

Vaccine Preventable Disease Monitoring Report Pneumococcal, 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 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 Categories I and II Communicable Diseases, as well as any communicable disease outbreaks to the Chief and Deputy Chief Medical Health Officers. Invasive pneumococcal 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

Streptococcus pneumoniae (pneumococcal disease) is a bacterial disease that has over 90 different serotypes. It causes common diseases of the respiratory tract such as ear infections, sinus infections and pneumonia. It is also able to cause invasive disease that affects the brain, heart and bloodstream, which is more serious.

The bacteria are very common and many people carry them in their nose and throat without getting sick. However, certain people are at higher risk for illness: infants and the elderly, people with chronic medical conditions such as HIV, diabetes, heart or lung disease, and people with weakened immune systems because of illness or medications. When these at-risk people are in settings that have increased risk of transmission (spread) such as daycares, prisons, homeless shelters and overcrowded living conditions, there is a greater chance of illness.

Immunization

A seven-strain pneumococcal conjugate vaccine was added to the public program in September 2002 as a four-dose series for high risk children younger than 24 months. High risk children 24 to 59 months of age became eligible in October 2003.

In April 2005, the eligibility for the four-dose series was expanded to include all children at two months of age who were born since April 1, 2005. This formulation was replaced by a 13-strain vaccine as a four-dose series in 2010.

In April 2012, the current three-dose series was introduced. It is offered at two, four and 12 months of age for healthy children. High risk children receive an

additional dose at six months of age. However, some can result in long-term problems, such as brain damage or hearing loss. Some can also cause death, most commonly in infants and the elderly (one in five with infection of the brain, one in fifteen with infection of the blood stream and one in twenty with invasive pneumonia affecting the lining of the heart or lungs).

Most pneumococcal infections are mild. However, some can result in long-term problems, such as brain damage or hearing loss. Some can also cause death, most commonly in infants and the elderly (one in five with infection of the brain, one in fifteen with infection of the blood stream and one in twenty with invasive pneumonia affecting the lining of the heart or lungs).

Immunization programs in Saskatchewan are targeted to protect individuals at greatest risk of infection. A small proportion of the 90 serotypes are vaccine-preventable. The serotypes most commonly causing illness have shifted over time and the effectiveness of antibiotics has also decreased, making prevention more important.

additional dose at six months of age. In April 2013, high risk children five to 17 years of age became eligible to receive one dose if they did not receive this formulation previously.

Although this report contains no coverage information on anyone born before 2007, it is worth noting that one dose of pneumococcal polysaccharide vaccine (containing 23 strains of *S. pneumoniae*) is offered to persons 65 years and older. Those two years and older who have select medical conditions are also eligible for this one vaccine dose. Some of these individuals may receive a booster dose five years later.

Surveillance

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

Standard case definitions allow comparability of surveillance data. These definitions should not be

misinterpreted as a clinical diagnosis. Invasiveness for surveillance purposes does not include infections of the pleural cavity or the middle ear.

Some genomic sequencing of the pneumococcal strain has been published in the International Nucleotide Sequence Database Collaboration.

EPIDEMIOLOGY AND VACCINE COVERAGE SUMMARIES

Invasive Pneumococcal Disease in Saskatchewan: 2015

- Of the 134 cases of invasive pneumococcal disease in 2015, only 13 cases (10%) had documentation that their immunizations were up-to-date for their age and eligibility. Eight were among the 35 cases aged 65+ years.
- The highest number of cases was among people 65 years and older (35, 26%). Five cases were infants.
- One hundred seven cases (80%) were hospitalized from 0 to 47 days. All five infants were hospitalized; 35 admitted cases were aged 65+ years.
- Seven of the 15 people who died were over 65 years of age. The majority had underlying medical conditions which diminished an effective immune response, even when immunized.

Invasive Pneumococcal Disease in Saskatchewan: 2011 to 2015

- The 633 cases of invasive pneumococcal disease ranged in age from newborn to 98 years. The median age was 52 years indicating this is a disease of an older population, albeit infants are vulnerable to severe disease.
- Twenty-three cases had two or more episodes of invasive pneumococcal disease in this five year period.
- Over half of the cases (54%) lived in the regional health authorities of Regina Qu'Appelle and Saskatoon.
- Sixty-three percent (401 cases) were reported hospitalized, the majority having underlying medical conditions exacerbated by the infection.
- Sixty percent of those known to have died as a result of their infection were over 65 years of age (34 of 57 deaths). Other cases who succumbed to the infection had co-morbidities or high risk lifestyles.
- Only fifty-eight cases had documentation in their epidemiological record that immunization against invasive pneumococcal disease was up to date. Fourteen of 75 cases under 10 years of age had documentation of an up-to-date immunization status in their epidemiological record.

Pneumococcal Disease Coverage in Saskatchewan: 2012 to 2016

- From 2012 to 2016, provincial immunization coverage rates improved for three-, five- and eight-month old children.
- Provincial up-to-date coverage declined from 2012 to 2016 for 13-, 20- and 24-month old children but slightly improved for 59-month old children.

Table 1: Invasive pneumococcal case counts by year

	2016*	2015	2014	2013	2012	2011	Total
Saskatchewan	143	134	111	125	129	134	776
Canada	N/A	3,305	3,418	3,184	3,178	3,211	16,296

*preliminary counts to date, December 2016

N/A = not available

Note: historical counts have been updated so may not be the same as reported in the 2014 report

Table 2: Invasive pneumococcal case characteristics, 2011-2015

Characteristics of pneumococcal cases – Saskatchewan 2011 - 2015		Cases	Percent of Cases
Total		633	100
Sex	Male	289	46
	Female	344	54
Age	Less than 1 year	25	4
	1 - 4 years	34	5
	5 - 19 years	39	6
	20 - 49	197	31
	50 years and over	338	53
Hospitalized	Yes	401	63
	No	232	37
	Unknown	0	0
Immunization status for pneumococcal vaccine	Up to date	58	9
	No	60	9
	Unknown	515	81
Source	International	N/A	N/A
	Canada	N/A	N/A
	Saskatchewan	N/A	N/A
Provincial source	Domestic Travel	N/A	N/A
	Epidemiologically-linked to travel case	N/A	N/A
	Epidemiologically-linked to case with unknown source	N/A	N/A
	No identified source	N/A	N/A
Genotype	Unknown	N/A	N/A

N/A = not available

Note: rounded percentages may not total 100%

Table 3: Pneumococcal vaccine coverage for Saskatchewan, 2012-2016

Age	Doses	2016	2015	2014	2013	2012
3 months	1	84.7%	84.2%	84.0%	83.1%	82.8%
	2	92.2%	90.8%	91.7%	91.0%	91.4%
5 months	1	76.6%	75.0%	73.5%	73.4%	71.9%
	2	93.8%	92.8%	93.5%	93.3%	93.5%
8 months	1	88.3%	87.0%	87.7%	87.4%	87.1%
	2	59.2%	60.1%	59.2%	56.0%	76.4%
13 months	Up-to-date	84.1%	82.9%	83.8%	84.8%	86.8%
20 months	Up-to-date	86.5%	85.3%	85.7%	88.4%	88.1%
24 months	Up-to-date	92.3%	89.5%	92.5%	92.2%	91.8%
59 months	Up-to-date					

VACCINE COVERAGE SUMMARIES

Table 4: Pneumococcal Vaccine Coverage by Health Region, 2016

Health Region, by Peer Group	Vaccine coverage (% immunized), by age and doses or up-to-date									
	3 months		5 months		8 months		13 months	20 months	24 months	59 months
	1 dose	1 dose	2 doses	1 dose	2 doses	up-to-date	up-to-date	up-to-date	up-to-date	
Saskatchewan	84.7	92.2	76.6	93.8	88.3	59.2	84.1	86.5	92.3	
Peer Group A										
Regina Qu'Appelle	86.7	92.8	77.9	93.7	88.9	53.7	81.7	85.1	91.9	
Saskatoon	83.6	91.8	75.8	93.5	87.9	60.8	86.4	88.4	92.6	
Peer Group D										
Cypress	87.3	92.6	80.6	94.0	90.4	65.7	90.1	92.8	93.8	
Five Hills	88.9	93.9	79.8	95.1	90.6	69.9	87.0	86.7	92.0	
Heartland	88.4	96.4	79.7	95.8	92.1	64.1	89.3	90.0	94.7	
Kelsey Trail	86.2	92.5	77.2	94.4	89.8	69.7	84.9	87.6	91.4	
Sun Country	90.2	94.3	89.6	95.9	94.5	75.2	91.6	92.4	96.3	
Sunrise	87.5	93.9	82.3	94.2	89.3	64.9	83.3	85.7	92.8	
Peer Group F										
Athabasca Health Authority	90.2	97.6	65.9	100.0	94.6	61.1	86.1	82.9	96.3	
Keewatin Yatthé	66.7	84.5	55.0	91.7	78.2	48.6	74.7	78.9	91.9	
Mamawetan Churchill River	73.4	90.4	62.7	95.8	84.5	47.0	77.5	84.6	93.5	
Peer Group H										
Prairie North	83.0	91.2	74.6	93.1	86.0	51.4	79.0	82.6	88.8	
Prince Albert Parkland	76.1	87.2	64.0	91.6	80.2	50.2	75.8	77.8	90.8	

Table 5: Pneumococcal Vaccine Coverage by Health Region, 2015

Health Region, by Peer Group	Vaccine coverage (% immunized), by age and doses or up-to-date									
	3 months		5 months		8 months		13 months	20 months	24 months	59 months
	1 dose	1 dose	2 doses	1 dose	2 doses	up-to-date	up-to-date	up-to-date	up-to-date	
Saskatchewan	84.2	90.8	75.0	92.8	87.0	60.1	82.9	85.3	89.5	
Peer Group A										
Regina Qu'Appelle	84.7	90.0	75.9	92.1	86.5	62.2	82.8	84.7	88.6	
Saskatoon	84.0	91.4	76.7	93.2	88.1	60.7	83.4	86.0	87.7	
Peer Group D										
Cypress	84.6	90.3	73.3	93.4	88.6	70.0	87.0	89.4	92.7	
Five Hills	87.9	92.6	78.9	92.5	88.7	61.1	83.3	85.9	92.2	
Heartland	85.9	92.8	79.5	93.9	91.0	60.9	87.7	89.2	94.3	
Kelsey Trail	84.7	91.0	76.7	93.2	88.6	56.0	86.2	85.1	93.7	
Sun Country	92.3	95.2	87.3	95.3	93.6	71.4	91.2	91.9	96.1	
Sunrise	81.2	89.0	73.2	91.6	87.2	59.4	86.1	86.3	90.5	
Peer Group F										
Athabasca Health Authority	79.4	94.9	56.4	100.0	80.6	82.4	90.9	94.1	89.6	
Keewatin Yatthé	65.3	90.7	46.6	90.4	72.3	46.8	71.4	80.6	88.0	
Mamawetan Churchill River	80.4	92.2	57.5	95.6	86.8	44.9	79.5	84.7	92.7	
Peer Group H										
Prairie North	83.8	89.7	68.9	92.6	83.7	54.5	78.9	83.5	88.1	
Prince Albert Parkland	78.3	88.0	63.3	91.1	79.5	45.8	72.5	76.8	88.9	

- Two years of coverage data in nine age-dose/up-to-date categories are provided by RHA. A yellow highlighted cell means the RHAs coverage rate is below the provincial coverage rate.
- Pneumococcal vaccine is recommended for healthy children at two and four months, with a booster at 12 months. If the primary series is delayed or interrupted, the series is adjusted to bring the child up-to-date for protection. Data for three, five, 13, 20, 24 and 59 months are shown with 13, 20, 24 and 59 months reported as up-to-date.
- Up-to-date at 13 months:
 - a) children who received three doses at two, four and 12 months AND
 - b) children who received two doses with at least 28 days between each dose and a third dose at 12-13 months, if it is at least eight weeks after the second dose AND
 - c) children who received two or three doses before 12 months of age and one more (i.e., third or fourth) dose at 12-13 months, if it is at least eight weeks after the penultimate dose AND
 - d) children who received one dose before 12 months of age and a second dose at 12-13 months of age, if at least eight weeks after the first dose AND
 - e) children who received their first dose at 12-13 months of age.
- Up-to-date at 20 months:
 - a) a) to c) for 12 months AND
 - b) children who received one dose before 12 months of age and two more doses by 20 months of age, if there is an interval of at least eight weeks between each dose AND
 - c) children who received two doses eight weeks apart between 12 and 20 months of age AND
 - d) children who receive two or three doses before 12 months of age and one more (i.e., third or fourth) dose between 13 and 20 months of age.
- Up-to-date at 24 months:
 - a) a) to d) for 20 months AND
 - b) children who received two doses eight weeks apart between 20 months plus a day and 24 months of age AND
 - c) children who received one dose before 12 months of age and two more doses between 20 months plus a day and 24 months of age, if there is an interval of at least eight weeks between each dose AND
 - d) children who receive two or three doses before 12 months of age and one more (i.e., third or fourth) dose between 20 months plus a day and 24 months of age AND
 - e) children who received a single dose at 24 months.
- Up-to-date at 59 months:
 - a) a) to e) for 24 months AND
 - b) children who received a single dose between 24 months plus a day and 59 months.
- At the provincial level, coverage at all age-dose categories improved from 2015 to 2016, except for the age of 13 months.
- In 2016, the up-to-date coverage rate was higher among the 20-month age-group compared to the 13-month age-group: 84.1% vs. 59.2%.
- In 2016, three RHAs were at or above the provincial rates in all nine age-dose categories and two were at or above all but one age-dose categories.
- In 2016, three RHAs were below the provincial rates in all nine age-dose categories and one was below in all but two age-dose categories.

SURVEILLANCE CASE DEFINITION: Saskatchewan CDC Manual

Respiratory and Direct Contact Pneumococcal Disease – invasive

Notification Timeline:

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

From Public Health to Saskatchewan Health: Within 2 weeks.

Public Health Follow-up Timeline: Initiate within 72 hrs.

Case Definition (adopted from Public Health Agency of Canada, 2008)

Confirmed Case	<p>Clinical evidence of invasive disease¹ with laboratory confirmation of infection:</p> <ul style="list-style-type: none"> isolation of <i>Streptococcus pneumoniae</i> from a normally sterile site (excluding the middle ear and pleural cavity) OR demonstration of <i>S. pneumoniae</i> DNA from a normally sterile site (excluding the middle ear and pleural cavity) 	<p>¹Clinical illness associated with invasive disease manifests itself mainly as pneumonia with bacteremia, bacteremia without a known site of infection, and meningitis. Pneumonia without bacteremia is not notifiable.</p>
Probable Case	<p>Clinical evidence of invasive disease¹ with no other apparent cause and with nonconfirmatory laboratory evidence:</p> <ul style="list-style-type: none"> demonstration of <i>S. pneumoniae</i> antigen from a normally sterile site (excluding the middle ear and pleural cavity) 	

DATA NOTES

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

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 twelve health regions and one health authority in Saskatchewan fall into four groups identified by letters A, D, F and H.

Vaccine Coverage Data Source: The Saskatchewan Immunization Management System (SIMS) was a client-based registry recording vaccines delivered by public health services. It did not include vaccines delivered by First Nations (FN) communities that did not use SIMS.

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. It does not include vaccines delivered by FN communities that do not use Panorama.

SIMS was implemented province-wide in 2001 and was replaced by Panorama's immunization module on January 27, 2015. To learn more, please visit: www.ehealthsask.ca/services/panorama/Pages/default.aspx.

This report includes only those children with Saskatchewan health coverage and registered in Panorama under a health region jurisdiction as of January 12, 2017. This means this report does not include coverage statistics for the entire provincial or regional populations.

The pneumococcal conjugate vaccine contains antigens from 13 serotypes of *S. pneumoniae* and the pneumococcal polysaccharide vaccine contains antigens from 23 serotypes of the bacterium. Immunization coverage is based on those who turned three, five, eight, 13, 20, 24 and 59 months by December 31 in 2015 and 2016. For example, the immunization coverage for 24-month-old children in 2016 is based on clients who were born in 2014 and their immunization records up to December 31, 2016.