Vaccine Preventable Disease Monitoring Report
Polio, 2014

Report release date: June 2016

Purpose:

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

This report presents the most recent data for reportable communicable diseases as collected by the Integrated Public Health Information System (iPHIS) and immunization coverage information as collected by the Saskatchewan Immunization Management System (SIMS) and Panorama. Limitations associated with these systems have been described elsewhere.

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

Report Features:

Prepared by:

Population Health Branch,
Saskatchewan Ministry of Health.

Contact:

Val Mann, PhD
Chief Population Health Epidemiologist,
Population Health Branch,
Saskatchewan Ministry of Health
email: cdc@health.gov.sk.ca

Background

Polio, or poliomyelitis, is a crippling and potentially deadly infectious disease. It is caused by the poliovirus. The virus is transmitted person-to-person and spreads mainly through the fecal-oral route or, less frequently, by a common vehicle (e.g., contaminated water or food). The virus multiplies in the intestine, from where it can invade the nervous system and cause paralysis.

Approximately 72% of poliovirus infections in children are asymptomatic. Approximately 25% of individuals will experience a mild illness involving a low-grade fever, sore throat, headache, fatigue and nausea or stomach pain. This typically lasts 2-5 days and will resolve on its own. A smaller proportion may experience paresthesia, meningitis (1%) or paralysis (0.5%). Paralysis can lead to permanent disability or death.

People that are infected with the virus can spread it before they are ill and up to two weeks after the symptoms appear. Asymptomatic individuals can also spread the virus.

Polio can be prevented through immunization. Canada uses inactivated polio vaccine while other parts of the world continue to use live oral poliovirus vaccines.

There is a global polio eradication initiative. In 2015, wild poliovirus transmission was at the lowest levels ever, with fewer cases reported from fewer areas of fewer countries than ever before. Individuals who plan to travel to endemic countries should receive a booster dose of polio vaccine before they leave.

Immunization

Since 1995/96, inactivated poliomyelitis vaccine (IPV) has replaced live attenuated oral polio vaccine (OPV) in Canada because the more recent cases of paralytic polio in Canada were associated with the use of OPV and importations of wild polio virus. The Saskatchewan Routine Childhood Immunization Schedule recommends a four dose primary series of IPV-containing vaccine at 2, 4, 6 and 18 months of age and a booster dose between 4 and 6 years of age. Three doses of IPV are recommended for older children or adults who have never been vaccinated against polio and are travelling to polio-endemic areas or are at higher risk of occupational exposure to polio virus. A single lifetime booster dose of IPV-containing vaccine is recommended for adults at an increased risk of exposure to polio virus, even if they were previously immunized with polio vaccine.

More than 95% of individuals develop immunity against all three types of poliovirus following the completion of three doses of IPV-containing vaccine and almost all develop immunity after the booster dose. Although Canada was certified as free of wild polio viruses by the World Health Organization (WHO), routine immunization against polio is recommended due to the possibility of importing the virus with travel to countries where polio is endemic or recently reported.

Surveillance

Under *The Public Health Act, 1994*, Saskatchewan health care providers are required to report cases of polio 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 Control Manual.

Polio is under international surveillance as part of the WHO polio elimination program.

Some communicable diseases occur rarely and therefore, rates are based on small numbers of cases which can fluctuate dramatically over time. In these situations, year to year comparisons should be interpreted with caution.

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.

Currently molecular epidemiology genotyping of polio is done by the National Microbiology Laboratory.

EPIDEMIOLOGY AND VACCINE COVERAGE SUMMARIES

Polio in Saskatchewan: 2014

- No (0) cases of lab-confirmed polio were reported.

Table 1: Polio case counts by year

	2015*	2014	2013	2012	2011	Total
Saskatchewan	0	0	0	0	0	0
Canada	N/A	N/A	0	0	0	0

*preliminary counts to date, January 2016

N/A = not available

Polio in Saskatchewan: 2011 to 2014

- No (0) cases of lab-confirmed polio were reported during this time period.
- The last case of polio was in 2008. Since the illness was vaccine-induced from an immunization given in a country outside of North America, the case was not attributed to Saskatchewan.

Table 2: Polio case characteristics, 2011-2014

Characteristics of polio cases – Saskatchewan 2011 - 2014		Cases	Percent of Cases
Total		0	0
Sex	Male	0	0
	Female	0	0
Age	Less than 1 year	0	0
	1 - 4 years	0	0
	5 - 19 years	0	0
	20 - 49 years	0	0
	50 years and over	0	0
Hospitalized	Yes	0	0
	No	0	0
	Unknown	0	0
Immunization status for polio vaccine	4 doses	0	0
	0 dose	0	0
	Too young	0	0
	Unknown	0	0
Source	International	0	0
	Canada	0	0
	Saskatchewan	0	0
Provincial source	Domestic Travel	0	0
	Epidemiologically-linked to travel case	0	0
	Epidemiologically-linked to case with unknown source	0	0
	No identified source	0	0
Genotype	Unknown	0	0

Table 3: Polio vaccine coverage for Saskatchewan by year

Age	Doses	2014	2013	2012
3 months	1	84.2%	83.4%	83.1%
5 months	2	73.8%	73.8%	72.3%
8 months	3	76.3%	75.7%	74.7%
12 months	3	84.5%	84.4%	84.6%
20 months	3	88.7%	89.1%	88.6%
	4	60.2%	59.0%	59.6%
24 months	3	89.6%	90.2%	89.1%
	4	75.5%	76.1%	75.3%
4 years	4	84.4%	84.3%	83.5%
7 years	Up-to-date	85.5%	86.6%	85.8%
13 years	Up-to-date	90.5%	90.6%	90.7%
15 years	Up-to-date	90.9%	91.6%	91.4%
17 years	Up-to-date	91.1%	91.0%	82.6%*

*Immunization records may be incomplete for children born prior to 1996; therefore, the coverage for 17-year-old adolescents may not reflect the actual provincial rate.

VACCINE COVERAGE SUMMARIES

Table 4: Polio Vaccine Coverage by Health Region, 2014

Health Region,	Vaccine coverage (% immunized), by age and dose/up-to-date												
	3 months	5 months	8 months	12 months	20 months		24 months		4 years	7 years	13 years	15 years	17 years
by Peer Group	1 dose	2 doses	3 doses	3 doses	3 doses	4 doses	3 doses	4 doses	4 doses	up-to-date	up-to-date	up-to-date	up-to-date
Saskatchewan	**84.2**	**73.8**	**76.3**	**84.5**	**88.7**	**60.2**	**89.6**	**75.5**	**84.4**	**85.5**	**90.5**	**90.9**	**91.1**
Peer Group A													
Regina Qu'Appelle	86.3	74.8	77.8	85.1	88.4	62.7	88.9	74.7	82.7	86.7	91.1	90.4	91.6
Saskatoon	84.8	76.5	77.2	85.0	89.7	63.0	89.9	78.2	84.2	85.7	90.7	91.6	92.0
Peer Group D													
Cypress	88.6	75.9	79.5	88.4	89.6	66.1	92.4	80.6	88.9	88.8	93.8	94.3	92.3
Five Hills	87.4	78.9	81.6	89.0	91.0	62.2	91.4	79.9	86.2	87.2	94.0	95.4	95.3
Heartland	86.4	75.2	83.3	88.7	92.6	63.4	94.1	82.4	89.3	88.6	92.4	94.0	93.7
Kelsey Trail	85.2	70.2	74.6	84.5	87.3	50.1	91.6	72.7	87.2	84.3	89.8	90.3	88.2
Sun Country	90.7	88.2	89.8	92.0	91.8	68.9	94.2	83.7	94.2	89.8	94.4	95.8	94.8
Sunrise	82.4	72.5	78.0	86.8	88.9	61.7	88.9	73.8	86.8	85.2	92.4	90.7	90.8
Peer Group F													
Athabasca Health	82.8	59.4	84.2	97.8	97.7	77.3	95.7	91.3	90.9	81.5	82.7	96.3	93.2
Keewatin Yatthé	70.2	51.4	51.1	74.1	90.4	39.3	92.1	64.8	91.9	97.2	91.7	88.5	82.8
Mamawetan Churchill River	71.8	55.5	59.6	80.0	90.2	43.8	93.3	70.9	87.8	90.2	90.8	83.3	80.7
Peer Group H													
Prince Albert Parkland	73.2	59.3	63.2	75.0	81.2	44.9	84.6	64.8	79.9	78.3	84.2	86.4	85.9
Prairie North	79.3	66.5	69.2	78.8	85.4	52.3	85.2	66.8	78.5	78.3	85.4	87.8	89.0

Table 5: Polio Vaccine Coverage by Health Region, 2013

Health Region,	Vaccine coverage (% immunized), by age and dose or up-to-date												
	3 months	5 months	8 months	12 months	20 months		24 months		4 years	7 years	13 years	15 years	17 years
by Peer Group	1 dose	2 doses	3 doses	3 doses	3 doses	4 doses	3 doses	4 doses	4 doses	up-to-date	up-to-date	up-to-date	up-to-date
Saskatchewan	**83.4**	**73.8**	**75.7**	**84.4**	**89.1**	**59.0**	**90.2**	**76.1**	**84.3**	**86.6**	**90.6**	**91.6**	**91.0**
Peer Group A													
Regina Qu'Appelle	84.6	76.1	78.1	85.3	88.9	63.9	89.4	76.3	83.3	87.4	90.8	91.4	92.0
Saskatoon	84.1	76.3	77.3	84.7	89.2	59.7	91.0	79.2	83.7	88.6	91.4	93.3	91.8
Peer Group D													
Cypress	81.6	70.5	74.1	86.5	91.9	57.6	91.6	76.3	88.9	86.8	93.6	92.0	93.0
Five Hills	86.7	78.2	81.9	88.8	91.2	58.5	91.9	78.3	89.3	86.3	93.9	95.2	96.4
Heartland	84.7	76.1	81.1	91.3	93.6	66.5	93.2	81.4	89.5	90.8	92.3	92.7	93.6
Kelsey Trail	83.6	74.0	77.9	87.7	90.6	56.1	90.8	72.8	85.6	84.3	88.9	89.0	87.2
Sun Country	89.5	83.8	86.5	91.6	94.6	76.4	94.3	85.4	90.4	94.1	94.0	94.6	95.1
Sunrise	82.8	74.0	78.8	84.7	88.1	52.8	90.2	71.7	87.4	87.0	90.9	91.2	90.1
Peer Group F													
Athabasca Health Authority	84.0	74.2	80.6	97.8	100.0	75.0	100.0	92.5	96.7	78.6	91.5	94.6	89.6
Keewatin Yatthé	72.5	59.8	59.6	81.0	85.7	48.1	92.4	77.1	89.3	84.8	91.1	88.5	82.1
Mamawetan Churchill River	78.2	53.7	53.9	79.5	91.8	43.4	93.2	70.9	79.5	77.4	81.8	79.5	79.0
Peer Group H													
Prince Albert Parkland	77.5	58.7	58.0	72.5	83.4	44.4	85.6	64.0	79.4	81.4	87.6	87.5	85.1
Prairie North	79.1	66.8	68.7	78.6	84.4	46.6	86.2	65.4	79.5	76.3	85.9	89.0	88.5

Table 6: Polio Vaccine Coverage by Health Region, 2012

Health Region,	Vaccine coverage (% immunized), by age and dose or up-to-date												
	3 months	5 months	8 months	12 months	20 months		24 months		4 years	7 years	13 years	15 years	17 years*
by Peer Group	1 dose	2 doses	3 doses	3 doses	3 doses	4 doses	3 doses	4 doses	4 doses	up-to-date	up-to-date	up-to-date	up-to-date
Saskatchewan	**83.1**	**72.3**	**74.7**	**84.6**	**88.6**	**59.6**	**89.1**	**75.3**	**83.5**	**85.8**	**90.7**	**91.4**	**82.6**
Peer Group A													
Regina Qu'Appelle	84.5	74.7	76.6	84.3	88.3	66.2	89.0	76.9	81.8	86.8	91.1	92.0	51.4
Saskatoon	83.5	73.4	75.7	86.1	89.4	59.1	89.5	75.9	83.6	87.0	90.8	92.6	91.5
Peer Group D													
Cypress	83.9	71.0	75.3	86.4	90.6	56.6	92.3	78.3	87.9	88.4	94.4	92.8	93.6
Five Hills	83.3	75.4	77.6	89.4	91.7	58.7	92.9	76.5	86.5	90.0	95.2	96.2	92.7
Heartland	84.4	76.4	81.9	90.4	92.7	65.7	91.7	80.8	90.6	88.2	93.4	94.8	94.4
Kelsey Trail	86.3	74.6	77.5	86.8	91.3	57.9	91.0	74.3	85.0	82.9	90.6	89.4	90.0
Sun Country	91.3	87.1	87.7	91.5	95.0	72.0	95.5	87.7	90.4	93.2	95.7	94.7	91.8
Sunrise	80.1	70.0	75.3	84.7	89.1	56.9	91.0	76.7	87.7	84.7	90.0	90.5	89.7
Peer Group F													
Athabasca Health Authority	90.3	65.6	63.9	97.4	94.5	74.5	94.4	83.3	86.4	88.4	96.2	91.4	71.2
Keewatin Yatthé	72.7	47.9	46.7	75.0	91.4	48.5	90.9	75.3	82.9	83.7	87.9	81.6	83.1
Mamawetan Churchill River	68.6	48.4	55.3	73.1	83.3	46.9	87.5	68.0	80.4	76.7	77.6	76.5	76.3
Peer Group H													
Prince Albert Parkland	77.2	57.4	60.0	75.0	82.0	45.0	82.8	64.4	80.9	82.3	86.8	85.9	86.8
Prairie North	79.3	68.1	69.0	77.7	82.4	49.7	83.0	65.5	76.9	75.2	87.2	89.5	89.3

Three years of coverage data in thirteen age-dose/up-to-date categories are provided by RHA. A yellow highlighted cell means the RHA's coverage rate is below the provincial coverage rate.

Polio vaccine is recommended at two, four, six and 18 months, with a booster dose between four and six years of age. If the primary series is delayed or interrupted, the schedule can be adjusted to bring the child up-to-date for protection. Data for three, five, eight, 12, 20, and 24 months; and four, seven, 13, 15 and 17 years are shown with seven, 13, 15 and 17 years reported as up-to-date.

Up-to-date:
a) children who received the four-dose primary series and one booster and
b) children and adolescents who received either three or four doses with the last dose administered after the fourth birthday and six months after the previous dose.

At a provincial level, coverage improved from 2012 to 2014 at all ages except 12 months, seven, 13, and 15 years.

Provincially in 2014, there was an improvement in coverage from 7 years to 17 years with an increase of 6.5%.

In 2014, four RHAs reported coverage rates equal to or above the provincial average for all ages compared to 2012 when only two RHAs did so.

Overall, the poorest coverage rates are seen at 20 months - 4 doses. In 2012, only four regions reported a coverage rate equal to or above the provincial average but by 2014, eight regions reported rates at or above the provincial average for this age-dose group.

Coverage rates for health regions in Peer Groups F and H should be interpreted with caution.

*Immunization records may be incomplete for children born prior to 1996. Therefore, the immunization coverage for 17-year-old adolescents may not reflect actual provincial or RHA rates.

SURVEILLANCE CASE DEFINITION: Saskatchewan

Polio	
Notification Timeline: **From Lab/Practitioner to Public Health:** Immediate. **From Public Health to Ministry of Health:** Immediate. **Public Health Follow-up Timeline:** Initiate within 24-48 hrs.	
Case Definition (adopted from Public Health Agency of Canada, 2008)	
Confirmed Case	Clinical illness[1] with laboratory confirmation of infection: • isolation of polio virus (vaccine or wild-type) from an appropriate clinical specimen **OR** • detection of polio virus RNA **OR** Clinical illness[1] in a person who is epidemiologically linked to a laboratory-confirmed case. Confirmed cases of poliomyelitis can be further subdivided into the following two categories: 1) Wild virus Laboratory investigation implicates wild-type virus. This group is further subdivided as follows: Imported: travel in or residence in a polio-endemic area 30 days or less before onset of symptoms. Import-related: epidemiologic link to someone who has travelled in or resided in a polio-endemic area within 30 days of onset of symptoms Indigenous: no travel or contact as described above. 2) Vaccine-associated virus Laboratory investigation implicates vaccine-type virus. This group is further subdivided as follows: Recipient: the illness began 7-30 days after the patient received oral polio vaccine (OPV) Contact: the patient was shown to have been in contact with an OPV-recipient and became ill 7-60 days after the contact was vaccinated Possible contact: the patient had no known direct contact with an OPV-recipient and no history of receiving OPV, but the paralysis occurred in an area in which a mass vaccination campaign using OPV had been in progress 7-60 days before the onset of paralysis No known contact: the patient had no known contact with an OPV-recipient and no history of receiving OPV, and the paralysis occurred in an area where no routine or intensive OPV vaccination had been in progress. In Canada, this would include all provinces and territories.
Probable Case	Clinical illness[1] without detection of polio virus from an appropriate clinical specimen and without evidence of infection with other neurotropic viruses but with one of the following laboratory confirmations of infection: • significant rise (e.g., fourfold or greater) in polio IgG titre by any standard serologic assay between acute and convalescent sera **OR** • positive serologic test for polio IgM antibody in the absence of recent immunization with polio virus-containing vaccine
Suspect Case	• Clinical illness[1] and no laboratory confirmation of infection (no polio virus detection or serologic evidence), including negative test results and inadequate or no investigation

Photo Courtesy of Centers for Disease Control

[1] Clinical illness is characterized by all of the following:
- acute flaccid paralysis of one or more limbs
- decreased or absent deep tendon reflexes in the affected limbs
- no sensory or cognitive loss
- no other apparent cause (including laboratory investigation to rule out other causes of a similar syndrome) neurologic deficit present 60 days after onset of initial symptoms, unless the patient has died.

DATA NOTES

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

Genotyping is a tool for establishing the strain of polio and differentiating wild strain polio from vaccine-associated disease. It also tracks polio virus importations, establishing connections between current polio cases and use of oral polio vaccines in countries of origin or visitation in order to establish the absence of acquired polio within Canada. Genotyping is performed by the National Medical Laboratory (NML).

Peer groups were created by Statistics Canada. A peer group consists of health regions with similar socio-economic characteristics so that important differences may be detected by comparing within a peer group. The thirteen health regions in Saskatchewan fall into four (identified by letters A , D, F and H) of the ten peer groups (A to J) across Canada.

Vaccine Coverage Data Source: Saskatchewan Immunization Management System (SIMS) is a client-based registry recording vaccines delivered by regional public health services. It does not include vaccines delivered out of province or by First Nations communities that declined to use SIMS. Immunization data from Keewatin Yatthé and Mamawetan Churchill River health regions and historical data from Athabasca Health Authority are incomplete. As a result, this report does not provide immunization coverage for the entire provincial or regional populations.

The four-dose primary series IPV-containing vaccine is administered as diphtheria, tetanus, acellular pertussis, inactivated polio & *Haemophilus influenzae* type b (DTaP-IPV-Hib) and the one-dose booster IPV-containing vaccine is administered as diphtheria, tetanus, acellular pertussis & inactivated polio (DTaP-IPV). Immunization coverage is based on those who turned 3, 5, 8, 12, 20 and 24 months, and 4, 7, 13, 15, and 17 years by December 31 in 2012, 2013 and 2014. For example, the immunization coverage for 7-year-old children in 2014 is based on clients who were born in 2007 and their immunization records up to December 31, 2014.