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Immunization Uptake in Children by the Second Birthday

2007-2017



A research and teaching centre affiliated with UBC

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Measure Specifications

Measure: Percent of two-year olds with up-to-date immunizations

Years: 2007-2017

Data last updated January 15, 2018.

Coverage reported on any given year reflects uptake among children who turned 2 years old during that calendar year (i.e., 2017 results are for children born in 2015).

Data Sources: Panorama, BC Centre for Disease Control (2013 onward)
Integrated Public Health Information System (iPHIS), BC Centre for Disease Control (2007-2012)

Measure Specification:

- 1 Numerator:** Number of children with active records in iPHIS or Panorama who have completed the routine childhood immunization schedule by age two in the Interior Health, Island Health, Fraser Health, and Northern Health Authorities.
- 2 Denominator:** All children with active records in iPHIS/Panorama in the Interior Health, Island Health, Fraser Health, and Northern Health Authorities.

Vancouver Coastal Health (VCH) provides their two-year old coverage data through a separate mechanism. Two-year old immunization coverage data for VCH have not been included with provincial data because the VCH data (based on periodic surveys of a sample of the population) may not be comparable with population based immunization data obtained from the registry for the rest of the province. While immunizations provided to infants by public health immunizers in VCH are captured in the health authority's electronic information system (called PARIS), the majority of VCH infants are immunized by physicians. The BC Public Health Act does not require reporting of immunizations to public health, nor are physicians reimbursed for reporting immunizations; thus immunizations delivered by physicians are not captured systematically in the VCH electronic database. VCH thus endeavours to examine 2-year old coverage data by the use of periodic coverage studies. Coverage studies have been conducted for the 2003, 2006, 2009 and 2012 birth cohorts. While coverage studies have inherent limitations (coverage can only be obtained for babies whose parents/guardians could be located and agreed to provide the information), this is the only solution at present.

[Immunization coverage of children in these birth cohorts is available in Appendix 3.](#)

3 Definitions

[See Appendix 1 for the Routine Immunization Schedule.](#)

- o **Up-to-date for age (UTD)** - 4 doses diphtheria/tetanus/pertussis, 3 doses hepatitis B, 1 dose measles/mumps/rubella, 3 doses polio¹, up-to-date for *Haemophilus influenzae* type b as defined by age of first dose, 1 dose varicella (or recorded exemption for varicella due to previous disease or protective antibody levels), up-to-date for pneumococcal conjugate and meningococcal C conjugate as defined by age of first dose
- o **Up-to-date for age minus booster (UTD-MB)** - 3 doses diphtheria/tetanus/pertussis, 3 doses hepatitis B, 1 dose measles/mumps/rubella, 2 doses polio¹, at least 1 valid dose *Haemophilus influenzae* type b, 1 dose varicella (or recorded exemption for varicella due to previous disease or protective antibody levels), up-to-date for pneumococcal conjugate and meningococcal C conjugate as defined by age of first dose

Measure Specifications

- o **D/T/aP/IPV** - 4 doses diphtheria/tetanus/pertussis, 3 doses polio¹
- o **D/T/aP/IPV/Hib** - 4 doses diphtheria/tetanus/pertussis, 3 doses polio¹, up-to-date for *Haemophilus influenzae* type b as defined by age of first dose
- o **Hep B** - 3 doses hepatitis B
- o **Hib** - If dose 1 before 15 months of age: at least 2 valid doses of *Haemophilus influenzae* type b vaccine with the last dose on or after 12 months of age. If dose 1 on or after 15 months of age: 1 dose of *Haemophilus influenzae* type b vaccine.
- o **MMR** - 1 dose measles/mumps/rubella (2012 onward)
[See Explanatory Notes](#)
- o **Polio** - 3 doses polio¹
- o **Varicella** - 1 dose of varicella or recorded exemption for varicella due to previous disease or protective antibody levels
- o **Meningococcal C conjugate (Men-C-C)** - At least 1 dose of meningococcal C conjugate on or after 12 months of age. For children who receive quadrivalent meningococcal conjugate vaccine instead of meningococcal C conjugate, 2-3 doses are required (depending on age at first dose).
- o **Pneumococcal conjugate (Pneu-C)** - As defined by age of first dose: 3 doses pneumococcal conjugate if dose 1 before 12 months of age; 2 doses pneumococcal conjugate if dose 1 between 12 and 23 months of age
- o **Rotavirus** - 2 doses of rotavirus
- o **No immunizations recorded** - No immunizations recorded in Panorama
- o **Refusal to all** - Exemptions recorded for "Client Refusal" or "Parent/Guardian Refusal", effective on the second birthday, to all of: diphtheria, tetanus, pertussis, polio, hep B, measles, mumps, rubella, meningococcal C conjugate, varicella, Hib, pneumococcal, rotavirus.

Notes:

¹ Up-to-date by second birthday for Polio is defined as 3 doses at 2, 4 and 18 months.

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, or at a time interval equal to or greater than the shortest recommended interval.

[See Appendix 2 - Minimum Intervals Between Eligible Doses.](#)

Table 1. Percent of Two-year-olds with Up-to-date Immunizations, British Columbia and Health Authorities

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Province / Health Authority	Vaccination Details	Percent Immunized										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
British Columbia BC *	Up-to-date for age	66%	68%	65%	66%	68%	71%	68%	67%	70%	73%	74%
	Up-to-date minus the booster	70%	76%	74%	75%	77%	79%	78%	76%	78%	80%	81%
	<i>Specific Agents</i>											
	D/T/aP/IPV	76%	77%	74%	74%	75%	77%	74%	73%	75%	78%	78%
	D/T/aP/IPV/Hib	76%	77%	74%	74%	75%	77%	74%	72%	75%	78%	78%
	Hep B	87%	87%	83%	83%	84%	86%	85%	84%	85%	86%	86%
	Hib	81%	82%	79%	78%	79%	81%	77%	76%	79%	79%	82%
	MMR	76%	78%	75%	74%	75%	88%	86%	85%	86%	87%	87%
	Polio	80%	81%	77%	77%	78%	80%	76%	75%	78%	80%	81%
	Varicella	83%	85%	83%	83%	84%	85%	83%	82%	84%	85%	86%
	Pneumococcal conjugate	79%	83%	82%	84%	85%	86%	84%	82%	83%	85%	85%
	Meningococcal C conjugate	88%	87%	86%	86%	87%	88%	86%	84%	86%	87%	87%
	Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	70%	75%	79%	81%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7%	7%	6%
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2%	2%	2%
Interior Health IHA	Up-to-date for age	70%	68%	68%	69%	70%	75%	71%	68%	68%	72%	73%
	Up-to-date minus the booster	74%	77%	77%	79%	79%	82%	80%	77%	77%	79%	79%
	<i>Specific Agents</i>											
	D/T/aP/IPV	79%	77%	76%	76%	77%	80%	76%	73%	73%	76%	77%
	D/T/aP/IPV/Hib	79%	77%	76%	76%	77%	80%	75%	73%	73%	76%	77%
	Hep B	88%	86%	85%	86%	86%	88%	87%	84%	84%	85%	85%
	Hib	82%	80%	79%	79%	80%	83%	78%	76%	76%	78%	80%
	MMR	78%	76%	76%	76%	76%	89%	87%	85%	84%	86%	86%
	Polio	81%	79%	78%	79%	79%	82%	77%	75%	75%	78%	79%
	Varicella	85%	84%	83%	84%	84%	86%	84%	81%	81%	83%	83%
	Pneumococcal conjugate	82%	86%	86%	87%	86%	89%	86%	83%	83%	84%	85%
	Meningococcal C conjugate	90%	86%	87%	88%	88%	90%	88%	85%	84%	86%	86%
	Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	69%	70%	73%	77%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9%	9%	8%
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3%	2%	3%
Fraser Health FHA	Up-to-date for age	62%	65%	62%	63%	67%	71%	68%	68%	72%	76%	77%
	Up-to-date minus the booster	65%	73%	70%	72%	75%	78%	76%	76%	79%	82%	82%
	<i>Specific Agents</i>											
	D/T/aP/IPV	73%	75%	71%	72%	75%	78%	74%	74%	77%	81%	82%
	D/T/aP/IPV/Hib	72%	75%	71%	72%	75%	77%	74%	74%	77%	80%	82%
	Hep B	85%	86%	80%	81%	83%	85%	84%	83%	85%	87%	88%
	Hib	79%	82%	78%	77%	79%	82%	77%	77%	81%	82%	85%
	MMR	74%	77%	73%	73%	75%	88%	85%	85%	87%	89%	89%
	Polio	77%	80%	76%	75%	78%	80%	77%	76%	80%	83%	84%
	Varicella	81%	85%	82%	82%	84%	86%	84%	83%	86%	88%	88%
	Pneumococcal conjugate	76%	80%	79%	81%	83%	85%	83%	82%	84%	86%	87%
	Meningococcal C conjugate	86%	87%	84%	84%	86%	88%	85%	84%	87%	88%	89%
	Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	69%	79%	83%	85%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6%	6%	5%
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%	2%

Table 1. Percent of Two-year-olds with Up-to-date Immunizations, British Columbia and Health Authorities

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Province / Health Authority	Vaccination Details	Percent Immunized										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Island Health VIHA	Up-to-date for age	75%	73%	70%	68%	69%	68%	67%	65%	70%	74%	73%
	Up-to-date minus the booster	77%	81%	79%	78%	79%	78%	79%	76%	79%	81%	81%
	<i>Specific Agents</i>											
	D/T/aP/IPV	83%	82%	78%	75%	75%	73%	71%	70%	74%	78%	77%
	D/T/aP/IPV/Hib	83%	81%	78%	75%	75%	73%	71%	70%	74%	77%	76%
	Hep B	90%	89%	86%	85%	86%	86%	86%	84%	85%	87%	87%
	Hib	85%	84%	81%	79%	78%	76%	75%	75%	79%	79%	81%
	MMR	82%	81%	77%	74%	74%	86%	85%	85%	87%	88%	88%
	Polio	85%	84%	80%	78%	77%	75%	74%	74%	78%	80%	79%
	Varicella	86%	86%	84%	83%	84%	83%	83%	82%	84%	86%	86%
	Pneumococcal conjugate	84%	88%	87%	86%	86%	85%	84%	83%	84%	86%	86%
	Meningococcal C conjugate	90%	89%	88%	88%	87%	86%	86%	85%	86%	88%	87%
	Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	70%	73%	76%	81%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6%	6%	5%
Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%	2%	
Northern Health NHA	Up-to-date for age	67%	70%	69%	70%	69%	72%	68%	65%	63%	63%	63%
	Up-to-date minus the booster	70%	79%	78%	78%	79%	79%	77%	75%	72%	70%	72%
	<i>Specific Agents</i>											
	D/T/aP/IPV	75%	78%	78%	79%	77%	78%	73%	70%	70%	69%	68%
	D/T/aP/IPV/Hib	75%	78%	78%	79%	77%	78%	73%	70%	69%	69%	68%
	Hep B	89%	89%	87%	87%	87%	88%	86%	84%	82%	79%	80%
	Hib	79%	81%	81%	81%	80%	81%	76%	74%	73%	70%	73%
	MMR	75%	78%	78%	79%	76%	88%	85%	84%	81%	80%	79%
	Polio	78%	80%	81%	81%	78%	80%	76%	73%	72%	72%	71%
	Varicella	82%	84%	83%	83%	83%	83%	80%	80%	77%	77%	77%
	Pneumococcal conjugate	79%	86%	87%	87%	87%	86%	84%	81%	78%	78%	77%
	Meningococcal C conjugate	89%	87%	88%	89%	88%	87%	85%	84%	81%	80%	79%
	Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	71%	69%	72%	75%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8%	9%	11%
Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2%	2%	2%	

Table 2. Percent of Two-year-olds with Up-to-date Immunizations, BC Health Service Delivery Areas

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Health Authority	Health Service Delivery Area	Vaccination Details	Percent Immunized										
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
IHA	East Kootenay	Up-to-date for age	69%	67%	65%	66%	71%	74%	67%	71%	72%	78%	78%
		Up-to-date minus the booster	72%	73%	73%	77%	79%	82%	79%	78%	80%	83%	82%
		<i>Specific Agents</i>											
		D/T/aP/IPV	80%	78%	76%	76%	78%	82%	74%	77%	78%	84%	82%
		D/T/aP/IPV/Hib	80%	78%	76%	75%	78%	81%	74%	77%	78%	84%	82%
		Hep B	86%	85%	82%	85%	86%	89%	87%	86%	86%	89%	87%
		Hib	84%	82%	80%	79%	81%	84%	77%	81%	82%	85%	86%
		MMR	79%	78%	76%	75%	77%	92%	89%	89%	89%	91%	89%
		Polio	82%	80%	79%	79%	80%	83%	76%	80%	80%	85%	84%
		Varicella	86%	84%	82%	84%	86%	88%	86%	84%	85%	88%	86%
		Pneumococcal conjugate	83%	84%	86%	87%	87%	91%	87%	86%	87%	90%	88%
		Meningococcal C conjugate	91%	84%	86%	89%	89%	92%	89%	88%	89%	91%	89%
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	71%	71%	77%	80%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6%	5%	7%	
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4%	2%	4%	
	Kootenay Boundary	Up-to-date for age	55%	55%	54%	55%	54%	56%	57%	51%	58%	60%	58%
		Up-to-date minus the booster	58%	59%	60%	61%	62%	64%	65%	63%	65%	68%	67%
		<i>Specific Agents</i>											
		D/T/aP/IPV	69%	70%	68%	70%	65%	65%	67%	60%	66%	67%	66%
		D/T/aP/IPV/Hib	69%	70%	68%	70%	64%	65%	67%	60%	66%	66%	66%
		Hep B	75%	75%	71%	71%	73%	76%	79%	74%	76%	76%	77%
		Hib	73%	74%	72%	74%	68%	67%	71%	64%	71%	68%	71%
		MMR	67%	70%	67%	68%	65%	76%	79%	76%	77%	77%	80%
		Polio	71%	73%	71%	72%	69%	67%	69%	62%	68%	69%	68%
		Varicella	69%	67%	67%	67%	69%	68%	70%	68%	69%	72%	74%
		Pneumococcal conjugate	70%	74%	75%	77%	77%	76%	77%	72%	75%	76%	77%
		Meningococcal C conjugate	80%	76%	78%	78%	77%	77%	79%	75%	77%	78%	79%
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	54%	51%	59%	62%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6%	15%	13%	
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4%	3%	3%	
	Okanagan	Up-to-date for age	71%	68%	67%	68%	69%	78%	72%	67%	70%	73%	74%
		Up-to-date minus the booster	74%	78%	77%	79%	78%	84%	81%	76%	78%	80%	81%
		<i>Specific Agents</i>											
D/T/aP/IPV		79%	77%	74%	74%	75%	83%	76%	72%	74%	77%	78%	
D/T/aP/IPV/Hib		79%	76%	74%	74%	75%	83%	76%	72%	74%	77%	78%	
Hep B		88%	86%	85%	86%	86%	88%	88%	83%	84%	85%	86%	
Hib		82%	79%	77%	77%	78%	85%	78%	74%	77%	79%	81%	
MMR		79%	75%	74%	74%	74%	90%	87%	83%	85%	86%	86%	
Polio		81%	78%	76%	77%	77%	84%	78%	74%	76%	79%	80%	
Varicella		85%	84%	83%	84%	83%	88%	85%	80%	82%	83%	84%	
Pneumococcal conjugate		82%	85%	85%	86%	85%	90%	87%	82%	83%	85%	86%	
Meningococcal C conjugate		90%	85%	86%	87%	86%	91%	88%	83%	84%	86%	86%	
Rotavirus		n/a	n/a	n/a	n/a	n/a	n/a	n/a	69%	73%	74%	79%	
No immunizations recorded		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8%	8%	8%	
Refusal to all		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3%	2%	3%	

Table 2. Percent of Two-year-olds with Up-to-date Immunizations, BC Health Service Delivery Areas

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Health Authority	Health Service Delivery Area	Vaccination Details	Percent Immunized											
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
IHA	Thompson Cariboo Shuswap	Up-to-date for age	76%	72%	76%	77%	77%	77%	76%	74%	69%	72%	73%	
		Up-to-date minus the booster	80%	83%	84%	85%	85%	85%	86%	83%	79%	80%	80%	
		<i>Specific Agents</i>												
		D/T/aP/IPV	82%	80%	82%	82%	83%	82%	78%	78%	72%	76%	76%	
		D/T/aP/IPV/Hib	82%	80%	82%	82%	83%	82%	78%	78%	72%	76%	76%	
		Hep B	92%	91%	90%	90%	90%	90%	90%	89%	86%	85%	85%	
		Hib	84%	82%	84%	84%	86%	83%	81%	80%	75%	77%	80%	
		MMR	81%	79%	82%	82%	82%	91%	91%	89%	85%	86%	86%	
		Polio	84%	82%	84%	84%	85%	83%	80%	80%	75%	79%	78%	
		Varicella	90%	89%	88%	89%	89%	89%	89%	86%	83%	85%	84%	
		Pneumococcal conjugate	85%	91%	90%	91%	92%	90%	90%	88%	84%	84%	85%	
		Meningococcal C conjugate	94%	91%	92%	92%	92%	92%	91%	89%	85%	86%	86%	
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	75%	73%	75%	76%	
		No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8%	9%	9%	
Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2%	2%	2%			

Table 2. Percent of Two-year-olds with Up-to-date Immunizations, BC Health Service Delivery Areas

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Health Authority	Health Service Delivery Area	Vaccination Details	Percent Immunized										
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
FHA	Fraser East	Up-to-date for age	69%	73%	68%	65%	68%	72%	67%	68%	71%	75%	77%
		Up-to-date minus the booster	72%	81%	78%	77%	79%	81%	77%	77%	80%	82%	82%
		<i>Specific Agents</i>											
		D/T/aP/IPV	75%	80%	74%	71%	74%	77%	71%	71%	75%	78%	80%
		D/T/aP/IPV/Hib	75%	80%	73%	71%	73%	76%	71%	71%	75%	78%	80%
		Hep B	90%	90%	86%	85%	86%	87%	85%	84%	86%	87%	87%
		Hib	78%	83%	77%	75%	77%	81%	74%	75%	79%	80%	85%
		MMR	75%	80%	73%	71%	74%	88%	84%	84%	86%	87%	88%
		Polio	77%	82%	76%	74%	76%	79%	73%	74%	78%	80%	82%
		Varicella	85%	87%	83%	82%	83%	85%	81%	81%	83%	85%	86%
		Pneumococcal conjugate	78%	87%	84%	83%	84%	86%	82%	81%	84%	86%	87%
		Meningococcal C conjugate	89%	89%	86%	85%	86%	88%	84%	84%	86%	87%	88%
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	70%	73%	77%	80%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7%	7%	7%	
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3%	3%	4%	
	Fraser North	Up-to-date for age	62%	66%	60%	62%	66%	69%	66%	67%	71%	74%	76%
		Up-to-date minus the booster	65%	72%	66%	70%	73%	75%	74%	74%	77%	80%	81%
		<i>Specific Agents</i>											
		D/T/aP/IPV	73%	76%	69%	71%	74%	76%	74%	74%	77%	80%	81%
		D/T/aP/IPV/Hib	72%	75%	69%	71%	73%	75%	73%	73%	77%	80%	81%
		Hep B	82%	85%	75%	78%	81%	83%	83%	81%	84%	85%	86%
		Hib	79%	82%	76%	76%	77%	80%	77%	77%	80%	81%	85%
		MMR	74%	78%	72%	72%	74%	87%	84%	84%	86%	87%	88%
		Polio	77%	81%	74%	74%	76%	79%	76%	76%	80%	82%	83%
		Varicella	81%	85%	80%	80%	83%	84%	83%	82%	85%	86%	87%
		Pneumococcal conjugate	75%	79%	75%	79%	81%	83%	81%	80%	83%	85%	86%
		Meningococcal C conjugate	84%	86%	81%	82%	84%	85%	84%	83%	86%	87%	88%
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	66%	79%	83%	85%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7%	6%	6%	
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%	1%	
	Fraser South	Up-to-date for age	59%	61%	60%	64%	66%	72%	69%	69%	74%	77%	78%
		Up-to-date minus the booster	63%	69%	69%	73%	75%	80%	78%	77%	81%	83%	84%
		<i>Specific Agents</i>											
D/T/aP/IPV		72%	74%	72%	74%	76%	79%	75%	75%	79%	82%	83%	
D/T/aP/IPV/Hib		72%	73%	71%	74%	76%	79%	75%	75%	79%	82%	83%	
Hep B		85%	86%	81%	82%	83%	87%	85%	85%	86%	88%	89%	
Hib		79%	81%	79%	79%	80%	83%	79%	79%	83%	83%	86%	
MMR		73%	75%	74%	75%	77%	90%	87%	87%	89%	90%	90%	
Polio		78%	79%	77%	77%	79%	82%	78%	78%	82%	85%	85%	
Varicella		80%	84%	83%	83%	85%	87%	86%	85%	88%	89%	90%	
Pneumococcal conjugate		75%	78%	79%	83%	85%	87%	84%	83%	86%	88%	88%	
Meningococcal C conjugate		85%	86%	86%	86%	88%	89%	87%	86%	88%	90%	90%	
Rotavirus		n/a	n/a	n/a	n/a	n/a	n/a	n/a	72%	82%	84%	87%	
No immunizations recorded		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5%	4%	4%	
Refusal to all		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%	1%	

Table 2. Percent of Two-year-olds with Up-to-date Immunizations, BC Health Service Delivery Areas

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

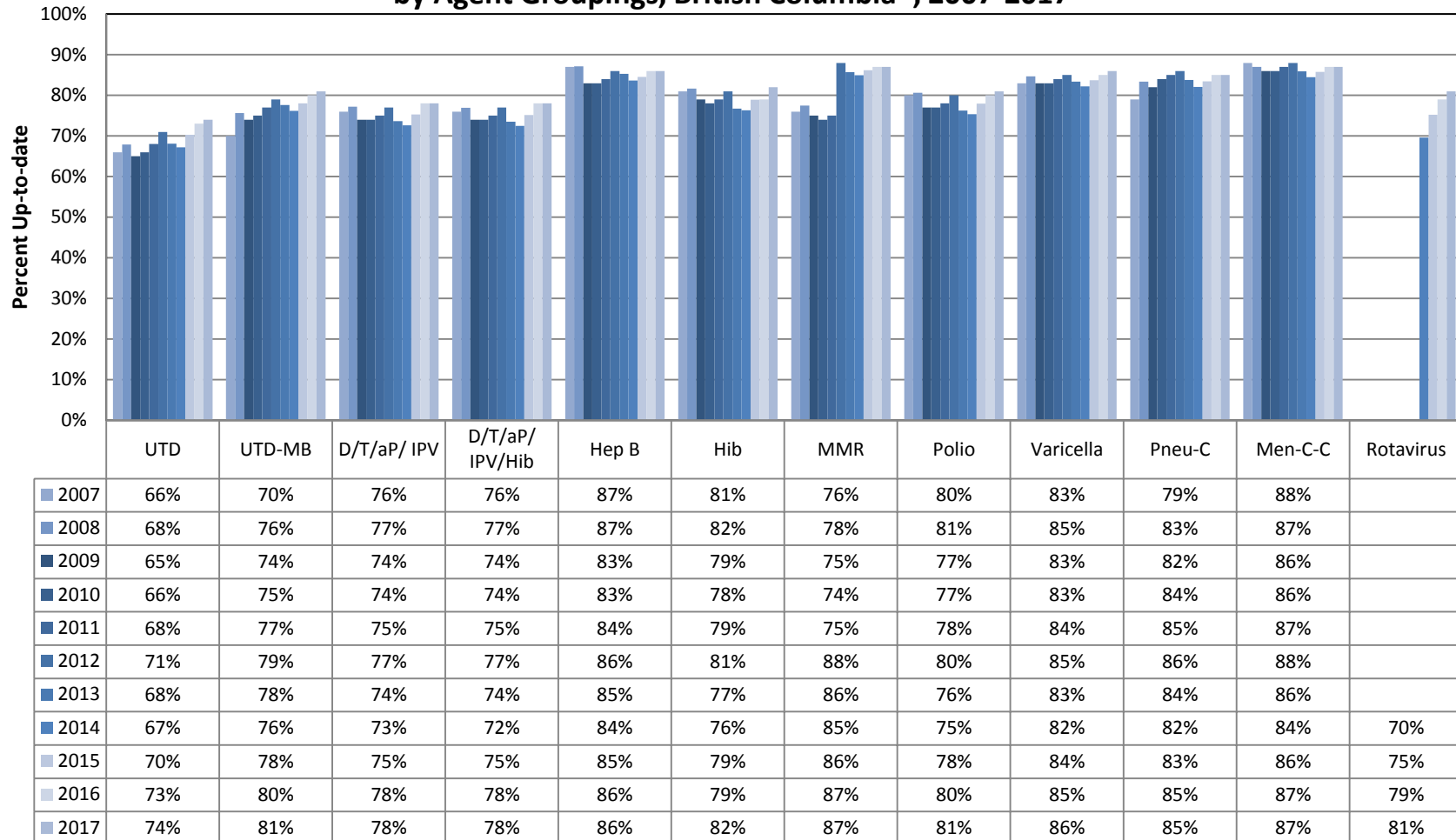
Health Authority	Health Service Delivery Area	Vaccination Details	Percent Immunized										
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
VIHA	South Vancouver Island	Up-to-date for age	78%	76%	73%	70%	71%	70%	69%	68%	74%	76%	76%
		Up-to-date minus the booster	79%	81%	80%	79%	81%	80%	81%	78%	81%	82%	83%
		<i>Specific Agents</i>											
		D/T/aP/IPV	86%	85%	81%	78%	78%	75%	73%	74%	79%	80%	81%
		D/T/aP/IPV/Hib	85%	84%	81%	78%	78%	75%	73%	74%	79%	80%	80%
		Hep B	91%	90%	87%	87%	87%	87%	88%	86%	87%	88%	89%
		Hib	87%	87%	83%	81%	81%	78%	77%	77%	82%	81%	83%
		MMR	85%	85%	80%	77%	77%	87%	87%	87%	89%	89%	89%
		Polio	87%	87%	83%	80%	80%	77%	76%	77%	81%	82%	82%
		Varicella	87%	87%	86%	85%	85%	85%	84%	83%	86%	86%	88%
		Pneumococcal conjugate	86%	88%	88%	88%	88%	87%	86%	85%	87%	87%	87%
		Meningococcal C conjugate	91%	91%	89%	90%	89%	88%	88%	86%	89%	88%	89%
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	73%	77%	79%	84%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5%	5%	4%	
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%	1%	
	Central Vancouver Island	Up-to-date for age	72%	70%	67%	63%	64%	64%	62%	58%	64%	69%	67%
		Up-to-date minus the booster	76%	80%	78%	75%	76%	76%	76%	73%	75%	79%	78%
		<i>Specific Agents</i>											
		D/T/aP/IPV	79%	77%	73%	70%	69%	69%	66%	63%	68%	74%	71%
		D/T/aP/IPV/Hib	79%	77%	73%	70%	69%	69%	66%	63%	68%	73%	71%
		Hep B	89%	88%	86%	83%	85%	85%	84%	82%	83%	85%	83%
		Hib	82%	80%	77%	74%	73%	73%	71%	69%	75%	75%	78%
		MMR	78%	76%	72%	69%	69%	84%	83%	82%	84%	87%	85%
		Polio	82%	80%	76%	73%	72%	72%	70%	68%	73%	77%	75%
		Varicella	85%	87%	83%	81%	81%	82%	80%	79%	81%	84%	83%
		Pneumococcal conjugate	82%	87%	85%	82%	83%	83%	81%	79%	81%	84%	82%
		Meningococcal C conjugate	89%	89%	86%	85%	85%	85%	83%	82%	83%	86%	85%
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	67%	68%	72%	76%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6%	6%	7%	
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2%	2%	3%	
	North Vancouver Island	Up-to-date for age	72%	73%	70%	70%	70%	66%	69%	69%	70%	75%	73%
		Up-to-date minus the booster	74%	79%	77%	80%	79%	75%	78%	78%	79%	84%	82%
		<i>Specific Agents</i>											
D/T/aP/IPV		82%	82%	79%	79%	76%	73%	75%	74%	75%	78%	77%	
D/T/aP/IPV/Hib		82%	82%	79%	79%	76%	73%	75%	74%	75%	78%	76%	
Hep B		88%	88%	85%	87%	85%	83%	85%	85%	83%	89%	87%	
Hib		85%	85%	83%	82%	80%	78%	79%	79%	80%	80%	81%	
MMR		82%	82%	78%	78%	76%	85%	87%	86%	87%	90%	88%	
Polio		84%	84%	82%	81%	79%	77%	78%	77%	79%	81%	79%	
Varicella		84%	84%	84%	85%	83%	81%	83%	82%	84%	87%	86%	
Pneumococcal conjugate		84%	88%	86%	87%	85%	83%	85%	85%	85%	88%	87%	
Meningococcal C conjugate		89%	89%	88%	90%	88%	85%	86%	86%	87%	89%	88%	
Rotavirus		n/a	n/a	n/a	n/a	n/a	n/a	n/a	68%	70%	76%	81%	
No immunizations recorded		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7%	5%	5%	
Refusal to all		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%	1%	

Table 2. Percent of Two-year-olds with Up-to-date Immunizations, BC Health Service Delivery Areas

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

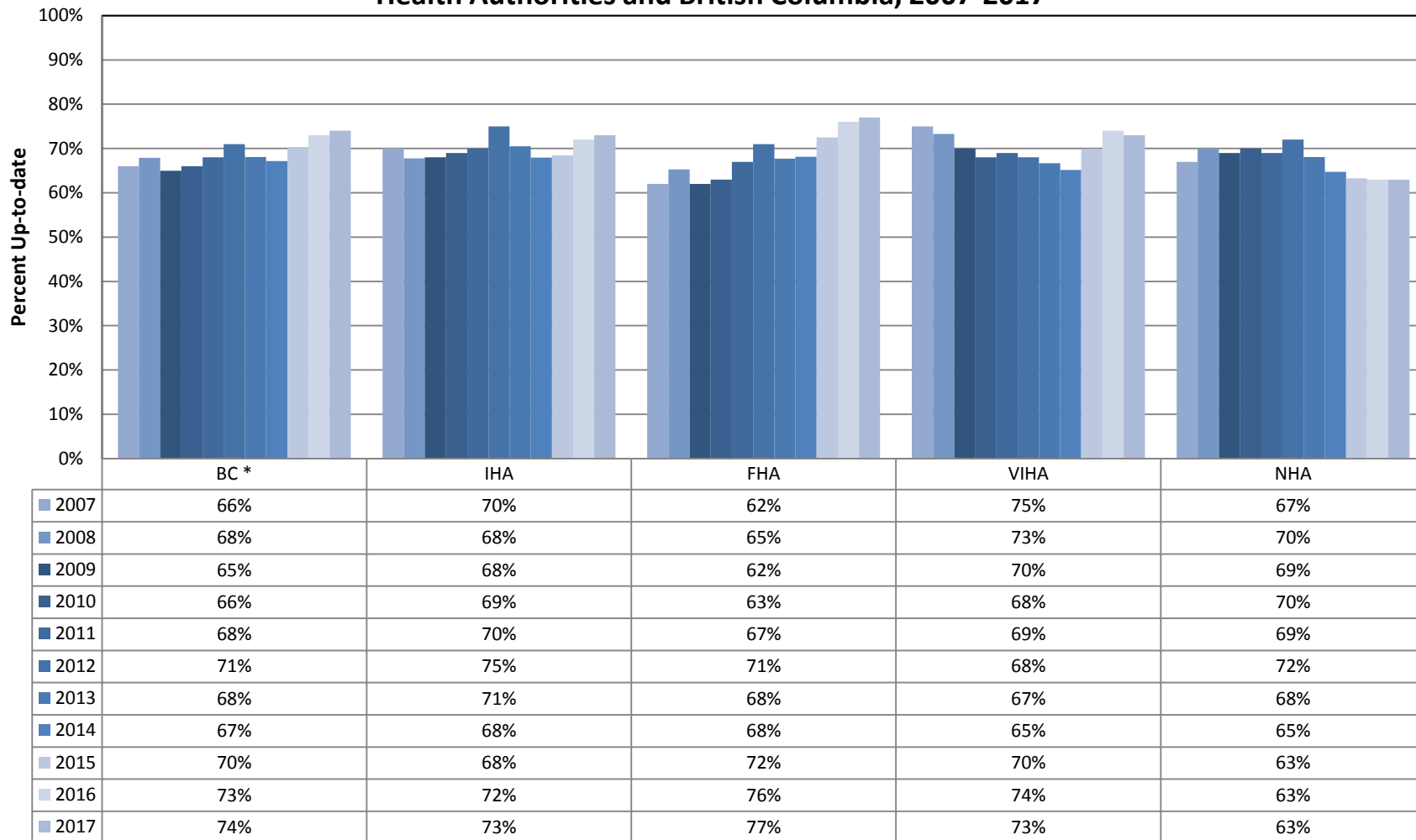
Health Authority	Health Service Delivery Area	Vaccination Details	Percent Immunized										
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NHA	Northwest	Up-to-date for age	63%	65%	60%	65%	62%	68%	60%	56%	56%	58%	57%
		Up-to-date minus the booster	68%	77%	72%	75%	75%	78%	74%	71%	65%	67%	67%
		<i>Specific Agents</i>											
		D/T/aP/IPV	71%	74%	72%	75%	71%	75%	67%	62%	62%	64%	61%
		D/T/aP/IPV/Hib	71%	74%	72%	75%	71%	75%	67%	62%	62%	64%	61%
		Hep B	88%	88%	84%	83%	84%	86%	86%	80%	75%	77%	74%
		Hib	75%	78%	77%	79%	76%	79%	72%	68%	66%	66%	67%
		MMR	71%	73%	70%	75%	72%	88%	85%	82%	76%	76%	75%
		Polio	75%	77%	76%	79%	74%	78%	71%	67%	66%	67%	64%
		Varicella	81%	84%	80%	83%	82%	84%	79%	79%	73%	73%	72%
		Pneumococcal conjugate	77%	84%	85%	85%	85%	86%	84%	78%	72%	73%	73%
		Meningococcal C conjugate	87%	87%	86%	89%	88%	88%	86%	82%	76%	76%	75%
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	66%	66%	72%	69%
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11%	10%	13%	
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%	1%	
	Northern Interior	Up-to-date for age	75%	77%	78%	77%	77%	76%	75%	72%	71%	71%	
		Up-to-date minus the booster	77%	83%	85%	83%	85%	82%	83%	84%	79%	78%	
		<i>Specific Agents</i>											
		D/T/aP/IPV	83%	84%	85%	85%	83%	84%	79%	79%	78%	77%	
		D/T/aP/IPV/Hib	83%	84%	85%	85%	83%	83%	79%	79%	78%	77%	
		Hep B	93%	92%	91%	91%	92%	91%	91%	90%	89%	85%	
		Hib	85%	87%	88%	86%	86%	85%	81%	81%	81%	78%	
		MMR	82%	84%	85%	84%	82%	91%	89%	90%	88%	87%	
		Polio	84%	86%	87%	86%	85%	85%	81%	81%	80%	79%	
		Varicella	86%	87%	88%	86%	88%	85%	86%	87%	85%	84%	
		Pneumococcal conjugate	84%	90%	92%	91%	92%	90%	88%	89%	85%	84%	
		Meningococcal C conjugate	92%	90%	93%	92%	93%	90%	89%	90%	88%	87%	
		Rotavirus	n/a	n/a	n/a	n/a	n/a	n/a	n/a	80%	77%	78%	
	No immunizations recorded	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4%	5%		
	Refusal to all	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1%	1%		
	Northeast	Up-to-date for age	56%	63%	63%	64%	63%	67%	63%	57%	60%	55%	
		Up-to-date minus the booster	61%	73%	72%	74%	72%	74%	71%	66%	69%	62%	
		<i>Specific Agents</i>											
D/T/aP/IPV		66%	71%	72%	73%	70%	72%	69%	64%	66%	62%		
D/T/aP/IPV/Hib		66%	71%	72%	72%	70%	72%	69%	63%	66%	62%		
Hep B		82%	83%	81%	84%	81%	84%	81%	78%	79%	74%		
Hib		71%	75%	75%	75%	72%	76%	72%	68%	70%	63%		
MMR		67%	71%	71%	73%	70%	82%	80%	76%	78%	73%		
Polio		70%	74%	74%	75%	71%	74%	71%	66%	69%	65%		
Varicella		76%	79%	77%	79%	76%	78%	74%	71%	74%	69%		
Pneumococcal conjugate		72%	81%	82%	83%	80%	80%	79%	74%	75%	70%		
Meningococcal C conjugate		85%	82%	83%	85%	81%	82%	80%	76%	78%	73%		
Rotavirus		n/a	n/a	n/a	n/a	n/a	n/a	n/a	63%	64%	62%		
No immunizations recorded		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	11%	14%		
Refusal to all		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3%	3%		

**Figure 1. Percent of Two-year Olds with Up-to-date Immunizations
by Agent Groupings, British Columbia*, 2007-2017**



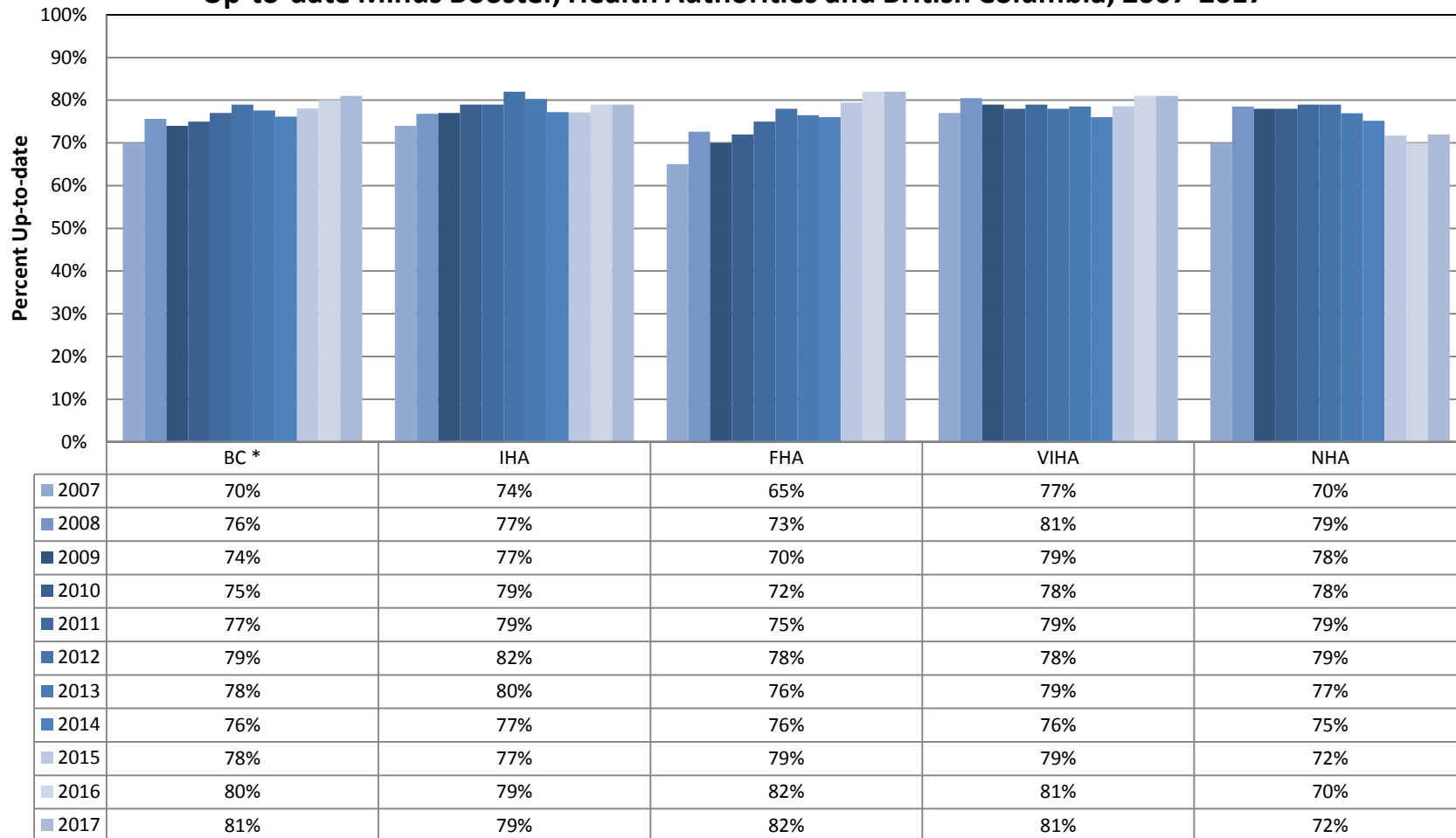
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 2. Percent of Two-year Olds with Up-to-date Immunizations: Up-to-date for Age
Health Authorities and British Columbia, 2007-2017**



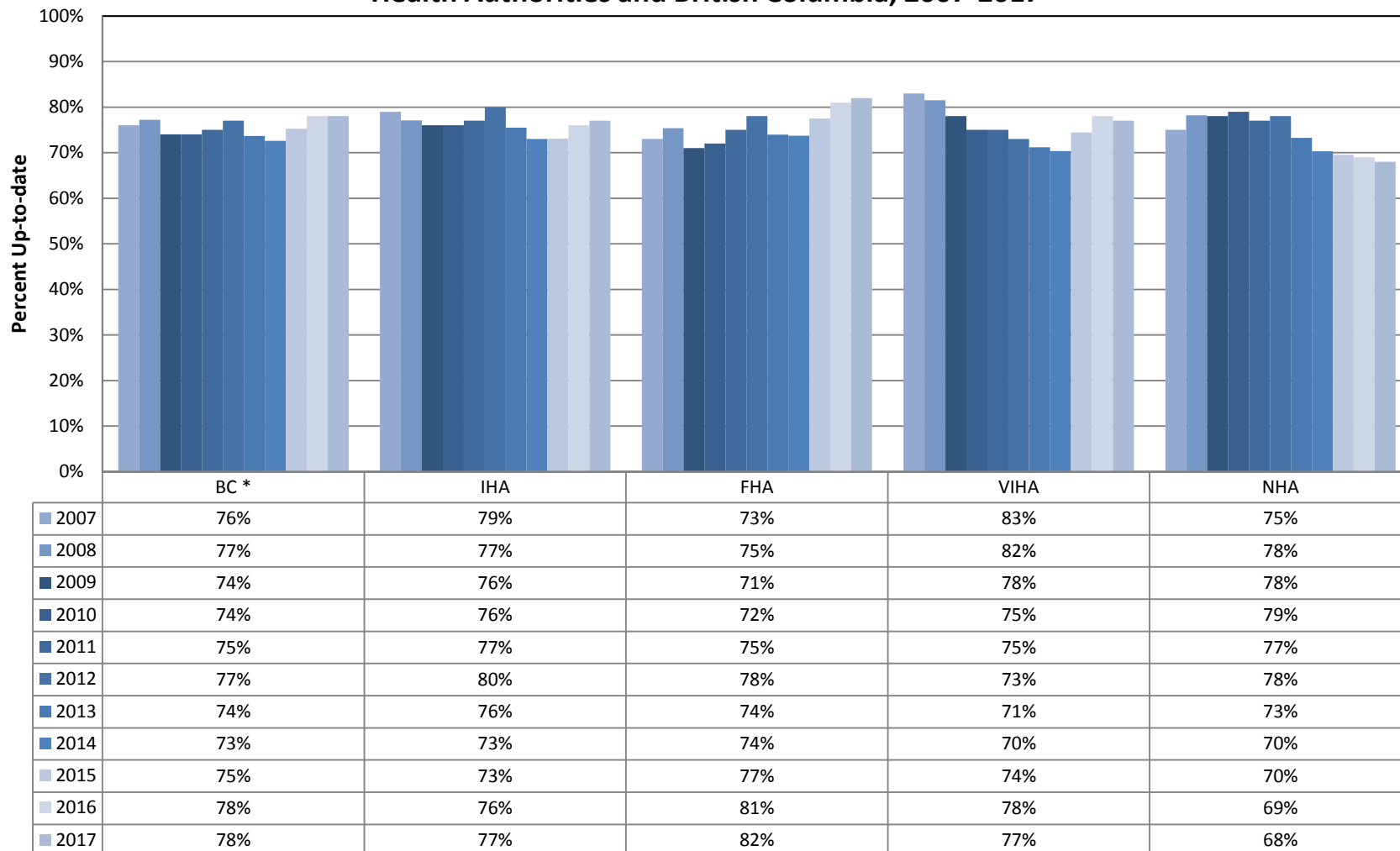
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 3. Percent of Two-year Olds with Up-to-date Immunizations:
Up-to-date Minus Booster, Health Authorities and British Columbia, 2007-2017**



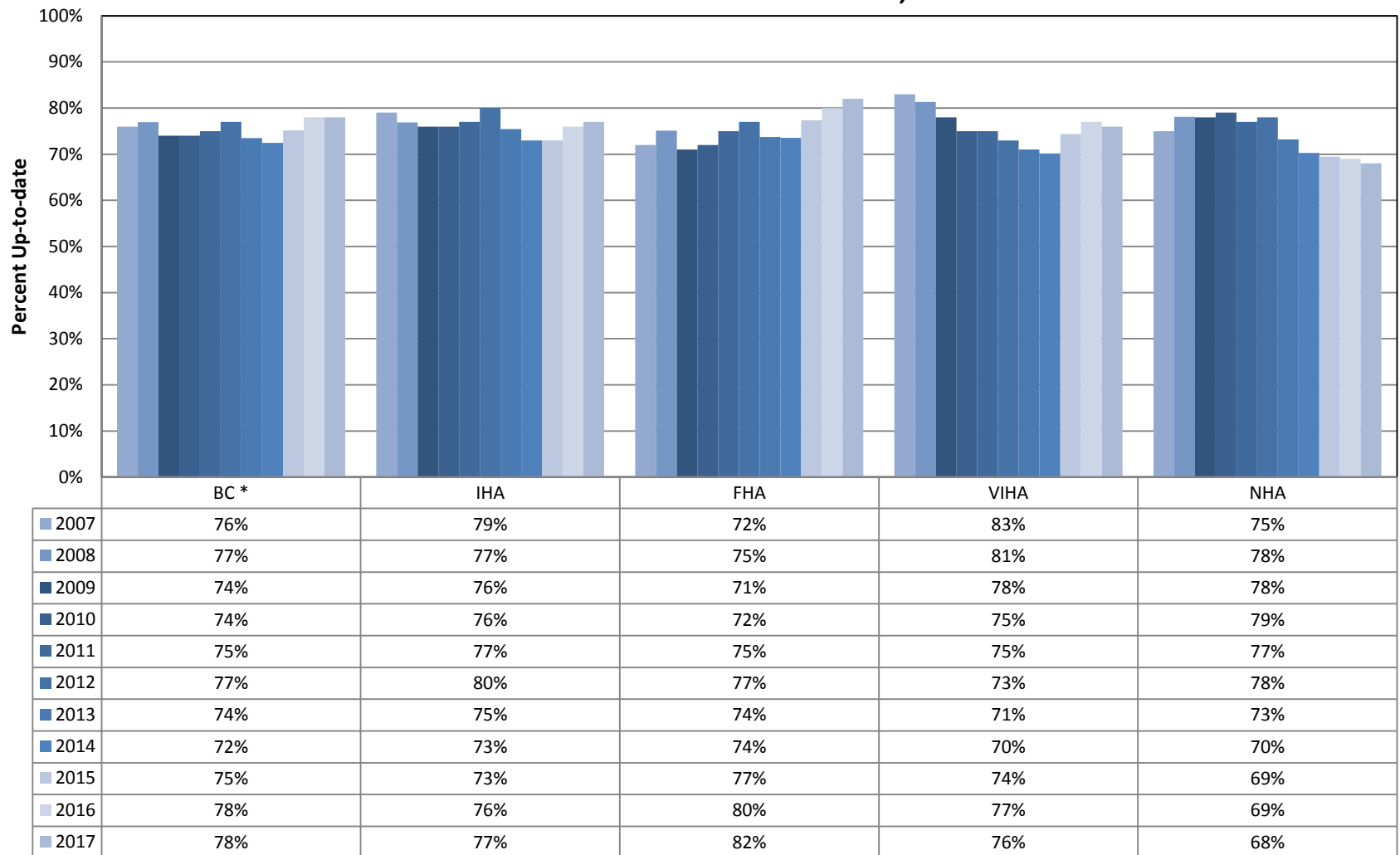
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 4. Percent of Two-year Olds with Up-to-date Immunizations: D/T/aP/IPV
Health Authorities and British Columbia, 2007-2017**



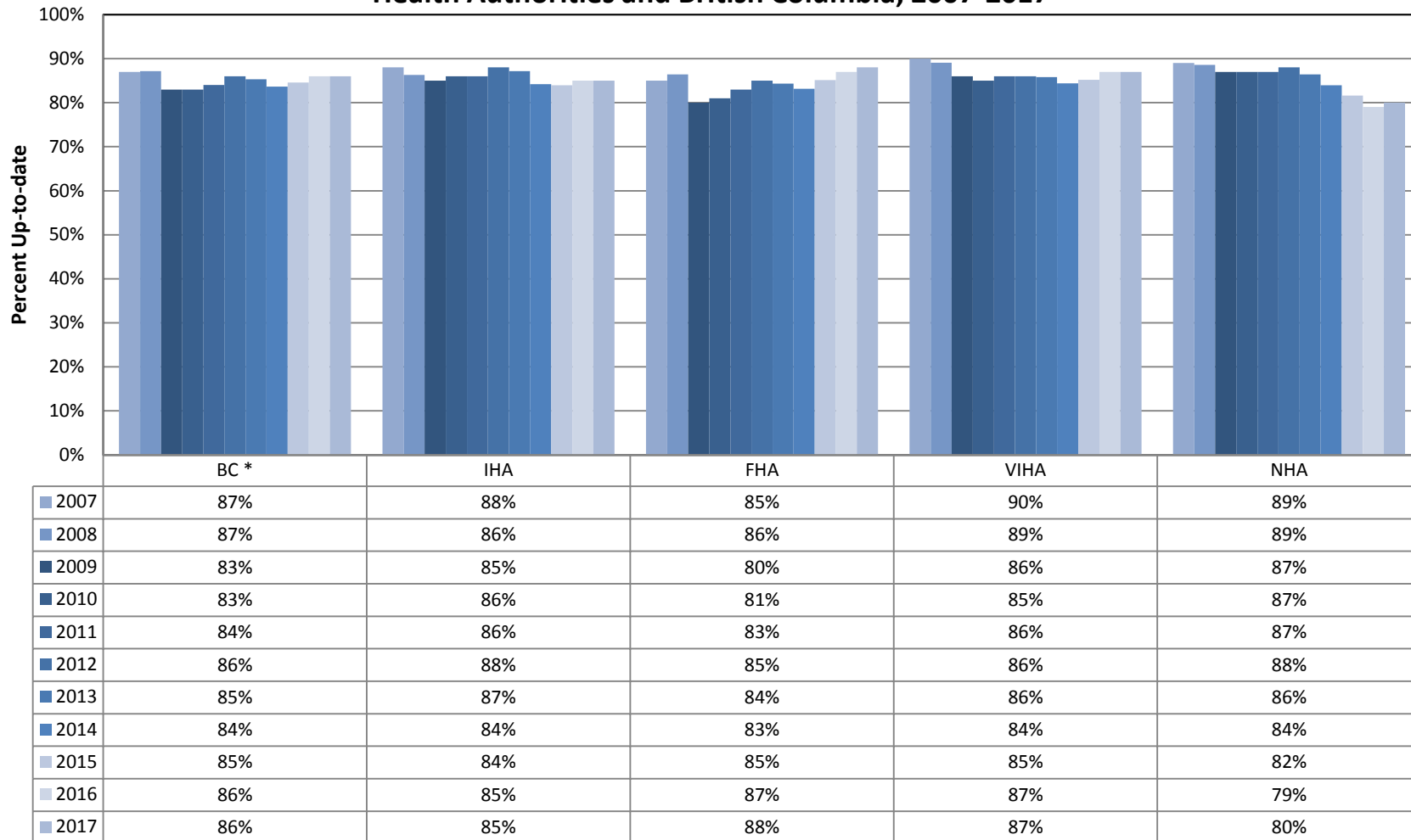
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 5. Percent of Two-year Olds with Up-to-date Immunizations: D/T/aP/IPV/Hib
Health Authorities and British Columbia, 2007-2017**



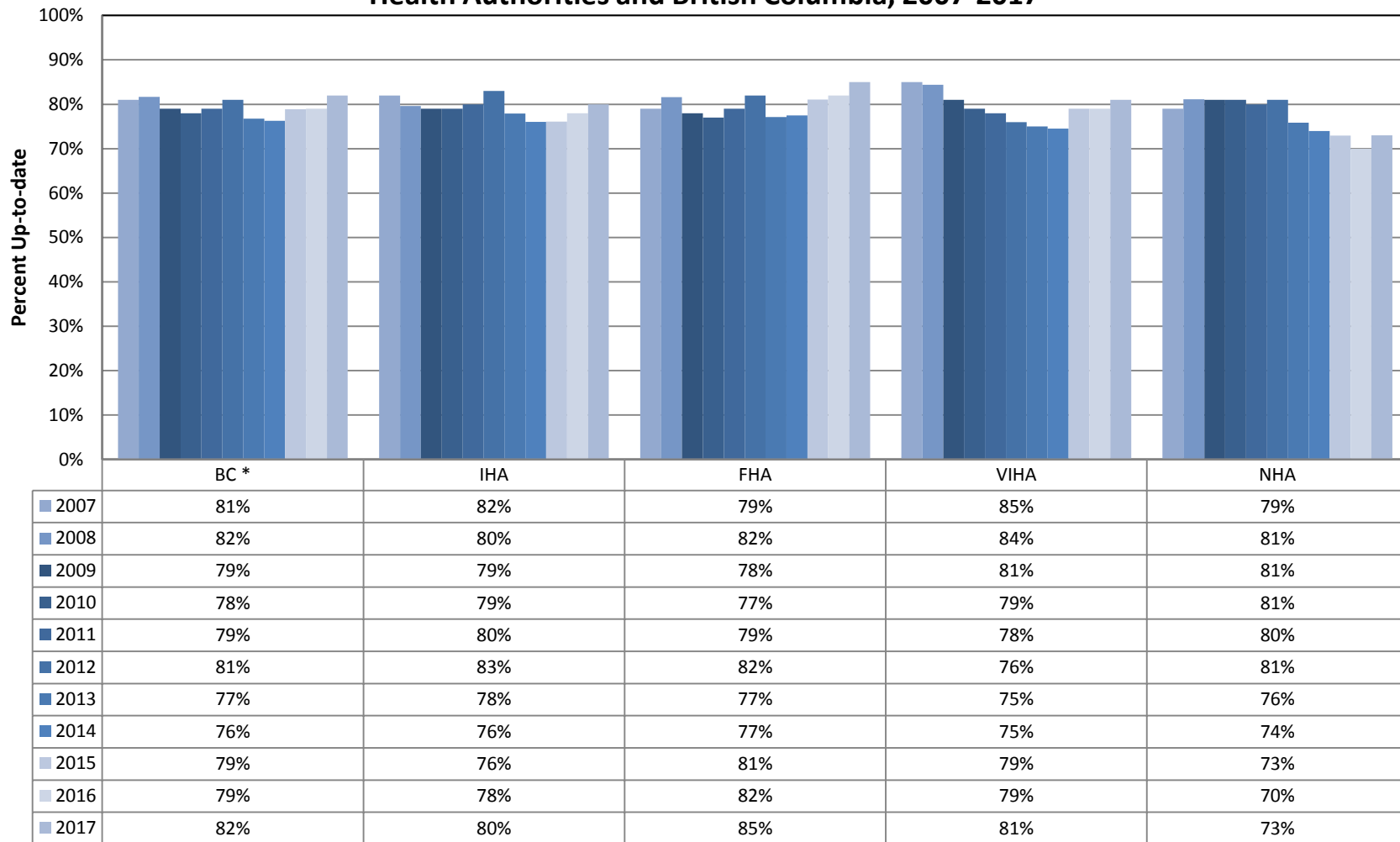
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 6. Percent of Two-year Olds with Up-to-date Immunizations: Hepatitis B
Health Authorities and British Columbia, 2007-2017**



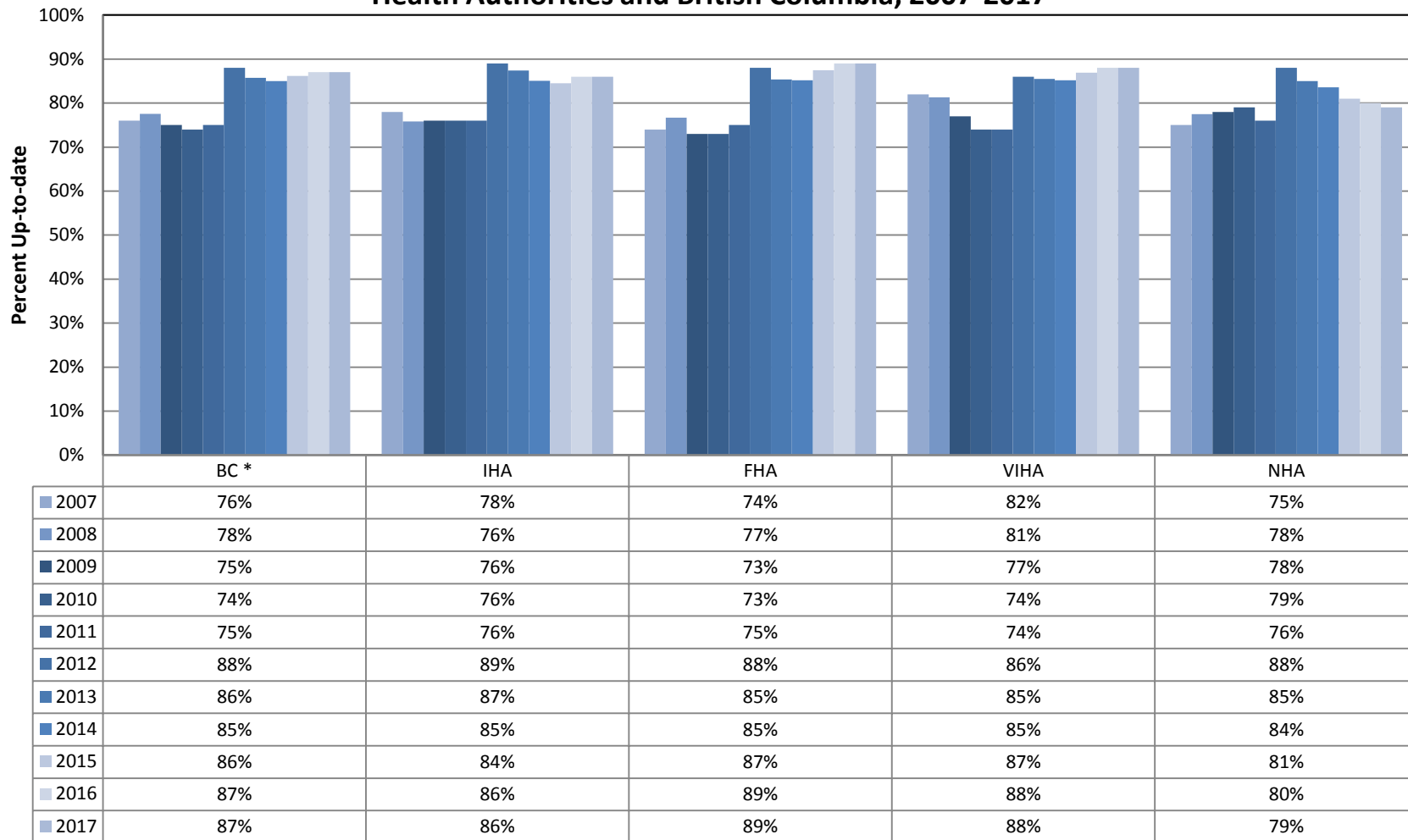
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 7. Percent of Two-year Olds with Up-to-date Immunizations: Hib
Health Authorities and British Columbia, 2007-2017**



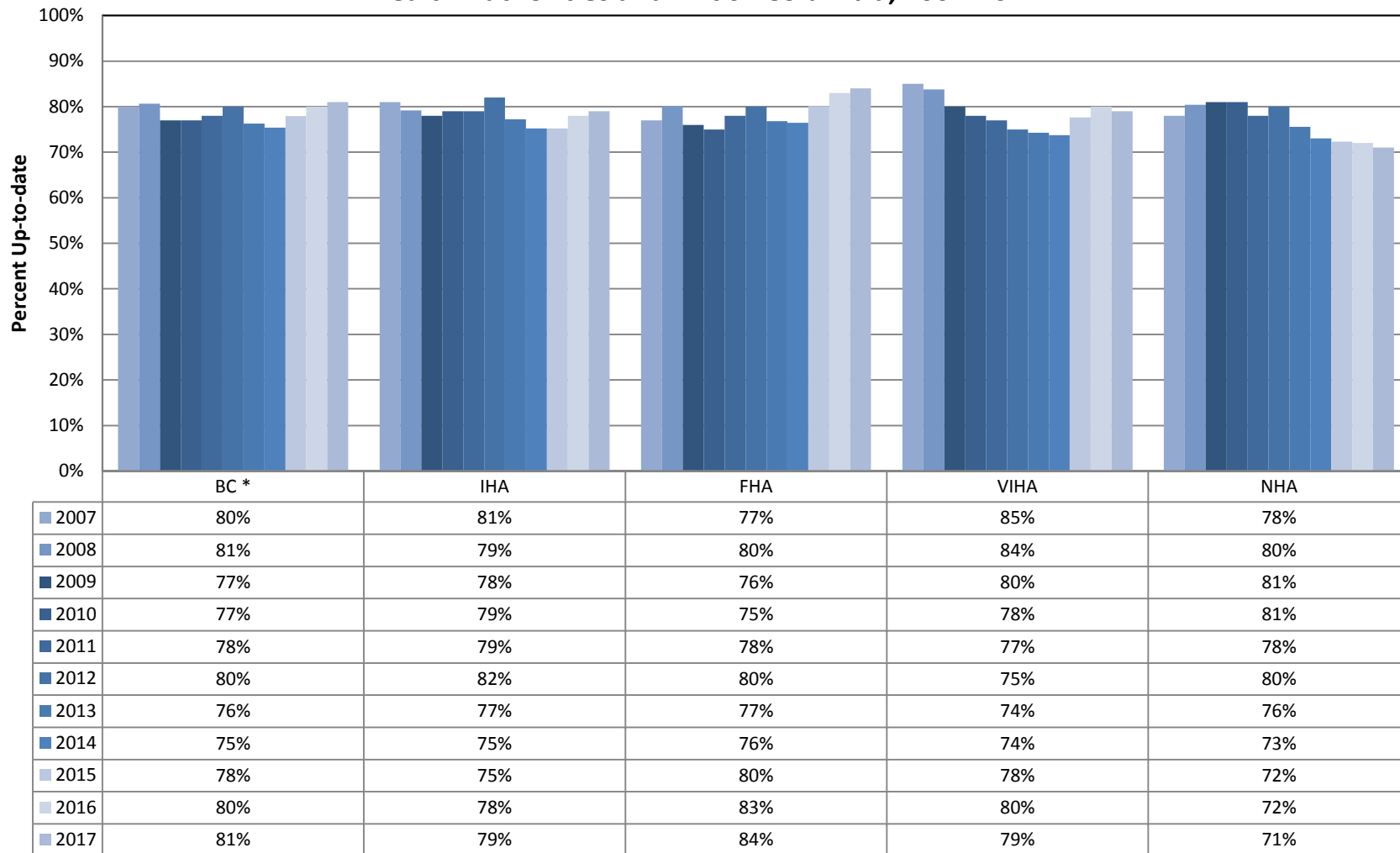
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 8. Percent of Two-year Olds with Up-to-date Immunizations: MMR
Health Authorities and British Columbia, 2007-2017**



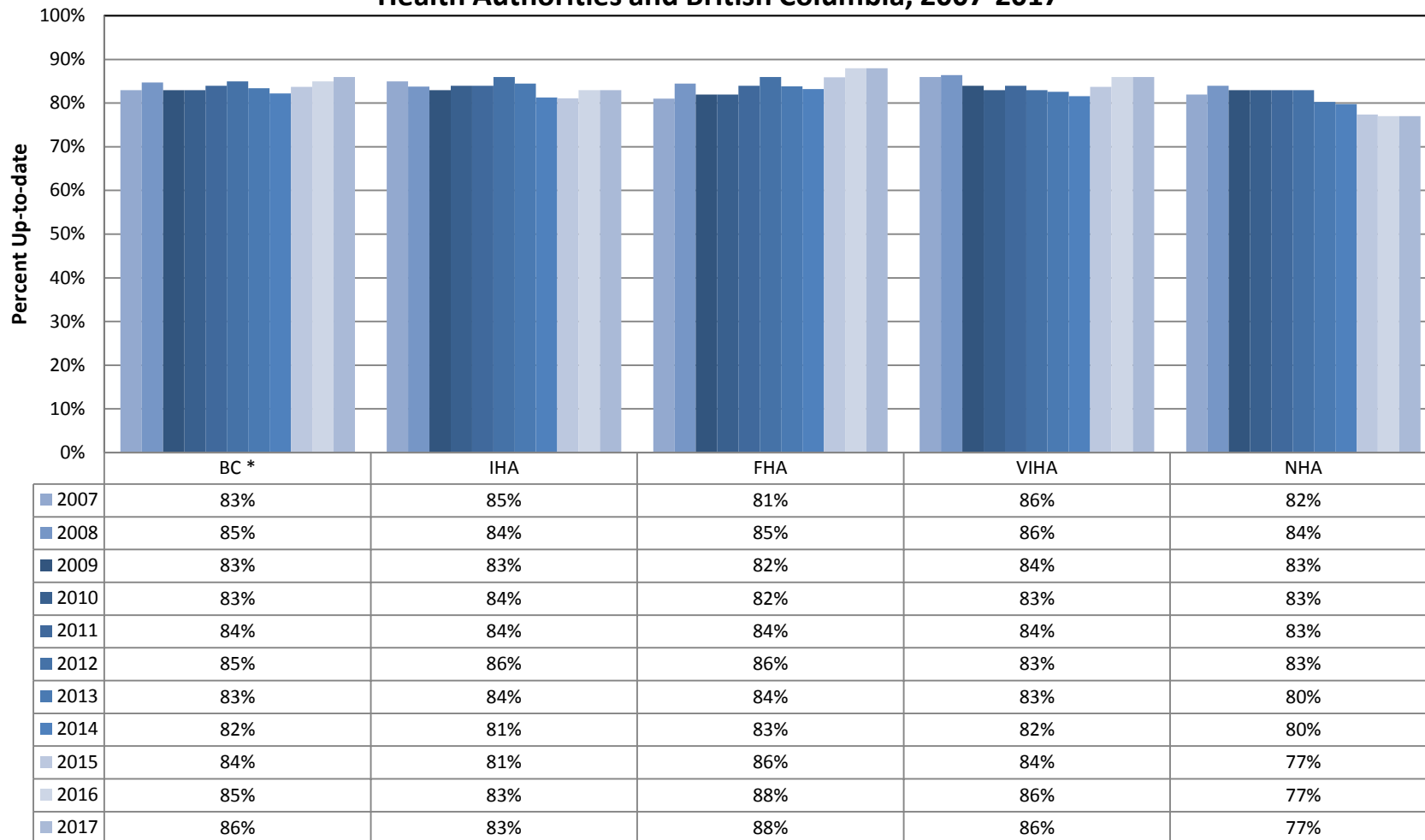
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 9. Percent of Two-year Olds with Up-to-date Immunizations: Polio
Health Authorities and British Columbia, 2007-2017**



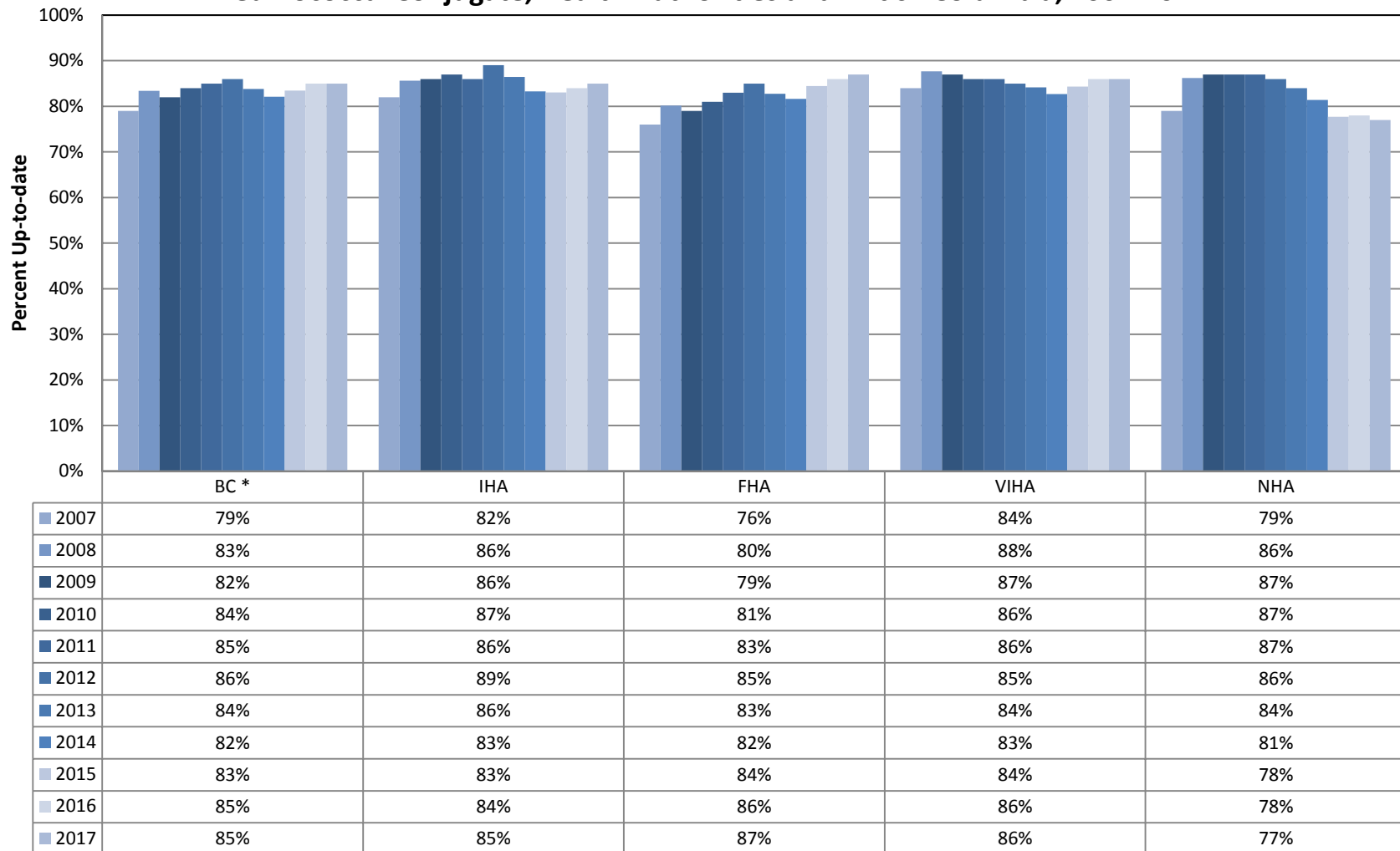
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 10. Percent of Two-year Olds Up-to-date: Varicella
Health Authorities and British Columbia, 2007-2017**



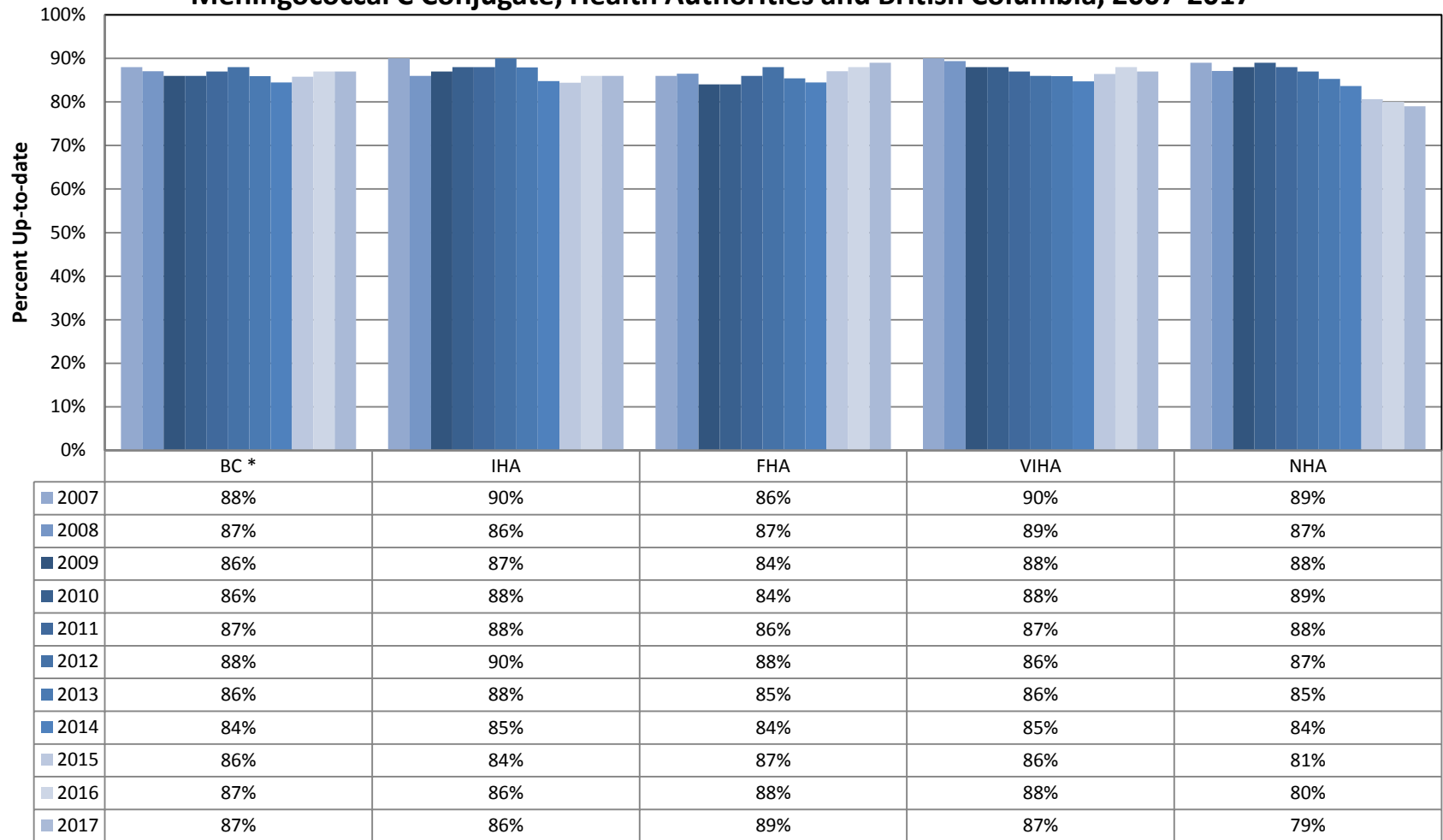
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 11. Percent of Two-year Olds with Up-to-date Immunizations:
Pneumococcal Conjugate, Health Authorities and British Columbia, 2007-2017**



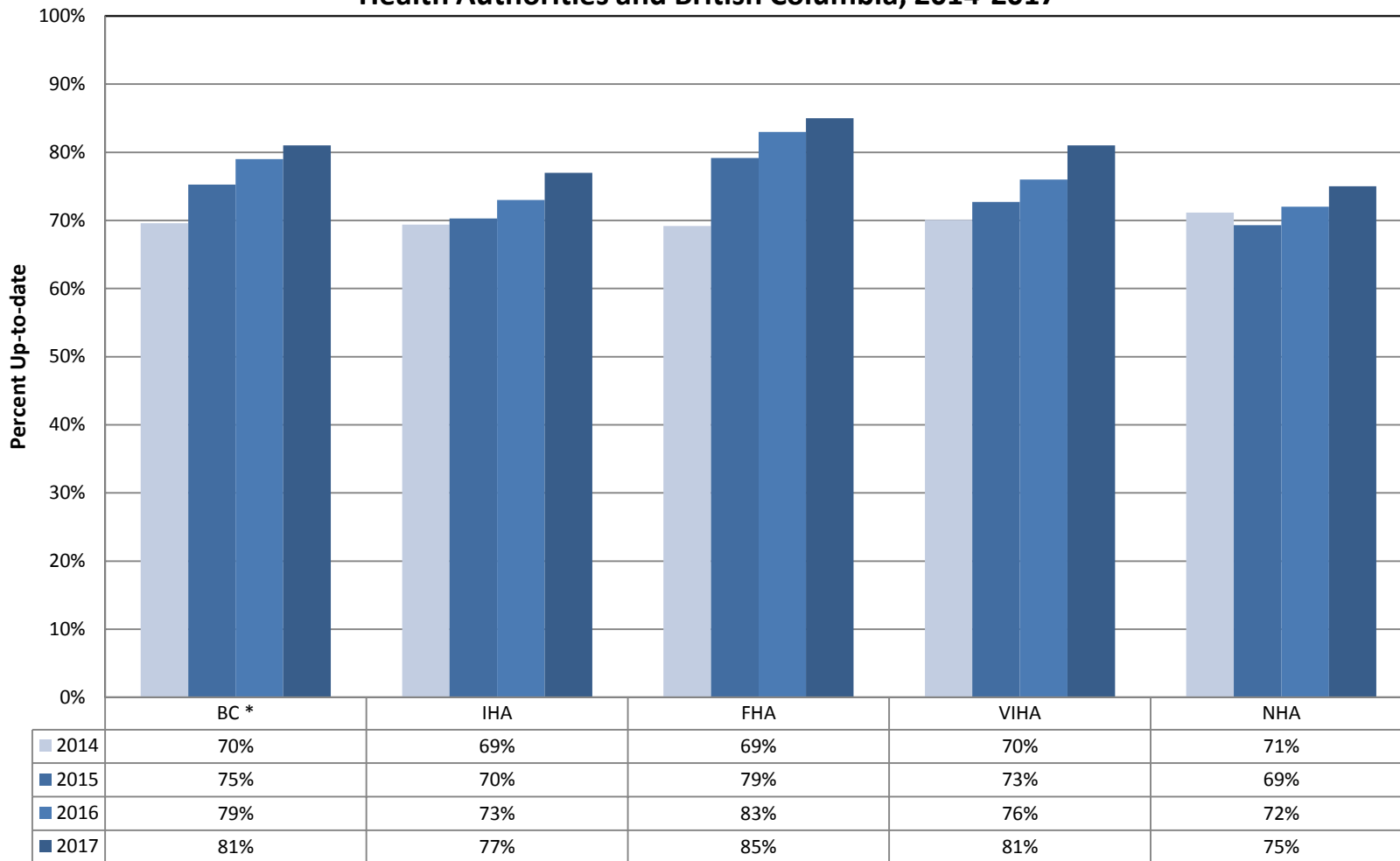
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 12. Percent of Two-year Olds with Up-to-date Immunizations:
Meningococcal C Conjugate, Health Authorities and British Columbia, 2007-2017**



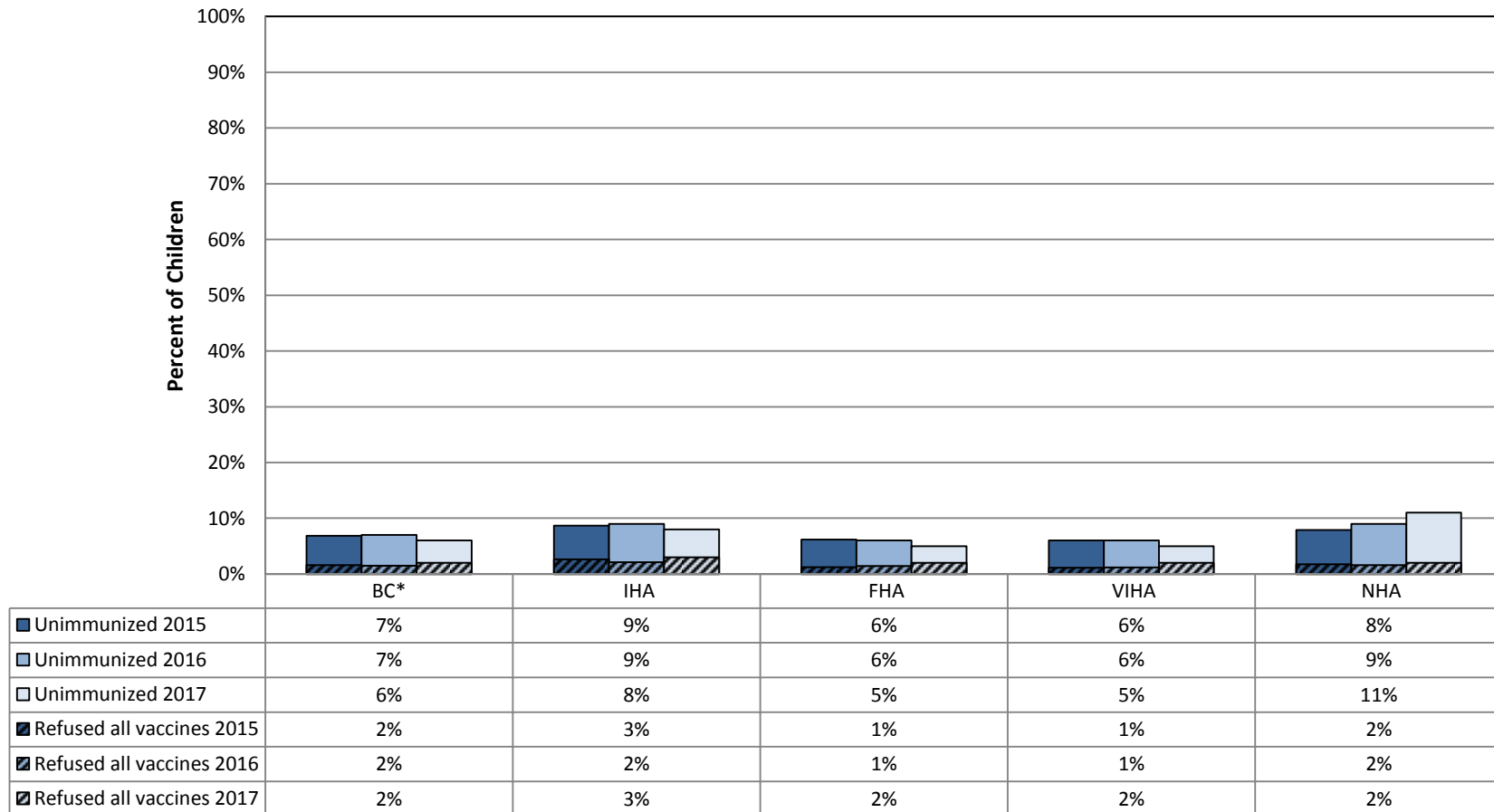
* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 13. Percent of Two-year Olds with Up-to-date Immunizations: Rotavirus
Health Authorities and British Columbia, 2014-2017**



* Does not include Vancouver Coastal Health (see Definitions and Notes)

**Figure 14. Percent of Two-year Olds with No Immunizations Recorded
Health Authorities and British Columbia, 2015-2017**



* Does not include Vancouver Coastal Health (see Definitions and Notes)

Appendix 1: Routine Immunization Schedule, 2017

Vaccine	Recommended Age				
	2 Months	4 Months	6 Months	12 Months	18 Months
Diphtheria, Tetanus, Acellular Pertussis, Hepatitis B, Polio, <i>Haemophilus influenzae</i> type b (INFANRIX™ hexa)	✓	✓	✓		
Pneumococcal Conjugate	✓	✓		✓	
Meningococcal C Conjugate	✓			✓	
Rotavirus ‡	✓	✓			
Measles, Mumps, Rubella *				✓	
Varicella				✓	
Diphtheria, Tetanus, Acellular Pertussis, Polio, <i>Haemophilus influenzae</i> type b (PEDIACEL®)					✓
Influenza **			✓	✓	✓

‡ Children born in 2012 were the first complete cohort offered rotavirus vaccine. Rotavirus was added to the coverage assessment reports in 2014.

* In 2011 the schedule for measles/mumps/rubella changed from 2 doses at 12 and 18 months to 2 doses at 12 months and school entry (4-6 years of age). As a result, the measure of coverage at 2 years of age changed from requiring two to requiring only one dose of MMR.

** Yearly influenza immunization is recommended for infants 6 – 23 months of age during the influenza season (i.e., two doses in the first year of vaccine receipt and one dose in subsequent years). Influenza immunization is not included in routine immunization coverage assessment at 2 years of age.

NOTE: There have been no changes to the BC Routine Immunization Schedule since 2012.

Appendix 2: Minimum Intervals Between Eligible Doses, Two-year olds with Up-to-date Immunizations

Vaccine	Minimum time interval between eligible doses			
	Dose 1 ^A	Dose 2	Dose 3	Dose 4
Diphtheria, Tetanus, acellular Pertussis (DTaP)	42 days	28 days	28 days	24 weeks
Polio ^B	42 days	28 days	24 weeks	
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 ^C	
received 3rd dose in June 2014 or later	0 days	28 days	56 days ^{C,D}	
Measles, Mumps, Rubella	12 months			
Varicella ^E	12 months			
Meningococcal C Conjugate				
meningococcal C conjugate vaccine	12 months			
quadrivalent meningococcal vaccine (Menveo [®]), initial dose before 12 months of age	8 weeks	8 weeks	8 weeks	
quadrivalent meningococcal vaccine (Menveo [®]), initial dose on or after 12 months of age	12 months	8 weeks		
<i>Haemophilus influenzae b</i>				
initial dose before 15 months of age	42 days	8 weeks ^F		
initial dose on or after 15 months of age	15 months			
Pneumococcal Conjugate				
initial dose before 12 months of age	42 days	28 days	56 days ^G	
initial dose between 12 and 23 months of age	12-23 months	56 days		
Rotavirus	42 days	28 days		

- A. Dose 1 refers to the earliest age a child can receive the initial dose.
- B. Schedule for DTaP should be followed when poliomyelitis provided in combination vaccine.
- C. Dose 3 must be given at least 16 weeks (112 days) after dose 1.
- D. Dose 3 must be given on or after 24 weeks of age.
- 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 iPHIS/Panorama. For the purposes of this assessment, any child with a past history of varicella disease recorded in iPHIS/Panorama is considered protected, regardless of their age at the time of illness.
- F. The booster dose may be given as early as 12 months of age.
- G. Dose must be given on or after 12 months of age.

Appendix 3: Percent of Two-year-olds with Up-to-date Immunizations by Health Authority and Health Service Delivery Area, Vancouver Coastal Health

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Health Authority / Health Service Delivery Area	Vaccination Details	Percent Immunized		
		Children Born in 2006	Children Born in 2009	Children Born in 2012
Vancouver Coastal Health VCH	Up-to-date for age	77%	65%	69%
	Up-to-date minus the booster	78%	72%	70%
	<i>Specific Agents</i>			
	D/T/aP/IPV	87%	80%	81%
	D/T/aP/IPV/Hib	86%	80%	81%
	Hep B	93%	81%	85%
	Hib	90%	84%	85%
	MMR	87%	78%	93%
	Polio	89%	83%	84%
	Varicella	92%	87%	90%
	Pneumococcal conjugate	88%	86%	88%
	Meningococcal C conjugate	93%	89%	90%
Rotavirus	n/a	n/a	84%	
Richmond	Up-to-date for age	85%	71%	72%
	Up-to-date minus the booster	85%	77%	72%
	<i>Specific Agents</i>			
	D/T/aP/IPV	93%	85%	87%
	D/T/aP/IPV/Hib	93%	85%	86%
	Hep B	96%	86%	86%
	Hib	95%	89%	89%
	MMR	93%	83%	94%
	Polio	94%	88%	89%
	Varicella	94%	91%	92%
	Pneumococcal conjugate	90%	88%	87%
	Meningococcal C conjugate	94%	91%	90%
Rotavirus	n/a	n/a	88%	
Vancouver	Up-to-date for age	69%	63%	72%
	Up-to-date minus the booster	71%	70%	73%
	<i>Specific Agents</i>			
	D/T/aP/IPV	80%	82%	84%
	D/T/aP/IPV/Hib	79%	82%	83%
	Hep B	91%	79%	85%
	Hib	85%	86%	86%
	MMR	82%	79%	95%
	Polio	83%	86%	85%
	Varicella	90%	87%	91%
	Pneumococcal conjugate	85%	84%	89%
	Meningococcal C conjugate	92%	89%	90%
Rotavirus	n/a	n/a	85%	

Appendix 3: Percent of Two-year-olds with Up-to-date Immunizations by Health Authority and Health Service Delivery Area, Vancouver Coastal Health

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Health Authority / Health Service Delivery Area	Vaccination Details	Percent Immunized		
		Children Born in 2006	Children Born in 2009	Children Born in 2012
North Shore	Up-to-date for age	82%	61%	69%
	Up-to-date minus the booster	83%	70%	70%
	<i>Specific Agents</i>			
	D/T/aP/IPV	92%	76%	80%
	D/T/aP/IPV/Hib	92%	76%	80%
	Hep B	94%	76%	85%
	Hib	93%	80%	85%
	MMR	90%	76%	95%
	Polio	93%	80%	84%
	Varicella	94%	86%	92%
	Pneumococcal conjugate	91%	86%	88%
	Meningococcal C conjugate	94%	88%	93%
	Rotavirus	n/a	n/a	85%
Coast Garibaldi	Up-to-date for age	79%	65%	64%
	Up-to-date minus the booster	79%	74%	65%
	<i>Specific Agents</i>			
	D/T/aP/IPV	88%	74%	71%
	D/T/aP/IPV/Hib	88%	74%	71%
	Hep B	88%	81%	82%
	Hib	89%	80%	77%
	MMR	87%	74%	87%
	Polio	88%	77%	75%
	Varicella	87%	83%	84%
	Pneumococcal conjugate	88%	84%	86%
	Meningococcal C conjugate	90%	86%	88%
	Rotavirus	n/a	n/a	77%

Notes:

Data source: Vancouver Coastal Health Authority and Fraser Health Authority, 2012 Cohort Two-Year-Old Immunization Coverage Survey. Vancouver Coastal Health Authority and Fraser Health Authority, 2009 Cohort Two-Year-Old Immunization Coverage Survey. Vancouver Coastal Health and Vaccine Evaluation Centre, 2006 Cohort Two-Year-Old Immunization Coverage Surveys.

Prepared by: Vancouver Coastal Health, Public Health Surveillance Unit, October 2012 and September 2015.

*2009 and 2012 coverage rates are based on a random sample from total surveys completed.

*2006 was a random sample generated by Ministry of Health but follow-up was prioritized for those with existing records in iPHIS or PARIS. This may have led to an overestimation of coverage for that birth cohort.

Appendix 3: Percent of Two-year-olds with Up-to-date Immunizations by Health Authority and Health Service Delivery Area, Vancouver Coastal Health

Data should be interpreted with caution. Please refer to the Definitions and Explanatory Notes for additional information.

Up-to-date definitions - Children Born in 2012:

Up-to-date for age - Four doses diphtheria/tetanus/pertussis, 3 doses polio, 1 dose of *haemophilus influenzae* type b after 15 months of age, 3 doses hepatitis B, 1 dose measles/mumps/rubella, 1 dose varicella, up-to-date for meningococcal C conjugate and pneumococcal conjugate (depending on age of first dose) as per schedule.

Up-to-date for age minus booster - Three doses diphtheria/tetanus/pertussis, 2 doses polio, 1-3 doses of *haemophilus influenzae* type b (depending on age of first dose), 3 doses hepatitis B, 1 dose measles/mumps/rubella, 1 dose varicella, up-to-date for meningococcal C conjugate and pneumococcal conjugate (depending on age of first dose) as per schedule.

Up-to-date definitions for individual antigens:

D/T/aP/IPV - 4 doses diphtheria/tetanus/pertussis, 3 doses polio.

D/T/aP/IPV/Hib - 4 doses diphtheria/tetanus/pertussis, 3 doses polio, at least 1 dose of *haemophilus influenzae* type b after 15 months of age.

Hep B - 3 doses hepatitis B.

Hib - At least 1 dose *haemophilus influenzae* type b after 15 months of age.

MMR - 1 dose measles, 1 dose mumps and 1 dose rubella.

Meningococcal C conjugate - At least 1 dose of meningococcal C conjugate on or after 12 months of age.

Pneumococcal conjugate - As defined by age of first dose: 3 doses pneumococcal conjugate if dose 1 before 12 months of age; 2 doses pneumococcal conjugate if dose 1 between 12 and 23 months of age.

Polio - 3 doses polio.

Varicella - 1 dose of varicella.

Rotavirus - 2 doses of rotavirus where first dose is given at at least 20 weeks less 1 day of age and second dose given at at least 8 months less 1 day of age.

Note that the varicella up-to-date definition for VCH considers varicella vaccine only, while the definition used for the other four health authorities considers both varicella vaccine and previous varicella disease or protective antibody levels. For the 2012 birth cohort, previous varicella disease or protective antibody levels accounted for 0.2% of children who were up-to-date for varicella for the "BC excluding VCH" total. The remaining up-to-date definitions for the 2012 birth cohort are consistent.

Appendix 4: Explanatory Notes

1. In June-July 2013, the health authorities using the iPHIS immunization registry migrated their data to the Panorama immunization registry. The data source for 2-year old coverage immunization coverage changed to Panorama as of 2013.

The decline in coverage in 2013 may be explained by the change in the immunization registry. Due to increased workload involved with the new system, there was decreased clinic availability in some regions, leading to fewer children being immunized. In addition, some regions were unable to run their recall and reminder reports out of the new system, and therefore did not notify all children who were behind on their immunizations prior to their second birthday.

2. In July 2013, Northern Health Authority began using the Community Medical Office Information System (MOIS) to record immunizations at point of care, with secondary data entry into Panorama. As a result, timeliness of data entry into Panorama has been impacted. As well, the frequency of reminders/ recalls from birth to the 2nd birthday has been reduced from four to one. These two factors may contribute to both artificial and potentially real declines in coverage.
3. In 2011 (2009 birth cohort), the scheduled age for the second ("booster") dose of measles/mumps/rubella vaccine changed from 18 months to 4-6 years of age. Prior to this, two doses of measles-, 1 (children born in 2007-2008) to 2 (children born prior to 2007) doses of mumps-, and at least 1-dose of rubella-containing vaccine were required before the second birthday for a child to be considered up-to-date. As a result of this change, the percent of children born in 2010 (assessed in 2012) up-to-date for MMR increased dramatically when compared to previous years. If the only one dose of MMR had been required for the 2009 birth cohort, the percent of children up-to-date for MMR would have been 13% higher (89%); the percent up-to-date for age would have been 3% higher (71%); the percent up-to-date minus the booster would have been 2.6% higher (80%).
4. In the fall and winter of 2009/10, the influenza H1N1 pandemic required an immense public health response. Regions reported that resources normally used to follow-up children under the age of two were diverted to the H1N1 response. As a result, two year old coverage rates were lower in 2009 and 2010 than previous years.
5. Starting in 2015 (2013 birth cohort), a Hib booster dose is considered valid when given as early as 12 months of age; previously, the minimum age for this dose was 15 months. This change had a very small effect on coverage estimates - at the provincial level, this change resulted in an increase of 0.2% in children up-to-date for Hib.
6. In 2017 (2015 birth cohort), 7% of children provincially had no record of immunizations in Panorama at the second birthday (2% had refused all routine vaccines). Potential explanations for children with no immunizations and no documented refusal to all vaccines include clients not responding to public health contact and records that have not been inactivated after a child has moved out of province or has died.
7. In 2017 (2015 birth cohort) 148 children had Panorama records indicating that they lived in BC, but did not have a specific health region assigned (i.e., the client health region was reported as "Unknown City / Town - BC". These children were excluded from the analysis.
8. Prior to 2017, children who received a single dose of quadrivalent meningococcal vaccine on or after 12 months of age were considered up-to-date for meningococcal C conjugate. As of 2017, children who receive quadrivalent meningococcal vaccine are only considered up-to-date for meningococcal C conjugate if they receive 2-3 doses (depending on age at first dose) and if the trade name of those doses is recorded as Menveo®. In 2017, there was one child who would have been considered up-to-date under the previous meningococcal C rules who was no longer considered up-to-date. This change had no overall impact on the percent up-to-date for meningococcal C conjugate or up-to-date for age at the provincial level.

Appendix 4: Explanatory Notes

9. 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 the provincial immunization registry (iPHIS/Panorama) is required. Some children may have received doses that have not been documented in the immunization registry. All regions make their best efforts to obtain vaccination records pertaining to physician-delivered immunizations. There can be a delay in obtaining these records from physicians, which can result in delay of data entry. Both these issues will artificially lower the rates of vaccine coverage.

- b. Data completeness with respect to children residing in the Health Authority may vary. Some regions enter all children born in their region into the registry. Other regions enter only those children into the system that present for service. In addition, First Nations children may not be completely captured in the registry system, as on-reserve birth records and immunizations may not be entered into iPHIS/Panorama. It is our opinion based on the difference found in the 2001 cohort of children followed up in the Medical Services Plan study, that these numbers represent the limitations in the data population of our registry system.

9. Health Authority abbreviations:

- IHA Interior Health
- FHA Fraser Health
- VIHA Vancouver Island Health
- NHA Northern Health
- VCH Vancouver Coastal Health

For an explanation of BC Health Authorities, please visit:

<http://www.health.gov.bc.ca/socsec/index.html>