

Manitoba Annual Immunization Surveillance Report

January 1 to December 31, 2014

Epidemiology & Surveillance

Public Health Branch

Public Health and Primary Health Care Division

Manitoba Health, Healthy Living and Seniors

Released: January 2016

TABLE OF CONTENTS

Acronyms and Abbreviations.....	6
Acknowledgments	7
Executive Summary	8
What to Expect in This Report	10
About Antigens, Immunogens and Vaccines.....	11
About Manitoba Immunization Monitoring System (MIMS).....	12
Introduction	13
Part A: Childhood Immunizations	21
1. Immunizations at Age 1	22
1.1 Immunizations in Manitoba, Age 1	22
1.2 Immunizations by RHA, Age 1	25
1.3 Residency and Immunization Rates, Age 1	30
1.4 Summary of Immunizations, Age 1	32
2. Immunizations at Age 2	33
2.1 Immunizations in Manitoba, Age 2	33
2.2 Immunizations by RHA, Age 2	36
2.3 Residency and Immunization Rates, Age 2	45
2.4 Summary of Immunizations, Age 2	47
3. Immunizations at Age 7	48
3.1 Immunizations in Manitoba, Age 7	48
3.2 Immunizations by RHA, Age 7	51
3.3 Residency and Immunization Rates, Age 7	56
3.4 Summary of Immunizations, Age 7	58
4. Immunizations at Age 11	59
4.1 Immunizations in Manitoba, Age 11	59
4.2 Immunizations by RHA, Age 11	61
4.3 Residency and Immunization Rates, Age 11	62
4.4 Summary of Immunizations, Age 11	63
5. Immunizations at Age 17	64
5.1 Immunizations in Manitoba, Age 17	64
5.2 Immunizations by RHA, Age 17	66
5.3 Residency and Immunization Rates, Age 17	68
5.4 Summary of Immunizations, Age 17	69
Part B: Providers of Childhood Immunizations.....	70

Vaccine Doses by Provider Type and Provider Location, Ages 0-17	71
Part C: Adulthood Immunizations	74
1. Immunizations at Ages 18+	75
1.1 Immunizations in Manitoba, Ages 18+	75
1.2 Immunizations by RHA, Ages 18+	77
2. Immunizations for Ages 65+	80
2.1 Immunizations in Manitoba, Ages 65+	80
2.2 Immunizations by RHA, Ages 65+	81
Part D: Providers of Adulthood Immunizations	82
1. Vaccine Doses by Provider Type and Provider Location, Ages 18-64	83
2. Vaccine Doses by Provider Type and Provider Location, Ages 65+	85
Conclusion.....	87
Appendix A: Manitoba's Recommended Immunization Schedule	88
Appendix B: Doses required for children to be considered complete for age, by immunogen, 2011-2013	89

LIST OF FIGURES

Figure 1: Percentage of children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1	23
Figure 2: Percentage of children complete for age for diphtheria, tetanus, pertussis, <i>Haemophilus influenzae</i> type b (Hib), polio, and pneumococcal conjugate 13 valent (Pneu-C-13) in Manitoba, 2014 & 3-year average (2011-2013), age 1	24
Figure 3: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1	25
Figure 4: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1	26
Figure 5: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1	26
Figure 6: Percentage of children complete for age for <i>Haemophilus influenzae</i> type b (Hib) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1	27
Figure 7: Percentage of children complete for age for polio by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1	28
Figure 8: Percentage of children complete for age for pneumococcal conjugate 13 valent (Pneu-C-13) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1	29
Figure 9: Percentage of children complete for age overall by continuous and non-continuous resident status in Manitoba, 2011-2014, age 1	30
Figure 10: Percentage of continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 1	31

Figure 11: Percentage of non-continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 1	31
Figure 12: Percentage of children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2	34
Figure 13: Percentage of children complete for age for diphtheria, tetanus, pertussis, <i>Haemophilus influenzae</i> type b (Hib), polio, pneumococcal conjugate 13 valent (Pneu-C-13), measles, mumps, rubella, varicella, and meningococcal conjugate C (Men-C-C) in Manitoba, 2014 & 3-year average (2011-2013), age 2	35
Figure 14: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2.....	36
Figure 15: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2.....	37
Figure 16: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2.....	37
Figure 17: Percentage of children complete for age for <i>Haemophilus influenzae</i> type b (Hib) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2	38
Figure 18: Percentage of children complete for age for polio by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2	39
Figure 19: Percentage of children complete for age for pneumococcal conjugate 13 valent (Pneu-C-13) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2	40
Figure 20: Percentage of children complete for age for measles by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2.....	41
Figure 21: Percentage of children complete for age for mumps by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2.....	42
Figure 22: Percentage of children complete for age for rubella by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2.....	42
Figure 23: Percentage of children complete for age for varicella by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2.....	43
Figure 24: Percentage of children complete for age for meningococcal conjugate C (Men-C-C) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2	44
Figure 25: Percentage of children complete for age overall by continuous and non-continuous resident status in Manitoba, 2011-2014, age 2	45
Figure 26: Percentage of continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 2.....	46
Figure 27: Percentage of non-continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 2.....	46
Figure 28: Percentage of children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7	49
Figure 29: Percentage of children complete for age for diphtheria, tetanus, pertussis, polio, measles, mumps, and rubella in Manitoba, 2014 & 3-year average (2011-2013), age 7	50
Figure 30: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7.....	51

Figure 31: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7.....	52
Figure 32: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7.....	52
Figure 33: Percentage of children complete for age for polio by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7	53
Figure 34: Percentage of children complete for age for measles by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7.....	54
Figure 35: Percentage of children complete for age for mumps by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7.....	55
Figure 36: Percentage of children complete for age for rubella by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7.....	55
Figure 37: Percentage of children complete for age overall by continuous and non-continuous resident status in Manitoba, 2011-2014, age 7	56
Figure 38: Percentage of continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 7	57
Figure 39: Percentage of non-continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 7	57
Figure 40: Percentage of children complete for age for meningococcal conjugate C (Men-C-C), and hepatitis B, in Manitoba, 2014 & 3-year average (2011-2013), age 11	60
Figure 41: Percentage of children complete for age for meningococcal conjugate C (Men-C-C) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 11	61
Figure 42: Percentage of children complete for age for hepatitis B by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 11.....	62
Figure 43: Percentage of children complete for age for diphtheria, tetanus, pertussis and human papillomavirus (HPV), in Manitoba, 2014 & 3-year average (2011-2013), age 17	65
Figure 44: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17.....	66
Figure 45: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17.....	67
Figure 46: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17.....	67
Figure 47: Percentage of children complete for age for human papillomavirus (HPV) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17	68
Figure 48: Percentage of people who received at least one dose of tetanus, diphtheria, and pertussis in 2014, compared to the cumulative percentage of people who received at least one dose of tetanus (diphtheria) within the past 10 years, and the cumulative percentage of people who received at least one dose of pertussis since age seven, Manitoba, ages 18+	76
Figure 49: Percentage of people who received at least one dose of tetanus in 2014, compared to the cumulative percentage of people who received at least one dose of tetanus within the past 10 years, by regional health authority (RHA), Manitoba, ages 18+	78

Figure 50: Percentage of people who received at least one dose of diphtheria in 2014, compared to the cumulative percentage of people who received at least one dose of tetanus within the past 10 years, by regional health authority (RHA), Manitoba, ages 18+	78
Figure 51: Percentage of people who received at least one dose of pertussis in 2014, compared to the cumulative percentage of people who received at least one dose of pertussis since age seven years, by regional health authority (RHA), Manitoba, ages 18+	79
Figure 52: Percentage of people who received at least one dose of pneumococcal polysaccharide vaccine (Pneu-P-23) in 2014, compared to the cumulative percentage of people who received at least one dose of Pneu-P-23 within their lifetime, by regional health authority (RHA), Manitoba, ages 65+	81

LIST OF TABLES

Table 1: Doses required for children to be considered complete for age, by immunogen, 2014	15
Table 2: Doses required for adults, by immunogen, 2014	19
Table 3: Recommended Immunization Schedule, 2014, age 1	22
Table 4: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 1	32
Table 5: Recommended Immunization Schedule, 2014, age 2	33
Table 6: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 2	47
Table 7: Recommended Immunization Schedule, 2014, age 7	48
Table 8: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 7	58
Table 9: Recommended Immunization Schedule, 2014, age 11	59
Table 10: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 11	63
Table 11: Recommended Immunization Schedule, 2014, age 17	64
Table 12: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 17	69
Table 13: Number and percentage of vaccine doses administered by provider type and provider location, for each regional health authority (RHA) in Manitoba, 2014, ages 0-17	71
Table 14: Recommended Immunization Schedule, 2014, ages 18+	75
Table 15: Recommended Immunization Schedule, 2014, ages 65+	80
Table 16: Number and percentage of vaccine doses administered by provider type and provider location, for each regional health authority (RHA) in Manitoba, 2014, ages 18-64	83
Table 17: Number and percentage of vaccine doses administered by provider type and provider location, for each regional health authority (RHA) in Manitoba, 2014, ages 65+	85

Acronyms and Abbreviations

CDC	Communicable Disease Control
DTaP-IPV	diphtheria, tetanus, pertussis, and polio (combined vaccine)
DTaP-IPV-Hib	diphtheria, tetanus, pertussis, polio, and <i>Haemophilus influenzae</i> type b (combined vaccine)
HAHB	hepatitis A and hepatitis B (combined vaccine)
HB	hepatitis B (vaccine and/or immunogen)
HPV	human papillomavirus (vaccine and/or immunogen)
Men-C-C	meningococcal conjugate C vaccine
MHLS	Manitoba Health, Healthy Living and Seniors
MMR	measles, mumps, and rubella (combined vaccine)
MMRV	measles, mumps, rubella, and varicella (combined vaccine)
Pneu-C-13	Pneumococcal Conjugate Vaccine (13 valent)
Pneu-P-23	pneumococcal polysaccharide vaccine
RHA	regional health authority
Td	tetanus and diphtheria (combined vaccine)
Tdap	tetanus, diphtheria, and pertussis (combined vaccine)
V	varicella (vaccine and/or immunogen)

Acknowledgments

Manitoba Annual Immunization Surveillance Report (2014) is the product 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 efforts and expertise in the area of immunization are essential to produce this valuable report.

Corrections – February 4, 2016

The contents of Tables 10 and 12 were inadvertently switched during the construction of this report. These tables have now been corrected. We apologize for any inconvenience or confusion this may have caused.

Citation

Government of Manitoba, Manitoba Health, Healthy Living and Seniors, Public Health and Primary Health Care Division, Public Health Branch, Epidemiology and Surveillance. (2015). *Manitoba Annual Immunization Surveillance Report 2014*.

Let us know what you think. We appreciate your feedback! If you would like to comment on any aspect of this report, please send an email to: outbreak@gov.mb.ca

Executive Summary

MHLS is pleased to present the *Manitoba Annual Immunization Surveillance Report (2014)*. This report provides an overview of:

- A. childhood immunizations (for ages 1, 2, 7, 11, and 17 years),
 - B. providers of childhood immunizations (for all children from birth to age 17 years),
 - C. adulthood immunizations (for ages 18+ years and age 65+ years), and
 - D. providers of adulthood immunizations (for ages 18 – 64 years and ages 65+ years).
- Below are selected highlights from the report:

Childhood Immunizations

Immunizations at Age 1

- In Manitoba, 77.9% of one-year-old children received the required doses of vaccine to be considered complete for age *overall* in 2014.
- Prairie Mountain Health had the highest percentage of one-year-old children complete for age *overall* (83.9%). There was considerable variation in immunization uptake between the health regions; the range between the highest and lowest uptake rate was approximately 15.0%.
- Approximately eight out of ten one-year-old children were complete for age for each of the diphtheria (79.2%), tetanus (79.2%), pertussis (79.1%), and *Haemophilus influenzae* type b (Hib) (78.7%) immunogens; almost nine out of ten (88.3%) one-year-old children were complete for age for the polio immunogen. The percentage of children complete for age for the pneumococcal conjugate 13 valent vaccine (Pneu-C-13) (86.2%) was slightly higher than those of tetanus, diphtheria, pertussis, and Hib.

Immunizations at Age 2

- In Manitoba, 65.5% of two-year-olds received the necessary doses of vaccine required to be considered complete for age *overall* in 2014.
- Prairie Mountain Health had the highest percentage of two-year-old children complete for age *overall* (70.7%). There was considerable variation in uptake between the regions; the range between the highest and lowest uptake rate was approximately 15.0%.
- Approximately seven in ten of Manitoba's two-year olds were considered complete for age for diphtheria (71.0%), tetanus (71.0%), pertussis (70.9%), and Hib (70.4%) in 2014; the percentage of children complete for age for polio was higher (87.6%).
- More than eight out of ten two-year-olds were complete for age for the measles (86.3%), mumps (86.2%), rubella (86.2%), and varicella (83.2%) immunogens, and the Pneu-C-13 (84.0%) and meningococcal conjugate C (Men-C-C) (84.8%) vaccines.

Immunizations at Age 7

- In Manitoba, 61.7% of seven-year-olds received the required doses of vaccine to be considered complete for age *overall* in 2014.
- Northern Health Region had the highest percentage of seven-year-old children complete for age *overall* (74.2%), with Prairie Mountain Health a close second (72.6%). There was considerable variation in uptake between the regions; the range between the highest and lowest uptake rate was approximately 15.0%.

- In 2014, approximately seven out of ten of Manitoba's seven-year olds were considered complete for age for diphtheria (67.4%), tetanus (67.4%), and pertussis (67.1%). The percentage of children complete for age for polio was higher (83.8%).
- More than seven out of ten seven-year-olds (75.0%) were complete for age for the measles immunogen but, the percentage of seven-year-olds complete for age for mumps and rubella was higher with over nine out of ten (92.4%) children considered complete for age for each immunogen.

Immunizations at Age 11

- Almost eight in ten (79.8%) of Manitoba's 11-year-olds were considered complete for age for Men-C-C, in 2014, while approximately seven in ten (70.9%) of 11-year-olds were considered complete for age for the hepatitis B immunogen.

Immunizations at Age 17

- Just over one-half (54.9%) of Manitoba's 17-year-olds were considered complete for age for the tetanus and diphtheria immunogens. These percentages were slightly higher than the percentage of children complete for age for the pertussis immunogen (51.5%).
- In Manitoba, in 2014, 57.6% of 17-year-old *females* had completed the three doses required to be complete for age for the human papillomavirus (HPV) immunogen.

Providers of Childhood Immunizations

- In 2014, there were 256,892 doses of vaccine (excluding influenza) provided to children between birth and age 17 years, in Manitoba. 49.9% of these doses were provided by public health nurses, 47.5% by physicians, and 2.6% by other providers.

Adulthood Immunizations

Immunizations for Ages 18+

- In Manitoba, the cumulative percentages of people who had received at least one dose each of tetanus and diphtheria in the past 10 years were 37.7% and 37.6%, respectively.
- The cumulative percentage of people who received at least one dose of pertussis since turning seven-years-old (16.8%) was approximately one-half the cumulative percentages of tetanus and diphtheria.

Immunizations for Ages 65+

- In Manitoba, 70.0% of people over the age of 65 had received at least one dose of the pneumococcal polysaccharide vaccine (Pneu-P-23) in their lifetime.

Providers of Adulthood Immunizations

Ages 18 – 64

- In 2014, there were 33,298 doses of vaccine (excluding influenza) provided to people ages 18 – 64 years in Manitoba. 49.9% of these doses were provided by physicians, 26.9% by public health nurses, and 23.2% by other providers.

Ages 65+

- In 2014, there were 14,683 doses of vaccine (excluding influenza) provided to people ages 65+ years in Manitoba. 58.1% of these doses were provided by physicians, 29.9% by public health nurses, and 12.1% by other providers.

What to Expect in This Report

Our goal is to summarize immunization coverage in Manitoba in a user-friendly manner that allows the reader to quickly access the required information. The *Manitoba Annual Immunization Surveillance Report (2014)* will display the 2014 immunization data in all graphs, with many graphs also displaying the 3-year average (2011-2013), or cumulative rate, for comparison. In some instances, results presented in this report may differ slightly from the results presented in previous years' reports; differences may result from changes in the analyses of the previous years' complete for age criteria.

What you will see in this report:

- Highlights of the Recommended Immunization Schedule by age category,
- Graphs and figures to provide visual representations of data,
- Details of the recommended immunizations for each age category by RHA,
- A tabular overview of all immunizations in the summary section of each *childhood* chapter,
- A tabular overview of the vaccines administered in Manitoba, in 2014, by provider type and location, for specified age categories.
- Highlighted elements in bright text boxes, and
- Supporting text to provide context to the data.

Note that this report does not provide data on:

- First Nation status - the self-reported First Nations status variable in the MIMS data is not considered reliable for health care policy and planning purposes.
- Influenza immunizations – influenza immunization uptake is reported in the weekly seasonal influenza reports¹ and a more detailed analysis is reported in the Manitoba Annual Influenza Report².

¹ <http://www.gov.mb.ca/health/publichealth/surveillance/influenza/index.html>

² <http://www.gov.mb.ca/health/publichealth/surveillance/influenza/annual.html>

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.

There are three different types of vaccine preparations based on how many and what types of immunogens are contained in the vaccine:

1. vaccines containing only one immunogen, against one disease (e.g. hepatitis B vaccine).
2. vaccines containing immunogens against more than one serogroup or serotype of the same disease (e.g. Men-C-C, Pneu-C-13, Pneu-P-23).
3. vaccines containing immunogens against more than one vaccine preventable disease (e.g. the combined vaccine MMRV).

In this report, all vaccines are referred to by the immunogens they contain, rather than by their “brand” names. For example, the combined vaccine DTaP-IPV-Hib contains the diphtheria, tetanus, pertussis, polio, and Hib immunogens. These specific vaccine names (such as DTaP-IPV-Hib) are used in describing the Recommended Immunization Schedules for each age group, as well as in Part B and Part D, the provider type analyses.

Single immunogen names will be used for majority of the interpretation in Parts A and C. Most immunogens (e.g. tetanus, diphtheria, measles, mumps) can be provided via several different combination vaccines and, as such, their coverage rates may vary depending on what vaccines were actually administered. Due to this, it is important to examine most immunogens separately.

Vaccine names may be used in specific reference throughout the interpretations in Part A and Part C; for example, when discussing the Pneu-C-13 vaccine. We distinguish the coverage for the Pneu-C-13 vaccine, which is a conjugate vaccine, from the coverage for the Pneu-P-23 vaccine, which is a polysaccharide vaccine.

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, different immunogens are counted due to 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 (or a combination of the two), and is considered complete for age when the full series was given on schedule.

Throughout the report, the term “pertussis immunogen” is referring to the **acellular** pertussis immunogen. Whole cell pertussis vaccine was used prior to 1997, and should *only* have been administered to children less than 7 years of age. In 1997, acellular pertussis vaccines were introduced which could be administered to older children (adolescents) and adults.

- Children born in or after 1997 should have only received immunizations containing acellular pertussis. For a child to be considered complete for age, they need the required doses of (acellular) pertussis as outlined in Table 1.
- Adults born prior to 1997 were counted in the cumulative percentage of acellular pertussis if they received at least one dose of pertussis vaccine since their seventh birthday, as outlined in Table 2. For this analysis, all doses of pertussis vaccine administered after age seven were assumed to contain acellular pertussis immunogen.

About Manitoba Immunization Monitoring System (MIMS)

The MIMS database was used to identify each individual’s immunization coverage. MIMS is a population-based, province-wide, electronic immunization registry that has been recording immunizations administered to Manitoba residents since 1988. Initially, it was a childhood immunization registry, but it was expanded to include adult immunizations in 2000.

Information, including vaccine type and date of immunization, is captured in MIMS for each immunization event through:

1. **manual data entry into MIMS** for: vaccines administered by public health and other regional staff in each RHA; pharmacy administered vaccines; non-publicly-funded vaccines; and, vaccines administered by other health care providers who do not have access to MIMS or the Claims Processing Solution.
2. **physician billing claims** for publicly-funded vaccines administered by physicians (and other providers who submit fee for service or shadow billing claims to the Claims Processing Solution).

Starting in January 2015, the MIMS data (excluding archived records) were transferred to a new immunization monitoring system called Panorama. The new system allows for the storage of more detailed variables, and provides a user-friendly interface for use by public health nurses in the RHAs (and all users who previously had access to MIMS). Physician immunization data will be interfaced (moved via a one-way transfer) into Panorama from the Claims Processing Solution, and, as of October 2015, pharmacist immunization data will be interfaced into Panorama directly from the Drug Programs Information Network (DPIN). For future versions of the Manitoba Annual Immunization Report, data will be extracted from Panorama.

Introduction

This annual report is divided into four parts:

- A. childhood immunizations (for ages 1, 2, 7, 11, and 17 years),
- B. providers of childhood immunizations (for all children from birth to age 17 years),
- C. adulthood immunizations (for ages 18+ years and age 65+ years), and
- D. providers of adulthood immunizations (for ages 18 – 64 years and ages 65+ years).

Parts A and C provide information on the number and percentage of **people** immunized by age and by **region of residence**, where the “region of residence” is the RHA within which the individual *receiving* the vaccine resides.

Parts C and D provide information on the number and percentage of vaccine **doses** administered by: age, provider type, and **provider location**, where the “provider location” is the RHA within which the provider’s practice is located.

Part A: Childhood Immunizations

This part is divided into five chapters; each chapter represents a specific age category (ages 1, 2, 7, 11, and 17 years) that corresponds with Manitoba’s Recommended Immunization Schedule (Appendix A). Within each of these chapters, there are four sections that further describe immunizations from a provincial and regional perspective. It is important to note that, in this part of the report, the RHA classifications were determined by the child’s **region of residence**.

Section 1: Immunizations in Manitoba

- Highlights the additional vaccines required by Manitoba’s Recommended Immunization Schedule (full schedule can be found in Appendix A) to be considered complete for age, from one age group to the next. For example, at age 17, the tetanus, diphtheria, and pertussis vaccine (Tdap) is one of the vaccines highlighted; between ages 11 and 17 children should have received one dose of Tdap (in addition to the doses they received at earlier ages).
- Describes the key vaccines required to be complete for age.
- Provides an overview of the proportion of children considered complete for age “overall” in Manitoba and by RHA. **Note: this information is useful primarily at ages 1, 2, and 7; it has been excluded for ages 11 and 17. Please see the ages 11 and 17 chapters for a more detailed explanation.**
- Provides an overview of the proportion of children considered complete for age in Manitoba for each of the “highlighted” immunogens in the age group.

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 Manitoba’s Recommended Immunization 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 by their 17th birthday.

Section 2: Immunizations by RHA

The proportion of children who are complete for age for a particular immunogen is summarized graphically. Only those immunogens contained in the vaccines highlighted in Section 1, are detailed.

The proportion of children who are complete for age is calculated with a denominator of the mid-year population³ in the specified age category, in Manitoba. For 2014, the numerator contains the count of individuals who received all required doses of a given immunogen(s), as shown in Table 1. For *previous* years (2011-2013), the numerator was calculated using the count of individuals who received all required doses of immunogen(s) as shown in Appendix B.

For example, at age 17, in 2014, 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. It is possible for smaller regions, such as Northern Health Region, to have close to or greater than 100% of a given population complete for age for a given immunogen, due to people moving in and out of those regions.

The number of doses required to be complete for age by each immunogen is generated based on Manitoba's Recommended Immunization Schedule for each reporting year. For example, from 2012 – 2014, one dose of varicella was a requirement to be considered complete for age at 11 years but, prior to 2012, varicella was not a requirement to be considered complete for age. This might result in complete for age rates that are not comparable to previous years' rates for certain immunogens.

Though combined vaccines (e.g. diphtheria, tetanus, pertussis, polio [DTaP-IPV]) are frequently used to vaccinate children in Manitoba, in some instances, the data shows that complete for age rates by immunogen vary slightly (even for immunogens commonly given together as part of a combined vaccine). This may be due to 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 rather than by vaccine.

³ The mid-year population is based on the residency of individuals as of June 1st regardless of their health coverage. The population file is built December 1st (6 month lag) to allow for late data changes that may affect the residency status at June 1st.

Table 1: Doses required for children to be considered complete for age, by immunogen, 2014

Age (Years)	Diphtheria (D)	Tetanus (T)	Pertussis (aP)	Polio (IPV)	Haemophilus influenzae type b (Hib)	Pneumococcal Conjugate 13 valent (Pneu-C-13)	Measles (M)	Mumps (Mu)	Rubella (R)	Varicella (V)	Meningococcal Conjugate C (Men-C-C)	Hepatitis B (HB)	Human Papillomavirus (HPV - females only)
2014													
1	3	3	3	2	3	2							
2	4	4	4	3	4	3	1	1	1	1	1		
7	5	5	5	4			2	1	1	1			
11	5	5	5	4			2	1	1	1	1	3	
17	6	6	6	4			2	1	1	1	1	3	3

Section 3: Residency and Immunization Rates

This section describes immunization rates by comparing complete for age “overall” data on continuous residents to non-continuous residents in Manitoba by year (2011 to 2014) and for each RHA (2014, and 3-year average of 2011 to 2013). **Note: as in Section 1, this information is only valuable at ages 1, 2, and 7; it has been excluded for ages 11 and 17. Please see the ages 11 and 17 chapters for a more detailed explanation.**

A **continuous resident** is defined as an individual with an uninterrupted registration with MHLS from their date of birth to their birthday in 2014.

A **non-continuous resident** has lived outside of Manitoba for a period of time, but was registered with MHLS by their birthday in 2014. 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:



The MIMS was linked to the Insurance Registry at MHHLS. As such, MIMS was dependent on the presence of a valid PHIN⁴ to collect immunization data. Residency impacts the interpretation of immunization rates substantially and thus, it is important to track and understand population trends.

Some reasons for the variations in rates may include:

- 1) upon re-entry to Manitoba, non-continuous residents can submit their immunization records to their local public health office for entry into MIMS. However, 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 immunization 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 unavailable.

Section 4: Summary of Immunizations

This section presents a table containing the number (and percentage) of **children** who are complete for age for each immunogen: diphtheria, tetanus, pertussis, Hib, polio, Pneu-C-13, measles, mumps, rubella, varicella, Men-C-C, and hepatitis B (and HPV for ages 11 and 17), by RHA.

Note: if at a particular age, the number of recommended doses of a particular immunogen is zero (see Table 1) a child is counted as complete for age for that immunogen if they receive even one dose of that immunogen. For example, at age 1, measles is not required to be considered complete for age, but 3.4% of one-year-olds were reported as being complete for age for measles in Table 4. This means 3.4% of one-year-olds received at least one dose of the measles immunogen, which is reasonable considering they are supposed to receive their first dose at 12 months and some parents may vaccinate early.

Part B: Providers of Childhood Immunizations

In this part of the report, the data is aggregated for **all children from birth (age 0) to age 17**. The data is displayed in a table format. The table displays the number of doses of each vaccine given by each provider type, within each RHA, and for Manitoba overall in 2014. The corresponding percentages are also presented; the percentages indicate the proportion of each vaccine administered by each provider type, for easier comparison.

The number of doses (and corresponding percentages) given by out of province providers are also displayed. Out of province providers are those providers who do not have a practice in Manitoba. A child may have received immunizations from an out of province provider if they were a non-continuous resident (who moved to Manitoba and

⁴ A PHIN is a 9-digit lifetime identification number assigned to each resident of Manitoba. A PHIN links personal health information to the individual it belongs to. Your PHIN will be valid as long as you are a current resident of Manitoba. Your PHIN may become invalid for several reasons such as moving out of Manitoba or death.

submitted their immunization records to their local public health office), or while travelling.

It is important to note, in this part of the report:

- the RHA classifications were determined by the provider's location (i.e. the RHA where the provider's practice is located).
- the data is presented by **dose**, rather than by person. Thus, the number of doses administered may be higher than the total population.
- if the total number of doses provided was between one and five, that number, and the corresponding percentage, was suppressed and marked with an "S" in the table.

The providers were categorized into three types:

1. Physician

The physician category includes providers reported as "physician" and "primary care".

2. Public health nurse

The public health nurse category includes providers reported as: "public health nurse", "First Nation/ Tribal Council", and "pharmacy".

"Pharmacy" is included under the public health nurse category for 2014, as pharmacists were not authorized to administer vaccinations until October 1st, 2014. Prior to this date, any immunizations administered in a pharmacy setting would likely have been a "pop-up" immunization clinic with a public health nurse administering the doses. Since there is no way to definitively determine whether the dose was administered by a pharmacist or by a public health nurse, and due to the small numbers in the pharmacy category, "pharmacy" was grouped into the public health nurse category, for 2014.

3. Other

The other category includes all other reported provider types. This category includes providers reported as: "Publicly Funded Health Facility" (usually a hospital), "Private Health Care Provider" (groups such as the Victorian Order of Nurses), "Facility" (all facilities not captured in other groupings), "Occupational Health" (any occupational health provider), and "Unknown".

Important Note:

For **Part A and C**, the RHA classification is determined by the **region of residence** of the person who **received** the immunogen. That is, the RHA within which the individual resides.

For **Part B and D**, the RHA classification is determined by the **provider location** of the person who **administered** the vaccine. That is, the RHA within which the provider's practice is located.

Part C: Adulthood Immunizations

Part C has two chapters. One chapter covers those immunizations recommended for *all* people aged 18 years and older (including people who are aged 65 years and older), and the other chapter covers those immunizations recommended for people aged 65 years and over.

Part C has been defined this way because tetanus, diphtheria, and pertussis are part of the adult immunization schedule for *all* people aged 18 years and older while Pneu-P-23 is recommended for people aged 65 years and older.

Within each chapter there are two sections that further describe immunizations from a provincial and regional perspective. It is important to note, in this part of the report, the RHA classifications were determined by the adult's **region of residence**.

Section 1: Immunizations in Manitoba

- Highlights the vaccines required by adults in Manitoba's Recommended Immunization Schedule.
- Describes the key vaccines/immunogens required by adults.
- Contains an overall snapshot of immunizations in the province for all people aged 18 years and older (*this is not provided for older adults aged 65 years and older because there is only one vaccine, Pneu-P-23, in that chapter, so there is nothing for comparison*).

Section 2: Immunizations by RHA

The proportion of people who received their immunizations as described in Table 2 is presented graphically. Only those vaccines/immunogens required by a particular age category are detailed. The graphs display the cumulative proportion of people who received the immunogen according to the Recommended Immunization Schedule, compared to the proportion of people who received the immunogen in 2014. For example, for pertussis, this will be: the proportion of people aged 18 years and older who received at least one dose of acellular pertussis in 2014 compared to the proportion of people aged 18 years and older who received at least one dose of acellular pertussis since age seven.

The proportion of people who received the immunization is calculated with a denominator of the mid-year population⁵ in the specified age category, in Manitoba. The numerator contains the count of individuals who received the required doses of immunogen(s), within the time frame, as shown in Table 2. For example, at all ages over the age of 18, an individual must have received at least one dose of tetanus within the past 10 years to be included in the numerator count for that immunogen. If an individual over the age of 18 has not received one or more doses of tetanus within the past 10 years, that individual would not be included in the numerator count.

As in Part A, rates will be provided by immunogen rather than vaccine.

⁵ The mid-year population is based on the residency of individuals as of June 1st regardless of their health coverage. The population file is built December 1st (6 month lag) to allow for late data changes that may affect the residency status at June 1st.

Table 2: Doses required for adults, by immunogen, 2014

Age (years)	Diphtheria (D)	Tetanus (T)	Pertussis (aP)	Pneumococcal Polysaccharide (Pneu-P-23)
18-64	1/10 year	1/10 year	1/since age seven	
65+	1/10 year	1/10 year	1/since age seven	1/lifetime

Part D: Providers of Adulthood Immunizations

This part of the report is divided into two chapters: 1) **ages 18-64 years**, and 2) **ages 65+ years**. Within each chapter the data is displayed in a table format. The table displays the number of doses of each vaccine given by each provider type, within each RHA, and for Manitoba overall, in the year 2014. The corresponding percentages are also presented; the percentages indicate the proportion of each vaccine administered by each provider type, for easier comparison. The number of doses (and corresponding percentages) given by out of province providers is also displayed.

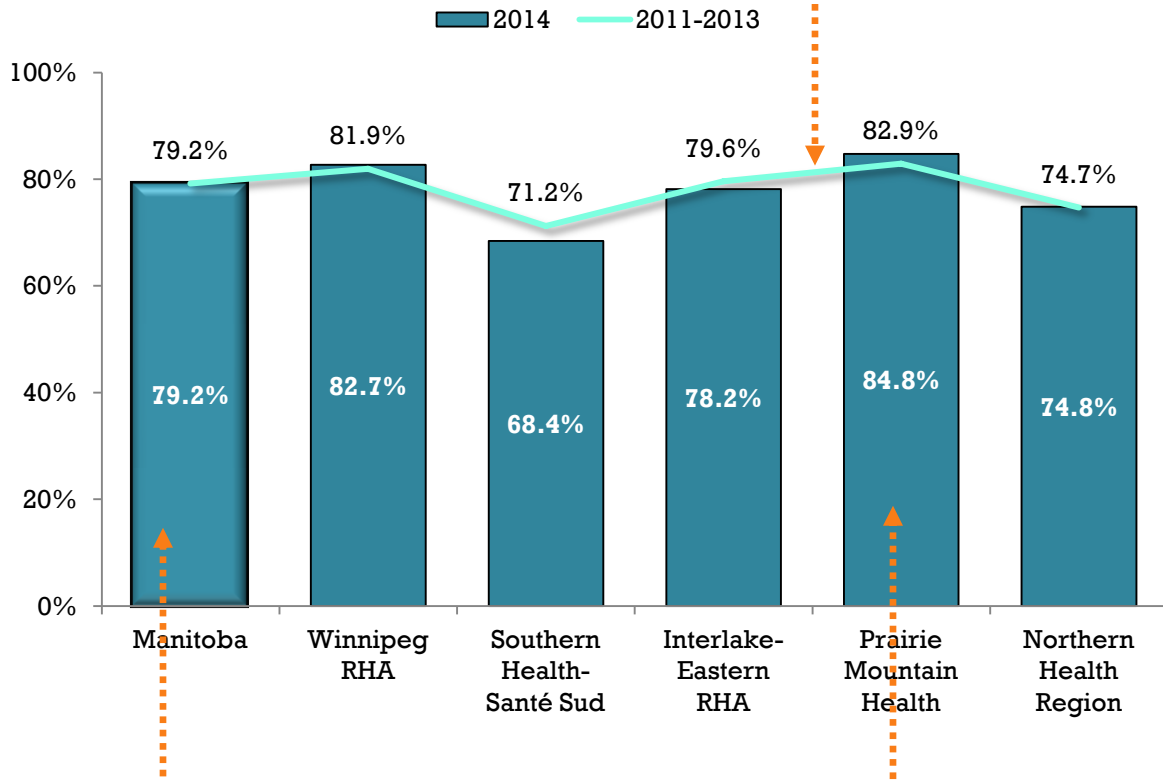
It is important to note, in this part of the report:

- the RHA classifications were determined by the provider's location (i.e. the RHA where the provider's practice is located).
- the data is presented by **dose**, rather than by person. Thus, it is possible for the number of doses administered to be higher than the total population in that age group.
- if the total number of doses provided was between one and five, that number, and the corresponding percentage, was suppressed and marked with an "S" in the table.

The provider type groupings used in the adulthood provider type reports are the same as those used in the childhood provider type reports. Please refer to the overview of Part B (page 17) for a description of how provider types are broken down.

Key Elements in Graphs

For child immunizations, this line represents the average proportion of children complete for age for the immunogen by **RHA**, in the previous three years, 2011 – 2013. The number above the line corresponds to the numerical value.



This bar represents the **provincial** average of children complete for age for the immunogen in 2014.

Each bar represents the proportion of children complete for age for the immunogen by **RHA** in 2014. The bold number in the centre of the bar denotes the exact percentage.

Part A: Childhood Immunizations

1. Immunizations at Age 1

1.1 Immunizations in Manitoba, Age 1

Table 3: Recommended Immunization Schedule, 2014, age 1

Vaccine	Age		
	2 months	4 months	6 months
DTaP-IPV-Hib Diphtheria, tetanus, pertussis, polio, <i>Haemophilus influenzae</i> type b	◆	◆	◆
Pneu-C-13* Pneumococcal conjugate 13 valent	◆	◆	

◆ A single dose given with one needle.

* 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.

At age one, Manitoba's 2014 universal childhood immunization program provided protection against the following bacterial pathogens: diphtheria, tetanus, pertussis, Hib, and the 13 types of *streptococcus pneumoniae* (pneumococcal bacteria) that cause the most severe pneumococcal infections in children. The age one program also provided protection against viral polio infection. The immunization status of children at age one in 2014 represents those who were born in 2013 and who turned one year old in 2014 (*2013 birth cohort*).

The data reported in Figure 1 is for children who were complete for age *overall*: they had received all of the scheduled doses of vaccines as shown in Table 1. In order to be considered complete for age *overall* at one year, children needed to have three doses of diphtheria, tetanus, pertussis, and Hib, and two doses of polio and Pneu-C-13. For an overview of immunogens required to be complete for age in 2014, please refer to Table 1 (for an overview of the immunogens that were required to be complete for age from 2011-2013 see Appendix B).

If a child missed one of these immunogens, they were not considered complete for age *overall* at one year, but they could still be considered complete for age for a specific immunogen. Therefore, *overall* complete for age estimates are expected to be lower than the immunogen-specific complete for age estimates.

In Manitoba, 77.9% of one-year-olds received the necessary doses of vaccine required to be considered complete for age *overall* (Figure 1) in 2014. This percentage was calculated with a denominator of all one-year-olds in Manitoba, who had valid MHHS PHINs (n=16,630), and a numerator containing all one-year-olds who received all of their required immunizations (n=12,955). The number of vaccinated one-year-olds did vary by RHA: Prairie Mountain Health had the highest percentage of one-year-old children complete for age overall (83.9%) in 2014, while Southern Health - Santé Sud had the lowest (67.3%).

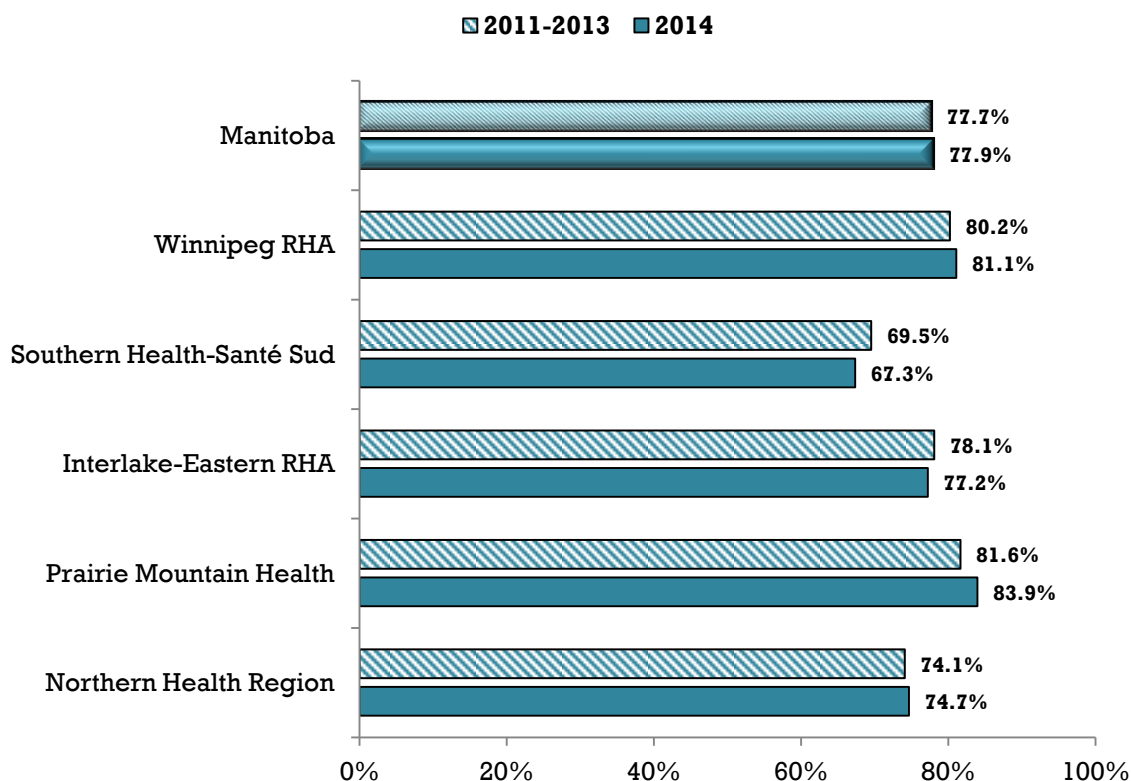


Figure 1: Percentage of children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1

Almost 8 out of 10 one-year-old Manitobans received all the vaccine doses necessary to be considered complete for age *overall*, in 2014.

In their first year, children should have received *three* doses of the combined vaccine DTaP-IPV-Hib (which provides protection against diphtheria, tetanus, pertussis, polio, and Hib), at ages two, four, and six months. *Three* doses of diphtheria, tetanus, pertussis, and Hib were required to be considered complete for age at age one for those immunogens in 2014. However, children only required *two* doses of polio to be considered complete for age for that immunogen. The third dose of polio was acceptable to give as an additional dose in the combination vaccine for convenience of administration.

This resulted in a difference in immunization rates between polio and the other immunogens in the vaccine. For example, if a child missed one dose and, therefore, only received two doses of DTaP-IPV-Hib, they were not considered complete for age for diphtheria, tetanus, pertussis, or Hib but *were* considered complete for age for polio. Polio immunization rates were typically higher for this reason (Figure 2). In addition to the three doses of DTaP-IPV-Hib, two doses of Pneu-C-13 were required to be considered complete for age *overall* at age one.

The data reported in Figure 2 is for children who were complete for age for the particular immunogen, regardless of whether they were complete for age overall. Almost eight out of ten children were complete for age for each of the diphtheria (79.2%), tetanus (79.2%), pertussis (79.1%), and Hib (78.7%) immunogens; the complete for age rates for these immunogens were very close as they were typically given in the combined vaccine DTaP-IPV-Hib, and all required three doses to be considered complete for age. The percentage of children complete for age for polio was higher (88.3%), for the reasons discussed above. The percentage of children complete for age for Pneu-C-13 (86.2%) was slightly higher than those of tetanus, diphtheria, pertussis, and Hib, as only two doses of this immunogen were required to be complete for age at age one, rather than three doses.

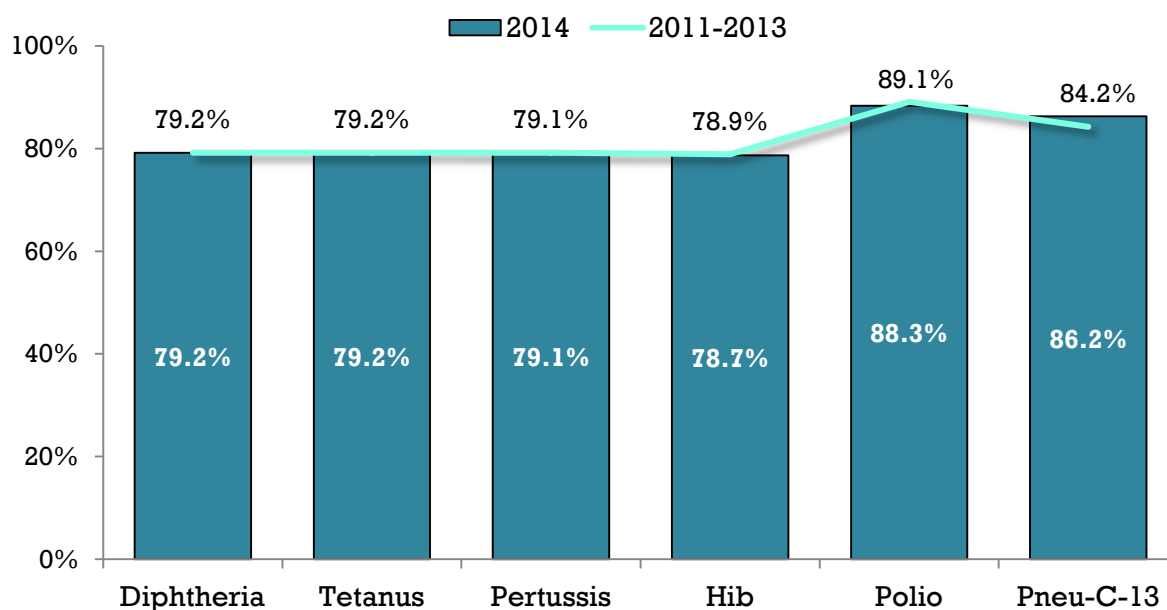


Figure 2: Percentage of children complete for age for diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b (Hib), polio, and pneumococcal conjugate 13 valent (Pneu-C-13) in Manitoba, 2014 & 3-year average (2011-2013), age 1

1.2 Immunizations by RHA, Age 1

This section considers whether a child was complete for age for the particular immunogen, regardless of whether they were complete for age overall at age one.

Diphtheria, Tetanus, Pertussis, and Hib

Figure 3 shows the percentage of children aged one year who received three doses of the diphtheria immunogen, in each RHA.

In Manitoba, 79.2% of one-year-olds were complete for age for the diphtheria immunogen (commonly administered as part of the combined vaccine DTaP-IPV-Hib), in 2014. Prairie Mountain Health had the highest percentage of one-year-olds complete for age (84.8%), with Winnipeg RHA a close second (82.7%), both surpassing their 3-year average complete for age rates (82.9% and 81.9%, respectively). Southern Health-Santé Sud had the lowest percentage of one-year-olds complete for age for diphtheria (68.4%), in 2014, falling just below their 3-year average rate (71.2%).

A similar trend was observed for the percentage of children complete for age 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.

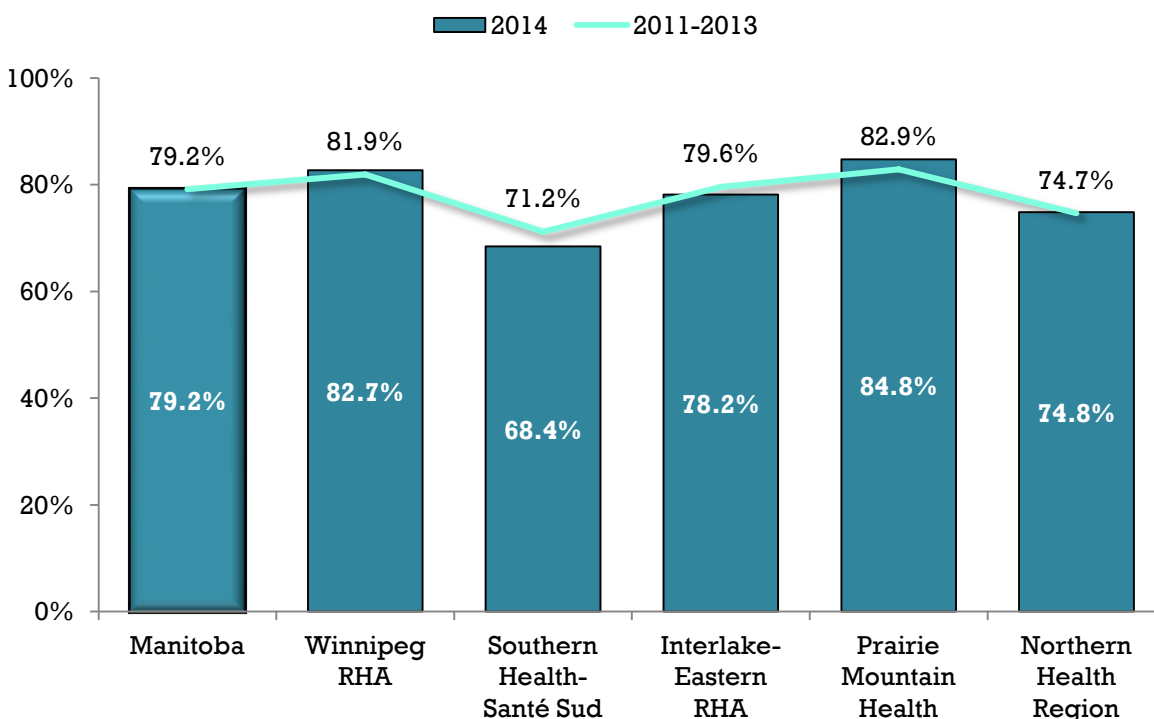


Figure 3: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1

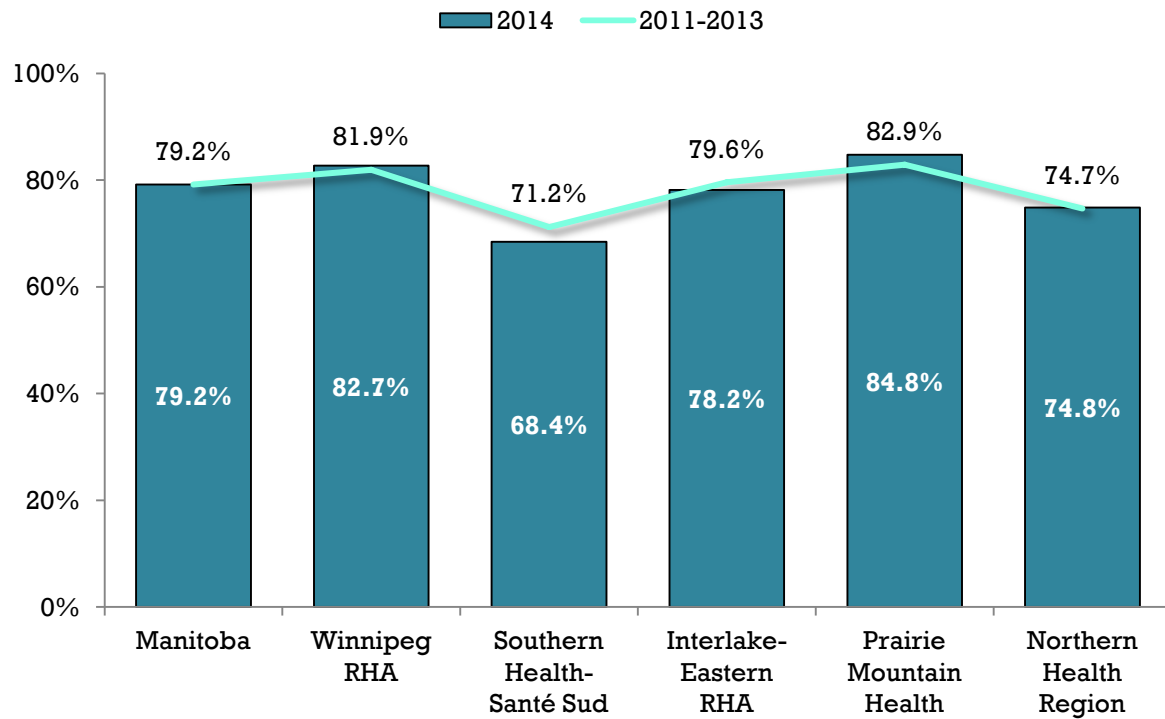


Figure 4: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1

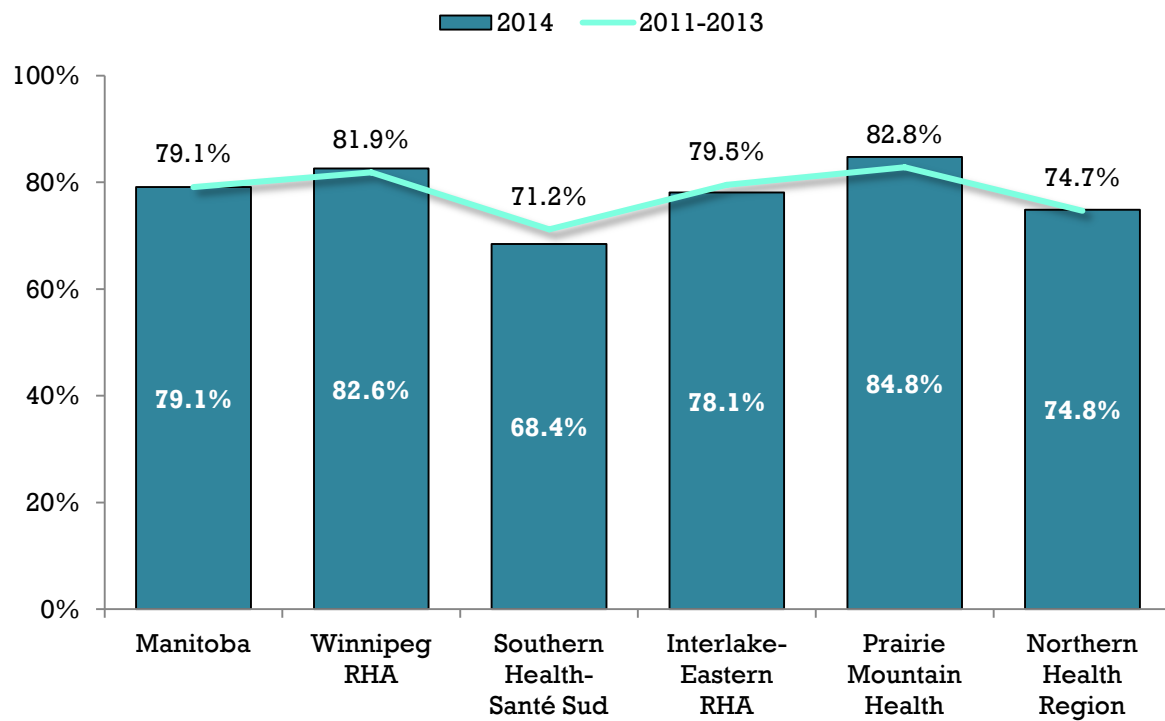


Figure 5: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1

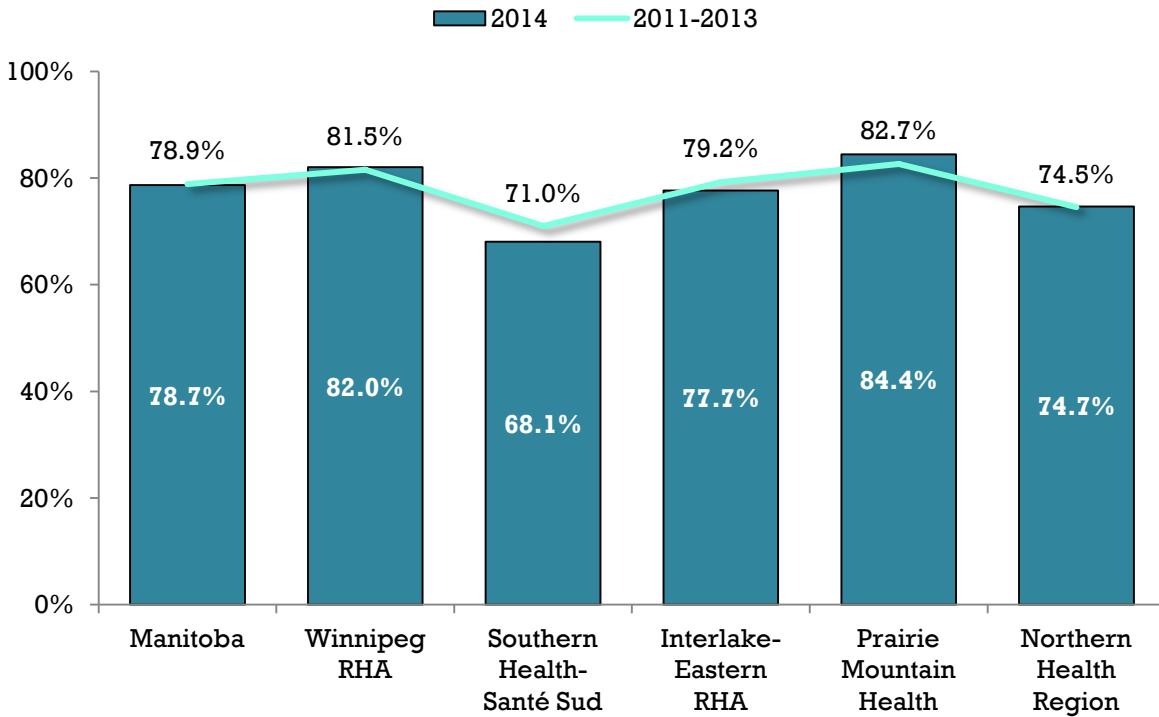


Figure 6: Percentage of children complete for age for *Haemophilus influenzae* type b (Hib) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1

In Manitoba, approximately **8 out of 10** one-year-old children received the three doses necessary to be **complete for age** for the **diphtheria, tetanus, pertussis, and Hib** immunogens in 2014.

Polio

In Manitoba, the percentage of one-year-old children complete for age for the polio immunogen was high (Figure 7). Only two doses of the polio immunogen were required to be complete for age in 2014 but, the polio immunogen was commonly received as part of the combined vaccine, DTaP-IPV-Hib, administered in three doses at ages two, four, and six months.

Across the province, almost nine out of ten one-year-olds (88.3%) received the required number of doses to be considered complete for age for the polio immunogen (Figure 7). The percentage of one-year-olds complete for age ranged from 76.9% (Southern Health – Santé Sud) to 91.5% (Prairie Mountain Health). The percentage of children in Southern Health – Santé Sud that were complete for age for the polio immunogen in 2014, was lower than the 3-year average complete for age rate (80.2%).

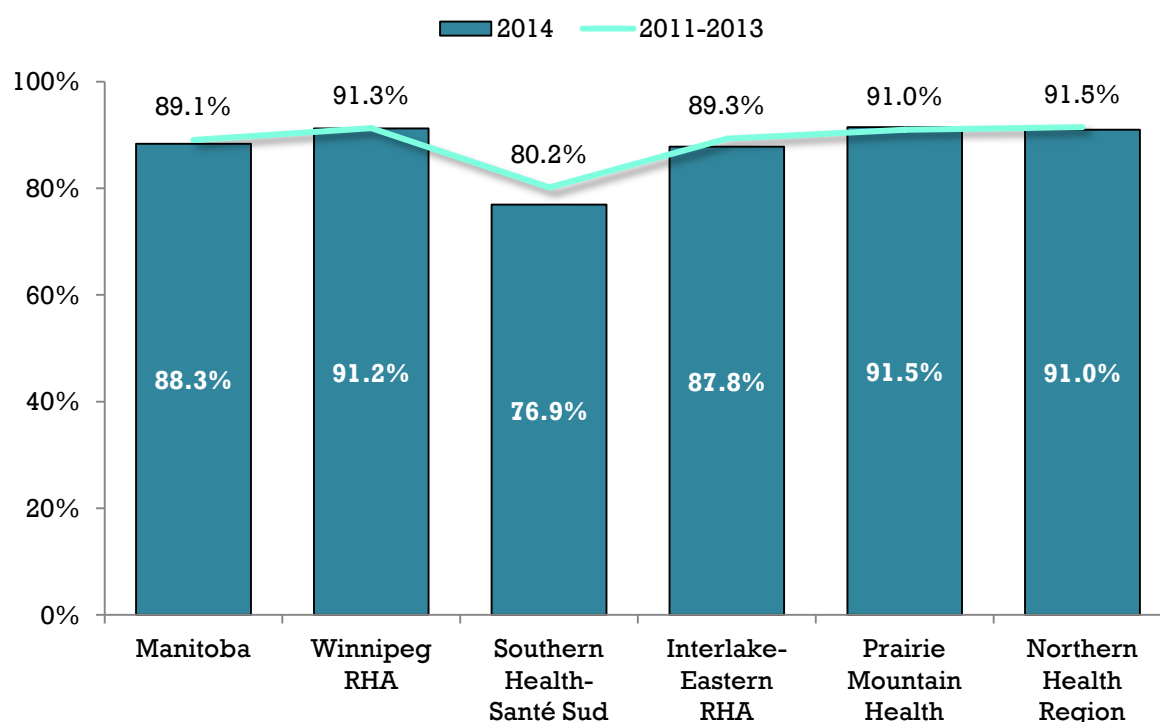


Figure 7: Percentage of children complete for age for polio by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1

In Manitoba, almost **9 out of 10** one-year-old children received the two doses necessary to be **complete for age** for the **polio** immunogen in 2014.

Pneumococcal Conjugate 13 valent

In Manitoba, the Pneu-C-13 vaccine should have been administered to children at ages two, four, and 12 months in 2014. But, to be considered complete for age for Pneu-C-13 at age one, only *two* doses were required; the third dose, administered at 12 months, was not part of the complete for age requirement until age two. This allowed time for parents to get “caught-up” in vaccinating their children.

Across the province, almost nine in ten one-year-old children (86.2%) met the requirements to be considered complete for age for Pneu-C-13 (Figure 8); that is, they received *at least* two doses of the vaccine by age one. The number of doses required to be complete for age for Pneu-C-13 at age one changed in July 2012. Previously, four doses were required at two, four, six, and 18 months of age (that is, *three* doses were required before a child’s first birthday) but, after July 2012, only *two* doses were required before a child’s first birthday. Due to this, most RHAs had a slightly higher percentage of children complete for age in 2014 than in their 3-year averages. Since the number of required doses decreased, it was easier for more children to reach “complete for age” status. Note: high risk groups and those living in First Nations communities remain at the four dose schedule at two, four, six, and 18 months.

In 2014, the amount of children complete for age for Pneu-C-13 in Southern Health-Santé Sud (75.0%) was lower than the amount of children complete for age for the vaccine in the other RHAs (approximately nine in ten one-year-olds). This trend was also apparent in the 3-year average.

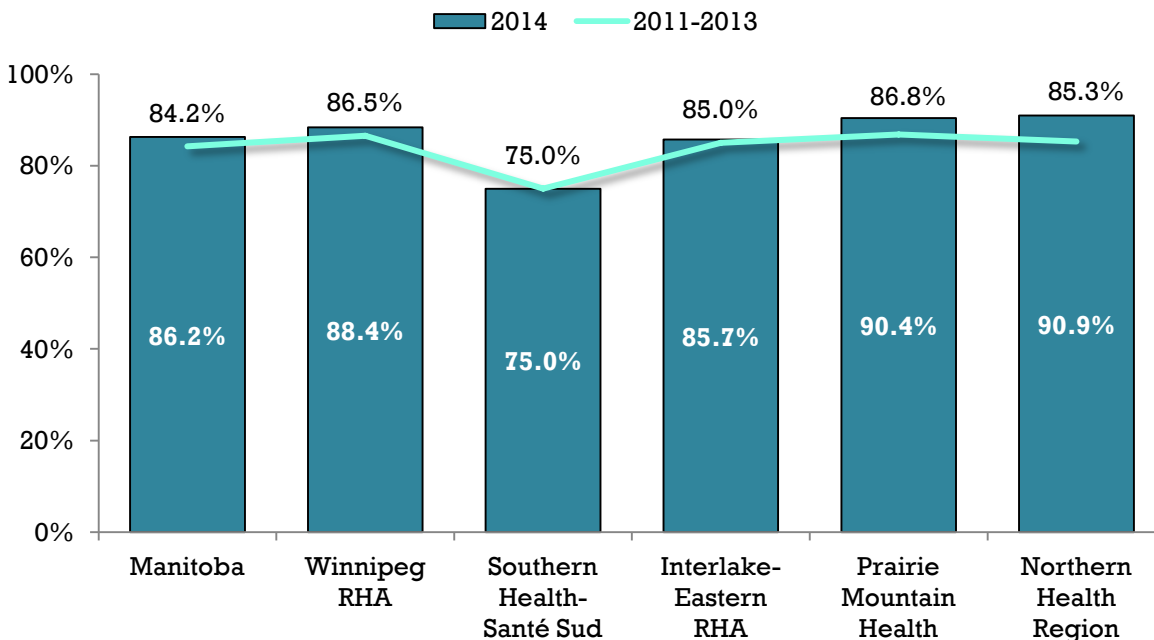


Figure 8: Percentage of children complete for age for pneumococcal conjugate 13 valent (Pneu-C-13) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 1

In Manitoba, almost **9 out of 10** one-year-old children received the two doses necessary to be **complete for age** for the **Pneu-C-13** vaccine in 2014.

1.3 Residency and Immunization Rates, Age 1

This section considers whether a child was complete for age *overall* at age one. That is, whether they received *all* doses of the immunogens recommended by age one.

From 2011 to 2014, the percentage of children considered complete for age overall at age one was substantially higher for continuous residents than non-continuous residents (Figure 9). Approximately three-quarters of continuous residents were complete for age 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 16.

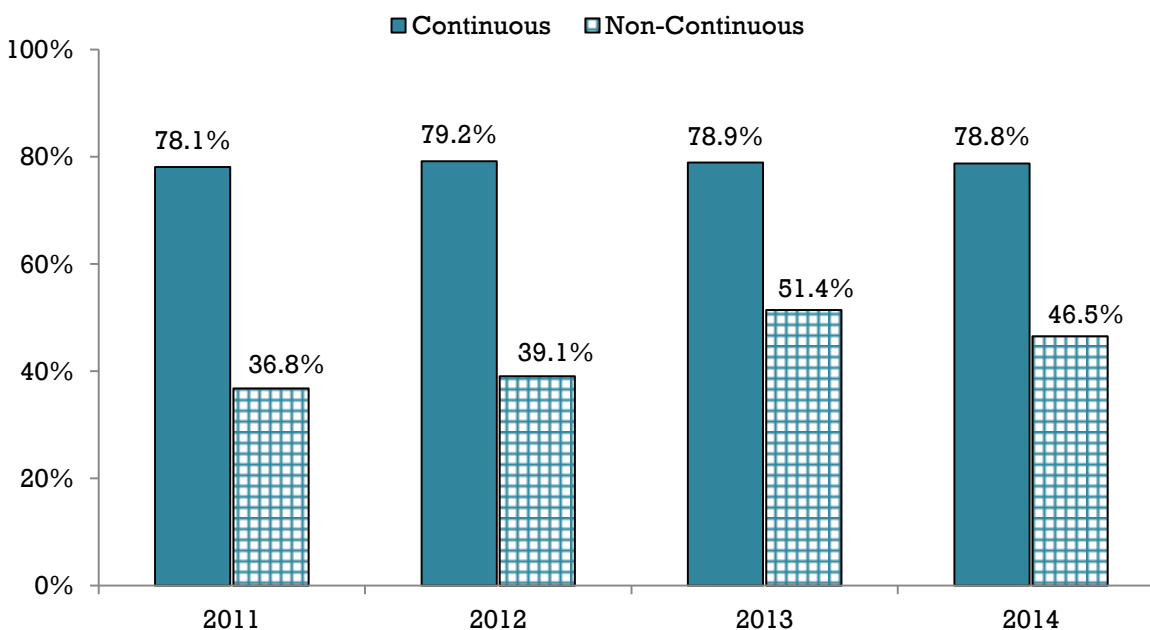


Figure 9: Percentage of children complete for age overall by continuous and non-continuous resident status in Manitoba, 2011-2014, age 1

The percentage of one-year-olds considered complete for age *overall* was substantially higher for continuous residents than non-continuous residents.

In all RHAs, the percentage of continuous residents considered complete for age overall at age one (Figure 10), was higher than the percentage of non-continuous residents considered complete for age overall at age one (Figure 11), with the exception of Northern Health Region. In Northern Health Region, 90.0% of non-continuous residents were complete for age in 2014, compared to 74.6% of continuous residents. Figure 10 shows Prairie Mountain Health had the highest percentage of one-year-old continuous residents complete for age in 2014 (83.9%), while Southern Health – Santé Sud had the lowest percentage (67.4%). Figure 11 shows Northern Health Region had the highest percentage of one-year-old non-continuous residents complete for age in 2014 (90.0%), while Winnipeg RHA had the lowest percentage (34.2%).

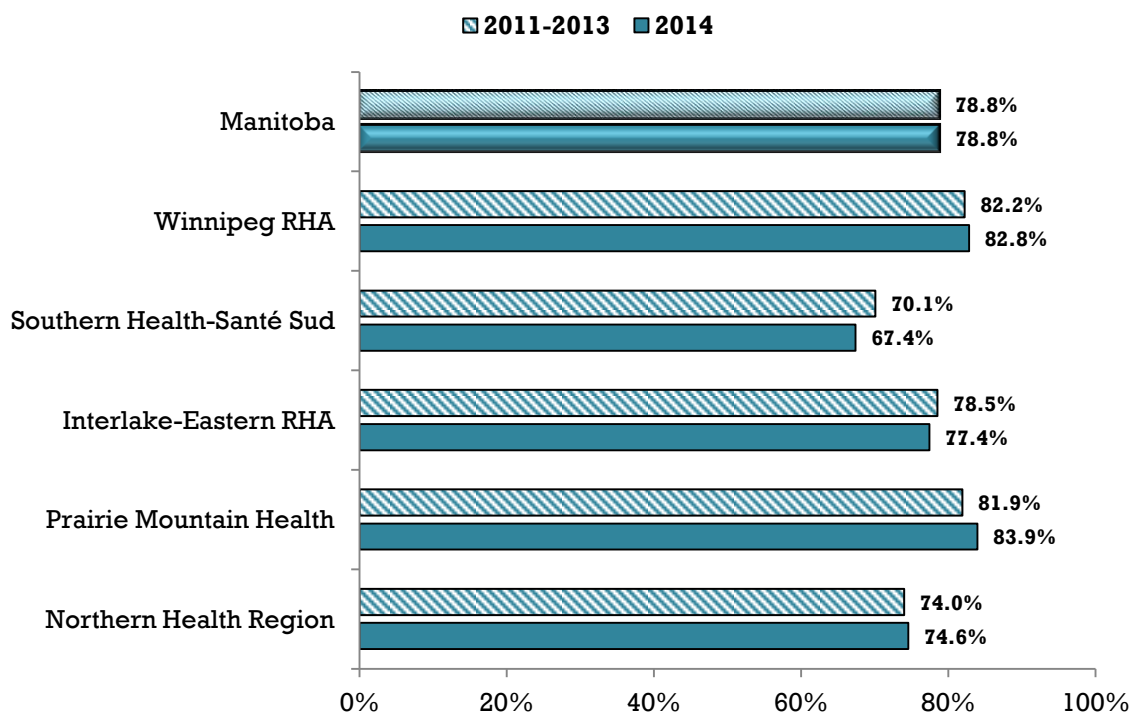


Figure 10: Percentage of continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 1

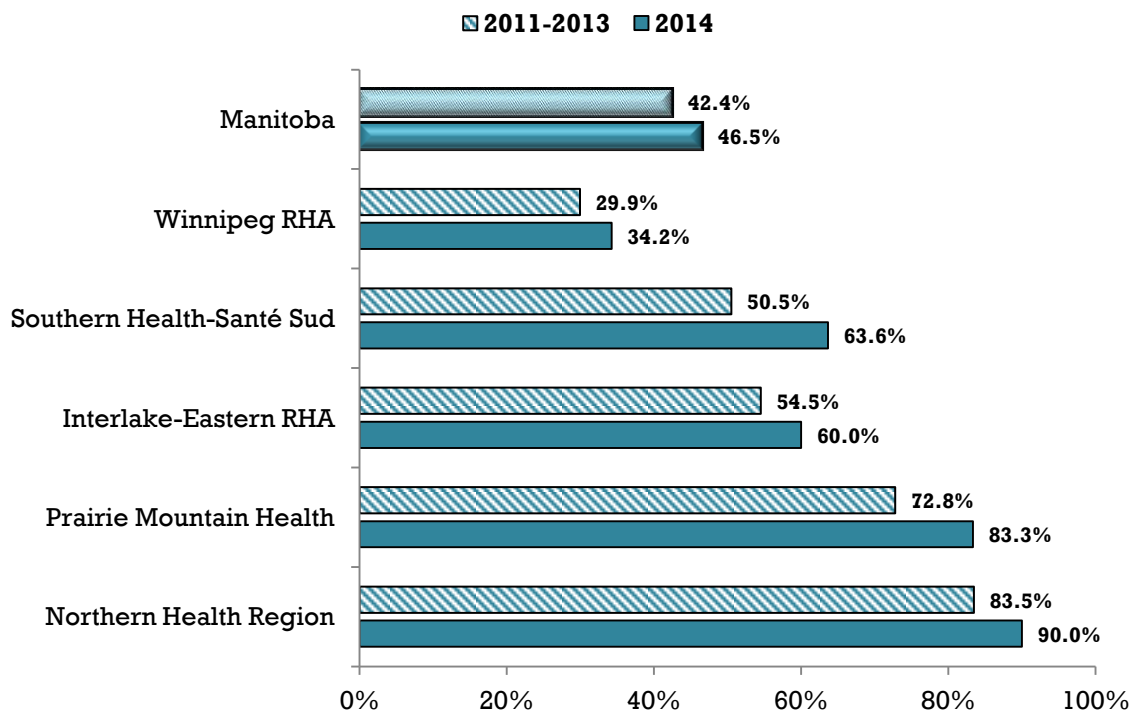


Figure 11: Percentage of non-continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 1

1.4 Summary of Immunizations, Age 1

It is important to note, in this part of the report

- the RHA classifications were determined by the child’s region of residence (i.e. the RHA where the child lives).
- the data is presented by **number of children**, rather than by dose.

Table 4: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 1

Immunogens	Year	Manitoba		Winnipeg RHA		Southern Health-Santé Sud		Interlake-Eastern RHA		Prairie Mountain Health		Northern Health Region	
Population	2011-2013	48,242		23,923		8,734		4,210		6,442		4,933	
	2014	16,630		8,320		3,014		1,411		2,153		1,732	
Diphtheria	2011-2013	38,190	79.2%	19,598	81.9%	6,218	71.2%	3,351	79.6%	5,339	82.9%	3,684	74.7%
	2014	13,168	79.2%	6,881	82.7%	2,063	68.4%	1,103	78.2%	1,825	84.8%	1,296	74.8%
Tetanus	2011-2013	38,190	79.2%	19,598	81.9%	6,218	71.2%	3,351	79.6%	5,339	82.9%	3,684	74.7%
	2014	13,168	79.2%	6,881	82.7%	2,063	68.4%	1,103	78.2%	1,825	84.8%	1,296	74.8%
Pertussis	2011-2013	38,176	79.1%	19,591	81.9%	6,217	71.2%	3,349	79.5%	5,336	82.8%	3,683	74.7%
	2014	13,158	79.1%	6,872	82.6%	2,063	68.4%	1,102	78.1%	1,825	84.8%	1,296	74.8%
Hib	2011-2013	38,045	78.9%	19,509	81.5%	6,199	71.0%	3,336	79.2%	5,325	82.7%	3,676	74.5%
	2014	13,082	78.7%	6,823	82.0%	2,052	68.1%	1,096	77.7%	1,818	84.4%	1,293	74.7%
Polio	2011-2013	42,972	89.1%	21,838	91.3%	7,001	80.2%	3,760	89.3%	5,861	91.0%	4,512	91.5%
	2014	14,691	88.3%	7,589	91.2%	2,318	76.9%	1,239	87.8%	1,969	91.5%	1,576	91.0%
Pneu-C-13	2011-2013	40,638	84.2%	20,705	86.5%	6,552	75.0%	3,578	85.0%	5,594	86.8%	4,209	85.3%
	2014	14,342	86.2%	7,351	88.4%	2,260	75.0%	1,209	85.7%	1,947	90.4%	1,575	90.9%
Measles	2011-2013	1,320	2.7%	787	3.3%	149	1.7%	121	2.9%	158	2.5%	105	2.1%
	2014	566	3.4%	345	4.1%	61	2.0%	58	4.1%	65	3.0%	37	2.1%
Mumps	2011-2013	1,248	2.6%	734	3.1%	148	1.7%	122	2.9%	144	2.2%	100	2.0%
	2014	540	3.2%	326	3.9%	60	2.0%	57	4.0%	61	2.8%	36	2.1%
Rubella	2011-2013	1,254	2.6%	736	3.1%	149	1.7%	121	2.9%	148	2.3%	100	2.0%
	2014	542	3.3%	327	3.9%	60	2.0%	57	4.0%	62	2.9%	36	2.1%
Varicella	2011-2013	968	2.0%	532	2.2%	117	1.3%	106	2.5%	116	1.8%	97	2.0%
	2014	424	2.5%	245	2.9%	48	1.6%	53	3.8%	48	2.2%	30	1.7%
Men-C-C	2011-2013	1,278	2.6%	682	2.9%	168	1.9%	120	2.9%	189	2.9%	119	2.4%
	2014	450	2.7%	265	3.2%	54	1.8%	46	3.3%	47	2.2%	38	2.2%
Hepatitis B	2011-2013	1,467	3.0%	1,105	4.6%	127	1.5%	48	1.1%	87	1.4%	100	2.0%
	2014	525	3.2%	396	4.8%	52	1.7%	13	0.9%	37	1.7%	27	1.6%
Note													
Hib: <i>Haemophilus influenzae</i> type b, Pneu-C-13: pneumococcal conjugate 13 valent, Men-C-C: meningococcal conjugate C													

2. Immunizations at Age 2

2.1 Immunizations in Manitoba, Age 2

Table 5: Recommended Immunization Schedule, 2014, age 2

Vaccine	Age	
	12 months	18 months
DTaP-IPV-Hib Diphtheria, tetanus, pertussis, polio, <i>Haemophilus influenzae</i> type b		♦
Pneu-C-13 Pneumococcal conjugate 13 valent	♦	
MMRV Measles, mumps, rubella, varicella	♦	
Men-C-C Meningococcal conjugate C	♦	

♦ A single dose given with one needle.

At age two, Manitoba's 2014 universal childhood immunization program provided *added* protection (sometimes described as *boosting*) against the following bacterial pathogens: diphtheria, tetanus, pertussis, Hib, and the 13 types of *streptococcus pneumoniae* (pneumococcal bacteria) that cause the most severe pneumococcal infections in children, and the viral infection polio. The age two program also provided protection against the bacterial pathogen meningococcal disease type C, and the following viral infections: measles, mumps, rubella, and varicella (chickenpox). MHLS sends reminder letters to parents of children aged 15 months and 20 months, who are missing one or more recommended immunizations, encouraging them to ensure their children's immunizations are up-to-date.

The immunization status of children at age two in 2014 represents those who were born in 2012 and who turned two years old in 2014 (*2012 birth cohort*). The data reported in Figure 12 is for children who were complete for age *overall* at age two: they received all of the scheduled doses of vaccines as shown in Table 1. In order to be considered complete for age overall at two years, children needed 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 in 2014, please refer to Table 1 (for an overview of the immunogens that were required to be complete for age from 2011-2013 see Appendix B)

If a child missed one of these immunogens, they were not considered complete for age *overall* at two years, but they could still be considered complete for age for a specific immunogen. Therefore, *overall* complete for age estimates are expected to be lower than the immunogen-specific complete for age estimates.

In Manitoba, 65.5% of two-year-olds received the necessary doses of vaccine required to be considered complete for age *overall* (Figure 12), in 2014. This percentage was calculated with a denominator of all two-year-olds in Manitoba, who had valid MHHS PHINs (n=16,737) and a numerator containing all two-year-olds who received all of their required immunizations (n=10,963). The percentage of children complete for age at age two did vary by RHA: Prairie Mountain Health had the highest percentage of two-year-old children complete for age overall (70.7%) in 2014, while Southern Health – Santé Sud had the lowest (56.1%).

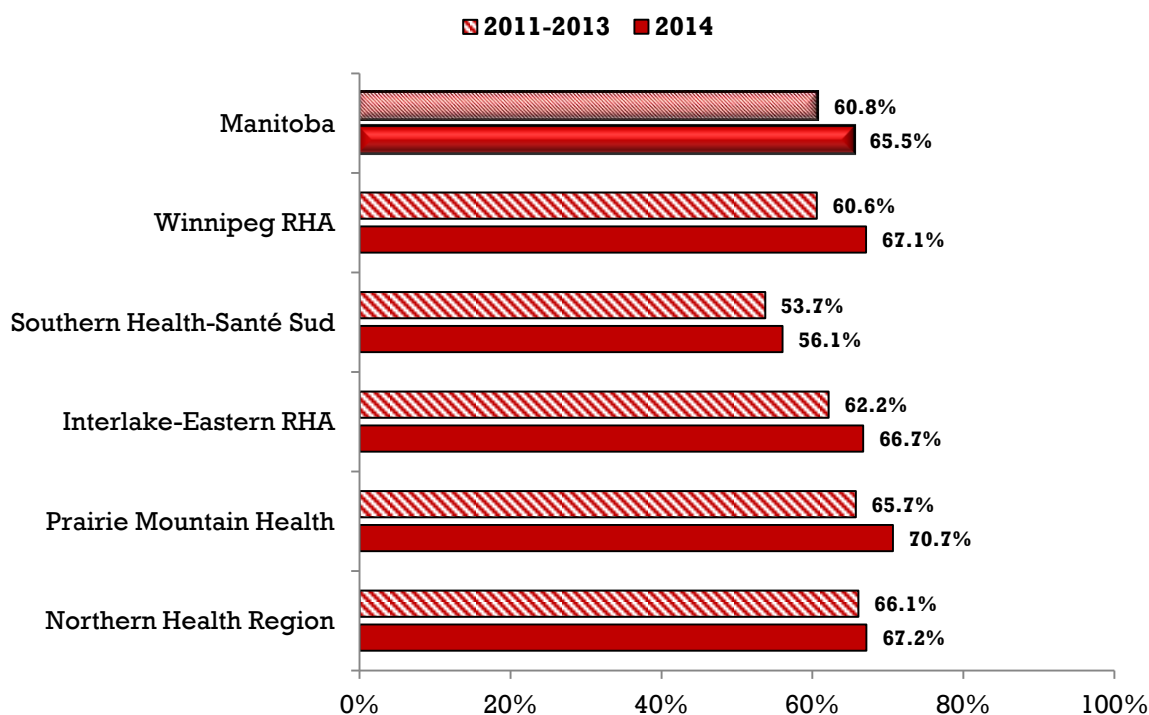


Figure 12: Percentage of children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

About 7 out of 10 two-year-old Manitobans received all the vaccine doses necessary to be considered complete for age overall in 2014.

Before their second birthday, children should have received *four* doses of the combined vaccine DTaP-IPV-Hib at ages two, four, six, and 18 months to have the four doses necessary to be considered complete for age for the diphtheria, tetanus, pertussis, and Hib immunogens at age two in 2014. However, children only required *three* doses to be considered complete for age for the polio immunogen. The fourth dose of polio was acceptable to give as an additional dose in the combination vaccine for convenience of administration. This resulted in a difference in immunization rates between polio and the other immunogens in the combined vaccine (Figure 13).

The data reported in Figure 13 is for children who were complete for age for the particular immunogen, regardless of whether they were complete for age overall. Approximately seven in ten of Manitoba's two-year olds were considered complete for age for diphtheria (71.0%), tetanus (71.0%), pertussis (70.9%), and Hib (70.4%); the percentage of children complete for age for polio was higher (87.6%), for reasons discussed above.

More than eight in ten two-year-olds were complete for age for the measles (86.3%), mumps (86.2%), rubella (86.2%), and varicella (83.2%) immunogens. Starting in 2012, it was recommended to provide one dose of the combined vaccine MMRV, at age 12 months, to protect against measles, mumps, rubella, and varicella, as opposed to immunizing children with two separate vaccines – MMR (measles, mumps, and rubella immunogens) and V (varicella immunogen). If a child received one dose of MMR but did not receive one dose of V, they would be considered complete for age for the measles, mumps, and rubella immunogens, but not the varicella immunogen. This could cause the slightly different complete for age estimates seen between measles, mumps, rubella, and varicella (Figure 13).

Similarly, more than eight in ten of Manitoba's two-year-olds were considered complete for age for the Pneu-C-13 and Men-C-C vaccines (84.0% and 84.8%, respectively). The Pneu-C-13, MMRV, and Men-C-C vaccines were scheduled to be given at age 12 months while the DTaP-IPV-Hib vaccine was scheduled to be given at age 18 months; this provided a longer time period for all required doses of the Pneu-C-13, MMRV, and Men-C-C vaccines to be received before the child's second birthday, compared to DTaP-IPV-Hib. This could cause the difference in rates seen in Figure 13.

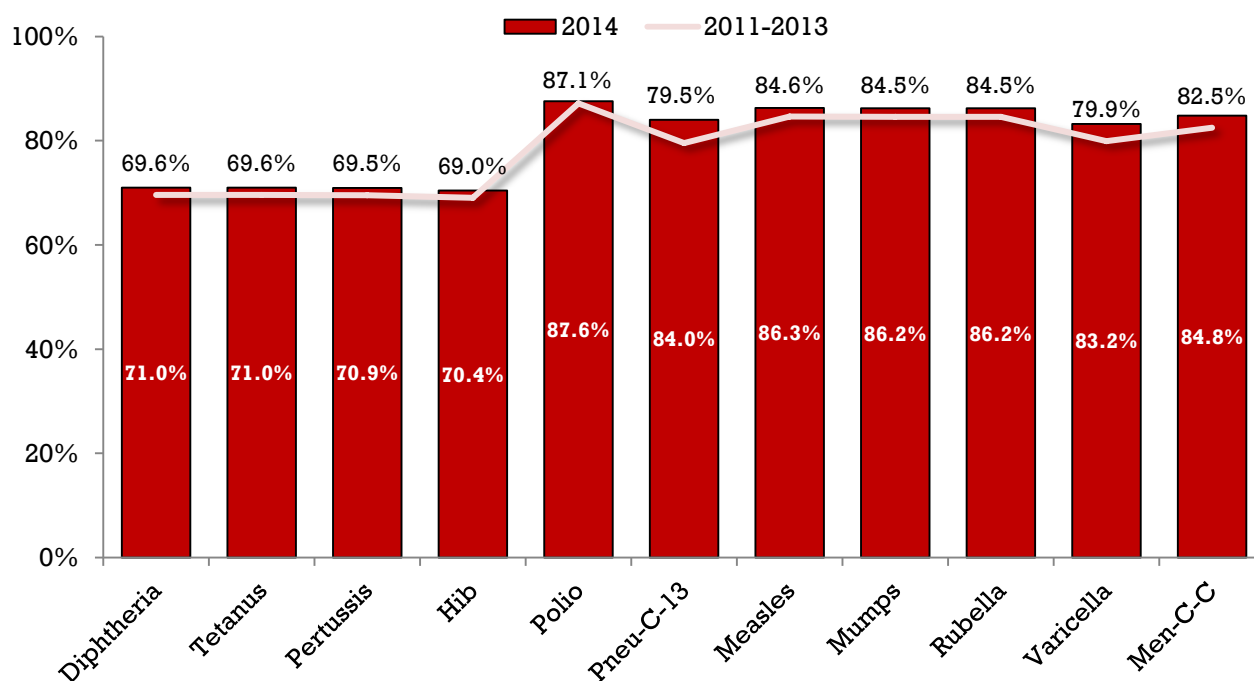


Figure 13: Percentage of children complete for age for diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b (Hib), polio, pneumococcal conjugate 13 valent (Pneu-C-13), measles, mumps, rubella, varicella, and meningococcal conjugate C (Men-C-C) in Manitoba, 2014 & 3-year average (2011-2013), age 2

2.2 Immunizations by RHA, Age 2

This section considers whether a child was complete for age for the particular immunogen, regardless of whether they were complete for age overall at age two.

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

Figure 14 shows the percentage of children aged two years who received four doses of the diphtheria immunogen, in each RHA.

In Manitoba, 71.0% of two-year-olds were complete for age for the diphtheria immunogen (commonly administered as part of the combined vaccine DTaP-IPV-Hib) in 2014. Prairie Mountain Health had the highest percentage of two-year-olds complete for age (75.5%), with Winnipeg RHA a close second (73.0%), both surpassing their 3-year average complete for age rates (73.6% and 70.8%, respectively). Southern Health – Santé Sud had the lowest percentage of children complete for age for diphtheria (62.6%), in both 2014 and the 3-year average.

A similar trend was observed for the percentage of children complete for age for the tetanus (Figure 15), pertussis (Figure 16), and Hib (Figure 17) immunogens. This is due to these immunogens being most commonly given (with polio) as the combined vaccine DTaP-IPV-Hib.

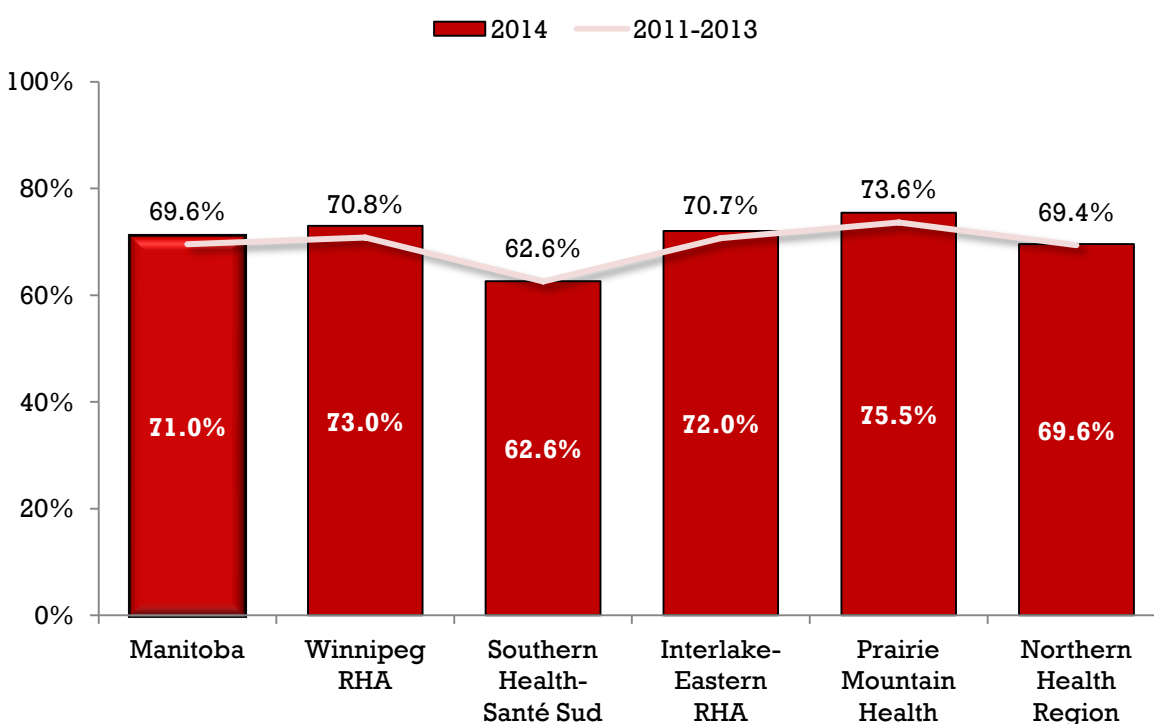


Figure 14: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

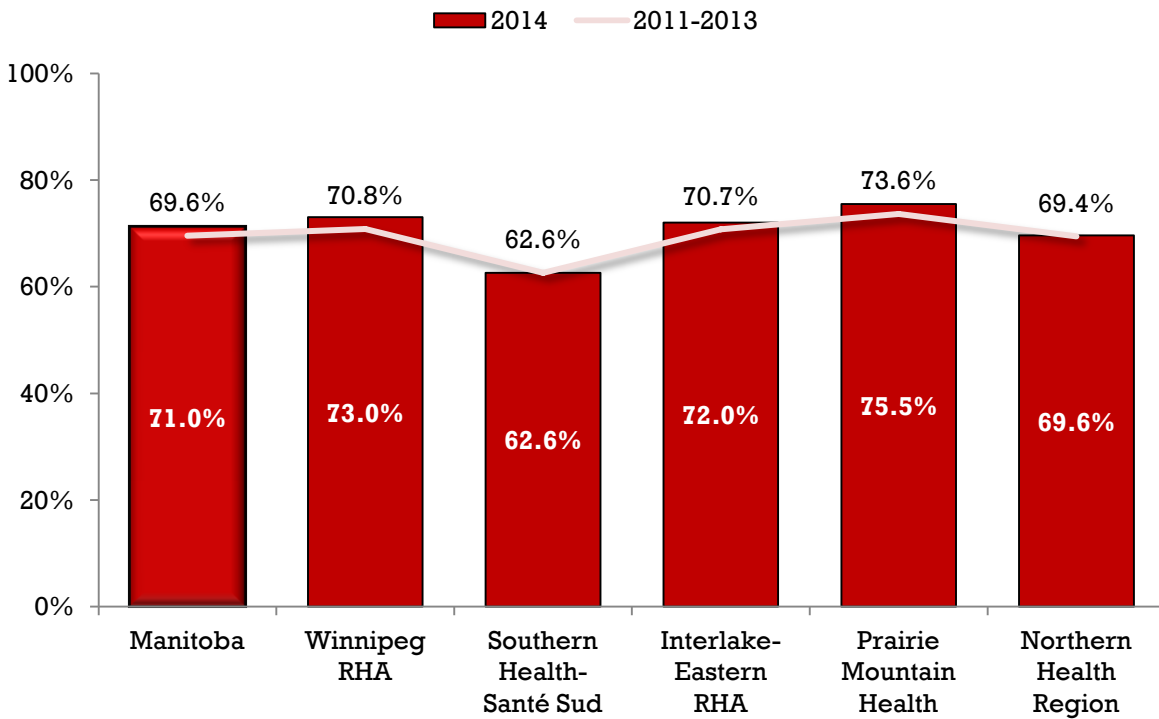


Figure 15: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

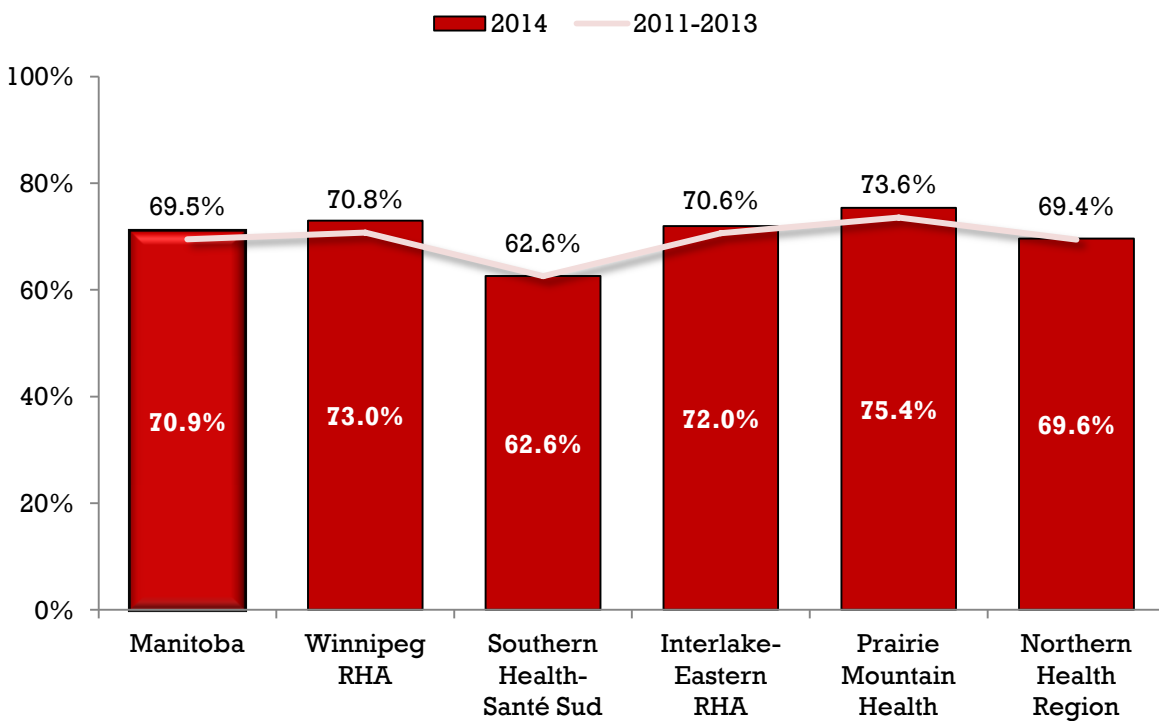


Figure 16: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

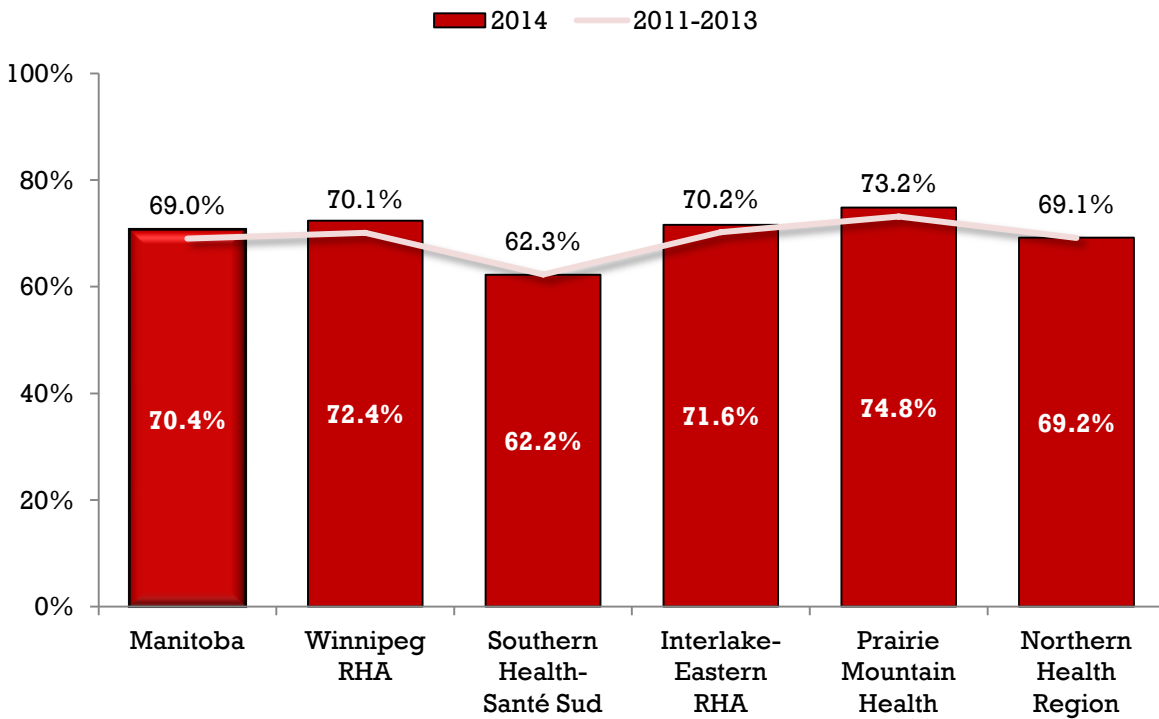


Figure 17: Percentage of children complete for age for *Haemophilus influenzae* type b (Hib) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

In Manitoba, 7 out of 10 two-year-old children received the four doses necessary to be complete for age for the diphtheria, tetanus, pertussis, and Hib immunogens in 2014.

Polio

Children who were complete for age for the polio immunogen should have received at least three doses of the immunogen before their second birthday. The polio immunogen was typically administered as part of the combined vaccine DTaP-IPV-Hib, given in four doses, at two, four, six and 18 months. Therefore, the uptake rates for polio vaccine were considerably higher than the other component antigens in the 5-in-1 vaccine because one less dose of polio vaccine was required to be considered complete for age, compared to tetanus, diphtheria, pertussis, and Hib.

Across the province, almost nine out of ten two-year-olds (87.6%) received the required number of doses to be considered complete for age for the polio immunogen (Figure 18). The percentage of two-year-olds complete for age for the polio immunogen ranged from 78.1% (Southern Health – Santé Sud) to 91.9% (Northern Health Region) in 2014, with a similar 3-year average trend. The complete for age estimates for polio at age two were fairly close to those for age one (Figure 7), and followed the same trend where Southern Health-Santé Sud had the lowest completion rates.

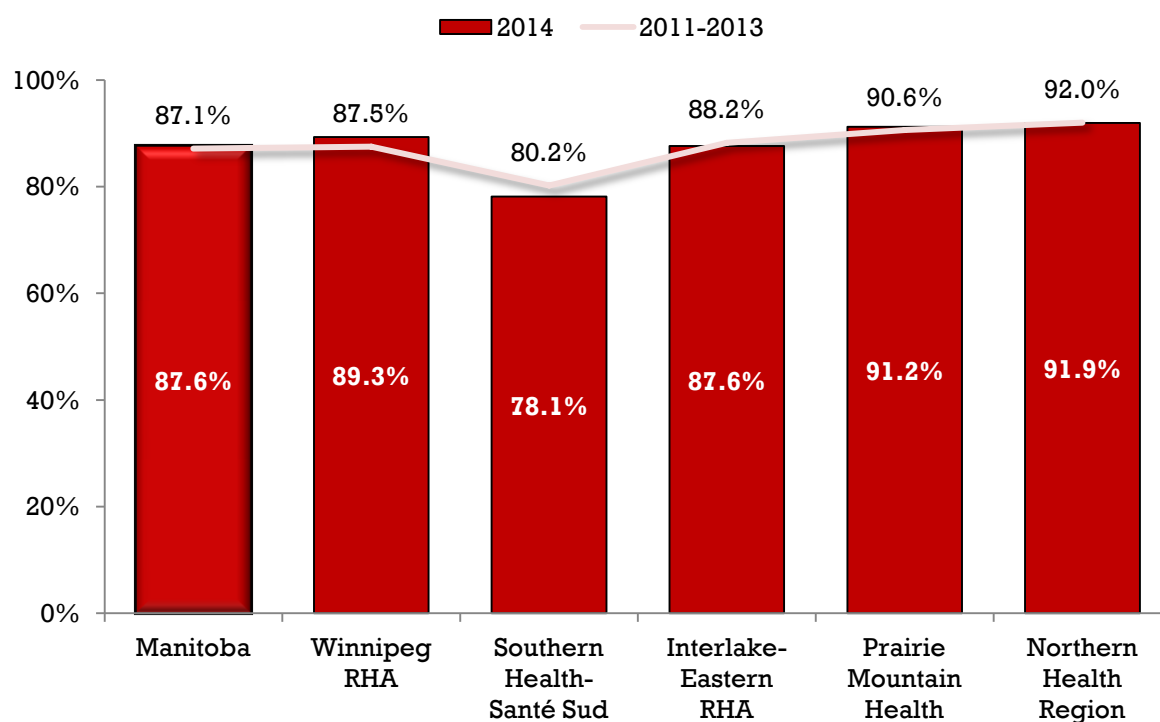


Figure 18: Percentage of children complete for age for polio by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

In Manitoba, approximately **9 out of 10** two-year-old children received the three doses necessary to be **complete for age** for the **polio** immunogen in 2014.

Pneumococcal Conjugate 13 valent

In Manitoba, the Pneu-C-13 vaccine was typically administered to children in three doses, at ages two, four, and 12 months in 2014. Figure 19 shows more than eight in ten two-year-old children (84.0%) received the three doses of vaccine necessary to be considered complete for age for Pneu-C-13. There was some variation between RHAs; Southern Health-Santé Sud had lowest percentage of two-year-olds complete for age for Pneu-C-13 in 2014 (71.7%) whereas Northern Health Region had the highest percentage of two-year-olds complete for age (90.9%). This trend was also apparent in the 3-year average.

As previously mentioned, the number of doses required to be complete for age for Pneu-C-13 at age two changed in July 2012. Previously, four doses were required at two, four, six, and 18 months of age (that is, *four* doses were required before a child's second birthday) but, after July 2012, only *three* doses were required before a child's second birthday. Due to this, most RHAs had a slightly higher percentage of children complete for age in 2014 than in their 3-year averages. Since the number of required doses decreased, it was easier for more children to reach "complete for age" status. Note: high risk groups and those living in First Nations communities remain at the four dose schedule at two, four, six, and 18 months.

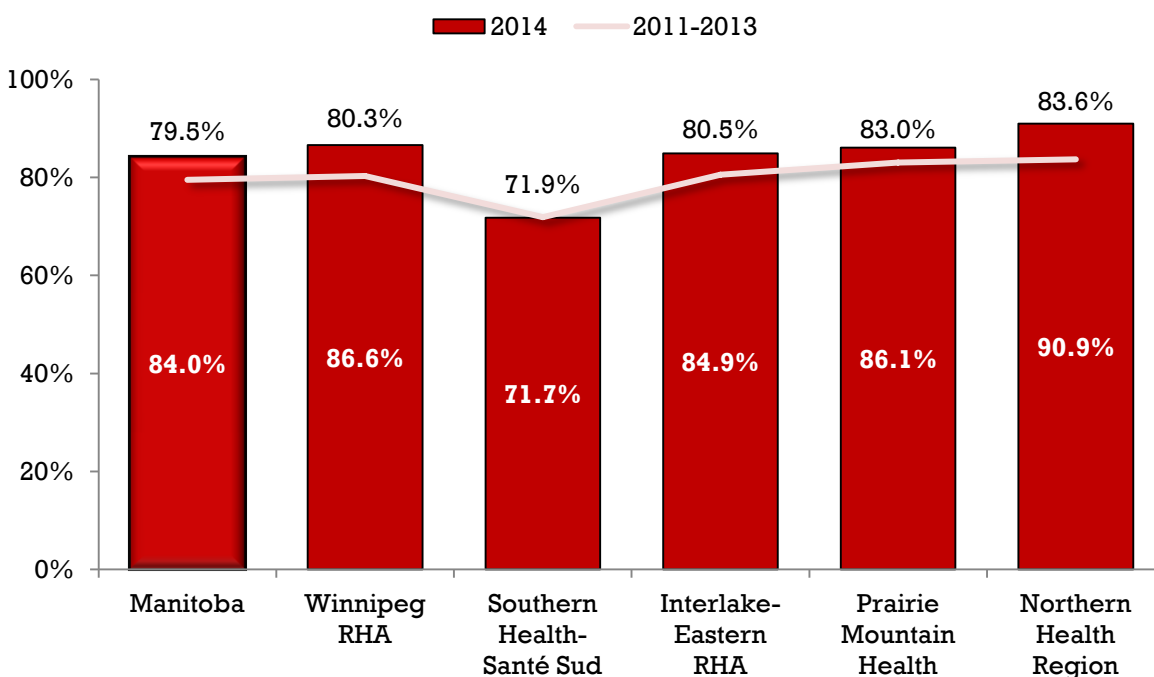


Figure 19: Percentage of children complete for age for pneumococcal conjugate 13 valent (Pneu-C-13) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

In Manitoba, over **8 out of 10** two-year-old children received the three doses necessary to be **complete for age** for the **Pneu-C-13** vaccine in 2014.

Measles, Mumps, Rubella, and Varicella

By their second birthday, children should have received one dose each of the measles, mumps, rubella, and varicella immunogens. Figure 20 shows the percentage of children aged two years who received at least one dose of the measles immunogen, in each RHA.

In Manitoba, 86.3% of two-year-olds were complete for age for the measles immunogen (most commonly administered as part of the combined vaccine MMRV) in 2014. Northern Health Region had the highest percentage of two-year-olds complete for age (91.1%), with Prairie Mountain Health a close second (90.0%). Southern Health - Santé Sud had the lowest percentage of children complete for age for the measles immunogen (75.8%) in 2014. A similar trend can be seen in the 3-year average.

A similar trend was observed for the percentage of children complete for age for mumps (Figure 22), rubella (Figure 22), and varicella (Figure 23) immunogens; this is due to these immunogens being most commonly given as the combined vaccine MMRV. The percentage of two-year-olds complete for age for the varicella immunogen (Figure 23) was slightly lower than the complete for age estimates for the measles, mumps, and rubella immunogens, as varicella (V) can be administered separately from MMR or in combination as MMRV.

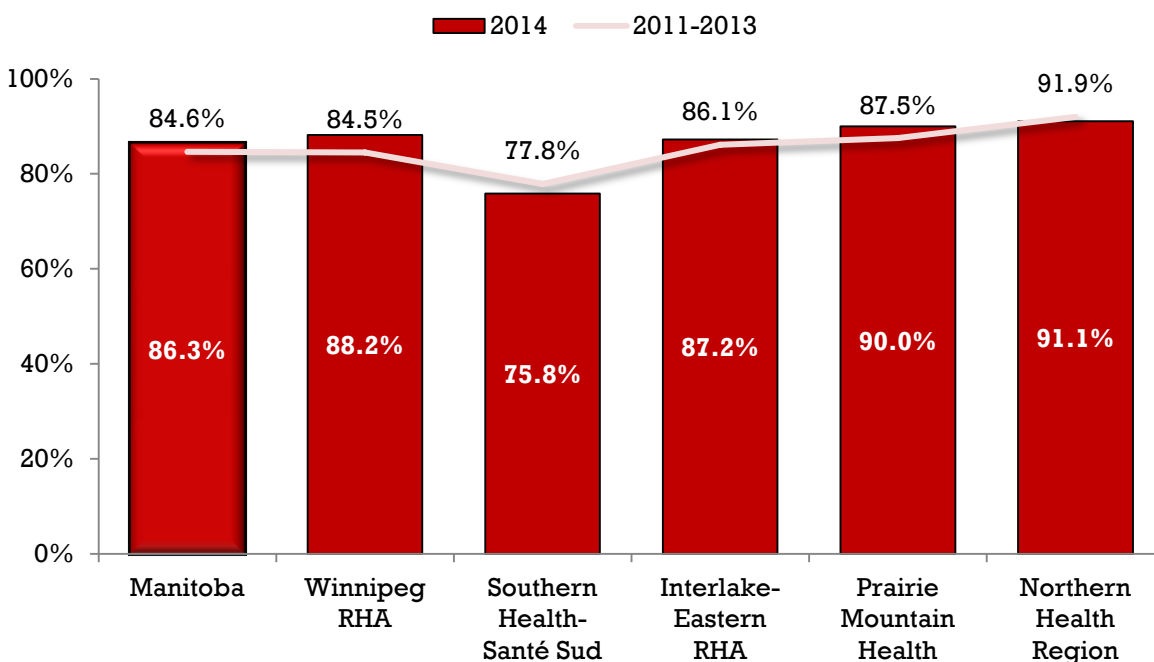


Figure 20: Percentage of children complete for age for measles by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

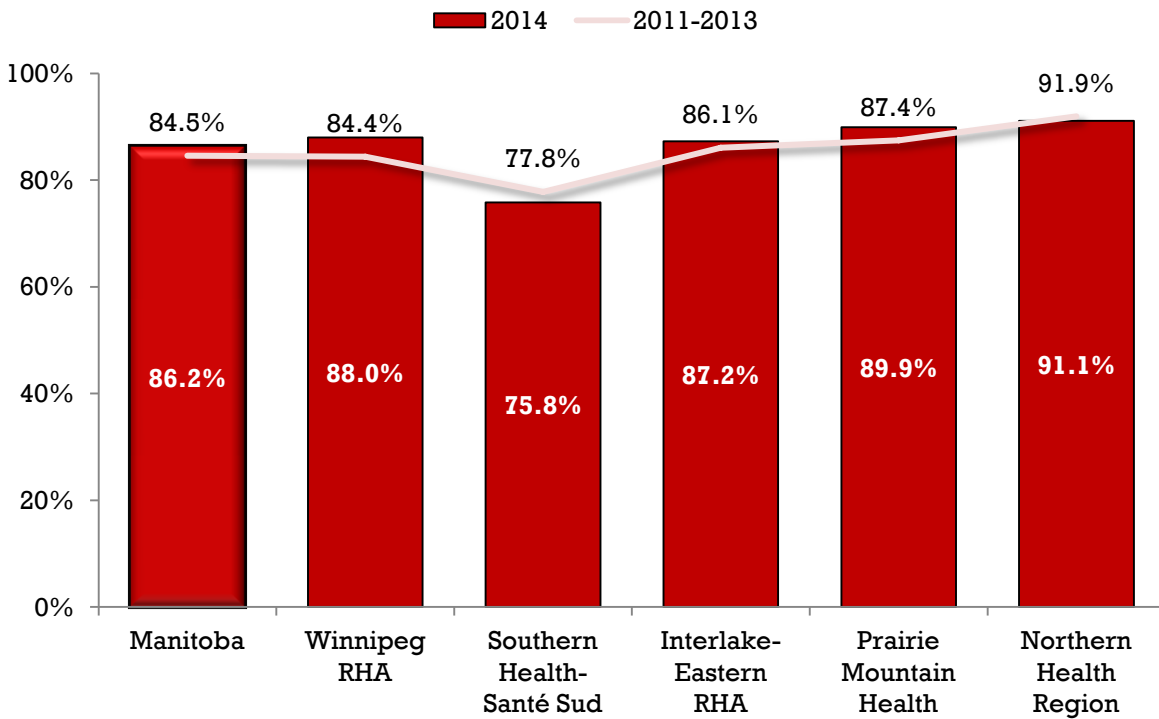


Figure 21: Percentage of children complete for age for mumps by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

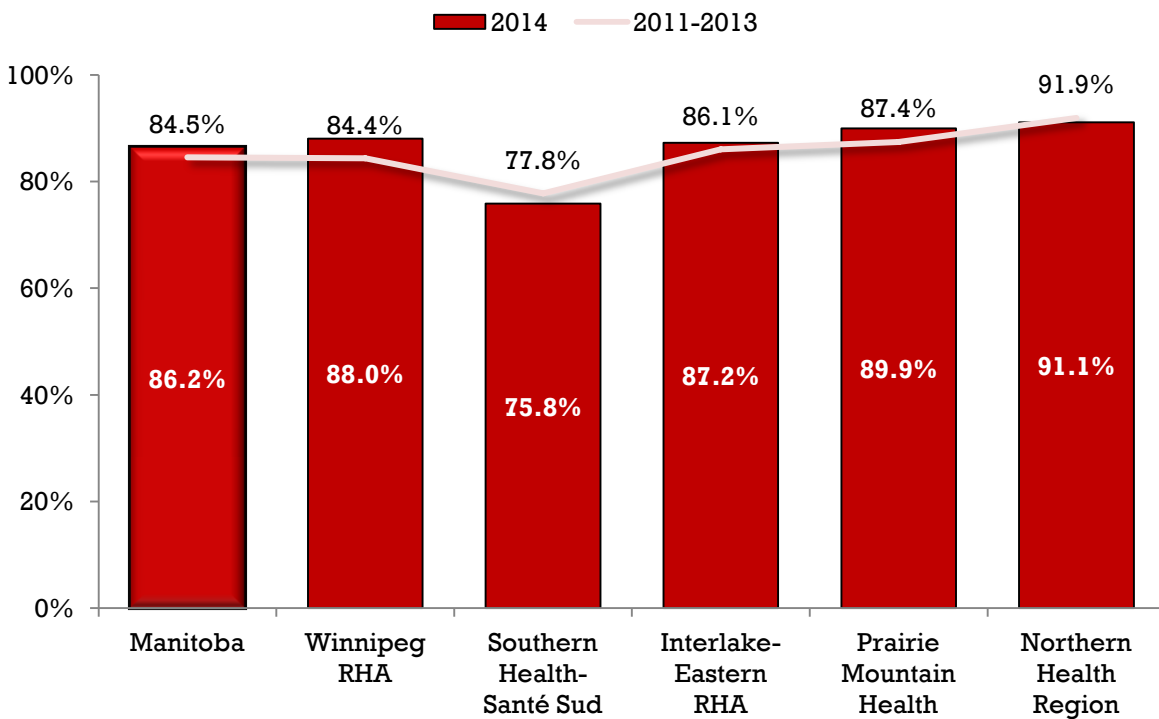


Figure 22: Percentage of children complete for age for rubella by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

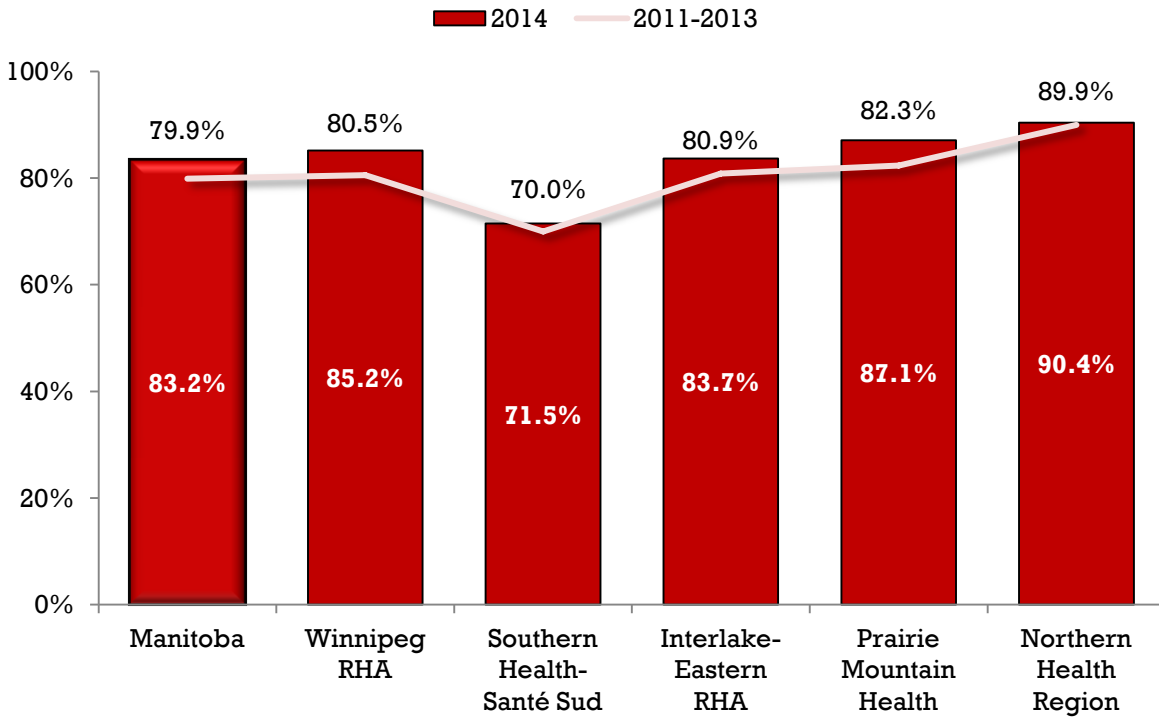


Figure 23: Percentage of children complete for age for varicella by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

In Manitoba, more than **8 out of 10** two-year-old children received the one dose necessary to be **complete for age** for the **measles, mumps, rubella, and varicella** immunogens in 2014.

Meningococcal Conjugate C

In Manitoba, since 2009, the Men-C-C vaccine was to be given to all 12 month old infants at the same time as the combined vaccine MMRV (prior to this the vaccine was only publicly-funded for grade four students and high risk individuals). Figure 24 shows more than eight in ten two-year-olds received at least the one dose necessary to be considered complete for age for Men-C-C in 2014. There continued to be some variation between RHAs; Northern Health Region had the highest percentage of children complete for age for this immunogen (90.6%) in 2014, while Southern Health-Santé Sud had the lowest percentage of children complete for age (74.1%). These rates were almost unchanged from the 3-year average rates where a similar trend was observed (Northern Health Region, 90.7% and Southern Health-Santé Sud, 74.4%).

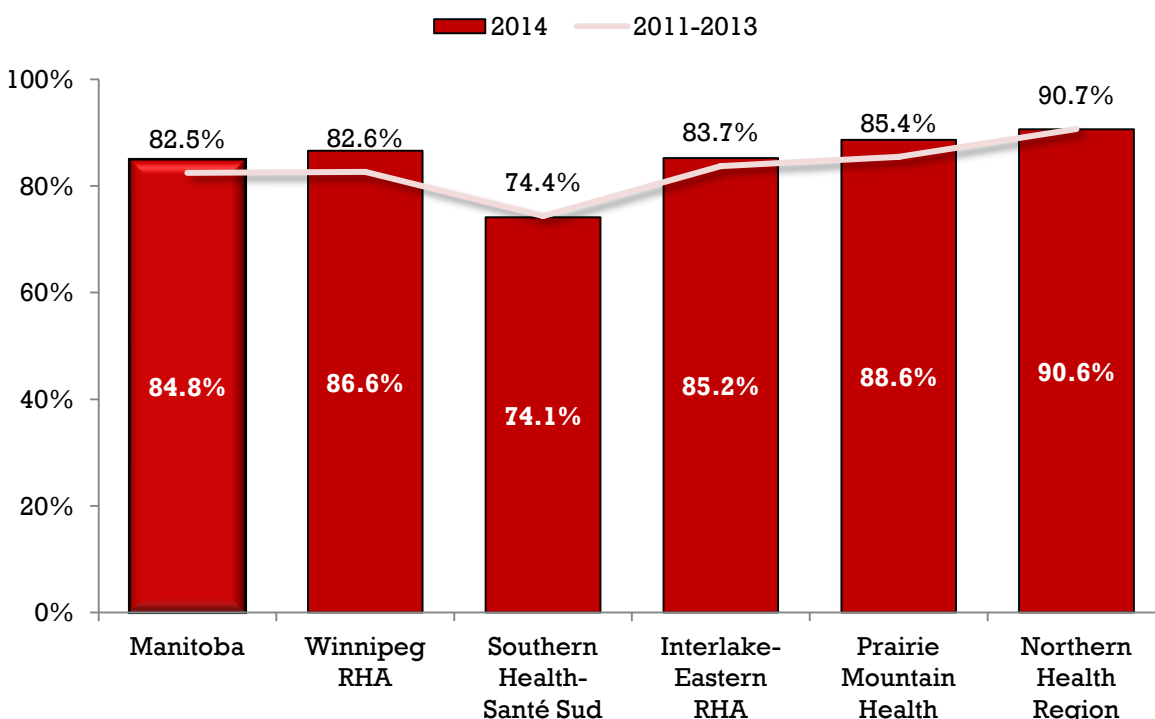


Figure 24: Percentage of children complete for age for meningococcal conjugate C (Men-C-C) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 2

In Manitoba, over **8 out of 10** two-year-old children received the one dose necessary to be **complete for age** for the **Men-C-C** vaccine in 2014.

2.3 Residency and Immunization Rates, Age 2

This section considers whether a child was complete for age *overall* at age two. That is, whether they received *all* doses of the immunogens recommended by age two.

From 2011 to 2014, the percentage of children considered complete for age overall at age two was substantially higher for continuous residents than non-continuous residents (Figure 25). Approximately two-thirds of continuous residents were complete for age compared to approximately one-quarter of non-continuous residents. Additional explanations on the reasons for these differences in rates can be found on page 16.

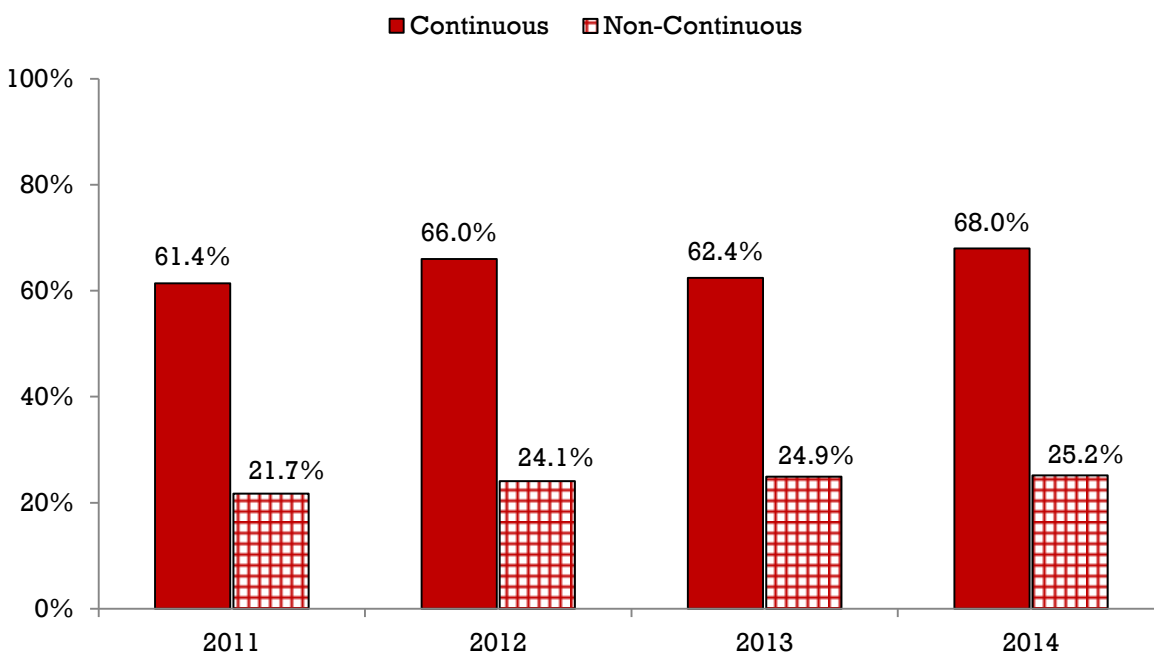


Figure 25: Percentage of children complete for age overall by continuous and non-continuous resident status in Manitoba, 2011-2014, age 2

The percentage of two-year-olds considered complete for age *overall* was substantially higher for continuous residents than non-continuous residents.

In all RHAs, the percentage of continuous residents considered complete for age overall at age two (Figure 26), was higher than the percentage of non-continuous residents considered complete for age overall at age two (Figure 27), with the exception of Northern Health Region. In Northern Health Region, 74.3% of non-continuous residents were complete for age in 2014, compared to 67.0% of continuous residents. Figure 26 shows Prairie Mountain Health had the highest percentage of two-year-old continuous residents complete for age in 2014 (72.3%), while Southern Health – Santé Sud had the lowest percentage (57.0%). Figure 27 shows Northern Health Region had the highest percentage of two-year-old non-continuous residents complete for age in 2014 (74.3%), while Winnipeg RHA had the lowest percentage (17.3%).

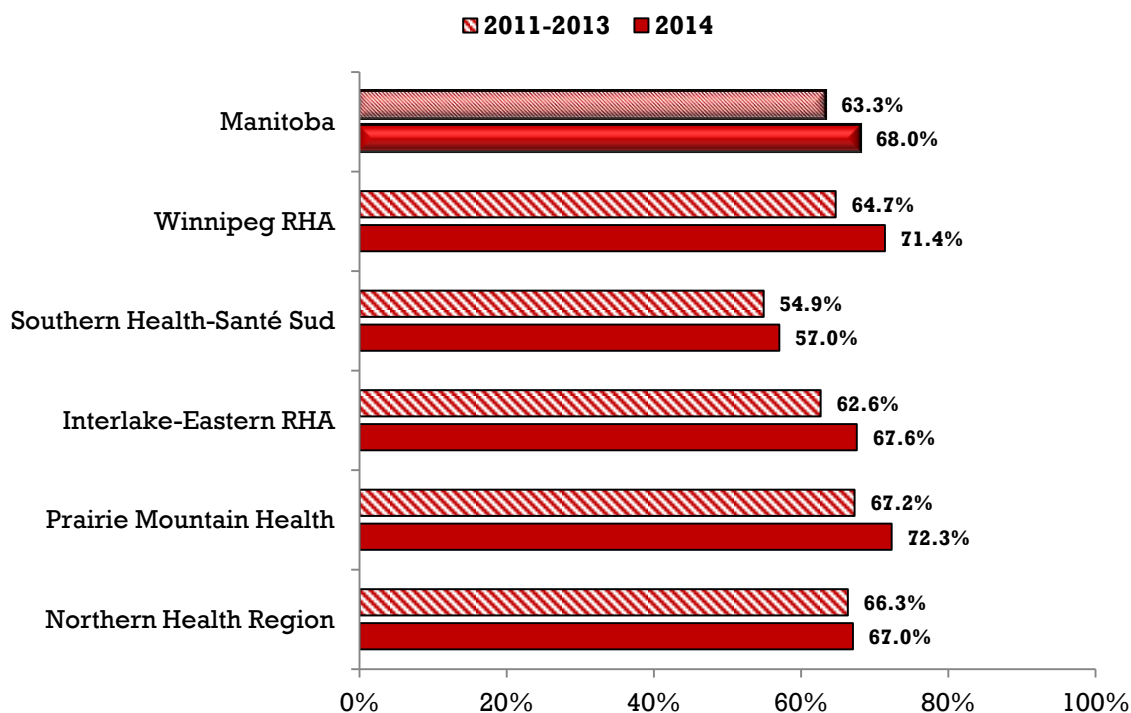


Figure 26: Percentage of continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 2

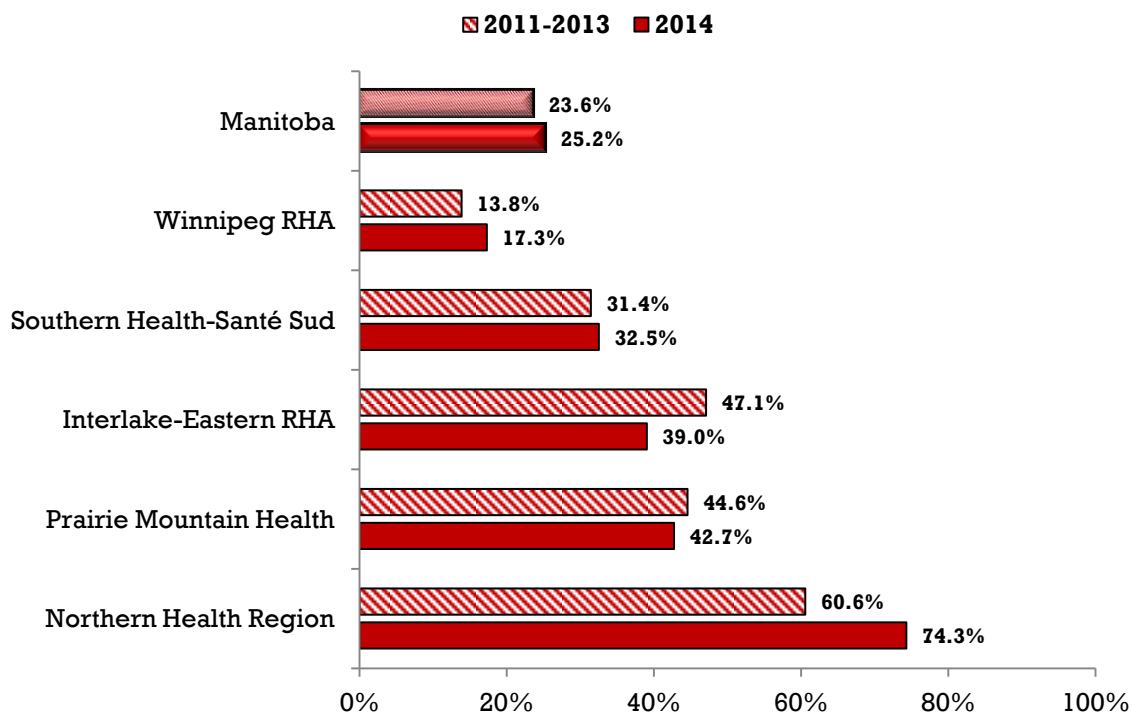


Figure 27: Percentage of non-continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 2

2.4 Summary of Immunizations, Age 2

It is important to note, in this part of the report

- the RHA classifications were determined by the child's region of residence (i.e. the RHA where the child lives).
- the data is presented by **number of children**, rather than by dose.

Table 6: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 2

Immunogens	Year	Manitoba		Winnipeg RHA		Southern Health-Santé Sud		Interlake-Eastern RHA		Prairie Mountain Health		Northern Health Region	
Population	2011-2013	48,710		24,188		8,705		4,253		6,500		5,064	
	2014	16,737		8,397		3,125		1,419		2,194		1,602	
Diphtheria	2011-2013	33,888	69.6%	17,130	70.8%	5,449	62.6%	3,008	70.7%	4,786	73.6%	3,515	69.4%
	2014	11,881	71.0%	6,131	73.0%	1,957	62.6%	1,022	72.0%	1,656	75.5%	1,115	69.6%
Tetanus	2011-2013	33,888	69.6%	17,130	70.8%	5,449	62.6%	3,008	70.7%	4,786	73.6%	3,515	69.4%
	2014	11,881	71.0%	6,131	73.0%	1,957	62.6%	1,022	72.0%	1,656	75.5%	1,115	69.6%
Pertussis	2011-2013	33,866	69.5%	17,116	70.8%	5,448	62.6%	3,003	70.6%	4,784	73.6%	3,515	69.4%
	2014	11,874	70.9%	6,127	73.0%	1,957	62.6%	1,021	72.0%	1,654	75.4%	1,115	69.6%
Hib	2011-2013	33,624	69.0%	16,959	70.1%	5,422	62.3%	2,986	70.2%	4,757	73.2%	3,500	69.1%
	2014	11,790	70.4%	6,078	72.4%	1,945	62.2%	1,016	71.6%	1,642	74.8%	1,109	69.2%
Polio	2011-2013	42,440	87.1%	21,156	87.5%	6,982	80.2%	3,753	88.2%	5,889	90.6%	4,660	92.0%
	2014	14,659	87.6%	7,500	89.3%	2,442	78.1%	1,243	87.6%	2,001	91.2%	1,473	91.9%
Pneu-C-13	2011-2013	38,725	79.5%	19,415	80.3%	6,255	71.9%	3,424	80.5%	5,395	83.0%	4,236	83.6%
	2014	14,061	84.0%	7,269	86.6%	2,242	71.7%	1,205	84.9%	1,888	86.1%	1,457	90.9%
Measles	2011-2013	41,211	84.6%	20,432	84.5%	6,776	77.8%	3,661	86.1%	5,686	87.5%	4,656	91.9%
	2014	14,444	86.3%	7,402	88.2%	2,370	75.8%	1,238	87.2%	1,975	90.0%	1,459	91.1%
Mumps	2011-2013	41,181	84.5%	20,411	84.4%	6,771	77.8%	3,661	86.1%	5,683	87.4%	4,655	91.9%
	2014	14,430	86.2%	7,390	88.0%	2,370	75.8%	1,238	87.2%	1,973	89.9%	1,459	91.1%
Rubella	2011-2013	41,184	84.5%	20,413	84.4%	6,772	77.8%	3,661	86.1%	5,683	87.4%	4,655	91.9%
	2014	14,431	86.2%	7,391	88.0%	2,370	75.8%	1,238	87.2%	1,973	89.9%	1,459	91.1%
Varicella	2011-2013	38,914	79.9%	19,479	80.5%	6,091	70.0%	3,439	80.9%	5,350	82.3%	4,555	89.9%
	2014	13,931	83.2%	7,152	85.2%	2,233	71.5%	1,187	83.7%	1,911	87.1%	1,448	90.4%
Men-C-C	2011-2013	40,162	82.5%	19,982	82.6%	6,473	74.4%	3,561	83.7%	5,554	85.4%	4,592	90.7%
	2014	14,190	84.8%	7,269	86.6%	2,316	74.1%	1,209	85.2%	1,944	88.6%	1,452	90.6%
Hepatitis B	2011-2013	2,366	4.9%	1,720	7.1%	269	3.1%	90	2.1%	164	2.5%	123	2.4%
	2014	967	5.8%	698	8.3%	81	2.6%	44	3.1%	87	4.0%	57	3.6%

Note
Hib: *Haemophilus influenzae* type b, Pneu-C-13: pneumococcal conjugate 13 valent, Men-C-C: meningococcal conjugate C

3. Immunizations at Age 7

3.1 Immunizations in Manitoba, Age 7

Table 7: Recommended Immunization Schedule, 2014, age 7

Vaccine	Age
	4-6 years
MMRV Measles, mumps, rubella, varicella	◆
DTaP-IPV or Tdap-IPV Diphtheria, tetanus, pertussis, polio	◆

◆ A single dose given with one needle.

Important: In 2014, the varicella immunization program was expanded to a two dose program, with the second dose given at four to six years of age to those born on or after January 1, 2008, using the combined MMRV vaccine (replacing the previously recommended MMR vaccine). This additional dose of varicella appears in Manitoba's 2014 Recommended Immunization Schedule, for children at age seven (Table 7) but, it was *not required* to be considered complete for age at age seven in 2014 because the first eligible birth cohort would not yet have reached age seven.

The immunization status of children at age seven in 2014 represents those who were born in 2007 and who turned seven years old in 2014 (*2007 birth cohort*). Children in the 2007 birth cohort were *not* eligible for the additional dose of varicella immunogen, only requiring *one* dose of varicella immunogen (administered at 12 months of age) to be considered complete for age at age seven. Thus, this chapter will only report the percentages of seven-year-old children complete for age for measles, mumps, rubella (as the 2007 birth cohort should have received the combined vaccine MMR at four to six years of age), diphtheria, tetanus, pertussis, and polio.

At age seven, Manitoba's 2014 universal childhood immunization program boosted protection for pre-school children against the following bacterial pathogens: diphtheria, tetanus, and pertussis. The pre-school program also provided protection against the viral infections of measles, mumps, rubella, and polio.

The doses were due between age four and age six, but were not counted as "missing" until the child's seventh birthday. MHLS 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 data reported in Figure 28 is for children who were complete for age *overall* at age seven: they had received all of the scheduled doses of vaccines as shown in Table 1. In order to be considered complete for age overall at seven years, children needed to have five doses of diphtheria, tetanus, and pertussis, four doses of polio, two doses of measles, and one dose of mumps, rubella, and varicella. For an overview of immunogens required

to be complete for age in 2014, please refer to Table 1 (for an overview of the immunogens that were required to be complete for age from 2011-2013 see Appendix B). If a child missed one of these immunogens, they were not considered complete for age *overall* at seven years, but they could still be considered complete for age for a specific immunogen. Therefore, *overall* complete for age estimates are expected to be lower than the immunogen-specific complete for age estimates.

In Manitoba, 61.7% of seven-year-olds received the necessary doses of vaccine required to be considered complete for age *overall* (Figure 28) in 2014. This percentage was calculated with a denominator of all seven-year-olds in Manitoba, who had valid MHLS PHINs (n=16,961), and a numerator containing all seven-year-olds who received all of their required immunizations (n=10,465). The percentage of children complete for age overall at age seven did vary by RHA: Northern Health Region had the highest percentage of seven-year-old children complete for age overall (74.2%) in 2014, with Prairie Mountain Health a close second (72.6%). Winnipeg RHA had the lowest percentage of children complete for age overall at age seven (56.5%).

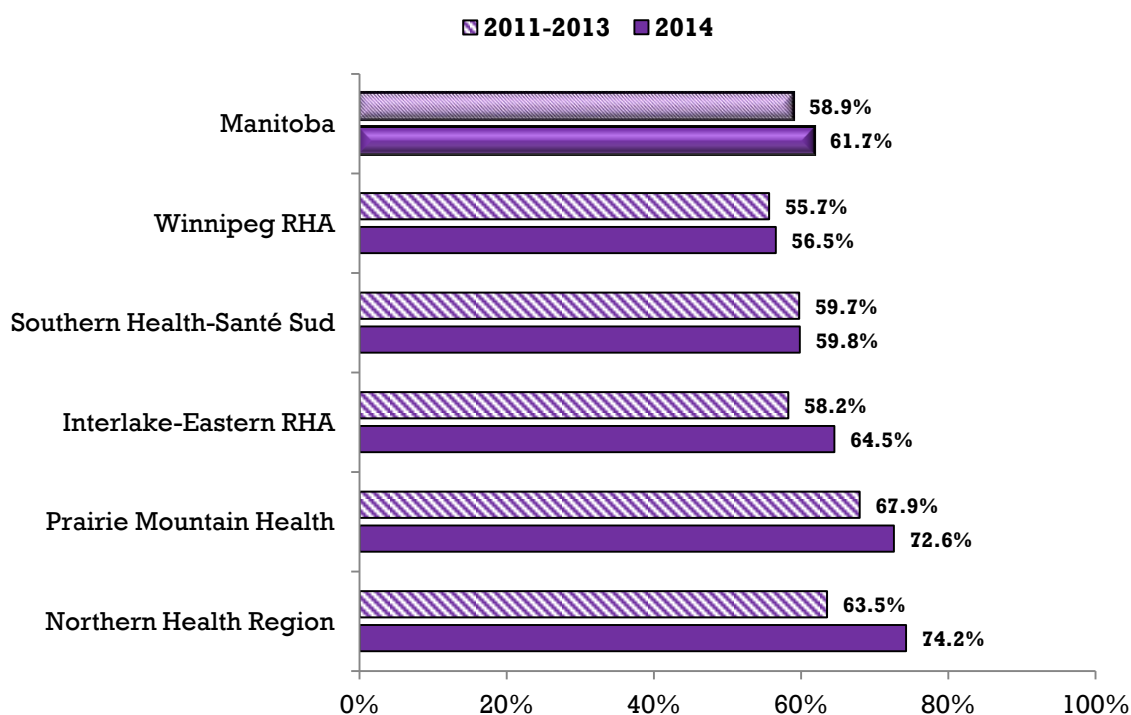


Figure 28: Percentage of children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

About 6 out of 10 seven-year-old Manitobans received all the vaccine doses necessary to be considered complete for age *overall* in 2014.

Before their seventh birthday, children should have received *four* doses of the combined vaccine DTaP-IPV-Hib at ages two, four, six, and 18 months, and *one* dose of the combined vaccine DTaP-IPV or Tdap-IPV (which provides protection against diphtheria, tetanus, pertussis, and polio) at four to six years of age in order to have the *five* doses necessary to be considered complete for age at age seven, for the diphtheria, tetanus, and pertussis immunogens. Children only required *four* doses of polio to be considered complete for age for that immunogen; however, when the four doses were received *is* important. For the polio immunogen, one of the infant series doses (two, four, and six months) was not “required” to be considered complete for age, but the 18-month and pre-school boosters (ages four to six) *were* required to be considered complete for age. Due to this, it is possible the complete for age coverage is over-estimated because while some children may have received four doses (putting them in the “complete for age” category), they may have missed the 18-month booster or pre-school booster.

The data reported in Figure 29 is for children who were complete for age for the particular immunogen, regardless of whether they were complete for age overall. In 2014, almost seven out of ten of Manitoba’s seven-year olds were considered complete for age for diphtheria (67.4%), tetanus (67.4%), and pertussis (67.1%). The percentage of children complete for age for polio was higher (83.8%).

More than seven out of ten seven-year-olds (75.0%) were complete for age for the measles immunogen (Figure 29) but, the percentage of seven-year-olds complete for age for mumps and rubella was higher with more than nine out of ten (92.4%) children considered complete for age for each immunogen. The lower rate of measles immunization compared to mumps and rubella is a reflection of the requirements to be complete for age: two doses of measles, compared to one dose of mumps, and one dose of rubella. For the 2007 birth cohort, measles, mumps, and rubella were given in the combined vaccine MMR - along with varicella (V) - at 12 months, and the combined vaccine MMR at four to six years.

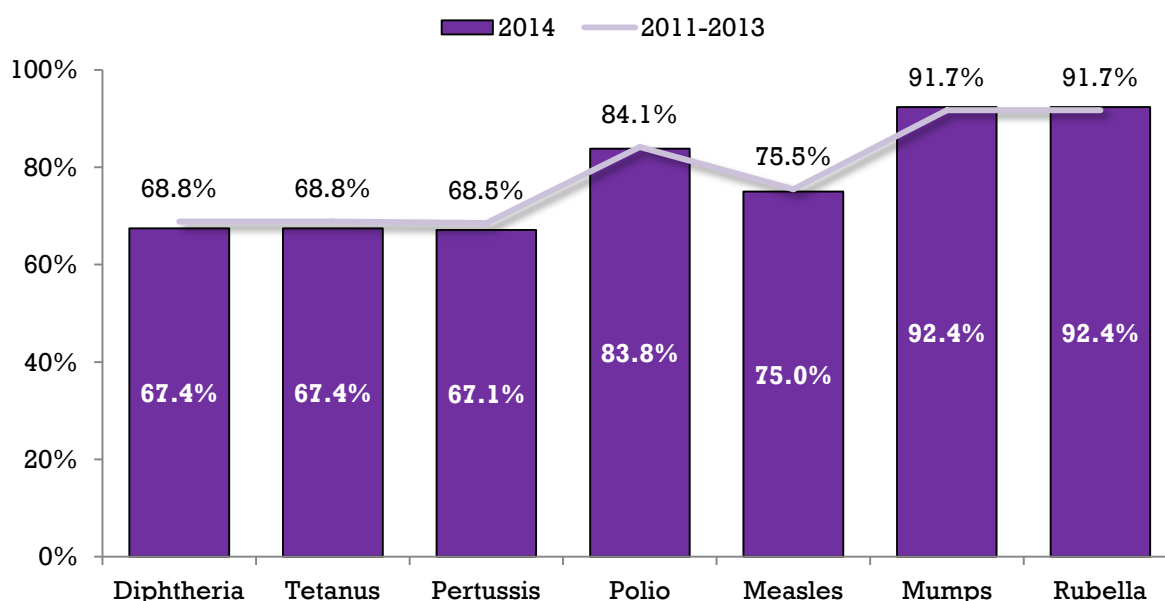


Figure 29: Percentage of children complete for age for diphtheria, tetanus, pertussis, polio, measles, mumps, and rubella in Manitoba, 2014 & 3-year average (2011-2013), age 7

3.2 Immunizations by RHA, Age 7

This section considers whether a child was complete for age for the particular immunogen, regardless of whether they were complete for age overall at age seven.

Diphtheria, Tetanus, and Pertussis

Figure 30 shows the percentage of children aged seven years who received five doses of the diphtheria immunogen, in each RHA.

In Manitoba, 67.4% of seven-year-olds were complete for age for the diphtheria immunogen (commonly administered as part of the combined vaccine DTaP-IPV-Hib at ages two, four, six, and 18 months and part of the combined vaccine DTaP-IPV at four to six years of age) in 2014. Northern Health Region had the highest percentage of seven-year-olds complete for age (78.2%) in 2014, with Prairie Mountain Health a close second (77.9%), both exceeding their 3-average complete for age rates (74.7% and 77.7%, respectively). Winnipeg RHA had the lowest percentage of children considered complete for age for the diphtheria immunogen in 2014 (62.1%), dipping below their 3-year average complete for age estimate (63.7%).

A similar trend was observed for the percentage of children complete for the tetanus (Figure 31), and pertussis (Figure 32) immunogens. This is due to these immunogens being most commonly given as part of a combined vaccine, either DTaP-IPV-Hib or DTaP-IPV.

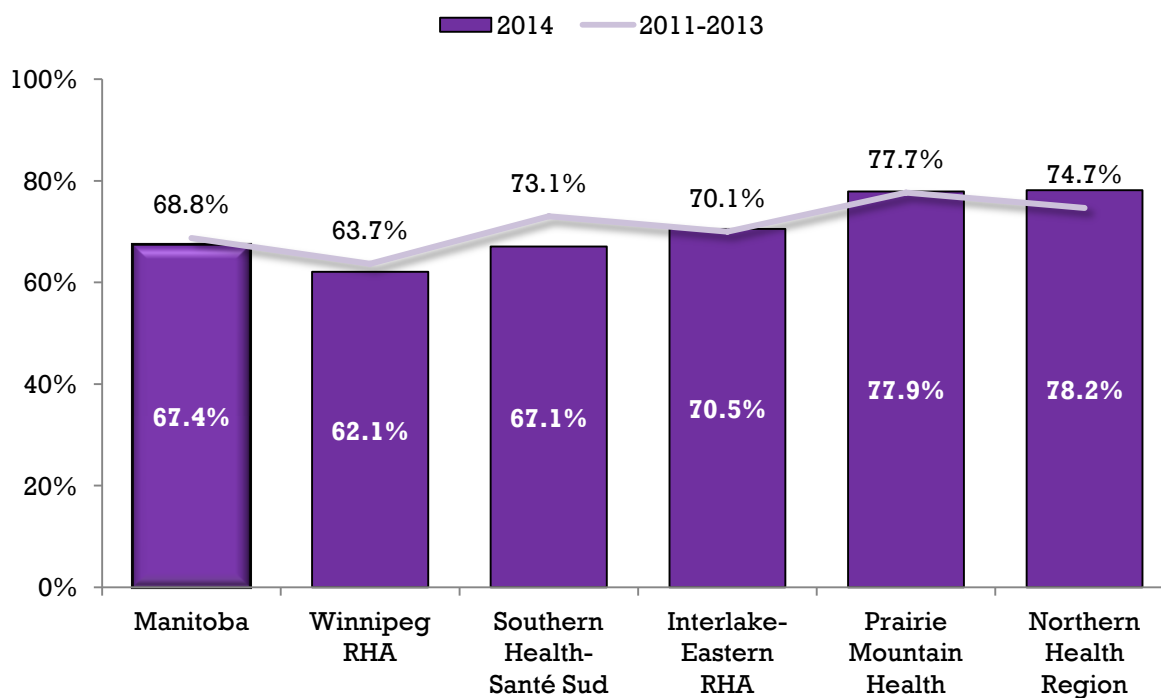


Figure 30: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

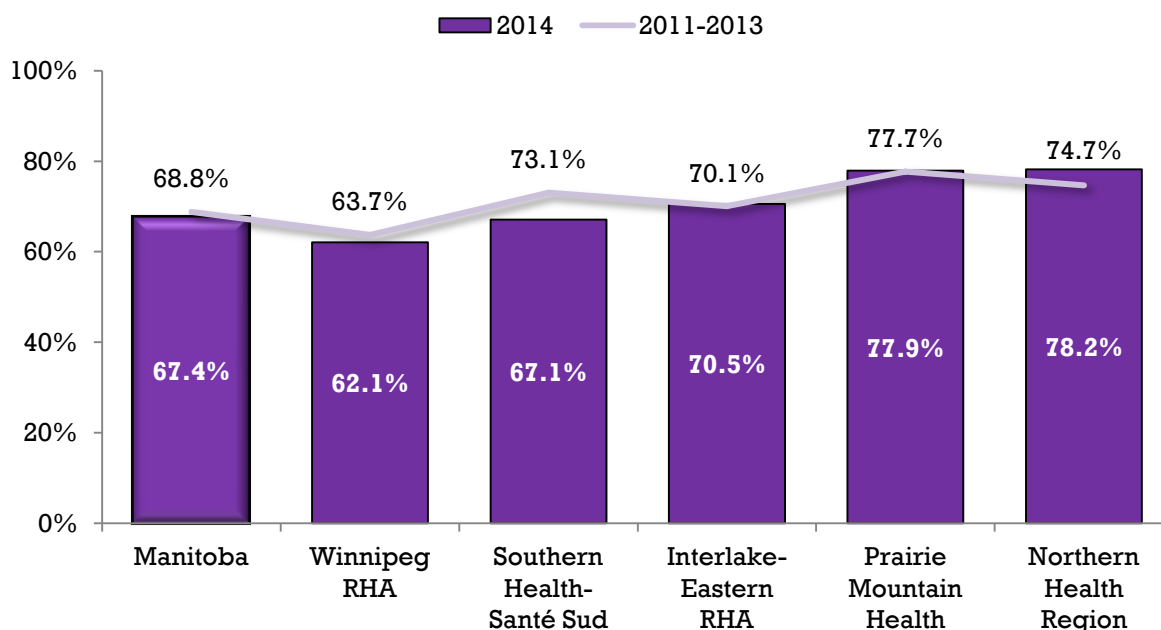


Figure 31: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

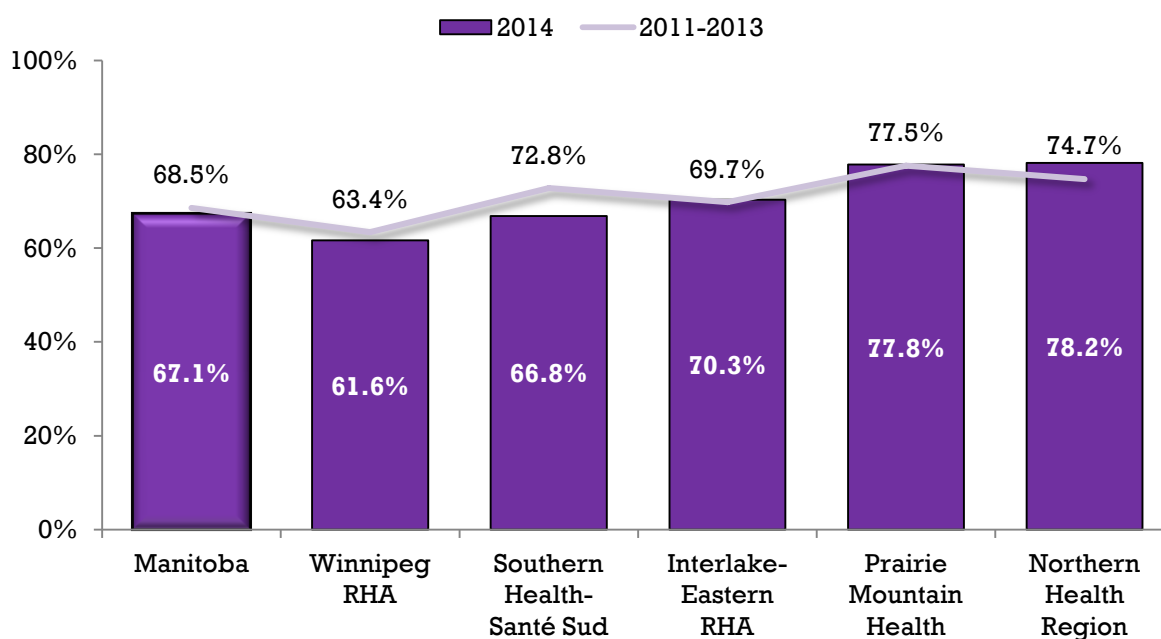


Figure 32: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

In Manitoba, approximately **7 out of 10** two-year-old children received the five doses necessary to be **complete for age** for the **diphtheria, tetanus, and pertussis** immunogens in 2014.

Polio

Children who were complete for age for the polio immunogen should have received at least four doses of the immunogen before their seventh birthday, and when the four doses were received *is* important. The polio immunogen was typically administered as part of the combined vaccine DTaP-IPV-Hib at ages two, four, six, and 18 months and part of the combined vaccine DTaP-IPV at four to six years of age. As previously mentioned, one of the infant series doses was not “required” to be considered complete for age, but the 18-month and pre-school boosters were required to be considered complete for age. So, while the uptake rates for polio vaccine were considerably higher than the other component antigens in the combined vaccines (because one less dose of polio vaccine was required), it is possible the complete for age coverage is over-estimated.

In Manitoba, more than eight in ten seven-year-olds (83.8%) received the four doses required to be considered complete for age for the polio immunogen (Figure 33). The percentage of seven-year-olds complete for age for the polio immunogen ranged from 78.7% (Winnipeg RHA) to 94.5% (Northern Health Region). The polio immunogen complete for age estimates for seven-year-olds in Interlake – Eastern, Prairie Mountain Health, and Northern Health Region were comparable to those of the one-year-olds and two-year-olds in the same RHAs. Southern Health – Santé Suds’ polio immunogen complete for age estimates for seven-year-olds were *greater* than those for one-year-olds and two-year-olds, while Winnipeg RHA’s seven-year-old estimates were *lower* than those for one-year-olds and two-year-olds. The 2014 polio immunogen completion rates followed the 3-year average rates very closely.

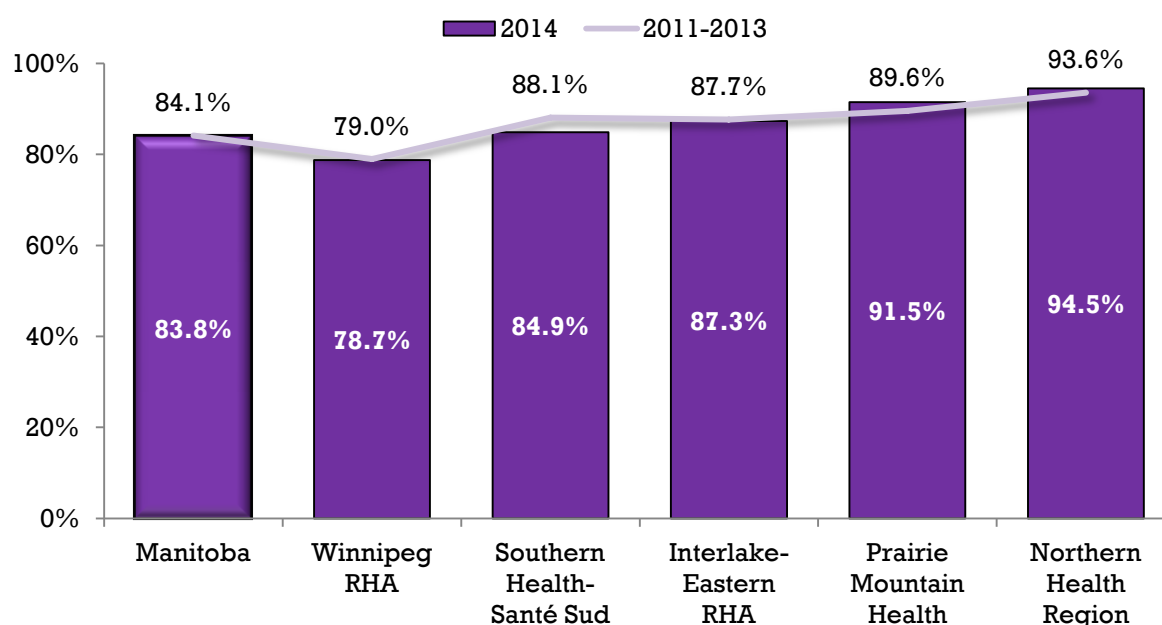


Figure 33: Percentage of children complete for age for polio by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

In Manitoba, approximately **8 out of 10** seven-year-old children received the four doses necessary to be **complete for age** for the **polio** immunogen in 2014.

Measles, Mumps, and Rubella

Before their seventh birthday, children in the 2007 birth cohort should have received one dose each of the MMR and V vaccines at 12 months and one dose of the combined MMR vaccine at four to six years of age. *Two* doses of measles were required to be considered complete for age at age seven for the measles immunogen. However, only *one* dose of mumps and rubella were required to be considered complete for age at age seven for those immunogens. This resulted in a difference in immunization rates between measles, and mumps and rubella; some children may only have received one of the immunizations, making them complete for age for mumps and rubella, but not for measles.

In Manitoba, over seven out of ten seven-year-olds (75.0%) received the two doses required to be considered complete for the measles immunogen in 2014 (Figure 34). The percentage of seven-year-olds complete for age for the measles immunogen ranged from 69.5% (Winnipeg RHA) to 87.8% (Northern Health Region). By comparison, in Manitoba over nine out of ten seven-year-olds (92.4%) received at least the one dose required to be considered complete for age for the mumps immunogen (Figure 35). The percentage of seven-year-olds complete for age for the mumps immunogen ranged from 90.5% (Winnipeg RHA) to 99.2% (Northern Health Region); the same trend was observed for the percentage of children complete for age for the rubella immunogen (Figure 36). The difference in uptake between measles and mumps/rubella suggests children are not receiving their second dose of MMR.

Despite the differences in the percentage of seven-year-olds complete for age for the measles immunogen when compared to the mumps and rubella immunogens, one trend was similar throughout: Winnipeg RHA had the lowest complete for age estimates, followed by Southern Health – Santé Sud, Interlake-Eastern, and Prairie Mountain Health with Northern Health Region having the highest percentage of seven-year-olds complete for age for the immunogen. The same trend was seen in the 3-year average for all three immunogens.

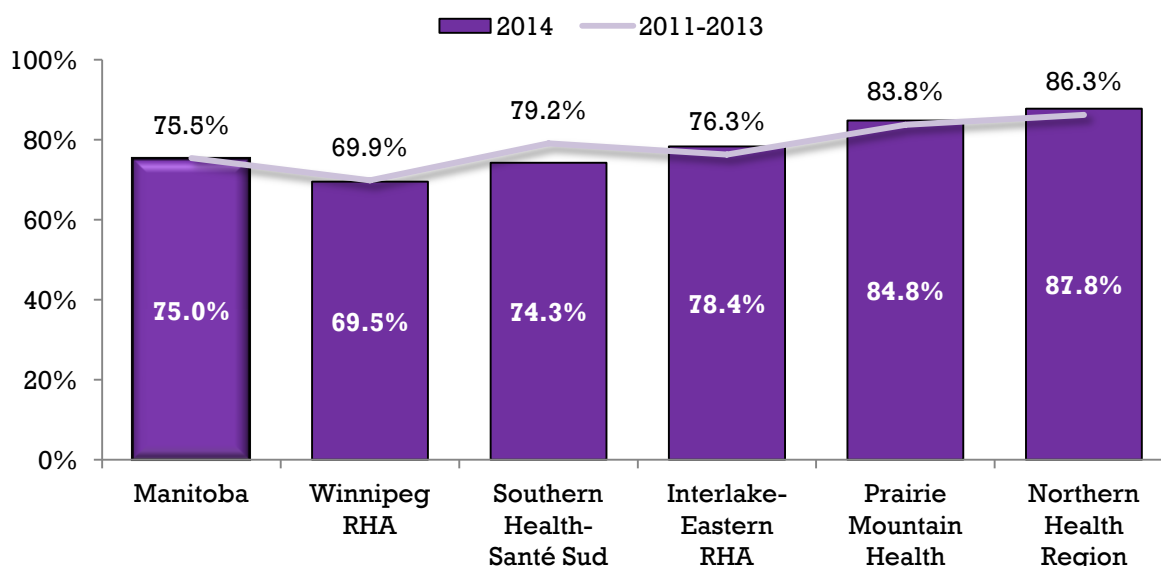


Figure 34: Percentage of children complete for age for measles by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

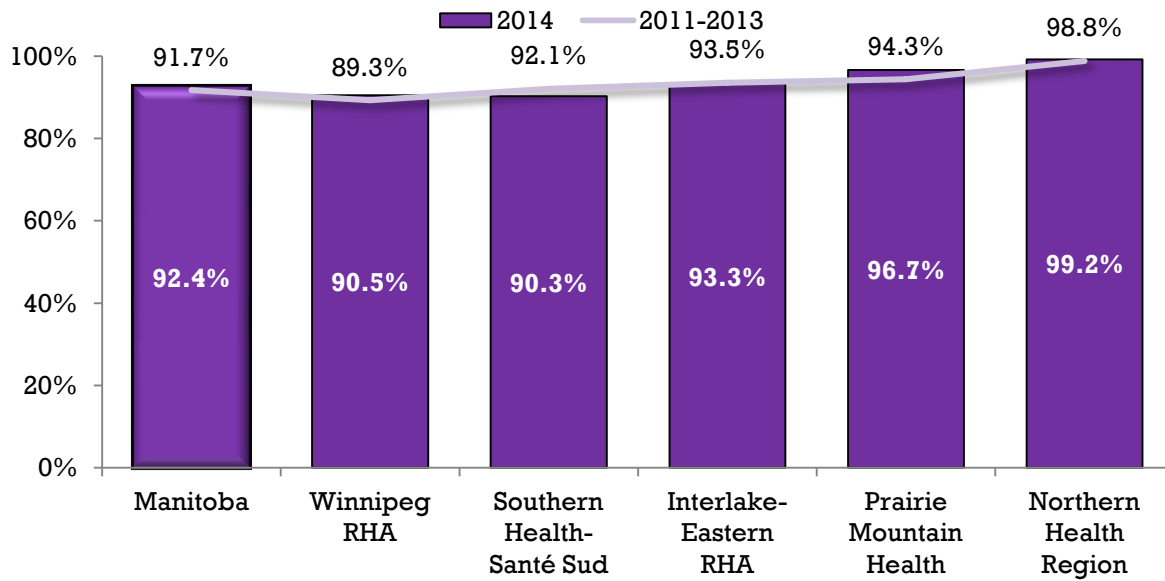


Figure 35: Percentage of children complete for age for mumps by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

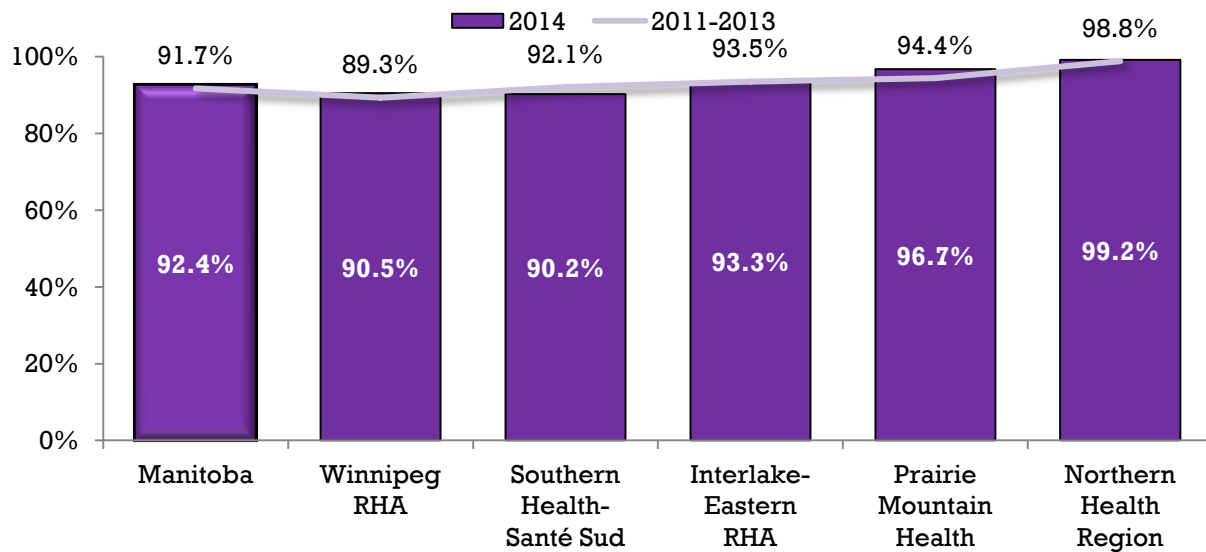


Figure 36: Percentage of children complete for age for rubella by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 7

In Manitoba, more than **7 out of 10** seven-year-old children received the two doses necessary to be **complete for age** for the **measles** immunogen in 2014.

More than **9 out of 10** seven-year-old children received the one dose necessary to be **complete for age** for the **mumps and rubella** immunogens in 2014.

3.3 Residency and Immunization Rates, Age 7

This section considers whether a child was complete for age *overall* at age seven. That is, whether they received *all* doses of the immunogens recommended by age seven.

From 2011 to 2014, the percentage of children considered complete for age overall at age seven was substantially higher for continuous residents than non-continuous residents (Figure 37). Approximately two-thirds of continuous residents were complete for age compared to approximately one-quarter of non-continuous residents. Additional explanations for the reasons for these differences in rates can be found on page 16.

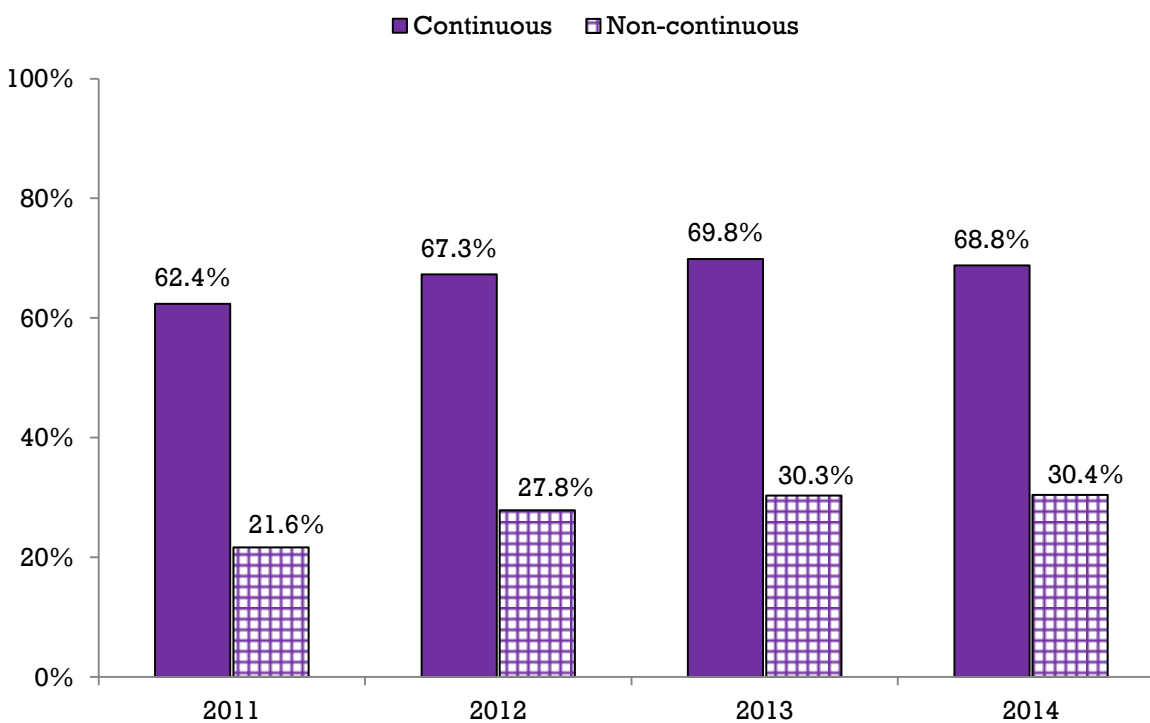


Figure 37: Percentage of children complete for age overall by continuous and non-continuous resident status in Manitoba, 2011-2014, age 7

The percentage of seven-year-olds considered complete for age *overall* was substantially higher for continuous residents than non-continuous residents.

In all RHAs, the percentage of continuous residents considered complete for age overall at age seven (Figure 38), was higher than the percentage of non-continuous residents considered complete for age overall at age seven (Figure 39). Figure 38 shows Prairie Mountain Health had the highest percentage of seven-year-old continuous residents complete for age in 2014 (76.9%), while Southern Health – Santé Sud had the lowest percentage (63.4%). Figure 39 shows Northern Health Region had the highest percentage of seven-year-old non-continuous residents complete for age in 2014 (59.2%), while Winnipeg RHA had the lowest percentage (20.1%).

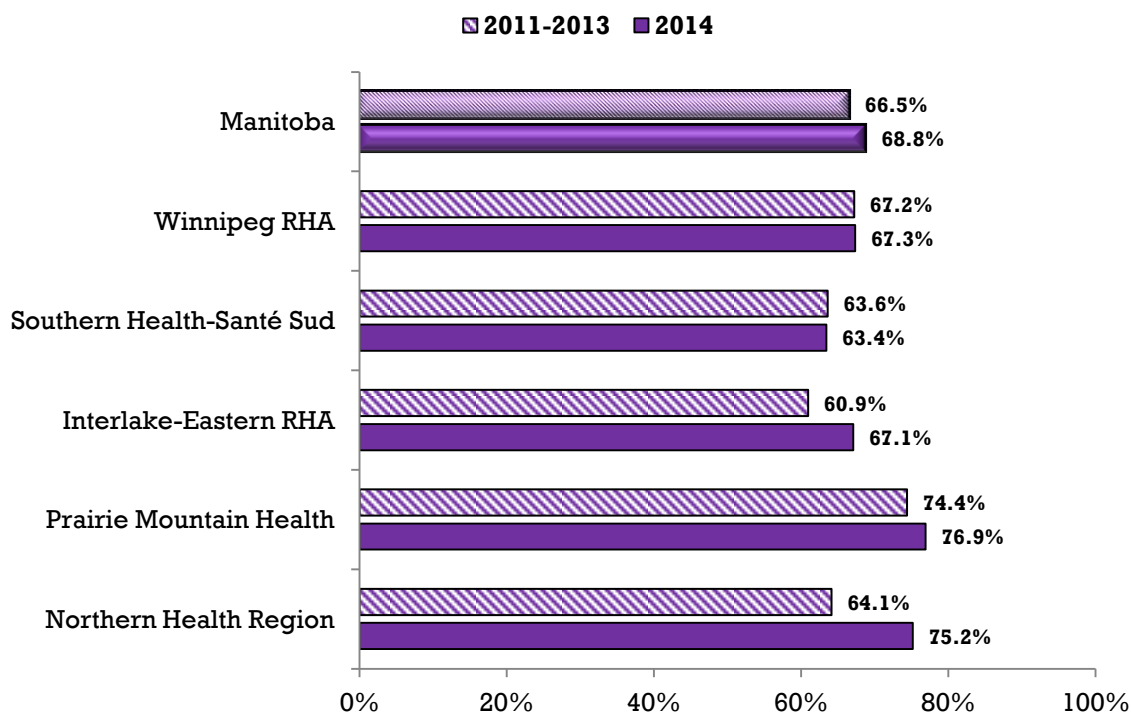


Figure 38: Percentage of continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 7

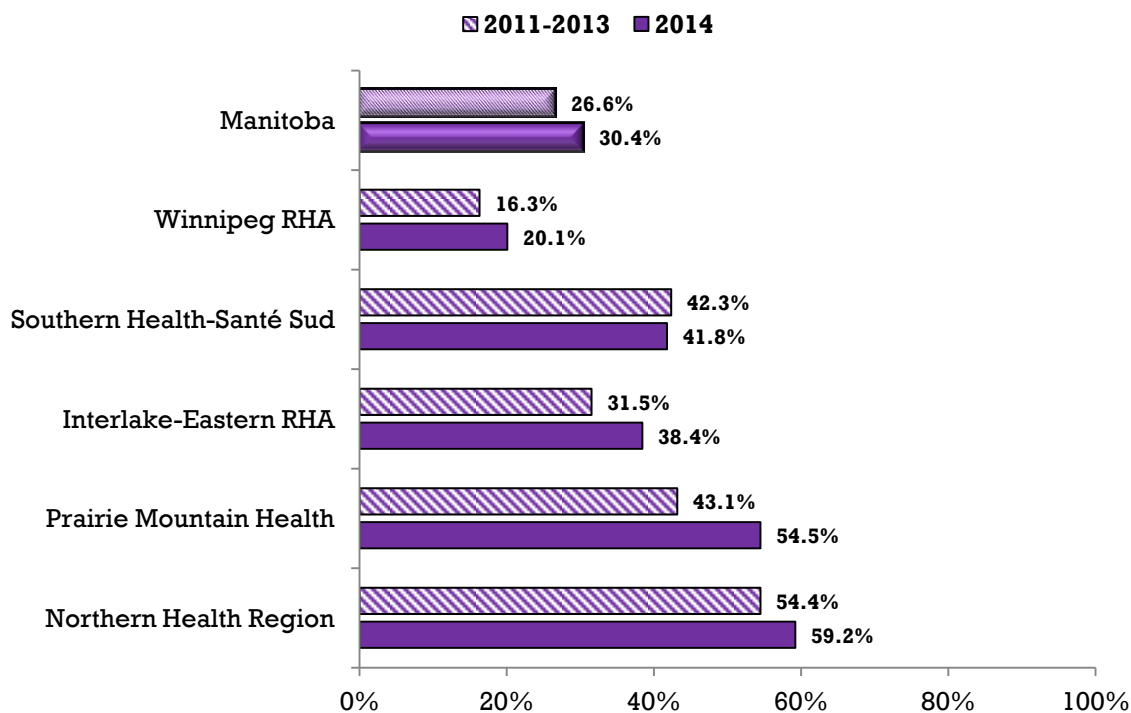


Figure 39: Percentage of non-continuous resident children complete for age overall by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011 - 2013), age 7

3.4 Summary of Immunizations, Age 7

It is important to note, in this part of the report

- the RHA classifications were determined by the child's region of residence (i.e. the RHA where the child lives).
- the data is presented by **number of children**, rather than by dose.

Table 8: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 7

Immunogens	Year	Manitoba		Winnipeg RHA		Southern Health-Santé Sud		Interlake-Eastern RHA		Prairie Mountain Health		Northern Health Region	
Population	2011-2013	46,882		23,771		8,379		4,294		6,135		4,303	
	2014	16,961		8,500		2,967		1,544		2,269		1,681	
Diphtheria	2011-2013	32,256	68.8%	15,144	63.7%	6,121	73.1%	3,008	70.1%	4,769	77.7%	3,214	74.7%
	2014	11,438	67.4%	5,277	62.1%	1,990	67.1%	1,089	70.5%	1,768	77.9%	1,314	78.2%
Tetanus	2011-2013	32,254	68.8%	15,142	63.7%	6,121	73.1%	3,008	70.1%	4,769	77.7%	3,214	74.7%
	2014	11,438	67.4%	5,277	62.1%	1,990	67.1%	1,089	70.5%	1,768	77.9%	1,314	78.2%
Pertussis	2011-2013	32,125	68.5%	15,063	63.4%	6,097	72.8%	2,995	69.7%	4,756	77.5%	3,214	74.7%
	2014	11,386	67.1%	5,237	61.6%	1,983	66.8%	1,086	70.3%	1,766	77.8%	1,314	78.2%
Hib	2011-2013	40,368	86.1%	19,485	82.0%	7,500	89.5%	3,867	90.1%	5,509	89.8%	4,007	93.1%
	2014	15,539	91.6%	7,498	88.2%	2,745	92.5%	1,458	94.4%	2,171	95.7%	1,667	99.2%
Polio	2011-2013	39,443	84.1%	18,777	79.0%	7,379	88.1%	3,764	87.7%	5,497	89.6%	4,026	93.6%
	2014	14,221	83.8%	6,691	78.7%	2,518	84.9%	1,348	87.3%	2,076	91.5%	1,588	94.5%
Pneu-C-13	2011-2013	39,745	84.8%	19,563	82.3%	6,944	82.9%	3,893	90.7%	5,202	84.8%	4,143	96.3%
	2014	15,071	88.9%	7,285	85.7%	2,600	87.6%	1,442	93.4%	2,086	91.9%	1,658	98.6%
Measles	2011-2013	35,380	75.5%	16,617	69.9%	6,635	79.2%	3,277	76.3%	5,139	83.8%	3,712	86.3%
	2014	12,726	75.0%	5,911	69.5%	2,204	74.3%	1,210	78.4%	1,925	84.8%	1,476	87.8%
Mumps	2011-2013	42,991	91.7%	21,222	89.3%	7,715	92.1%	4,015	93.5%	5,788	94.3%	4,251	98.8%
	2014	15,670	92.4%	7,692	90.5%	2,678	90.3%	1,440	93.3%	2,193	96.7%	1,667	99.2%
Rubella	2011-2013	42,997	91.7%	21,226	89.3%	7,714	92.1%	4,015	93.5%	5,791	94.4%	4,251	98.8%
	2014	15,670	92.4%	7,692	90.5%	2,677	90.2%	1,440	93.3%	2,194	96.7%	1,667	99.2%
Varicella	2011-2013	36,394	77.6%	18,360	77.2%	6,123	73.1%	3,302	76.9%	5,014	81.7%	3,595	83.5%
	2014	14,158	83.5%	6,932	81.6%	2,309	77.8%	1,302	84.3%	2,027	89.3%	1,588	94.5%
Men-C-C	2011-2013	4,617	9.8%	2,686	11.3%	797	9.5%	380	8.8%	499	8.1%	255	5.9%
	2014	2,909	17.2%	1,685	19.8%	405	13.7%	250	16.2%	291	12.8%	278	16.5%
Hepatitis B	2011-2013	4,427	9.4%	2,505	10.5%	1,029	12.3%	214	5.0%	503	8.2%	176	4.1%
	2014	1,759	10.4%	1,056	12.4%	302	10.2%	92	6.0%	217	9.6%	92	5.5%
Note													
Hib: <i>Haemophilus influenzae</i> type b, Pneu-C-13: pneumococcal conjugate 13 valent, Men-C-C: meningococcal conjugate C													

4. Immunizations at Age 11

4.1 Immunizations in Manitoba, Age 11

Table 9: Recommended Immunization Schedule, 2014, age 11

Vaccine	Age
	Grade 4
Men-C-C Meningococcal conjugate C	◆
Hepatitis B	◆◆◆

◆ A single dose given with one needle.

At age 11, Manitoba's 2014 universal childhood immunization program provided protection against the bacterial pathogen meningococcal type C and the viral infection of hepatitis B. In 2004, MHLS began publicly-funding the Men-C-C vaccine for all children in grade four. In 2009, the Men-C-C vaccine was also offered to infants at 12 months (that is, to children born on or after January 1, 2008). Since the 2008 birth cohort had not yet reached 11 years of age in 2014, only the one dose of Men-C-C, received in grade four, was recommended to be considered complete for age at 11 years. Furthermore, Manitoba's hepatitis B immunization program was introduced in 1998 to be given to all children in grade four born on or after January 1, 1989. A total of three doses of hepatitis B were required by age 11 to be considered complete for age.

The immunization status of children at age 11 in 2014 represents those who were born in 2003 and who turned 11 years old in 2014 (*2003 birth cohort*). In order to be considered complete for age *overall* at 11 years, children needed 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 in 2014, please refer to Table 1 (for an overview of the immunogens that were required to be complete for age from 2011-2013 see Appendix B).

The Age 11 chapter will not provide data by complete for age overall, it will only provide data by complete for age per immunogen. By this age, several factors have influenced the "complete for age overall" status of children, such as: program starts dates, natural immunity, and moving in and out of the province. For reasons such as these, the overall complete for age rates misrepresent the actual completion rates for this age category, and will not be presented in this report.

The data reported in Figure 40 is for children who were complete for age for the particular immunogen, regardless of whether they were complete for age overall. Approximately eight in ten (79.8%) of Manitoba's 11-year-olds were considered complete for age for Men-C-C in 2014, while seven in ten (70.9%) of 11-year-olds were considered complete for age for the hepatitis B immunogen.

A potential explanation for why the Men-C-C completion estimates were higher than the hepatitis B completion estimates is only one dose of the Men-C-C vaccine was required to be considered complete for age for the Men-C-C immunogen, while three doses of hepatitis B vaccine was required to be considered complete for age for the hepatitis B immunogen. Since less doses of Men-C-C were required, it was easier for children to achieve complete for age status. Also, hepatitis B can be administered at earlier ages for travel reasons, and is administered to infants in other jurisdictions. This may result in missing records if out-of-province immunization records, and/or non-publicly funded vaccine immunization records, were not submitted.

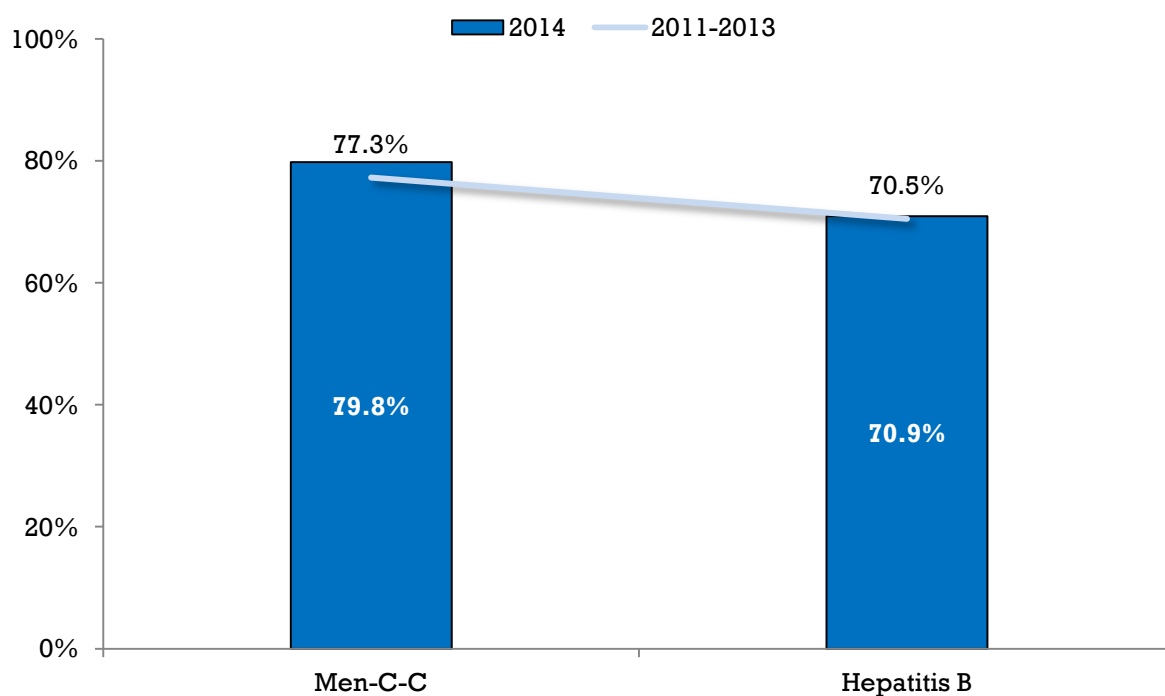


Figure 40: Percentage of children complete for age for meningococcal conjugate C (Men-C-C), and hepatitis B, in Manitoba, 2014 & 3-year average (2011-2013), age 11

4.2 Immunizations by RHA, Age 11

This section considers whether a child was complete for age for the particular immunogen, regardless of whether they were complete for age for overall at age 11.

Meningococcal Conjugate C

Figure 41 shows the percentage of children aged 11 years who received one dose of Men-C-C vaccine, in each RHA.

In Manitoba, 79.8% of 11-year-olds were complete for age for the Men-C-C immunogen in 2014. Prairie Mountain Health had the highest percentage of 11-year-olds complete for age (85.5%) with Interlake-Eastern a close second (82.7%), both surpassing their 3-year average complete for age percentages (84.1% and 81.1%, respectively). Southern Health – Santé Sud had the lowest percentage of children complete for age for Men-C-C, in both 2014 (74.1%) and the 3-year average (74.0%).

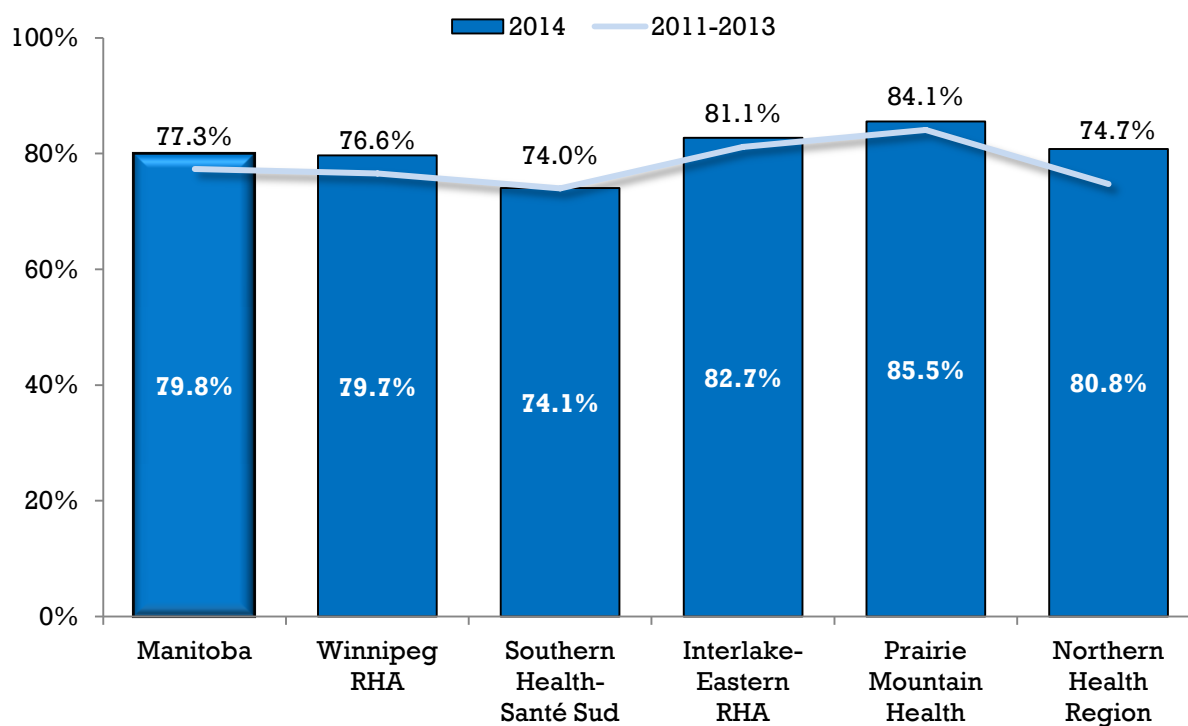


Figure 41: Percentage of children complete for age for meningococcal conjugate C (Men-C-C) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 11

In Manitoba, almost **8 out of 10** 11-year-old children received the one dose necessary to be **complete for age** for the **Men-C-C** vaccine in 2014.

Hepatitis B

Figure 41 shows the percentage of children aged 11 years who received three doses of hepatitis B vaccine, in each RHA.

In Manitoba, 70.9% of 11-year-olds were complete for age for the hepatitis B immunogen in 2014; that is, they received the complete hepatitis B vaccine series (three doses) before their eleventh birthday (Figure 42). Prairie Mountain Health had the highest percentage of 11-year-olds complete for age (78.4%) in 2014, while Northern Health Region had the lowest percentage of 11-year-olds complete for age (66.4%). The remaining three RHAs had approximately seven out of ten 11-year olds complete for age.

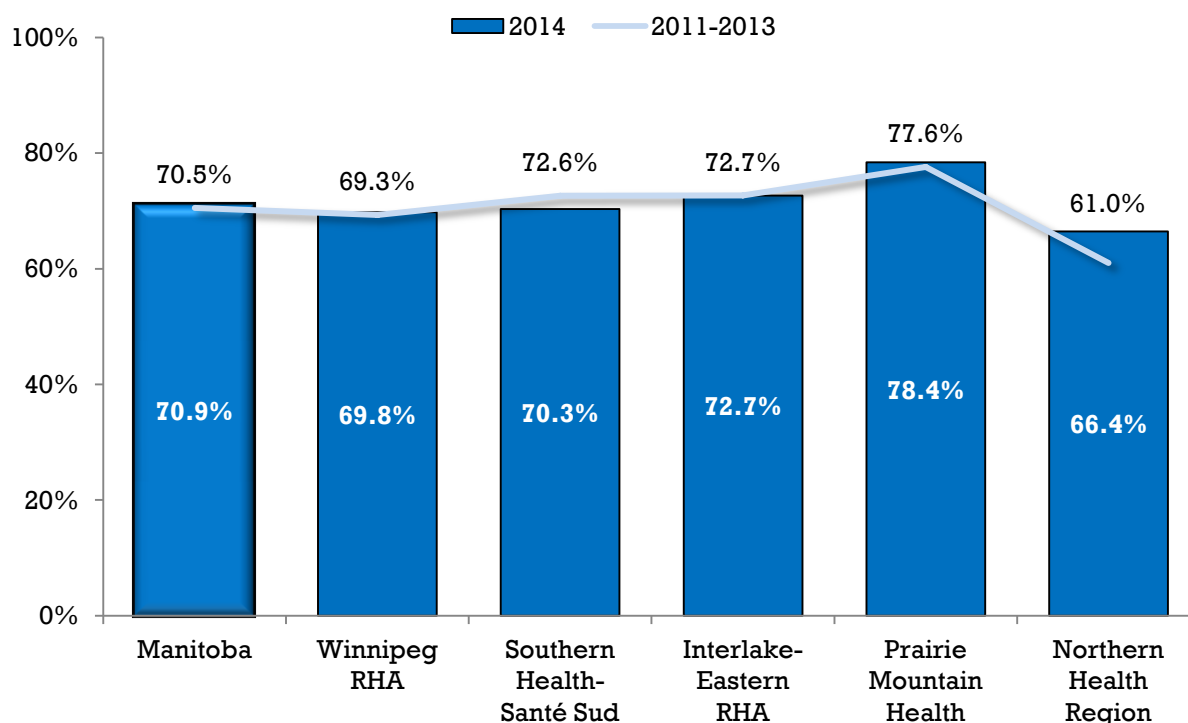


Figure 42: Percentage of children complete for age for hepatitis B by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 11

In Manitoba, **7 out of 10** 11-year-old children received the three doses necessary to be **complete for age** for the **Hepatitis B** immunogen in 2014.

4.3 Residency and Immunization Rates, Age 11

Information will not be provided for this section. Please see section 4.1 (page 59) for details.

4.4 Summary of Immunizations, Age 11

It is important to note, in this part of the report

- the RHA classifications were determined by the child's region of residence (i.e. the RHA where the child lives).
- the data is presented by **number of children**, rather than by dose.

Table 10: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 11

Immunogens	Year	Manitoba		Winnipeg RHA		Southern Health-Santé Sud		Interlake-Eastern RHA		Prairie Mountain Health		Northern Health Region	
Population	2011-2013	47,194		24,538		8,414		4,548		5,748		3,946	
	2014	15,852		8,219		2,881		1,449		1,971		1,332	
Diphtheria	2011-2013	33,676	71.4%	15,809	64.4%	6,747	80.2%	3,509	77.2%	4,621	80.4%	2,990	75.8%
	2014	11,114	70.1%	5,140	62.5%	2,281	79.2%	1,109	76.5%	1,590	80.7%	994	74.6%
Tetanus	2011-2013	33,673	71.4%	15,805	64.4%	6,748	80.2%	3,509	77.2%	4,621	80.4%	2,990	75.8%
	2014	11,115	70.1%	5,141	62.6%	2,281	79.2%	1,109	76.5%	1,590	80.7%	994	74.6%
Pertussis	2011-2013	33,355	70.7%	15,620	63.7%	6,681	79.4%	3,488	76.7%	4,588	79.8%	2,978	75.5%
	2014	11,028	69.6%	5,091	61.9%	2,264	78.6%	1,101	76.0%	1,578	80.1%	994	74.6%
Hib	2011-2013	40,982	86.8%	19,774	80.6%	7,752	92.1%	4,314	94.9%	5,260	91.5%	3,882	98.4%
	2014	13,845	87.3%	6,613	80.5%	2,684	93.2%	1,389	95.9%	1,825	92.6%	1,334	100.2%
Polio	2011-2013	39,057	82.8%	18,609	75.8%	7,579	90.1%	4,085	89.8%	5,137	89.4%	3,647	92.4%
	2014	13,190	83.2%	6,205	75.5%	2,604	90.4%	1,326	91.5%	1,803	91.5%	1,252	94.0%
Pneu-C-13	2011-2013	4,062	8.6%	2,532	10.3%	524	6.2%	474	10.4%	310	5.4%	222	5.6%
	2014	4,610	29.1%	2,583	31.4%	628	21.8%	550	38.0%	446	22.6%	403	30.3%
Measles	2011-2013	37,408	79.3%	17,457	71.1%	7,492	89.0%	3,894	85.6%	5,060	88.0%	3,505	88.8%
	2014	12,561	79.2%	5,819	70.8%	2,529	87.8%	1,262	87.1%	1,759	89.2%	1,192	89.5%
Mumps	2011-2013	42,339	89.7%	20,907	85.2%	7,900	93.9%	4,303	94.6%	5,361	93.3%	3,868	98.0%
	2014	14,331	90.4%	7,050	85.8%	2,698	93.6%	1,382	95.4%	1,876	95.2%	1,325	99.5%
Rubella	2011-2013	42,332	89.7%	20,903	85.2%	7,896	93.8%	4,303	94.6%	5,362	93.3%	3,868	98.0%
	2014	14,336	90.4%	7,055	85.8%	2,698	93.6%	1,382	95.4%	1,876	95.2%	1,325	99.5%
Varicella	2011-2013	18,120	38.4%	9,464	38.6%	2,791	33.2%	1,794	39.4%	2,590	45.1%	1,481	37.5%
	2014	8,074	50.9%	4,182	50.9%	1,344	46.7%	758	52.3%	1,082	54.9%	708	53.2%
Men-C-C	2011-2013	36,476	77.3%	18,784	76.6%	6,223	74.0%	3,690	81.1%	4,832	84.1%	2,947	74.7%
	2014	12,646	79.8%	6,551	79.7%	2,134	74.1%	1,199	82.7%	1,686	85.5%	1,076	80.8%
Hepatitis B	2011-2013	33,275	70.5%	16,999	69.3%	6,106	72.6%	3,305	72.7%	4,459	77.6%	2,406	61.0%
	2014	11,244	70.9%	5,735	69.8%	2,026	70.3%	1,053	72.7%	1,545	78.4%	885	66.4%
HPV	2014	848	11.0%	516	12.9%	91	6.5%	75	10.5%	65	6.8%	101	15.7%

Notes

Hib: Haemophilus influenzae type b, Pneu-C-13: pneumococcal conjugate 13 valent, Men-C-C: meningococcal conjugate C, HPV: human papillomavirus. HPV percentages were calculated using a denominator of the *female* population only.

5. Immunizations at Age 17

5.1 Immunizations in Manitoba, Age 17

Table 11: Recommended Immunization Schedule, 2014, age 17

Vaccine	Age	
	Grade 6	14-16 years
HPV – females only Human papillomavirus	◆◆◆	
Tdap Tetanus, diphtheria, pertussis		◆

◆ A single dose given with one needle.

At age 17, Manitoba’s 2014 universal childhood immunization program boosted protection against the bacterial pathogens: tetanus, diphtheria, and pertussis. In 2003, the tetanus and diphtheria vaccine (Td) was replaced with the combined vaccine Tdap. The Tdap immunization program was offered by public health nurses in the schools, in either grade eight or nine (varies by region); thus, the Tdap vaccine was due between 14 to 16 years of age, and may have been given through the 16th year of life. The dose was not counted until it was overdue, at age 17.

Starting in 2008, Manitoba’s universal childhood immunization program also provided protection against HPV; the HPV immunization program was publicly-funded for grade six *females* who were born on or after January 1, 1997. Three doses of the vaccine were required by age 17 to be considered complete for age for the HPV immunogen.

The immunization status of children at age 17 in 2014 represents those who were born in 1997 and who turned 17 years old in 2014 (1997 birth cohort). To be considered complete for age *overall* at 17 years, children needed to have six doses of the immunogens diphtheria, tetanus, and pertussis; four doses of polio; three doses of hepatitis B, and HPV (females only); two doses of measles; and one dose each of mumps, rubella, varicella, and Men-C-C. For an overview of immunogens required to be complete for age in 2014, please refer to Table 1 (for an overview of the immunogens that were required to be complete for age from 2011-2013 see Appendix B).

As previously mentioned, the Age 17 chapter will not provide data by complete for age overall, it will only provide data by complete for age per immunogen.

By this age, several factors have influenced the “complete for age overall” status of children, such as: program starts dates, natural immunity, and moving in and out of the province. For reasons such as these, the overall complete for age rates misrepresent the actual completion rates for this age category, and will not be presented in this report.

The data reported in Figure 43 is for children who were complete for age for the particular immunogen, regardless of whether they are complete for age overall. The percentages of children complete for age for each diphtheria (54.9%) and tetanus (54.9%) were slightly higher than the percentage of children complete for age for pertussis (51.5%). A possible explanation for the lower pertussis percentage is some 17-year-olds may have received the Td vaccine as a booster dose, as opposed to the recommended Tdap vaccine. Td vaccine is often given in situations where the Tdap vaccine is not readily available, and there is an immediate need for immunization (e.g. wound management in a hospital emergency department). Despite this, the percentage of children complete for age for the three immunogens was very close as they were typically provided as part of a combined vaccine (DTaP-IPV-Hib at two, four, six and 18 months of age, DTaP-IPV (or Tdap-IPV) at 4 to 6 years of age, and Tdap at 14 to 16 years of age). All three immunogens experienced a decrease in completion rates compared to the 3-year average.

Figure 43 also shows the percentage of 17-year-old *females* who were complete for age for the HPV immunogen. In Manitoba, 57.6% of 17-year-old females received the three doses required to be complete for age for the immunogen. This represents the 1997 birth cohort, the first cohort eligible to receive the publicly-funded HPV vaccine. The 3-year average for the HPV immunogen is not available for comparison, since 2014 was the first year the HPV vaccine was counted as part of the complete for age requirements.

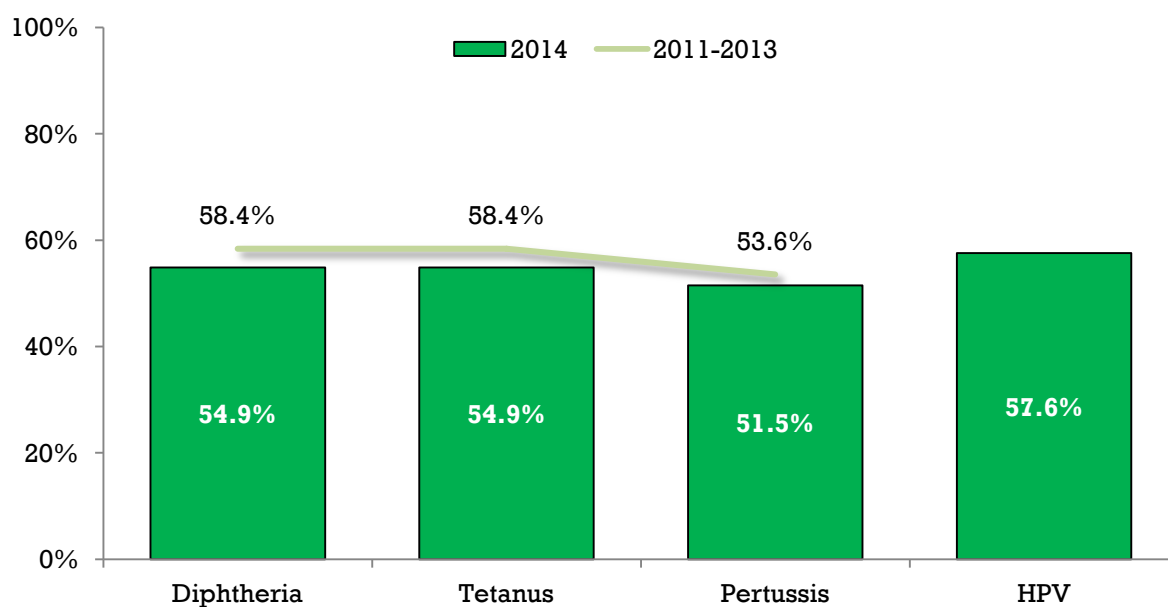


Figure 43: Percentage of children complete for age for diphtheria, tetanus, pertussis and human papillomavirus (HPV), in Manitoba, 2014 & 3-year average (2011-2013), age 17

5.2 Immunizations by RHA, Age 17

This section considers whether a child was complete for age for the particular immunogen, regardless of whether they were complete for age overall at age 17.

Tetanus, Diphtheria, and Pertussis

Figure 44 shows the percentage of children aged 17 years who received six doses of the diphtheria immunogen, in each RHA.

In Manitoba, 54.9% of 17-year-olds were complete for age for the diphtheria immunogen (commonly administered as part of the following combined vaccines: DTaP-IPV-Hib at two, four, six and 18 months of age, DTaP-IPV at 4 to 6 years of age, and Tdap at 14 to 16 years of age) in 2014. Prairie Mountain Health had the highest percentage of 17-year-olds complete for age for the diphtheria immunogen (70.6%) in 2014, while Winnipeg RHA had the lowest percentage of 17-year-olds complete for age for the diphtheria immunogen (46.9%). Both experienced 2014 completion rates below their 3-year average completion rates (71.6% and 52.2%, respectively), as did the rest of the RHAs.

A similar trend was observed for the percentage of children complete for age for the tetanus (Figure 45) and the pertussis (Figure 46) immunogens. This is due to these immunogens being most commonly given together as part of a combined vaccine.

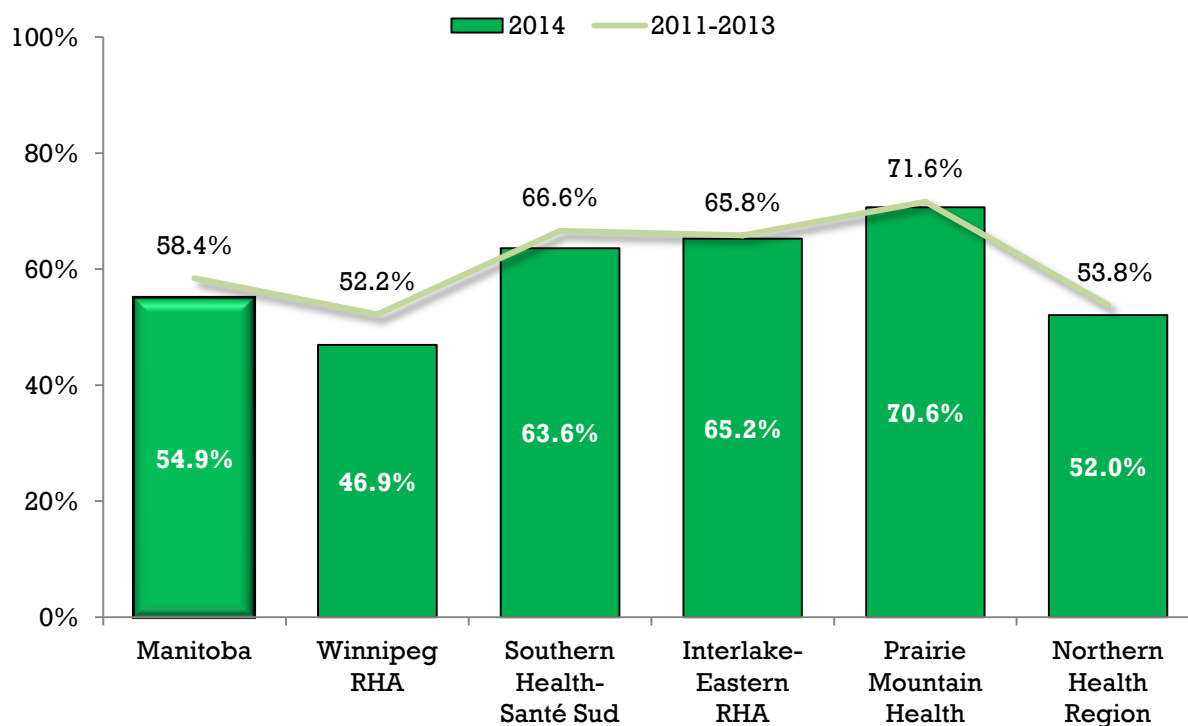


Figure 44: Percentage of children complete for age for diphtheria by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17

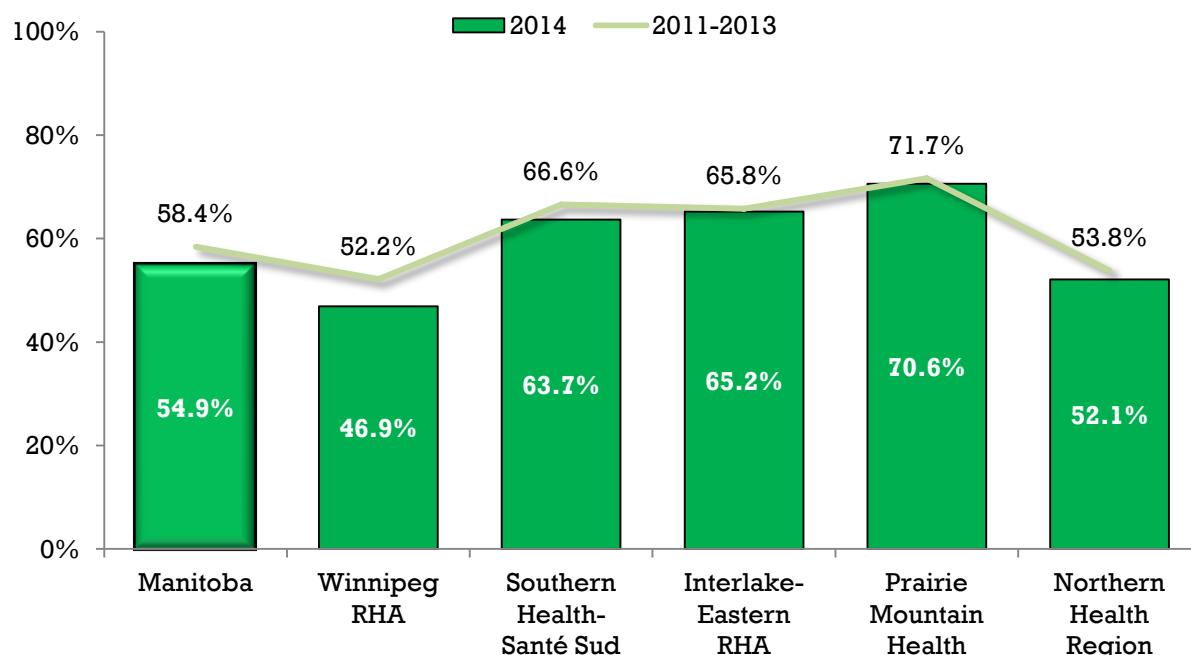


Figure 45: Percentage of children complete for age for tetanus by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17

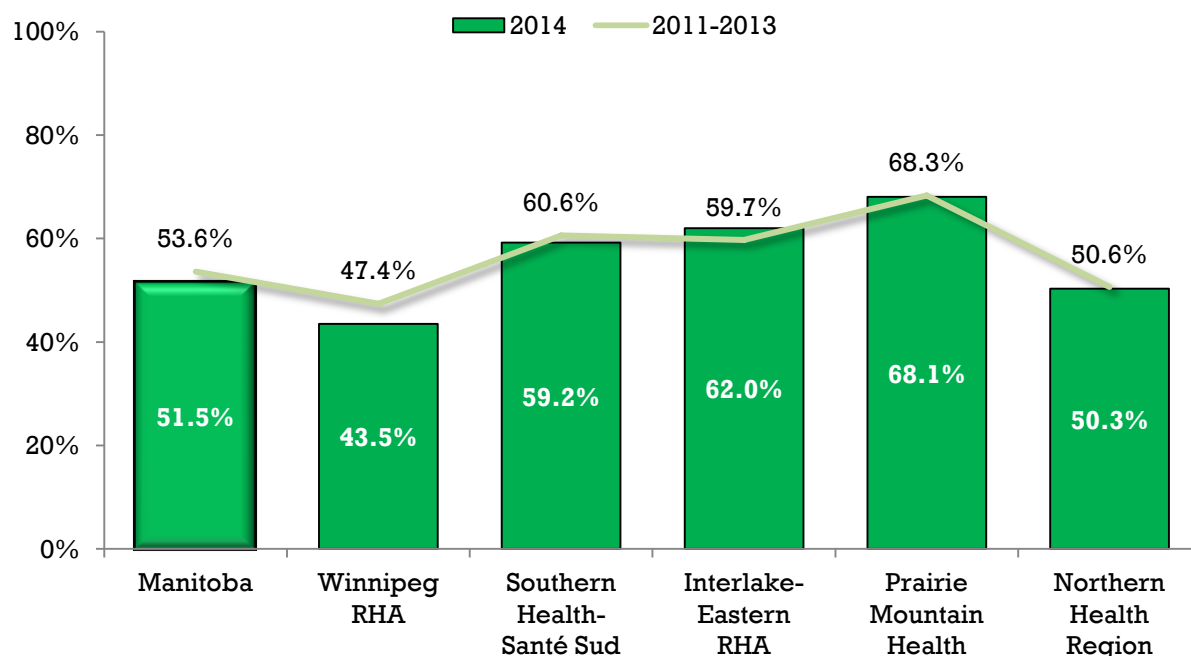


Figure 46: Percentage of children complete for age for pertussis by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17

In Manitoba, approximately **one-half** of 17-year-old children received the six doses necessary to be **complete for age** for the **diphtheria, tetanus, and pertussis** immunogens in 2014.

Human Papillomavirus

Figure 47 shows the percentage of children aged 17 years who were complete for age for the HPV immunogen, in each RHA.

In Manitoba, 57.6% of 17-year-old *females* were complete for age for the HPV immunogen in 2014. Prairie Mountain Health had the highest percentage of 17-year-old females complete for age for the immunogen (68.3%), while Southern Health – Santé Sud had the lowest percentage of 17-year-old females complete for age for the immunogen (49.6%) in 2014.

The HPV complete for age estimates were calculated with a numerator of the number of females who received the three doses of the HPV vaccine by their 17th birthday, in a given RHA, and a denominator of the total number of 17-year-old females in that RHA. Since the 1997 birth cohort was the first cohort eligible to receive the publicly funded HPV vaccine, 2014 was the first year three doses of the HPV immunogen was required to be complete for age at age 17. Due to this, there was no 3-year average complete for age estimate for comparison.

Normally, the HPV vaccine was administered during the 11th – 12th year of life. The three doses were not counted as necessary to be complete for age until age 17, as this allowed time for an individual to get caught-up if a dose is missed.

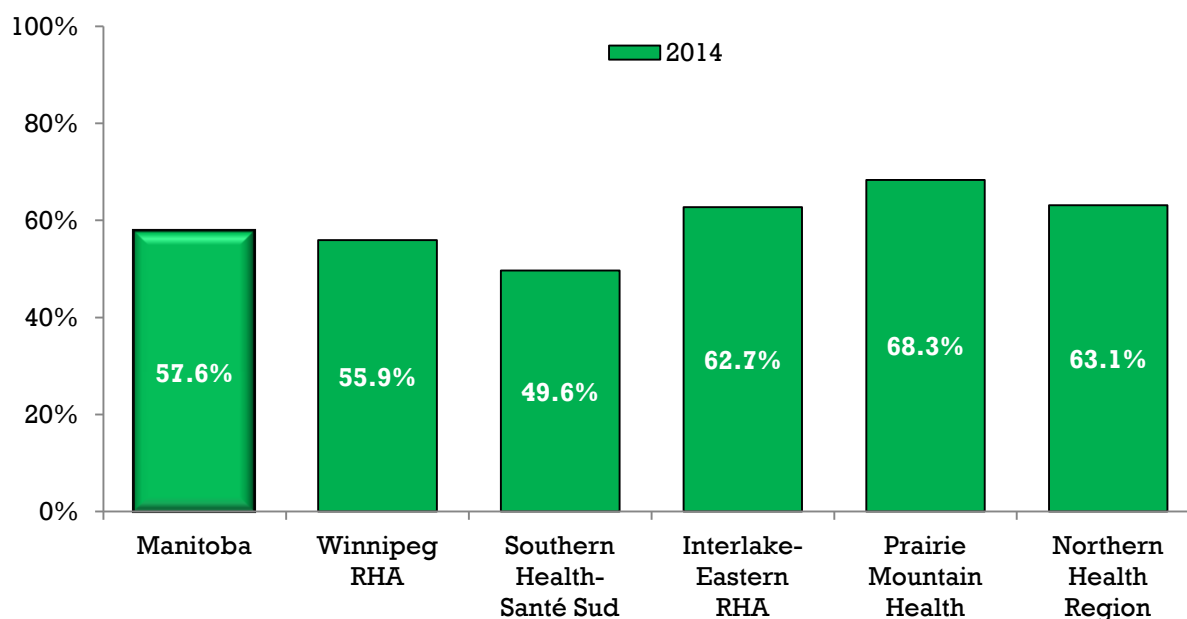


Figure 47: Percentage of children complete for age for human papillomavirus (HPV) by regional health authority (RHA) in Manitoba, 2014 & 3-year average (2011-2013), age 17

In Manitoba, almost **6 out of 10** 17-year-old *females* received the three doses necessary to be **complete for age** for the **HPV** vaccine in 2014.

5.3 Residency and Immunization Rates, Age 17

Information will not be provided for this section. Please see section 5.1 (page 64) for details.

5.4 Summary of Immunizations, Age 17

It is important to note, in this part of the report

- the RHA classifications were determined by the child's **region of residence** (i.e. the RHA where the child lives).
- the data is presented by **number of children**, rather than by dose.

Table 12: Number and percentage of children complete for age by immunogen and regional health authority (RHA), in Manitoba, 2014 & 3-year average (2011-2013), age 17

Immunogens	Year	Manitoba		Winnipeg RHA		Southern Health-Santé Sud		Interlake-Eastern RHA		Prairie Mountain Health		Northern Health Region	
Population	2011-2013	52,603		28,304		8,648		5,401		6,339		3,911	
	2014	16,734		8,991		2,929		1,617		2,046		1,151	
Diphtheria	2011-2013	30,720	58.4%	14,766	52.2%	5,757	66.6%	3,555	65.8%	4,539	71.6%	2,103	53.8%
	2014	9,179	54.9%	4,218	46.9%	1,862	63.6%	1,055	65.2%	1,445	70.6%	599	52.0%
Tetanus	2011-2013	30,723	58.4%	14,763	52.2%	5,760	66.6%	3,554	65.8%	4,542	71.7%	2,104	53.8%
	2014	9,182	54.9%	4,218	46.9%	1,865	63.7%	1,055	65.2%	1,444	70.6%	600	52.1%
Pertussis	2011-2013	28,185	53.6%	13,411	47.4%	5,241	60.6%	3,224	59.7%	4,330	68.3%	1,979	50.6%
	2014	8,619	51.5%	3,910	43.5%	1,734	59.2%	1,003	62.0%	1,393	68.1%	579	50.3%
Hib	2011-2013	44,945	85.4%	22,351	79.0%	7,962	92.1%	5,046	93.4%	5,791	91.4%	3,795	97.0%
	2014	13,881	83.0%	6,678	74.3%	2,684	91.6%	1,512	93.5%	1,861	91.0%	1,146	99.6%
Polio	2011-2013	40,223	76.5%	20,373	72.0%	7,179	83.0%	4,414	81.7%	5,289	83.4%	2,968	75.9%
	2014	12,865	76.9%	6,163	68.5%	2,538	86.7%	1,381	85.4%	1,789	87.4%	994	86.4%
Pneu-C-13	2011-2013	194	0.4%	119	0.4%	30	0.3%	18	0.3%	14	0.2%	13	0.3%
	2014	119	0.7%	65	0.7%	20	0.7%	11	0.7%	17	0.8%	6	0.5%
Measles	2011-2013	41,748	79.4%	20,488	72.4%	7,843	90.7%	4,540	84.1%	5,567	87.8%	3,310	84.6%
	2014	12,623	75.4%	5,842	65.0%	2,610	89.1%	1,355	83.8%	1,818	88.9%	998	86.7%
Mumps	2011-2013	46,107	87.7%	23,126	81.7%	8,268	95.6%	5,059	93.7%	5,859	92.4%	3,795	97.0%
	2014	14,372	85.9%	7,049	78.4%	2,759	94.2%	1,519	93.9%	1,906	93.2%	1,139	99.0%
Rubella	2011-2013	46,104	87.6%	23,124	81.7%	8,268	95.6%	5,059	93.7%	5,858	92.4%	3,795	97.0%
	2014	14,373	85.9%	7,050	78.4%	2,758	94.2%	1,519	93.9%	1,907	93.2%	1,139	99.0%
Varicella	2011-2013	4,830	9.2%	2,372	8.4%	755	8.7%	546	10.1%	680	10.7%	477	12.2%
	2014	2,615	15.6%	1,344	14.9%	416	14.2%	237	14.7%	390	19.1%	228	19.8%
Men-C-C	2011-2013	28,595	54.4%	14,301	50.5%	4,858	56.2%	3,152	58.4%	3,887	61.3%	2,397	61.3%
	2014	12,773	76.3%	6,307	70.1%	2,323	79.3%	1,337	82.7%	1,756	85.8%	1,050	91.2%
Hepatitis B	2011-2013	39,171	74.5%	19,768	69.8%	6,936	80.2%	4,251	78.7%	5,290	83.5%	2,926	74.8%
	2014	12,510	74.8%	6,141	68.3%	2,353	80.3%	1,335	82.6%	1,708	83.5%	973	84.5%
HPV	2014	4,657	57.6%	2,434	55.9%	684	49.6%	521	62.7%	669	68.3%	349	63.1%

Notes

Hib: Haemophilus influenzae type b, Pneu-C-13: pneumococcal conjugate 13 valent, Men-C-C: meningococcal conjugate C, HPV: human papillomavirus. HPV percentages were calculated using a denominator of the *female* population only.

Part B: Providers of Childhood Immunizations

It is important to note, in this part of the report

- the RHA classifications were determined by the provider's location (i.e. the RHA where the provider's practice is located).
- the data is presented by **dose**, rather than by person. That is, all the doses administered by a provider are counted, even if it was the same vaccine being administered to the same person. For that reason, the number of doses administered may be higher than the total population.
- if the number of doses provided was between one and five anywhere in the table, that number and the corresponding percentage was suppressed and marked with an "S".

Vaccine Doses by Provider Type and Provider Location, Ages 0-17

In 2014, a total of 256,892 doses of vaccine were provided to children between birth (age 0) and age 17 years, in Manitoba (Table 13). 49.9% of these doses were provided by public health nurses, 47.5% by physicians, and 2.6% by other providers. The majority of vaccine doses (72.1%) were given by physicians in Winnipeg RHA, but in all other RHAs, the majority of vaccine doses were provided by public health nurses. In fact, in Northern Health Region 99.6% of vaccine doses were administered by public health nurses.

Table 13: Number and percentage of vaccine doses administered by provider type and provider location, for each regional health authority (RHA) in Manitoba, 2014, ages 0-17

Providers	DTaP-IPV	DTaP-IPV-Hib	HB	HAHB	HPV	Men-C-C	MMR	MMRV	Pneu-C-13	Td	TdaP	Var	Total Per Provider
Manitoba													
Public Health Nurse	2,541	19,758	31,384	709	15,594	17,356	2,250	9,834	16,973	59	10,657	1,096	128,211
	32.0%	33.0%	87.8%	17.0%	87.5%	58.4%	37.8%	35.8%	33.0%	10.9%	87.7%	27.5%	49.9%
Physician	5,188	38,390	3,888	3,384	2,009	11,808	3,521	16,890	32,792	319	1,101	2,820	122,110
	65.3%	64.1%	10.9%	81.3%	11.3%	39.7%	59.1%	61.5%	63.7%	59.2%	9.1%	70.8%	47.5%
Other	218	1,760	491	71	222	568	187	718	1,718	161	391	66	6,571
	2.7%	2.9%	1.4%	1.7%	1.2%	1.9%	3.1%	2.6%	3.3%	29.9%	3.2%	1.7%	2.6%
Total	7,947	59,908	35,763	4,164	17,825	29,732	5,958	27,442	51,483	539	12,149	3,982	256,892

Providers	DTaP-IPV	DTaP-IPV-Hib	HB	HAHB	HPV	Men-C-C	MMR	MMRV	Pneu-C-13	Td	TdaP	Var	Total Per Provider
Winnipeg RHA													
Public Health Nurse	143	549	13,877	339	8,177	5,726	172	411	464	18	5,230	76	35,182
	2.9%	1.6%	76.7%	10.1%	79.7%	34.3%	5.0%	2.6%	1.5%	6.4%	80.6%	2.7%	23.7%
Physician	4,551	32,866	3,775	2,965	1,862	10,420	3,112	14,943	28,301	240	1,031	2,710	106,776
	92.8%	93.5%	20.9%	88.2%	18.1%	62.3%	89.8%	93.0%	92.8%	85.4%	15.9%	95.0%	72.1%
Other	212	1,753	451	56	222	567	180	715	1,717	23	225	66	6,187
	4.3%	5.0%	2.5%	1.7%	2.2%	3.4%	5.2%	4.4%	5.6%	8.2%	3.5%	2.3%	4.2%
Total	4,906	35,168	18,103	3,360	10,261	16,713	3,464	16,069	30,482	281	6,486	2,852	148,145
Southern Health Santé Sud													
Public Health Nurse	638	4,961	5,163	116	2,087	3,168	780	2,434	3,776	6	1,746	183	25,058
	76.2%	69.4%	99.6%	54.5%	98.2%	85.6%	84.4%	76.1%	68.3%	6.9%	96.6%	83.6%	80.9%
Physician	197	2,186	11	88	39	530	140	762	1,756	31	27	36	5,803
	23.5%	30.6%	0.2%	41.3%	1.8%	14.3%	15.2%	23.8%	31.7%	35.6%	1.5%	16.4%	18.7%
Other	S	S	8	9	0	S	S	S	0	50	35	0	115
	S	S	0.2%	4.2%	0.0%	S	S	S	0.0%	57.5%	1.9%	0.0%	0.4%
Total	837	7,151	5,182	213	2,126	3,699	924	3,198	5,532	87	1,808	219	30,976
Interlake-Eastern RHA													
Public Health Nurse	351	2,134	3,505	74	1,402	1,823	352	1,060	1,969	7	1,093	120	13,890
	79.6%	69.5%	98.1%	60.2%	95.8%	87.4%	70.3%	77.8%	71.8%	15.2%	95.6%	73.6%	83.1%
Physician	88	936	64	48	61	262	148	302	774	6	12	43	2,744
	20.0%	30.5%	1.8%	39.0%	4.2%	12.6%	29.5%	22.2%	28.2%	13.0%	1.0%	26.4%	16.4%
Other	S	0	S	S	0	0	S	0	0	33	38	0	78
	S	0.0%	S	S	0.0%	0.0%	S	0.0%	0.0%	71.7%	3.3%	0.0%	0.5%
Total	441	3,070	3,572	123	1,463	2,085	501	1,362	2,743	46	1,143	163	16,712
Prairie Mountain Health													
Public Health Nurse	803	5,768	4,982	115	2,320	3,478	526	2,938	4,698	9	1,815	385	27,837
	69.4%	70.6%	99.0%	29.0%	98.6%	85.4%	81.3%	76.9%	70.6%	9.0%	96.0%	92.5%	80.2%
Physician	352	2,399	35	277	34	595	121	882	1,959	42	28	31	6,755
	30.4%	29.4%	0.7%	69.8%	1.4%	14.6%	18.7%	23.1%	29.4%	42.0%	1.5%	7.5%	19.5%
Other	S	S	15	S	0	0	0	0	S	49	48	0	123
	S	S	0.3%	S	0.0%	0.0%	0.0%	0.0%	S	49.0%	2.5%	0.0%	0.4%
Total	1,157	8,170	5,032	397	2,354	4,073	647	3,820	6,658	100	1,891	416	34,715

Providers	DTaP-IPV	DTaP-IPV-Hib	HB	HAHB	HPV	Men-C-C	MMR	MMRV	Pneu-C-13	Td	Tdap	Var	Total Per Provider
Northern Health Region													
Public Health Nurse	606	6,346	3,857	65	1,608	3,161	420	2,991	6,066	19	773	332	26,244
	100.0%	100.0%	99.6%	91.5%	99.2%	100.0%	99.5%	99.9%	100.0%	76.0%	94.2%	100.0%	99.6%
Physician	0	S	S	6	13	S	0	S	S	0	S	0	32
	0.0%	S	S	8.5%	0.8%	S	0.0%	S	S	0.0%	S	0.0%	0.1%
Other	0	0	14	0	0	0	S	S	0	6	45	0	68
	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	S	S	0.0%	24.0%	5.5%	0.0%	0.3%
Total	606	6,349	3,874	71	1,621	3,162	422	2,993	6,068	25	821	332	26,344
Out of Province													
Public Health Nurse	14	68	28	S	6	40	54	17	86	0	9	30	357
	42.4%	40.5%	11.9%	S	6.5%	26.3%	58.7%	26.6%	49.7%	0.0%	50.0%	57.7%	31.2%
Physician	S	0	0	0	0	0	S	0	0	0	0	0	2
	S	0.0%	0.0%	0.0%	0.0%	0.0%	S	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Other	18	100	208	57	86	112	37	47	87	S	9	22	786
	54.5%	59.5%	88.1%	91.9%	93.5%	73.7%	40.2%	73.4%	50.3%	S	50.0%	42.3%	68.6%
Total	33	168	236	62	92	152	92	64	173	3	18	52	1145
<p>DTaP-IPV= diphtheria, tetanus, pertussis, and polio (combined vaccine); DTaP-IPV-Hib = diphtheria, tetanus, pertussis, polio, and Haemophilus influenzae type b (combined vaccine); HAHB = hepatitis A and hepatitis B (combined vaccine); HB = hepatitis B (vaccine and/or immunogen); HPV = human papillomavirus (vaccine and/or immunogen); Men-C-C = meningococcal conjugate C vaccine (vaccine and/or immunogen); MMR = measles, mumps, and rubella (combined vaccine); MMRV = measles, mumps, rubella, and varicella (combined vaccine); Pneu-C-13 = pneumococcal conjugate 13 valent vaccine; Td = tetanus and diphtheria (combined vaccine); Tdap = tetanus, diphtheria, and pertussis (combined vaccine); V = varicella (vaccine and/or immunogen);</p> <p>Other providers includes: publicly funded health facilities, private health care providers, occupational health workers, and unknown providers.</p> <p>“S” represents a value from one (1) to five (5) that has been suppressed.</p>													

Part C: Adulthood Immunizations

1. Immunizations at Ages 18+

1.1 Immunizations in Manitoba, Ages 18+

Table 14: Recommended Immunization Schedule, 2014, ages 18+

Vaccine	Age
	All Adults 18+
Tdap Tetanus, diphtheria, pertussis	•
Td Tetanus, diphtheria	◆ Every 10 years

• Adults due for a Td booster and have never previously received an acellular pertussis vaccine; OR primary caregivers of newborn infants up to 6 months of age who have never previously received an acellular pertussis vaccine regardless of when their last Td vaccine was given.

◆ A single dose given with one needle.

For people aged 18 years and older, Manitoba's 2014 universal adult immunization program boosts protection against the bacterial pathogens tetanus and diphtheria. This reflects the recommendation for a booster dose of tetanus and diphtheria every 10 years. Starting in 2012, some people aged 18 years and older were also eligible for a one time dose of acellular pertussis vaccine if:

- 1) they did not receive an *acellular* pertussis vaccine in adolescence or adulthood and they were due for their Td booster, or
- 2) they were the primary caregivers of newborn infants and did not receive an *acellular* pertussis vaccine in adolescence or adulthood, regardless of when their last Td vaccine was given.

The immunization status of people aged 18 years and older in 2014 represents those people who were born in or before 1996.

- Over the age of 17 years, an individual should have received at least one dose of tetanus within the past *10 years*.
- Over the age of 17 years, an individual should have received at least one dose of diphtheria within the past *10 years*.
- Over the age of 17 years, an individual should have received at least one dose of *acellular* pertussis since turning seven years old.

For an overview of immunogens required by people aged 18 years and older, refer to Table 2. It is important to keep in mind, for this chapter we only consider Table 2; we are **not** also considering whether an individual is complete for age for the immunogens in Table 1. For this analysis, doses of pertussis vaccine administered after age seven were assumed to contain acellular pertussis immunogen. Thus, adults who received at least one dose of pertussis vaccine since their seventh birthday were counted in the cumulative percentage of acellular pertussis.

This chapter includes immunizations recommended for *all people aged 18 years and older* (including older adults aged 65 years and older). Tetanus, diphtheria, and pertussis are part of the adult immunization schedule for all people aged 18 years and older. Rather than split this information between an adult (ages 18-64 years) chapter and an older adults (ages 65+ years) chapter, it has been included in *one chapter*, to make viewing the material easier.

Figure 48 presents the percentage of people aged 18 years or older who received at least one dose of the particular immunogen *in 2014*, and the cumulative percentage of people who had received at least one dose of the particular immunogen, as according to Table 2 in 2014. For example, for acellular pertussis, the 2014 percentage would be: the percentage of people aged 18 years and older who received at least one dose of acellular pertussis immunogen in 2014. The cumulative percentage would be: the proportion of people aged 18 years and older who received at least one dose of acellular pertussis immunogen since their seventh birthday.

The tetanus and diphtheria immunogens were most commonly given together (as one of the combined vaccines, Td or Tdap). As a result, the percentages of people who received tetanus and diphtheria in 2014 were the same (3.8%); these immunogens also had very similar cumulative percentages (37.7% and 37.6%, respectively).

The rates for pertussis in 2014 were slightly lower than those of tetanus and diphtheria (2.3%); this is likely due to the vaccine used to provide the immunogen. The cumulative percentage of acellular pertussis (16.8%) was approximately one-half the cumulative percentages of tetanus and diphtheria. This difference in rates is the result of the publicly-funded acellular pertussis immunization programs being introduced fairly recently: in 2003 for adolescents (switched from giving just Td to giving Tdap between ages 14 to 16 years), and in 2012 for adults.

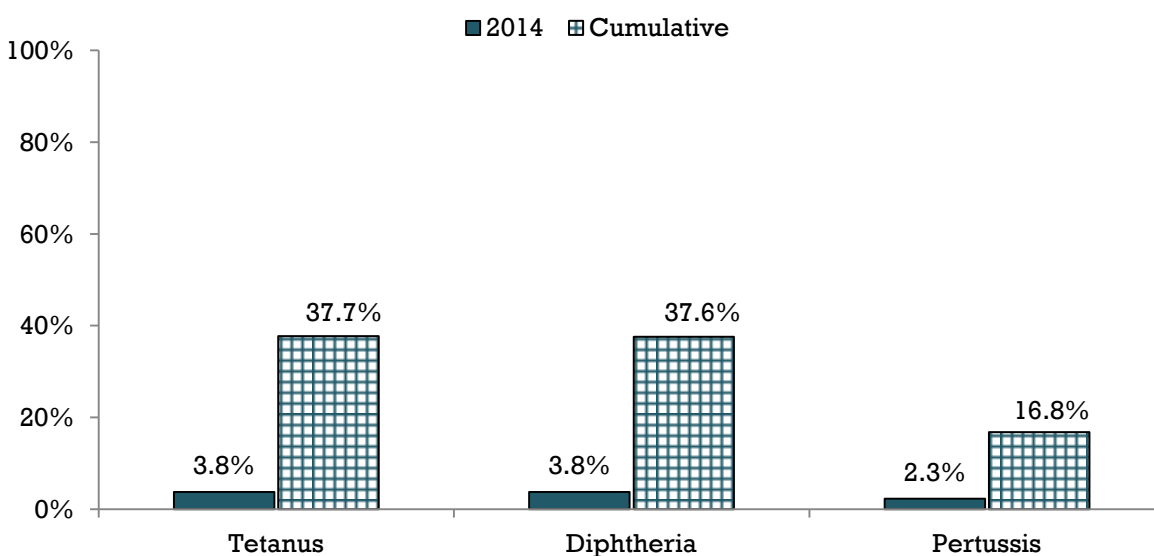


Figure 48: Percentage of people who received at least one dose of tetanus, diphtheria, and pertussis in 2014, compared to the cumulative percentage of people who received at least one dose of tetanus (diphtheria) within the past 10 years, and the cumulative percentage of people who received at least one dose of pertussis since age seven, Manitoba, ages 18+

1.2 Immunizations by RHA, Ages 18+

This section considers whether a person received the particular immunogen, regardless of whether they received all of the immunogens recommended for people aged 18 years and older.

Tetanus, Diphtheria, and Pertussis

Figure 49 shows the percentage of people over the age of 18 who received at least one dose of tetanus immunogen in 2014 compared to the cumulative percentage of people who received at least one dose of tetanus immunogen within the past 10 years, in each RHA.

In Manitoba, 3.8% of people over the age of 18 received at least one dose of the tetanus immunogen in 2014 (commonly administered as part of one of the combined vaccines, Td or Tdap). In total, 37.7% of people over the age of 18 had received at least one dose of the tetanus immunogen, within the past 10 years. Northern Health Region had the highest percentage of people over the age of 18 who received at least one dose of the tetanus immunogen in 2014 (5.4%) and the highest percentage of people over the age of 18 who received at least one dose of the immunogen in the past 10 years (53.6%). Winnipeg RHA and Prairie Mountain Health had the lowest percentage of people who received at least one dose of the tetanus immunogen in 2014 (3.5%), and Winnipeg RHA had the lowest percentage of people over the age of 18 who had received at least one dose of the tetanus immunogen within the past 10 years (32.9%). Td (and/or Tdap) is given in many different settings (e.g. hospitals that do not have MIMS access), so it is possible not all of the doses were captured.

A very similar trend was observed for the percentage of people who received the diphtheria immunogen (Figure 50). This is due to these immunogens being most commonly given as part of a combined vaccine.

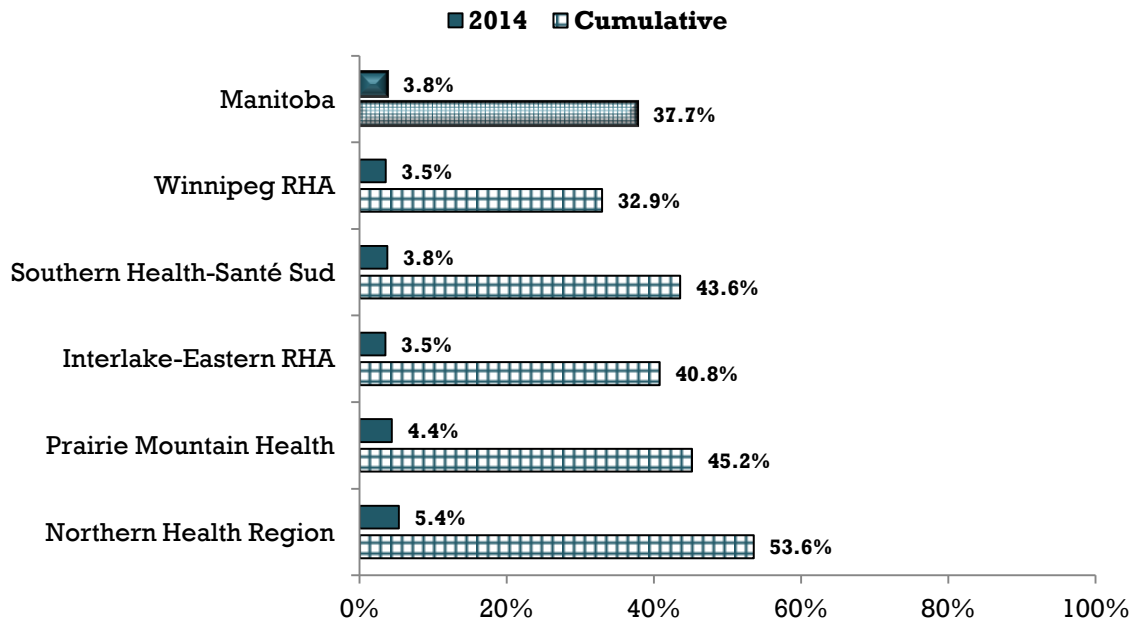


Figure 49: Percentage of people who received at least one dose of tetanus in 2014, compared to the cumulative percentage of people who received at least one dose of tetanus within the past 10 years, by regional health authority (RHA), Manitoba, ages 18+

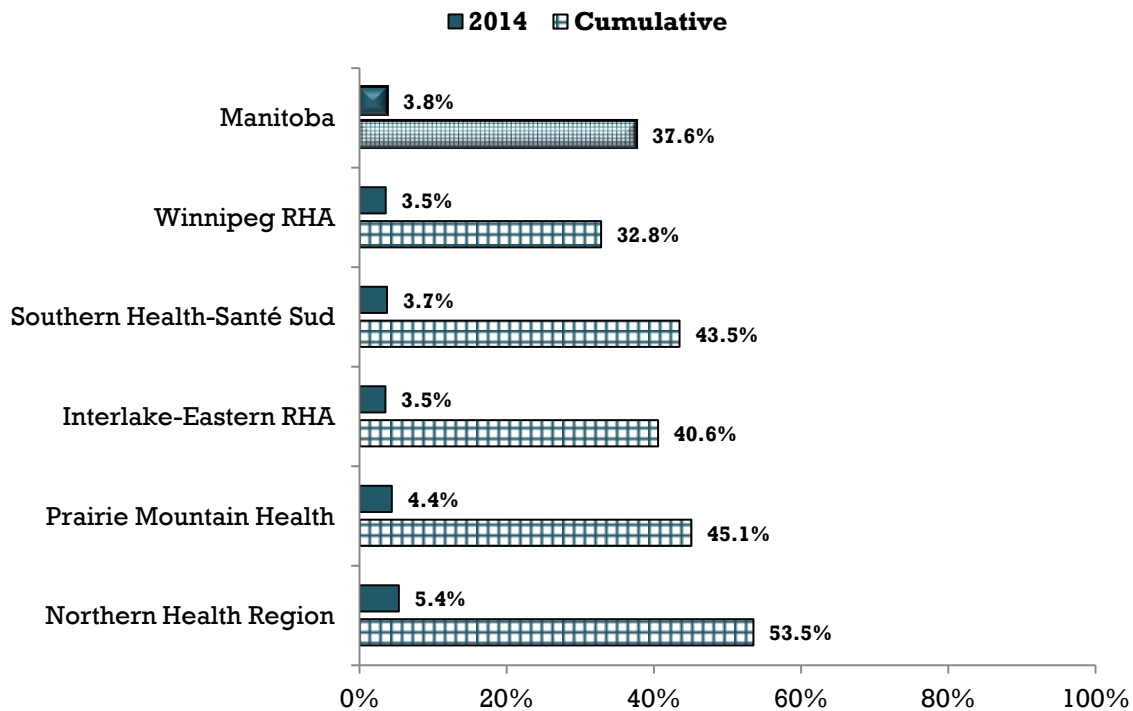


Figure 50: Percentage of people who received at least one dose of diphtheria in 2014, compared to the cumulative percentage of people who received at least one dose of tetanus within the past 10 years, by regional health authority (RHA), Manitoba, ages 18+

Figure 51 shows the percentage of people over the age of 18 who received at least one dose of the pertussis immunogen in 2014 compared to the cumulative percentage of people who received at least one dose of pertussis immunogen since turning seven-years-old, in each RHA.

In Manitoba, 2.3% of people over the age of 18 received at least one dose of the acellular pertussis immunogen in 2014. In total, 16.8% of people over the age of 18 received at least one dose of the pertussis immunogen since age seven years. Northern Health Region had the highest percentage of people over the age of 18 who received at least one dose of the acellular pertussis immunogen in 2014 (4.6%) and the highest percentage of people over the age of 18 who received at least one dose of the acellular pertussis immunogen since age seven years (29.1%).

Interlake – Eastern RHA had the lowest percentage of people who received at least one dose of the acellular pertussis immunogen in 2014 (1.9%), and Winnipeg RHA had the lowest percentage of people over the age of 18 who received at least one dose of acellular pertussis immunogen since age seven years (14.4%).

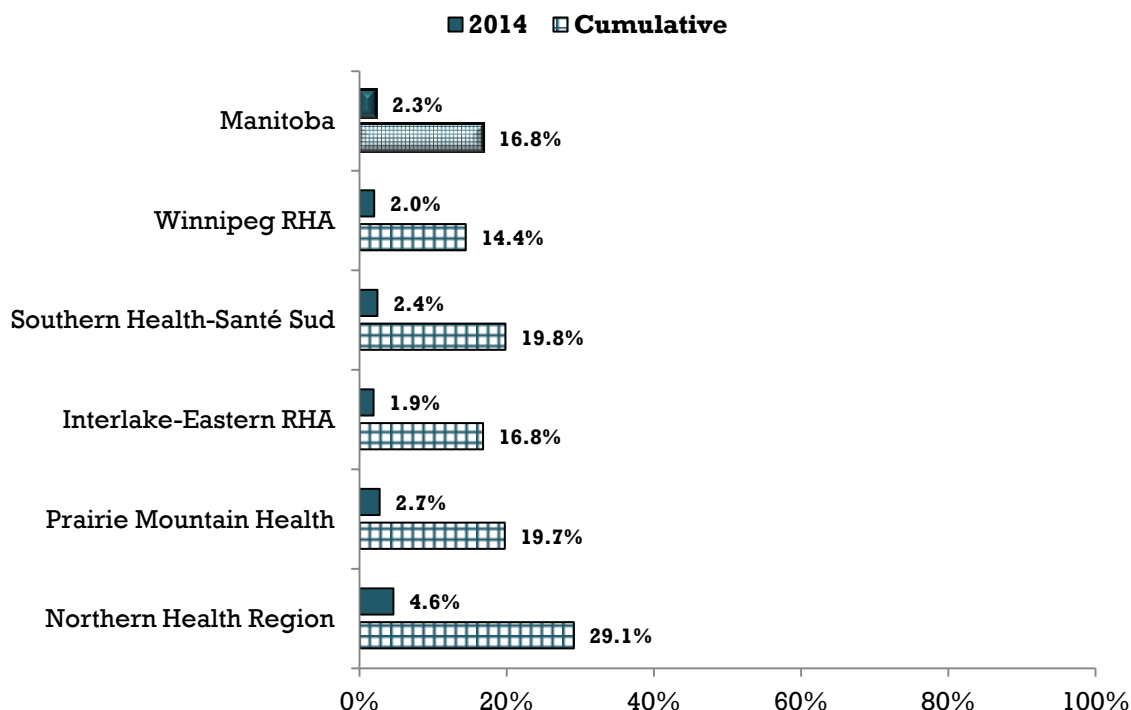


Figure 51: Percentage of people who received at least one dose of pertussis in 2014, compared to the cumulative percentage of people who received at least one dose of pertussis since age seven years, by regional health authority (RHA), Manitoba, ages 18+

In Manitoba, almost **4 out of 10** people aged 18 years and older had received at least one dose of **tetanus** within the past 10 years (the same trend is apparent for **diphtheria**).

Almost **2 out of 10** people aged 18 years and older received at least one dose of **pertussis** since turning seven-years-old.

2. Immunizations for Ages 65+

2.1 Immunizations in Manitoba, Ages 65+

Table 15: Recommended Immunization Schedule, 2014, ages 65+

Vaccine	Age
	All older adults 65 +
Pneu-P-23 Pneumococcal polysaccharide	♦ Lifetime dose

For people aged 65 years and older, Manitoba's 2014 universal adult immunization program provides protection against 23 types of *streptococcus pneumoniae* (pneumococcal bacteria) that cause the most severe pneumococcal infections.

The immunization status of adults aged 65 years and older in 2014 represents those people who were born in or before 1949. An individual aged 65 years or older should have received at least one dose of Pneu-P-23 within their *lifetime*, even if it was received before turning 65. For an overview of immunogens required to be up-to-date as an adult, refer to Table 2.

This chapter only includes information on those vaccines recommended for people aged 65 years and older, that is Pneu-P-23. It does not include information on those immunogens recommended for all adults aged 18 years and older. Information on adult tetanus, diphtheria, and pertussis immunogens are included in the previous, "Ages 18+", chapter.

2.2 Immunizations by RHA, Ages 65+

This section considers whether a person received the particular immunogen, regardless of whether they received all of the immunogens recommended for people over the age of 65.

Pneu-P-23

Figure 52 shows the percentage of people over the age of 65 who received at least one dose of Pneu-P-23 vaccine in 2014, compared to the cumulative percentage of people who received at least one dose of Pneu-P-23 vaccine within their lifetime, in each RHA.

In Manitoba, 4.5% of people over the age of 65 received at least one dose of the Pneu-P-23 vaccine in 2014. In total, 70.0% of people over the age of 65 received at least one dose of Pneu-P-23 in their lifetime. The percentage of people over the age of 65 who received at least one dose of Pneu-P-23 in 2014 was very similar across all of the RHAs but, Interlake-Eastern had the highest percentage with 4.8% of older adults receiving the vaccine in 2014. Winnipeg RHA had the highest percentage of people over the age of 65 who received at least one dose of Pneu-P-23 in their lifetime (71.7%), while Prairie Mountain Health was a close second (71.5%).

Northern Health Region had the lowest percentage of people who received at least one dose of Pneu-P-23 in 2014 (3.7%), and Southern Health – Santé Sud had the lowest percentage of people over the age of 65 who had received at least one dose of the Pneu-P-23 within their lifetime (64.0%).

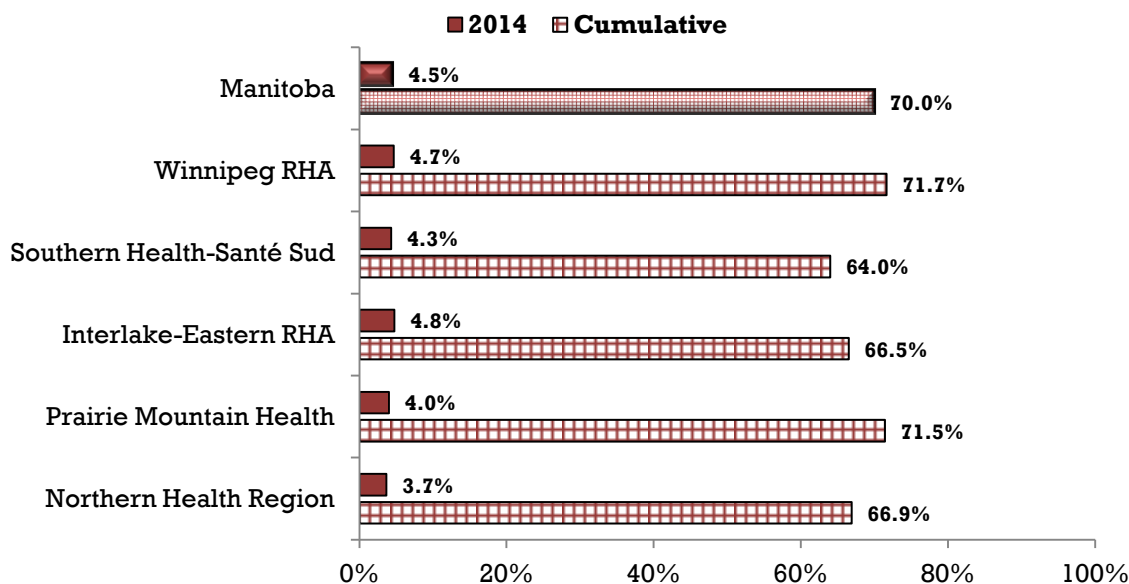


Figure 52: Percentage of people who received at least one dose of pneumococcal polysaccharide vaccine (Pneu-P-23) in 2014, compared to the cumulative percentage of people who received at least one dose of Pneu-P-23 within their lifetime, by regional health authority (RHA), Manitoba, ages 65+

In Manitoba, 7 out of 10 people aged 65 years and older received at least one dose of the Pneu-P-23 vaccine in their lifetime.

Part D: Providers of Adulthood Immunizations

It is important to note in this part of the report, that:

- the RHA classifications were determined by the provider's location (i.e. the RHA where the provider's practice is located).
- the data is presented by **dose**, rather than by person. That is, all the doses administered by a provider are counted, even if it was the same vaccine being administered to the same person. For that reason, it is possible for the number of doses administered to be higher than the total population in that age group.
- if the number of doses provided was between one and five anywhere in the table, that number and the corresponding percentage was suppressed and marked with an "S".

1. Vaccine Doses by Provider Type and Provider Location, Ages 18-64

In 2014, a total of 33,298 doses of vaccine were provided to people from 18 to 64 years of age in Manitoba (Table 16). 49.9% of these doses were provided by physicians, 26.9% by public health nurses, and 23.2% by other providers. The majority of vaccine doses were provided by public health nurses in Northern Health Region (52.5%), by physicians in Winnipeg RHA (69.8%), and by other providers in Southern Health – Santé Sud (43.3%), Interlake-Eastern RHA (49.1%), and Prairie Mountain Health (38.2%).

Table 16: Number and percentage of vaccine doses administered by provider type and provider location, for each regional health authority (RHA) in Manitoba, 2014, ages 18-64

Providers	Pneu-P-23	Td	Tdap	Total Per Provider
Manitoba				
Public Health Nurse	772 29.6%	1,840 14.8%	6,349 34.8%	8,961 26.9%
Physician	1,549 59.4%	7,493 60.3%	7,571 41.4%	16,613 49.9%
Other	286 11.0%	3,089 24.9%	4,349 23.8%	7,724 23.2%
Total	2,607	12,422	18,269	33,298
Winnipeg RHA				
Public Health Nurse	267 14.8%	1,187 14.6%	2,534 26.3%	3,988 20.4%
Physician	1,298 71.8%	6,100 75.1%	6,255 64.9%	13,653 69.8%
Other	242 13.4%	836 10.3%	843 8.8%	1,921 9.8%
Total	1,807	8,123	9,632	19,562

Providers	Pneu-P-23	Td	Tdap	Total Per Provider
Southern Health-Santé Sud				
Public Health Nurse	40	89	871	1,000
	34.2%	7.5%	38.6%	28.1%
Physician	73	498	444	1,015
	62.4%	42.1%	19.7%	28.5%
Other	S	597	940	1,541
	S	50.4%	41.7%	43.3%
Total	117	1,184	2,255	3,556
Interlake-Eastern RHA				
Public Health Nurse	151	136	504	791
	66.5%	14.9%	41.5%	33.6%
Physician	62	214	131	407
	27.3%	23.4%	10.8%	17.3%
Other	14	565	578	1,157
	6.2%	61.7%	47.7%	49.1%
Total	227	915	1,213	2,355
Prairie Mountain Health				
Public Health Nurse	192	160	1,444	1,796
	59.8%	8.5%	48.3%	34.6%
Physician	108	670	634	1,412
	33.6%	35.7%	21.2%	27.2%
Other	21	1,045	913	1,979
	6.5%	55.7%	30.5%	38.2%
Total	321	1,875	2,991	5,187
Northern Health Region				
Public Health Nurse	122	268	996	1,386
	90.4%	82.5%	45.7%	52.5%
Physician	8	11	107	126
	5.9%	3.4%	4.9%	4.8%
Other	S	46	1,075	1,126
	S	14.2%	49.4%	42.7%
Total	135	325	2,178	2,638
Out of Province				
Public Health Nurse	S	S	31	34
	S	S	18.9%	14.8%
Physician	0	S	S	S
	0.0%	S	S	S
Other	36	22	132	190
	94.7%	81.5%	80.5%	83.0%
Total	38	27	164	229
<p>Pneu-P-23 = pneumococcal polysaccharide vaccine; Td = tetanus and diphtheria (combined vaccine); Tdap = tetanus, diphtheria, and pertussis (combined vaccine);</p> <p>Other providers includes: publicly funded health facilities, private health care providers, occupational health workers, and unknown providers.</p> <p>“S” represents a value from one (1) to five (5) that has been suppressed.</p>				

2. Vaccine Doses by Provider Type and Provider Location, Ages 65+

In 2014, 14,683 doses of vaccine were provided to people 65 years of age and older in Manitoba (Table 17). 58.1% of these doses were provided by physicians, 29.9% by public health nurses, and 12.1% by other providers. Public health nurses administered the majority of doses in Interlake-Eastern RHA (55.0%), Prairie Mountain Health (43.0%), and Northern Health Region (69.0%); physicians administered the majority of vaccine doses in Winnipeg RHA (73.1%), and Southern Health – Santé Sud (43.4%).

Table 17: Number and percentage of vaccine doses administered by provider type and provider location, for each regional health authority (RHA) in Manitoba, 2014, ages 65+

Providers	Pneu-P-23	Td	Tdap	Total Per Provider
Manitoba				
Public Health Nurse	3,164	345	876	4,385
	35.5%	13.2%	27.7%	29.9%
Physician	5,279	1,644	1,601	8,524
	59.2%	62.9%	50.7%	58.1%
Other	468	626	680	1,774
	5.3%	23.9%	21.5%	12.1%
Total	8,911	2,615	3,157	14,683
Winnipeg RHA				
Public Health Nurse	1,176	256	527	1,959
	20.3%	15.2%	29.3%	21.1%
Physician	4,275	1,312	1,197	6,784
	73.7%	78.1%	66.5%	73.1%
Other	347	111	77	535
	6.0%	6.6%	4.3%	5.8%
Total	5,798	1,679	1,801	9,278
Southern Health-Santé Sud				
Public Health Nurse	405	12	76	493
	44.2%	5.5%	22.5%	33.5%
Physician	464	85	91	640
	50.6%	39.0%	26.9%	43.4%
Other	48	121	171	340
	5.2%	55.5%	50.6%	23.1%
Total	917	218	338	1,473
Interlake-Eastern RHA				
Public Health Nurse	562	33	59	654
	74.4%	15.3%	26.9%	55.0%
Physician	168	48	17	233
	22.3%	22.2%	7.8%	19.6%
Other	25	135	143	303
	3.3%	62.5%	65.3%	25.5%
Total	755	216	219	1,190

Providers	Pneu-P-23	Td	Tdap	Total Per Provider
Prairie Mountain Health				
Public Health Nurse	838	20	158	1,016
	67.4%	4.3%	24.3%	43.0%
Physician	359	198	281	838
	28.9%	42.3%	43.3%	35.5%
Other	47	250	210	507
	3.8%	53.4%	32.4%	21.5%
Total	1,244	468	649	2361
Northern Health Region				
Public Health Nurse	183	24	56	263
	92.9%	70.6%	37.3%	69.0%
Physician	13	S	15	29
	6.6%	S	10.0%	7.6%
Other	S	9	79	89
	S	26.5%	52.7%	23.4%
Total	197	34	150	381
Out of Province				
Public Health Nurse	S	0	7	11
	S	0.0%	26.9%	15.5%
Physician	S	S	0	S
	S	S	0.0%	S
Other	32	S	19	55
	82.1%	S	73.1%	77.5%
Total	39	6	26	71
<p>Pneu-P-23 = pneumococcal polysaccharide vaccine; Td = tetanus and diphtheria (combined vaccine); Tdap = tetanus, diphtheria, and pertussis (combined vaccine);</p> <p>Other providers includes: publicly funded health facilities, private health care providers, occupational health workers, and unknown providers.</p> <p>“S” represents a value from one (1) to five (5) that has been suppressed.</p>				

Conclusion

This report provided information on the number and percentage of people immunized by age category and by region of residence, and on the number and percentage of vaccine doses administered by: age category, provider type, and provider location.

Overall, childhood immunization rates remained relatively stable as seen by comparing the 2014 completion rates to the 3-year average rates. Of note, there have been small and continuous declines in childhood immunization rates in Southern Health-Santé Sud for several years. At ages 1 and 2, Southern Health-Santé Sud experienced noticeably lower rates than the other RHAs. Additionally, at ages 7 and 17, Winnipeg RHA experienced lower rates than the other RHAs, with a decline in complete for age overall coverage from age 1 year through age 7 years. There continues to be variation in completion rates among the different age categories and immunogens in *all* RHAs, demonstrating there is potential to improve the immunization coverage of all Manitobans.

This report included an analysis of adult immunizations for the first time. Since MIMS did not capture adult immunizations until 2000, it is possible the adult immunization rates were underestimated. However, the data are useful to monitor trends in the uptake of important adulthood immunizations. Another addition to this report was the analysis of the immunization provider data which examined who administered both childhood and adulthood immunizations in 2014, by dose. This data could be useful for inventory purposes and to monitor trends which may be affected by changes in the provincial immunization program.

Immunization rates can be influenced by a variety of factors, including: ease of access to immunization information and services, and public awareness and attitudes toward immunization. The publicly funded immunization schedule continues to expand, increasing the complexity of delivering immunization services. This report did not explore the reasons behind the differences in immunization uptake, but can be used by providers and programs to identify populations where immunization uptake was lower, and where further exploration of factors affecting uptake rates and/or targeted interventions may be of benefit.

Appendix A: Manitoba's Recommended Immunization Schedule

Manitoba's Recommended Immunization Schedule for 2014

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) *	♦	♦		♦		
Rotavirus	♦	♦				
Measles, Mumps, Rubella, Varicella (MMRV)				♦		♦
Meningococcal Conjugate C (Men-C-C)				♦		
Diphtheria, Tetanus, Pertussis, Polio (DTaP-IPV)						♦
Influenza (Flu)	Universal seasonal influenza program. **					

♦ A single dose given with one needle.

*Children with high-risk medical conditions and those living in First Nations communities should be immunized at 2, 4, 6 and 18 months.

**Influenza vaccine is offered to all Manitobans. The seasonal influenza program may vary each year. For current information on the seasonal influenza vaccine, visit www.gov.mb.ca/health/flu/index.html

School Immunization Schedule

Vaccine	Grade 4	Grade 6	14-16 years
Meningococcal Conjugate C (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.

**Influenza vaccine is offered to all Manitobans. The seasonal influenza program may vary each year. For current information on the seasonal influenza vaccine, visit www.gov.mb.ca/health/flu/index.html

Immunization Schedule for Adults

Vaccine	18-26 years	All adults	65 years
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.

* Adults who are due for a Td booster and have never previously received an acellular pertussis vaccine; OR primary caregivers of newborn infants up to 6 months of age 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. The seasonal influenza program may vary each year. For current information on the seasonal influenza vaccine, visit www.gov.mb.ca/health/flu/index.html

Appendix B: Doses required for children to be considered complete for age, by immunogen, 2011-2013

Age (years)	Diphtheria (D)	Tetanus (T)	Pertussis (aP)	Polio (IPV)	Haemophilus influenzae type b (Hib)	Pneumococcal Conjugate 13 valent (Pneu-C-13)	Measles (M)	Mumps (M)	Rubella (R)	Varicella (V)	Meningococcal Conjugate C (Men-C-C)	Hepatitis B (HB)	HPV (females only)
2012 & 2013													
1	3	3	3	2	3	2							
2	4	4	4	3	4	3	1	1	1	1	1		
7	5	5	5	4			2	1	1	1			
11	5	5	5	4			2	1	1	1	1	3	
17	6	6	6	4			2	1	1			3	
2011													
1	3	3	3	2	3	3							
2	4	4	4	3	4	4	1	1	1	1	1		
7	5	5	5	4	4		2	1	1	1			
11	5	5	5	4			2	1	1		1	3	
17	6	6	6	4			2	1	1			3	