

Vaccine Preventable Disease Monitoring Report Measles, 2015 and 2016

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Purpose:

The Saskatchewan Ministry of Health's Population Health Branch provides routine surveillance of notifiable diseases at the provincial and regional health authority (RHA), First Nations and Inuit Health Branch (FNIHB) and Northern Inter-Tribal Health Authority (NITHA) levels.

This report presents the most recent data for reportable communicable diseases and vaccine coverage rates as collected by the Integrated Public Health Information System (iPHIS) and Panorama, respectively.

Under *The Public Health Act, 1994* and the accompanying Disease Control Regulations, local medical health officers (MHOs) must report Categories I and II Communicable Diseases, as well as any communicable disease outbreaks to the Chief and Deputy Chief Medical Health Officers. Measles is a Category I disease.

Report Features:

Background
Epidemiological Summary
Surveillance Case Definition
Case Counts by Year
Case Characteristics
Vaccine Coverage by RHA

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Background

Measles is an acute, highly communicable disease with early symptoms of fever, cough, runny nose, mild eye inflammation and diarrhea that lasts two to four days (range one to seven days). Koplik's spots (small, red spots with bluish-white spots in the centre) may occur opposite to the second molar teeth. A few days later, a characteristic red blotchy rash appears beginning behind the ear and on the face, gradually spreading down to the trunk and then the extremities (see image, page 4).

The time from exposure to early symptoms such as fever (incubation period) averages 10-12 days. The time from exposure to start of the rash is about 14 days (seven to 18 days).

Immunization

The Saskatchewan Routine Immunization Schedule for Infants, Children and Adolescents recommends two doses of measles containing vaccine as part of the routine childhood vaccination schedule.

The first dose is recommended at one year (12 months) and the second dose at 18 months of age.

Approximately 95% of people will be protected against measles after one dose of vaccine. After two doses, protection increases to 99%.

Surveillance

Under *The Public Health Act, 1994*, Saskatchewan health care providers are required to report cases of measles to the local medical health officer (MHO) who then reports the case to the Chief and Deputy Chief Medical Health Officers using the case definition in the Saskatchewan Communicable Disease Manual.

Notifiable diseases may be undetected, therefore underreported, due to a number of factors including lack of contact with the health care system or inability of laboratory tests to identify the organism. Some communicable diseases occur rarely and therefore, rates are based on small numbers of cases which may fluctuate dramatically over time. In these cases, year to year comparisons should be interpreted with caution.

Measles virus is a member of the family *Paramyxovirus*, genus *Morbillivirus*.

Measles was declared eliminated in Canada in 1998. In 2002, the World Health Organization (WHO) declared measles eliminated from the Americas (North America, Central America and South America). Measles virus is still circulating in the rest of the world.

Measles continues to be imported into Canada by infected people travelling to Canada or by susceptible people exposed when travelling to areas where measles cases are still common or experiencing measles outbreaks. This can lead to spread in Canada, particularly in those who are unvaccinated or under vaccinated.

Immunization coverage rates measure the numbers of individuals who have received the appropriate doses by a specific date/age and are a reliable indicator of the preventative measures to control the spread of disease.

A very high level (92% -95%) of immunity in the population is required to interrupt/stop measles transmission.

Surveillance case definitions ensure uniform reporting to allow comparability of surveillance data. The definitions are not intended to be used for clinical or laboratory diagnosis or management of cases.

Measles molecular epidemiology (genotyping) may be used to establish whether connections exist between concurrent measles cases or outbreaks and/or to indicate possible sources of importations.

EPIDEMIOLOGY AND VACCINE COVERAGE SUMMARIES

Measles in Saskatchewan: 2015

- No cases of measles were reported.
- No cases were reported hospitalized.

Measles in Saskatchewan: 2011 to 2015

- 25 cases of measles were reported province-wide from Five Hills, Prairie North, Prince Albert Parkland, Regina Qu'Appelle, Saskatoon, and Sun Country health regions.
- The median† age was 19 years.
- One case was reported to be hospitalized, 16 had unknown hospitalization status.
- Of the 13 cases aged less than 20 years, all were unvaccinated, with five cases being too young for the vaccination.
- Of the 12 cases aged 20 years and older, six were unimmunized, three had one and three had two doses of vaccine.
- Transmission is believed to have occurred in the province in at least 13 instances either by household contact, social contact or contact with a case with international travel history.
- Among the three cases who acquired measles internationally, travel was reported to Europe or the Philippines during the incubation period.
- Genotyping was available for 12 of the cases. Of those, three were B3, five were D8 and four were D9. Genotyping is an important tool for outbreak investigation.

†The median age divides a population into two equal groups; that is, half the people are younger than this age and half are older.

Table 1: Measles case counts by year

	2016*	2015	2014	2013	2012	2011	Total
Saskatchewan	0	0	16	1	2	6	25
Canada	N/A	191	419	82	9	752	1,453

*preliminary count

N/A = not available

Table 2: Measles case characteristics, 2011-2015

Characteristics of measles cases - Saskatchewan 2011 - 2015		Cases	Percent of Cases
Total		25	100
Sex	Male	12	48
	Female	13	52
	Unknown	0	0
Age	Less than 1 year	4	16
	1 - 4 years	3	12
	5 - 19 years	6	24
	20 - 49 years	12	48
	50 years and over	0	0
Hospitalized	Yes	1	4
	No	8	32
	Unknown	16	64
Immunization status for measles vaccine	2 doses	3	12
	1 dose	4	16
	0 doses	13	52
	Too young	5	20
	Unknown	0	0
Source	International	3	12
	Philippines	2	
	Europe	1	
	Canada	0	0
	Saskatchewan	22	88
Provincial source (n = 22)	Domestic Travel	0	0
	Epidemiologically-linked to travel case	10	45
	Epidemiologically-linked to case with unknown source	5	23
	No identified source	7	32
Genotype**	B3	3	12
	D8	5	20
	D9	4	16
	Unknown	13	52

**Laboratory analyses can identify different genotypes of measles which may help identify whether the virus was imported or possibly related to other cases.

Table 3: Measles coverage for Saskatchewan by year

Age	Doses	2016	2015
13 months	1	58.5%	59.5%
18 months	1	84.4%	82.9%
19 months	2	46.5%	46.5%
24 months	1	88.7%	88.0%
	2	76.3%	73.4%
5 years	1	93.4%	91.4%
	2	87.9%	84.7%
7 years	2	90.2%	88.7%
13 years	2	93.3%	92.8%
15 years	2	94.8%	94.1%
17 years	2	94.6%	95.0%

VACCINE COVERAGE SUMMARIES

Table 4: Measles Vaccine Coverage by Health Region, 2016

Health Region, by Peer Group	Vaccine coverage (% immunized), by age and dose										
	13 months	18 months	19 months	24 months		5 years		7 years	13 years	15 years	17 years
	1 dose	1 dose	2 doses	1 dose	2 doses	1 dose	2 doses	2 doses	2 doses	2 doses	2 doses
Saskatchewan	58.5	84.4	46.5	88.7	76.3	93.4	87.9	90.2	93.3	94.8	94.6
Peer Group A											
Regina Qu'Appelle	52.8	82.0	43.9	87.1	75.1	93.5	87.2	90.3	93.6	95.7	94.0
Saskatoon	60.2	86.9	48.2	90.8	79.9	93.3	88.0	89.9	93.0	95.3	94.6
Peer Group D											
Cypress	64.0	87.4	56.4	93.7	88.0	94.4	92.3	92.6	95.0	95.0	96.2
Five Hills	69.5	88.5	48.7	88.2	75.7	93.1	86.3	91.3	94.3	95.3	95.9
Heartland	64.0	89.6	53.3	91.9	80.8	96.9	92.2	93.6	93.9	94.4	96.7
Kelsey Trail	69.9	86.9	53.3	90.2	77.2	92.4	87.9	91.6	95.7	95.6	95.2
Sun Country	75.1	92.3	65.5	93.7	88.7	96.8	94.2	94.0	96.9	98.2	97.4
Sunrise	65.4	82.1	49.0	86.8	73.1	94.5	89.0	90.6	94.7	96.1	96.7
Peer Group F											
Athabasca Health Authority	61.1	94.4	31.6	91.4	82.9	96.9	96.9	97.8	87.2	90.0	92.2
Keewatin Yatthé	41.9	75.2	17.3	83.9	56.5	92.6	87.3	88.6	96.6	94.7	94.2
Mamawetan Churchill River	45.7	78.4	28.3	86.2	64.1	94.0	87.5	89.5	87.5	91.2	86.6
Peer Group H											
Prairie North	50.5	77.6	38.6	85.6	68.7	89.0	82.8	87.3	89.6	91.2	94.4
Prince Albert Parkland	49.6	77.3	35.6	81.1	60.8	92.2	86.0	86.7	90.8	90.9	93.1

Table 5: Measles Vaccine Coverage by Health Region, 2015

Health Region, by Peer Group	Vaccine coverage (% immunized), by age and dose										
	13 months	18 months	19 months	24 months		5 years		7 years	13 years	15 years	17 years
	1 dose	1 dose	2 doses	1 dose	2 doses	1 dose	2 doses	2 doses	2 doses	2 doses	2 doses
Saskatchewan	59.5	82.9	46.5	88.0	73.4	91.4	84.7	88.7	92.8	94.1	95.0
Peer Group A											
Regina Qu'Appelle	61.5	82.9	51.8	87.4	73.1	90.3	82.8	88.4	93.0	94.4	94.4
Saskatoon	60.1	83.9	46.9	88.8	75.6	90.4	82.9	88.3	92.3	94.3	95.4
Peer Group D											
Cypress	69.3	88.6	56.4	91.3	78.2	95.2	90.3	92.1	94.8	95.2	95.6
Five Hills	60.8	82.3	42.6	88.7	70.1	92.1	85.7	92.5	95.2	93.5	96.8
Heartland	61.5	86.8	46.0	91.9	80.1	95.9	91.9	93.8	93.9	95.6	96.0
Kelsey Trail	54.5	84.3	39.5	87.7	72.6	95.3	90.8	89.6	96.1	93.8	94.5
Sun Country	71.8	91.1	59.9	93.6	84.5	97.6	94.4	91.5	96.4	96.5	96.7
Sunrise	58.1	83.9	44.6	87.5	73.8	91.8	86.0	88.1	93.0	94.8	96.1
Peer Group F											
Athabasca Health Authority	79.4	85.3	58.1	94.1	82.4	93.6	91.5	94.7	81.6	92.5	97.0
Keewatin Yatthé	45.0	74.7	23.0	86.1	60.0	88.3	86.2	88.3	95.0	88.4	94.5
Mamawetan Churchill River	45.5	80.1	31.3	87.0	67.8	92.8	86.0	89.3	94.0	91.0	91.6
Peer Group H											
Prairie North	53.9	78.3	37.2	85.6	68.2	89.1	81.2	85.6	89.2	92.0	94.4
Prince Albert Parkland	45.1	72.3	31.2	81.3	60.9	91.0	85.1	85.8	90.2	92.9	93.5

- Two years of coverage data in 11 age-dose categories are provided by RHA. Yellow highlight indicates RHAs below the provincial coverage rate.
- As measles vaccine is recommended at 12 and 18 months, data for 13 and 19 months are shown.
- At a provincial level, coverage at 13 months declined from 2015 to 2016, from 59.5% to 58.5%.
- Other rates showed modest improvements for ages up to and including 15 years.
- At 13 months of age for 2016, eight RHAs exceeded the provincial average and five were below. At 19 months of age, seven RHAs exceeded the provincial average and six were below.
- For 2016, there is a significant growth in two dose coverage from the 19 to the 24 month age groups - an increase of 64.1%.
- Across all 11 age-dose categories, two RHAs were below the provincial rate in all 11 categories and two were below in ten categories.
- Two RHAs were at or above the provincial rate in all age categories and two were below the provincial average in one age-dose category.
- Coverage rates for health regions in Peer Groups F and H should be interpreted with caution (see Data Notes).

SURVEILLANCE CASE DEFINITION: Saskatchewan CDC Manual

Respiratory and Direct Contact Measles



* The most frequent reaction to measles-mumps-rubella (MMR) immunization is malaise and fever (with or without rash) occurring 6-23 days after immunization. However, this should be determined for each case, as these reactions and the timeframe can vary (Public Health Agency of Canada, 2012).

† Confirmation of genotype is required in recently vaccinated individuals (within the past 45 days) to determine if illness is related to wild virus or vaccine-related.

‡ IgM serology has the potential for false-positive findings. If the clinical presentation is inconsistent with a diagnosis of measles or in the absence of recent travel/exposure history, IgM results must be confirmed by the other listed confirmatory methods.

Most acute measles cases develop IgM after 3 days post rash onset. Therefore, a suspected measles case in which serum collected \leq 3 days after rash onset initially tests IgM negative should have a second serum specimen collected $>$ 3 days after onset for retesting for IgM.

Further strain characterization is indicated for epidemiologic, public health and control purposes.

Notification Timeline:

From Lab/Practitioner to Public Health: Within 48 hours.

From Public Health to Saskatchewan Health: Within 72 hours.

Public Health Follow-up Timeline: Immediate.

Case Definition (adopted from Public Health Agency of Canada, 2013)

Confirmed Case	<p>Laboratory confirmation of infection in the absence of recent immunization* with measles-containing vaccine:</p> <ul style="list-style-type: none"> isolation of measles virus from an appropriate clinical specimen OR detection of measles virus RNA† OR seroconversion or a significant (e.g., fourfold or greater) rise in measles IgG titre by any standard serologic assay between acute and convalescent sera OR positive serologic test for measles IgM antibody using a recommended assay‡ in a person who is either epidemiologically linked to a laboratory-confirmed case or has recently travelled to an area of known measles activity. <p>OR</p> <p>Clinical illness in a person with an epidemiologic link to a laboratory-confirmed case.</p>
Probable Case	<p>Clinical illness</p> <ul style="list-style-type: none"> in the absence of appropriate laboratory tests OR in the absence of an epidemiologic link to a laboratory-confirmed case OR in a person who has recently travelled to an area of known measles activity.
Clinical Case	<p>Clinical illness is characterized by all of the following features:</p> <ul style="list-style-type: none"> fever of 38.3° C or greater; cough, coryza or conjunctivitis; generalized maculopapular rash for at least 3 days.

DATA NOTES

Case Data Source: The Saskatchewan Integrated Public Health Information System (iPHIS) is a provincially mandated integrated client-centered case management information system that supports public health surveillance. Confirmed cases must meet the provincial surveillance case definition.

Measles molecular epidemiology is a tool for tracking measles virus importations, establishing whether connections exist between concurrent measles cases or outbreaks, and demonstrating the absence of sustained measles transmission. Genotyping is performed by the National Medical Laboratory (NML).

There are 10 peer groups used by Statistic Canada, each identified by a letter (A to J). A peer group consists of health regions with similar socio-economic characteristics which facilitates comparisons within a peer group. The thirteen health regions in Saskatchewan fall into four groups identified by letters A, D, F and H.

Vaccine Coverage Data Source: Panorama is a comprehensive, integrated public health information system. Of the five modules in the system, two have been implemented: vaccine inventory and immunization. When fully functional, it will help public health professionals work together to effectively manage vaccine inventories, immunizations, investigations, outbreaks and family health. Panorama's immunization module replaced the former

Saskatchewan Immunization Management System (SIMS), on January 27, 2015. SIMS had been used province-wide since 2001. To learn more, please visit: www.ehealthsask.ca/services/panorama/Pages/default.aspx.

Most FNIHB and NITHA communities, with the exception of those in the Athabasca Health Authority (AHA), are not currently using Panorama. Therefore, immunization data for most First Nations children are missing or are incomplete. This report includes only those children with Saskatchewan health coverage and registered in Panorama under a health region jurisdiction as of January 12, 2017. In other words, children with Saskatchewan health coverage and registered in Panorama under FNIHB or NITHA jurisdiction are excluded (including those from FNIHB and NITHA communities in AHA). This means this report does not include coverage statistics for the entire provincial or regional population.

The measles vaccine is currently administered as measles, mumps, rubella and varicella (MMRV) or measles, mumps and rubella (MMR) vaccine. Immunization coverage is based on those who turned 13, 18, 19 and 24 months, and 5, 7, 13, 15 and 17 years by December 31 in 2015 and 2016. For example, the rate for 7-year-old children in 2016 is based on clients who were born in 2009 and their immunization records up to December 2016.