special Consideration = Exemption AND Reason for Special Consideration = Immunity - Previous Disease AND Special Consideration Effective From Date ≤ 7th birthday AND Special Consideration Effective To Date > 7th birthday OR <blank>
Partially Immunized with Contraindication	*For agents/antigens requiring more than one dose.* Does not meet any of the previous definitions AND Received at least one valid dose of the agent/antigen of interest AND Type of Special Consideration = Contraindication AND Reason for Special Consideration is valid for the agent/antigen of interest AND Special Consideration Effective From Date ≤ 7th birthday AND Special Consideration Effective To Date > 7th birthday OR <blank>
Partially Immunized with Refusal	*For agents/antigens requiring more than one dose.* Does not meet any of the previous definitions AND Received at least one valid dose of the agent/antigen of interest AND Type of Special Consideration = Exemption Reason for Special Consideration = Client Refusal OR Parental/Guardian Refusal Special Consideration Effective From Date ≤ 7th birthday
Partially Immunized - Unknown	*For agents/antigens requiring more than one dose.* Does not meet any of the previous definitions AND Received at least one valid dose of the agent/antigen of interest **Note:** This category will include children with at least one valid dose of the agent/antigen of interest. These children may have any of the following: invalid doses recorded; invalid refusals, exemptions, or contraindications for the agent/antigen of interest; valid refusals, exemptions, or contraindications that do not apply to agent/antigen of interest; or no recorded refusals, exemptions, or contraindications for any agent/antigen.

Measure	Definition
Unimmunized with Contraindication	Does not meet any of the previous definitions AND Has no recorded valid dose(s) of the agent/antigen of interest AND Type of Special Consideration = Contraindication AND Reason for Special Consideration is valid for the agent/antigen of interest AND Special Consideration Effective From Date ≤ 7th birthday AND Special Consideration Effective To Date > 7th birthday OR <blank>
Unimmunized with Refusal	Does not meet any of the previous definitions AND Has no recorded valid dose(s) of the agent/antigen of interest AND Type of Special Consideration = Exemption Reason for Special Consideration = Client Refusal OR Parental/Guardian Refusal Special Consideration Effective From Date ≤ 7th birthday
Unimmunized – Unknown	Does not meet any of the previous definitions AND Has no recorded valid dose(s) of the agent/antigen of interest **Note:** This category will include children with no recorded valid dose(s) of the agent/antigen of interest. These children may have any of the following: invalid doses recorded; invalid refusals, exemptions, or contraindications for the agent/antigen of interest; valid 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.

Table A2. Minimum Intervals 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		
Meningococcal C Conjugate				
meningococcal-C conjugate vaccine [G] or quadrivalent meningococcal vaccine (Nimenrix®)	12 months			
quadrivalent meningococcal vaccine (Menveo®), initial dose before 12 months of age	8 weeks	8 weeks	8 weeks [H]	
quadrivalent meningococcal vaccine (Menveo®), initial dose on or after 12 months of age	12 months	8 weeks		
quadrivalent meningococcal vaccine (Menveo® or Menactra®), initial dose on or after 24 months of age	24 months			

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).
H. Dose 3 must be given on or after 12 months of age.