epiREPORT

Manitoba Health, Healthy Living and Seniors

Manitoba Annual Immunization Surveillance Report, 2012 and 2013

January 1, 2012 to December 31, 2013
with 5-year average comparison (January 1, 2007 to December 31, 2011)

Epidemiology & Surveillance
Public Health Branch
Public Health and Primary Health Care Division
Manitoba Health, Healthy Living and Seniors

Manitoba

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Acknowledgments

Manitoba Annual Immunization Surveillance Report (2012 and 2013) is a result of the ongoing efforts of a dedicated team of individuals throughout the province of Manitoba including public health nurses, immunization coordinators, physicians, and other primary health care providers. Their combined efforts and expertise in the area of immunization is necessary to produce this valuable report.

Citation

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Executive Summary

Manitoba Health, Healthy Living and Seniors (MHHLS) is pleased to present the *Manitoba Annual Immunization Surveillance Report, 2012 and 2013*. This report is intended to provide an overview of the immunization coverage of children from 2 months of age to <17 years of age for the years 2012 and 2013. Below are a few selected highlights from the report:

Immunizations at Age 1

- Overall, 78.0% and 78.2% (for 2012 and 2013, respectively) of one year old Manitobans were considered complete for age for all the required vaccinations.
- In 2012, both Interlake-Eastern Regional Health Authority (RHA) and Prairie Mountain RHA had the highest percentages of one year old children complete for age (both had 81.2% vaccinated) while Southern RHA had the lowest (69.8%). The corresponding estimates in 2013 showed similar trend.

Immunizations at Age 2

- 63.3% and 60.1% of two year olds in Manitoba were complete for age in 2012 and 2013, respectively.
- In 2012 and 2013, Northern RHA had the highest percentage of two year-olds complete for age (68.0% in 2012 and 67.0% in 2013) while Southern RHA had the lowest (55.0% in 2012 and 54.4% in 2013).

Immunizations at Age 7

- In Manitoba, 59.6% of seven year old children had received the immunizations required to be complete for age in 2012. In 2013, the corresponding rate slightly increased (62.3%).
- In 2012, Prairie Mountain RHA had the highest percentage of children vaccinated (69.5%) whereas Winnipeg RHA had the lowest (56.2%). In 2013, Northern RHA had the highest complete for age rates (72.9%) and Winnipeg RHA again had the lowest (58.4%).

Immunizations at Age 11

- 24.8% and 27.6% of age 11 children received the vaccines available to them to be considered for complete for age (in 2012 and in 2013, respectively). Low immunization coverage could be due to that, in 2012 and 2013, one dose of varicella was a requirement to be considered complete for age at 11 years while this was not a requirement for complete for age criteria previously.
- In both 2012 and 2013, Prairie Mountain RHA had the highest percentage of children vaccinated (32.8% and 36.0%, respectively) whereas Northern RHA had the lowest (20.7% and 22.8%, respectively).

Immunizations at Age 17

- In Manitoba, 45.8% and 46.4% of the 17 year olds (in 2012 and in 2013, respectively) were considered complete for age for all the required vaccinations.
- Prairie Mountain RHA had the highest levels of complete for age rates in both years (61.9% in 2012 and 62.3% in 2013), compared to the Winnipeg RHA having the lowest complete for age rates during both years (39.2% in 2012 and 40.5% in 2013).

What to Expect in This Report

Our goal is to provide data in a user-friendly manner that allows the reader to quickly access the required information. This year, we present a joint report showing the immunization coverage information for both 2012 and 2013. In all graphs, the 2012 and 2013 information is presented side-by-side for easy comparison. In many graphs, the 5-year average from 2007 to 2011 is also provided. In some instances, the results presented in previous years' reports may differ slightly from the results presented in the current report due to use of a live immunization surveillance database, which is subject to change from time to time. Slight differences may also result from changes in the analyses of complete for age criteria in previous years versus this year's report.

What you will see in this report:

- Graphs and figures to provide visual representations of data,
- Highlights of the recommended immunization schedules by age,
- Details of the recommended immunizations for each age by regional health authority (RHA),
- A tabular overview of all immunizations in the summary section of each chapter,
- Highlighted elements of the report in bright text boxes, and
- Supporting text to provide context to the data.

Note that this report does not provide data:

- by First Nation status - The level of accuracy in this self-reported variable is felt to be too low to provide consistent and reliable data for health care policy and planning purpose.
- on influenza vaccinations - It is presented in the Manitoba annual influenza report (see: http://www.gov.mb.ca/health/publichealth/surveillance/influenza/index.html).
- on human papillomavirus vaccination (HPV) - The first cohort received the HPV vaccine in 2008 (grade 6 females only), and therefore, did not fulfill the complete for age at 17 years criteria in 2012 and 2013, but will fulfill the criteria in 2015.
- on the vaccinations recommended for individuals 18 years and older (e.g. pneumococcal polysaccharide 23).

NOTE on Winnipeg RHA: *The Winnipeg RHA contains the combined information for both Winnipeg and Churchill.*

Report Overview

Each chapter represents a specific age period that corresponds with the immunization schedule (ages 1, 2, 7, 11, and 17). Within each chapter, there are four sections that further describe immunizations from a provincial and regional perspective:

Section A: Immunizations in Manitoba

- Presents the immunization schedule containing the vaccines required to be complete for age.
- Describes the key vaccines required to be complete for age.
- Provides an overview of the proportion of children vaccinated by RHA.
- Contains an overall snapshot of immunizations in the province for the age group.

Section B: Immunization Rates by RHA

- The proportion of children who are complete for age for particular vaccinations are summarized graphically. Only those vaccines required to be complete for age are detailed.

Complete for age refers to a child who has received all of the recommended doses of a given immunogen, by a specified age, according to the schedule given in Table 1. For example, to be considered complete for age at 17 years, a child must have received: six doses of diphtheria, tetanus, and pertussis; four doses of polio; two doses of measles; one dose of mumps and rubella; and three doses of hepatitis B.

The proportion of children who are complete for age is calculated with a denominator of mid-year population count in the specified age group, in Manitoba, who have active Manitoba Health, Healthy Living and Seniors (MHHLS) Personal Health Information Numbers (PHIN), and a numerator containing the count of individuals who have received all required doses of immunogen(s), as shown in Table 1. For example, at age 17, an individual requires six doses of tetanus to be considered complete for age, for that immunogen. If, at age 17, the count for an individual shows five doses (or less) of tetanus, that individual would not be considered complete for age and would therefore not be included in the numerator count. For some instances, a percentage greater than 100 occurs due to use of denominator containing the mid-year population of the reported year (June 1st) and use of numerator containing the count of individuals who have received all required doses of immunogen(s) as of December 31st of the report year.

Table 1: Doses Required to be Complete for Age by Immunogen, 2012 and 2013

Age	**Diphtheria** (D)	**Tetanus** (T)	**Pertussis** (aP)	**Haemophilus influenza type b** (Hib)	**Polio** (IPV)	**Pneumococcal Conjugate 13 valent** (Pneu-C-13)	**Measles** (M)	**Mumps** (M)	**Rubella** (R)	**Varicella** (V)	**Meningococcal C Conjugate** (Men-C-C)	**Hepatitis B** (HB)
1	3	3	3	3	2	2	0	0	0	0	0	0
2	4	4	4	4	3	3	1	1	1	1	1	0
7	5	5	5	0	4	0	2	1	1	1	0	0
11	5	5	5	0	4	0	2	1	1	1	1	3
17	6	6	6	0	4	0	2	1	1	0	0	3

Doses required to be complete for age by each immunogen is generated based on Manitoba's Recommended Immunization Schedule in each reported year. For example, in 2012 and 2013, one dose of varicella was a requirement to be considered complete for age at 11 years while receiving varicella was not a requirement for complete for age definition during 2007 to 2011.

Combined vaccines (e.g. diphtheria, tetanus, pertussis, polio [DTaP-IPV]) are most frequently used to vaccinate children in Manitoba. In some instances, the data shows that complete for age rates by immunogen vary slightly. This may be for reasons such as personal choice (e.g. a parent chooses not to vaccinate a child with a particular immunogen), coding errors, or vaccine supply. For this reason, we have chosen to provide rates by immunogen.

Section C: Residency and Immunization Rates

- This section describes immunization rates by comparing data on continuous residents to non-continuous residents for Manitoba by year (2007 to 2013) and for each RHA (2012, 2013, and 5-year average [2007 to 2011]). A **continuous resident** is defined as an individual with an uninterrupted registration with MHHLS from birth to December 31st of the year in question (i.e., 2012 or 2013, etc.). A **non-continuous resident** has lived outside of Manitoba for a period of time, but was registered with MHHLS by December 31st of the year in question. Non-continuous residents may have been born in Manitoba but left for a period of time and then returned to Manitoba (see example 1), or they may have been born outside of the province and then moved to Manitoba (see example 2):

Example 1:

Example 2:

- Manitoba Immunization Monitoring System (MIMS) database is linked to the Insurance Registry at MHHLS. As such, MIMS is dependent on the presence of an active PHIN in order to collect immunization data. Residency impacts the interpretation of vaccination rates substantially and thus, it is important to track and understand population trends.
- Some reasons for the variations in rates may include: 1) non-continuous residents are requested to provide MHHLS with vaccination records upon re-entry to Manitoba. These records may be incomplete or unavailable, or may not be submitted to the local public health office; 2) the immunization schedules in other provinces or countries may be substantially different than in Manitoba; and, 3) the vaccination records provided by non-continuous residents may not have been inputted into MIMS before the end of the year. Thus, it is likely that the rates for non-continuous residents are an underrepresentation of actual complete for age rates. However, without all the data available, a better estimate is not available.

Section D: Overview of All Immunization Rates by RHA

- The final section is a table containing all of the immunization rates for each vaccine by RHA.

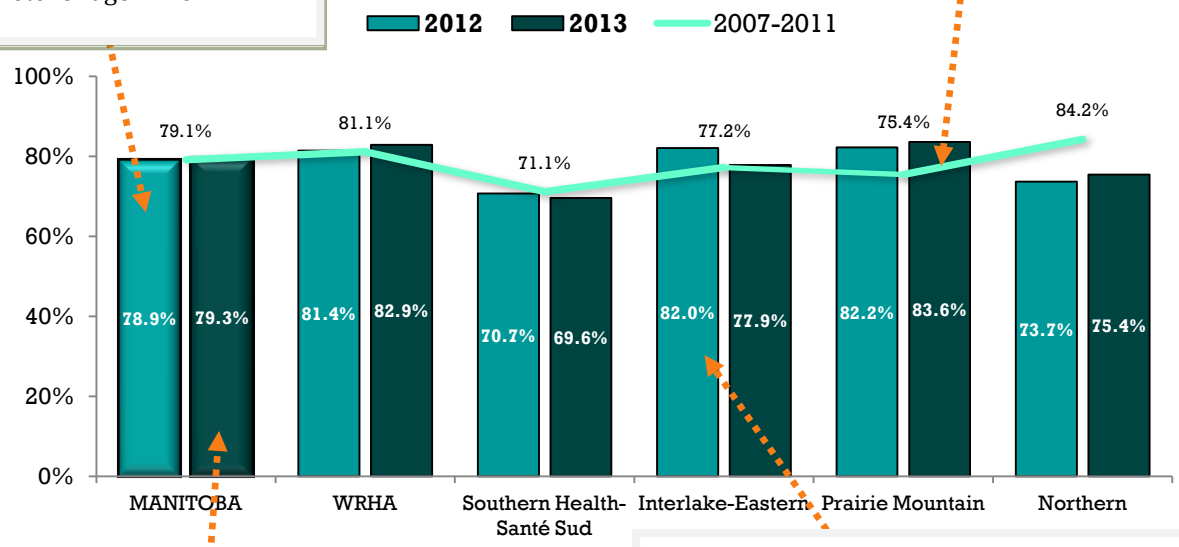
About Manitoba Immunization Monitoring System (MIMS) Data

We used the Manitoba's MIMS database to identify each individual's immunization coverage. The MIMS is population-based province-wide electronic immunization registry that has been recording virtually all immunizations administered to Manitoba residents since 1988. Information, including vaccine type and date of immunization, is captured for each immunization event either through direct data entry for vaccines administered by public health staff in each RHA or using physician claims data for vaccines administered by physicians.

Key Elements in Graphs

This bar represents the **provincial** average of children complete for age in 2012.

This line represents the average percent of children complete for age by **RHA**, calculated using data from the previous 5 years (2007-2011). The number above corresponds to the numerical value.



This bar represents the **provincial** average of children complete for age in 2013.

Each bar represents the proportion of children complete for age by **RHA** (the left bar represents 2012; the right bar represents 2013). The bold number in the centre of the bar denotes the exact percentage.

A note about antigens, immunogens and vaccines:

- An **antigen** is any molecular agent that binds to components of the immune response (including lymphocytes and their receptors) antibodies and the t-cell receptor. Note: not every antigen can evoke an immune response.
- An **immunogen** is any antigen capable of inducing an immune response.
- **Vaccines** are a preparation of dead or inactivated organisms, purified products, or live attenuated organisms that contain one or more immunogens, and are administered to produce or artificially increase immunity to a particular disease

In this report, we use vaccine names to describe the immunization schedule and in specific reference throughout the interpretation. Immunogens are more frequently used and describe single antigens.

The programming queries that produce the annual statistics use all of the current and historical immunogens that contribute to the immunization schedule. This means that in some instances, we are counting different immunogens because of product changes. For example, the pneumococcal conjugate vaccine currently in use in Manitoba is the 13-valent product, which replaced the 7-valent product starting in July 2010. The 13-valent product is currently the only pneumococcal conjugate vaccine used in Canada, but the 7-valent and potentially the 10-valent product is still used in some countries, so some non-continuous residents may have received it. A separate tariff code is assigned to each product to clinically identify the products, but both products are counted equally in complete for age calculations. A child would complete the series with either one product or the other, and is considered complete for age when the full series was given on schedule.

Immunizations at Age 1

Section A: Immunizations in Manitoba

Table 2: Recommended Immunization Schedule, Age 1

Vaccine	Age		
	2 months	4 months	6 months
DTaP-IPV-Hib Diphtheria, Tetanus, Pertussis, Polio, *Haemophilus influenzae* type b	♦	♦	♦
Pneu-C-13^ Pneumococcal Conjugate 13 valent	♦	♦	

♦ A single dose given with one needle.
^ As of July 2012, children with high risk medical conditions and children living in First Nations communities are recommended to follow a 4 dose schedule at 2, 4, 6, and 18 months. A catch-up dose is provided to children ≤ 59 months of age who have NEVER received a dose of Pneu-C-13.

At age one, Manitoba's universal childhood immunization program provides protection against the following bacterial pathogens: diphtheria, tetanus, pertussis, *haemophilus influenzae* type b, and *streptococcus pneumoniae*. The age one program also provides protection against viral polio infection.

The immunization status of children aged one year in 2012 represents those who were born in 2011 and who turned one year old in 2012 (2011 birth cohort); the immunization status of children aged one year in 2013 represents those who were born in 2012 and who turned one year old in 2013 (2012 birth cohort).

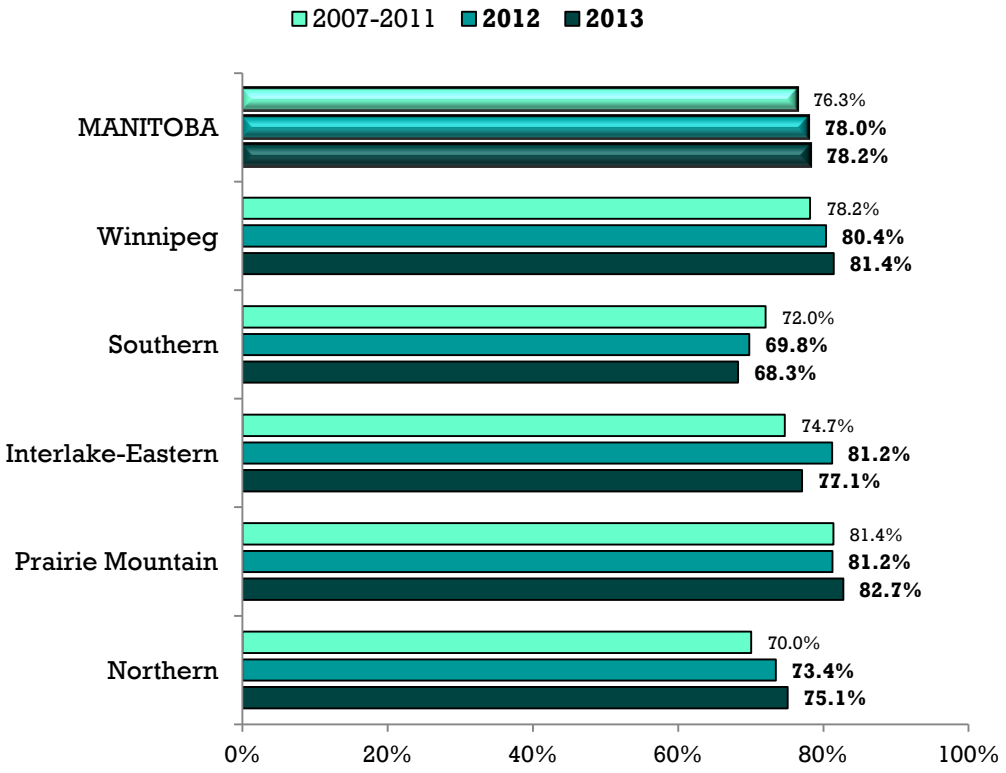
The data reported is for children who are complete for age: they have received all of the scheduled doses of vaccines as shown in Table 2. In order to be considered complete for age at one year, children need to have three doses of diphtheria, tetanus, pertussis, and *haemophilus influenzae* type b (Hib), and two doses of polio and Pneu-C-13 (for an overview of immunogens required to be complete for age refer to Table 1).

Immunizations given after the age of one (measles, mumps, rubella, varicella [shortly named MMRV] and Pneu-C-13 doses at 12 months of age) are not included in this one year old section; rather, data for these immunizations are provided in the two year old section.

Manitoba Immunization Rates, Age 1

Overall, 78.0% and 78.2% (for 2012 and 2013, respectively) of one year old Manitobans received the vaccines available to them (Figure 1). This percentage is calculated with a denominator of all one year olds in Manitoba, who have active MHHLS PHINs (n_{2012}=15,904 and n_{2013}=16,449), and a numerator containing the children who received all of their required vaccinations (n_{2012}=12,398 and n_{2013}=12,860). The number of vaccinated one year olds did vary by RHA. In 2012, both Interlake-Eastern RHA and Prairie Mountain RHA had the highest percentages of one year old children complete for age (both had 81.2% vaccinated) while Southern RHA had the lowest (69.8%). In 2013, Prairie Mountain RHA had the highest percentage of one year old children vaccinated (82.7%) while Southern RHA had the lowest (68.3%).

Figure 1: Manitoba Immunization Rates by RHA, Age 1
Percent of children who are complete for age by RHA, 2012, 2013, and 5-year average (2007-2011)



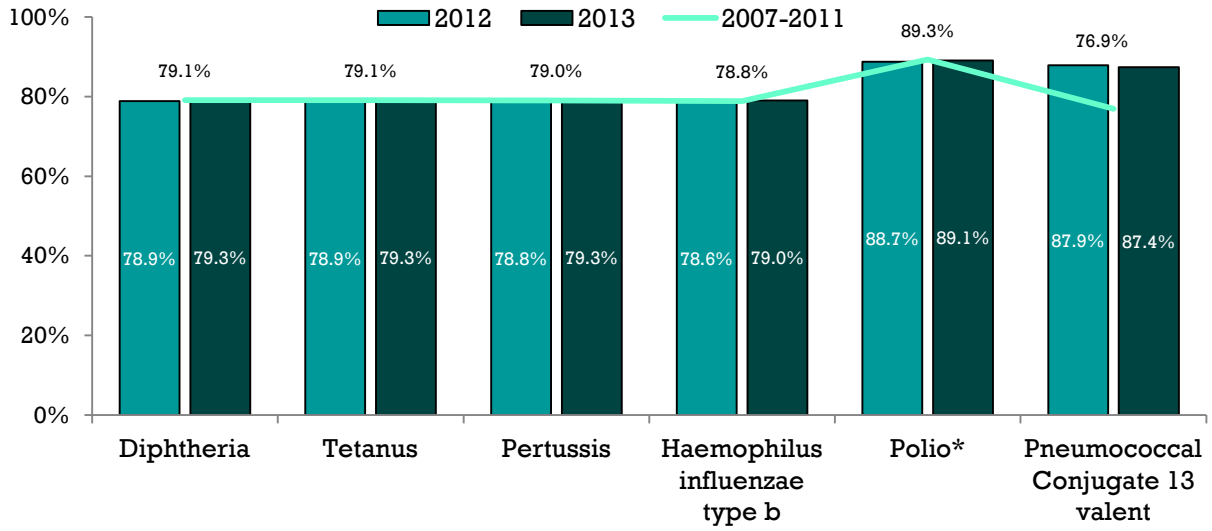
In Manitoba, almost 8 out of 10 children at age one year received all the vaccine doses necessary to be considered complete for age in both 2012 and 2013.

In their first year, children receive a combined vaccine which offers protection against diphtheria, tetanus, pertussis, Hib, and polio referred to as the DTaP-IPV-Hib. Three doses are required, at ages two, four, and six months, to be considered complete for age for diphtheria, tetanus, pertussis, and Hib. However, children only require two doses of the polio vaccine to be complete for age. The third dose of polio is acceptable to give as an additional dose in a combination vaccine for convenience of administration; this results in a difference in immunization rates between polio and the other immunogens in the vaccine (Figure 2). For example, if a child missed one booster and, therefore, only had two doses of DTaP-IPV-Hib, s/he would not be considered complete for age for diphtheria, tetanus, pertussis, or Hib but would be complete for age for polio. Polio vaccination rates are typically higher for this reason (Figure 2). In addition to the DTaP-IPV-Hib, two doses of pneumococcal conjugate 13 valent are required to be considered complete for age one.

As represented in Figure 2, overall, complete for age rates for all vaccines required at age one was slightly higher in 2013 as compared to complete for age rates in 2012 and in 2007 to 2011.Corresponding rates in 2012 was slightly lower as compared to the previous 5-year (2007-2011), with the exception of pneumococcal conjugate 13 valent. This is because the number of required doses for pneumococcal conjugate 13 valent changed in July 2012, from four doses required at two, four, six, and 18 months of age to only three doses required at two, four, and 12 months of age.

Figure 2: Manitoba Immunization Rates by Immunogens, Age 1

Percent of children who are complete for age for diphtheria, tetanus, pertussis, haemophilus influenzae type b, polio, and pneumococcal conjugate 13 valent, 2012, 2013 & 5-year average (2007-2011)



* Children require 2 doses of polio. As they typically receive 3 boosters given as a combined product the uptake rate is higher than the other immunogens in the combined vaccine.

Section B: Immunization Rates by RHA, Age 1

Diphtheria, Tetanus, Pertussis, and *Haemophilus influenzae* type b

Figure 3 shows the percentages of children at age one year receiving three doses of the diphtheria immunogen. In Manitoba, 78.9% and 79.3% of one year old children were complete for age for diphtheria vaccine (given as DTaP-IPV-Hib vaccine) in 2012 and 2013, respectively. In 2012, Prairie Mountain RHA had the highest percentage of one year old children vaccinated (82.2%), with Interlake-Eastern RHA a close second (82.0%), whereas Southern RHA had the lowest (70.7%). Similarly, in 2013, Prairie Mountain RHA had the highest percentage of one year old children complete for age (83.6%) while Southern RHA had the lowest (69.6%). A similar trend was observed for complete for age rates for tetanus (Figure 4), pertussis (Figure 5), and Hib (Figure 6) immunogens. This is due to these immunogens being most commonly given (with polio) as the combined vaccine DTaP-IPV-Hib.

Figure 3: Diphtheria Immunization Rates by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007 - 2011)

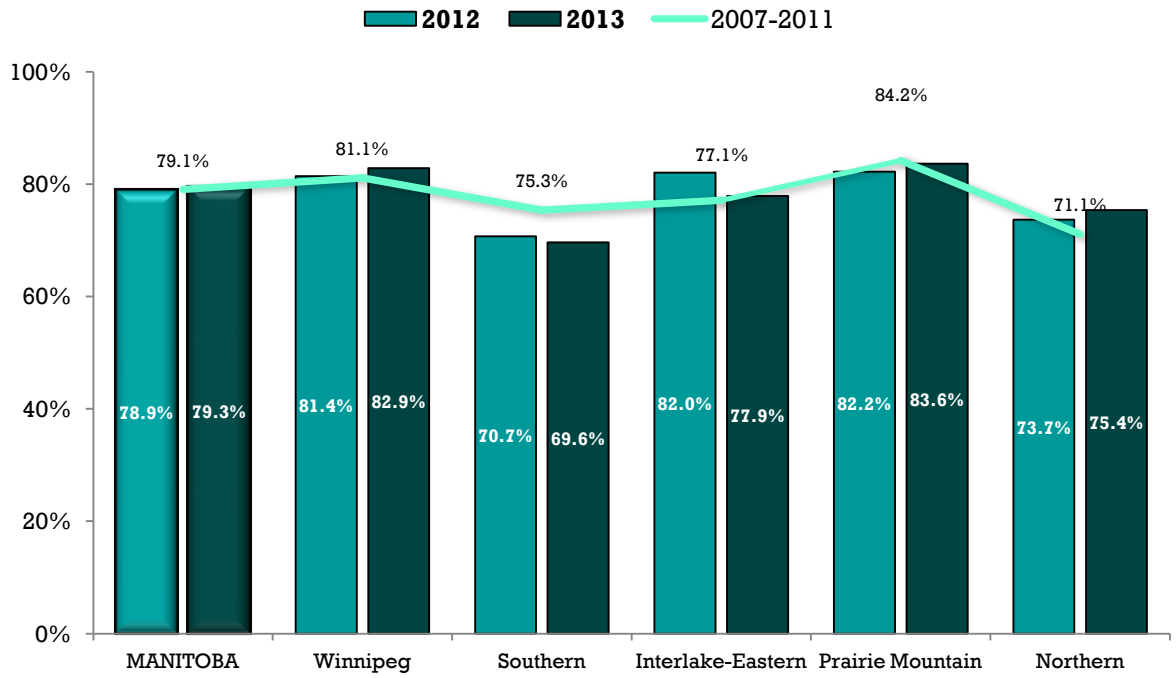


Figure 4: Tetanus Immunization Rates by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

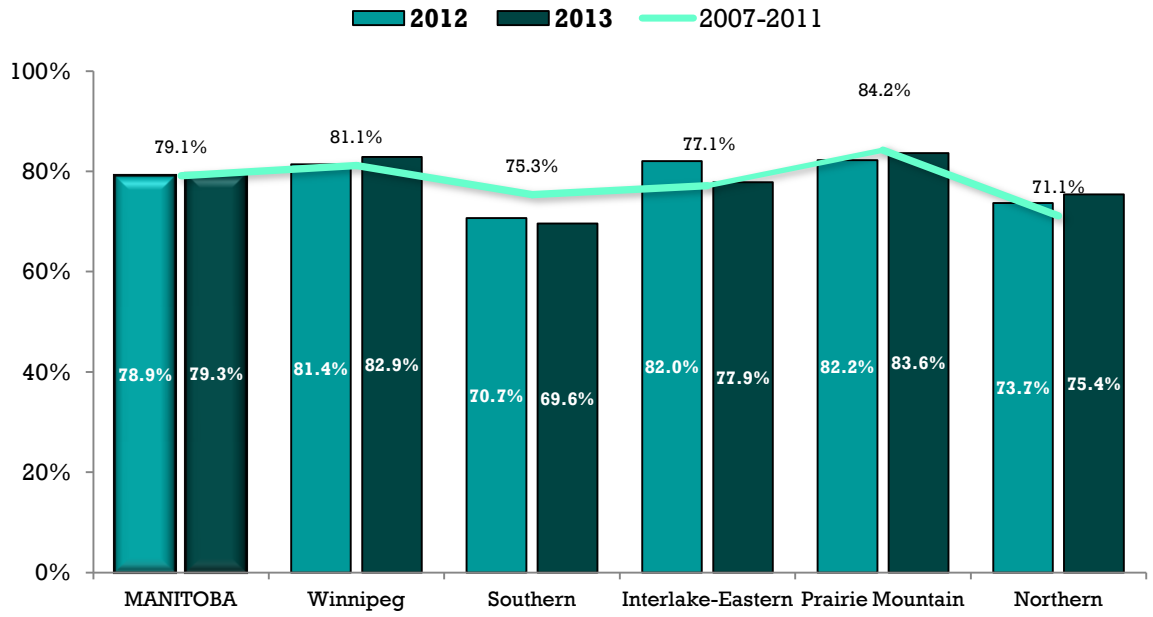


Figure 5: Pertussis Immunization Rates by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

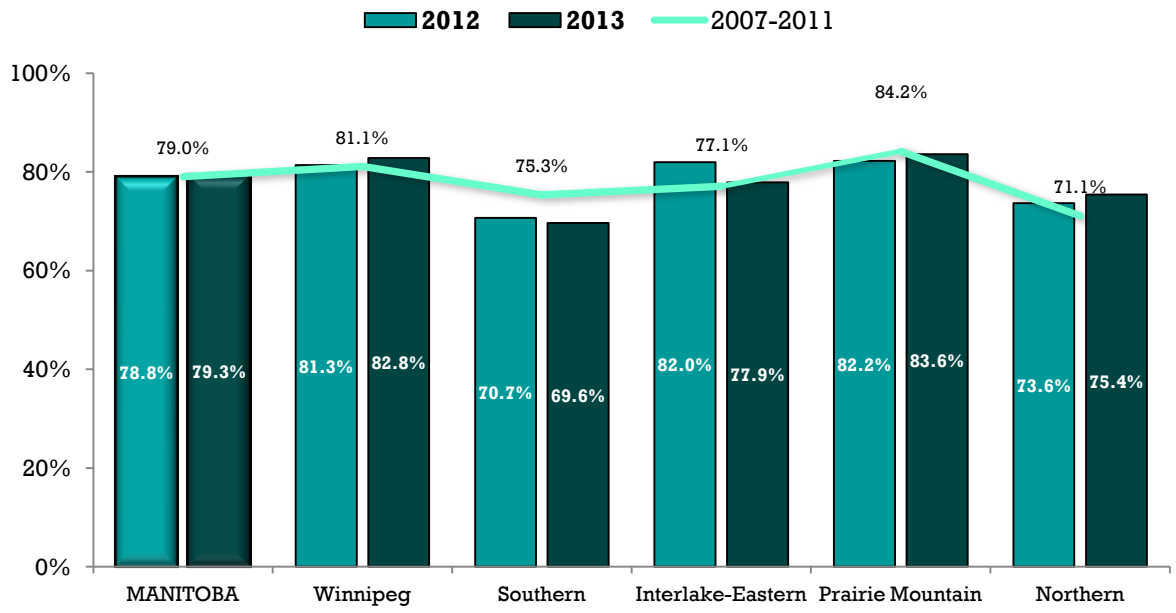
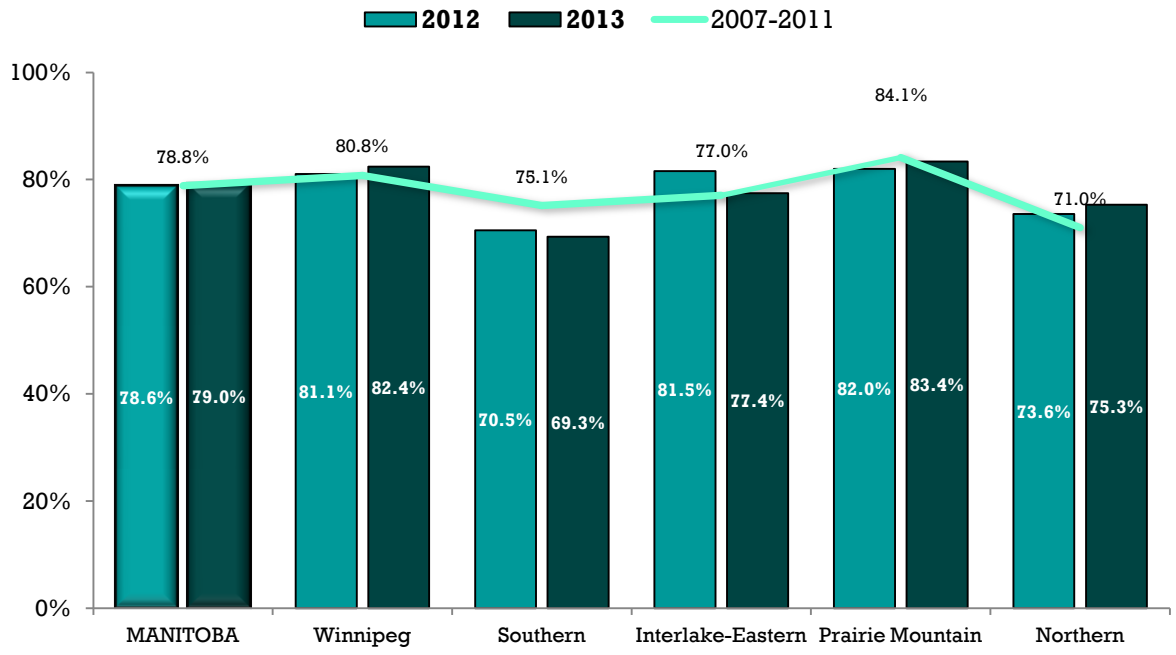


Figure 6: *Haemophilus influenzae* type B Immunization Rates by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

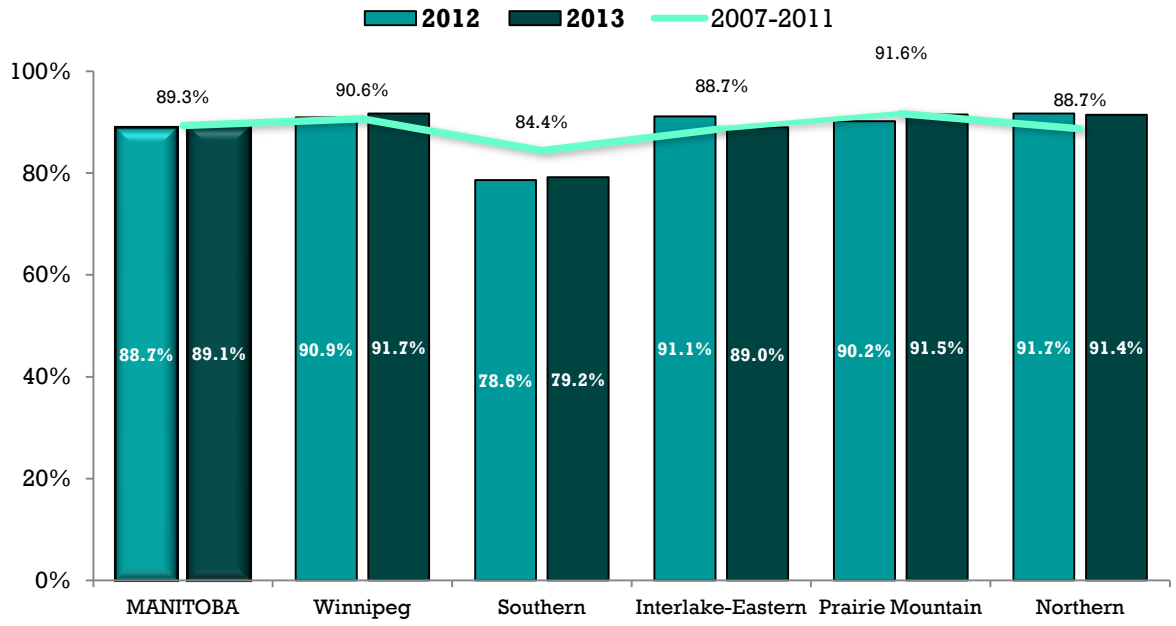


In Manitoba, approximately 8 out of 10 children at age one year received the diphtheria, tetanus, pertussis, and *haemophilus influenzae* type b immunogens in both 2012 and 2013.

Polio

Immunization rates for polio were high overall (Figure 7) since only two doses of polio were required to be complete for age, but the polio immunogen is commonly received as part of the combined vaccine, DTaP-IPV-Hib. In 2012, the percentage of one year olds complete for age ranged from 78.6% (Southern RHA) to 91.7% (Northern RHA). This is very similar to the percentages complete for age in 2013 which ranged from 79.2% (Southern RHA) to 91.7% (Winnipeg RHA). Complete for age rates in Southern RHA during 2012 and 2013 were lower than the complete for age rates during 2007 to 2011 (around 79% in 2012 and 2013 versus around 84% in 2007-2011). Further investigation is required to explain this difference in complete for age rates for polio immunogen.

Figure 7: Polio Immunization Rates by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

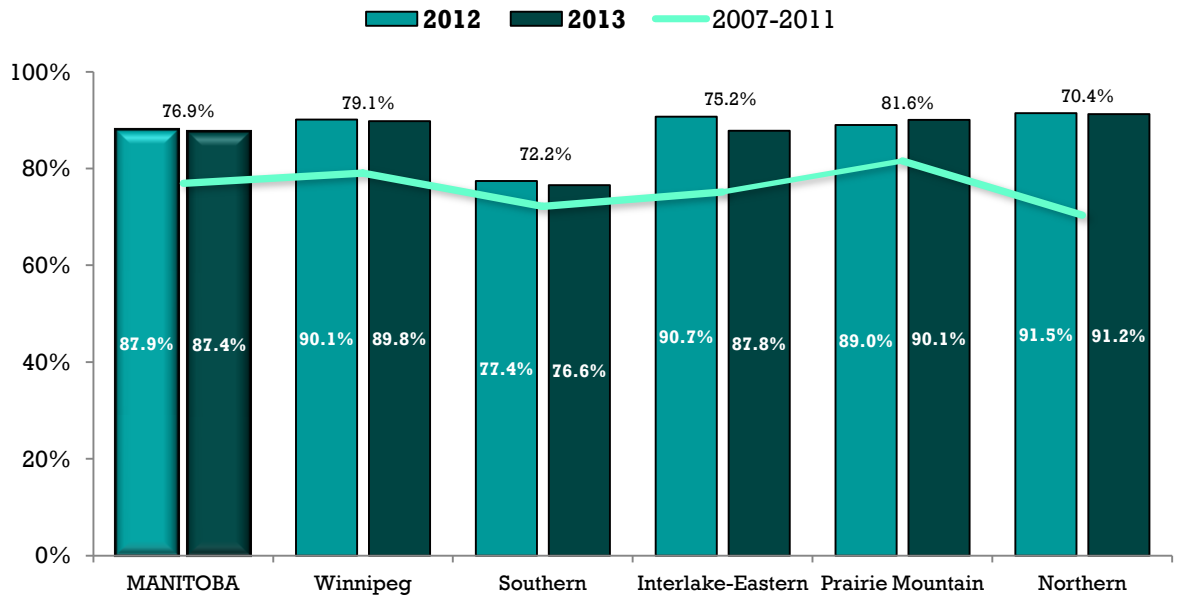


In Manitoba, roughly 9 out of 10 children at age one year received the two doses of polio vaccine in 2012 and 2013.

Pneumococcal Conjugate 13 valent

In Manitoba, the pneumococcal conjugate 13 valent is administered to children at ages two, four, and 12 months. Across the province, almost nine in ten infants (87.9% in 2012 and 87.4% in 2013) met the requirements to be considered complete for age for this vaccine (Figure 8); that is, they received two doses of the vaccine by age one. The complete for age rate in 2012 and 2013 is higher than the previous five years (2007 to 2011); the Manitoba overall completion rate for 2007-2011 was 76.9%, about ten percent less. All RHAs had higher rates in both 2012 and 2013 when compared to their previous five-year average. This is because the number of required doses changed in July 2012, from four doses required at two, four, six, and 18 months of age to only three doses required at two, four, and 12 months of age. There is a noticeable difference between Southern RHA and the other RHAs; in 2012 and 2013, the other RHAs had approximately nine in ten infants complete for age for pneumococcal conjugate 13 valent, while Southern RHA had just below eight in ten infants complete for age. Over the previous five years (from 2007 to 2011), complete for age rates by RHA ranged from 70.4% (Northern RHA) to 81.6% (Prairie Mountain RHA).

Figure 8: Pneumococcal Conjugate 13 valent Immunization Rates by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



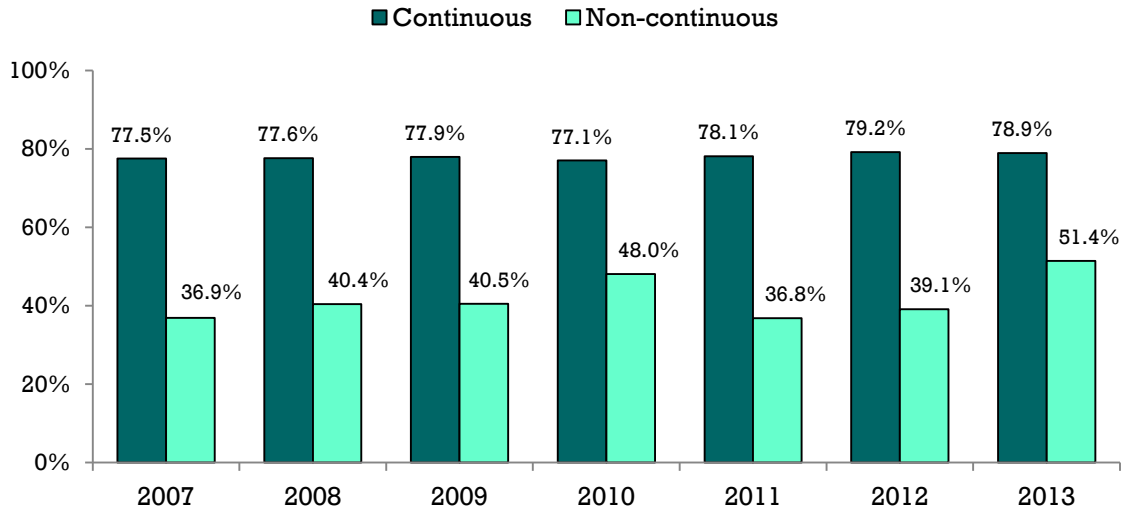
In Manitoba, roughly 9 out of 10 children at age one year received the two doses of pneumococcal conjugate 13 valent in 2012 and 2013.

Section C: Residency and Immunization Rates

Continuous versus Non-continuous Residency, Age 1

During 2007 to 2013, the continuous residents' complete for age rates remained higher than the non-continuous residents' complete for age rates (Figure 9). Approximately three quarters of continuous residents were complete for age at one year compared to between one-third and one-half of non-continuous residents. Additional explanations on the reasons for these differences in rates can be found on page 6. For continuous residents, complete for age rates increased from 77.5% in 2007 to 78.9% in 2013. Similar trend is noticed for non- continuous residents, with 36.9% in 2007 to 51.4% in 2013.

Figure 9: Continuous and Non-continuous Resident Status, Age 1
Percent of children who are complete for age, 2007-2013



The percentages of one year olds considered complete for age is substantially higher for continuous residents in comparison to non-continuous residents.

In all of the RHAs, the percentage of continuous residents' complete for age at one year (Figure 10) was higher than the percentage of non-continuous residents' complete for age at one year (Figure 11), with the exception of Northern RHA in 2013; in that year, the corresponding estimates in Northern RHA were higher for non-continuous residents (115.8% - see footnote in Figure 11 for reason of percentage greater than 100) as compared to continuous residents (74.6%). In both 2012 and 2013, the Winnipeg RHA had the highest complete for age rates for continuous residents (82.5% in 2012 and 83.1% in 2013), but the lowest complete for age rates for non-continuous residents (26.2% in 2012 and 37.8% in 2013).

Figure 10: Continuous Resident Status by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 and 5-year average (2007-2011)

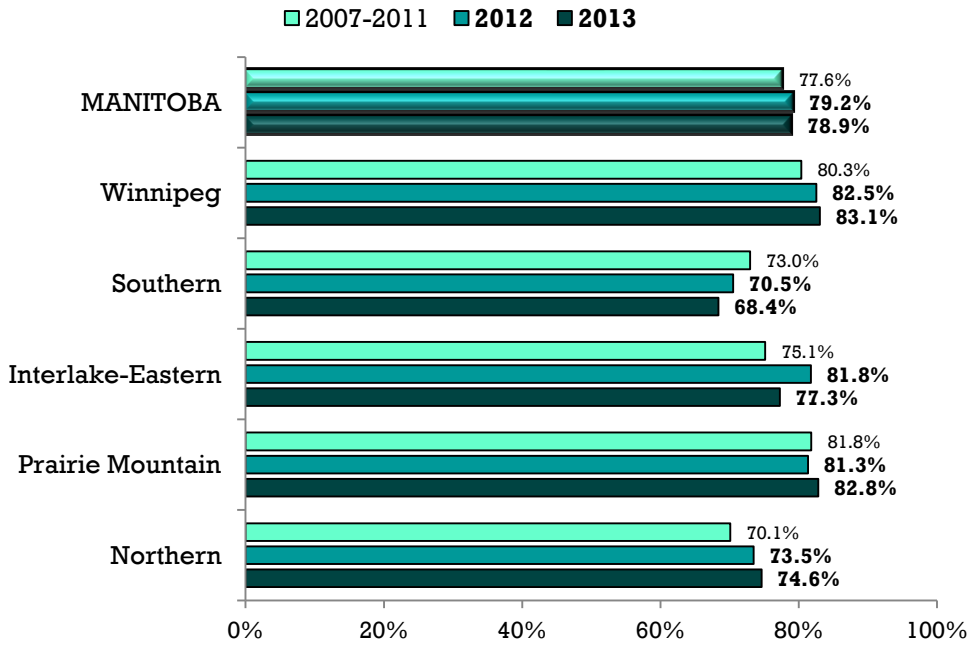
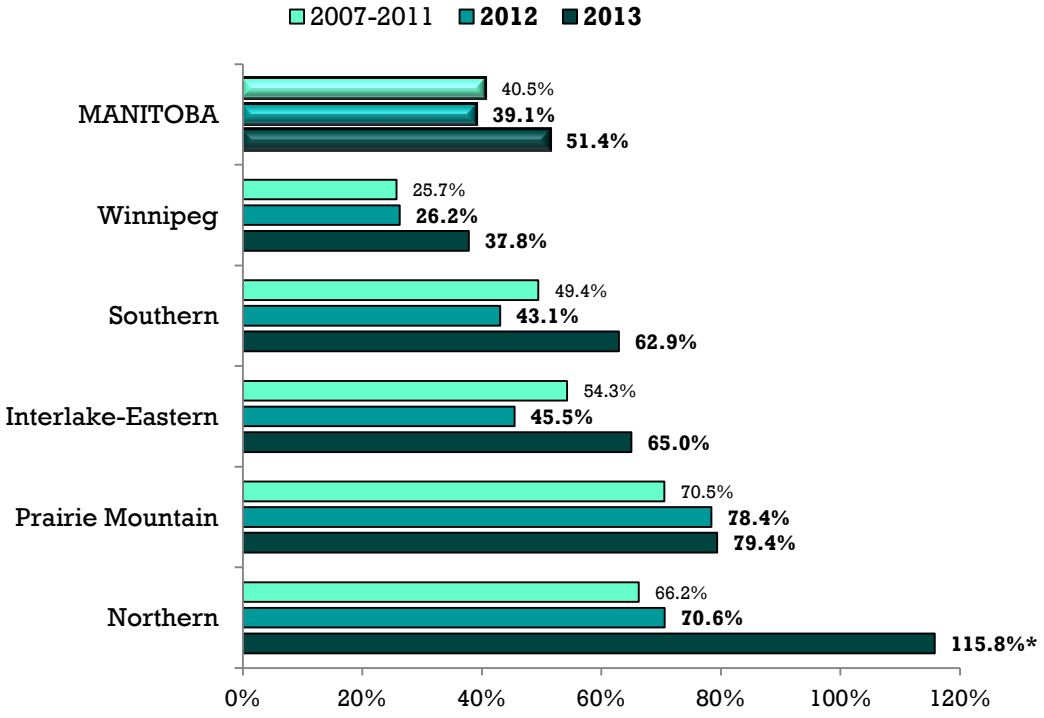


Figure 11: Non-Continuous Resident Status by RHA, Age 1
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



*A percentage greater than 100 occurs when the cell counts are low. The denominator is the population with its geographic allocation set as of June 1 of the report year. The numerator is the population with its geographic allocation set as of the following December 31 of the report year. This creates a disconnection of location which shows when there appears to be fewer individuals in a region than are counted.

Section D: Overview of all Immunization Rates by RHA, Age 1

Table 3: Counts and Percentages for All Immunogens by RHA, Age 1, 2012, 2013 & 5-year average (2007-2011)

Immunogens	MANITOBA		Winnipeg		Southern		Interlake-Eastern		Prairie Mountain		Northern	
2007-2011												
Population	77,934		38,762		13,431		6,883		10,254		8,604	
Diphtheria	**61,630**	79.1%	**31,449**	81.1%	**10,120**	75.3%	**5,309**	77.1%	**8,634**	84.2%	**6,118**	71.1%
Tetanus	**61,632**	79.1%	**31,451**	81.1%	**10,120**	75.3%	**5,309**	77.1%	**8,634**	84.2%	**6,118**	71.1%
Pertussis	**61,596**	79.0%	**31,428**	81.1%	**10,115**	75.3%	**5,305**	77.1%	**8,632**	84.2%	**6,116**	71.1%
Hib	**61,421**	78.8%	**31,302**	80.8%	**10,089**	75.1%	**5,301**	77.0%	**8,621**	84.1%	**6,108**	71.0%
Polio	**69,587**	89.3%	**35,122**	90.6%	**11,333**	84.4%	**6,104**	88.7%	**9,397**	91.6%	**7,631**	88.7%
Pneu-C-13	**59,954**	76.9%	**30,657**	79.1%	**9,700**	72.2%	**5,175**	75.2%	**8,367**	81.6%	**6,055**	70.4%
Measles	**1,975**	2.5%	**1,113**	2.9%	**232**	1.7%	**183**	2.7%	**243**	2.4%	**204**	2.4%
Mumps	**1,883**	2.4%	**1,040**	2.7%	**227**	1.7%	**183**	2.7%	**237**	2.3%	**196**	2.3%
Rubella	**1,890**	2.4%	**1,045**	2.7%	**227**	1.7%	**183**	2.7%	**239**	2.3%	**196**	2.3%
Varicella	**1,657**	2.1%	**944**	2.4%	**184**	1.4%	**162**	2.4%	**194**	1.9%	**173**	2.0%
Men-C-C	**2,143**	2.7%	**1,349**	3.5%	**259**	1.9%	**176**	2.6%	**235**	2.3%	**124**	1.4%
Hepatitis B	**1,960**	2.5%	**1,298**	3.3%	**307**	2.3%	**64**	0.9%	**107**	1.0%	**184**	2.1%
2012												
Population	15,904		7,811		2,858		1,398		2,222		1,615	
Diphtheria	**12,541**	78.9%	**6,357**	81.4%	**2,020**	70.7%	**1,147**	82.0%	**1,827**	82.2%	**1,190**	73.7%
Tetanus	**12,541**	78.9%	**6,357**	81.4%	**2,020**	70.7%	**1,147**	82.0%	**1,827**	82.2%	**1,190**	73.7%
Pertussis	**12,536**	78.8%	**6,354**	81.3%	**2,020**	70.7%	**1,146**	82.0%	**1,827**	82.2%	**1,189**	73.6%
Hib	**12,497**	78.6%	**6,331**	81.1%	**2,016**	70.5%	**1,140**	81.5%	**1,822**	82.0%	**1,188**	73.6%
Polio	**14,107**	88.7%	**7,102**	90.9%	**2,246**	78.6%	**1,274**	91.1%	**2,004**	90.2%	**1,481**	91.7%
Pneu-C-13	**13,972**	87.9%	**7,038**	90.1%	**2,212**	77.4%	**1,268**	90.7%	**1,977**	89.0%	**1,477**	91.5%
Measles	**391**	2.5%	**218**	2.8%	**55**	1.9%	**36**	2.6%	**50**	2.3%	**32**	2.0%
Mumps	**372**	2.3%	**205**	2.6%	**54**	1.9%	**36**	2.6%	**45**	2.0%	**32**	2.0%
Rubella	**376**	2.4%	**205**	2.6%	**55**	1.9%	**36**	2.6%	**48**	2.2%	**32**	2.0%
Varicella	**306**	1.9%	**159**	2.0%	**42**	1.5%	**35**	2.5%	**37**	1.7%	**33**	2.0%
Men-C-C	**410**	2.6%	**212**	2.7%	**54**	1.9%	**37**	2.6%	**70**	3.2%	**37**	2.3%
Hepatitis B	**510**	3.2%	**409**	5.2%	**34**	1.2%	**13**	0.9%	**31**	1.4%	**23**	1.4%
2013												
Population	16,449		8,192		3,037		1,418		2,184		1,618	
Diphtheria	**13,052**	79.3%	**6,788**	82.9%	**2,114**	69.6%	**1,104**	77.9%	**1,826**	83.6%	**1,220**	75.4%
Tetanus	**13,052**	79.3%	**6,788**	82.9%	**2,114**	69.6%	**1,104**	77.9%	**1,826**	83.6%	**1,220**	75.4%
Pertussis	**13,047**	79.3%	**6,784**	82.8%	**2,114**	69.6%	**1,104**	77.9%	**1,825**	83.6%	**1,220**	75.4%
Hib	**12,995**	79.0%	**6,753**	82.4%	**2,105**	69.3%	**1,098**	77.4%	**1,821**	83.4%	**1,218**	75.3%
Polio	**14,656**	89.1%	**7,512**	91.7%	**2,405**	79.2%	**1,262**	89.0%	**1,998**	91.5%	**1,479**	91.4%
Pneu-C-13	**14,371**	87.4%	**7,357**	89.8%	**2,326**	76.6%	**1,245**	87.8%	**1,967**	90.1%	**1,476**	91.2%
Measles	**491**	3.0%	**310**	3.8%	**49**	1.6%	**37**	2.6%	**63**	2.9%	**32**	2.0%
Mumps	**465**	2.8%	**291**	3.6%	**49**	1.6%	**38**	2.7%	**56**	2.6%	**31**	1.9%
Rubella	**464**	2.8%	**290**	3.5%	**49**	1.6%	**37**	2.6%	**57**	2.6%	**31**	1.9%
Varicella	**354**	2.2%	**204**	2.5%	**41**	1.4%	**34**	2.4%	**46**	2.1%	**29**	1.8%
Men-C-C	**458**	2.8%	**259**	3.2%	**62**	2.0%	**36**	2.5%	**62**	2.8%	**39**	2.4%
Hepatitis B	**518**	3.1%	**383**	4.7%	**39**	1.3%	**20**	1.4%	**34**	1.6%	**42**	2.6%

Note. Hib = haemophilus influenzae type b; Pneu-C-13 = pneumococcal conjugate 13 valent; Men-C-C = meningococcal C conjugate.

Immunizations at Age 2

Section A: Immunizations in Manitoba

Table 4: Recommended Immunization Schedule, Age 2

Vaccine	Age	
	12 months	18 months
DTaP-IPV-Hib Diphtheria, Tetanus, Pertussis, Polio, *Haemophilus influenzae* type b		♦
Pneu-C-13 Pneumococcal Conjugate 13 valent	♦	
MMRV Measles, Mumps, Rubella, Varicella	♦	
Men-C-C Meningococcal C Conjugate	♦	

♦ A single dose given with one needle.

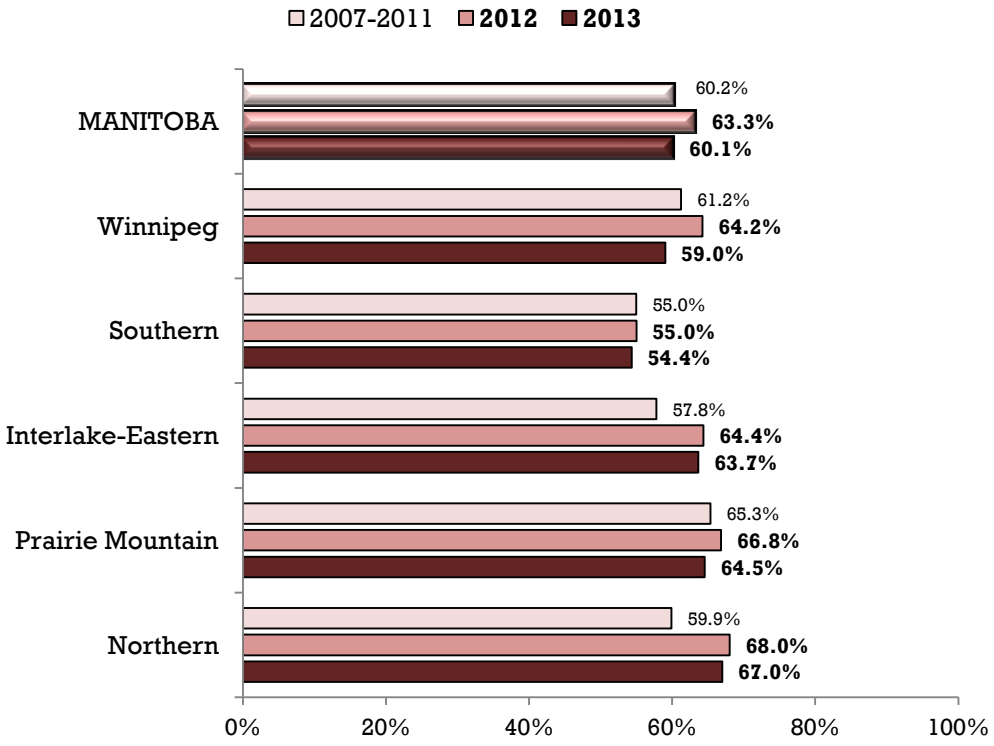
At age two, Manitoba's universal childhood immunization program provides added protection (sometimes described as *boosting*) against the following bacterial pathogens: diphtheria, tetanus, pertussis, *haemophilus influenzae* type b, and s*treptococcus pneumoniae*. The age two program also provides protection against the following viral infections: measles, mumps, rubella, varicella (chickenpox), and polio. MHHLS sends reminder letters to parents of children aged 15 months and 20 months, who are missing recommended immunizations, encouraging them to ensure their children's immunizations are up-to-date.

The immunization status of children at age two in 2012 represents those who were born in 2010 and who turned two years old in 2012 (2010 birth cohort); the immunization status of children at age two in 2013 represents those who were born in 2011 and turned two years old in 2013 (2011 birth cohort). The data reported is for children who have received all of their scheduled doses, as shown in Table 4, in addition to the doses recommended at age one, if applicable. In order to be considered complete for age at two years, children need to have four doses of diphtheria, tetanus, pertussis, and Hib; three doses of polio and Pneu-C-13; and one dose of measles, mumps, rubella, varicella, and Men-C-C (for an overview of immunogens required to be complete for age, refer to Table 1). If a child missed one of these immunogens, s/he was not considered complete for age at 2 years. Therefore, *overall* complete for age estimates is expected to be lower than the immunogen-specific complete for age estimates.

Manitoba Immunization Rates, Age 2

In Manitoba, 63.3% and 60.1% of two year olds were complete for age in 2012 and 2013, respectively (Figure 12). This percentage is calculated with a denominator of all two year olds in Manitoba, with active MHHLS PHINs (n_{2012}=16,190 and n_{2013}=16,136) and a numerator containing all two year olds who had received their required vaccinations (n_{2012}=10,247 and n_{2013}=9,704). The percentage of children complete for age two did vary by RHA. In 2012 and 2013, Northern RHA had the highest percentage of two year-olds complete for age (68.0% in 2012 and 67.0% in 2013) while Southern RHA had the lowest (55.0% in 2012 and 54.4% in 2013). During 2007 to 2011, the corresponding estimates were the highest in Prairie Mountain RHA (65.3%), and the lowest in Southern RHA (55.0%).

Figure 12: Manitoba Immunization Rates by RHA, Age 2
Percent of children who are complete for age by RHA, Age 2, 2012, 2013 & 5-year average (2007-2011)

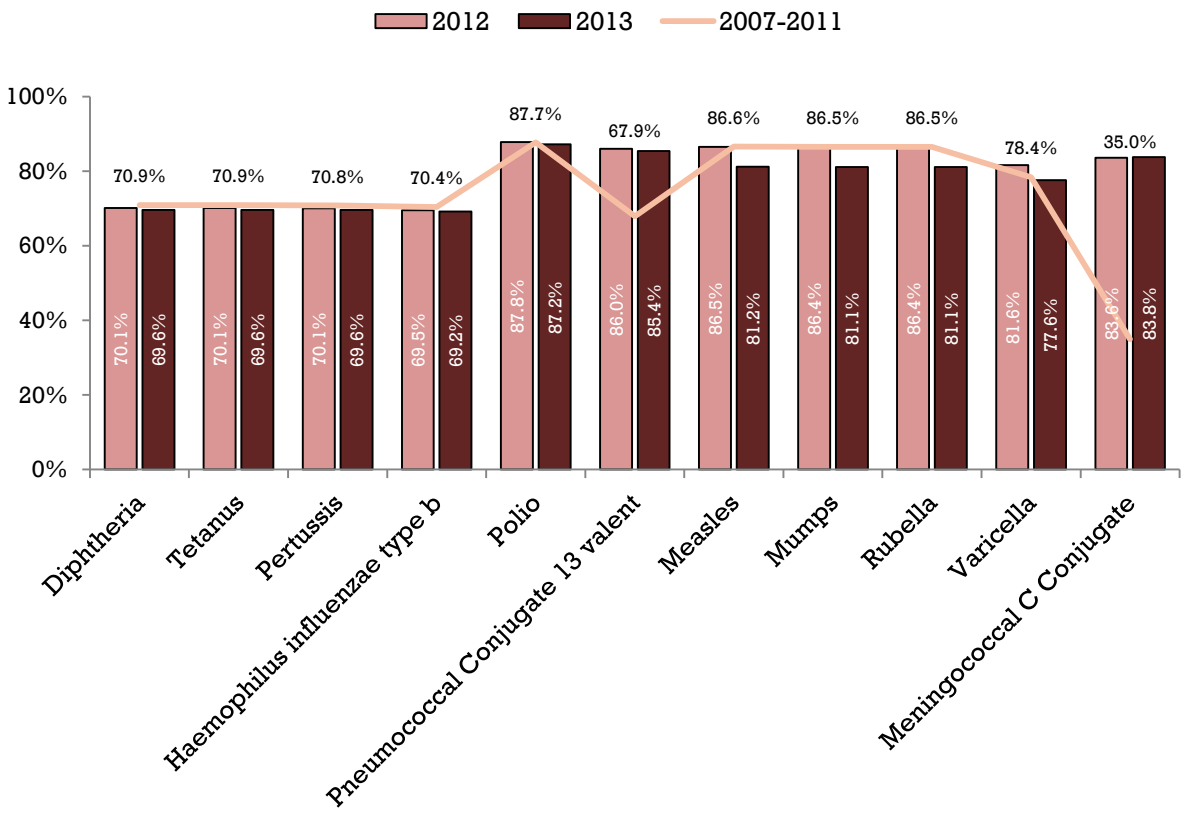


In 2012 and 2013, about 6 out of 10 two year old Manitobans were considered complete for age for all required vaccines.

As shown in Figure 13, in both 2012 and 2013, just under three quarters (7 in 10) of Manitoba's two year olds received all recommended doses for diphtheria, tetanus, pertussis, and Hib. Roughly, between eight and nine out of ten children were complete for age for polio, Pneu-C-13, measles, mumps, rubella, and varicella (MMRV), and Men-C-C vaccines.

Complete for age estimates for these immunogens were somewhat higher than the corresponding estimates for diphtheria, tetanus, pertussis, and Hib. Possible reasons for this are: one less dose of polio vaccine is required to be considered complete for age, compared to tetanus, diphtheria, pertussis, and Hib; Pneu-C-13, MMRV, and Men-C-C vaccines were scheduled to be given at 12 months while tetanus, diphtheria, pertussis, and Hib were scheduled to be given at 18 months. This provides longer time period (i.e., 12 months) for Pneu-C-13, MMRV, and Men-C-C to be received before at age two as compared to only 6 months for tetanus, diphtheria, pertussis, and Hib.

Figure 13: Manitoba Immunization Rates by Immunogens, Age 2
Percent of children who are complete for age for diphtheria, tetanus, pertussis, haemophilus influenzae type B, polio, pneumococcal conjugate 13 valent, measles, mumps, rubella, varicella, and meningococcal C conjugate, 2012, 2013 & 5-year average (2007-2011)



Section B: Immunization Rates by RHA, Age 2

Diphtheria, Tetanus, Pertussis, and *Haemophilus influenzae* type b

By the end of two years of age, children who are complete for age would have received four doses of diphtheria, tetanus, acellular pertussis, and *haemophilus influenzae* type b, typically given (with polio) in a combined vaccine (DTaP-IPV-Hib) at two, four, six, and 18 months. As shown in Figures 14 to17, complete for age rates for two year olds in Manitoba was fairly consistent over time, hovering around the 70% mark. As vaccines are typically given in a combined vaccine, the rates for the different immunogens are very similar. Across the province, in both 2012 and 2013, Southern RHA had the lowest complete for age rates for all four immunogens. Prairie Mountain RHA had the highest complete for age rates in 2012, 2013 and over the 5-year average (2007 – 2011), for all four immunogens.

Figure 14: Diphtheria Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

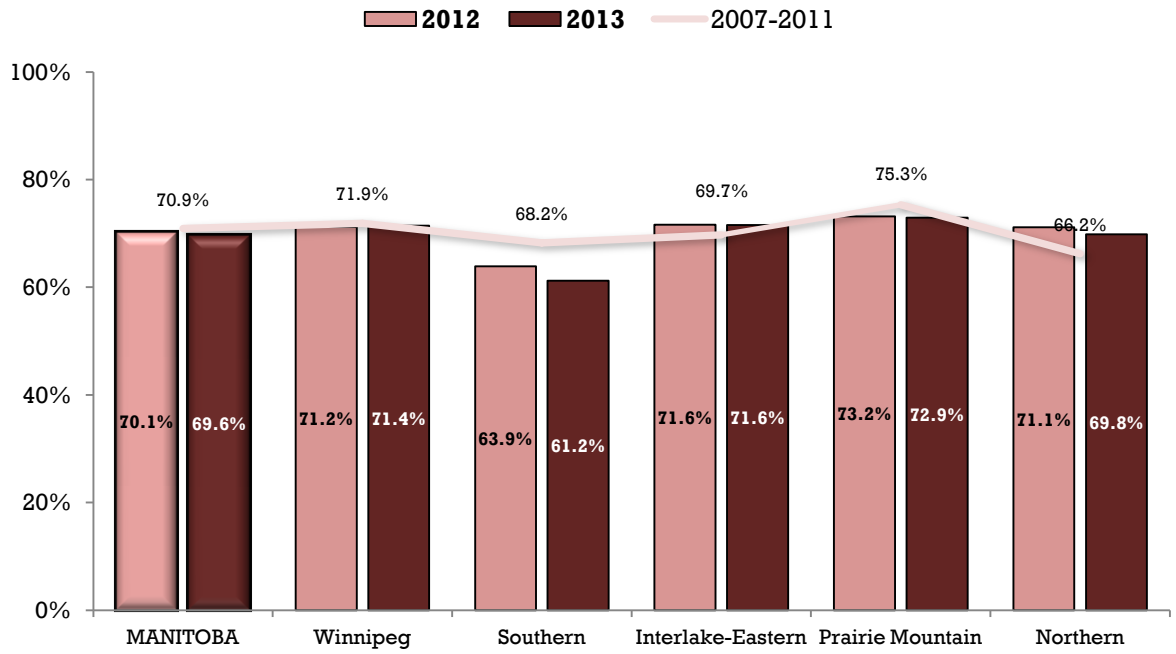


Figure 15: Tetanus Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

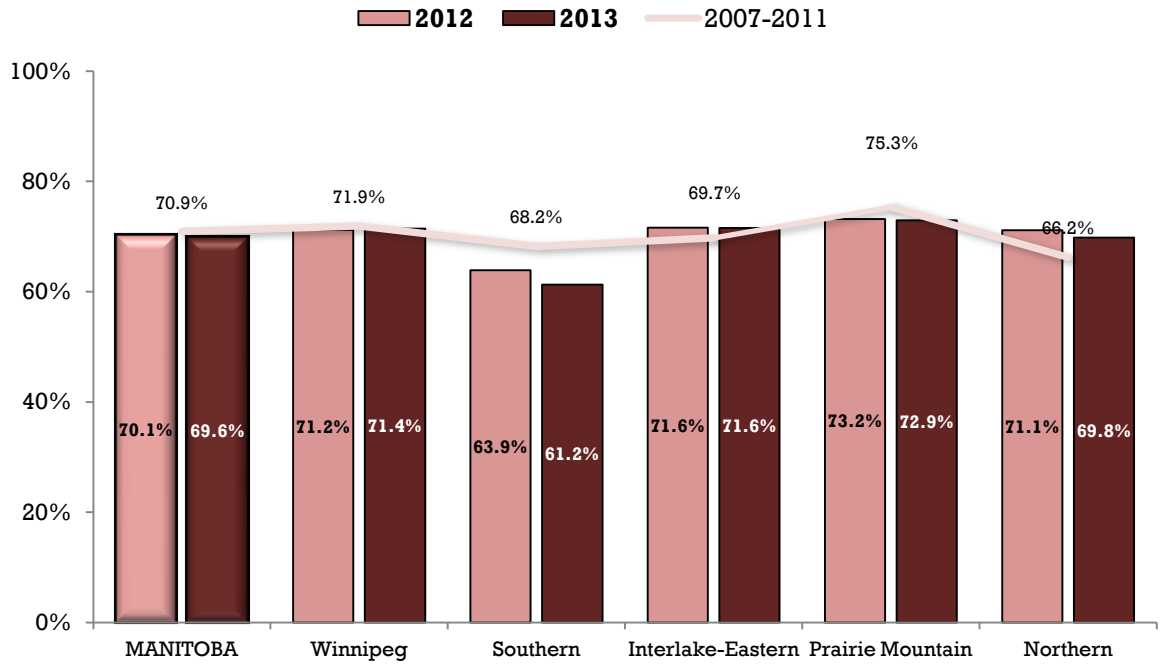


Figure 16: Pertussis Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

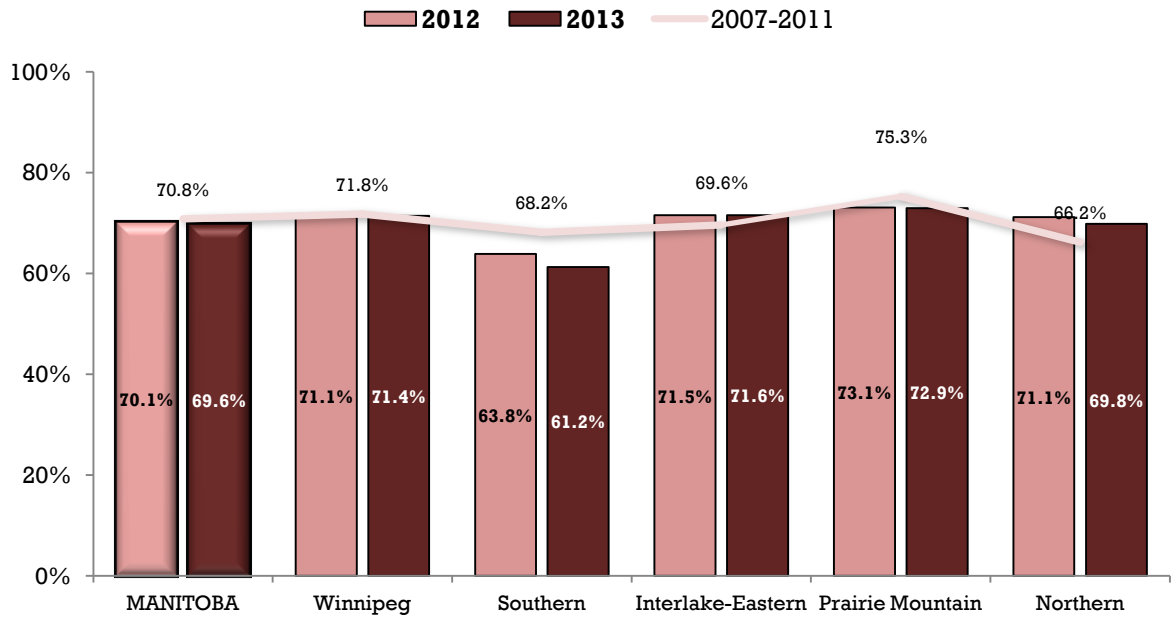
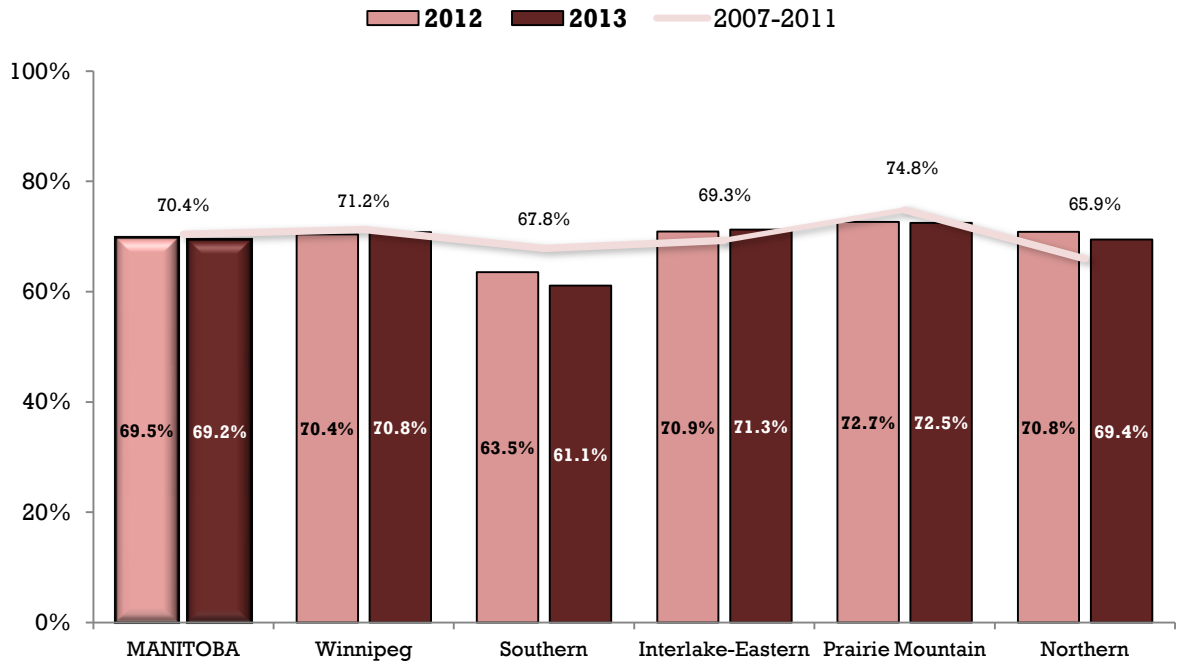


Figure 17: *Haemophilus influenzae* type b Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

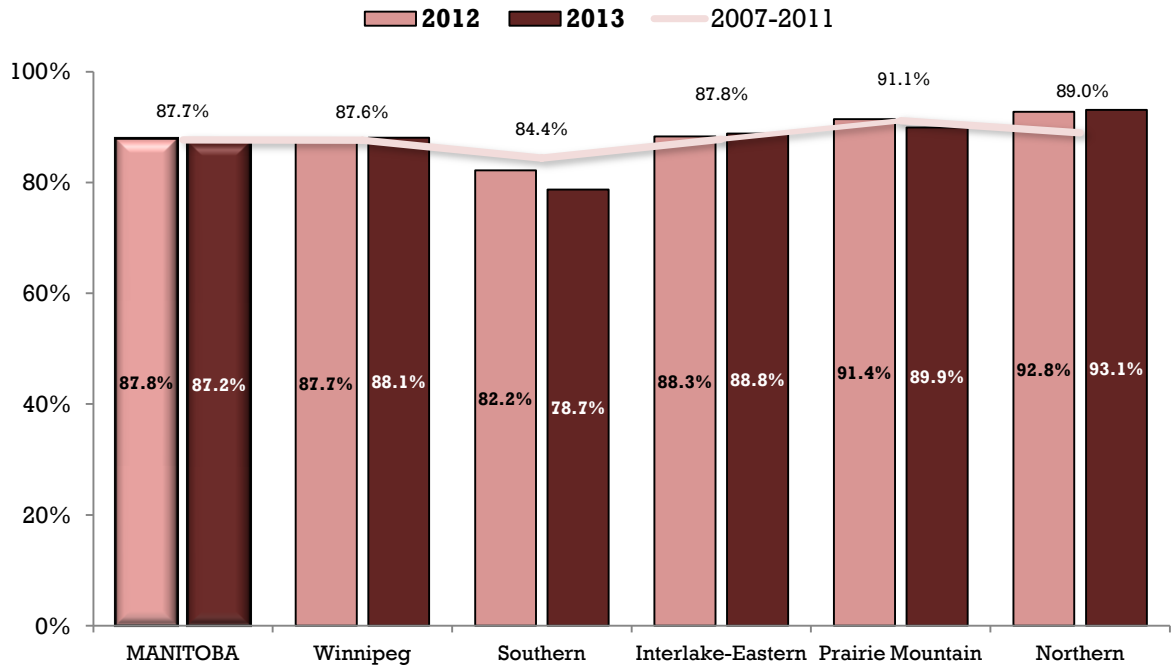


Polio

Children who are complete for age at two years for polio should have received at least three doses of the vaccine (administered at two, four, and 18 months). The polio immunogen is typically administered as part of a combined vaccine that also includes diphtheria, tetanus, pertussis, and Hib (DTaP-IPV-Hib), given in four doses, at 2, 4, 6 and 18 months. Therefore, the uptake rates for polio vaccine are considerably higher than the other component antigens in the 4-in-1 vaccine because one less dose of polio vaccine is required to be considered complete for age, compared to tetanus, diphtheria, pertussis, and Hib.

Across the province, roughly nine out of ten two-year olds (87.8% in 2012 and 87.2% in 2013) received the required number of doses to be considered complete for age for the polio vaccine (Figure 18). The polio vaccination rates at age two varied by RHA (Figure 18). For example, in 2013, four RHAs had complete for age rates within five percent of each other, ranging from 88.1% (Winnipeg RHA) to 93.1% (Northern RHA), while Southern RHA had a completion rate of 78.7%. The polio vaccination complete for age rates for two year olds were fairly close to those of the one year olds (Figure 7), and followed the same trend where Southern RHA had the lowest completion rates.

Figure 18: Polio Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

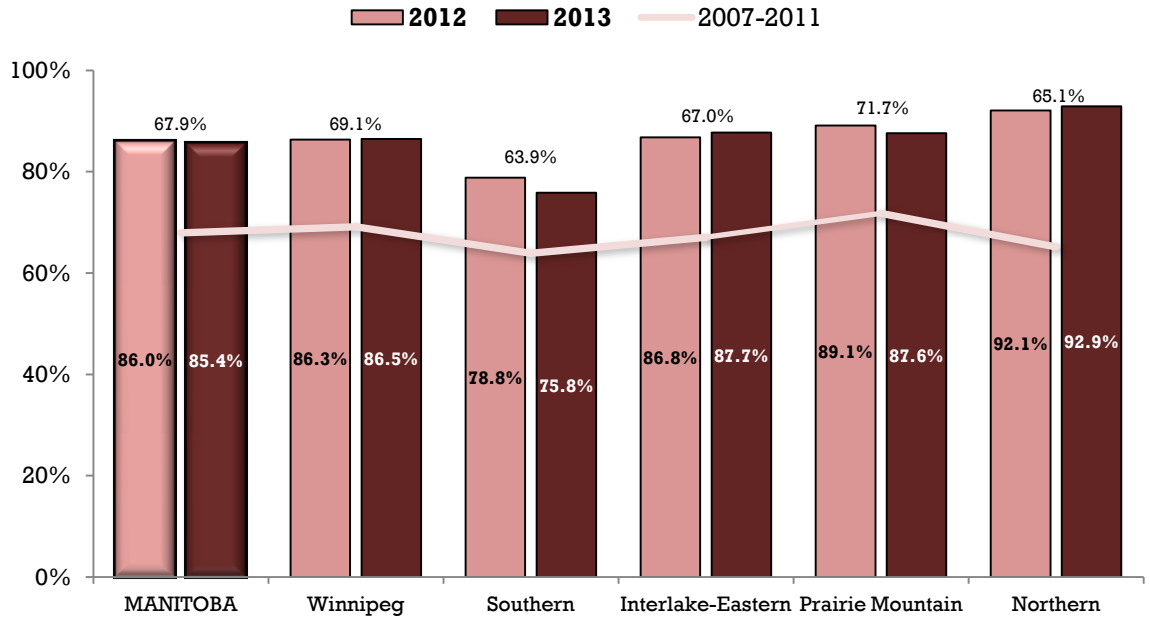


Pneumococcal Conjugate 13 valent

The pneumococcal conjugate 13 valent (Pneu-C-13) is administered to children at ages two, four, and 12 months. Figure 19 shows that just under nine in ten children received the three doses of vaccine necessary to be considered complete for age at two years (86.0% in 2012 and 85.4% in 2013). There continues to be some variation between RHAs; Southern RHA had lowest complete for age rates in 2012 and 2013 (63.9% and 78.8, respectively) whereas Northern RHA had the highest complete for age rates during both years (92.1% in 2012 and 92.9% in 2013).

The complete for age for this vaccine was almost 20% higher in 2012 and 2013 than in the 5-year average; this is due to a change in the Pneu-C-13 vaccination schedule. In July 2012, the Pneu-C-13 schedule was changed from requiring four doses to be complete for age, to requiring only three doses to be complete for age (note: high risk groups and those living in First Nations communities remain at the four dose schedule at two, four, six, and 18 months).

Figure 19: Pneumococcal conjugate 13 valent Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



In Manitoba, just under 9 out of 10 two year olds were considered complete for age for pneumococcal conjugate 13 valent in 2012 and 2013.

Measles, Mumps, Rubella, and Varicella

Starting in 2012, immunization protection for measles, mumps, rubella, and varicella was typically provided through a combination vaccine (MMRV) but it was also available as separate vaccines – MMR and V. Complete for age rates for measles (Figure 20), mumps (Figure 21), and rubella (Figures 22) were very similar as a result of these vaccines commonly being given in one combined dose.

Among all RHAs, Southern RHA had the lowest complete for age rates for measles, mumps, and rubella (roughly 80% in 2012 and 75% in 2013), and Northern RHA had the highest complete for age rates for the same vaccines (roughly 92% in 2012 and 93% in 2013). Overall, Manitoba's complete for age rates in 2013 was around 5% lower than the 2012 and 2007 – 2011 complete for age rates (81.2% in 2013 versus 86.5% in 2012 and 86.6% in 2007-2011). Opposite was true for Northern RHA where 2013 complete for age rate (92.5%) was comparable with the 2012 complete for age rate (92.1%) but slightly higher than 2007-2011 complete for age rate (89.5%). Varicella complete for age rates were somewhat lower than the complete for age rates for measles, mumps, and rubella but followed the similar trend (Figure 23). Further investigation is required to determine the reason of lower complete for age rate for varicella.

Figure 20: Measles Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

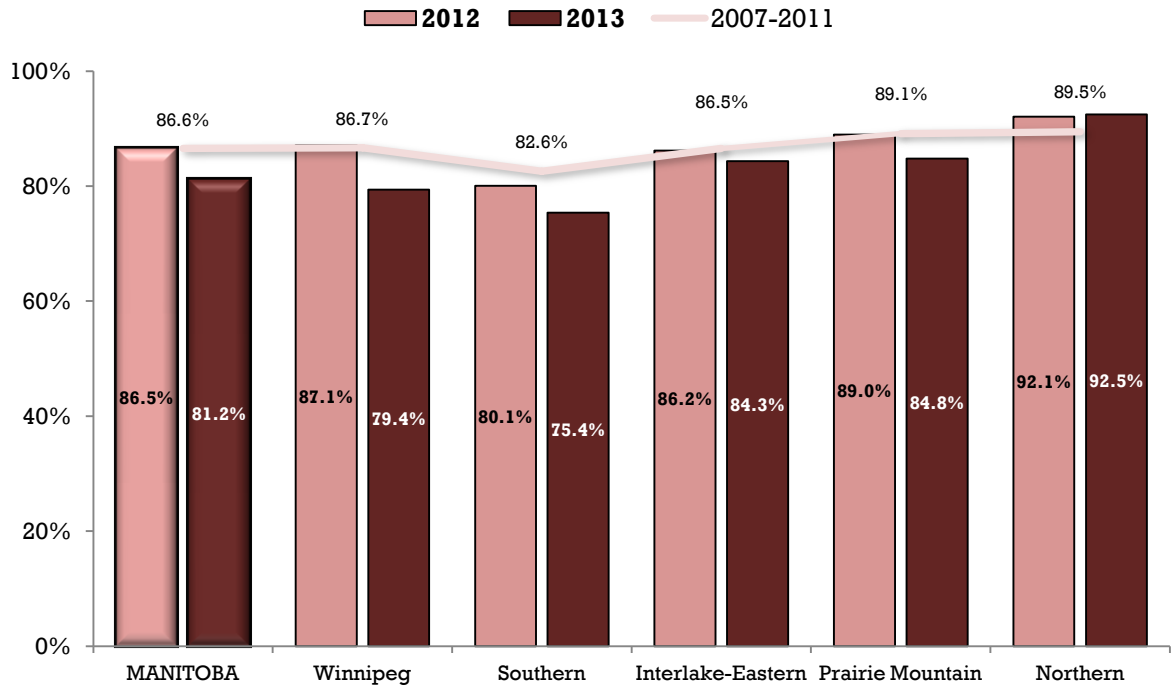


Figure 21: Mumps Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013, & 5-year average (2007-2011)

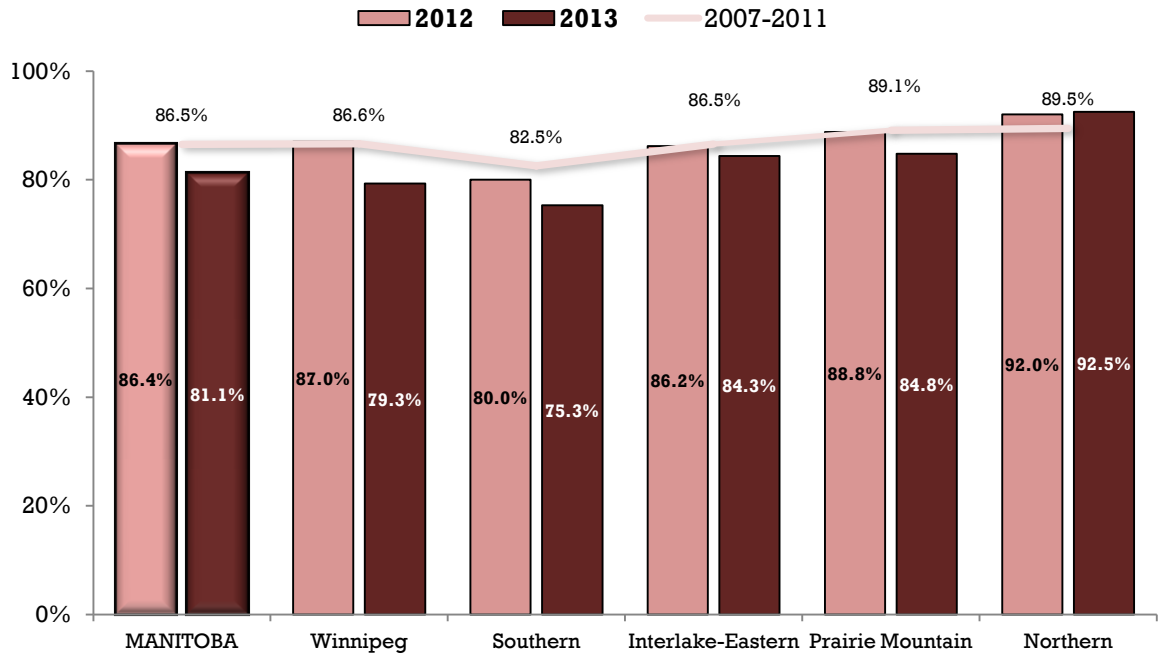


Figure 22: Rubella Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

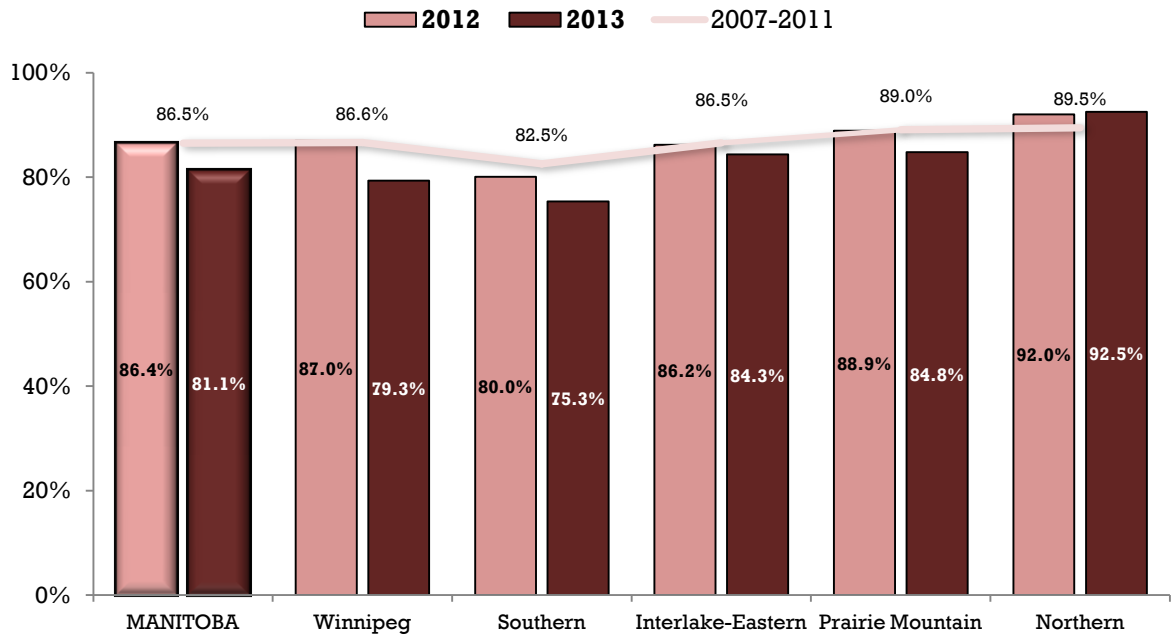
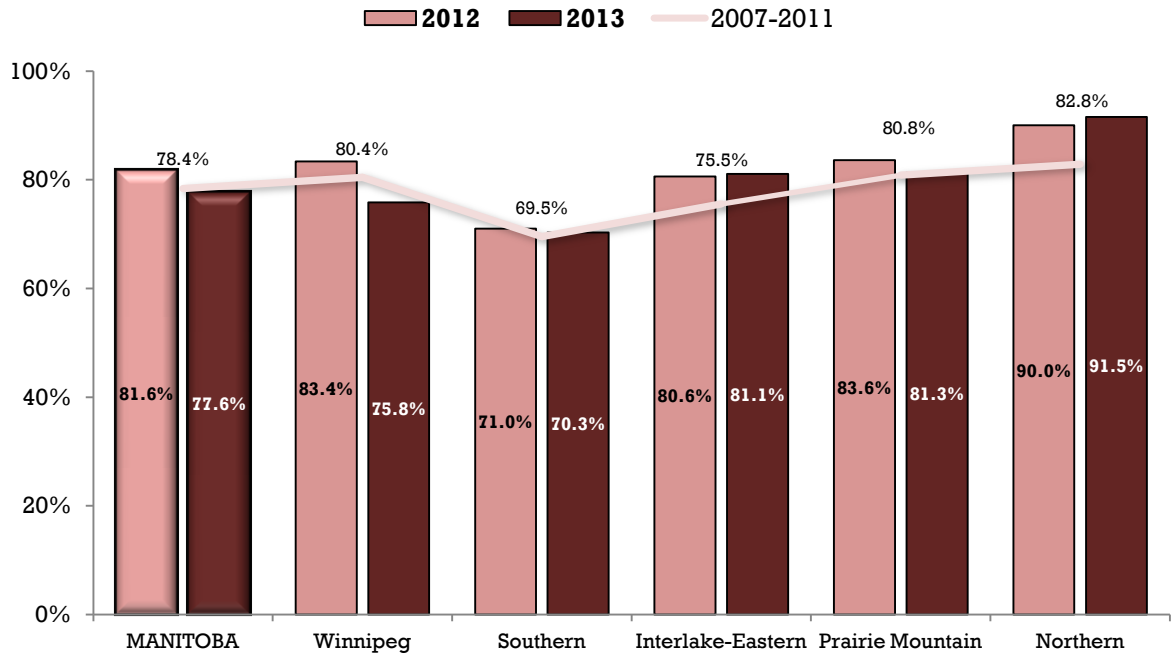


Figure 23: Varicella Immunization Rates by RHA, Age 2

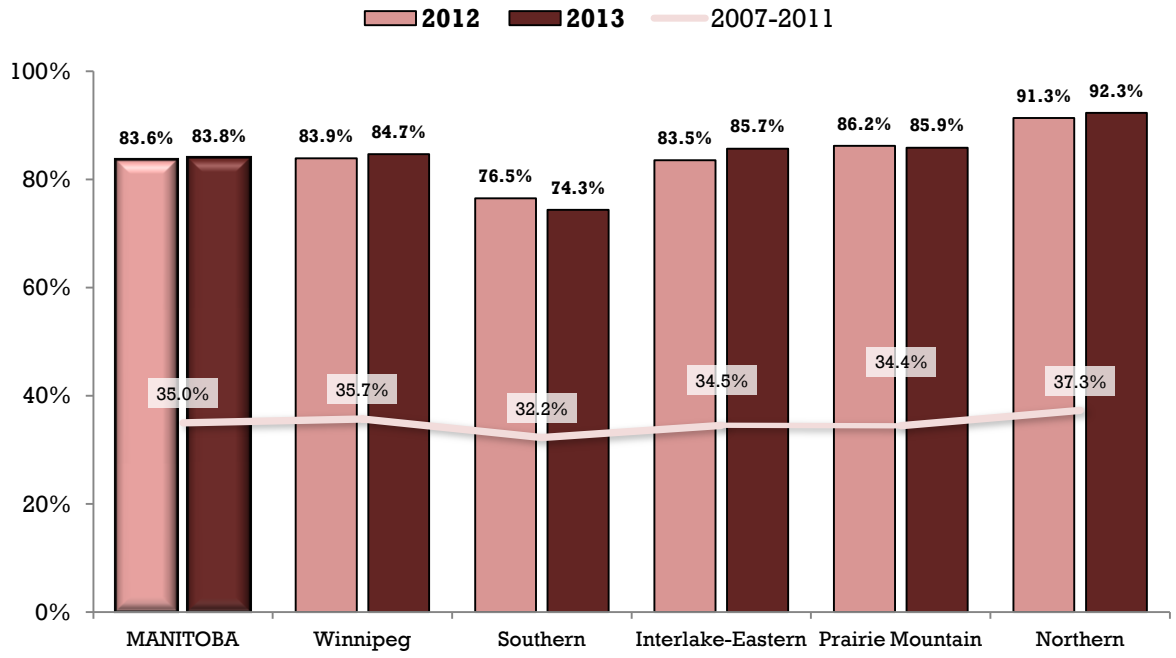
Percent of children who are complete for age, 2012, 2013, & 5-year average (2007-2011)



Meningococcal C Conjugate

In 2009, the meningococcal C conjugate (Men-C-C) vaccine was introduced for all infants at the 12 month mark to be given at the same time as the measles, mumps, rubella and varicella vaccines. Previous to that, Men-C-C was only provided to young children with high-risk medical conditions and/or grade four students. As a result of the change in the Men-C-C vaccination schedule, a higher proportion of two year olds received Men-C-C in 2012 (83.6%) and 2013 (83.8%) than the previous 5-year average (35.0%) (Figure 24). There continues to be some variation between RHAs; Southern RHA had lowest complete for age rates in 2012 and 2013 (76.5% and 74.3%, respectively) whereas Northern RHA had the highest complete for age rates during both years (91.3% in 2012 and 92.3% in 2013).

Figure 24: Meningococcal C Conjugate Immunization Rates by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



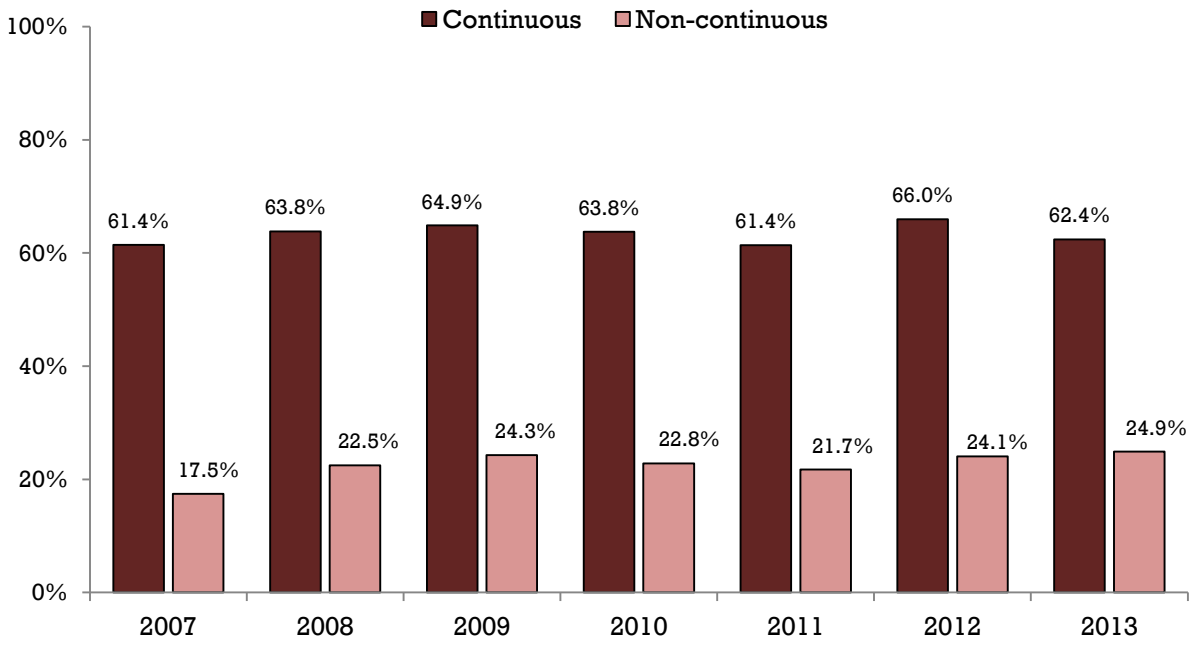
In 2012 and 2013, roughly 8 out of 10 two year old Manitobans had received the meningococcal C conjugate vaccine.

Section C: Residency and Immunization Rates

Continuous versus Non-continuous Residency, Age 2

From 2007 to 2013, approximately two-thirds of continuous residents were complete for age at two years compared to around one-quarter of non-continuous residents (Figure 25). Explanations for the differences in rates between continuous and non-continuous residents can be found on page 6. Complete for age rates for both continuous and non-continuous residents slightly increased from 2007 to 2013. For example, the corresponding rate among non-continuous residents was 17.5% in 2007 and increased to 24.9% in 2013.

Figure 25: Continuous and Non-Continuous Resident Status, Age 2
Percent of children who are complete for age, 2007-2013



In Manitoba, the percentage of two year olds considered complete for age is over two times higher for continuous residents in comparison to non-continuous residents.

The complete for age rates by RHA for continuous and non-continuous residents are presented in Figure 26 and Figure 27, respectively. Among continuous residents, while Southern RHA had the lowest complete for age rates for 2012 (56.2%) and 2013 (55.4%), the highest rate during same years were noted in Winnipeg RHA (68.7%) and in Northern RHA (66.8%), respectively (Figure 26). The corresponding estimates followed different trend among non-continuous residents (Figure 27); while Winnipeg RHA had the lowest complete for age rates for 2012 (14.4%) and 2013 (15.3%), the highest rate were noted in Interlake-Eastern RHA in 2012(55.8%) and in Northern RHA in 2013 (76.9%).

Figure 26: Continuous Resident Status by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

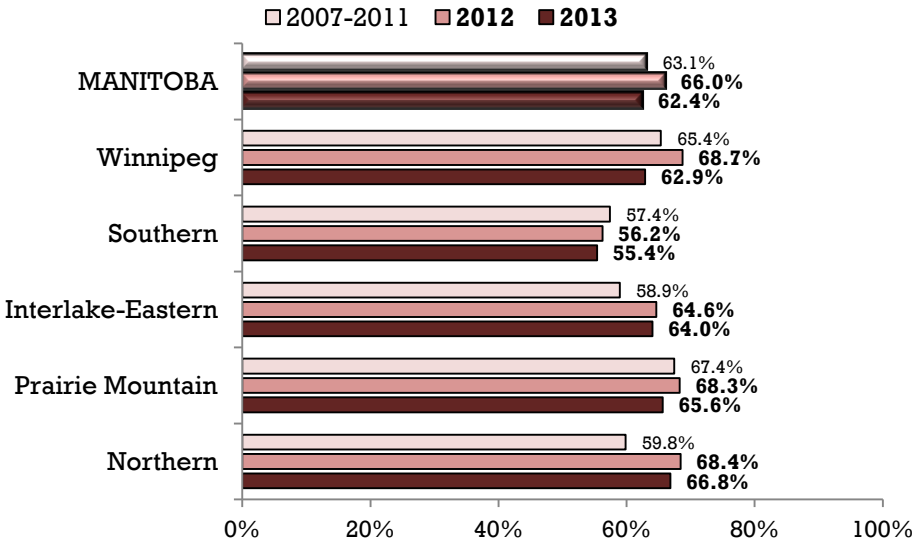
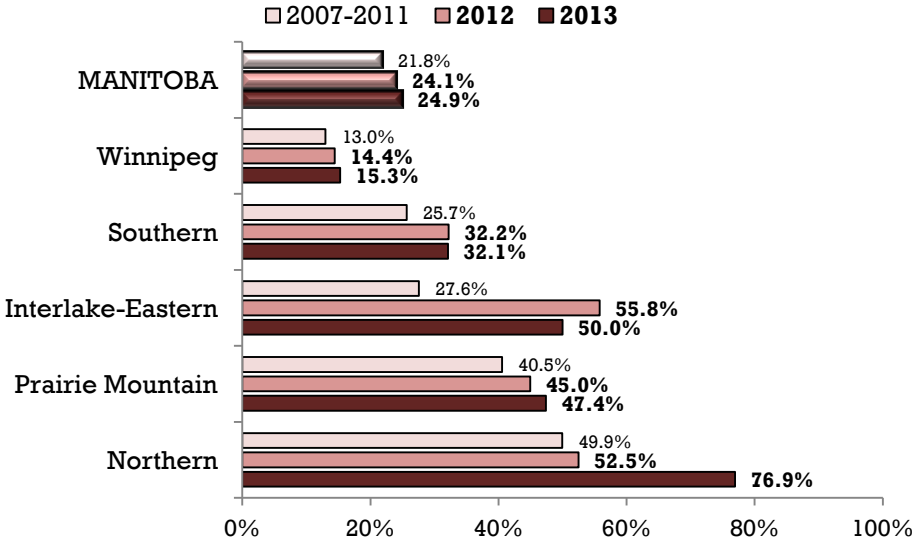


Figure 27: Non-Continuous Resident Status by RHA, Age 2
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



Section D: Overview of All Immunization Rates by RHA, Age 2

Table 5: Counts and Percentages for All Immunogens by RHA, Age 2, 2012, 2013 & 5-year average (2007-2011)

Immunogens	MANITOBA		Winnipeg		Southern		Interlake-Eastern		Prairie Mountain		Northern	
2007-2011												
Population	77,475		38,581		13,476		6,884		10,179		8,355	
Diphtheria	**54,913**	70.9%	**27,728**	71.9%	**9,191**	68.2%	**4,799**	69.7%	**7,664**	75.3%	**5,531**	66.2%
Tetanus	**54,912**	70.9%	**27,727**	71.9%	**9,191**	68.2%	**4,799**	69.7%	**7,664**	75.3%	**5,531**	66.2%
Pertussis	**54,870**	70.8%	**27,693**	71.8%	**9,189**	68.2%	**4,793**	69.6%	**7,664**	75.3%	**5,531**	66.2%
Hib	**54,521**	70.4%	**27,487**	71.2%	**9,142**	67.8%	**4,770**	69.3%	**7,615**	74.8%	**5,507**	65.9%
Polio	**67,922**	87.7%	**33,797**	87.6%	**11,372**	84.4%	**6,044**	87.8%	**9,276**	91.1%	**7,433**	89.0%
Pneu-C-13	**52,621**	67.9%	**26,654**	69.1%	**8,607**	63.9%	**4,615**	67.0%	**7,303**	71.7%	**5,442**	65.1%
Measles	**67,069**	86.6%	**33,432**	86.7%	**11,130**	82.6%	**5,958**	86.5%	**9,074**	89.1%	**7,475**	89.5%
Mumps	**67,030**	86.5%	**33,407**	86.6%	**11,123**	82.5%	**5,958**	86.5%	**9,068**	89.1%	**7,474**	89.5%
Rubella	**67,029**	86.5%	**33,409**	86.6%	**11,124**	82.5%	**5,958**	86.5%	**9,064**	89.0%	**7,474**	89.5%
Varicella	**60,738**	78.4%	**31,023**	80.4%	**9,369**	69.5%	**5,199**	75.5%	**8,226**	80.8%	**6,921**	82.8%
Men-C-C	**27,106**	35.0%	**13,769**	35.7%	**4,345**	32.2%	**2,376**	34.5%	**3,503**	34.4%	**3,113**	37.3%
Hepatitis B	**3,163**	4.1%	**2,064**	5.3%	**567**	4.2%	**113**	1.6%	**213**	2.1%	**206**	2.5%
2012												
Population	16,190		8,088		2,951		1,412		2,056		1,683	
Diphtheria	**11,354**	70.1%	**5,757**	71.2%	**1,885**	63.9%	**1,011**	71.6%	**1,504**	73.2%	**1,197**	71.1%
Tetanus	**11,354**	70.1%	**5,757**	71.2%	**1,885**	63.9%	**1,011**	71.6%	**1,504**	73.2%	**1,197**	71.1%
Pertussis	**11,346**	70.1%	**5,753**	71.1%	**1,884**	63.8%	**1,010**	71.5%	**1,502**	73.1%	**1,197**	71.1%
Hib	**11,256**	69.5%	**5,694**	70.4%	**1,875**	63.5%	**1,001**	70.9%	**1,494**	72.7%	**1,192**	70.8%
Polio	**14,209**	87.8%	**7,095**	87.7%	**2,426**	82.2%	**1,247**	88.3%	**1,880**	91.4%	**1,561**	92.8%
Pneu-C-13	**13,916**	86.0%	**6,983**	86.3%	**2,326**	78.8%	**1,225**	86.8%	**1,832**	89.1%	**1,550**	92.1%
Measles	**14,004**	86.5%	**7,045**	87.1%	**2,363**	80.1%	**1,217**	86.2%	**1,829**	89.0%	**1,550**	92.1%
Mumps	**13,991**	86.4%	**7,037**	87.0%	**2,362**	80.0%	**1,217**	86.2%	**1,826**	88.8%	**1,549**	92.0%
Rubella	**13,994**	86.4%	**7,039**	87.0%	**2,362**	80.0%	**1,217**	86.2%	**1,827**	88.9%	**1,549**	92.0%
Varicella	**13,210**	81.6%	**6,743**	83.4%	**2,095**	71.0%	**1,138**	80.6%	**1,719**	83.6%	**1,515**	90.0%
Men-C-C	**13,530**	83.6%	**6,785**	83.9%	**2,257**	76.5%	**1,179**	83.5%	**1,772**	86.2%	**1,537**	91.3%
Hepatitis B	**805**	5.0%	**573**	7.1%	**105**	3.6%	**30**	2.1%	**51**	2.5%	**46**	2.7%
2013												
Population	16,136		7,949		2,931		1,431		2,228		1,597	
Diphtheria	**11,237**	69.6%	**5,678**	71.4%	**1,795**	61.2%	**1,024**	71.6%	**1,625**	72.9%	**1,115**	69.8%
Tetanus	**11,237**	69.6%	**5,678**	71.4%	**1,795**	61.2%	**1,024**	71.6%	**1,625**	72.9%	**1,115**	69.8%
Pertussis	**11,233**	69.6%	**5,674**	71.4%	**1,795**	61.2%	**1,024**	71.6%	**1,625**	72.9%	**1,115**	69.8%
Hib	**11,164**	69.2%	**5,629**	70.8%	**1,791**	61.1%	**1,020**	71.3%	**1,615**	72.5%	**1,109**	69.4%
Polio	**14,070**	87.2%	**7,002**	88.1%	**2,307**	78.7%	**1,271**	88.8%	**2,003**	89.9%	**1,487**	93.1%
Pneu-C-13	**13,786**	85.4%	**6,872**	86.5%	**2,223**	75.8%	**1,255**	87.7%	**1,952**	87.6%	**1,484**	92.9%
Measles	**13,095**	81.2%	**6,312**	79.4%	**2,210**	75.4%	**1,207**	84.3%	**1,889**	84.8%	**1,477**	92.5%
Mumps	**13,086**	81.1%	**6,305**	79.3%	**2,208**	75.3%	**1,207**	84.3%	**1,889**	84.8%	**1,477**	92.5%
Rubella	**13,085**	81.1%	**6,304**	79.3%	**2,208**	75.3%	**1,207**	84.3%	**1,889**	84.8%	**1,477**	92.5%
Varicella	**12,522**	77.6%	**6,029**	75.8%	**2,060**	70.3%	**1,160**	81.1%	**1,811**	81.3%	**1,462**	91.5%
Men-C-C	**13,522**	83.8%	**6,730**	84.7%	**2,179**	74.3%	**1,226**	85.7%	**1,913**	85.9%	**1,474**	92.3%
Hepatitis B	**883**	5.5%	**668**	8.4%	**77**	2.6%	**36**	2.5%	**70**	3.1%	**32**	2.0%

Note. Hib = haemophilus influenzae type b; Pneu-C-13 = pneumococcal conjugate 13 valent; Men-C-C = meningococcal C conjugate.

Immunizations at Age 7

Section A: Immunizations in Manitoba

Table 6: Recommended Immunization Schedule, Age 7

Vaccine	Age
	4-6 years
MMR Measles, Mumps, Rubella	♦
DTaP-IPV Diphtheria, Tetanus, Pertussis, Polio	♦

♦ A single dose given with one needle.

At age seven, Manitoba's universal childhood immunization program boosts protection for pre-school children against the following bacterial pathogens: diphtheria, tetanus, and pertussis. The pre-school program also provides protection against the viral infections of measles, mumps, rubella, and polio.

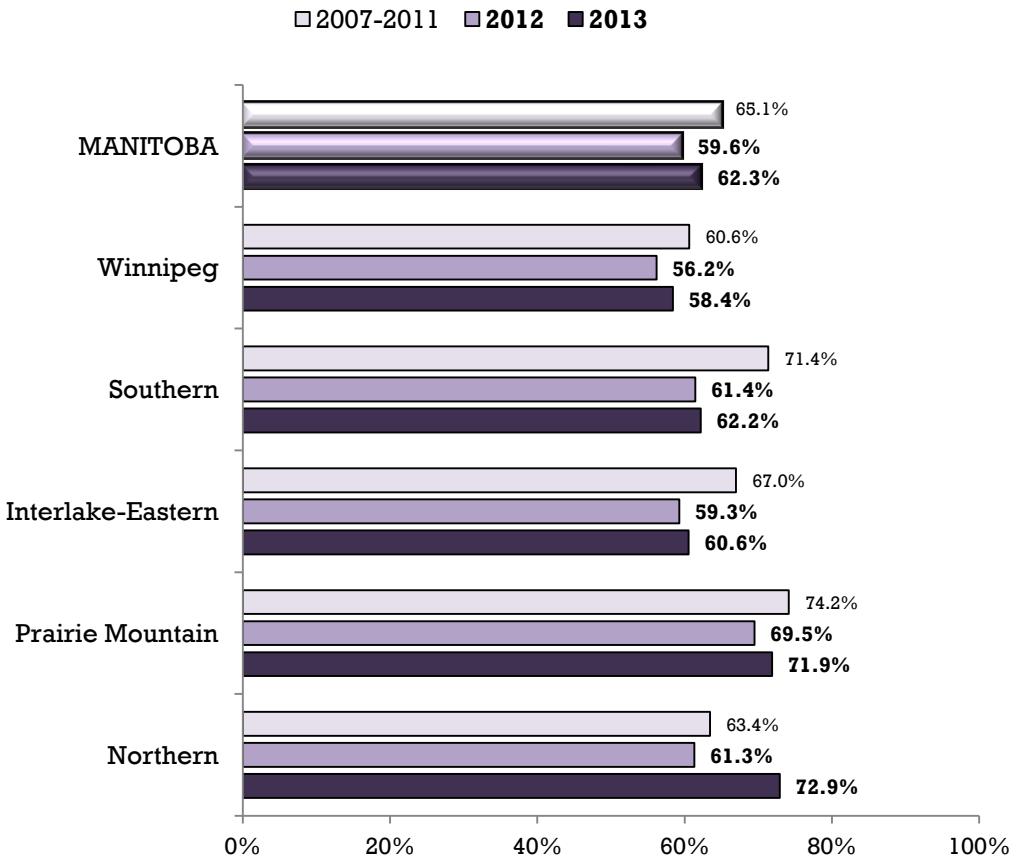
The doses are due between age four and age six, but are not counted as "missing" until the child's seventh birthday. MHHLS sends a reminder letter to parents of children who are missing recommended vaccine doses at age 5.5 years, encouraging them to ensure their children's immunizations are up-to-date. In Manitoba, proof of immunization is not required for school entry, as it is in Ontario and New Brunswick.

The immunization status of children at age seven in 2012 represents those who were born in 2005 and who turned seven years old in 2012 (2005 birth cohort); the immunization status of children at age seven in 2013 represents those who were born in 2006 and who turned seven years old in 2013 (2006 birth cohort). The data reported is for children who have received all of the scheduled doses as shown in Table 6, in addition to the doses recommended at earlier ages. In order to be considered complete for age at seven years, children need to have following immunogens: five doses of diphtheria, tetanus, and pertussis, four doses of polio, two doses of measles, and one dose of varicella, mumps and rubella (for an overview of immunogens required to be complete for age, refer to Table 1).

Manitoba Immunization Rates, Age 7

In Manitoba, 59.6% of seven year old children had received the immunizations required to be complete for age in 2012. In 2013, the corresponding rate increased to 62.3% (Figure 28). This percentage is calculated with a denominator of all seven year olds, in Manitoba, with active MHHLS PHINs (n_{2012}=15,566 and n_{2013}=16,146), and a numerator containing all the children who received their required vaccinations (n_{2012}=9,285 and n_{2013}=10,064). Figure 28 shows that complete for age rates at age seven were varied by RHA; in 2012, Prairie Mountain RHA had the highest percentage of children vaccinated (69.5%) whereas Winnipeg RHA had the lowest (56.2%). In 2013, Northern RHA had the highest complete for age rates (72.9%) and Winnipeg RHA had the lowest (58.4%).

Figure 28: Manitoba Immunization Rates by RHA, Age 7
Percent of children who are complete for age by RHA, Age 7, 2012, 2013 & 5-year average (2007-2011)



In 2012 and 2013, about 6 out of 10 seven year old Manitobans received the series of vaccinations required to be considered complete for age.

In 2012 and 2013, about 70% of seven year old children in Manitoba were complete for age for diphtheria, tetanus, and pertussis (Figure 29). As would be expected, polio rates during the same period were higher (roughly 84%) than the rates for diphtheria, tetanus, and pertussis because one less dose is required to be complete for age for polio. The lower rate of measles immunization (about 75%) compared to mumps (about 92%) and rubella (about 92%) is a reflection of the requirements to be complete for age: two doses for measles compared to one dose for mumps and rubella. Measles, mumps, and rubella are given as the combined MMR vaccine; some children may have only received one dose of MMR making them complete for age for mumps and rubella, but not for measles.

Figure 29: Manitoba Immunization Rates by Immunogens, Age 7
Percent of children who are complete for age for diphtheria, tetanus, pertussis, polio, measles, mumps, and rubella, 2012, 2013, & 5-year average (2007-2011)

Section B: Immunization Rates by RHA, Age 7

Diphtheria, Tetanus, and Pertussis

In Manitoba, overall, almost 69% of seven year olds were complete for age for diphtheria, tetanus, and pertussis in 2012 and 2013 (Figures 30-32). These three immunogens had similar rates as they were most commonly given (with polio) as a combined vaccine (DTaP-IPV). Overall, the diphtheria, tetanus and pertussis rates in 2012 and 2013 were somewhat lower in Winnipeg RHA (about 64%). On the other hand, RHAs with the highest complete for age rate for these vaccines were Prairie-Mountain RHA in 2012 (about 78%) and Northern RHA (79%) in 2013.

Figure 30: Diphtheria Immunization Rates by RHA, Age 7
Percent of children who are complete for age, 2012, 2013, & 5-year average (2007-2011)

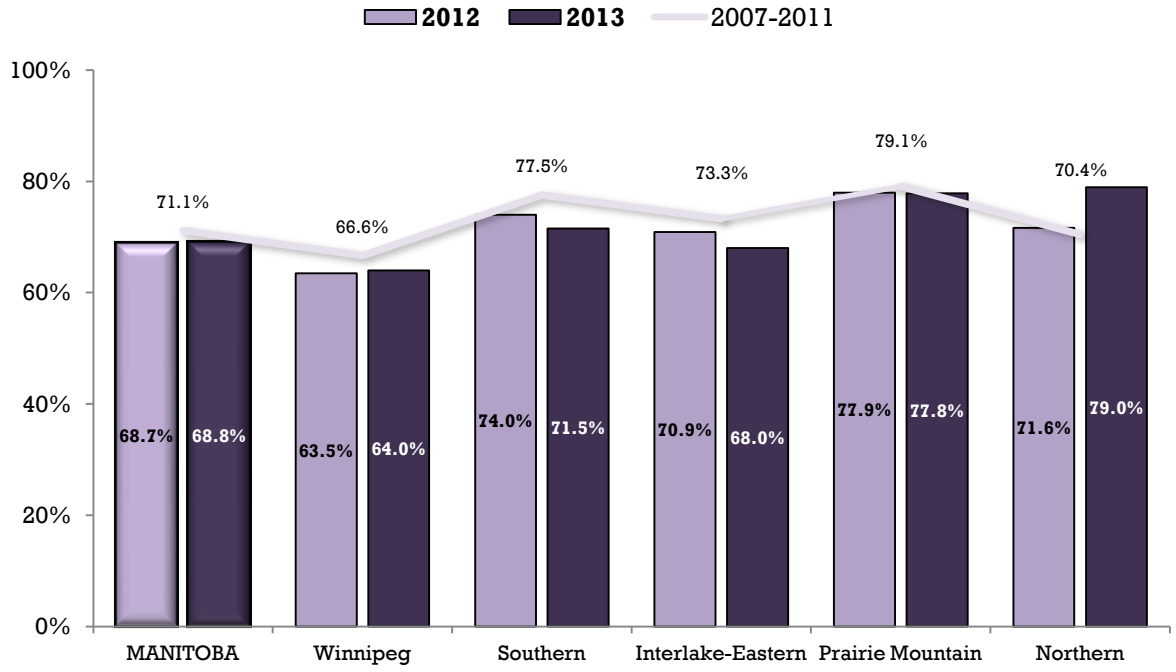
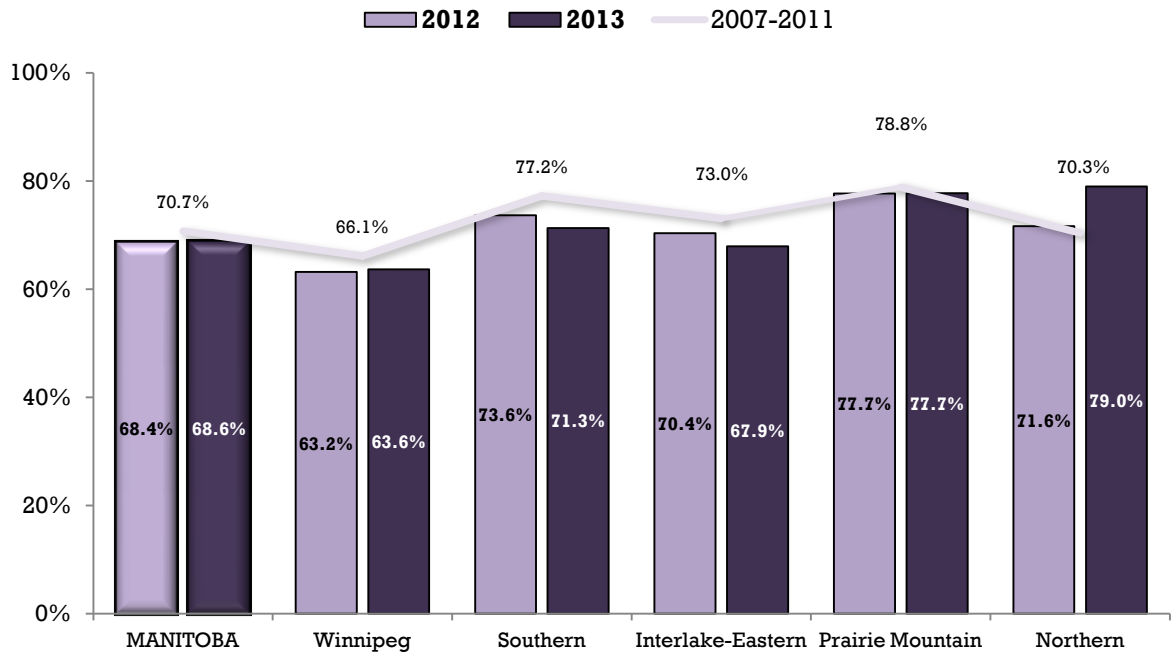


Figure 31: Tetanus Immunization Rates by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

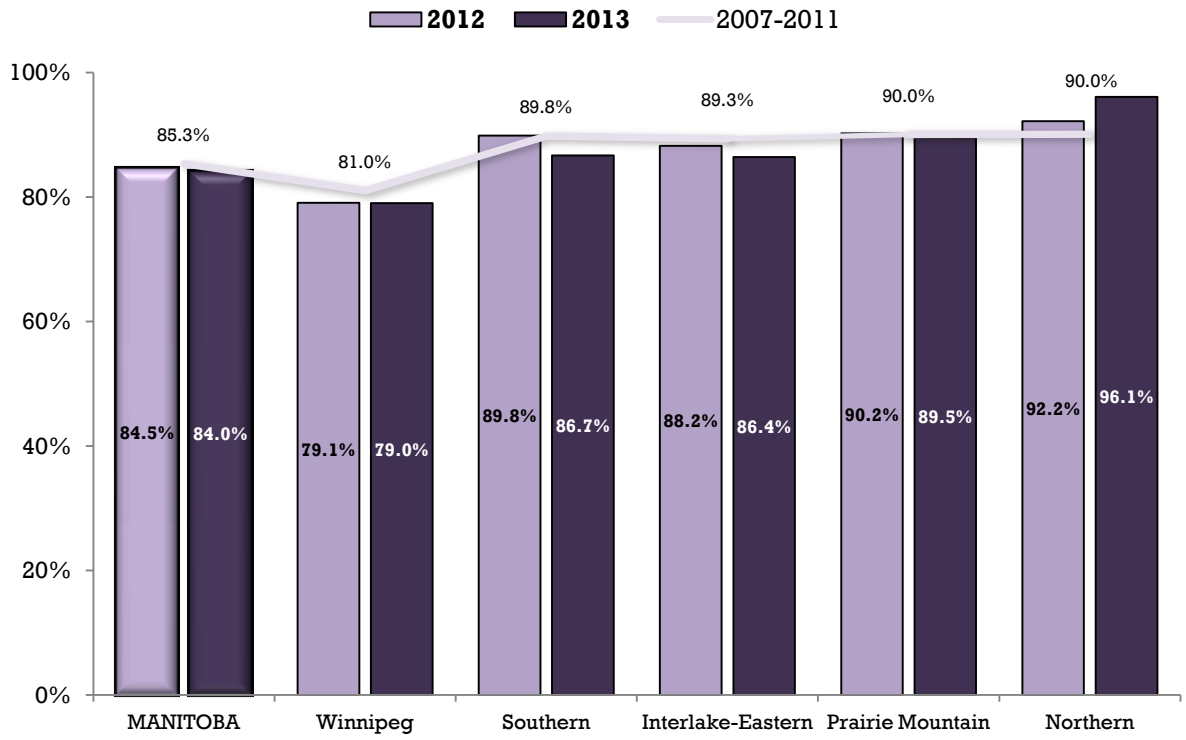
Figure 32: Pertussis Immunization Rates by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



Polio

Overall, in Manitoba, complete for age rates for polio was comparable in 2012 (84.5%) and in 2013 (84.0%) (Figure 33). In 2012, the complete for age rates by RHA ranged from 79.1% in Winnipeg RHA to 92.2% in Northern RHA. Similarly, the corresponding rates in 2013 ranged from 79.0% in Winnipeg RHA to 96.1% in Northern RHA. These high completion rates were due to requiring only four doses of polio vaccine to be complete for age at seven years old, while diphtheria, tetanus, and pertussis required five doses to be complete for age. These immunogens were typically provided through the combined vaccine (DTaP-IPV).

Figure 33: Polio Immunization Rates by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



Measles, Mumps, and Rubella

Figures 34-36 show the complete for age rates for measles, mumps, and rubella (typically given as the combined vaccine [MMR]). Recall that only one dose of mumps and rubella was required to be complete for age at seven years, resulting in much higher rates (approximately 92%) than those shown for measles where two doses were required (approximately 75%). In both 2012 and 2013, Winnipeg RHA had the lowest complete for age rates of all the RHAs, over all four immunogens, while Northern RHA has the highest. Northern RHA succeeded in having all – that is, 100% of - seven year old children vaccinated for mumps and rubella in 2013.

Figure 34: Measles Immunization Rates by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

Figure 35: Mumps Immunization Rates by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

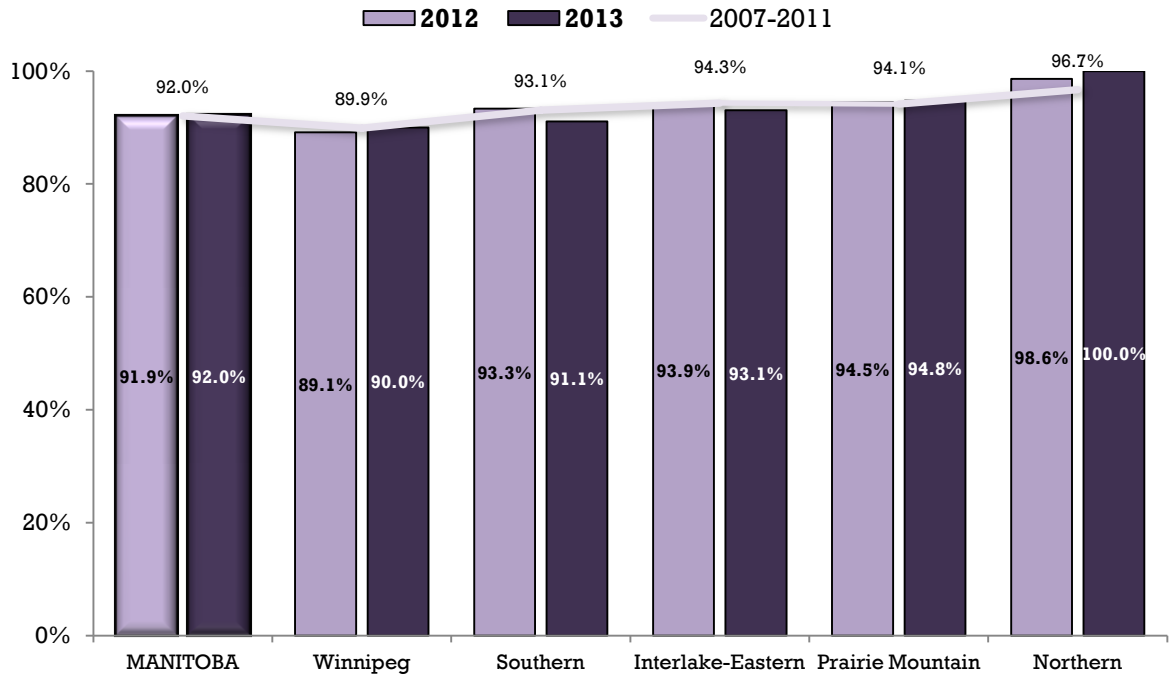
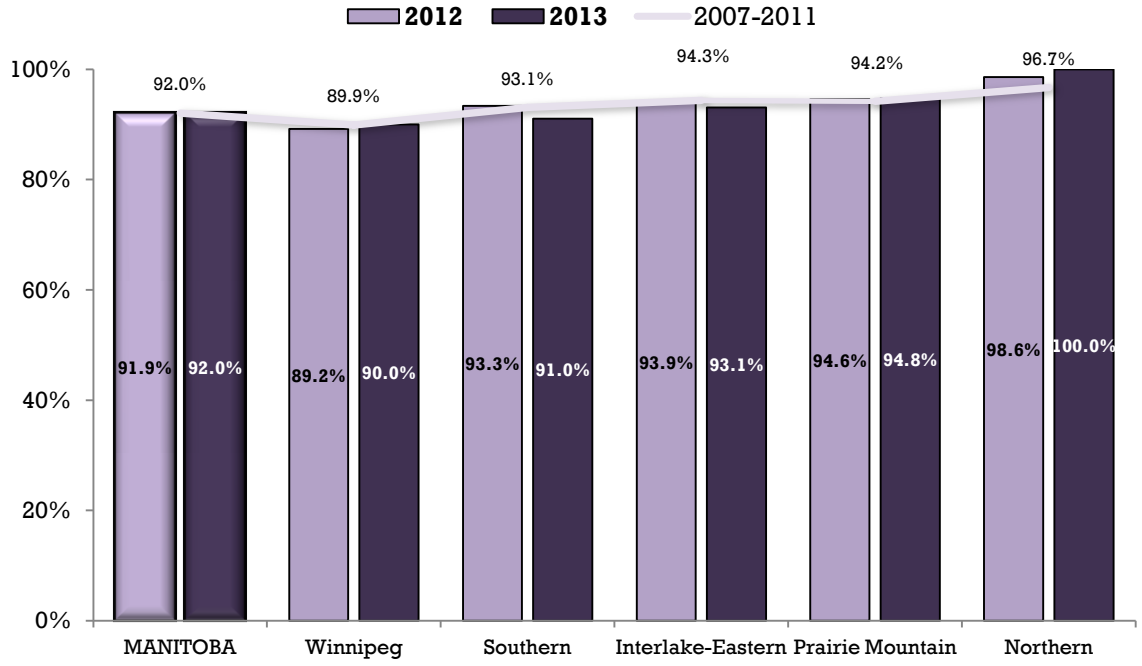


Figure 36: Rubella Immunization Rates by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

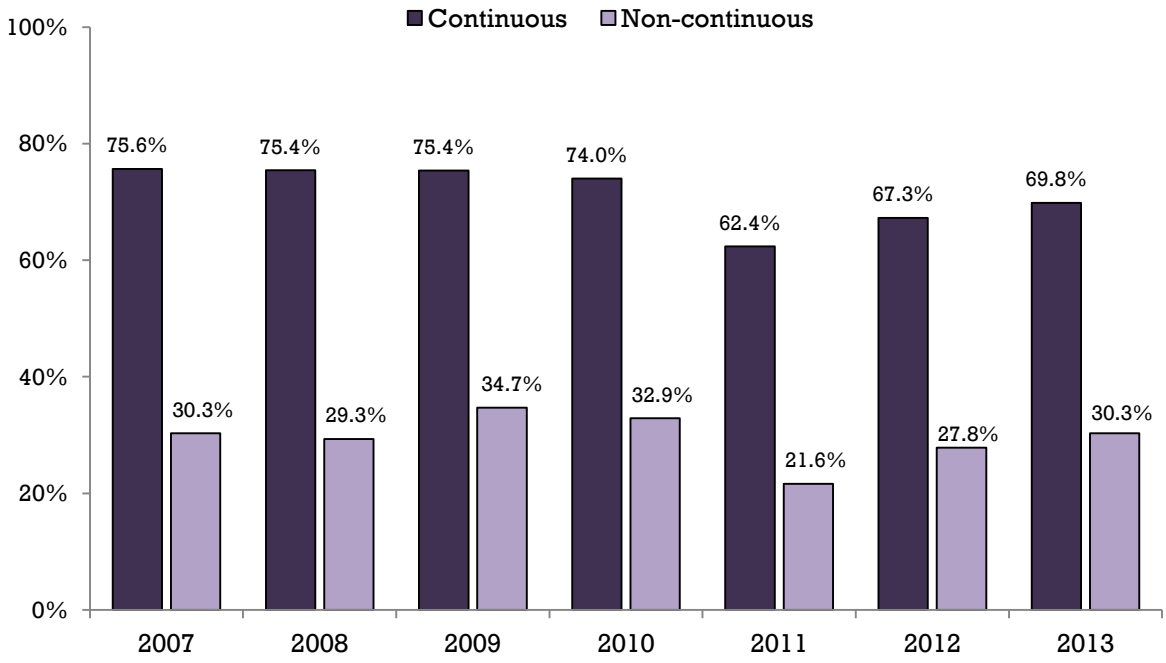


Section C: Residency and Immunization Rates

From 2007 to 2013, 70% to 76% of continuous residents were complete for age seven compared to only 22% to 35% of non-continuous residents (Figure 37). Explanations on the reasons for these differences in rates can be found on page 6. Annual complete for age rates among continuous residents slightly decreased from 75.6% in 2007 to 69.8% in 2013,while the corresponding rates were more stable among non-continuous residents during the same period.

Continuous vs. Non-continuous Residency, Age 7

Figure 37: Continuous and Non-Continuous Resident Status, Age 7
Percent of children who are complete for age, 2007-2013



In Manitoba, the percentage of seven year olds considered complete for age was substantially higher for continuous residents in comparison to non-continuous residents.

Figures 38 and 39 show, for seven year old children, all RHAs had higher complete for age rates for continuous resident rates compared to non-continuous resident rates. Winnipeg RHA experienced a large difference between continuous and non-continuous resident rates while Northern RHA experienced only a small difference.

Figure 38: Continuous Resident Status by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

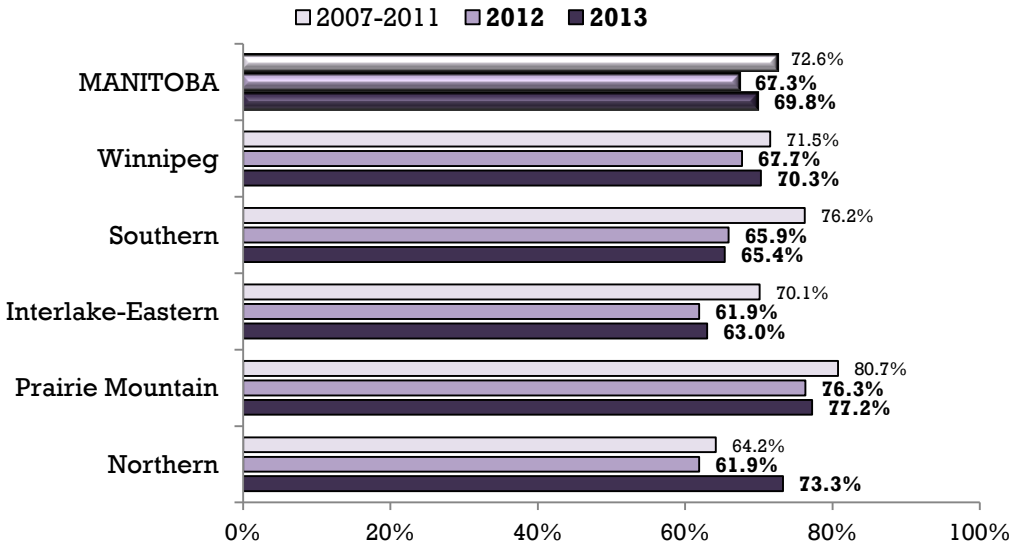
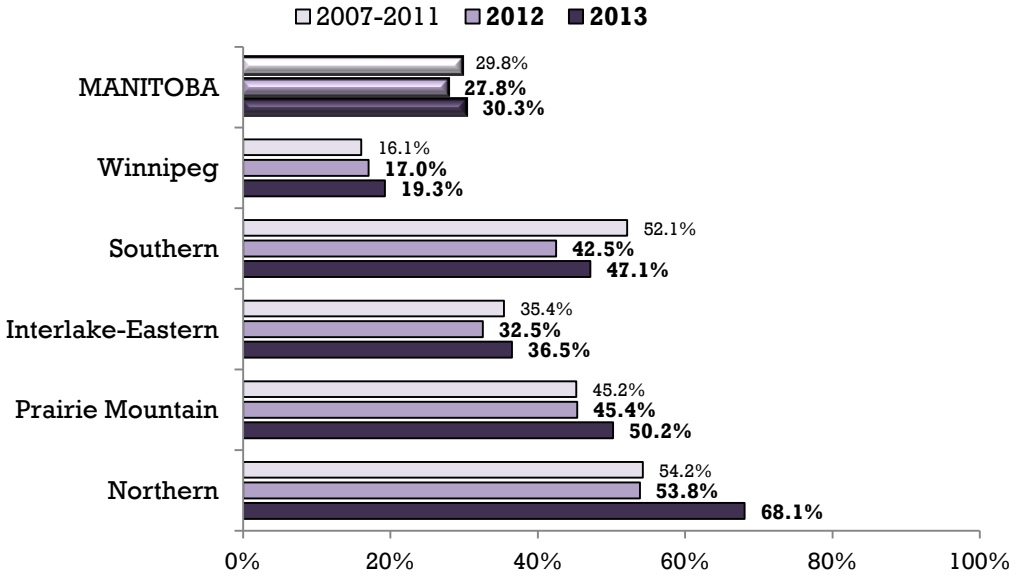


Figure 39: Non-Continuous Resident Status by RHA, Age 7
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



In Manitoba, for seven year olds, all RHAs experienced a higher complete for age rates among continuous residents as compared to non-continuous residents in both 2012 and 2013.

Section D: Overview of All Immunization Rates by RHA, Age 7

Table 7: Counts and Percentages for All Immunogens by RHA, Age 7, 2012, 2013 & 5-year average (2007-2011)

Immunogens	MANITOBA		Winnipeg		Southern		Interlake-Eastern		Prairie Mountain		Northern	
2007-2011												
Population	74,603		37,936		13,238		7,031		9,455		6,943	
Diphtheria	**53,056**	71.1%	**25,283**	66.6%	**10,256**	77.5%	**5,151**	73.3%	**7,475**	79.1%	**4,891**	70.4%
Tetanus	**53,052**	71.1%	**25,280**	66.6%	**10,255**	77.5%	**5,151**	73.3%	**7,475**	79.1%	**4,891**	70.4%
Pertussis	**52,753**	70.7%	**25,071**	66.1%	**10,216**	77.2%	**5,132**	73.0%	**7,451**	78.8%	**4,883**	70.3%
Hib	**57,874**	77.6%	**28,163**	74.2%	**10,874**	82.1%	**5,661**	80.5%	**7,891**	83.5%	**5,285**	76.1%
Polio	**63,656**	85.3%	**30,729**	81.0%	**11,884**	89.8%	**6,281**	89.3%	**8,511**	90.0%	**6,251**	90.0%
Pneu-C-13	**20,443**	27.4%	**11,052**	29.1%	**3,048**	23.0%	**2,165**	30.8%	**2,285**	24.2%	**1,893**	27.3%
Measles	**58,236**	78.1%	**27,493**	72.5%	**11,229**	84.8%	**5,687**	80.9%	**8,077**	85.4%	**5,750**	82.8%
Mumps	**68,655**	92.0%	**34,093**	89.9%	**12,319**	93.1%	**6,632**	94.3%	**8,899**	94.1%	**6,712**	96.7%
Rubella	**68,660**	92.0%	**34,092**	89.9%	**12,321**	93.1%	**6,632**	94.3%	**8,903**	94.2%	**6,712**	96.7%
Varicella	**33,058**	44.3%	**17,751**	46.8%	**5,120**	38.7%	**2,916**	41.5%	**4,554**	48.2%	**2,717**	39.1%
Men-C-C	**5,227**	7.0%	**3,190**	8.4%	**920**	6.9%	**434**	6.2%	**535**	5.7%	**148**	2.1%
Hepatitis B	**5,635**	7.6%	**3,089**	8.1%	**1,570**	11.9%	**300**	4.3%	**463**	4.9%	**213**	3.1%
2012												
Population	15,566		7,853		2,855		1,397		2,044		1,417	
Diphtheria	**10,695**	68.7%	**4,984**	63.5%	**2,113**	74.0%	**990**	70.9%	**1,593**	77.9%	**1,015**	71.6%
Tetanus	**10,696**	68.7%	**4,984**	63.5%	**2,114**	74.0%	**990**	70.9%	**1,593**	77.9%	**1,015**	71.6%
Pertussis	**10,649**	68.4%	**4,961**	63.2%	**2,102**	73.6%	**983**	70.4%	**1,588**	77.7%	**1,015**	71.6%
Hib	**14,046**	90.2%	**6,733**	85.7%	**2,685**	94.0%	**1,332**	95.3%	**1,894**	92.7%	**1,402**	98.9%
Polio	**13,157**	84.5%	**6,210**	79.1%	**2,565**	89.8%	**1,232**	88.2%	**1,844**	90.2%	**1,306**	92.2%
Pneu-C-13	**13,425**	86.2%	**6,529**	83.1%	**2,437**	85.4%	**1,301**	93.1%	**1,769**	86.5%	**1,389**	98.0%
Measles	**11,723**	75.3%	**5,446**	69.3%	**2,283**	80.0%	**1,063**	76.1%	**1,729**	84.6%	**1,202**	84.8%
Mumps	**14,305**	91.9%	**7,000**	89.1%	**2,665**	93.3%	**1,312**	93.9%	**1,931**	94.5%	**1,397**	98.6%
Rubella	**14,309**	91.9%	**7,002**	89.2%	**2,665**	93.3%	**1,312**	93.9%	**1,933**	94.6%	**1,397**	98.6%
Varicella	**12,235**	78.6%	**6,119**	77.9%	**2,137**	74.9%	**1,090**	78.0%	**1,701**	83.2%	**1,188**	83.8%
Men-C-C	**1,458**	9.4%	**817**	10.4%	**269**	9.4%	**112**	8.0%	**176**	8.6%	**84**	5.9%
Hepatitis B	**1,448**	9.3%	**807**	10.3%	**346**	12.1%	**56**	4.0%	**177**	8.7%	**62**	4.4%
2013												
Population	16,146		8,218		2,885		1,501		2,083		1,459	
Diphtheria	**11,116**	68.8%	**5,258**	64.0%	**2,064**	71.5%	**1,021**	68.0%	**1,621**	77.8%	**1,152**	79.0%
Tetanus	**11,114**	68.8%	**5,256**	64.0%	**2,064**	71.5%	**1,021**	68.0%	**1,621**	77.8%	**1,152**	79.0%
Pertussis	**11,076**	68.6%	**5,229**	63.6%	**2,057**	71.3%	**1,019**	67.9%	**1,619**	77.7%	**1,152**	79.0%
Hib	**14,684**	90.9%	**7,175**	87.3%	**2,673**	92.7%	**1,409**	93.9%	**1,957**	94.0%	**1,470**	100.8%
Polio	**13,557**	84.0%	**6,494**	79.0%	**2,500**	86.7%	**1,297**	86.4%	**1,864**	89.5%	**1,402**	96.1%
Pneu-C-13	**14,165**	87.7%	**6,949**	84.6%	**2,502**	86.7%	**1,391**	92.7%	**1,861**	89.3%	**1,462**	100.2%
Measles	**12,243**	75.8%	**5,822**	70.8%	**2,236**	77.5%	**1,131**	75.3%	**1,754**	84.2%	**1,300**	89.1%
Mumps	**14,854**	92.0%	**7,397**	90.0%	**2,627**	91.1%	**1,397**	93.1%	**1,974**	94.8%	**1,459**	100.0%
Rubella	**14,854**	92.0%	**7,398**	90.0%	**2,626**	91.0%	**1,397**	93.1%	**1,974**	94.8%	**1,459**	100.0%
Varicella	**13,252**	82.1%	**6,658**	81.0%	**2,213**	76.7%	**1,227**	81.7%	**1,802**	86.5%	**1,352**	92.7%
Men-C-C	**1,700**	10.5%	**1,013**	12.3%	**270**	9.4%	**132**	8.8%	**174**	8.4%	**111**	7.6%
Hepatitis B	**1,660**	10.3%	**990**	12.0%	**348**	12.1%	**72**	4.8%	**186**	8.9%	**64**	4.4%

Note. Hib = haemophilus influenzae type b; Pneu-C-13 = pneumococcal conjugate 13 valent; Men-C-C = meningococcal C conjugate.

Immunizations at Age 11

Section A: Immunizations in Manitoba

Table 8: Recommended Immunization Schedule, Age 11

Vaccine	Age
	Grade 4
Men-C-C Meningococcal C Conjugate	♦
Hepatitis B	♦ ♦ ♦

♦ A single dose given with one needle.

At age 11, Manitoba's universal childhood immunization program provides protection against the bacterial pathogen meningococcal type C and the viral infection of hepatitis B. The immunization status of children at age 11 in 2012 represents those who were born in 2001 and who turned 11 years old in 2012 (2001 birth cohort); the immunization status of children at age 11 in 2013 represents those who were born in 2002 and who turned 11 years old in 2013 (2002 birth cohort). The data reported is for children who received all of the scheduled doses, as shown in Table 8, in addition to the doses recommended at earlier ages.

In order to be considered complete for age at 11 years, children need to have five doses of diphtheria, tetanus, and pertussis; four doses of polio; three doses of hepatitis B; two doses of measles; and one dose of mumps, rubella, varicella and Men-C-C (for an overview of immunogens required to be complete for age, refer to Table 1). In 2004, MHHLS began publicly-funding the Men-C-C vaccine for all children in grade 4; then in 2009, the Men-C-C vaccine began being offered to infants at 12 months. Only one dose of Men-C-C is currently recommended to be considered complete for age at 11 years. Furthermore, Manitoba's Hepatitis B Immunization Program was introduced in 1998 for children born on or after January 1, 1989. A total of three doses of hepatitis B are required by age 11 to be considered complete for age.

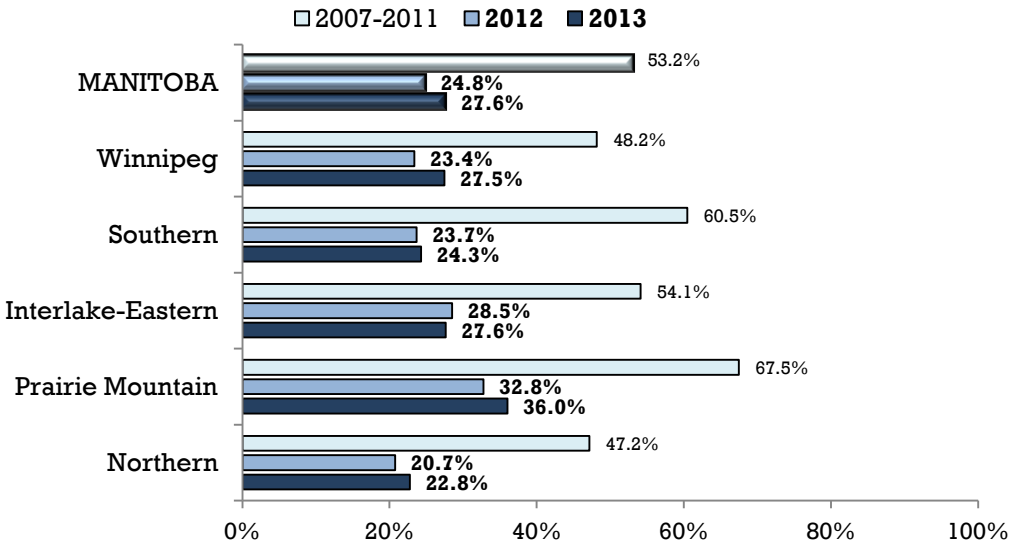
Manitoba Immunization Rates, Age 11

Figure 40 shows the percentage of 11 years old children in Manitoba who are complete for age in 2012, 2013, and 5-year average of 2007-2011 by RHA. This percentage is calculated with a denominator of all 11 year olds, in Manitoba, with active MHHLS PHINs (n_{2012}=15,805 and n_{2013}=15,725), and a numerator containing all the children who received the required vaccinations (n_{2012}=3,923 and n_{2013}=4,340).

In Manitoba, 24.8% and 27.6% of age 11 children received the vaccines available to them to be considered for complete for age (in 2012 and in 2013, respectively). The 2012 and 2013 complete for age rates are about half the 5-year average (2007-2011) rate (53.2%). This could be due to that, in 2012 and 2013, one dose of varicella was a requirement to be considered complete for age at 11 years while receiving varicella was not a requirement for complete for age definition during 2007 to 2011.

The percentage of children considered complete for age at 11 years varied by RHA; in both 2012 and 2013, Prairie Mountain RHA had the highest percentage of children vaccinated (32.8% and 36.0%, respectively) whereas Northern RHA had the lowest (20.7% and 22.8%).

Figure 40: Manitoba Immunization Rates by RHA, Age 11
Percent of children who are complete for age by RHA, Age 11, 2012, 2013 & 5-year average (2007-2011)



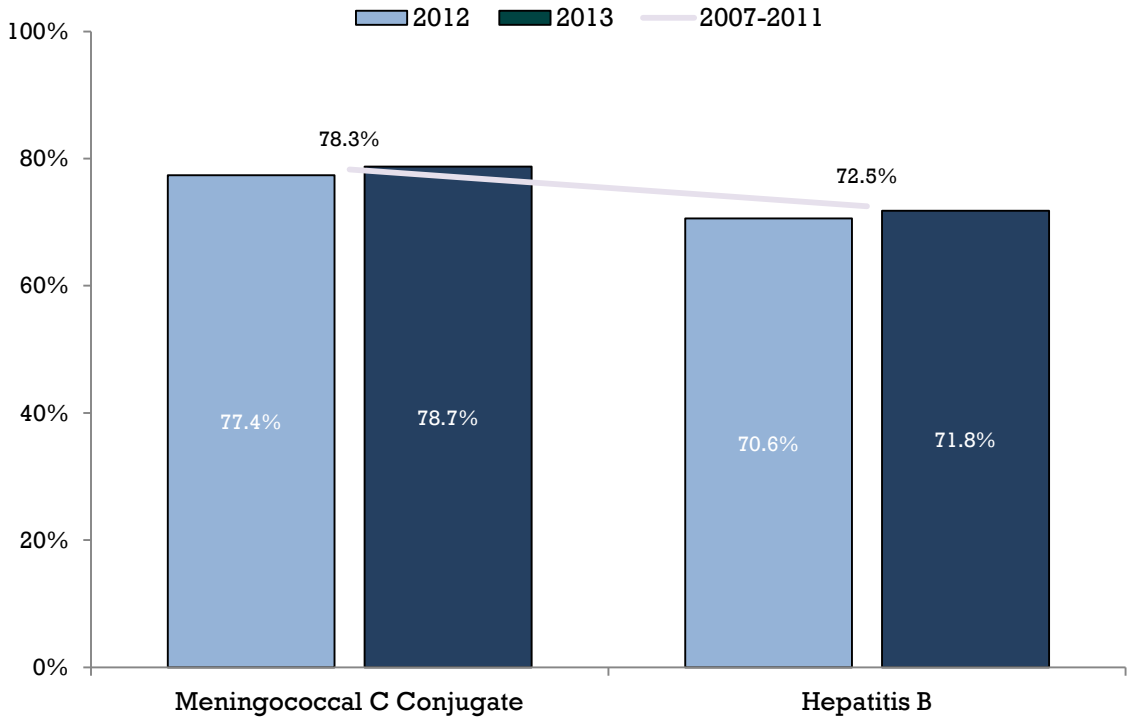
In Manitoba, fewer than 3 out of 10 eleven year olds received the vaccines available to them to be considered for complete for age in both 2012 and 2013.

Section B: Immunization Rates by RHA, Age 11

Figure 41 shows that the complete for age 11 rates for Men-C-C were slightly higher than those for hepatitis B in both 2012 and 2013; this is because only one dose of Men-C-C was required to be considered complete for age 11 while three doses of hepatitis B were required. The complete for age rates for 2012 and 2013 were similar within each immunogen. For Men-C-C, the complete for age rates were 77.4% in 2012 and 78.7% in 2013. For hepatitis B, the corresponding rates were 70.6% in 2012 and 71.8% in 2013.

Figure 41: Manitoba Immunization Rates by Immunogens, Age 11

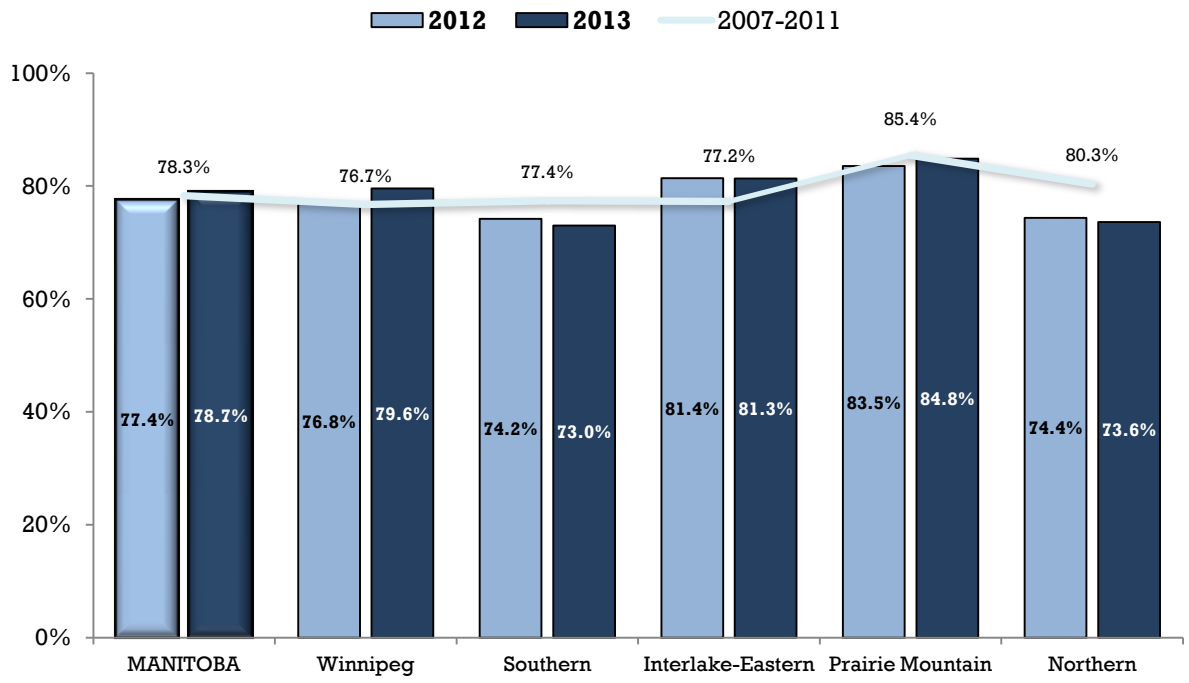
Percent of children who are complete for age for Meningococcal C Conjugate and Hepatitis B, 2012, 2013 & 5-year average (2007-2011)



Meningococcal C Conjugate

Figure 42 presents the complete for age rates for meningococcal C conjugate immunogen by RHA. In Manitoba, the complete for age rates by RHA ranged from 74.2% (Southern RHA) to 83.5% (Prairie Mountain RHA) in 2012, and from 73.0% (Southern RHA) to 84.8% (Prairie Mountain RHA) in 2013. With the exception of Winnipeg RHA and Interlake-Eastern RHA, the complete for age rates at 11 years in 2012 and 2013 were slightly lower than the previous 5-year average (2007-2011).

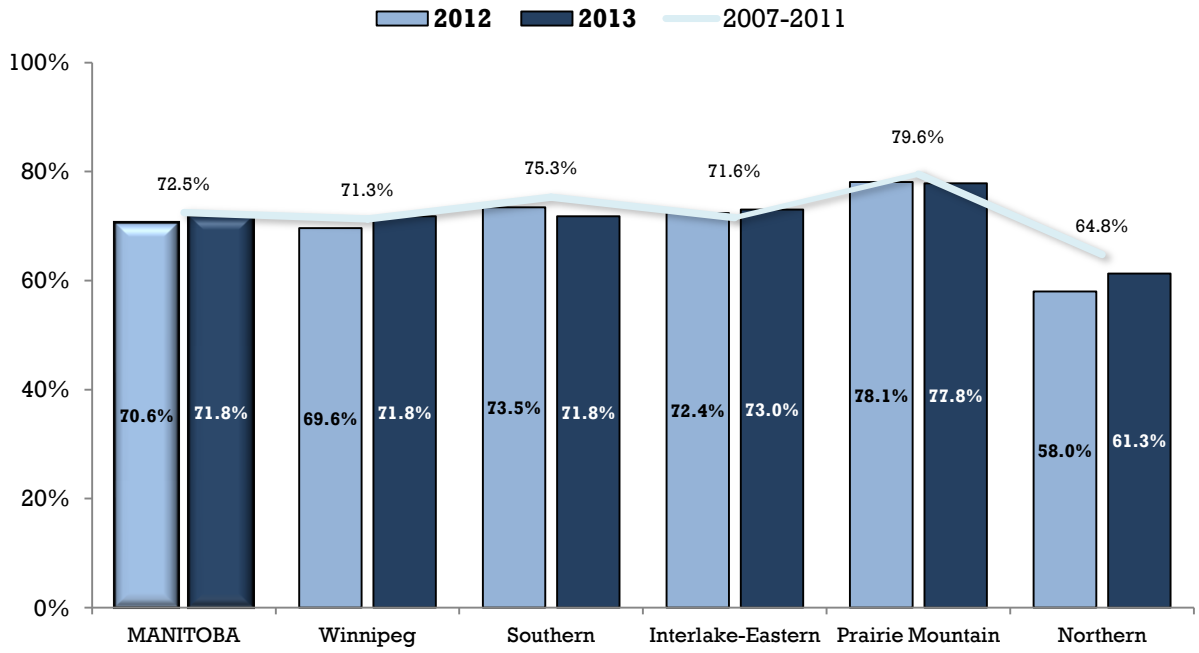
Figure 42: Meningococcal C Conjugate Immunization Rates by RHA, Age 11
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)



Hepatitis B

In Manitoba, during 2012 and 2013, about 70% of 11 year olds received the hepatitis B vaccine series (three doses) required to be complete for age (Figure 43). The complete for age rates in 2012 ranged from 58.0% (Northern RHA) to 78.1% (Prairie Mountain RHA). Similarly, the complete for age rates for hepatitis B in 2013 ranged from 61.3% (Northern RHA) to 77.8% (Prairie Mountain RHA).

Figure 43: Hepatitis B Immunization Rates by RHA, Age 11
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

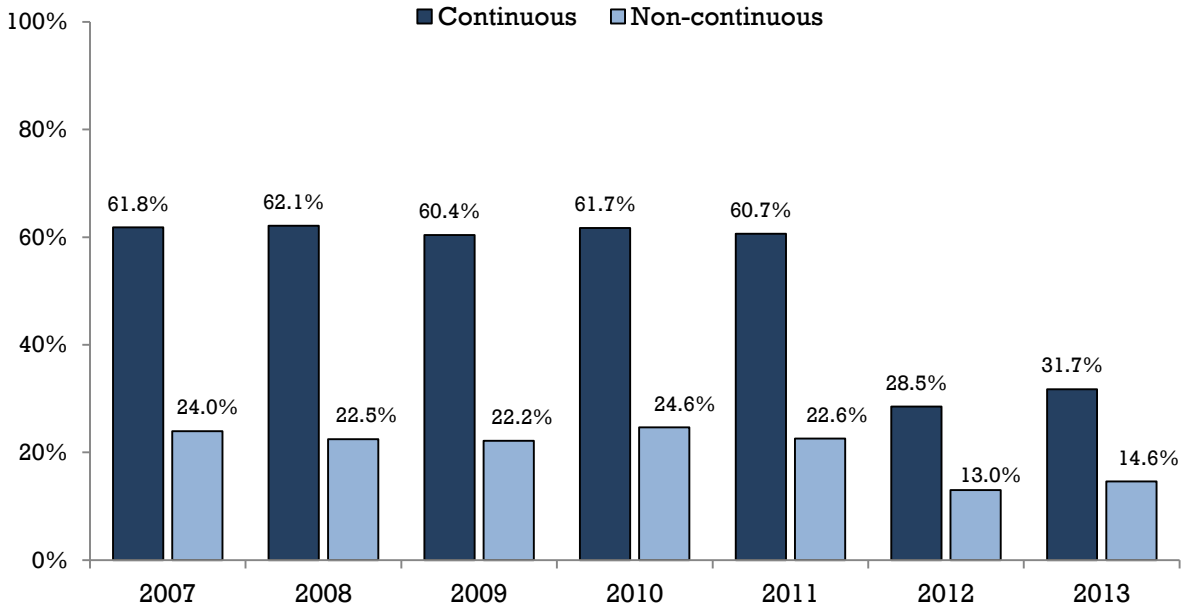


Section C: Residency and Immunization Rates

Continuous vs. Non-continuous Residency, Age 11

From 2007 to 2013, approximately two-thirds of continuous residents were complete for age at 11 years compared to about one-fifth of non-continuous residents (Figure 44). Explanations on the reasons for these differences in rates can be found on page 6.

Figure 44: Continuous and Non-Continuous Resident Status, Age 11
Percent of children who are complete for age, 2007-2013



In Manitoba, the percentages of 11 year olds considered complete for age was substantially higher for continuous residents in comparison to non-continuous residents during 2007 to 2013.

Figures 45 and 46 show all RHAs experienced lower complete for age rates in 2012 and 2013 for both continuous and non-continuous residents. Overall, for all RHAs, complete for age rates at 11 years was substantially higher for continuous residents in comparison to non-continuous residents, with the exception of Northern RHA. For example, in 2012, while complete for age rate for continuous residents in Northern RHA was 20.3%, the corresponding rate for non-continuous residents in the same region was 24.5%.

Figure 45: Continuous Resident Status by RHA, Age 11
Percent of children who are complete for age, 2012, 2013 & 5-year average, (2007-2011)

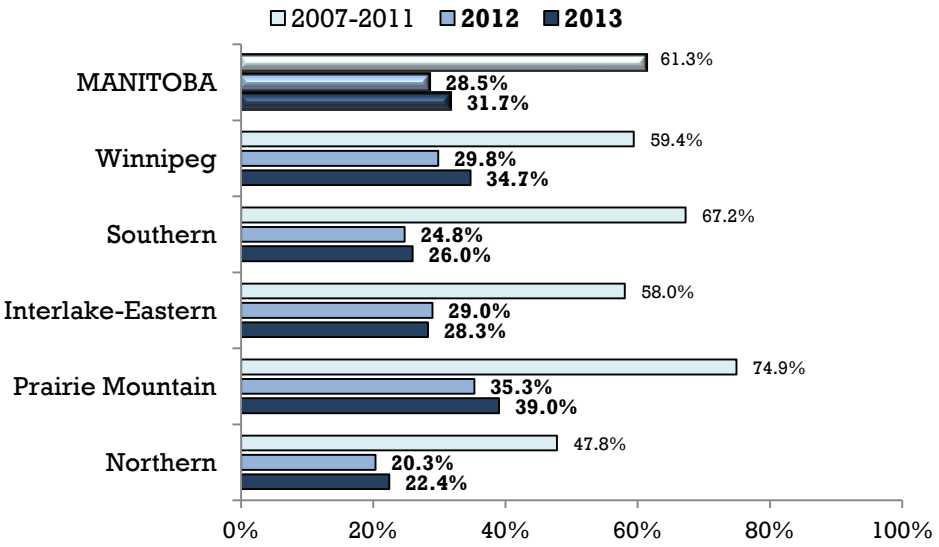
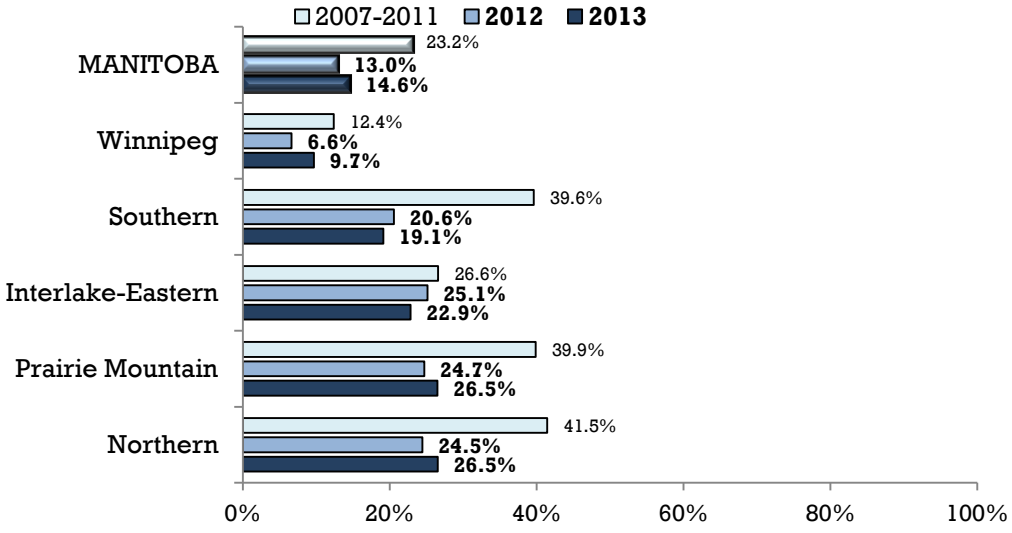


Figure 46: Non-Continuous Resident Status by RHA, Age 11
Percent of children who are complete for age, 2012, 2013 & 5-year average, (2007-2011)



Section D: Overview of All Immunization Rates by RHA, Age 11

Table 9: Counts and Percentages for All Immunogens by RHA, Age 11, 2012, 2013 & 5-year average (2007-2011)

Immunogens	MANITOBA		Winnipeg		Southern		Interlake-Eastern		Prairie Mountain		Northern	
2007-2011												
Population	78,503		40,479		13,569		7,844		9,850		6,761	
Diphtheria	**56,676**	72.2%	**27,064**	66.9%	**10,872**	80.1%	**5,936**	75.7%	**7,984**	81.1%	**4,820**	71.3%
Tetanus	**56,677**	72.2%	**27,066**	66.9%	**10,871**	80.1%	**5,936**	75.7%	**7,983**	81.0%	**4,821**	71.3%
Pertussis	**54,834**	69.8%	**25,925**	64.0%	**10,464**	77.1%	**5,762**	73.5%	**7,903**	80.2%	**4,780**	70.7%
Hib	**69,326**	88.3%	**33,648**	83.1%	**12,579**	92.7%	**7,361**	93.8%	**9,150**	92.9%	**6,588**	97.4%
Polio	**64,298**	81.9%	**31,228**	77.1%	**11,872**	87.5%	**6,739**	85.9%	**8,707**	88.4%	**5,752**	85.1%
Pneu-C-13	**1,123**	1.4%	**705**	1.7%	**161**	1.2%	**99**	1.3%	**110**	1.1%	**48**	0.7%
Measles	**62,245**	79.3%	**29,304**	72.4%	**12,123**	89.3%	**6,470**	82.5%	**8,673**	88.1%	**5,675**	83.9%
Mumps	**70,838**	90.2%	**34,921**	86.3%	**12,806**	94.4%	**7,333**	93.5%	**9,246**	93.9%	**6,532**	96.6%
Rubella	**70,851**	90.3%	**34,927**	86.3%	**12,809**	94.4%	**7,333**	93.5%	**9,250**	93.9%	**6,532**	96.6%
Varicella	**16,545**	21.1%	**8,686**	21.5%	**2,401**	17.7%	**1,589**	20.3%	**2,439**	24.8%	**1,430**	21.2%
Men-C-C	**61,451**	78.3%	**31,050**	76.7%	**10,497**	77.4%	**6,059**	77.2%	**8,415**	85.4%	**5,430**	80.3%
Hepatitis B	**56,907**	72.5%	**28,860**	71.3%	**10,216**	75.3%	**5,614**	71.6%	**7,836**	79.6%	**4,381**	64.8%
2012												
Population	15,805		8,242		2,830		1,530		1,868		1,335	
Diphtheria	**11,257**	71.2%	**5,282**	64.1%	**2,280**	80.6%	**1,177**	76.9%	**1,492**	79.9%	**1,026**	76.9%
Tetanus	**11,254**	71.2%	**5,279**	64.0%	**2,280**	80.6%	**1,177**	76.9%	**1,492**	79.9%	**1,026**	76.9%
Pertussis	**11,170**	70.7%	**5,229**	63.4%	**2,267**	80.1%	**1,172**	76.6%	**1,481**	79.3%	**1,021**	76.5%
Hib	**13,696**	86.7%	**6,619**	80.3%	**2,609**	92.2%	**1,452**	94.9%	**1,702**	91.1%	**1,314**	98.4%
Polio	**13,082**	82.8%	**6,234**	75.6%	**2,558**	90.4%	**1,374**	89.8%	**1,666**	89.2%	**1,250**	93.6%
Pneu-C-13	**1,238**	7.8%	**805**	9.8%	**153**	5.4%	**128**	8.4%	**87**	4.7%	**65**	4.9%
Measles	**12,499**	79.1%	**5,829**	70.7%	**2,538**	89.7%	**1,291**	84.4%	**1,645**	88.1%	**1,196**	89.6%
Mumps	**14,181**	89.7%	**7,014**	85.1%	**2,668**	94.3%	**1,445**	94.4%	**1,743**	93.3%	**1,311**	98.2%
Rubella	**14,177**	89.7%	**7,012**	85.1%	**2,666**	94.2%	**1,445**	94.4%	**1,743**	93.3%	**1,311**	98.2%
Varicella	**6,062**	38.4%	**3,127**	37.9%	**970**	34.3%	**622**	40.7%	**849**	45.4%	**494**	37.0%
Men-C-C	**12,227**	77.4%	**6,329**	76.8%	**2,100**	74.2%	**1,245**	81.4%	**1,560**	83.5%	**993**	74.4%
Hepatitis B	**11,158**	70.6%	**5,740**	69.6%	**2,079**	73.5%	**1,107**	72.4%	**1,458**	78.1%	**774**	58.0%
2013												
Population	15,725		8,146		2,807		1,527		1,963		1,282	
Diphtheria	**11,144**	70.9%	**5,200**	63.8%	**2,249**	80.1%	**1,161**	76.0%	**1,570**	80.0%	**964**	75.2%
Tetanus	**11,143**	70.9%	**5,198**	63.8%	**2,250**	80.2%	**1,161**	76.0%	**1,570**	80.0%	**964**	75.2%
Pertussis	**11,049**	70.3%	**5,145**	63.2%	**2,228**	79.4%	**1,154**	75.6%	**1,560**	79.5%	**962**	75.0%
Hib	**13,695**	87.1%	**6,571**	80.7%	**2,603**	92.7%	**1,442**	94.4%	**1,802**	91.8%	**1,277**	99.6%
Polio	**13,044**	83.0%	**6,177**	75.8%	**2,545**	90.7%	**1,361**	89.1%	**1,765**	89.9%	**1,196**	93.3%
Pneu-C-13	**2,288**	14.6%	**1,403**	17.2%	**291**	10.4%	**284**	18.6%	**181**	9.2%	**129**	10.1%
Measles	**12,439**	79.1%	**5,795**	71.1%	**2,487**	88.6%	**1,294**	84.7%	**1,724**	87.8%	**1,139**	88.8%
Mumps	**14,177**	90.2%	**6,992**	85.8%	**2,641**	94.1%	**1,438**	94.2%	**1,834**	93.4%	**1,272**	99.2%
Rubella	**14,173**	90.1%	**6,990**	85.8%	**2,640**	94.1%	**1,438**	94.2%	**1,833**	93.4%	**1,272**	99.2%
Varicella	**6,728**	42.8%	**3,556**	43.7%	**1,034**	36.8%	**640**	41.9%	**947**	48.2%	**551**	43.0%
Men-C-C	**12,381**	78.7%	**6,481**	79.6%	**2,049**	73.0%	**1,242**	81.3%	**1,665**	84.8%	**944**	73.6%
Hepatitis B	**11,294**	71.8%	**5,849**	71.8%	**2,016**	71.8%	**1,115**	73.0%	**1,528**	77.8%	**786**	61.3%

Note. Hib = haemophilus influenzae type b; Pneu-C-13 = pneumococcal conjugate 13 valent; Men-C-C = meningococcal C conjugate.

Immunizations at Age 17

Section A: Immunizations in Manitoba

Table 10: Recommended Immunization Schedule, Age 17

Vaccine	Age
	14-16 years
Tetanus, Diphtheria, Pertussis (Tdap)	♦

♦ A single dose given with one needle.

At age 17, Manitoba's universal childhood immunization program boosts protection against the following bacterial pathogens: tetanus, diphtheria, and pertussis. In 2003, the tetanus and diphtheria vaccine was replaced with the combined tetanus, diphtheria, and pertussis (Tdap) vaccine. The Tdap immunization program is offered by public health nurses in the schools, in either grades 8 or 9 (varies by region). The Tdap vaccine is due between ages 14 to 16 years of age, and may be given through the 16th year of life. This reflects the recommendation for a booster dose of tetanus and diphtheria every 10 years and the lifetime recommended booster dose of pertussis to enhance waning immunity. The dose is not counted until it is overdue, at age 17.

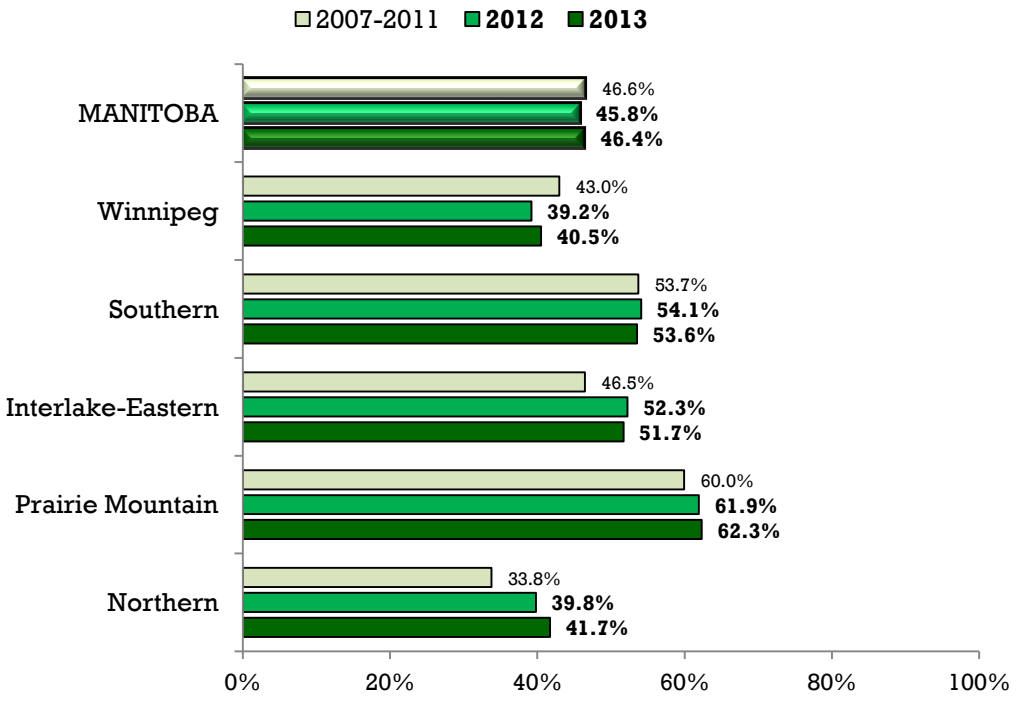
The immunization status of children aged 17 years in 2012 represents those who were born in 1995 and who turned 17 years of age in 2012 (1995 birth cohort); the immunization status of children aged 17 years in 2013 represents those who were born in 1996 and who turned 17 years of age in 2013 (1996 birth cohort). The data reported is for children who have received all of schedules doses, as shown in Table 10, in addition to the doses recommended at earlier ages. To be considered complete for age at 17 years, children need to have six doses of the immunogens diphtheria, tetanus, and pertussis; four doses of polio; three doses of hepatitis B; two doses of measles; and one dose of mumps and rubella. For an overview of immunogens required to be complete for age, refer to Table 1.

Manitoba Immunization Rates, Age 17

In Manitoba, 45.8% and 46.4% of the 17 year olds (in 2012 and in 2013, respectively) were considered complete for age for all the required vaccinations (Figure 47). This percentage is calculated with a denominator of all 17 year olds in Manitoba, with active MHHLS PHINs (n_{2012}=17,605 and n_{2013}=17,303), and a numerator containing all the children who had received all the required vaccinations at age 17 (n_{2012}=8,064 and n_{2013}=8,036).

Complete for age rates at 17 years varied by RHA; Prairie Mountain RHA had the highest levels of complete for age rates in both years (61.9% in 2012 and 62.3% in 2013), compared to the Winnipeg RHA having the lowest complete for age rates during both years (39.2% in 2012 and 40.5% in 2013).

Figure 47: Manitoba Immunization Rates by RHA, Age 17
Percent of children who are complete for age by RHA, Age 17, 2012, 2013 & 5-year average (2007-2011)

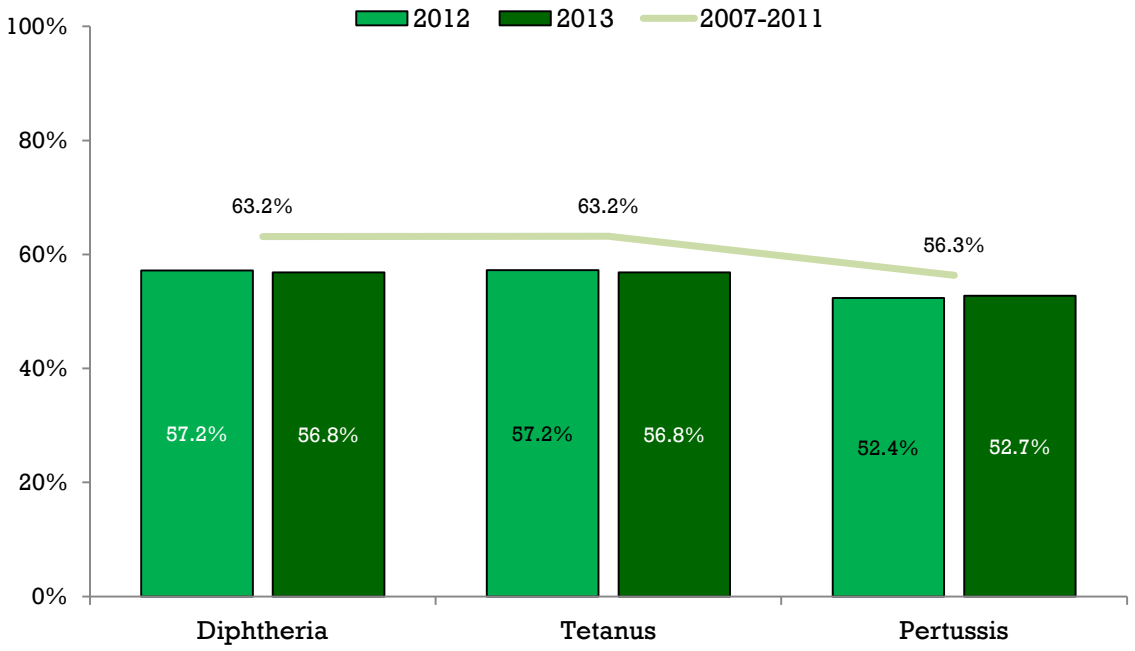


In Manitoba, about 5 out of 10 seventeen year olds received the vaccines available to them to be considered for complete for age in both 2012 and 2013.

Section B: Immunization Rates by RHA, Age 17

Complete for age rates during 2007 to 2011 was somewhat higher than the complete for age rates in 2012 and 2013 (Figure 48). Furthermore, in 2012 and 2013, fewer 17 year olds (about 52%) received the pertussis immunogen compared to approximately 57% who received the diphtheria and tetanus immunogens. A possible explanation for the lower pertussis rate is that some 17 year olds may have been given the tetanus and diphtheria (Td) product as a booster dose, as opposed to the recommended Tdap vaccine. The reason for this is because Td is often given in situations where Tdap is not readily available, and there is an immediate need for immunization (e.g. wound management in a hospital emergency department).

Figure 48: Manitoba Immunization Rates by Immunogens, Age 17
Percent of children who are complete for age for Diphtheria, Tetanus, and Pertussis, 2012, 2013, & 5-year average (2007-2011)



In 2012 and 2013, just over half of Manitoba's 17 year olds were complete for age for tetanus, diphtheria, and pertussis immunogens.

Tetanus, Diphtheria, and Pertussis

Figures 49 to 51 show complete for age rates for diphtheria, tetanus, and pertussis immunogens. In Manitoba, overall, almost 52-57% of seventeen year olds were complete for age for diphtheria, tetanus, and pertussis in 2012 and 2013. While the overall complete for age rates for pertussis was lower as compared to diphtheria and tetanus, the corresponding estimates stratified by RHA showed similar trends. For all three immunogens, Prairie Mountain RHA consistently had the highest complete for age rates in both 2012 and 2013, while Winnipeg RHA had the lowest complete for age rates during the same years.

Figure 49: Diphtheria Immunization Rates by RHA, Age 17
Percent of children who are complete for age, 2012, 2013, & 5-year average (2007-2011)

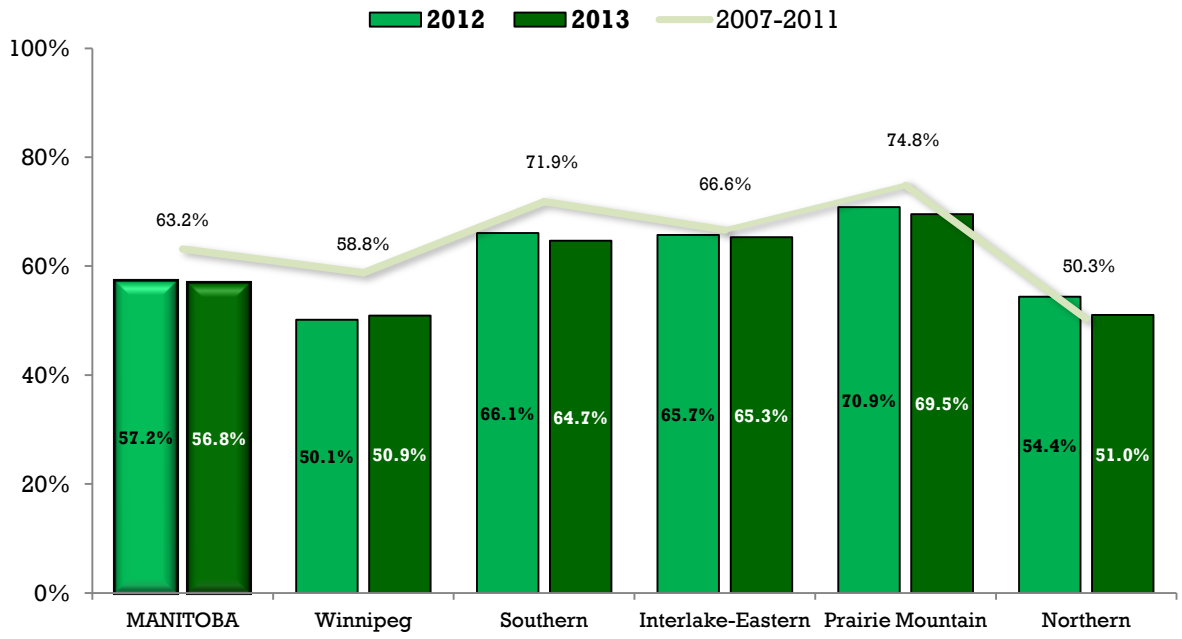


Figure 50: Tetanus Immunization Rates by RHA, Age 17
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

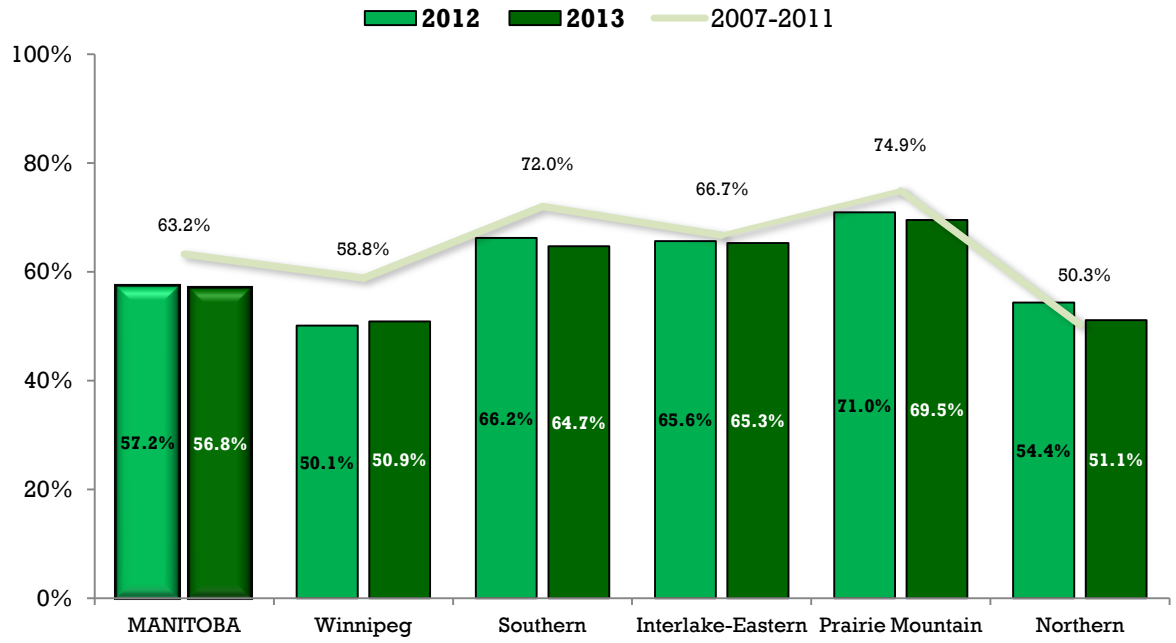
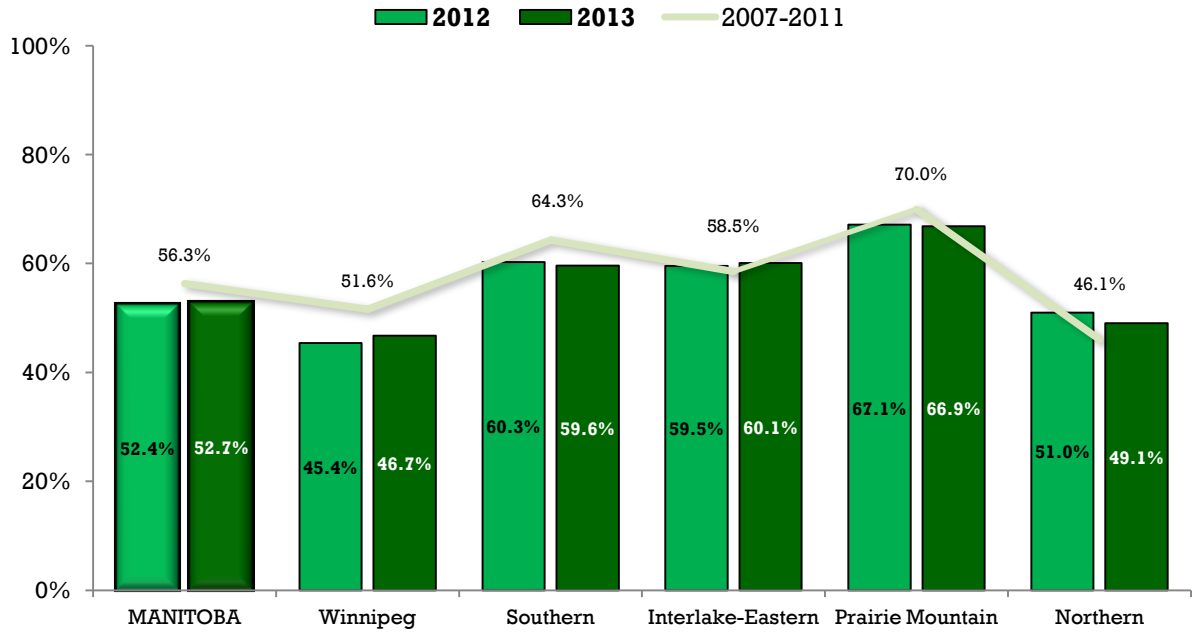


Figure 51: Pertussis Immunization Rates by RHA, Age 17
Percent of children who are complete for age, 2012, 2013 & 5-year average (2007-2011)

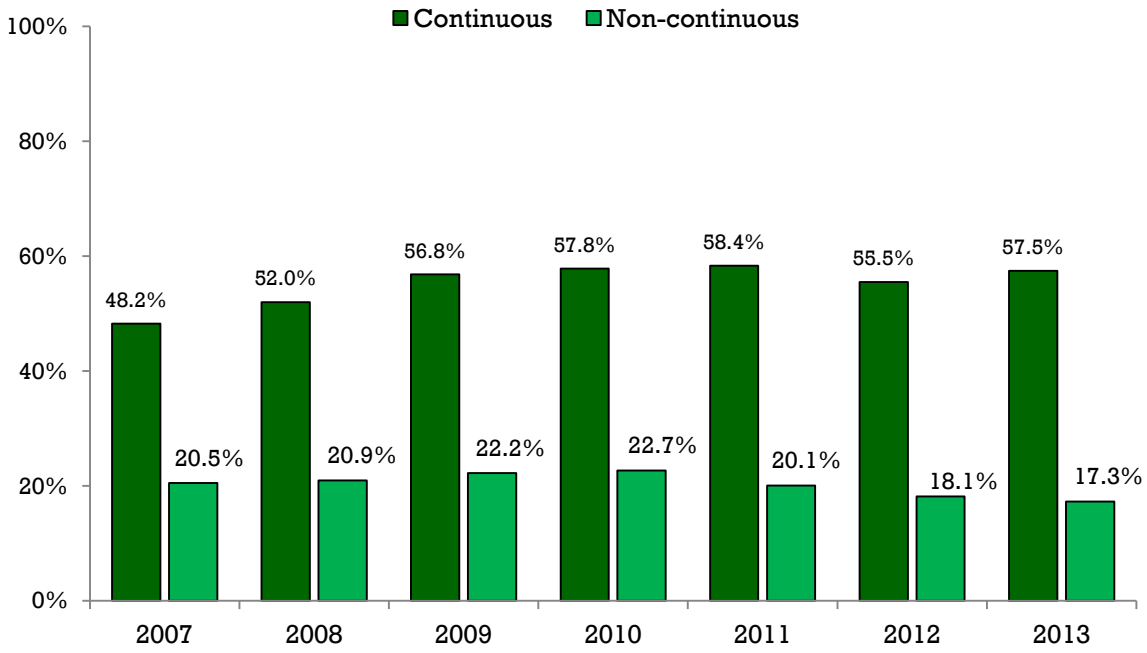


Section C: Residency and Immunization Rates

Continuous vs. Non-continuous Residency, Age 17

From 2007 to 2013, approximately half of continuous residents were complete for age at 17 years compared to approximately one-fifth of non-continuous residents (Figure 52). Explanations on the reasons for these differences in rates can be found on page 6.

Figure 52: Continuous and Non-Continuous Resident Status, Age 17
Percent of children who are complete for age, 2007-2013



From 2007 to 2013, in Manitoba, the percentages of 17 year olds considered complete for age is substantially higher for continuous residents in comparison to non-continuous residents.

Figures 53 shows all RHAs experienced higher complete for age rates in 2012 and 2013 for continuous residents than in 2007 to 2011, with the exception of Winnipeg RHA in 2012. Among non-continuous residents, complete for age rates by RHA in 2012 was slightly higher than the previous 5-year average (Figure 54). In 2013, non-continuous residents in Winnipeg RHA, Southern RHA, and Prairie Mountain RHA had slightly lower complete for age rates than previous 5-year average whereas non-continuous residents in Interlake-Eastern RHA and Northern RHA had slightly higher rates.

Figure 53: Continuous Resident Status by RHA, Age 17
Percent of children who are complete for age, 2012, 2013 & 5-year average, (2007-2011)

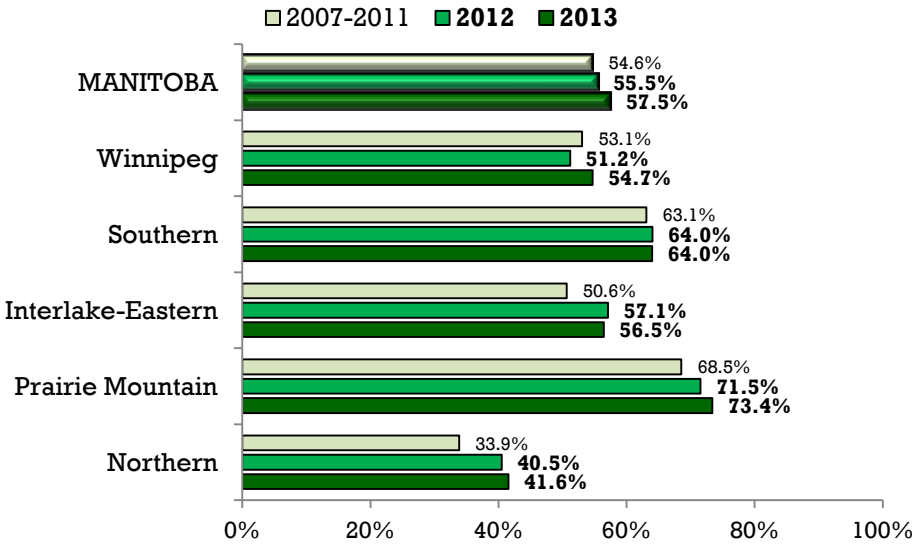
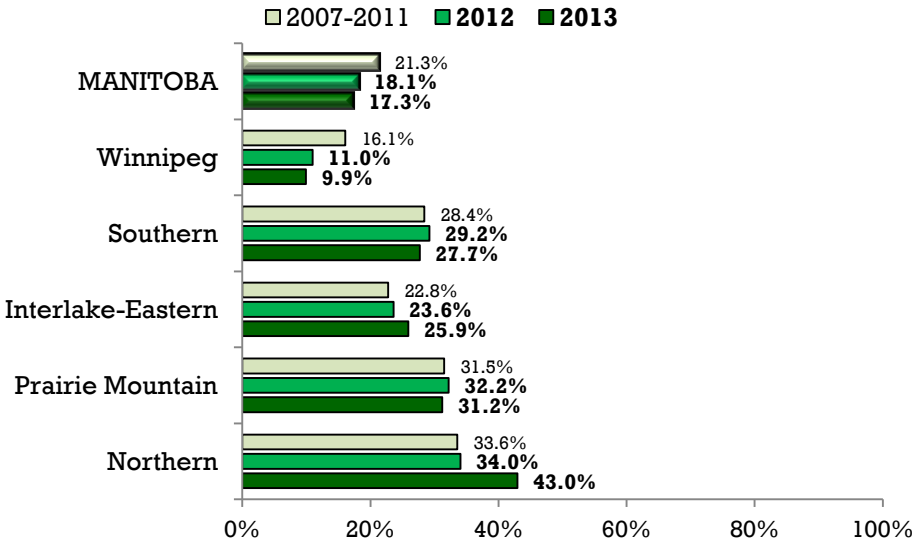


Figure 54: Non-Continuous Resident Status by RHA, Age 17
Percent of children who are complete for age, 2012, 2013 & 5-year average, (2007-2011)



Section D: Overview of All Immunization Rates by RHA, Age 17

Table 11: Counts and Percentages for All Immunogens by RHA, Age 17, 2012, 2013 & 5-year average (2007-2011)

Immunogens	MANITOBA		Winnipeg		Southern		Interlake-Eastern		Prairie Mountain		Northern	
2007-2011												
Population	87,940		46,164		14,547		9,150		11,214		6,865	
Diphtheria	**55,537**	63.2%	**27,141**	58.8%	**10,453**	71.9%	**6,096**	66.6%	**8,392**	74.8%	**3,455**	50.3%
Tetanus	**55,580**	63.2%	**27,164**	58.8%	**10,469**	72.0%	**6,102**	66.7%	**8,395**	74.9%	**3,450**	50.3%
Pertussis	**49,548**	56.3%	**23,823**	51.6%	**9,359**	64.3%	**5,357**	58.5%	**7,846**	70.0%	**3,163**	46.1%
Hib	**72,184**	82.1%	**36,382**	78.8%	**12,408**	85.3%	**7,861**	85.9%	**9,463**	84.4%	**6,070**	88.4%
Polio	**71,298**	81.1%	**36,703**	79.5%	**12,568**	86.4%	**7,638**	83.5%	**9,476**	84.5%	**4,913**	71.6%
Pneu-C-13	**137**	0.2%	**84**	0.2%	**21**	0.1%	**15**	0.2%	**11**	0.1%	**6**	0.1%
Measles	**72,038**	81.9%	**36,161**	78.3%	**13,104**	90.1%	**7,577**	82.8%	**9,813**	87.5%	**5,383**	78.4%
Mumps	**79,477**	90.4%	**39,988**	86.6%	**13,977**	96.1%	**8,535**	93.3%	**10,531**	93.9%	**6,446**	93.9%
Rubella	**79,720**	90.7%	**40,077**	86.8%	**13,998**	96.2%	**8,579**	93.8%	**10,548**	94.1%	**6,518**	94.9%
Varicella	**1,130**	1.3%	**632**	1.4%	**157**	1.1%	**107**	1.2%	**144**	1.3%	**90**	1.3%
Men-C-C	**6,086**	6.9%	**2,408**	5.2%	**736**	5.1%	**505**	5.5%	**1,076**	9.6%	**1,361**	19.8%
Hepatitis B	**63,276**	72.0%	**32,161**	69.7%	**10,951**	75.3%	**6,650**	72.7%	**8,991**	80.2%	**4,523**	65.9%
2012												
Population	17,605		9,432		2,921		1,841		2,107		1,304	
Diphtheria	**10,072**	57.2%	**4,729**	50.1%	**1,931**	66.1%	**1,210**	65.7%	**1,493**	70.9%	**709**	54.4%
Tetanus	**10,074**	57.2%	**4,728**	50.1%	**1,934**	66.2%	**1,208**	65.6%	**1,495**	71.0%	**709**	54.4%
Pertussis	**9,219**	52.4%	**4,283**	45.4%	**1,761**	60.3%	**1,096**	59.5%	**1,414**	67.1%	**665**	51.0%
Hib	**15,066**	85.6%	**7,447**	79.0%	**2,700**	92.4%	**1,730**	94.0%	**1,929**	91.6%	**1,260**	96.6%
Polio	**13,444**	76.4%	**6,759**	71.7%	**2,438**	83.5%	**1,522**	82.7%	**1,756**	83.3%	**969**	74.3%
Pneu-C-13	**55**	0.3%	**28**	0.3%	**10**	0.3%	**7**	0.4%	**s**	s	**s**	s
Measles	**14,015**	79.6%	**6,805**	72.1%	**2,662**	91.1%	**1,588**	86.3%	**1,860**	88.3%	**1,100**	84.4%
Mumps	**15,461**	87.8%	**7,699**	81.6%	**2,812**	96.3%	**1,749**	95.0%	**1,949**	92.5%	**1,252**	96.0%
Rubella	**15,460**	87.8%	**7,699**	81.6%	**2,811**	96.2%	**1,749**	95.0%	**1,949**	92.5%	**1,252**	96.0%
Varicella	**2,054**	11.7%	**1,013**	10.7%	**332**	11.4%	**249**	13.5%	**301**	14.3%	**159**	12.2%
Men-C-C	**13,169**	74.8%	**6,656**	70.6%	**2,269**	77.7%	**1,479**	80.3%	**1,796**	85.2%	**969**	74.3%
Hepatitis B	**13,116**	74.5%	**6,534**	69.3%	**2,361**	80.8%	**1,475**	80.1%	**1,789**	84.9%	**957**	73.4%
2013												
Population	17,303		9,412		2,812		1,762		2,049		1,268	
Diphtheria	**9,835**	56.8%	**4,794**	50.9%	**1,818**	64.7%	**1,151**	65.3%	**1,425**	69.5%	**647**	51.0%
Tetanus	**9,832**	56.8%	**4,790**	50.9%	**1,819**	64.7%	**1,150**	65.3%	**1,425**	69.5%	**648**	51.1%
Pertussis	**9,125**	52.7%	**4,398**	46.7%	**1,676**	59.6%	**1,059**	60.1%	**1,370**	66.9%	**622**	49.1%
Hib	**14,522**	83.9%	**7,231**	76.8%	**2,552**	90.8%	**1,640**	93.1%	**1,853**	90.4%	**1,246**	98.3%
Polio	**12,920**	74.7%	**6,514**	69.2%	**2,304**	81.9%	**1,411**	80.1%	**1,704**	83.2%	**987**	77.8%
Pneu-C-13	**87**	0.5%	**58**	0.6%	**13**	0.5%	**6**	0.3%	**s**	s	**s**	s
Measles	**13,430**	77.6%	**6,577**	69.9%	**2,524**	89.8%	**1,445**	82.0%	**1,789**	87.3%	**1,095**	86.4%
Mumps	**14,937**	86.3%	**7,523**	79.9%	**2,653**	94.3%	**1,630**	92.5%	**1,880**	91.8%	**1,251**	98.7%
Rubella	**14,940**	86.3%	**7,525**	80.0%	**2,655**	94.4%	**1,630**	92.5%	**1,879**	91.7%	**1,251**	98.7%
Varicella	**2,178**	12.6%	**1,061**	11.3%	**334**	11.9%	**239**	13.6%	**284**	13.9%	**260**	20.5%
Men-C-C	**13,200**	76.3%	**6,684**	71.0%	**2,209**	78.6%	**1,439**	81.7%	**1,743**	85.1%	**1,125**	88.7%
Hepatitis B	**12,925**	74.7%	**6,511**	69.2%	**2,264**	80.5%	**1,390**	78.9%	**1,715**	83.7%	**1,045**	82.4%

Note. Hib = haemophilus influenzae type b; Pneu-C-13= pneumococcal conjugate 13 valent; Men-C-C = meningococcal C conjugate. s=suppressed due to small sample size (n=1-5).

Appendix A: Manitoba's Recommended Immunization Schedule

Manitoba's Recommended Immunization Schedule for 2012 and 2013

Infants and Pre-School Children

Vaccine	2 months	4 months	6 months	12 months	18 months	4-6 years
Diphtheria, Tetanus, Pertussis, Polio, Haemophilus influenzae type b (DTaP-IPV-Hib)	♦	♦	♦		♦	
Pneumococcal Conjugate 13 valent (Pneu-C-13) *	♦	♦		♦		
Measles, Mumps, Rubella, Varicella (MMRV)				♦		
Measles, Mumps, Rubella (MMR)						♦
Meningococcal C Conjugate (Men-C-C)				♦		
Diphtheria, Tetanus, Pertussis, Polio (DTaP-IPV)						♦
Influenza (Flu)	Universal seasonal influenza program. **					

♦ A single dose given with one needle.

*(July 2012) Children with high-risk medical conditions and those living in First Nations communities should be immunized at 2, 4, 6 and 18 months. A catch-up dose is provided to children ≤ 59 months of age who have NEVER received a dose of Pneu-C-13.

**Influenza vaccine is offered to all Manitobans. Children ages 6 months to < 9 years receiving the influenza vaccine for the first time require two doses.

School Immunization Schedule

Vaccine	Grade 4	Grade 6	14-16 years
Meningococcal C Conjugate (Men-C-C)	♦		
Hepatitis B	♦♦♦		
Human Papillomavirus (HPV)*		♦♦♦ **Girls only**	
Tetanus, Diphtheria, Pertussis (Tdap)			♦
Influenza (Flu)	Universal seasonal influenza program. **		

♦ A single dose given with one needle.

* (November 2012) HPV vaccine publicly-funded for females 9 to ≤ 17 years of age with an increased risk of HPV infection, as determined by a health care provider.

**Influenza vaccine is offered to all Manitobans. Children ages 6 months to < 9 years receiving the influenza vaccine for the first time require two doses.

Immunization Schedule for Adults

Vaccine	18-26 years	All adults	65 years
Human Papillomavirus (HPV)*	♦		
Tetanus, Diphtheria, Pertussis (Tdap)**		♦	
Tetanus, Diphtheria (Td)		♦ **Every 10 years**	
Pneumococcal Polysaccharide (Pneu-P-23)^			♦
Influenza (Flu)	Universal seasonal influenza program. ***		

♦ A single dose given with one needle.

* (November 2012) HPV vaccine publicly-funded for females 18 to ≤ 26 years of age with an increased risk of HPV infection, as determined by a health care provider.

** (July 2012) Tdap is publicly-funded for adults due for a Td booster who have never received an acellular Pertussis vaccine; OR, primary caregivers of newborn infants who have never previously received an acellular Pertussis vaccine, regardless of when their last Td vaccine was given.

***Influenza vaccine is offered to all Manitobans.