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 604.707.2519
Fax 604.707.2515

www.bccdc.ca

Immunization Coverage in Grade 6 Students

2012-2022

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

A research and teaching centre affiliated with UBC

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Abbreviations

Health Authorities

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

Health Service Delivery Areas

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

Additional abbreviations

BC	British Columbia
HPV	Human papillomavirus
MoE	Ministry of Education
MyEdBC	MyEducation BC
PIR	Provincial Immunization Registry

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

The BCCDC Immunization Coverage Dashboard is available online here.

Executive Summary

The 2012-2022 grade 6 report contains coverage information for students who were enrolled in grade 6 in British Columbia (BC) for three antigens: hepatitis B, varicella, and human papillomavirus (HPV). In 2022, data reflects coverage as of the 2021/2022 school year. The hepatitis B and varicella vaccine series are based on completion of a primary series in early childhood and any missing doses may be re-offered in grade 6. The HPV series is routinely initiated and completed in grade 6.

Overall, provincial coverage was highest for hepatitis B (89.8%), followed by varicella (87.5%), and HPV (females: 60.6%; males: 59.0%). As hepatitis B and varicella series are usually completed at birth or during infancy students would have had more time to receive these immunizations, compared to the HPV series which is normally initiated and completed in grade 6. In comparison to 2021, coverage for hepatitis B increased by 5%, varicella by 9%, and HPV by approximately 50% in 2022. Coverage rates in 2021 were likely impacted by disruptions to school-based immunization programs from the COVID-19 pandemic.

In the 2022 report, as part of the assessment of the impact of the COVID-19 pandemic on routine childhood immunizations, coverage for hepatitis B, varicella, and HPV was also reported for grade 7 students in the 2021/2022 school year, who were in grade 6 in the 2020/2021 school year. In general, coverage improved in the grade 7 cohort and was comparable to pre-pandemic years. The largest improvement was seen for HPV, which requires receipt of two doses throughout the school year.

Reasons for non-immunization (i.e., documented refusals, exemptions, or contraindications) were also assessed among partially immunized and unimmunized students for all three antigens. Partially immunized students are defined as those who have received one or more vaccines in a series, but are not up-to-date (see Notes and Table A1 in the Appendix for further details). Many students were partially immunized or unimmunized with no documented refusals or contraindications (i.e., their reason for non-immunization was unknown), particularly for HPV. These unknown groups can include children who have missed the immunization clinics, those who deferred, or those who have not had their refusal, contraindication, or immunization doses recorded. Improving documentation of immunization doses, refusals, and contraindications may provide better estimates of the proportion of grade 6 students in BC with protection against hepatitis B, varicella, and HPV and indicate where to focus catch-up efforts.

Limitations
All calculations are based on vaccine doses recorded in the provincial or regional immunization registry and enrolment records maintained by regional HAs using electronic enrolment records from the Ministry of Education (MoE), or records received directly from schools. Doses administered by providers other than public health, including doses administered outside of BC to newly arrived students whose records have not yet been received by public health, may not be reported in the registry. Students attending First Nations schools may be under-represented in this dataset because some First Nations schools are not registered with the BC MoE and are therefore not captured in the provincial list of schools. Immunization records may be incomplete for international students, so coverage is likely underestimated for this population. Data from 2018 onwards are not comparable to historical data due to data source changes. Categorization of reasons for non-immunization as refusal or contraindication is likely to be incomplete for Fraser Health (FH) and Northern Health (NH) due to lack of supplemental data transfer between regional and provincial immunization registries. There may be lag times in data entry.

Please refer to the Notes for additional information.

Grade 6 students with up-to-date immunizations: Hepatitis B

Although most grade 6 students complete their hepatitis B series in infancy, the school program aims to catch-up any remaining students. In 2022, hepatitis B immunization coverage for grade 6 students in BC increased to 89.8% provincially, a similar rate as what was observed in 2018-2020 and a 5.6% increase from 2021 (**Table 1** and **Figure 1**). Rates were higher in all HAs, with the greatest increases in Vancouver Coastal Health (VCH) and FH. Rates and trends varied by HSDA and ranged from 79.8% to 97.2% in 2022 (**Table 1**).

In the 2021/2022 school year, only 2% of BC grade 6 students were unimmunized due to a documented refusal, while 3% and 5% were partially immunized and unimmunized for unknown reasons (**Table 2**). The highest reported refusal rate of 10% was in Kootenay Boundary. Less than 1% of students were unimmunized and had a reported contraindication.

Table 1. Percent of Grade 6 students with up-to-date immunizations: Hepatitis B

HEALTH AUTHORITY / HEALTH SERVICE DELIVERY AREA	YEAR										
	2012	2013	2014*	2015*	2016*	2017*	2018*	2019*	2020*	2021*	2022*
INTERIOR *	**83.8%**	**89.4%**	**90.5%**	**89.2%**	**89.9%**	**89.3%**	**90.2%**	**90.5%**	**88.3%**	**85.1%**	**88.1%**
East Kootenay	82.9%	91.4%	91.4%	89.0%	91.2%	85.8%	90.5%	90.2%	88.8%	83.1%	88.7%
Kootenay Boundary	73.6%	80.9%	82.9%	82.4%	80.5%	82.8%	80.2%	80.4%	73.7%	75.0%	79.8%
Okanagan	83.5%	88.2%	89.1%	89.3%	89.7%	88.9%	89.9%	90.7%	89.5%	85.3%	88.0%
Thompson Cariboo Shuswap	88.6%	93.5%	94.8%	91.3%	93.2%	93.5%	94.2%	93.9%	91.4%	88.9%	90.9%
FRASER *	**83.5%**	**87.5%**	**89.0%**	**89.0%**	**90.6%**	**91.8%**	**88.3%**	**89.0%**	**88.8%**	**80.6%**	**89.0%**
Fraser East	78.7%	86.9%	89.0%	86.9%	87.2%	90.5%	90.8%	89.9%	89.7%	85.6%	90.5%
Fraser North	80.6%	82.9%	86.5%	86.3%	90.1%	91.5%	87.7%	88.0%	88.2%	78.6%	88.2%
Fraser South	87.2%	91.0%	90.7%	91.7%	92.3%	92.5%	87.7%	89.3%	88.9%	80.1%	89.0%
VANCOUVER COASTAL	**91.9%**	**92.4%**	**93.0%**	**93.2%**	**94.2%**	**93.6%**	**93.7%**	**93.4%**	**90.4%**	**86.1%**	**92.1%**
Richmond	97.1%	97.3%	96.9%	96.9%	98.5%	96.8%	97.8%	97.7%	95.7%	91.4%	97.2%
Vancouver	92.6%	92.8%	93.4%	93.8%	94.0%	94.3%	94.6%	94.4%	90.9%	87.7%	91.0%
North Shore / Coast Garibaldi	87.4%	88.8%	90.0%	90.1%	91.8%	90.6%	90.1%	89.2%	86.8%	80.6%	91.0%
ISLAND *	**79.6%**	**90.5%**	**95.9%**	**97.9%**	**97.5%**	**98.5%**	**91.4%**	**91.1%**	**88.9%**	**88.9%**	**90.6%**
South Vancouver Island	83.1%	92.2%	93.2%	98.5%	97.0%	97.9%	92.5%	91.2%	89.9%	90.2%	91.7%
Central Vancouver Island	75.7%	89.6%	98.4%	96.2%	99.0%	97.9%	91.3%	91.4%	88.0%	88.7%	91.1%
North Vancouver Island	78.5%	88.0%	98.1%	99.6%	96.0%	100.0%	88.6%	90.5%	87.9%	86.4%	87.0%
NORTHERN *	**85.9%**	**93.4%**	**94.4%**	**92.7%**	**92.9%**	**91.5%**	**91.5%**	**91.1%**	**89.8%**	**87.1%**	**90.0%**
Northwest	83.9%	93.1%	95.2%	92.5%	94.4%	93.5%	90.6%	89.7%	86.9%	81.9%	88.6%
Northern Interior	88.5%	94.3%	95.5%	94.4%	94.8%	92.5%	94.3%	92.7%	91.0%	91.3%	92.9%
Northeast	83.2%	92.0%	91.2%	89.5%	88.0%	87.7%	86.7%	89.4%	90.2%	84.4%	85.7%
BRITISH COLUMBIA *	**85.0%**	**89.7%**	**91.5%**	**91.5%**	**92.4%**	**92.8%**	**90.4%**	**90.6%**	**89.1%**	**84.2%**	**89.8%**

* From 2014 onwards estimates for BC and some of the health authorities are not directly comparable to previous years. Immunization coverage rates approaching 100% in ISLH in 2014-2017 are likely over-estimates resulting from the use of different data sources for numerators and denominators. See Notes.

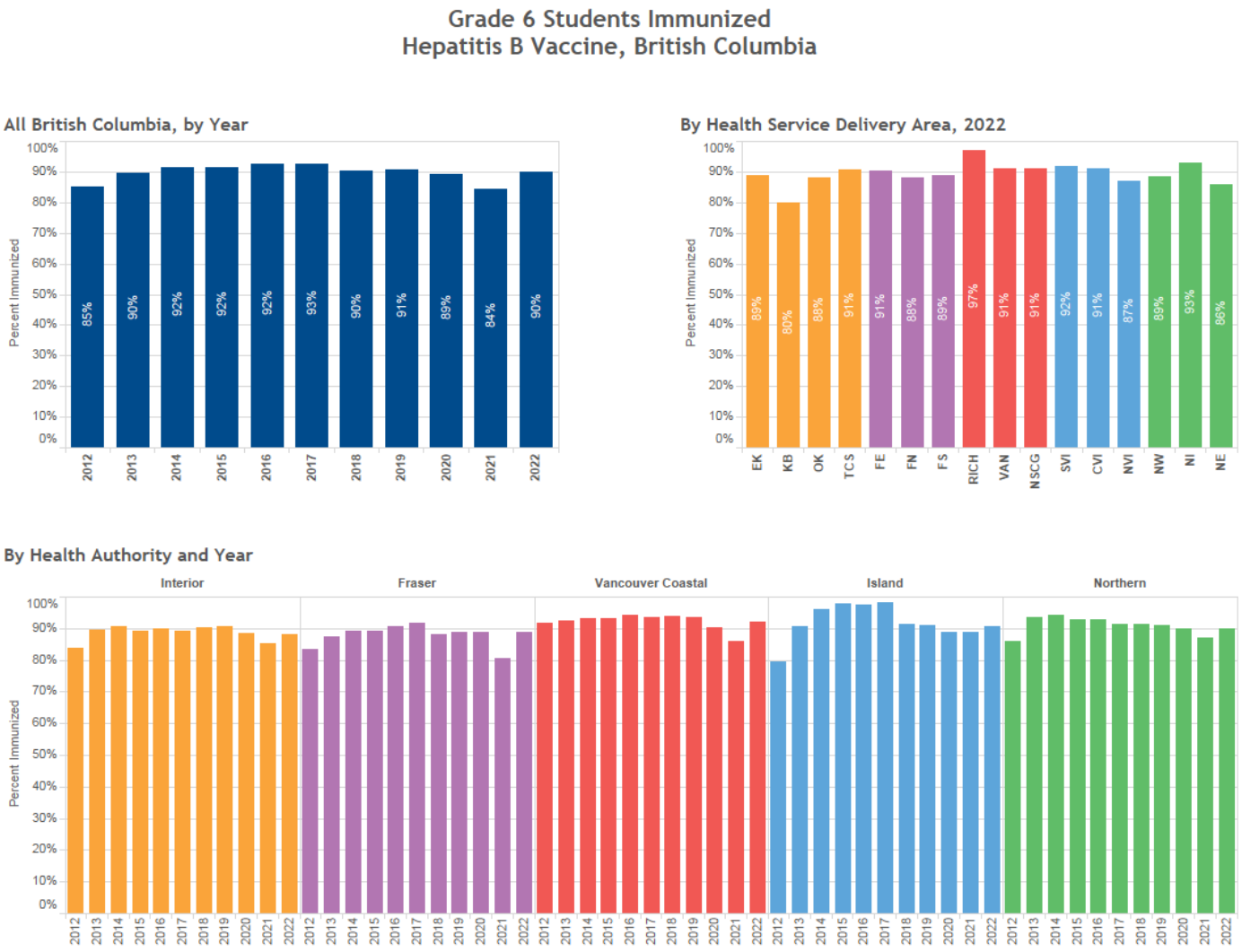


Figure 1. Percent of Grade 6 students with up-to-date immunizations: Hepatitis B

Table 2. Reasons for non-immunization for Grade 6 students: Hepatitis B, 2022

Region	Population	Count					Percent				
		Partially Immunized		Unimmunized			Partially Immunized		Unimmunized		
		Refusal	Unknown[a]	Refusal	Contraindication	Unknown[a]	Refusal	Unknown[a]	Refusal	Contraindication	Unknown[a]
British Columbia	**47,642**	**270**	**1,430**	**1,005**	**2**	**2,149**	**1%**	**3%**	**2%**	**0%**	**5%**
Interior	7,839	73	195	370	0	294	1%	2%	5%	0%	4%
East Kootenay	986	13	26	41	0	31	1%	3%	4%	0%	3%
Kootenay Boundary	787	11	26	75	0	47	1%	3%	10%	0%	6%
Okanagan	3,738	32	92	184	0	141	1%	2%	5%	0%	4%
Thompson Cariboo Shuswap	2,328	17	51	70	0	75	1%	2%	3%	0%	3%
Fraser[b]	**19,220**	**42**	**806**	**177**	**0**	**1,090**	**0%**	**4%**	**1%**	**0%**	**6%**
Fraser East	3,502	11	119	69	0	133	0%	3%	2%	0%	4%
Fraser North	6,169	12	259	38	0	422	0%	4%	1%	0%	7%
Fraser South	9,549	19	428	70	0	535	0%	4%	1%	0%	6%
Vancouver Coastal	**9,708**	**57**	**170**	**195**	**0**	**346**	**1%**	**2%**	**2%**	**0%**	**4%**
Richmond	1,685	3	21	8	0	15	0%	1%	0%	0%	1%
Vancouver	4,864	31	87	75	0	245	1%	2%	2%	0%	5%
North Shore / Coast Garibaldi	3,159	23	62	112	0	86	1%	2%	4%	0%	3%
Island	**7,657**	**82**	**168**	**209**	**0**	**261**	**1%**	**2%**	**3%**	**0%**	**3%**
South Vancouver Island	3,590	24	63	80	0	132	1%	2%	2%	0%	4%
Central Vancouver Island	2,640	37	63	67	0	68	1%	2%	2%	0%	3%
North Vancouver Island	1,427	21	42	62	0	61	2%	3%	4%	0%	4%
Northern[b]	**3,218**	**16**	**91**	**54**	**2**	**158**	**0%**	**3%**	**2%**	**0%**	**5%**
Northwest	828	5	27	13	1	48	1%	3%	2%	0%	6%
Northern Interior	1,593	3	29	25	1	55	0%	2%	2%	0%	4%
Northeast	797	8	35	16	0	55	1%	4%	2%	0%	7%

Notes: a. "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.
b. PIR does not contain complete supplementary information on reasons for non-immunization (i.e., exemptions, refusals and contraindications) for FH and NH. Therefore, the proportion of partially immunized and unimmunized students with unknown reasons for non-immunization is likely to be overestimated, see Note #11.

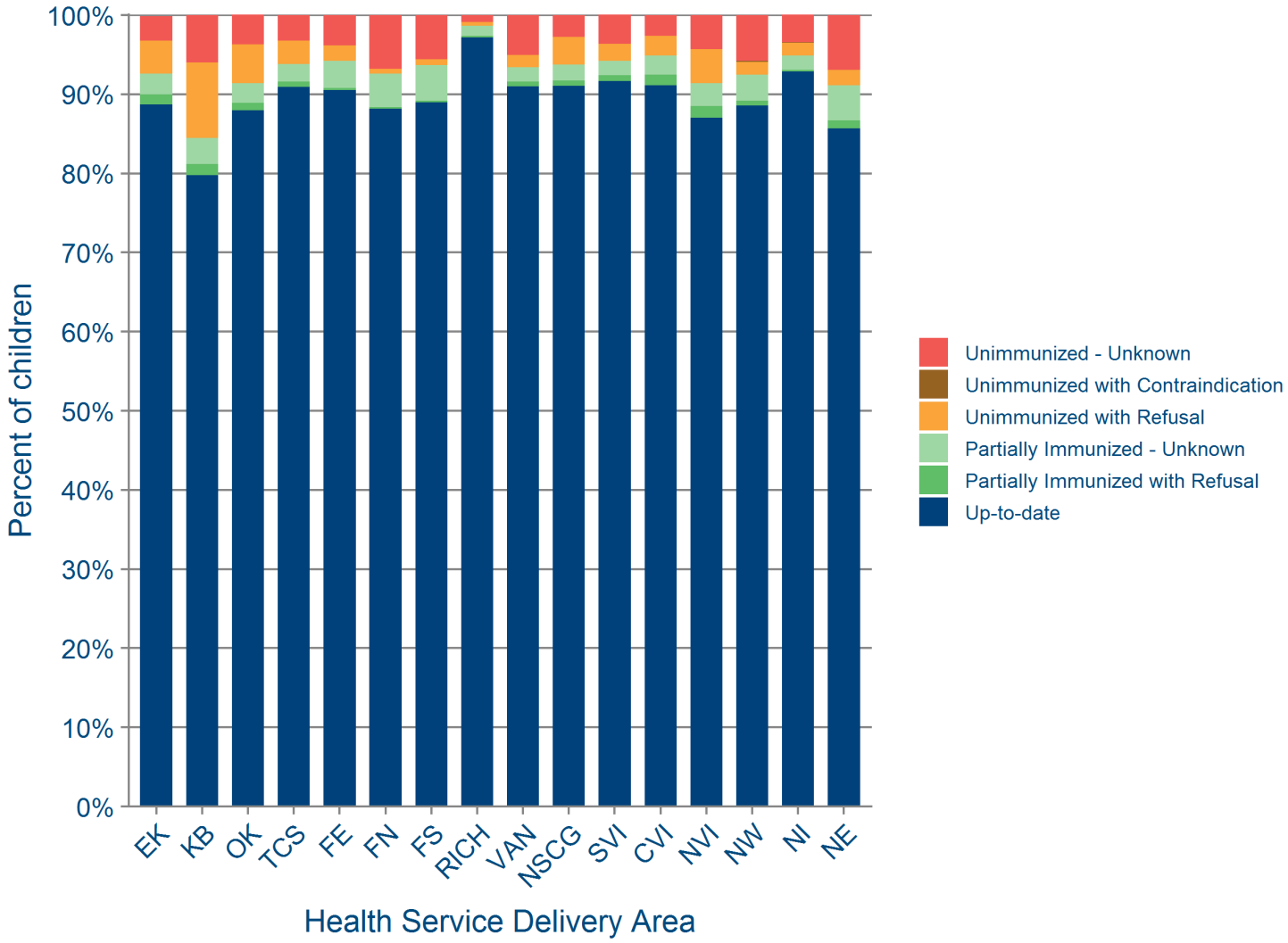


Figure 2. Reasons for non-immunization for Grade 6 students: Hepatitis B, 2022

Grade 6 students with up-to-date protection: Varicella

The provincial coverage rate for varicella in grade 6 students increased by almost 10% from 78.4% in 2021 to 87.5% in 2022, with the largest increase in FH from 71.1% to 87.0% (**Table 3** and **Figure 3**). The proportion of children who either had lab evidence or a self-report of previous varicella disease has decreased from 29.2% in 2012 to 1.2% in 2022, as fewer children are exposed to wild-type varicella (**Figure 4**). In 2022, varicella coverage rates by HSDA ranged from 78.3% to 96.0% (**Table 3**).

In the 2021/2022 school year, only 1% (range 0 – 2% among HSDAs) and 3% (range 1 – 11% among HSDAs) of BC grade 6 students were partially immunized and unimmunized with a documented refusal, respectively (**Table 4**). Less than 1% of students were partially immunized or unimmunized and had a reported contraindication. There may be an underestimate of the proportion of children who have protection from previous disease in FH and NH due to lack of supplemental data transfer between regional and provincial immunization registries. See Notes for further information.

Table 3. Percent of Grade 6 students with up-to-date protection: Varicella

HEALTH AUTHORITY / HEALTH SERVICE DELIVERY AREA	YEAR										
	2012	2013	2014*	2015*	2016*	2017*	2018*	2019*	2020*	2021*	2022*
INTERIOR *	**88.3%**	**85.7%**	**84.7%**	**82.2%**	**83.4%**	**82.5%**	**87.4%**	**86.2%**	**85.4%**	**84.1%**	**85.8%**
East Kootenay	91.7%	88.0%	90.0%	85.4%	82.8%	82.4%	88.9%	86.5%	87.0%	85.2%	88.3%
Kootenay Boundary	81.9%	74.6%	74.3%	78.4%	76.7%	78.5%	86.8%	74.2%	72.3%	75.3%	78.3%
Okanagan	87.0%	83.9%	82.5%	80.6%	82.6%	80.9%	85.8%	86.1%	86.4%	83.6%	84.9%
Thompson Cariboo Shuswap	91.6%	91.6%	89.4%	84.9%	87.3%	86.5%	89.6%	90.4%	87.8%	87.3%	88.5%
FRASER *	**83.5%**	**82.6%**	**82.6%**	**81.9%**	**82.8%**	**83.4%**	**81.4%**	**84.0%**	**82.9%**	**71.1%**	**87.0%**
Fraser East	80.5%	80.9%	80.1%	80.6%	79.3%	79.8%	84.8%	84.3%	83.9%	76.8%	87.4%
Fraser North	79.3%	80.0%	81.1%	79.0%	80.2%	80.9%	81.5%	83.3%	82.3%	70.1%	86.1%
Fraser South	87.5%	85.1%	84.6%	84.3%	85.9%	86.2%	80.0%	84.4%	83.0%	69.6%	87.6%
VANCOUVER COASTAL	**87.7%**	**85.0%**	**85.8%**	**85.6%**	**87.0%**	**85.9%**	**88.0%**	**91.7%**	**88.7%**	**80.4%**	**89.6%**
Richmond	90.1%	92.0%	90.1%	91.8%	93.4%	86.8%	94.1%	96.0%	94.7%	86.0%	96.0%
Vancouver	86.4%	84.5%	85.0%	84.8%	84.9%	86.8%	88.5%	92.2%	88.7%	81.2%	88.1%
North Shore / Coast Garibaldi	88.2%	81.5%	84.6%	83.3%	86.6%	83.7%	84.0%	88.5%	85.6%	76.1%	88.3%
ISLAND *	**88.2%**	**82.5%**	**76.1%**	**78.0%**	**84.8%**	**82.3%**	**88.4%**	**86.9%**	**86.0%**	**86.8%**	**88.6%**
South Vancouver Island	90.0%	82.6%	72.0%	78.0%	84.9%	81.8%	91.6%	87.3%	87.3%	88.4%	89.8%
Central Vancouver Island	85.9%	81.7%	80.1%	78.5%	86.5%	82.7%	87.4%	86.9%	84.9%	86.4%	89.7%
North Vancouver Island	88.0%	83.6%	79.2%	76.9%	81.3%	83.2%	81.8%	85.7%	84.6%	83.6%	83.7%
NORTHERN *	**91.1%**	**87.7%**	**86.1%**	**84.2%**	**84.6%**	**83.1%**	**85.3%**	**87.5%**	**81.8%**	**82.3%**	**85.0%**
Northwest	92.0%	90.4%	87.9%	87.7%	84.5%	84.9%	85.1%	87.3%	80.9%	77.8%	84.1%
Northern Interior	91.4%	86.8%	86.5%	83.8%	87.7%	86.1%	88.0%	90.1%	82.3%	87.0%	87.9%
Northeast	89.7%	86.6%	83.7%	81.3%	78.7%	75.8%	80.4%	83.0%	81.6%	77.9%	80.2%
BRITISH COLUMBIA *	**86.4%**	**83.9%**	**82.9%**	**82.3%**	**84.2%**	**83.6%**	**85.0%**	**86.6%**	**84.9%**	**78.4%**	**87.5%**

* From 2014 onwards estimates for BC and some of the health authorities are not directly comparable to previous years. The evidence required to record a previous history of varicella disease or shingles became more stringent as of the 2004 birth cohort (in grade 6 in the 2015/2016 school year). See Notes.

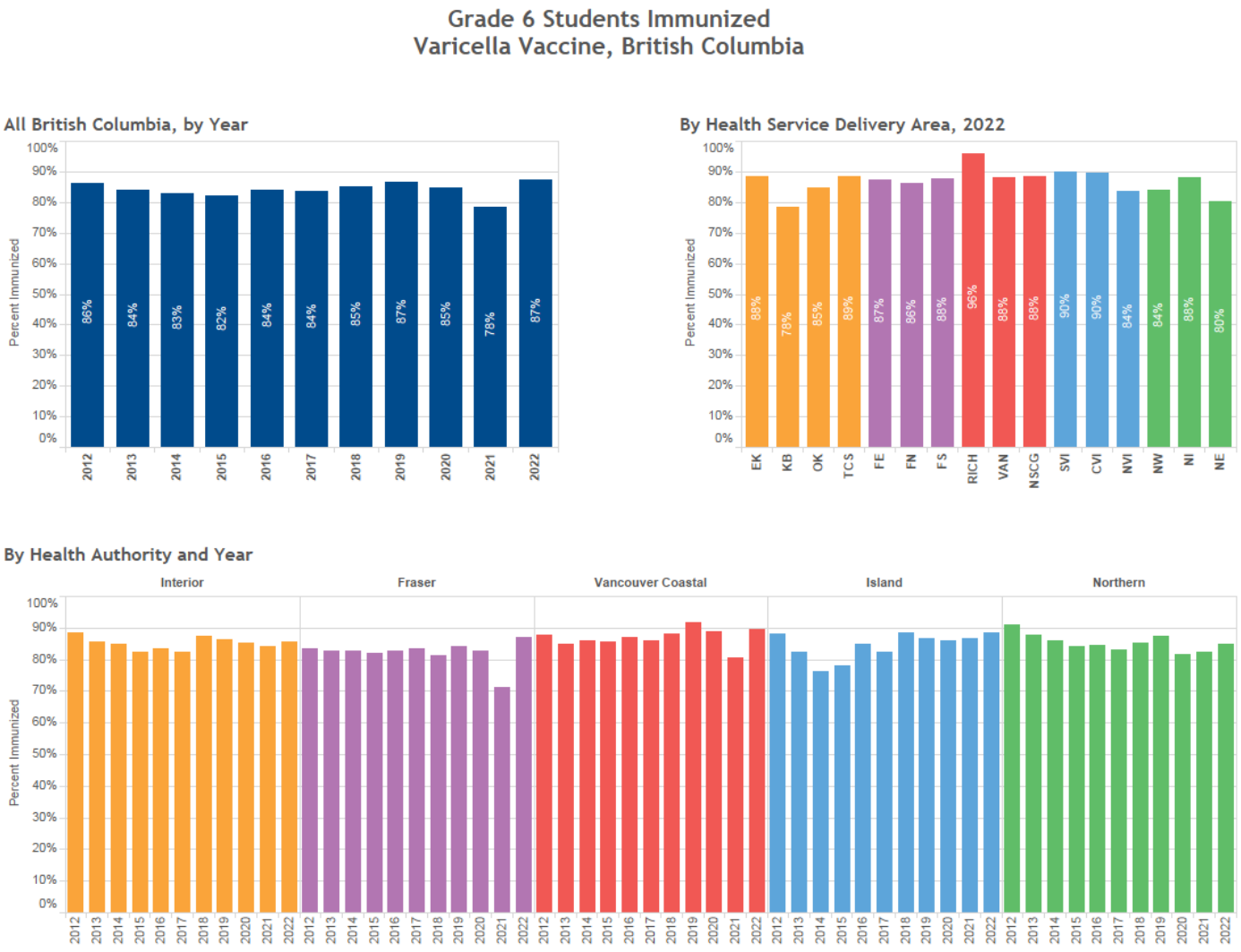
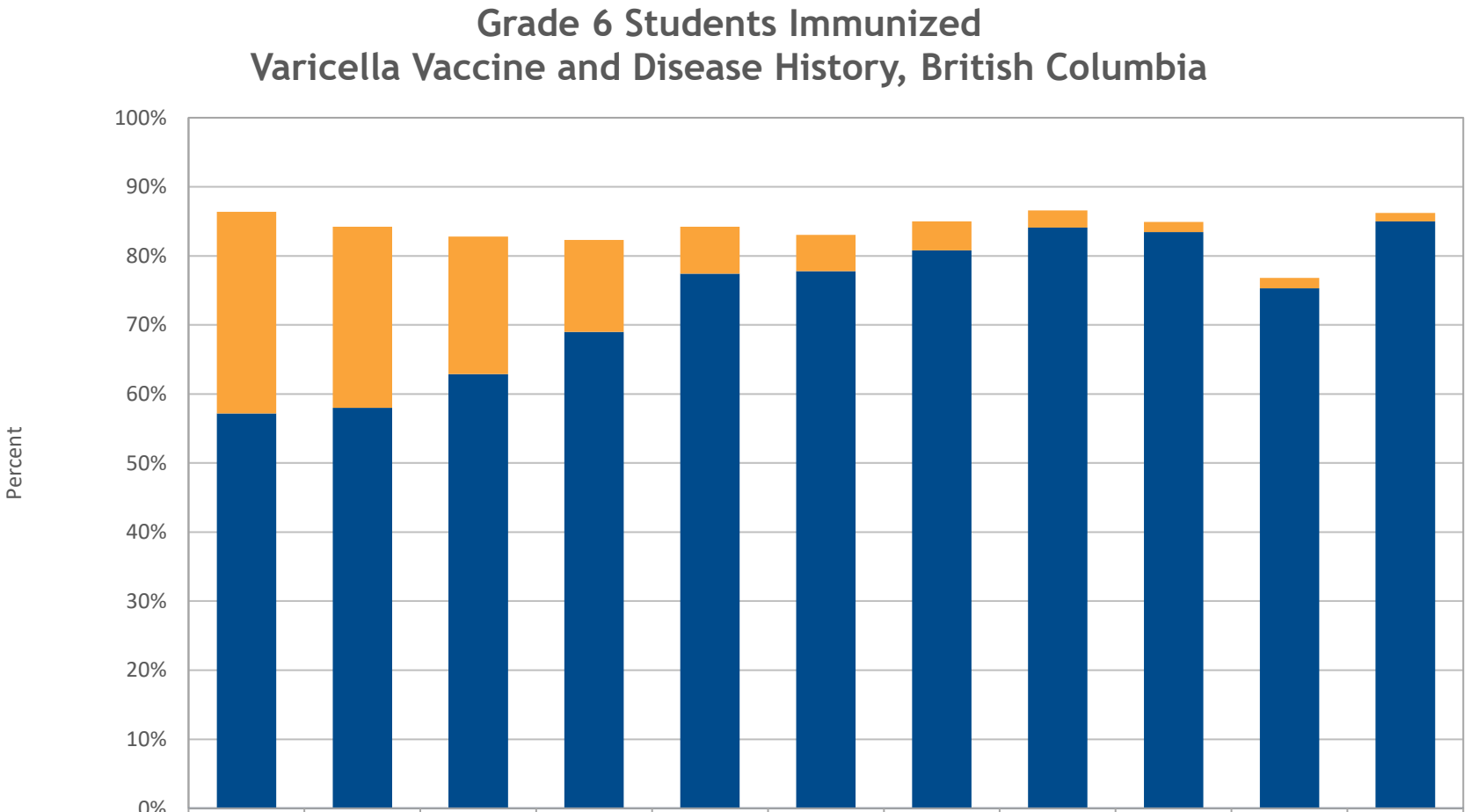


Figure 3. Percent of Grade 6 students with up-to-date protection: Varicella



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Disease History	29.2%	26.2%	19.9%	13.3%	6.8%	5.3%	4.2%	2.5%	1.5%	1.5%	1.2%
Vaccinated	57.2%	58.0%	62.9%	69.0%	77.4%	77.8%	80.8%	84.1%	83.5%	75.3%	85.0%

Figure 4. Grade 6 students – Varicella vaccine and disease history*, British Columbia

*Disease history includes children with self-reported or lab evidence of previous disease. See Note #2.

Table 4. Reasons for non-immunization for Grade 6 students: Varicella, 2022

Region	Population	Count							
		Immune: Previous Disease	Immune: Lab Evidence	Partially Immunized			Unimmunized		
				Refusal	Contraindication	Unknown[a]	Refusal	Contraindication	Unknown[a]
British Columbia	**47,642**	**531**	**54**	**542**	**6**	**1,789**	**1,290**	**4**	**2,340**
Interior	7,839	77	10	162	2	219	439	0	295
East Kootenay	986	11	0	21	0	24	43	0	27
Kootenay Boundary	787	20	1	18	0	20	90	0	43
Okanagan	3,738	29	7	79	1	112	218	0	154
Thompson Cariboo Shuswap	2,328	17	2	44	1	63	88	0	71
Fraser[b]	**19,220**	**121**	**22**	**89**	**0**	**926**	**238**	**1**	**1,235**
Fraser East	3,502	25	2	30	0	167	82	1	162
Fraser North	6,169	43	5	19	0	313	58	0	469
Fraser South	9,549	53	15	40	0	446	98	0	604
Vancouver Coastal	**9,708**	**219**	**0**	**143**	**1**	**280**	**220**	**2**	**367**
Richmond	1,685	12	0	8	1	27	10	0	21
Vancouver	4,864	128	0	77	0	148	95	1	256
North Shore / Coast Garibaldi	3,159	79	0	58	0	105	115	1	90
Island	**7,657**	**93**	**22**	**117**	**3**	**197**	**280**	**0**	**273**
South Vancouver Island	3,590	41	14	37	2	89	104	0	133
Central Vancouver Island	2,640	34	3	49	0	55	92	0	76
North Vancouver Island	1,427	18	5	31	1	53	84	0	64
Northern[b]	**3,218**	**21**	**0**	**31**	**0**	**167**	**113**	**1**	**170**
Northwest	828	3	0	5	0	53	23	0	51
Northern Interior	1,593	11	0	15	0	66	48	1	62
Northeast	797	7	0	11	0	48	42	0	57

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Region	Population	Percent							
		Immune: Previous Disease	Immune: Lab Evidence	Partially Immunized			Unimmunized		
				Refusal	Contraindication	Unknown[a]	Refusal	Contraindication	Unknown[a]
British Columbia	**47,642**	**1%**	**0%**	**1%**	**0%**	**4%**	**3%**	**0%**	**5%**
Interior	7,839	1%	0%	2%	0%	3%	6%	0%	4%
East Kootenay	986	1%	0%	2%	0%	2%	4%	0%	3%
Kootenay Boundary	787	2%	0%	2%	0%	2%	11%	0%	6%
Okanagan	3,738	1%	0%	2%	0%	3%	6%	0%	4%
Thompson Cariboo Shuswap	2,328	1%	0%	2%	0%	3%	4%	0%	3%
Fraser[b]	**19,220**	**1%**	**0%**	**0%**	**0%**	**5%**	**1%**	**0%**	**6%**
Fraser East	3,502	1%	0%	1%	0%	5%	2%	0%	5%
Fraser North	6,169	1%	0%	0%	0%	5%	1%	0%	8%
Fraser South	9,549	1%	0%	0%	0%	5%	1%	0%	6%
Vancouver Coastal	**9,708**	**2%**	**0%**	**1%**	**0%**	**3%**	**2%**	**0%**	**4%**
Richmond	1,685	1%	0%	0%	0%	2%	1%	0%	1%
Vancouver	4,864	3%	0%	2%	0%	3%	2%	0%	5%
North Shore / Coast Garibaldi	3,159	3%	0%	2%	0%	3%	4%	0%	3%
Island	**7,657**	**1%**	**0%**	**2%**	**0%**	**3%**	**4%**	**0%**	**4%**
South Vancouver Island	3,590	1%	0%	1%	0%	2%	3%	0%	4%
Central Vancouver Island	2,640	1%	0%	2%	0%	2%	4%	0%	3%
North Vancouver Island	1,427	1%	0%	2%	0%	4%	6%	0%	4%
Northern[b]	**3,218**	**1%**	**0%**	**1%**	**0%**	**5%**	**4%**	**0%**	**5%**
Northwest	828	0%	0%	1%	0%	6%	3%	0%	6%
Northern Interior	1,593	1%	0%	1%	0%	4%	3%	0%	4%
Northeast	797	1%	0%	1%	0%	6%	5%	0%	7%

Notes: a. "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.
b. PIR does not contain complete supplementary information on reasons for non-immunization (i.e., exemptions, refusals and contraindications) for FH and NH. Therefore, the proportion of partially immunized and unimmunized students with unknown reasons for non-immunization is likely to be overestimated, see Note #11.

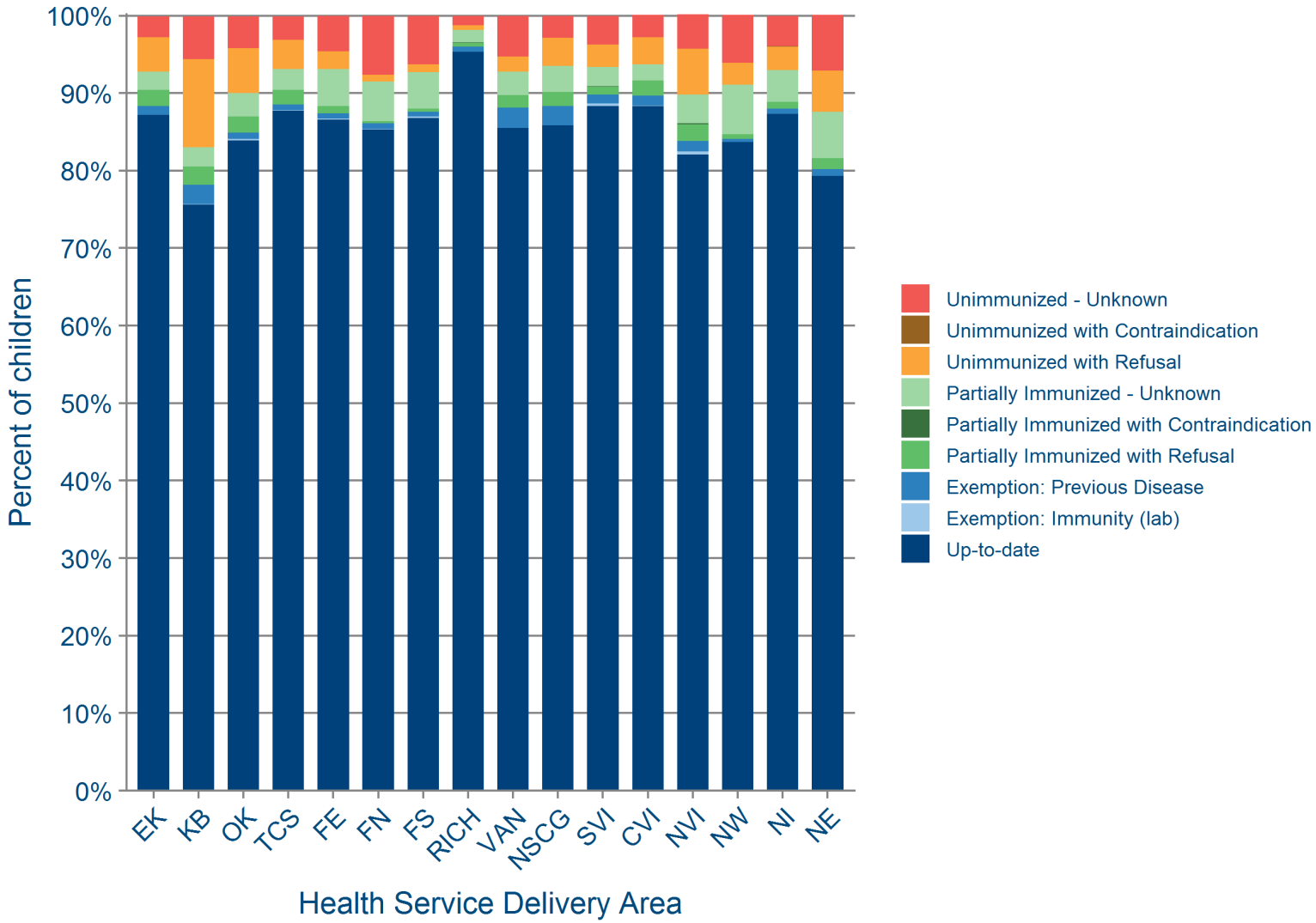

Figure 5. Reasons for non-immunization for Grade 6 students: Varicella, 2022

Grade 6 students with up-to-date immunizations: Human Papillomavirus (HPV)

The HPV adolescent immunization program has had several iterations in BC. The first cohort to receive HPV vaccination in grade 6 was females in 2008/2009, which was a three-dose series. Starting in 2010 (2010/2011 school year), the grade 6 program required two doses in grade 6 and a third dose in grade 11 (until 2013) or grade 9 (until 2014). Since 2014, females receiving 2 doses at least 150 days apart, with the first dose given before 15 years old, are considered complete. Starting in the 2017/2018 school year, HPV vaccine was extended to include males in grade 6. For more information on the history of the HPV program see History of Immunization in BC.

In 2022 (2021/2022 school year), HPV coverage in grade 6 students increased to 60.6% of female and 59.0% of male students receiving two doses of the HPV vaccine, a large increase compared with the previous year (**Table 5**, **Figure 6** and **Figure 7**). This trend was consistent across all HAs, with the largest increases in VCH, FH and Interior Health (IH). These improvements in coverage reflect the efforts of public health to return to routine immunization priorities in the later stage of the COVID-19 pandemic. Coverage had not quite returned to pre-pandemic levels, which may reflect some ongoing operational impacts of the COVID-19 response (e.g., increases in absenteeism among schoolchildren due to illness, lack of staffing resources in remote and rural areas, or competing priorities in public health departments). See Notes for further information on the impact of COVID-19 on school-based immunization in previous years.

Rates and trends varied by HSDA. In 2022, HPV coverage rates in females by HSDA ranged from 15.1% to 75.6% and coverage rates in males ranged from 16.4% to 73.5% (**Table 5**). When combining series initiation and completion, 77.0% of female students and 75.6% of male students received at least one dose of HPV vaccine, which is similar to the proportions of male and female students who received at least one dose in 2020 (77.1% and 75.2%, respectively). For initiation, 16.4% of female students and 16.6% of male students in grade 6 initiated, but did not complete, an HPV immunization series (**Table 6**). HPV series initiation was similar across HAs and most HSDAs (**Figure 8**). All HSDAs apart from Northeast had between 11% and 22% of both female and male students initiate, but not complete, their HPV series. In Northeast, it was a higher proportion (39% of females and 32% of males) who initiated and did not complete their series (**Table 6**).

In the 2021/2022 school year, only 6% of BC grade 6 students were unimmunized with a documented refusal, while 16% and 18% were partially immunized and unimmunized for unknown reasons (**Tables 7 – 9** and **Figures 9 – 11**). The proportion of students who were unimmunized with a documented refusal ranged from 1% to 22% across the HSDAs.

Table 5. Percent of Grade 6 students with up-to-date immunizations: Human Papillomavirus (HPV), by sex

HEALTH AUTHORITY / HEALTH SERVICE DELIVERY AREA	YEAR									
	2018*		2019*		2020*		2021*		2022*	
	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males
INTERIOR *	**64.7%**	**63.2%**	**65.2%**	**63.7%**	**42.1%**	**39.4%**	**13.9%**	**11.8%**	**53.3%**	**54.2%**
East Kootenay	62.6%	58.5%	61.7%	64.2%	42.0%	45.6%	2.9%	1.3%	60.8%	61.9%
Kootenay Boundary	55.5%	49.9%	51.6%	48.3%	26.0%	25.3%	34.1%	32.3%	42.3%	44.9%
Okanagan	64.7%	63.0%	65.0%	64.3%	52.8%	48.5%	14.9%	13.0%	56.1%	57.7%
Thompson Cariboo Shuswap	69.3%	69.3%	71.1%	68.2%	30.4%	27.0%	10.0%	7.1%	49.5%	48.6%
FRASER *	**69.3%**	**66.0%**	**65.2%**	**62.1%**	**25.3%**	**24.7%**	**0.4%**	**0.3%**	**63.1%**	**60.5%**
Fraser East	59.6%	55.0%	58.3%	53.9%	17.8%	15.8%	0.5%	0.6%	51.4%	49.6%
Fraser North	70.7%	66.3%	65.3%	63.0%	19.7%	20.7%	0.3%	0.2%	64.4%	62.3%
Fraser South	72.0%	70.0%	67.8%	64.6%	31.7%	30.5%	0.3%	0.3%	66.4%	63.5%
VANCOUVER COASTAL	**68.6%**	**65.8%**	**71.8%**	**68.8%**	**15.9%**	**14.3%**	**1.1%**	**1.3%**	**66.7%**	**64.1%**
Richmond	75.3%	72.7%	78.0%	73.6%	60.2%	56.4%	3.0%	3.1%	75.6%	73.5%
Vancouver	70.9%	65.6%	74.2%	70.6%	1.7%	0.8%	0.4%	1.0%	64.1%	62.2%
North Shore / Coast Garibaldi	61.1%	62.3%	64.1%	63.1%	12.9%	13.1%	1.2%	1.0%	66.2%	61.8%
ISLAND *	**62.6%**	**61.9%**	**64.0%**	**61.9%**	**35.3%**	**34.8%**	**50.4%**	**50.2%**	**60.7%**	**60.3%**
South Vancouver Island	69.0%	65.7%	68.7%	66.5%	37.3%	34.3%	57.8%	56.7%	69.5%	68.4%
Central Vancouver Island	59.3%	61.2%	63.1%	59.4%	37.6%	39.9%	42.8%	42.3%	56.0%	57.8%
North Vancouver Island	52.6%	52.6%	53.3%	55.0%	25.4%	26.5%	46.6%	48.2%	46.4%	45.2%
NORTHERN	**62.1%**	**61.0%**	**61.6%**	**59.3%**	**31.3%**	**29.1%**	**40.4%**	**38.5%**	**44.8%**	**42.3%**
Northwest	66.0%	57.3%	61.2%	58.3%	33.4%	24.4%	48.2%	44.3%	55.6%	48.9%
Northern Interior	66.8%	65.5%	66.2%	60.7%	24.7%	23.6%	53.3%	52.7%	52.7%	53.0%
Northeast	48.2%	56.0%	53.5%	57.6%	41.8%	43.0%	6.8%	8.6%	15.1%	16.4%
BRITISH COLUMBIA *	**66.9%**	**64.6%**	**66.1%**	**63.5%**	**28.1%**	**26.8%**	**13.2%**	**12.7%**	**60.6%**	**59.0%**

* From 2014 onwards estimates for BC and some of the health authorities are not directly comparable to previous years. See Notes.

Table continued on next page

HEALTH AUTHORITY / HEALTH SERVICE DELIVERY AREA	YEAR					
	2012	2013	2014*	2015*	2016*	2017*
	Females	Females	Females	Females	Females	Females
INTERIOR *	**67.7%**	**67.8%**	**68.1%**	**63.4%**	**64.6%**	**63.4%**
East Kootenay	65.5%	69.2%	65.6%	60.7%	57.1%	59.5%
Kootenay Boundary	57.7%	53.5%	55.9%	46.5%	56.3%	52.1%
Okanagan	66.4%	66.6%	66.6%	64.0%	64.3%	61.9%
Thompson Cariboo Shuswap	74.6%	74.3%	74.9%	69.8%	70.6%	71.4%
FRASER *	**68.7%**	**71.0%**	**69.9%**	**69.1%**	**69.6%**	**70.1%**
Fraser East	62.5%	63.6%	61.6%	57.5%	57.1%	58.2%
Fraser North	66.7%	70.9%	68.2%	65.7%	68.8%	68.6%
Fraser South	72.6%	74.0%	73.9%	75.4%	75.1%	75.5%
VANCOUVER COASTAL	**69.9%**	**66.2%**	**64.5%**	**66.4%**	**66.4%**	**66.7%**
Richmond	76.9%	71.7%	61.4%	74.8%	74.4%	68.4%
Vancouver	66.9%	66.1%	64.4%	64.3%	65.9%	67.7%
North Shore / Coast Garibaldi	70.5%	62.8%	66.2%	65.2%	62.7%	64.2%
ISLAND *	**67.4%**	**67.4%**	**54.3%**	**54.3%**	**65.6%**	**60.8%**
South Vancouver Island	72.2%	67.3%	51.2%	55.6%	67.5%	63.1%
Central Vancouver Island	62.4%	68.4%	57.2%	52.9%	65.2%	57.4%
North Vancouver Island	65.4%	65.2%	56.8%	53.5%	60.9%	61.5%
NORTHERN	**69.7%**	**68.5%**	**66.2%**	**61.1%**	**62.8%**	**63.9%**
Northwest	71.7%	69.7%	67.7%	67.3%	65.5%	67.6%
Northern Interior	69.9%	69.1%	67.7%	58.9%	65.4%	68.4%
Northeast	67.2%	66.2%	62.0%	59.2%	55.4%	52.3%
BRITISH COLUMBIA *	**68.7%**	**68.8%**	**65.8%**	**64.8%**	**67.1%**	**66.5%**

* From 2014 onwards estimates for BC and some of the health authorities are not directly comparable to previous years. See Notes.

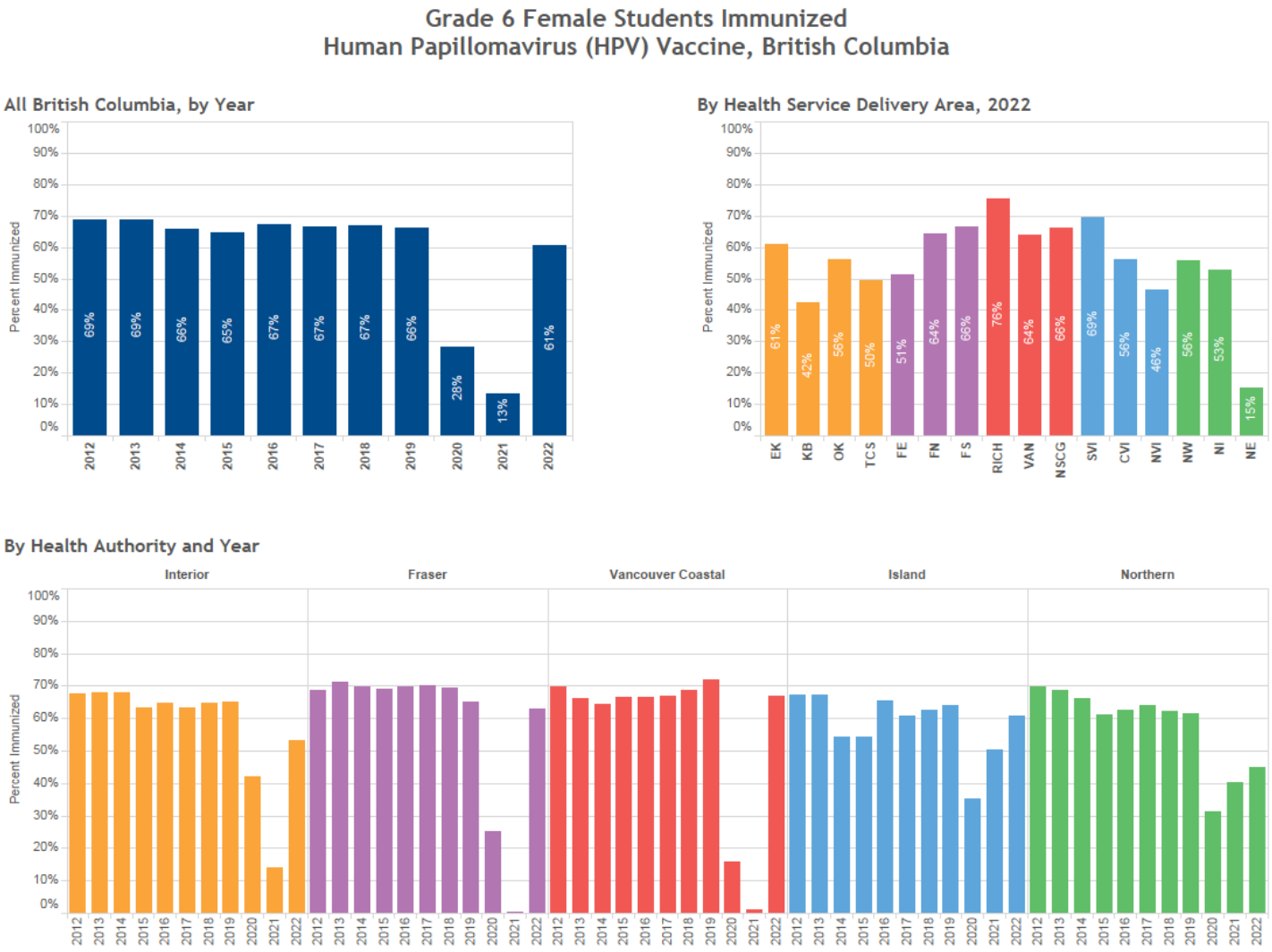

Figure 6. Percent of Grade 6 students with up-to-date immunizations: Human Papillomavirus (HPV), females

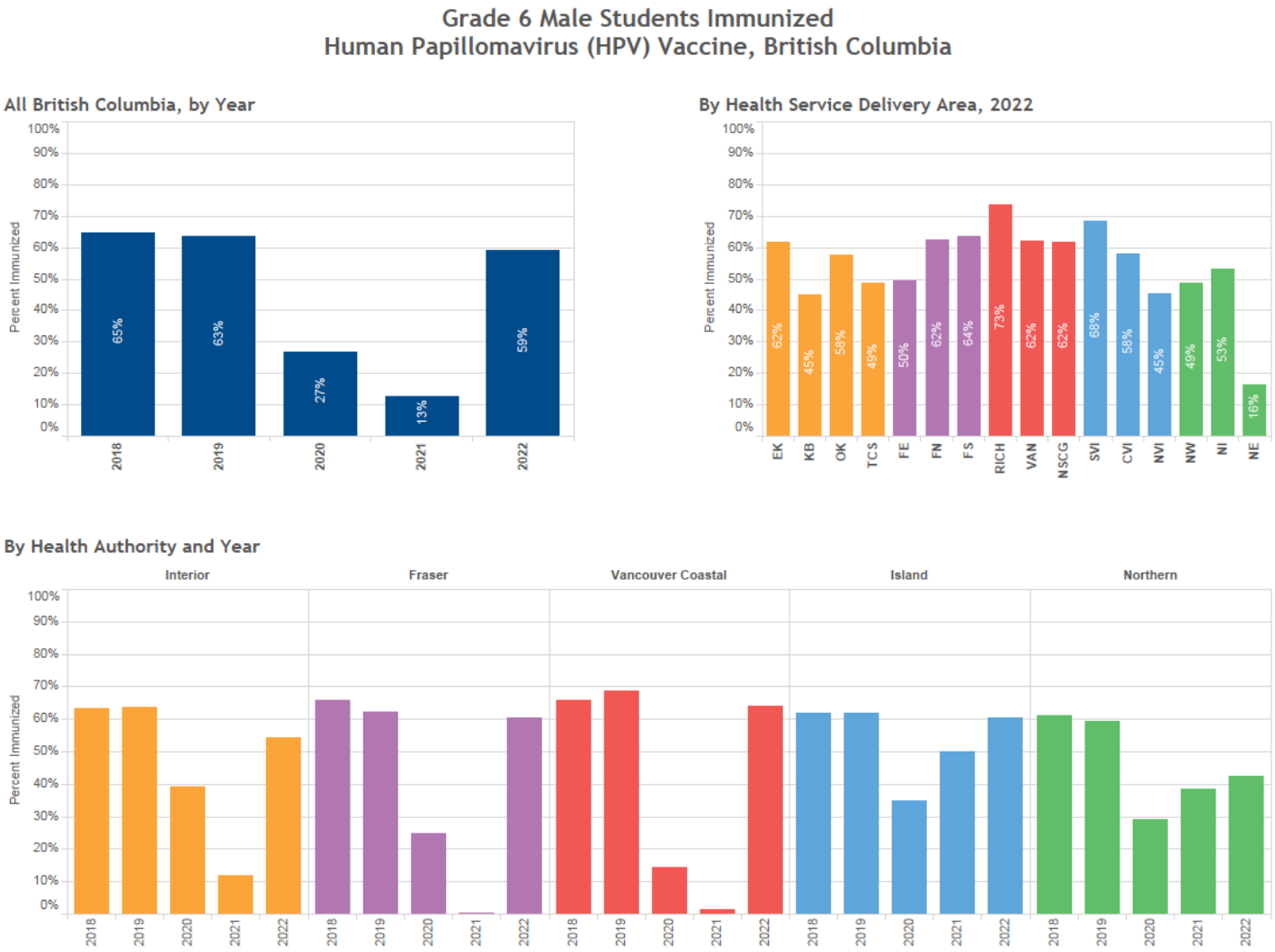

Figure 7. Percent of Grade 6 students with up-to-date immunizations: Human Papillomavirus (HPV), males

Table 6. Percent of Grade 6 students who initiated, but did not complete, a Human Papillomavirus (HPV) vaccine series

HEALTH AUTHORITY / HEALTH SERVICE DELIVERY AREA	2018		2019		2020		2021		2022	
	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males
INTERIOR	**7.2%**	**7.3%**	**8.6%**	**9.2%**	**31.8%**	**32.8%**	**54.8%**	**55.2%**	**16.4%**	**15.1%**
East Kootenay	6.5%	5.7%	9.7%	12.1%	31.6%	28.4%	68.6%	71.9%	13.5%	12.5%
Kootenay Boundary	6.8%	7.8%	9.7%	12.1%	28.7%	32.7%	20.6%	21.1%	14.2%	11.0%
Okanagan	7.3%	7.6%	8.1%	7.5%	22.5%	24.3%	54.0%	56.2%	14.3%	12.4%
Thompson Cariboo Shuswap	7.5%	7.3%	8.8%	9.4%	48.4%	48.3%	61.9%	58.8%	21.9%	21.7%
FRASER	**6.6%**	**6.6%**	**11.9%**	**12.1%**	**52.7%**	**50.8%**	**1.9%**	**1.6%**	**16.9%**	**17.8%**
Fraser East	8.5%	9.6%	10.8%	11.6%	52.8%	54.5%	1.8%	1.4%	21.2%	22.5%
Fraser North	7.3%	6.6%	12.0%	11.8%	59.5%	55.6%	0.9%	0.9%	16.4%	16.6%
Fraser South	5.4%	5.5%	12.3%	12.6%	48.2%	46.4%	2.6%	2.1%	15.7%	16.8%
VANCOUVER COASTAL	**12.6%**	**13.4%**	**11.9%**	**12.3%**	**65.4%**	**64.0%**	**11.4%**	**11.4%**	**14.9%**	**15.9%**
Richmond	11.6%	12.3%	10.1%	10.5%	26.9%	27.8%	10.4%	8.7%	11.3%	12.2%
Vancouver	11.9%	13.4%	11.3%	11.9%	79.3%	77.1%	9.1%	9.1%	15.4%	16.3%
North Shore / Coast Garibaldi	14.2%	13.9%	13.9%	13.8%	65.9%	63.0%	15.8%	16.5%	16.0%	17.3%
ISLAND	**10.1%**	**11.0%**	**10.9%**	**11.8%**	**40.1%**	**40.5%**	**22.2%**	**21.6%**	**15.6%**	**14.8%**
South Vancouver Island	7.6%	9.6%	8.4%	9.2%	42.8%	43.5%	18.9%	18.2%	11.9%	11.1%
Central Vancouver Island	11.8%	11.2%	12.7%	15.0%	34.2%	34.7%	28.2%	27.9%	19.6%	18.3%
North Vancouver Island	12.9%	14.3%	13.8%	12.0%	44.6%	43.6%	18.5%	18.3%	18.0%	17.1%
NORTHERN	**12.6%**	**11.7%**	**14.1%**	**14.8%**	**39.7%**	**41.6%**	**25.0%**	**24.6%**	**20.7%**	**19.9%**
Northwest	12.8%	12.0%	13.9%	15.1%	37.8%	44.4%	14.7%	20.7%	13.3%	15.8%
Northern Interior	14.4%	13.3%	17.0%	18.1%	49.6%	50.3%	17.1%	14.9%	16.4%	15.4%
Northeast	9.0%	8.3%	9.2%	8.5%	22.8%	23.7%	51.4%	45.1%	38.7%	32.1%
BRITISH COLUMBIA	**8.9%**	**9.1%**	**11.4%**	**11.8%**	**49.0%**	**48.4%**	**17.5%**	**17.1%**	**16.4%**	**16.6%**

*Data available from 2018 following the introduction of the male HPV vaccination program in grade 6 during the 2017/2018 school year.

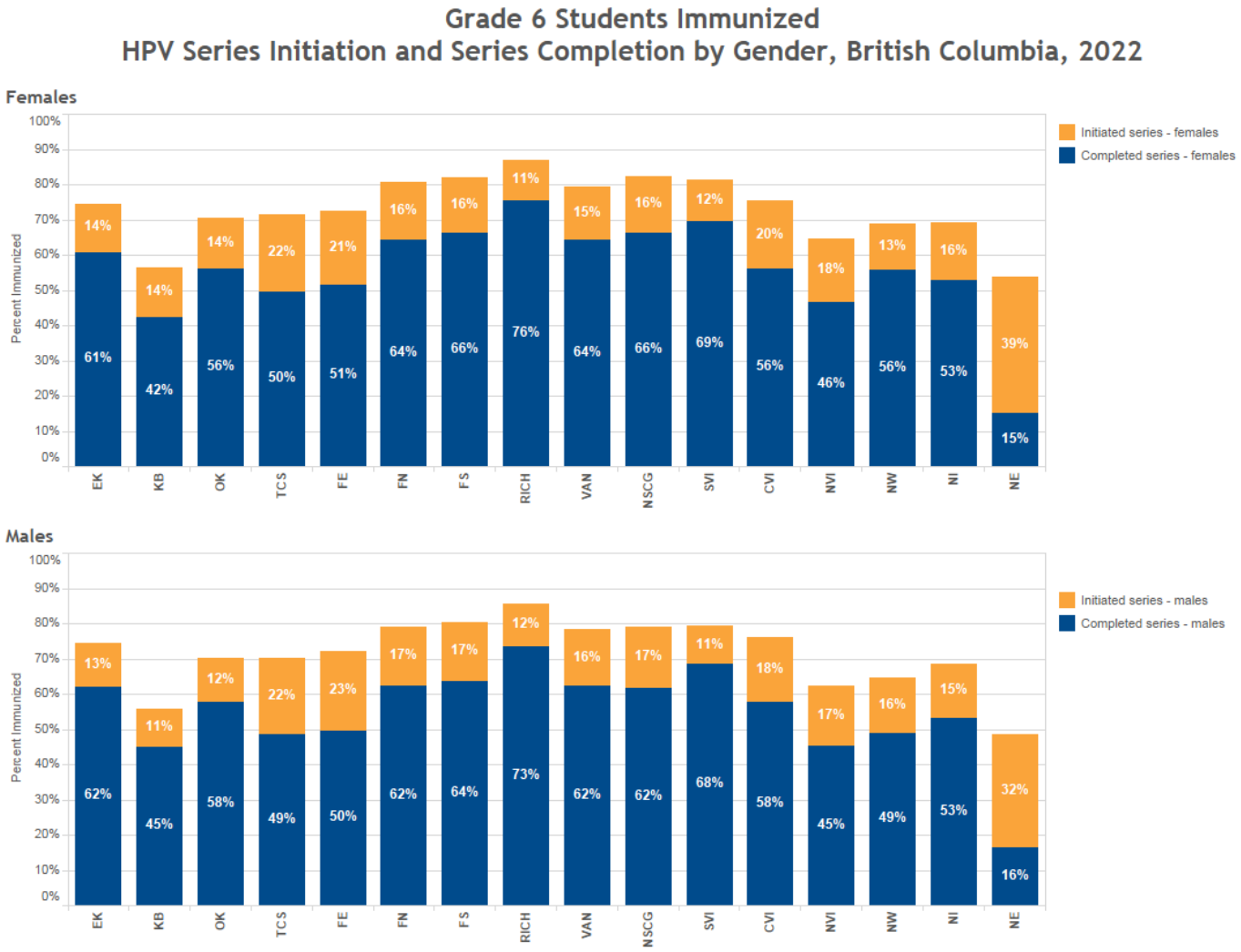

Figure 8. Percent of Grade 6 students who initiated, but did not complete, a Human Papillomavirus (HPV) vaccine series

Table 7. Reasons for non-immunization for Grade 6 students: HPV, 2022

Region	Population	Count					Percent				
		Partially Immunized		Unimmunized			Partially Immunized		Unimmunized		
		Refusal	Unknown[a]	Refusal	Contra-indication	Unknown[a]	Refusal	Unknown[a]	Refusal	Contra-indication	Unknown[a]
British Columbia	**47,642**	**196**	**7,684**	**2,926**	**1**	**8,371**	**0%**	**16%**	**6%**	**0%**	**18%**
Interior	7,839	59	1,175	1,181	1	1,207	1%	15%	15%	0%	15%
East Kootenay	986	3	125	143	0	110	0%	13%	14%	0%	11%
Kootenay Boundary	787	11	88	169	0	176	1%	11%	22%	0%	22%
Okanagan	3,738	33	466	560	0	552	1%	12%	15%	0%	15%
Thompson Cariboo Shuswap	2,328	12	496	309	1	369	0%	21%	13%	0%	16%
Fraser[b]	**19,220**	**18**	**3,318**	**189**	**0**	**3,825**	**0%**	**17%**	**1%**	**0%**	**20%**
Fraser East	3,502	8	759	76	0	893	0%	22%	2%	0%	26%
Fraser North	6,169	5	1,013	34	0	1,213	0%	16%	1%	0%	20%
Fraser South	9,549	5	1,546	79	0	1,719	0%	16%	1%	0%	18%
Vancouver Coastal	**9,708**	**63**	**1,431**	**747**	**0**	**1,122**	**1%**	**15%**	**8%**	**0%**	**12%**
Richmond	1,685	1	197	29	0	203	0%	12%	2%	0%	12%
Vancouver	4,864	31	739	390	0	633	1%	15%	8%	0%	13%
North Shore / Coast Garibaldi	3,159	31	495	328	0	286	1%	16%	10%	0%	9%
Island	**7,657**	**51**	**1,111**	**739**	**0**	**1,124**	**1%**	**15%**	**10%**	**0%**	**15%**
South Vancouver Island	3,590	25	387	286	0	417	1%	11%	8%	0%	12%
Central Vancouver Island	2,640	20	479	301	0	337	1%	18%	11%	0%	13%
North Vancouver Island	1,427	6	245	152	0	370	0%	17%	11%	0%	26%
Northern[b]	**3,218**	**5**	**649**	**70**	**0**	**1,093**	**0%**	**20%**	**2%**	**0%**	**34%**
Northwest	828	0	121	15	0	259	0%	15%	2%	0%	31%
Northern Interior	1,593	3	250	30	0	468	0%	16%	2%	0%	29%
Northeast	797	2	278	25	0	366	0%	35%	3%	0%	46%

Notes: a. "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.
b. PIR does not contain complete supplementary information on reasons for non-immunization (i.e., exemptions, refusals and contraindications) for FH and NH. Therefore, the proportion of partially immunized and unimmunized students with unknown reasons for non-immunization is likely to be overestimated, see Note #11.

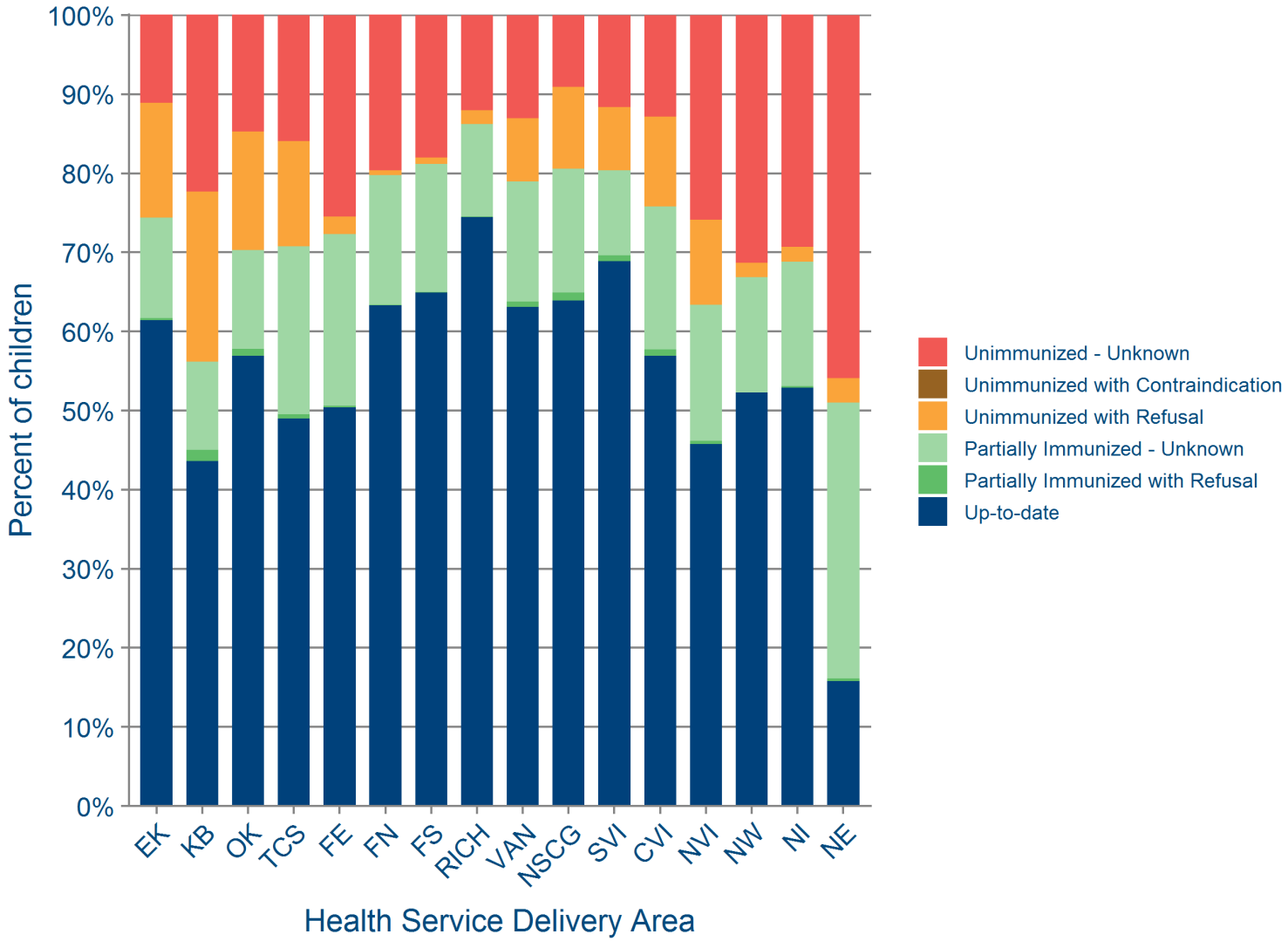

Figure 9. Reasons for non-immunization for Grade 6 students: HPV, 2022

Table 8. Reasons for non-immunization for Grade 6 students: HPV – females, 2022

Region	Population	Count					Percent				
		Partially Immunized		Unimmunized			Partially Immunized		Unimmunized		
		Refusal	Unknown[a]	Refusal	Contra-indication	Unknown[a]	Refusal	Unknown[a]	Refusal	Contra-indication	Unknown[a]
British Columbia	**23,184**	**100**	**3,713**	**1,430**	**1**	**3,900**	**0%**	**16%**	**6%**	**0%**	**17%**
Interior	3,847	26	605	583	1	581	1%	16%	15%	0%	15%
East Kootenay	459	1	61	67	0	51	0%	13%	15%	0%	11%
Kootenay Boundary	395	6	50	85	0	87	2%	13%	22%	0%	22%
Okanagan	1,872	13	254	287	0	268	1%	14%	15%	0%	14%
Thompson Cariboo Shuswap	1,121	6	240	144	1	175	0%	21%	13%	0%	16%
Fraser[b]	**9,262**	**11**	**1,552**	**96**	**0**	**1,761**	**0%**	**17%**	**1%**	**0%**	**19%**
Fraser East	1,654	4	347	35	0	418	0%	21%	2%	0%	25%
Fraser North	2,910	4	472	20	0	541	0%	16%	1%	0%	19%
Fraser South	4,698	3	733	41	0	802	0%	16%	1%	0%	17%
Vancouver Coastal	**4,691**	**32**	**667**	**358**	**0**	**503**	**1%**	**14%**	**8%**	**0%**	**11%**
Richmond	798	1	89	12	0	93	0%	11%	2%	0%	12%
Vancouver	2,335	14	345	195	0	284	1%	15%	8%	0%	12%
North Shore/Coast Garibaldi	1,558	17	233	151	0	126	1%	15%	10%	0%	8%
Island	**3,806**	**28**	**565**	**365**	**0**	**539**	**1%**	**15%**	**10%**	**0%**	**14%**
South Vancouver Island	1,831	15	202	129	0	213	1%	11%	7%	0%	12%
Central Vancouver Island	1,260	12	235	161	0	147	1%	19%	13%	0%	12%
North Vancouver Island	715	1	128	75	0	179	0%	18%	10%	0%	25%
Northern[b]	**1,578**	**3**	**324**	**28**	**0**	**516**	**0%**	**21%**	**2%**	**0%**	**33%**
Northwest	428	0	57	7	0	126	0%	13%	2%	0%	29%
Northern Interior	786	2	127	15	0	228	0%	16%	2%	0%	29%
Northeast	364	1	140	6	0	162	0%	38%	2%	0%	44%

Notes: a. "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.
b. PIR does not contain complete supplementary information on reasons for non-immunization (i.e., exemptions, refusals and contraindications) for FH and NH. Therefore, the proportion of partially immunized and unimmunized students with unknown reasons for non-immunization is likely to be overestimated, see Note #11.

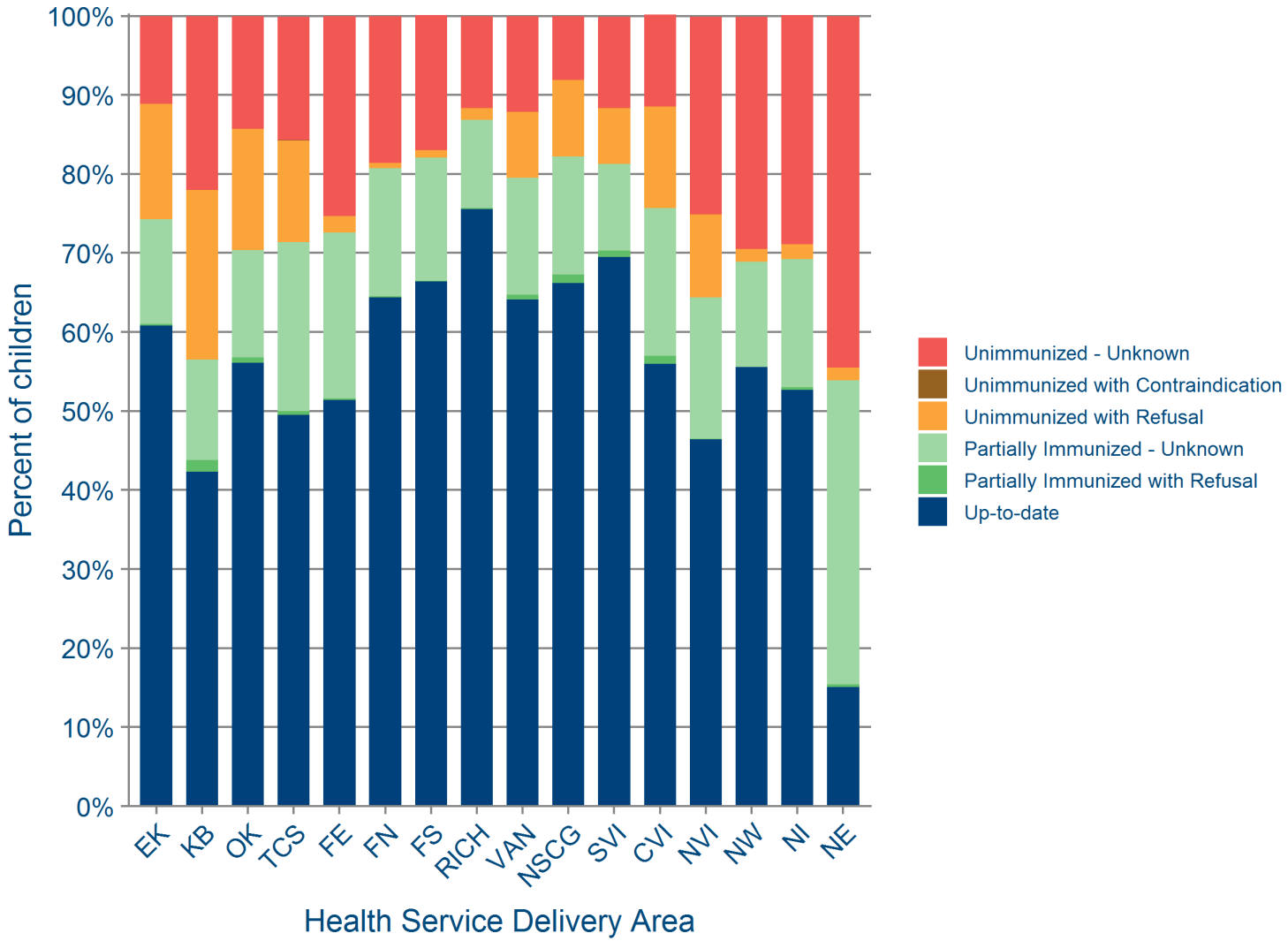

Figure 10. Reasons for non-immunization for Grade 6 students: HPV – females, 2022

Table 9. Reasons for non-immunization for Grade 6 students: HPV – males, 2022

Region	Population	Count				Percent			
		Partially Immunized		Unimmunized		Partially Immunized		Unimmunized	
		Refusal	Unknown[a]	Refusal	Unknown[a]	Refusal	Unknown[a]	Refusal	Unknown[a]
British Columbia	**24,453**	**96**	**3,970**	**1,496**	**4,469**	**0%**	**16%**	**6%**	**18%**
Interior	3,992	33	570	598	626	1%	14%	15%	16%
East Kootenay	527	2	64	76	59	0%	12%	14%	11%
Kootenay Boundary	392	5	38	84	89	1%	10%	21%	23%
Okanagan	1,866	20	212	273	284	1%	11%	15%	15%
Thompson Cariboo Shuswap	1,207	6	256	165	194	0%	21%	14%	16%
Fraser[b]	**9,957**	**7**	**1,766**	**93**	**2,063**	**0%**	**18%**	**1%**	**21%**
Fraser East	1,848	4	412	41	475	0%	22%	2%	26%
Fraser North	3,259	1	541	14	672	0%	17%	0%	21%
Fraser South	4,850	2	813	38	916	0%	17%	1%	19%
Vancouver Coastal	**5,014**	**31**	**764**	**389**	**618**	**1%**	**15%**	**8%**	**12%**
Richmond	886	0	108	17	110	0%	12%	2%	12%
Vancouver	2,528	17	394	195	349	1%	16%	8%	14%
North Shore/Coast Garibaldi	1,600	14	262	177	159	1%	16%	11%	10%
Island	**3,851**	**23**	**546**	**374**	**585**	**1%**	**14%**	**10%**	**15%**
South Vancouver Island	1,759	10	185	157	204	1%	10%	9%	12%
Central Vancouver Island	1,380	8	244	140	190	1%	18%	10%	14%
North Vancouver Island	712	5	117	77	191	1%	16%	11%	27%
Northern[b]	**1,639**	**2**	**324**	**42**	**577**	**0%**	**20%**	**3%**	**35%**
Northwest	399	0	63	8	133	0%	16%	2%	33%
Northern Interior	807	1	123	15	240	0%	15%	2%	30%
Northeast	433	1	138	19	204	0%	32%	4%	47%

Notes: a. "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.
b. PIR does not contain complete supplementary information on reasons for non-immunization (i.e., exemptions, refusals and contraindications) for FH and NH. Therefore, the proportion of partially immunized and unimmunized students with unknown reasons for non-immunization is likely to be overestimated, see Note #11.

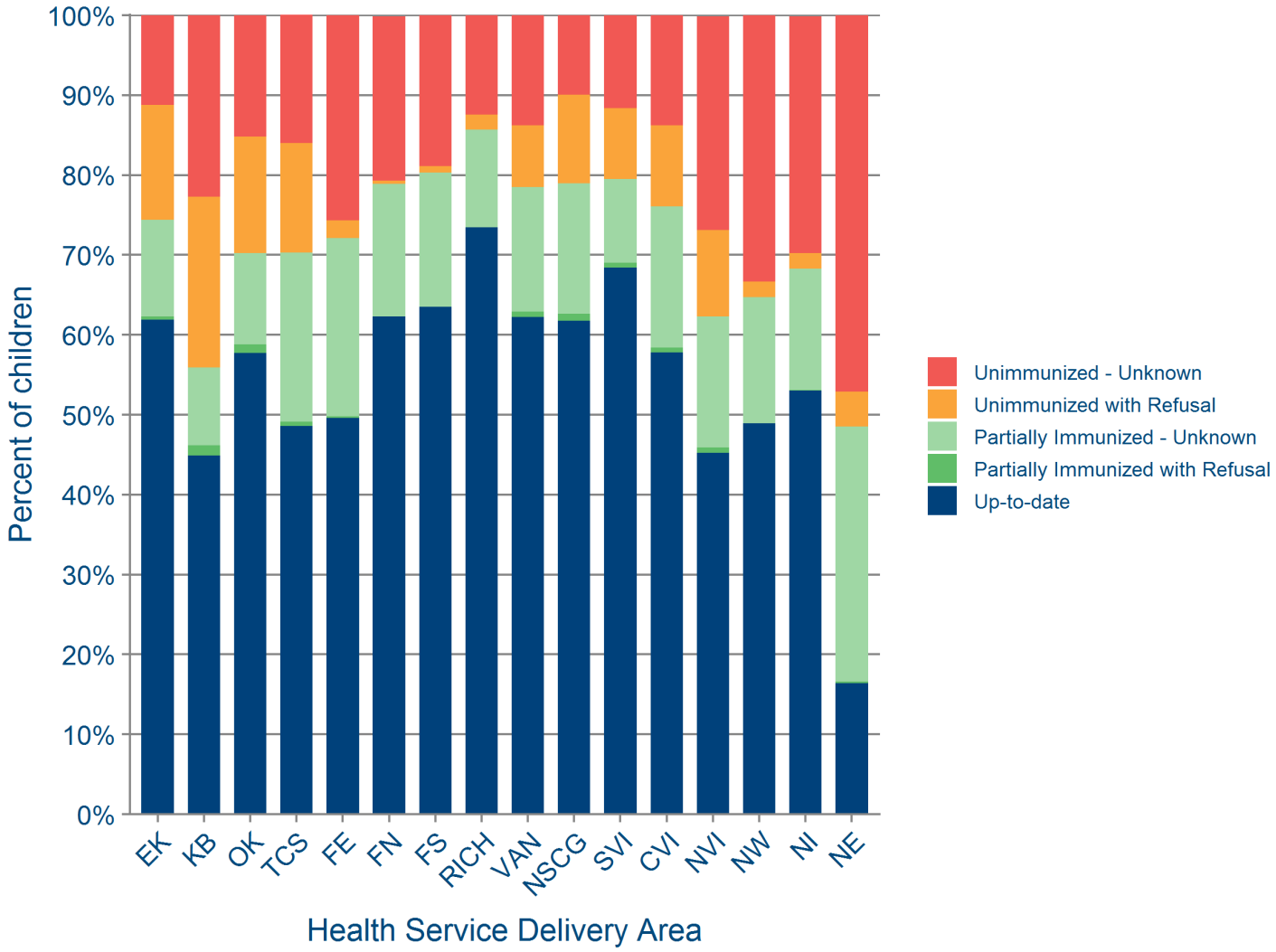

Figure 11. Reasons for non-immunization for Grade 6 students: HPV – males, 2022

2020/2021 Grade 6 students – Catch-up immunizations

Due to the effect of the COVID-19 pandemic response on routine immunization programs in the 2020/2021 school year, an additional analysis was included to assess progress in catching up students for the grade 6 milestone vaccines (hepatitis B, varicella, HPV). In the 2021/2022 school year, school-based clinics were offered in all HAs with catch-ups for grade 7 students to receive the grade 6 milestone vaccines. The same data sources and up-to-date for age definitions as used for grade 6 students were applied to students completing grade 7 by June 30, 2022. Grade 7 coverage was compared with the 2020/2021 grade 6 coverage values and a pre-pandemic value averaged from three years of previous data (from 2017 to 2019). Please note that with population migration, the grade 7 cohort in the 2021/2022 school year is not expected to reflect the same students as the grade 6 cohort in the 2020/2021 school year. Thus, the comparisons described are of general trends in immunization catch-up.

Hepatitis B

Compared with the hepatitis B coverage rates from the 2020/2021 grade 6 cohort, coverage improved for grade 7s in all HAs. All HSDAs apart from South Vancouver Island had an increase in coverage for grade 7 students (**Figure 12**). All HSDAs apart from one reported grade 7 hepatitis B coverage above 85%. Grade 7 coverage in 2020/2021 was higher than the pre-COVID-19 grade 6 coverage for Fraser East and Fraser North HSDAs.

Varicella

Four of the five HAs (IH, FH, VCH, and NH) saw improvements in varicella protection between the 2020/2021 grade 6 cohort and the 2021/2022 grade 7 cohort (**Figure 13**). Grade 7 coverage was higher than the pre-COVID-19 grade 6 varicella coverage for 9 of 16 HSDAs.

HPV

In the 2020/2021 school year, ongoing COVID-19 pandemic response priorities impacted some of the public health resources available for school-based immunization programs and thus in the 2021/2022 school year there were strong efforts made to catch-up the students who were affected. The 2021/2022 grade 7 cohort had improved series completion of their HPV vaccination series compared with the 2020/2021 grade 6 cohort for all HSDAs (**Figure 14 and 15**), with half of the HSDAs either exceeding their pre-pandemic series completion rates or getting within a couple of percentage points.

Most HSDAs (11/16 for females; 12/16 for males) had higher series initiation rates for the grade 7 2021/2022 cohort, compared with pre-pandemic rates.

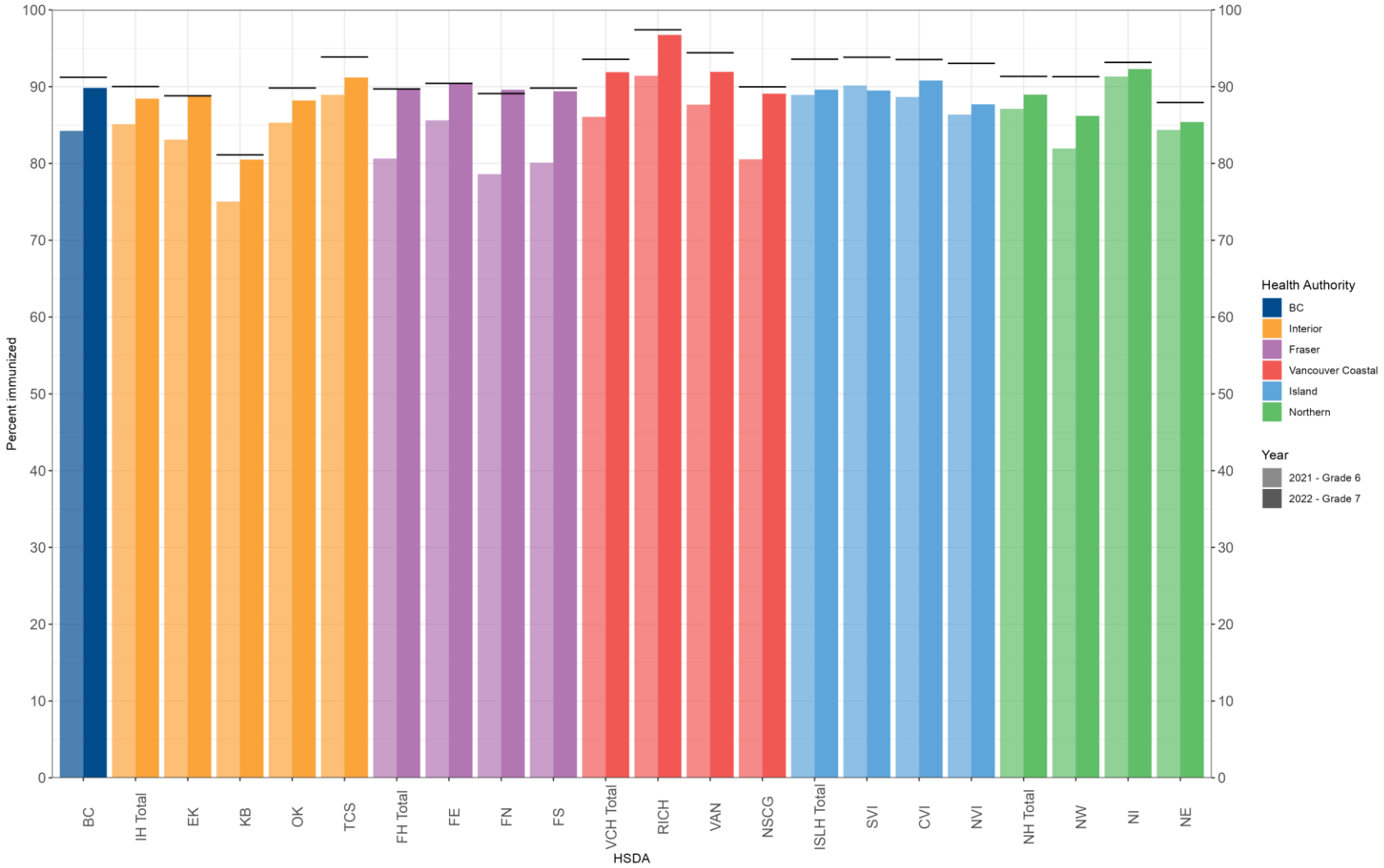

Figure 12. 2020/2021 Grade 6 cohort – Catch-up immunizations: Hepatitis B

Horizontal lines indicate pre-pandemic coverage average for hepatitis B in grade 6 students from the school years ending in 2017 to 2019.
Dual axes reflect the same coverage metric and are provided as a visual aid.

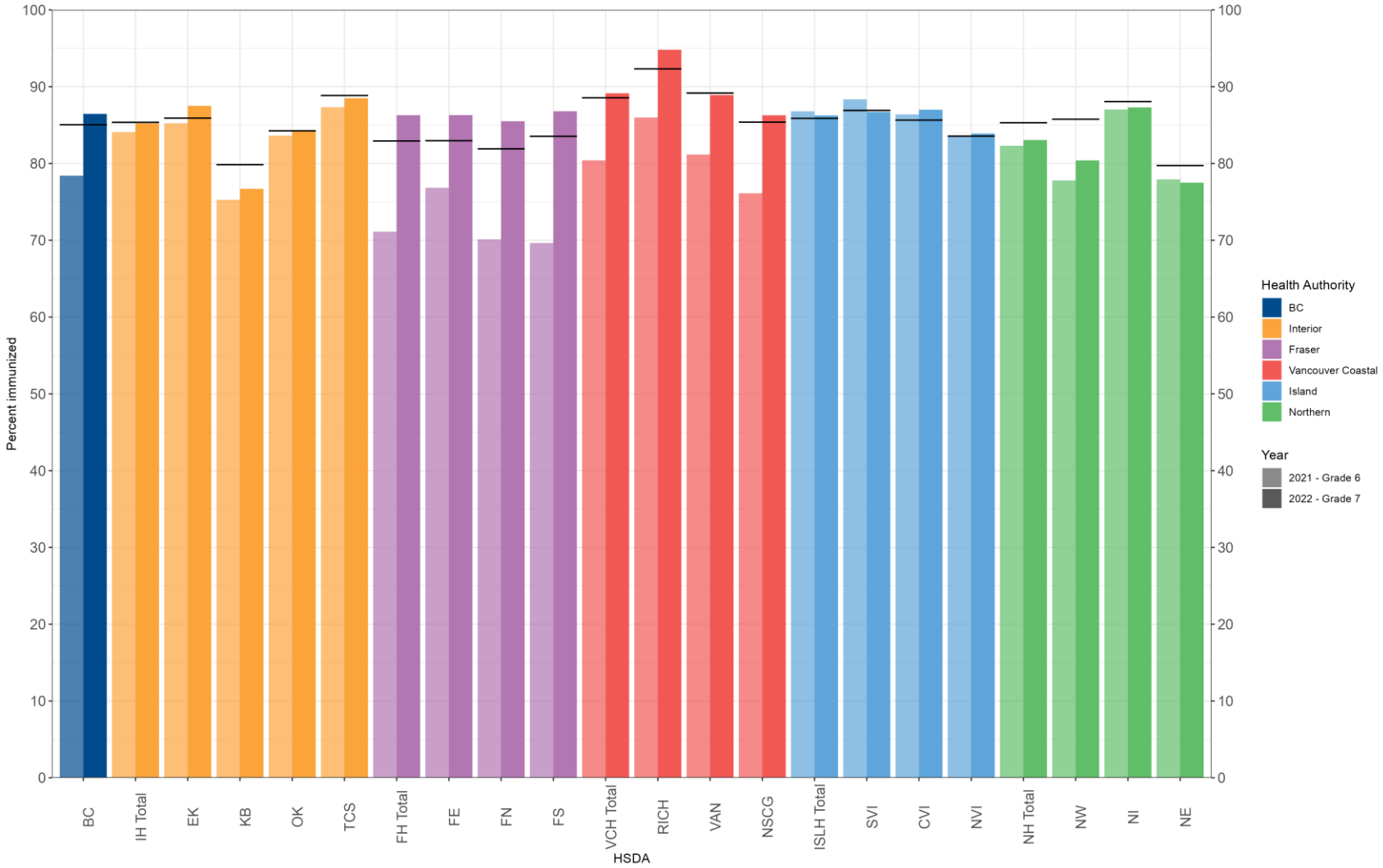

Figure 13. 2020/2021 Grade 6 cohort – Catch-up immunizations: Varicella

Horizontal lines indicate pre-pandemic coverage average for varicella in grade 6 students from the school years ending in 2017 to 2019.
Dual axes reflect the same coverage metric and are provided as a visual aid.

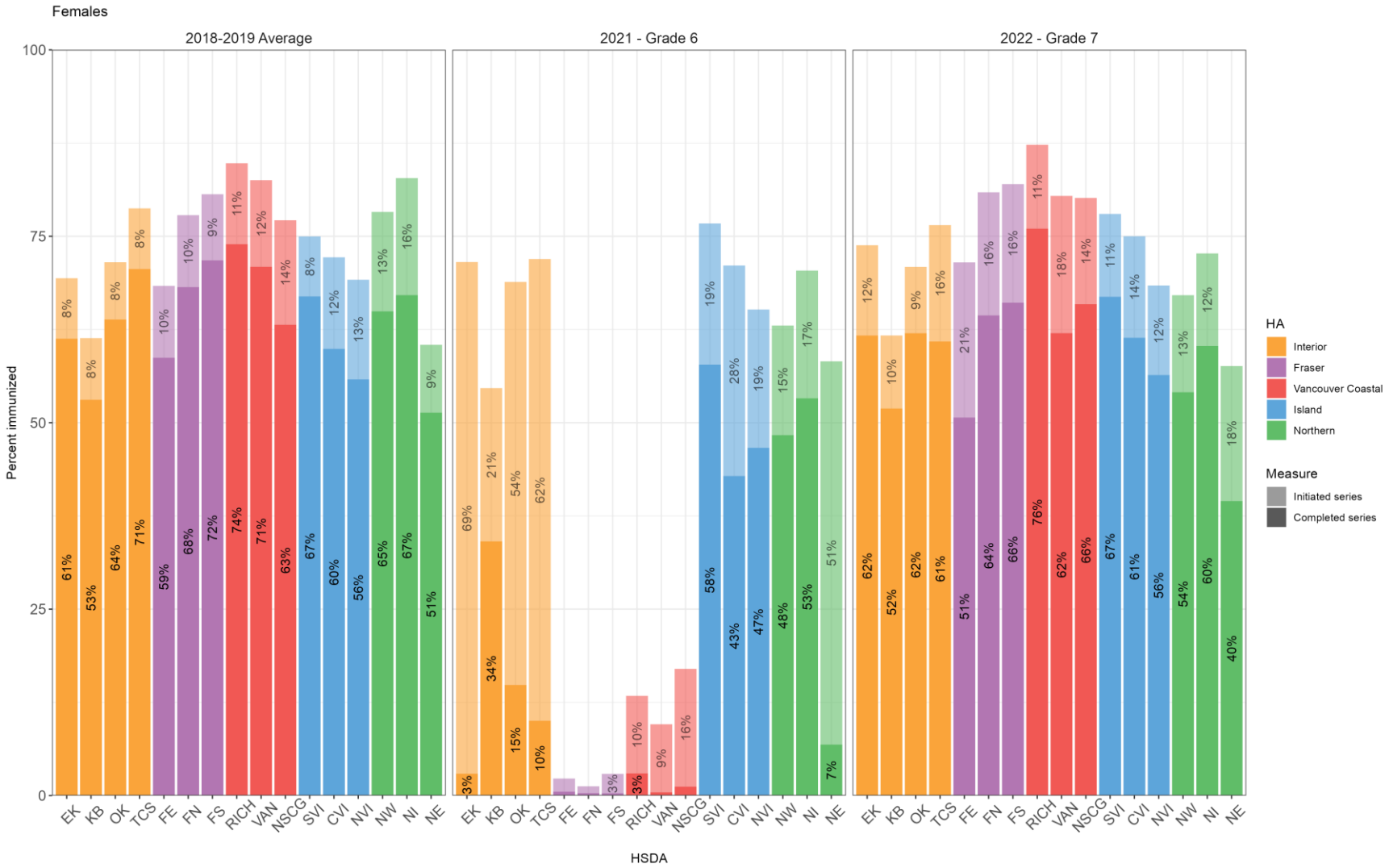

Figure 14. 2020/2021 Grade 6 cohort – Catch-up immunizations: HPV (females)

* Labels for coverage values <2% have been suppressed in the figure.

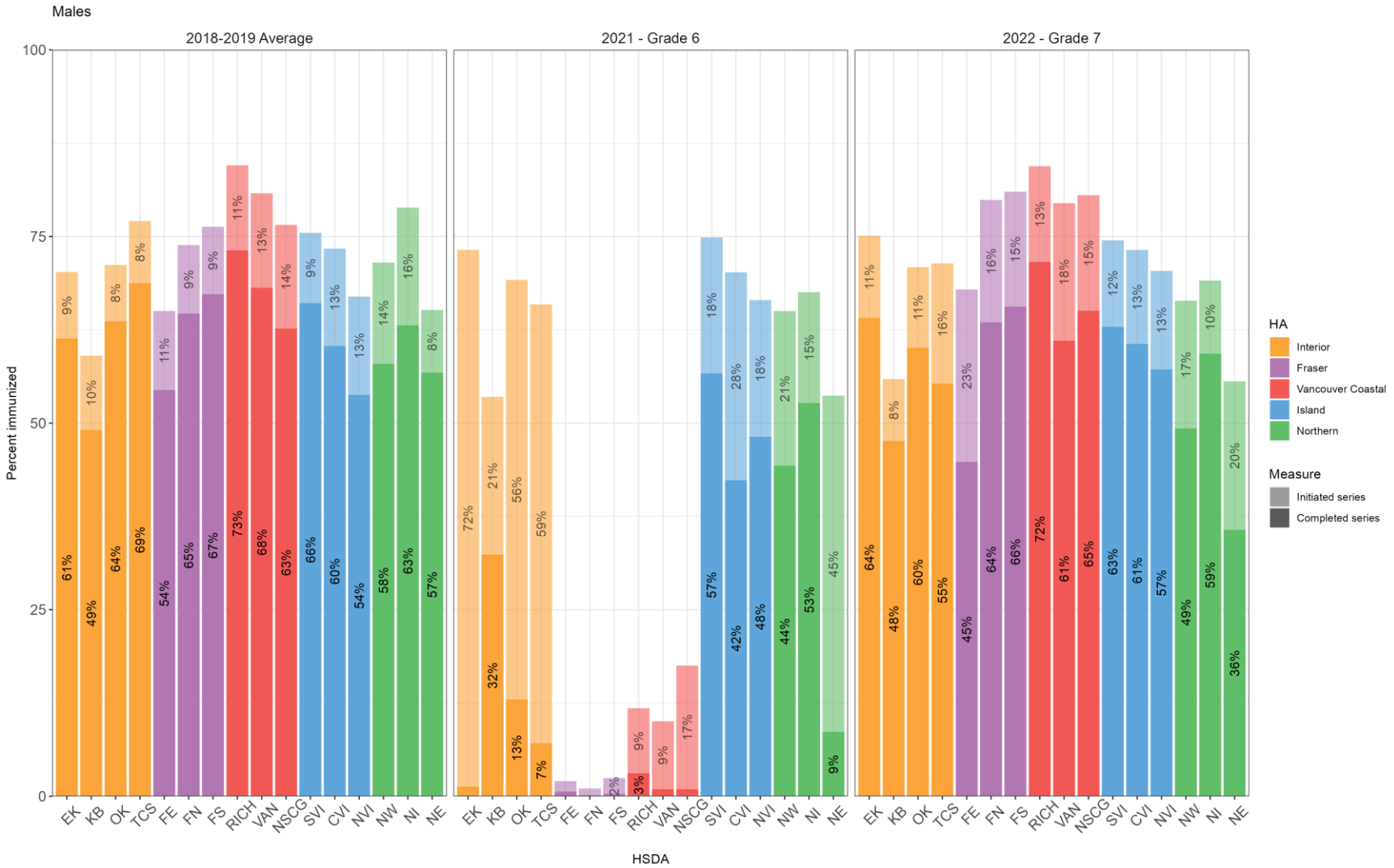

Figure 15. 2020/2021 Grade 6 cohort – Catch-up immunizations: HPV (males)

* Labels for coverage values <2% have been suppressed in the figure.

Notes

1. Data Sources

Provincial immunization registry (PIR) data based on the grade cohort defined as students whose records indicated they attended school within the region's service area based on MoE enrolment data as recorded in the online MyEdBC system and on student records obtained from schools not participating in MyEdBC. All doses are recorded in the 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 the PIR.

Coverage reported for any given year reflects doses recorded as administered up to June 30 of that year (e.g., 2022 coverage is for students completing a grade by June 30, 2022).

Coverage presented in this report is based on data entry to PIR (including transmission from regional registry systems) to July 15, 2022.

2. Up-to-date for Age Definitions

Hepatitis B	The proportion of students enrolled in grade 6 as of June 30 who ever completed a series of hepatitis B vaccine (3 doses if series was started before grade 6; 2 doses if series was started in Grade 6) by June 30.
Varicella	The proportion of students enrolled in grade 6 as of June 30 who reported a previous history of varicella disease or shingles or who received two valid doses of varicella vaccine by June 30. These children are only considered up-to-date if immunization occurred on or after the first birthday. 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 reliability for those born in 2004 or later. Most children born in 2004 were in grade 6 during the 2015/16 school year. Since June 2018, a varicella susceptible person is defined as one without a history of lab confirmed varicella or shingles and without a history of age-appropriate varicella vaccination. As such, the current definition requires lab evidence of prior disease on or after age 1 year for proof of immunity. However, due to lack of information about the age at which disease occurred, all recorded varicella exemptions are currently counted. Prior to 2013, only one dose of varicella vaccine (on or after the first birthday) was required in order to be considered up-to-date for varicella vaccine. This change in definition reflects a change in immunization policy that was implemented during the 2012/13 school year, when a second dose of varicella vaccine was offered to susceptible students in grade 6.
HPV (up-to-date/series completion)	The proportion of female and male students enrolled in grade 6 as of June 30 who were up-to-date for age for HPV based on age at commencement of series. Starting in the 2017/18 school year, HPV vaccine was routinely offered to males in grade 6; previously, it was only offered to females. Starting in the 2010/11 school year, the HPV immunization schedule in grade 6 changed from requiring 3 doses of HPV vaccine (with at least 4 weeks between doses 1 and 2 and at least 12 weeks between doses 2 and 3) to requiring 2 doses of HPV vaccine (with at least 6 months between doses until 2013/14, with a minimum acceptable interval of 5 months between doses from 2014/15 onwards).

HPV (series initiation, but not completion)	The proportion of female or male students enrolled in grade 6 as of June 30 who received at least one dose of HPV vaccine, but did not complete a 2-dose or a 3-dose series.

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 equal to or greater than the shortest recommended interval.

See: Minimum Intervals Between Doses

For HPV, data are shown for series completion, and series initiation but not completion; these categories are mutually exclusive.

3. Changes in Data Sources:

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

Health Authority	Year									
	2012 and Earlier	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
IH	Health Authority Summary Reports*						Pan-Grade*				
FH	Health Authority Summary Reports						Pan-Grade				
VCH	Health Authority Summary Reports										
ISLH	Health Authority Summary Reports		Pan-Year/MoE				Pan-Grade				
NH	Health Authority Summary Reports								Pan-Grade		

Health Authority Summary Reports: HAs provided summary reports including the number of students in grade 6 and, of those, the numbers up-to-date for each measure. These were usually based on class lists provided by schools and HA records of immunizations given.

Pan-Grade: PIR records were included for children with active records that indicated they were in grade 6 as of June 30 of the school year of interest.

Pan-Year/MoE: The numerator was the number of children in the birth cohort for which the majority of children attended grade 6 during the school year of interest with active records in PIR who were up-to-date for the specified agent. The denominator was the number of children in the birth cohort of interest attending grade 6 in schools within the health authority, based on estimates derived from BC MoE enrolment statistics.

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

4. The numerator used to calculate percent uptake was the number of students enrolled in grade 6 as of June 30 of the specified year who were up-to-date for age for the vaccine in question (per up-to-date for age definitions).
5. Unless otherwise indicated, the denominator used to calculate percent uptake was the number of students enrolled in grade 6 as of June 30 of the specified year, according to class lists in PIR or PARIS (for VCH). For HPV coverage stratified by gender, only the number of female or male students enrolled in grade 6 as of June 30 was used.
6. Students were included in the numerator and denominator if they had a value of 'Grade 6', 'Home Schooled', or 'Elementary ungraded' in the Grade variable in PIR and met the required birth date range. For the 2022 report, students born between January 1, 2009 and December 31, 2011 were included.

7. Ideally, numerators and denominators should be taken from the same data source. Using different data sources for numerators and denominators can result in inaccurate results, including coverage calculations exceeding 100%. Immunization coverage rates approaching 100% in the ISLH in 2014-2017 are likely over-estimates resulting from the use of different data sources for numerators and denominators.
8. Due to a difference in methods used for enumerating the numerator and denominator, the ISLH results, and corresponding provincial data for 2014 to 2017 are not directly comparable to previous or later years. Related to implementation of the new public health information system (called Panorama) in July 2013, ISLH was unable to reconcile all records of students enrolled in schools; therefore coverage was calculated using numerator data from Panorama on active records for those born in 2002 (for 2014), 2003 (for 2015), 2004 (for 2016) and 2005 (for 2017) without the ability to confirm school/grade 6 enrolment; denominators were aggregate data from the BC MoE's data on enrolment in grade 6 to attempt to account for those who have moved out of ISLH. This change led to inaccurate ascertainment of coverage rates, which may be artefactually higher or lower than true coverage rates depending on the antigen.
9. Due to the difference in methods used to calculate coverage in the Rutland branch in the Okanagan HSDA in 2017, the Okanagan and IH results, and corresponding provincial data for 2017 are not directly comparable to previous years.
10. Due to the changes in data sources used to calculate coverage in IH, ISLH, and FH from 2018, and NH from 2020, the FH, ISLH, IH, and NH corresponding provincial data are not directly comparable to previous years.

    This affects catch-up analyses for NH in particular since pre-pandemic coverage rates were calculated using different data sources.
11. Due to ongoing development of the interfaces between the NH and FH health information systems and the PIR, supplementary information on reasons for non-immunization (i.e., exemptions, refusals and contraindications) is not complete. Therefore, the proportion of partially immunized and unimmunized grade 6 students with unknown reasons for non-immunization is likely to be overestimated. The proportion of children partially immunized or unimmunized due to refusals or contraindications, as well as the proportion of students with protection against varicella due to previous infection and/or lab evidence of immunity is likely to be underestimated.
12. In the 2020/2021 school year, ongoing prioritization of the COVID-19 pandemic response affected some of the public health resources available for school-based immunization programs. This was most significant in FH, which did not complete any school-based clinics in the 2020/2021 school year.

    In the 2021/2022 school year, school-based clinics were offered in all HAs including some providing catch-ups for grade 7 students to receive the grade 6 milestone vaccines. Ongoing catch-up will be offered for subsequent years, as required. In instances when coverage did not return to pre-pandemic levels it may reflect some ongoing operational impacts of the COVID-19 response (e.g., increases in absenteeism among schoolchildren due to illness, lack of staffing resources in remote and rural areas, or competing priorities in public health departments) or changes in data sources between pre- and post-pandemic periods.
13. Due to migration, the grade 7 2021/2022 cohort included in the additional analysis may not reflect the exact same students included in previous years' grade 6 coverage assessments.
14. The COVID-19 pandemic was declared in March 2020. This pandemic initially resulted in a province-wide shut down, which impacted the provision of public health services including routine immunization services. As a result, some coverage rates were lower in 2020 than previous years, particularly for the doses scheduled to be received in the last few months of the 2019/2020 school year.
15. Starting in 2018 for FH, IH, 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 the 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 June 2022 and for the 2021/2022 school year, this process included 94% 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 the school and grade information. The process of adding enrolment details may not be completed for all HAs and grades. Most HAs prioritize milestone grades for enrolment data entry (kindergarten, Grade 6 and Grade 9). A small number of schools may not provide class lists.
   Gaps are expected for NH (approximately 6% of all NH students), and FH, for which non-MyEdBC enrollment data is entered into FH PARIS but not PIR (approximately 3% of all FH students).

16. Coverage results by HA and HSDA are reported based on the location of the school.
17. The following school types are included in the PIR: Alternate, Distance, Distance Learning, Independent, Long Term Program, Self-Directed, Short Term Program, and Standard.
18. The HPV immunization program for male students in grade 6 started in the 2017/2018 school year. The HPV immunization program for female students in grade 6 started in the 2008/2009 school year. As a result, the first year of assessment of HPV uptake for female students was 2009 and the first year for male students was 2018. Data are shown for 2018 onwards in this report.
19. The Gender variable in the PIR contains the following values: Male, Female, Undifferentiated, Unknown. For the purpose of this report, only coverage for males and females were reported in the tables stratified by gender as the proportion of those in the Undifferentiated and Unknown categories comprise <0.01% of the total population. Those in the Undifferentiated and Unknown categories are included in the tables that report coverage values for the total population.
20. In 2015, three schools with grade 6 students in the Kootenay Boundary HSDA did not provide public health with class lists. As the children attending these schools could not be identified, they could not be included in the immunization coverage analysis. Based on information posted on the BC MoE's website, these schools accounted for approximately 3% of grade 6 students in Kootenay Boundary.
21. While all grade 6 students attending BC schools are intended to be included in this report, some students may be under-represented. Examples may include those who attend schools that do not receive services from regional public health, including some schools serviced by First Nations Health Services Organizations, some distance/distributed learning schools and schools refusing any contact with public health due to religious or philosophical reasons.
22. International students who attend school in BC are classified into two categories in the PIR based on their length of stay: 1) short stay (<6 months) and 2) long stay (≥6 months). HAs attempt to collect immunization records for all long stay students in the province, however the length of stay is unknown for the majority of international students in the registry. Thus, immunization records may be incomplete for international students and coverage is likely underestimated for this population.
23. 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.

Acknowledgements

We acknowledge all BC health authorities in the contribution of information for this report.

Prepared by:
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: 604-707-2519

Appendix

Table A1. Reasons for non-immunization definitions

Measure	Definition
Exemption: Lab Evidence of Immunity	*For varicella 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 <= June 30 AND Special Consideration Effective To Date > June 30 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 <= June 30 AND Special Consideration Effective To Date > June 30 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 <= June 30 AND Special Consideration Effective To Date > June 30 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 <= June 30
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 the agent/antigen of interest; or no recorded refusals, exemptions, or contraindications for any agent/antigen.
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 <= June 30 AND Special Consideration Effective To Date > June 30 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

Measure	Definition
	Reason for Special Consideration = Client Refusal OR Parental/Guardian Refusal Special Consideration Effective From Date <= June 30
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 Doses		
	Dose 1 [A]	Dose 2	Dose 3
Hepatitis B			
Series started at any age:			
Received 3rd dose before June 2007	0 days	28 days	28 days
Received 3rd dose between June 2007 and May 2014	0 days	28 days	56 days [B]
Received 3rd dose in June 2014 or later	0 days	28 days	56 days [B,C]
Series started on or after 10 years and 8 months of age	10 years + 8 months	16 weeks [D]	
Varicella [E]	12 months	28 days	
HPV			
2 Dose schedule (for dose 1 given age 9 to 14)	9 years	150 days	
3 Dose schedule (for dose 1 given age 15+)	9 years	28 days	12 weeks [F]

A. Dose 1 refers to the earliest age a child can receive the initial dose.
B. Dose 3 must be given at least 16 weeks (112 days) after dose 1.
C. Dose 3 must be given on or after 24 weeks of age.
D. Dose 2 must be given at least 24 weeks after dose 1 if either dose 1 or dose 2 is Engerix®-B.
E. To be counted as valid, varicella vaccine must be administered on or after 12 months of age. Guidelines also state that children with a history of varicella disease should only be considered protected if the illness occurred on or after 12 months of age. The date of varicella disease onset is not systematically entered into the PIR. For the purposes of this assessment, any child with a past history of varicella disease recorded in PIR is considered protected, regardless of their age at the time of illness.
F. Dose 3 must be given at least 24 weeks after dose 1.