

**Manitoba Health, Seniors and Active Living**

## **ANNUAL INFLUENZA REPORT**

---

**2015–2016**

**Epidemiology and Surveillance**

Active Living, Population and Public Health

March 2017

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## Executive Summary

Seasonal influenza (herein referred to as “influenza”) can cause severe morbidity and mortality at extremes of life. In Manitoba, influenza is a reportable disease under *The Public Health Act*. Routine monitoring of influenza is performed by Manitoba Health, Seniors and Active Living (MHSAL) through a variety of mechanisms. In each season usually between November and May, influenza activity is reported in a publicly available weekly bulletin. This annual report summarizes all influenza related information between July 1, 2015 and June 30, 2016 in Manitoba.

The start and peak of the 2015–2016 season in Manitoba was delayed in comparison with the previous three seasons (2012–2013, 2013–2014, and 2014–2015), which was consistent with elsewhere in Canada and the United States. The activity level increased in late January 2016 and peaked at the end of February 2016. In comparison, the three previous seasons all peaked within the first three weeks of January.

In 2015–2016, the influenza A(H1N1)pdm09 virus was the predominant circulating strain. As expected with this particular influenza strain, there were higher rates of illness and hospital admissions in the younger populations, especially young children below the age of five, in comparison with the population over the age of 65. Overall, compared with 2014–2015, the influenza A(H3N2)-predominant season, the 2015–2016 season had a lower influenza activity level and was less severe. Compared with 2013–2014, the last influenza A(H1N1)-predominant season, the activity in 2015–2016 was at a similar level. Though there were higher numbers of laboratory-confirmed patients, outbreaks, and severe outcomes in 2015–2016 than in 2013–2014, this may be due to the fact that more physicians are requesting laboratory confirmation.

Influenza B and a smaller number of influenza A(H3N2) viruses also co-circulated. The majority of viruses characterized this season were antigenically similar to the reference viruses representing the recommended components of the 2015–2016 Northern Hemisphere quadrivalent influenza vaccine. Two quadrivalent influenza vaccine products were available in Manitoba for the season. It was estimated that 21.7% of all Manitoba residents in 2015–2016 were immunized with the influenza vaccine, similar to the coverage rate in the three previous seasons.

## Reporting Weeks

Time trends in this report were presented by epidemiological week, a schedule used by the national FluWatch Program coordinated by the Public Health Agency of Canada (PHAC).

Week	Start	End
27	2015-07-05	2015-07-11
28	2015-07-12	2015-07-18
29	2015-07-19	2015-07-25
30	2015-07-26	2015-08-01
31	2015-08-02	2015-08-08
32	2015-08-09	2015-08-15
33	2015-08-16	2015-08-22
34	2015-08-23	2015-08-29
35	2015-08-30	2015-09-05
36	2015-09-06	2015-09-12
37	2015-09-13	2015-09-19
38	2015-09-20	2015-09-26
39	2015-09-27	2015-10-03
40	2015-10-04	2015-10-10
41	2015-10-11	2015-10-17
42	2015-10-18	2015-10-24
43	2015-10-25	2015-10-31
44	2015-11-01	2015-11-07
45	2015-11-08	2015-11-14
46	2015-11-15	2015-11-21
47	2015-11-22	2015-11-28
48	2015-11-29	2015-12-05
49	2015-12-06	2015-12-12
50	2015-12-13	2015-12-19
51	2015-12-20	2015-12-26
52	2015-12-27	2016-01-02
1	2016-01-03	2016-01-09
2	2016-01-10	2016-01-16
3	2016-01-17	2016-01-23
4	2016-01-24	2016-01-30
5	2016-01-31	2016-02-06
6	2016-02-07	2016-02-13
7	2016-02-14	2016-02-20
8	2016-02-21	2016-02-27
9	2016-02-28	2016-03-05
10	2016-03-06	2016-03-12
11	2016-03-13	2016-03-19
12	2016-03-20	2016-03-26
13	2016-03-27	2016-04-02
14	2016-04-03	2016-04-09
15	2016-04-10	2016-04-16
16	2016-04-17	2016-04-23
17	2016-04-24	2016-04-30
18	2016-05-01	2016-05-07
19	2016-05-08	2016-05-14
20	2016-05-15	2016-05-21
21	2016-05-22	2016-05-28
22	2016-05-29	2016-06-04
23	2016-06-05	2016-06-11
24	2016-06-12	2016-06-18
25	2016-06-19	2016-06-25
26	2016-06-26	2016-07-02

**Acronyms**

<b>AEFI</b>	Adverse event following immunization
<b>CI</b>	Confidence Interval
<b>CPL</b>	Cadham Provincial Laboratory
<b>DPIN</b>	Drug Programs Information Network
<b>E&amp;S</b>	Epidemiology and Surveillance
<b>EIA</b>	Enzyme immunoassay
<b>ICU</b>	Intensive Care Unit
<b>ILI</b>	Influenza-like illness
<b>IRVS</b>	Influenza and Respiratory Viruses Section
<b>LTC</b>	Long Term Care
<b>MHSAL</b>	Manitoba Health, Seniors and Active Living
<b>MIMS</b>	Manitoba Immunization Monitoring System
<b>MOH</b>	Medical Officer of Health
<b>NML</b>	National Microbiology Laboratory
<b>ORS</b>	Oculo-Respiratory Syndrome
<b>PCR</b>	Polymerase chain reaction
<b>PHCC</b>	Provincial Health Contact Centre
<b>PHAC</b>	Public Health Agency of Canada
<b>RHA</b>	Regional Health Authority





## Introduction

Epidemiology and Surveillance (E&S), Active Living, Population and Public Health Branch of MHSAL monitors influenza activity year-round and produces regular bulletins during the season<sup>1</sup>, usually between November and May. This annual report summarizes information on influenza activity in Manitoba between July 1, 2015 and June 30, 2016.

Overall:

- a total of 864 laboratory-confirmed influenza A patients and 229 laboratory-confirmed influenza B patients were reported to E&S;
- influenza A(H1N1)pdm09 was the predominant circulating strain. As expected with this influenza strain, younger populations were affected more than older populations this season;
- the influenza A season started in Week 3 (January 17–23, 2016) and peaked in Week 9 (February 28–March 5, 2016). The influenza B season started in Week 8 (February 21–27, 2016) and peaked in Week 11 (March 13–19, 2016);
- in total, 291 patients with influenza were hospitalized, 78 of whom were admitted to intensive care units (ICU). In those hospitalized patients, 75% were younger than 65 years of age. There were 25 deceased influenza patients, 64% of whom were younger than 65 years of age;
- a total of 21 laboratory-confirmed influenza outbreaks, mostly in long term care (LTC) facilities, were reported;
- the provincial immunization coverage in 2015–2016 was 21.7%, similar to the three previous seasons;
- pharmacists delivered 20% of all influenza immunizations in their second season authorized to administer immunizations, an increase from 17% in the previous season; and
- the rate of adverse events following seasonal influenza immunizations was 19.5 reports per 100,000 doses administered.

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<sup>1</sup> Regular bulletins are published online at <http://www.gov.mb.ca/health/publichealth/surveillance/influenza/index.html>

A variety of data sources and surveillance indicators were evaluated to monitor the arrival, intensity and severity of influenza to characterize those infected as well as the broader trends. Surveillance data analyzed for this report include data from:

- syndromic surveillance
  - a. sentinel surveillance of influenza-like illness (ILI) in the community
  - b. influenza-related calls to Health Links–Info Santé;
- laboratory reports of influenza infections;
- hospitalizations, ICU admissions, and deaths associated with laboratory-confirmed influenza diagnosis;
- laboratory-confirmed influenza outbreaks;
- antiviral dispensing;
- influenza immunizations;
- adverse events following immunization (AEFIs); and
- strain characterization of influenza viruses and antiviral resistance.

## Syndromic Surveillance

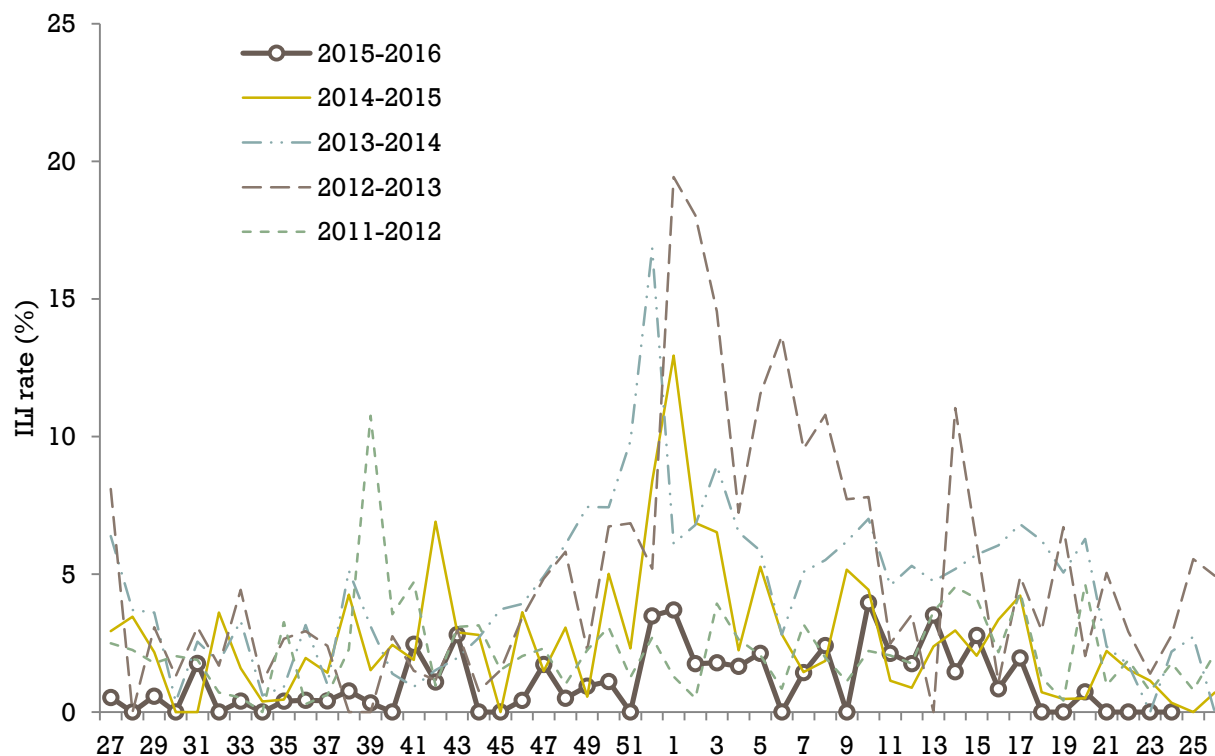
### *Sentinel Surveillance*

ILI in the general population is defined as acute onset of respiratory illness with fever and cough and with one or more of the symptoms, sore throat, joint or muscle pain, or fatigue, that are likely due to influenza. In children under the age of 5, gastrointestinal symptoms may also be present. In patients under 5 or over 65 years of age, fever may not be prominent.

*FluWatch*, Canada's national surveillance system co-ordinated by Public Health Agency of Canada (PHAC), monitors the spread of influenza and influenza like illness (ILI) on a year-round basis. A network of laboratories, hospitals, doctor's offices and provincial and territorial ministries of health are routinely providing information to this system.

In Manitoba, sentinel physicians in this network throughout the province report to *FluWatch* weekly. Sentinels can also opt into the voluntary swabbing component of the program. This consists of the submission of either two posterior pharyngeal swabs or two nasopharyngeal swabs within 48 hours of symptom onset from patients presenting with ILI. Requisitions, swabs, and antiviral transport media are available from Cadham Provincial Laboratory (CPL). In response, E&S receives a weekly report from *FluWatch* on the ILI rate for Manitoba and for each participating sentinel physician. In 2015–2016, there were 19 sentinel physicians in Manitoba, a decrease from 24 in 2014–2015.

During the 2015–2016 season, ILI consultations to sentinel physicians occurred year-round. The increase in the percentage of patient visits due to ILI during Weeks 52 and 1 (December 7, 2015–January 9, 2016) might be partially attributable to reduced routine health care services during the holidays. The peak occurred in Week 10 (March 10–12, 2016) with an approximate ILI rate of 4%. This indicator in 2015–2016 demonstrated less seasonality compared with previous seasons (Figure 1), probably due to lower influenza activity. But this could also be attributed to fewer participating physicians this season.



**Figure 1 Weekly percentage of patient visits to sentinel physicians due to ILI, Manitoba, 2015–2016**

### ***Health Links – Info Santé***

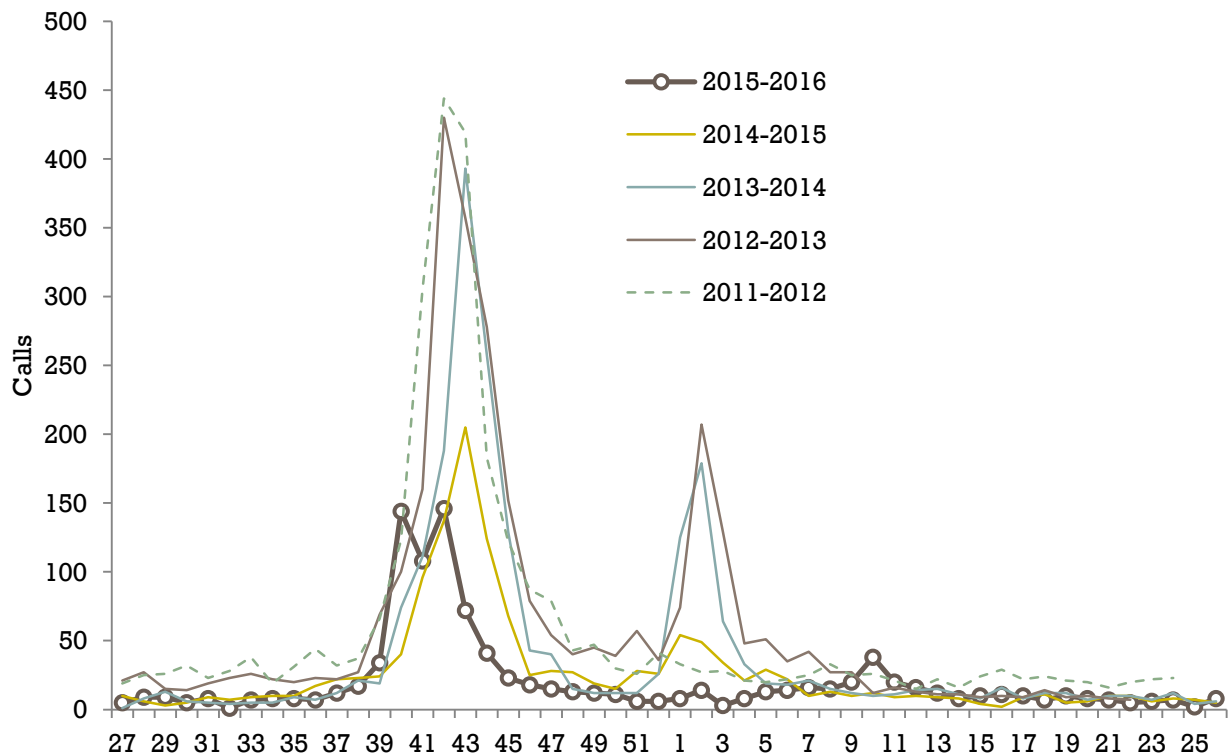
Health Links–Info Santé is one of 30 inbound and outbound calling programs offered by the Provincial Health Contact Centre (PHCC). Implemented in 1994, this bilingual program was the first telephone, nurse-based triage system in Canada. It is operated by Misericordia Health Centre in partnership with MHSAL and the Winnipeg Regional Health Authority (RHA). There are 80 full-time and part-time registered nurses working for this triage system, answering calls 24 hours a day, 365 days a year. Interpreters are available for over 100 different languages.

During each call, a nurse will obtain information about symptoms and follow clinical protocols to offer advice on whether to treat the symptoms at home, see a family doctor, or visit an emergency room. Calls range from concerns about abdominal pain to influenza virus symptoms<sup>2</sup>. Callers to Health Links–Info Santé who select “Influenza Service” are given five options: (1) to obtain information to assist with arranging a flu vaccination, (2) to learn who is

<sup>2</sup> <http://www.misericordia.mb.ca/Programs/PHCC.html>

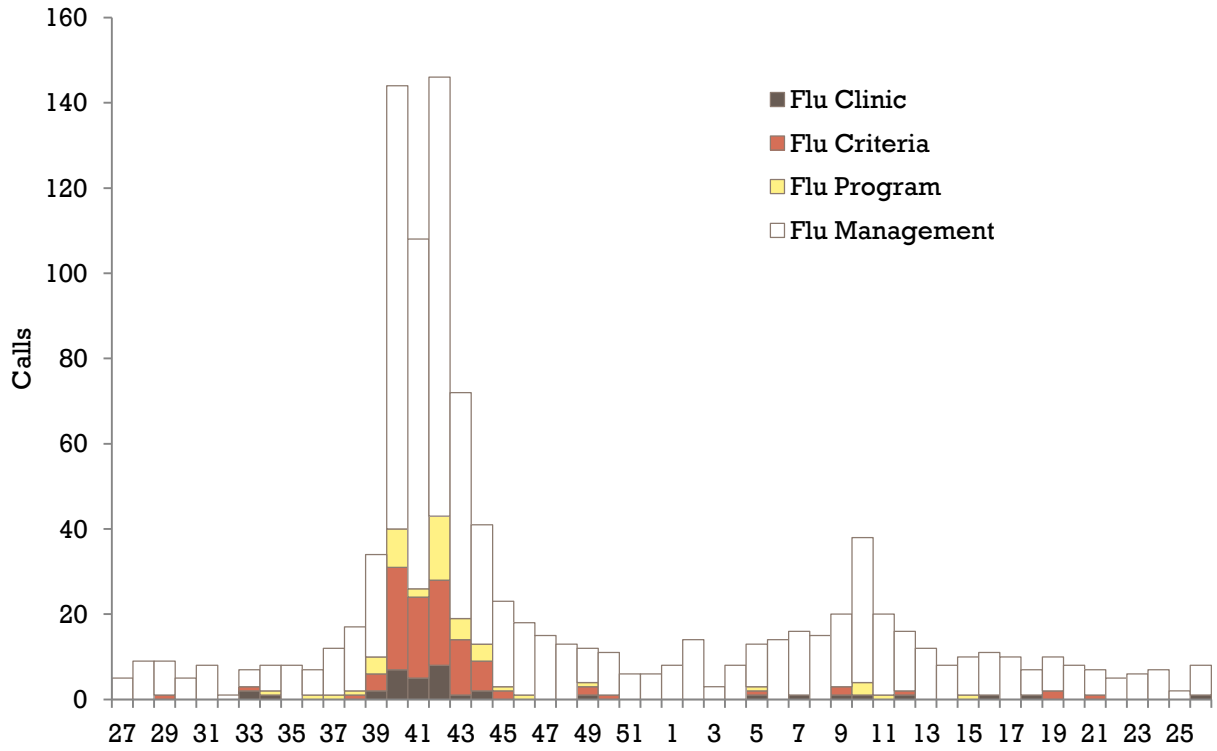
at increased risk of serious illness from the flu, (3) to obtain information about the flu vaccine, (4) to obtain information about the management of flu symptoms and possible complications, and (5) to speak with a nurse. E&S receives aggregate data from Health Links–Info Santé weekly.

Similar to previous seasons, there were two clear peaks in influenza-related calls to Health Links–Info Santé in 2015–2016 (Figure 2). The first peak in Week 40 (October 4–10, 2015) coincided with the launch of the annual Seasonal Influenza Immunization Program.



**Figure 2 Weekly influenza related calls to Health Links–Info Santé, Manitoba, 2015–2016**

The proportion of calls attributed to questions related to the influenza clinics and influenza program also peaked around the same time (Figure 3). The second, and considerably lower peak, occurred in Week 10 (March 10–12, 2016). Compared with the previous seasons, the two peaks in 2015–2016 were much lower.



**Figure 3** Types of influenza related calls to Health Links–Info Santé, Manitoba, 2015–2016

## Laboratory Reporting

Reports of influenza nucleic acid detection, culture isolation and enzyme immunoassay (EIA) detections from CPL (and occasionally other labs) are routinely forwarded to E&S within 24 hours of confirmation. Only Manitoba residents who were registered with MHSAL for health care coverage were included in this report and the specimen collection date was used to assign cases to reporting weeks.

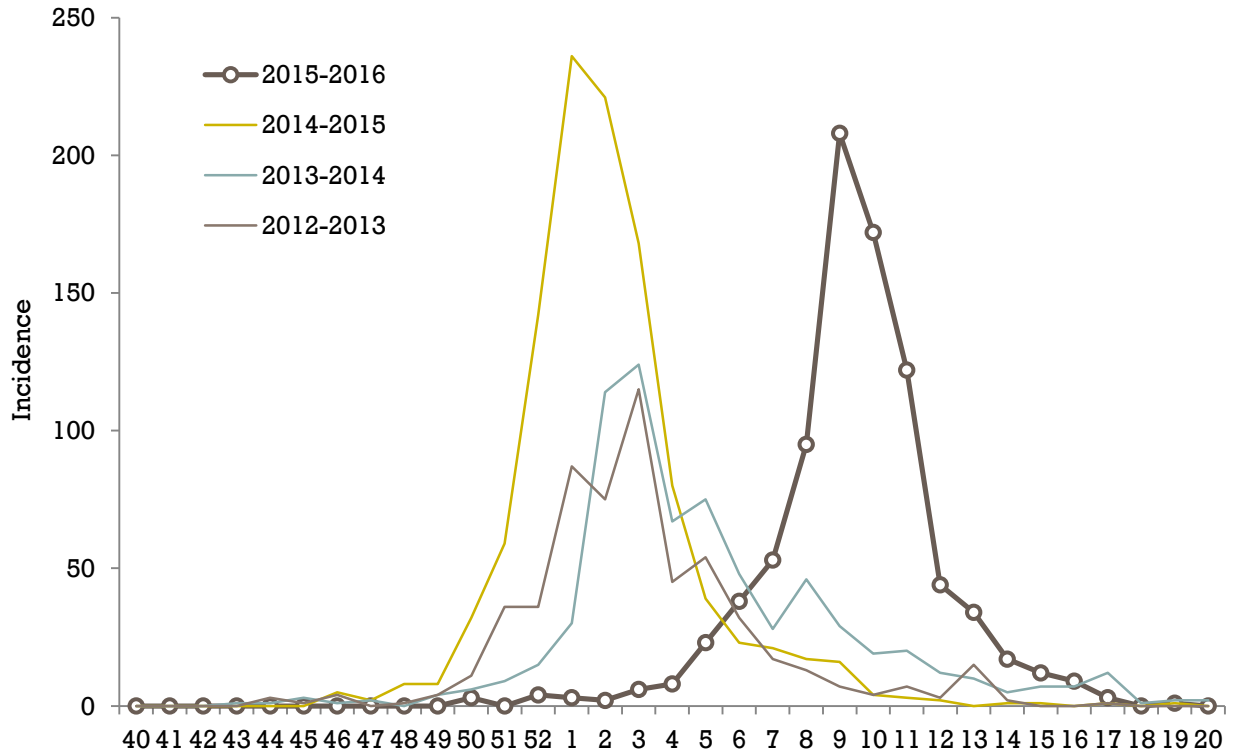
In 2015–2016, there were 864 laboratory-confirmed influenza A cases and 229 influenza B cases among Manitoba residents reported to E&S. Specifically:

- A(unsubtyped): 594 (54.3%)
- A(H1N1): 229 (21.0%)
- A(H3N2): 41 (3.8%)
- B: 229 (21.0%)

The laboratory detection had been predominated by the influenza A(H1N1) subtype. Note that not all individuals experiencing symptoms will seek medical attention and not all clinicians will routinely test cases of ILI for influenza. As such, the number of reports received by E&S will be smaller than the real number of cases in the community.

### *Influenza A*

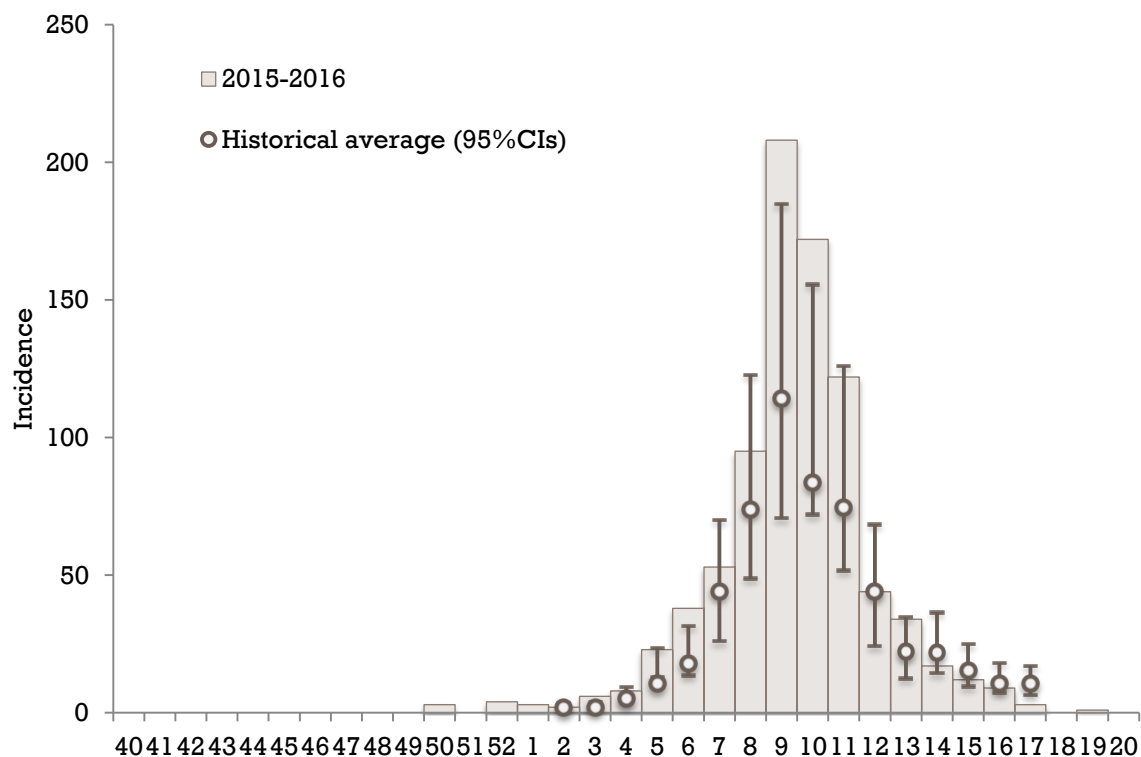
The seasonal epidemic of influenza A in 2015–2016 began in Week 3 (January 17–23, 2015), then increased and peaked in Week 9 (February 28–March 5, 2016). This season was delayed by almost two months compared with the three previous influenza A seasons (Figure 4). Note that 2013–2014 was the last influenza A(H1N1)-predominant season and 2011–2012 was the influenza B-predominant season.



**Figure 4 Weekly incidence of influenza A, Manitoba, 2012–2013 to 2015–2016**

Peak transmission varies widely in different seasons. To compare the current season to previous seasons, the incidence curves of influenza A in previous seasons were aligned with the curve in 2015–2016 by aligning on the peak. Subsequently, the average weekly incidence and 95% confidence intervals (CIs) for influenza A were calculated (Figure 5). In 2015–2016, the incidence in Week 9 and 10 (February 28–March 12, 2014) was significantly higher than the average. Specifically, 208 cases were reported in Week 9 compared to 114, the average peak incidence in previous influenza A seasons.



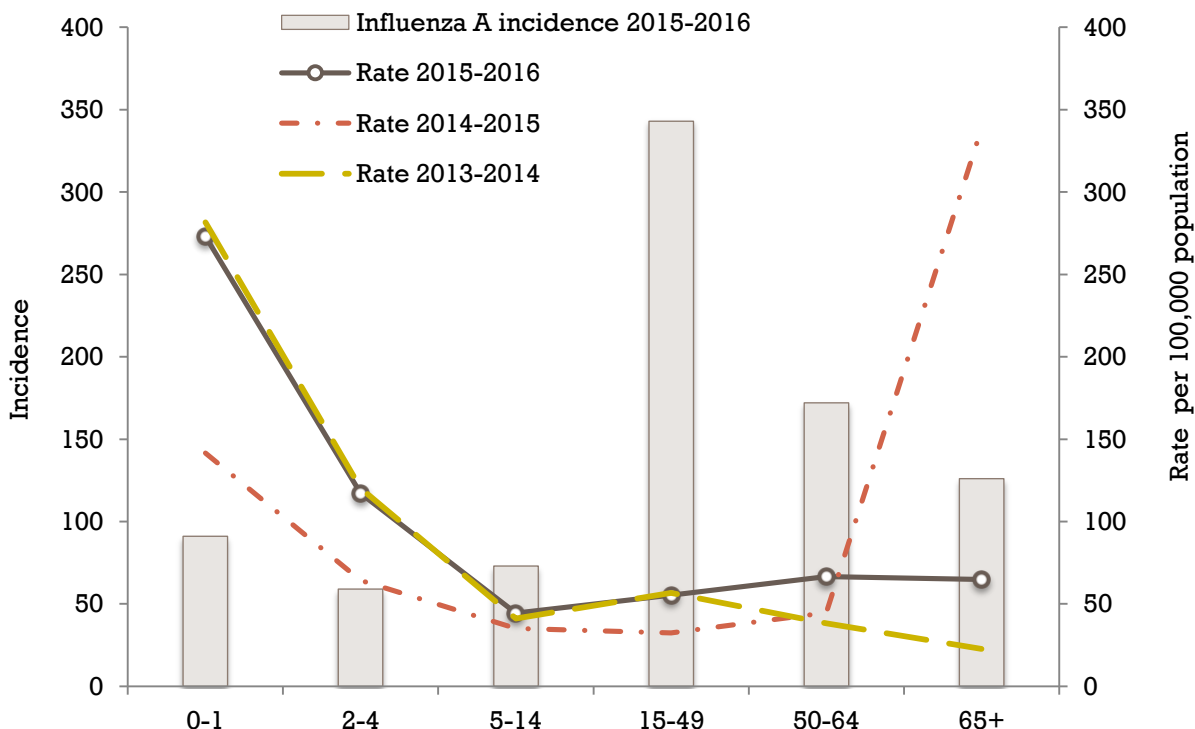


**Figure 5 Weekly incidence of influenza A, Manitoba, 2015–2016 and historical average**

*Note. Only influenza A predominant seasons were included.*

Unlike 2014–2015, younger populations were affected more than older populations in 2015–2016 due to the predominant A(H1N1) subtype (Figure 6). The highest incidence rate was observed among young children two years of age and younger (273 cases per 100,000 population). A total of 91 cases (10.5% of all cases) were reported in this age group<sup>3</sup>. The second highest incidence rate was observed also among children aged between two and four years (117 cases per 100,000 population). The incidence rate among those older than 65 years of age was much lower than in 2014–2015. In general, the disease burden by age group in 2015–2016 was comparable to the last A(H1N1) predominant season, 2013–2014.

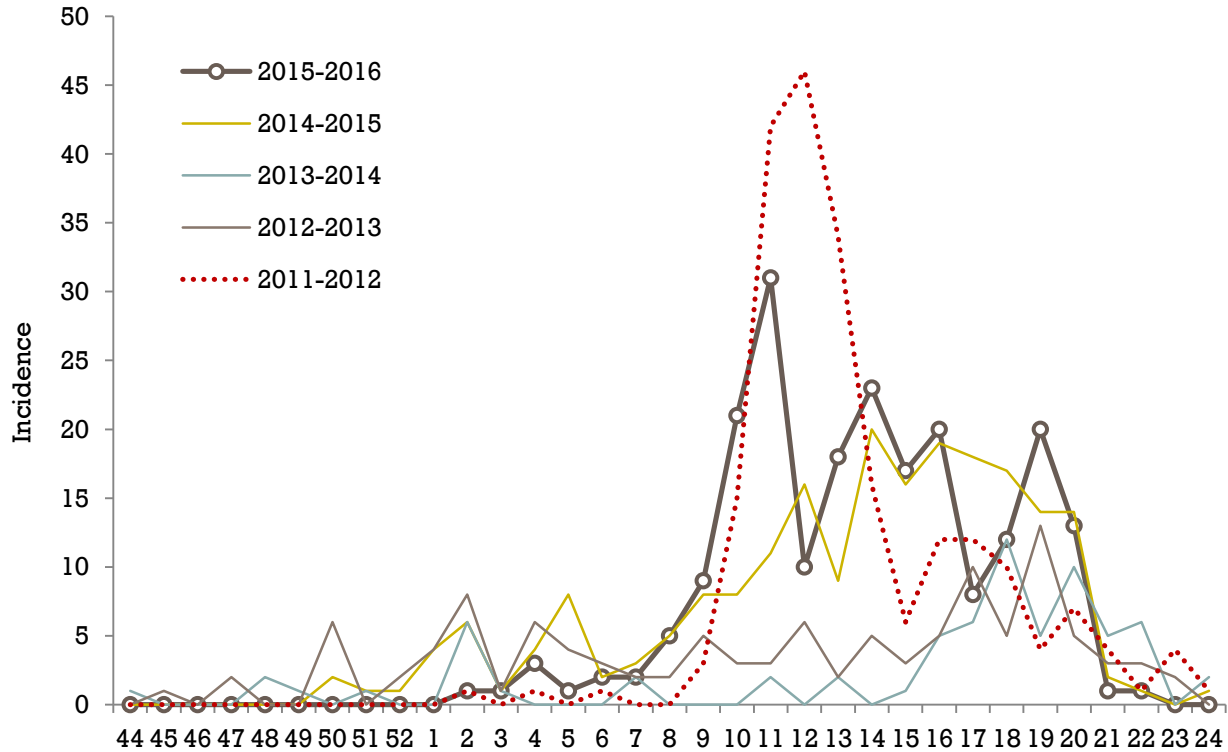
<sup>3</sup> Population counts as denominators in this report were based on all registered residents with MHSAL on June 1, 2015



**Figure 6 Incidence and incidence rate (per 100,000 population) of influenza A by age group, Manitoba, 2015–2016**

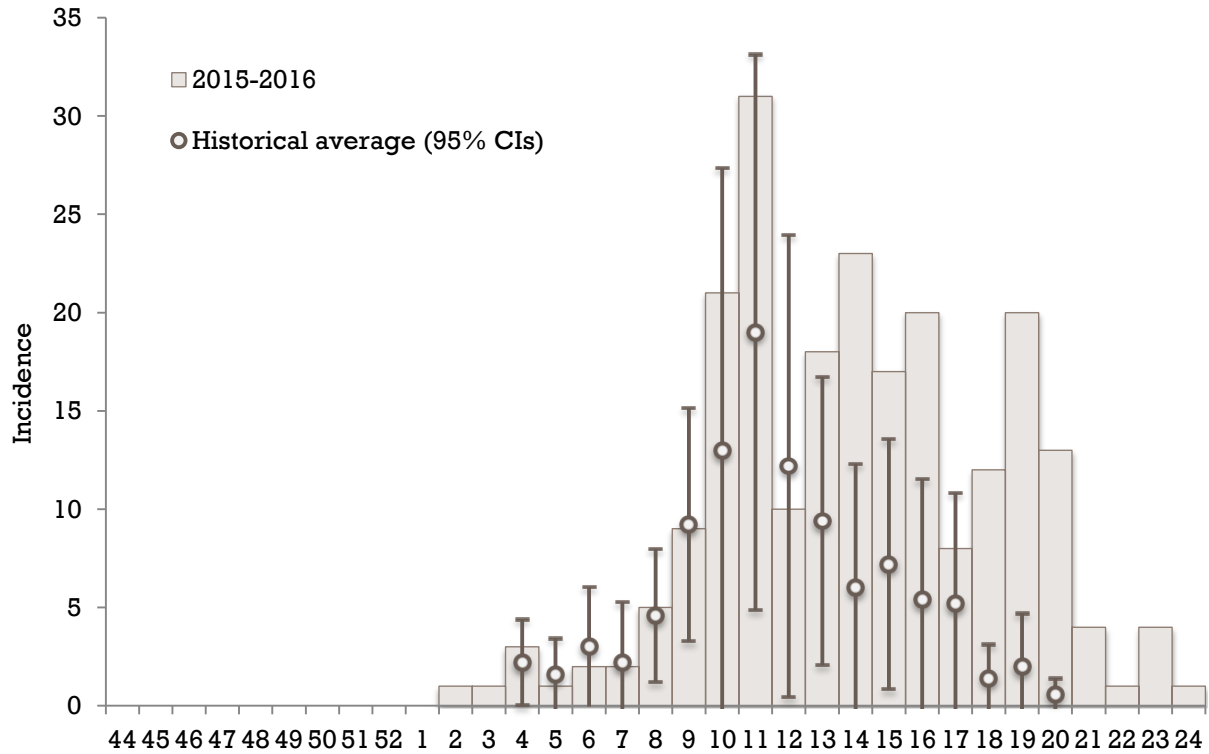
***Influenza B***

In 2015–2016, there were 229 laboratory-confirmed influenza B cases among Manitoba residents. The seasonal epidemic of influenza B began in Week 8 (February 21–27, 2016) and peaked in Week 11 (March 13–19, 2016), two weeks after the peak of influenza A (Figure 7). The elevated influenza B activity sustained until Week 20 (May 15–21, 2016) and resulted in a prolonged influenza B season compared with previous influenza B seasons. Though the peak incidence was the highest in 2011–2012, the influenza B predominant season, the epidemic ended much earlier in that season (Figure 7).



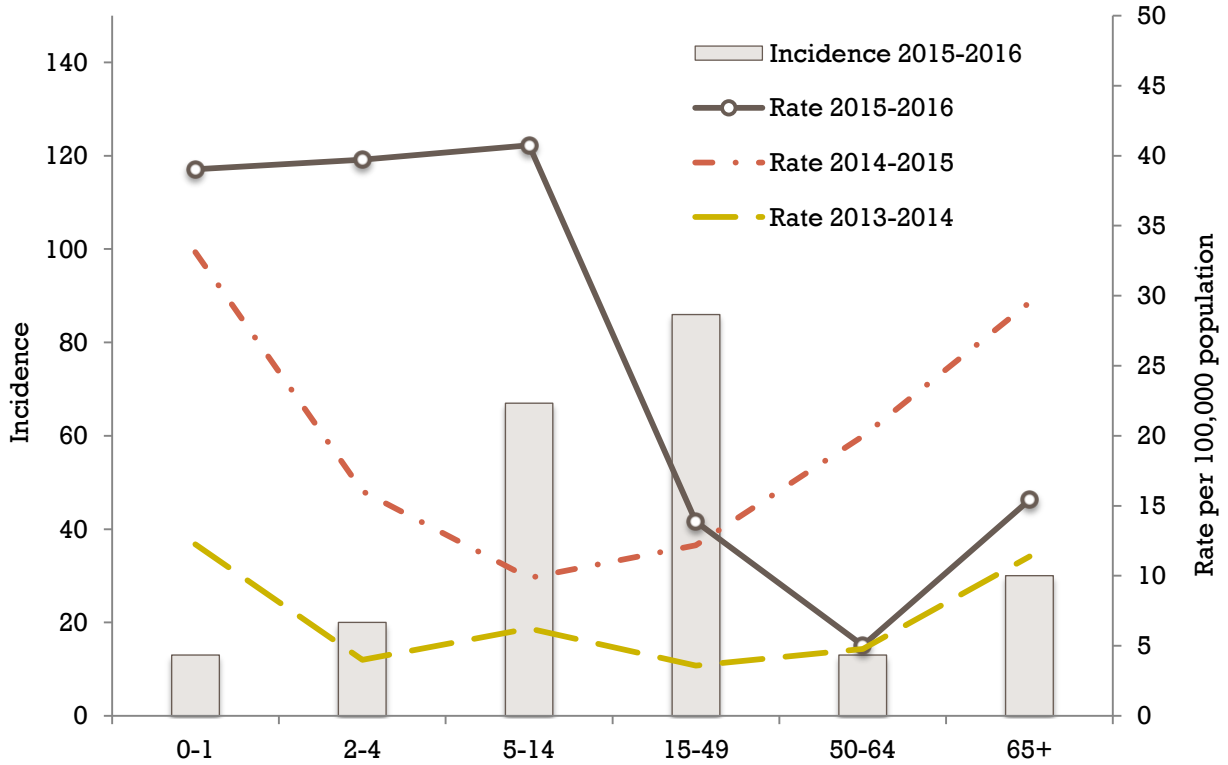
**Figure 7 Weekly incidence of influenza B, Manitoba, 2011–2012 to 2015–2016**

A similar method was used to calculate the historical average incidence each week for influenza B (Figure 8). In 2015–2016, the peak incidence of influenza B was not significantly higher than the historical average. However, from Week 13 (March 27–April 2, 2016), the incidence became significantly higher than the average, indicating a prolonged season.



**Figure 8 Weekly incidence of influenza B, Manitoba, 2015–2016 and historical average**

In 2015–2016, most influenza B cases (86.9%) were under the age of 65 (Figure 9) and young children up to 15 years of age were affected the most (around 40 cases per 100,000 population). Compared to the previous two influenza B seasons, the incidence rate in young children in 2015–2016, especially in those 2 to 14 years of age, was the highest.



**Figure 9 Incidence and incidence rate (per 100,000 population) of influenza B by age group, Manitoba, 2015–2016**

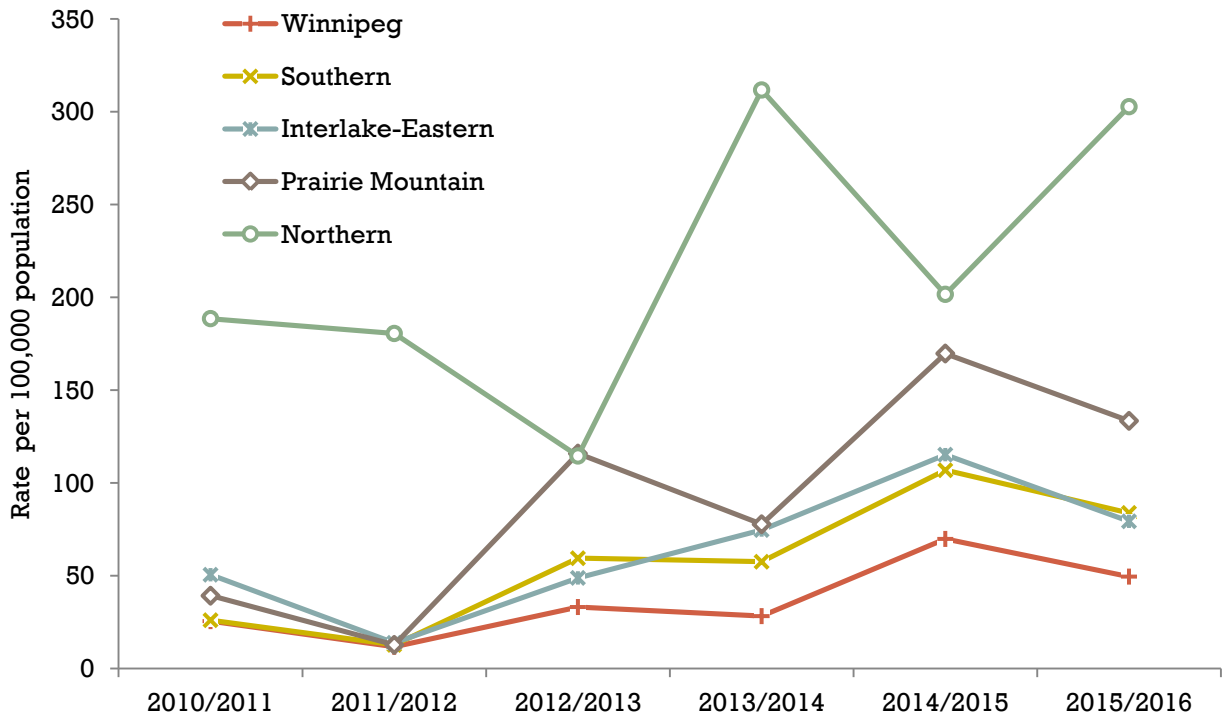
**Regions**

Similar to previous seasons, there were regional differences in 2015–2016 (Table 1). Northern Health Region had the highest incidence rate of influenza A (233 cases per 100,000 population) and influenza B (70 cases per 100,000 population). Prairie Mountain Health had the second highest incidence rate of influenza A (109 cases per 100,000 population) and influenza B (24 cases per 100,000 population).

**Table 1 Incidence and incidence rate (per 100,000 population) of influenza A and B by RHA, Manitoba, 2015–2016**

Region	Influenza A		Influenza B		Total	
	Incidence	Rate	Incidence	Rate	Incidence	Rate
<b>Winnipeg</b>	292	38.7	82	10.9	374	49.6
<b>Southern</b>	129	66.4	34	17.5	163	83.9
<b>Interlake-Eastern</b>	82	64.4	19	14.9	101	79.3
<b>Prairie Mountain</b>	184	109.2	41	24.3	225	133.5
<b>Northern</b>	177	233.1	53	69.8	230	302.9
<b>Manitoba</b>	864	65.4	229	17.3	1,093	82.7

Generally, Winnipeg RHA had the lowest incidence rate of influenza each season except for 2011–2012, the influenza B predominant season, when four RHAs had almost the same incidence rate (Figure 10). Northern Health Region consistently had the highest incidence rate than other RHAs in all seasons except 2013–2014 when Prairie Mountain Health also had a higher incidence rate, similar to Northern Health Region. Additionally, in Northern Health Region, the incidence rate of influenza in 2015–2016 was similar to 2013–2014 (303 cases per 100,000 population), the last influenza A(H1N1) predominant season. Overall, there has been an increasingly higher incidence and incidence rate of laboratory-confirmed influenza in all RHAs.



**Figure 10 Incidence rate (per 100,000 population) of influenza by RHA, Manitoba, 2010–2011 to 2015–2016**

## Hospitalizations, ICU Admissions and Deaths

E&S also routinely monitors and reports the burden of severe illness associated with influenza. Each influenza season on a weekly basis, the central public health office in each RHA is requested to submit a line listing of hospitalizations, ICU admissions and deaths for laboratory-confirmed influenza patients that were admitted to hospitals in the reporting RHA, or deceased as the registered residents of the reporting RHA.

Influenza associated deaths may also be reported from other sources, including:

- Chief Medical Examiner;
- Medical Officers of Health (MOHs) in RHAs; and
- Infection Control Practitioners in LTC facilities.

The reason for hospitalization and ICU admission or, the cause of death, does not have to be attributable to influenza. Instead, a temporal association with a positive influenza laboratory result is sufficient for reporting. Submissions are validated by E&S to remove duplicate submissions for the same patient within the same illness episode. The aggregate numbers of patients admitted to hospitals and ICUs, respectively, and deceased in a reporting week and cumulative for the season are submitted to PHAC for national surveillance on a weekly basis. In this report, only Manitoba residents were included.

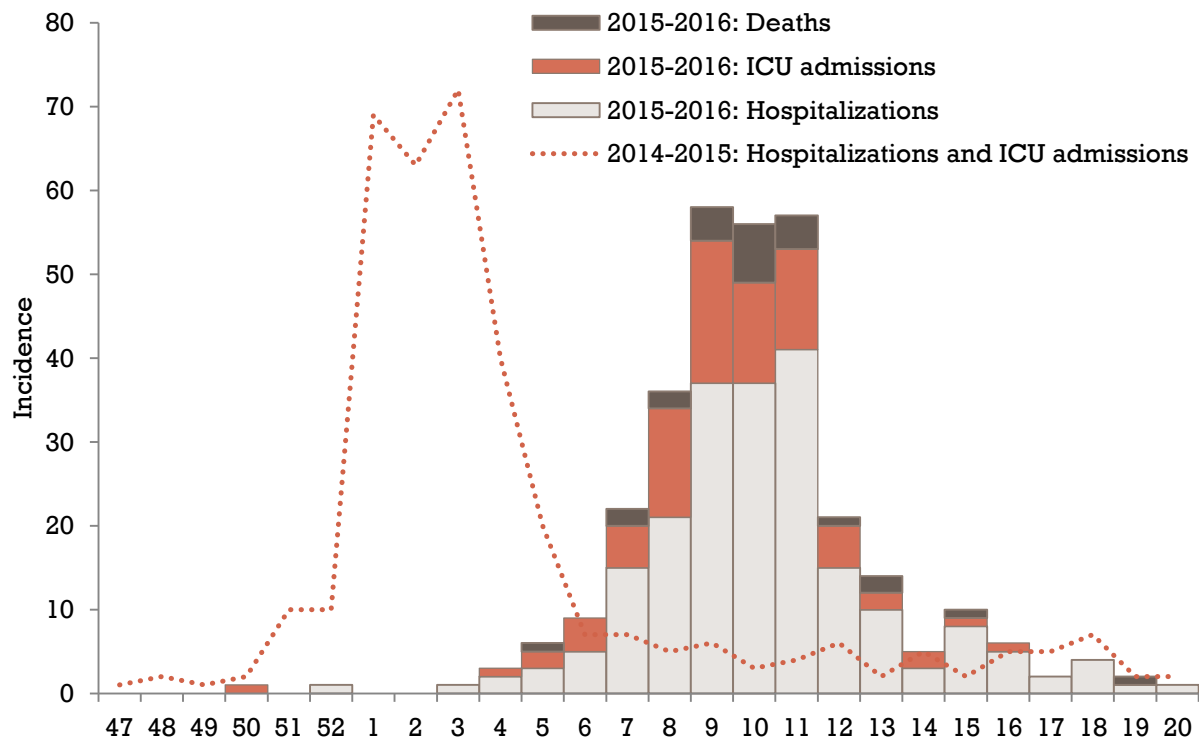
There were 291 influenza associated hospitalizations in 2015–2016 (Table 2), fewer than in 2014–2015 (N=346) but more than in 2013–2014 (N=127). Among those hospitalized patients, 78 were admitted to ICUs, more than in both 2014–2015 (N=62) and 2013–2014 (N=44). In 2015–2016, 26.6% of all influenza patients were reported to have been admitted to hospital, (27.1% in 2014–2015), and 7.1% to ICUs (4.8% in 2014–2015). A total of 25 influenza associated deaths were reported and most occurred in hospital. The majority of the hospitalizations (N=256, 88.0%), ICU admissions (N=73, 93.6%) and deaths (N=22, 88.0%) were associated with influenza A.



**Table 2 Hospitalizations, ICU admissions and deaths by influenza type, Manitoba, 2015–2016**

Type/subtype	Hospitalizations		ICU admissions		Deaths	
	N	%	N	%	N	%
<b>Influenza A (unsubtyped)</b>	164	56.4%	28	35.9%	5	20.0%
<b>Influenza A H1N1 Pandemic 2009</b>	79	27.1%	39	50.0%	16	64.0%
<b>Influenza A(H1N1)</b>	2	0.7%	1	1.3%	0	0.0%
<b>Influenza A(H3)</b>	11	3.8%	5	6.4%	1	4.0%
<b>Influenza B</b>	35	12.0%	5	6.4%	3	12.0%
<b>Total</b>	<b>291</b>		<b>78</b>		<b>25</b>	

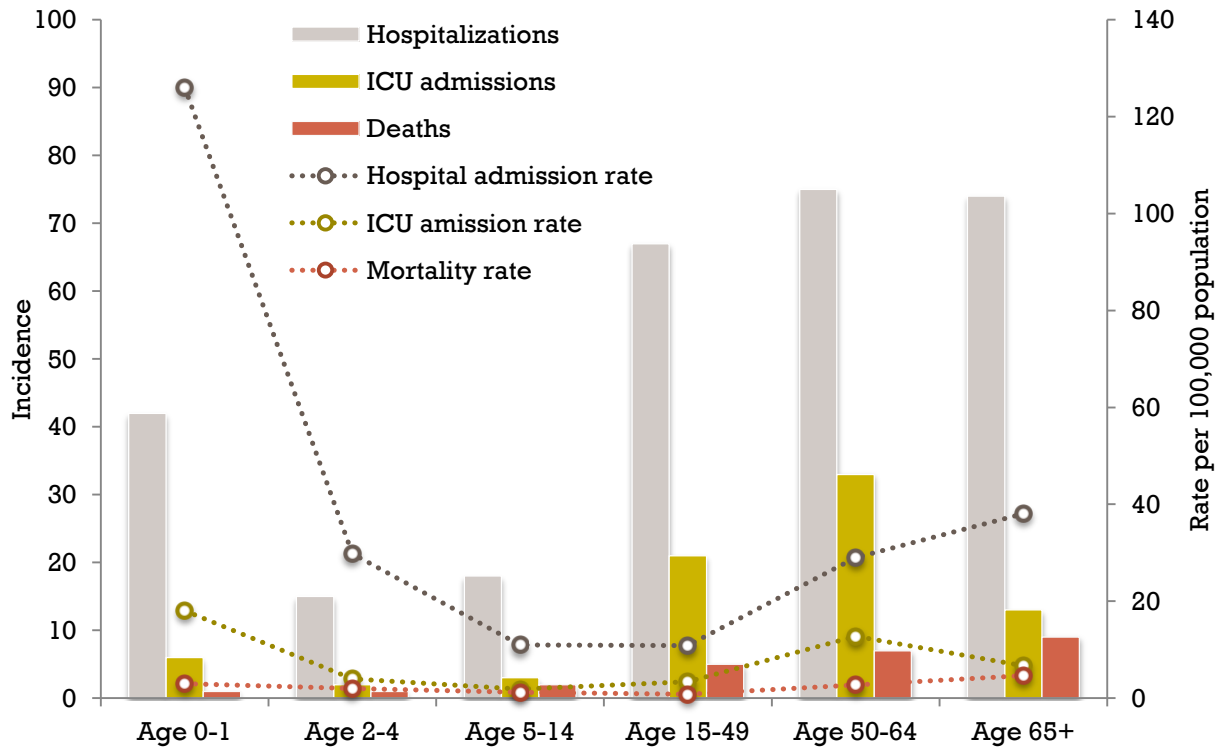
Unlike other indicators, a high incidence of influenza associated severe outcomes sustained for three weeks (Figure 11) from Week 9 (February 28–March 5) to Week 11 (March 13–19). Of the 25 influenza associated deaths, 15 occurred in these three weeks.



**Figure 11 Weekly incidence of influenza associated hospitalizations, ICU admissions, and deaths, Manitoba, 2015–2016**

*Note. ICU admissions are not included in the hospitalizations*

In 2015–2016, younger populations were more vulnerable to the influenza associated severe illness due to the predominating A(H1N1)pdm09 strain (Figure 12). Most hospitalized and deceased influenza patients were aged younger than 65 years of age. The highest rate for influenza associated hospitalizations was observed among patients below one year of age (126 hospitalizations per 100,000 population).



**Figure 12 Incidence and incidence rate (per 100,000 population) of influenza associated hospitalizations, ICU admissions, and deaths by age group, Manitoba, 2015–2016**

## Outbreaks

As outlined in Manitoba's Communicable Disease Management Protocol–Seasonal Influenza<sup>4</sup>, the common definition of an institutional outbreak is:

*Two or more cases of ILI (including at least one laboratory–confirmed case) occurring within a seven-day period in an institution. An institution includes but is not limited to hospitals, long-term care facilities for both adults and children (e.g., personal care homes, nursing homes, chronic care facilities) and correctional facilities.*

Each influenza season, suspected and confirmed outbreaks are reported to E&S from public health staff within RHAs. CPL also notifies E&S of outbreaks, for which specimens have been collected and shipped to CPL for laboratory confirmation. In this report, an outbreak was considered an influenza outbreak if an ILI outbreak had at least one laboratory confirmed influenza case.

Between July 1, 2015 and June 30, 2016, there were 21 influenza outbreaks reported in Manitoba: 18 outbreaks of influenza A, 2 outbreaks of influenza B, and 1 mixed outbreak of influenza A and B. The majority of those outbreaks were reported from LTC facilities.

Four RHAs reported influenza outbreaks:

- Winnipeg RHA: 11
- Southern Health-Santé Sud: 5
- Interlake-Eastern RHA: 2
- Prairie Mountain Health: 3

The weekly outbreak reports increased in alignment with influenza activity (Figure 13) in other indicators and peaked in Week 9 (February 28–March 5, 2016). Note that ILI outbreaks were reported year-round and when influenza activity increased, there were more ILI outbreaks.

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<sup>4</sup> <http://www.gov.mb.ca/health/publichealth/cdc/protocol/influenza1.pdf>

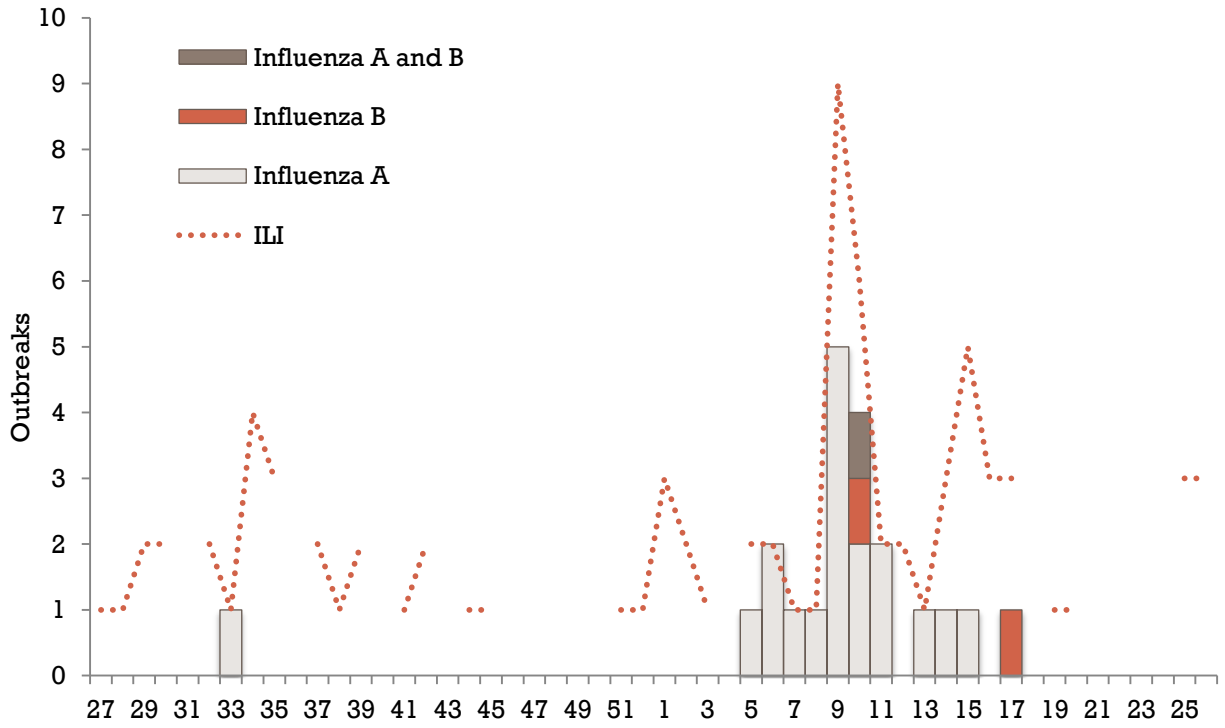
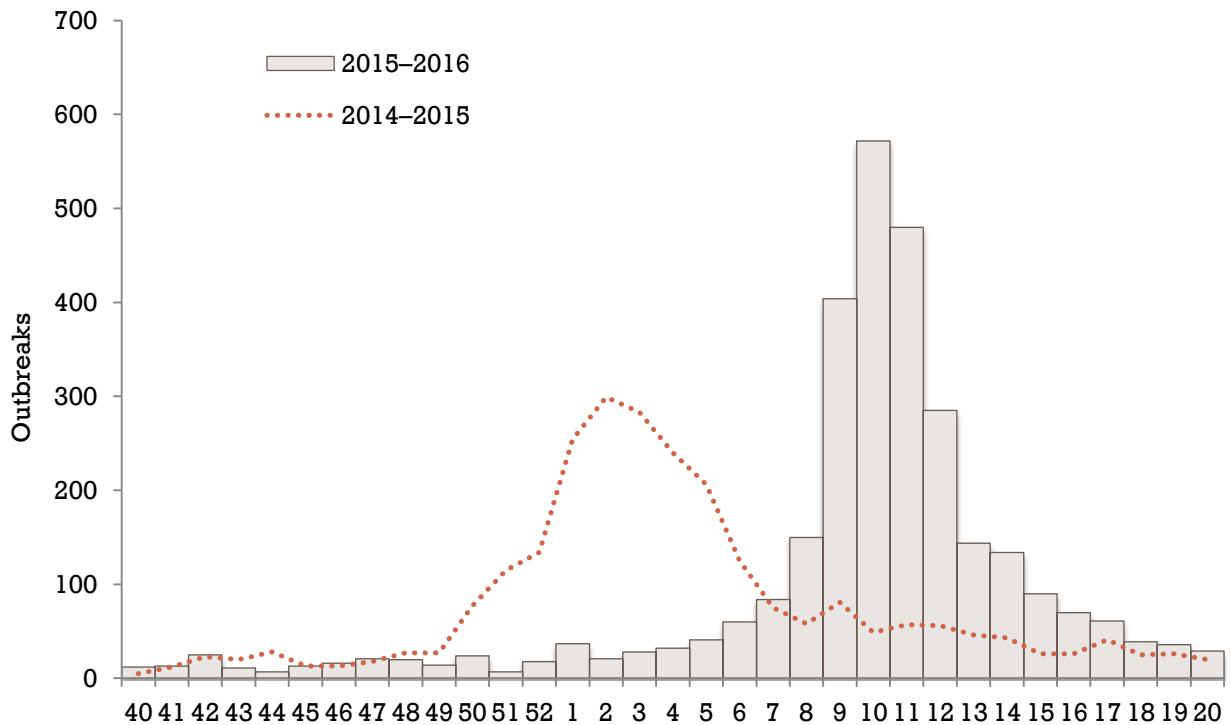


Figure 13 Weekly outbreaks of influenza A and B, Manitoba, 2015–2016

### Antiviral Dispensing

The daily units of antiviral drug, Oseltamivir (Tamiflu®), dispensed since October 1 to Manitoba residents are obtained from the Drug Programs Information Network (DPIN) on a weekly basis during each influenza season. Only drugs dispensed from community retail pharmacies were included in this report. Those dispensed in hospitals or nursing stations could not be included due to a lack of data.

Between October 1, 2015 and May 21, 2016, a total of 3,002 units of Oseltamivir were dispensed from community retail pharmacies. The units of Osteltamivir dispensed each week almost paralleled the laboratory detections of influenza (Figure 14), though the peak in Week 10 (March 6–12, 2016) was one week behind. Compared with 2014–2015, considerably more units of Oseltamivir were dispensed, probably due to more symptomatic patients.



**Figure 14 Weekly dispensing of Oseltamivir, Manitoba, 2015–2016**

## Immunizations

### *Uptake*

In 2015–2016, the quadrivalent seasonal influenza vaccine was available free-of-charge to all Manitoba residents over 6 months of age. As in previous seasons, MHSAL conducted an influenza immunization program for all Manitobans that focused on those at increased risk of serious illness from influenza, their caregivers and close contacts, including<sup>5</sup>:

- Seniors aged 65 or older
- Residents of a LTC facility
- Health care workers and first responders
- Children 6 to 59 months of age
- Individuals of Aboriginal ancestry
- Those with chronic illness, such as:
  - Cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis and asthma);
  - Diabetes mellitus and other metabolic disorders;
  - Cancer, immune compromising conditions (due to underlying disease and/or therapy);
  - Renal disease;
  - Anemia or hemoglobinopathy;
  - Conditions that compromise the management of respiratory secretions and are associated with an increased risk of aspiration; and,
  - Children 6 months to adolescents 18 years of age on long-term acetylsalicylic acid (i.e. Aspirin) therapy
- People who are severely overweight or obese
- Healthy pregnant women

In addition, international students, visitors and newcomers were eligible to receive the seasonal influenza vaccine free-of-charge regardless of the third party insurance or MHSAL coverage.

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<sup>5</sup> <http://www.gov.mb.ca/health/flu/index.html>

As per the World Health Organization (WHO), all seasonal quadrivalent influenza vaccines for the 2015–2016 season in the northern hemisphere contained:

- A/Switzerland/9715293/2013(H3N2)-like virus;
- A/California/7/2009(H1N1)pdm09-like virus;
- B/Phuket/3073/2013-like virus;
- B/Brisbane/60/2008-like virus (not included in the trivalent influenza vaccine).

In 2015–2016, two vaccines were included in the province’s Publicly-Funded Seasonal Influenza Immunization Program:

- Quadrivalent inactivated vaccine (QIV)—Fluzone® Quadrivalent (Sanofi Pasteur)
- Quadrivalent live attenuated influenza vaccine (QLAIV)—FluMist® Quadrivalent (AstraZeneca)

Immunization data for previous annual influenza reports were extracted from the Manitoba Immunization Monitoring System (MIMS). MIMS is a mainframe registry application with a listing of all immunizations administered to Manitoba residents. MIMS was initiated in 1988 for childhood immunizations provided to children born in 1980 or later. Adult immunizations were entered since 2000. For the 2015–2016 annual report, all immunization data were extracted from the new provincial immunization registry, Panorama. Panorama is a Public Health application for disease surveillance and management. It was developed by IBM Canada on behalf of the provinces and territories for implementation across Canada. Panorama contains five modules and two modules have been implemented in Manitoba as of spring 2016:

- Immunization Management – records immunization events. This module became fully functional in February 2015. All the immunization data in MIMS were incrementally imported into Panorama:
  - creates and manages immunization schedules and eligibility;
  - applies logic to forecast immunizations due in future;
  - maintains client records including consent and special considerations;
  - records adverse events following immunization;
  - manages mass immunization clinic events for large groups;
  - built-in reports, e.g., reports on coverage rates.
- Vaccine Inventory Management – manages and monitors vaccine inventories:
  - supports cold-chain monitoring during storage and transport;

- facilitates distribution and sharing in case of an outbreak;
- supports vaccine recall.

Seasonal influenza immunizations were captured in Panorama in one of three ways:

- immunizations administered by physicians were imported into Panorama from the Physician Billing System.
- immunizations administered by pharmacists were imported into Panorama from the Drug Processing Information System (DPIN).
- immunizations provided by all other health care providers including public health nurses were entered by data entry staff in the RHAs.

In facilities that Panorama has not been implemented, immunizations were entered into MIMS and loaded from MIMS to Panorama weekly. Therefore, immunization data in Panorama are considered comprehensive. However, it has been identified that some immunizations were not captured in either Panorama or MIMS, typically in facilities without access to either system. The impact of those missing records on the immunization assessment is unknown.

Between September 1, 2015 and March 31, 2016, a total of 292,066 influenza vaccine doses were administered to 286,160 patients. A small number of patients received more than one dose due to medical reasons or reasons unknown. For example, patients nine years of age and younger should receive two doses of influenza vaccine if the first time to be immunized with the influenza vaccine.

The overall influenza vaccine coverage in Manitoba was 21.7% as of March 31, 2016 in the registered Manitoba residents (Table 3). The age group over 65 had the highest coverage (54.4%) followed by the age groups of 50–64 (25.4%) and 0–4 (22.0%). In comparison, the age group 15–49 had the lowest coverage (12.0%).



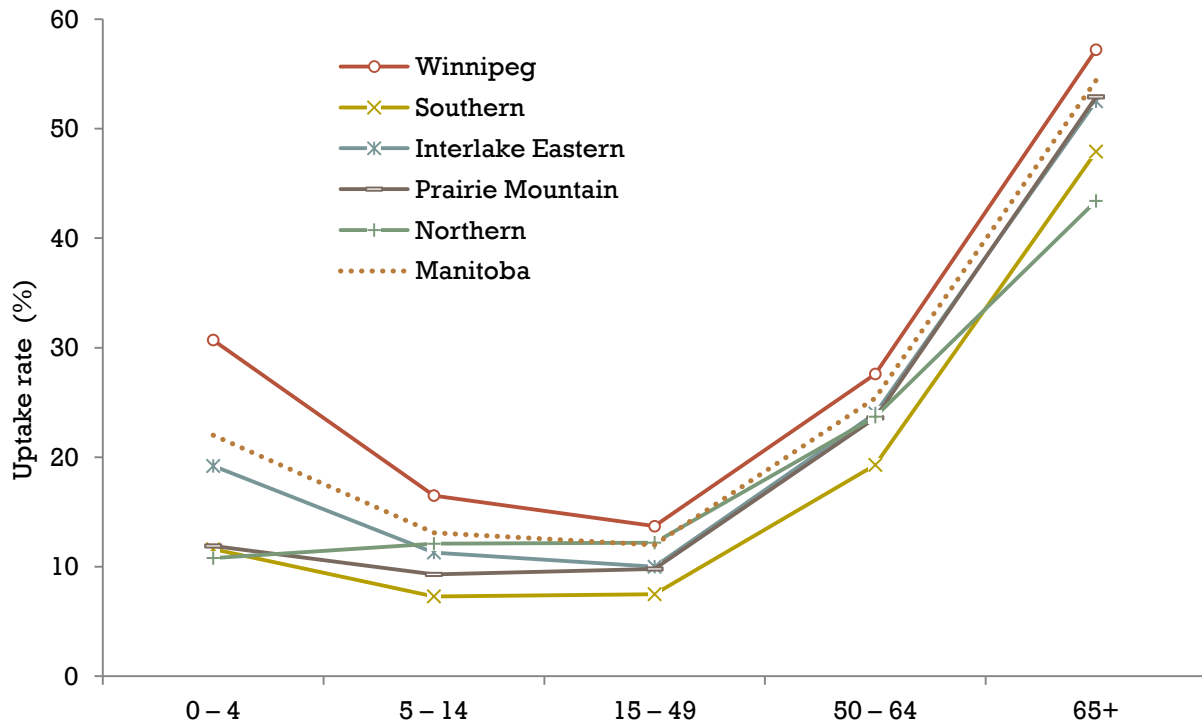
**Table 3 Influenza immunization coverage (%) by RHA and age group, Manitoba, 2015–2016**

Age	Winnipeg	Southern	Interlake Eastern	Prairie Mountain	Northern	Manitoba
0 – 4	30.7	11.6	19.2	11.9	10.8	22.0
5 – 14	16.5	7.3	11.3	9.3	12.1	13.1
15 – 49	13.7	7.5	10.0	9.8	12.2	12.0
50 – 64	27.6	19.3	24.0	23.6	23.7	25.4
65+	57.2	47.9	52.5	52.9	43.4	54.4
<b>Total</b>	<b>24.3</b>	<b>15.2</b>	<b>21.4</b>	<b>20.4</b>	<b>15.9</b>	<b>21.7</b>

*Note. Immunizations up to March 31, 2016.*

Regional variance continued to be present in immunization uptake. The highest coverage, 24%, was observed in Winnipeg RHA and the lowest, 15%, in Southern Health-Santé Sud. This regional variance was not even across all age groups. In some age groups, the variance was more prominent (Figure 15). In young children below five years of age, coverage in Winnipeg RHA (30.7%) was almost three times the coverage in Northern Health Region (10.8%), Southern Health-Santé Sud (11.6%), and Prairie-Mountain Health (11.9%).

Coverage in Northern Health Region among the 5–64 age group was similar to the provincial average. However, coverage in the very young group aged below five and in the older group aged above 65 was the lowest among all health regions.



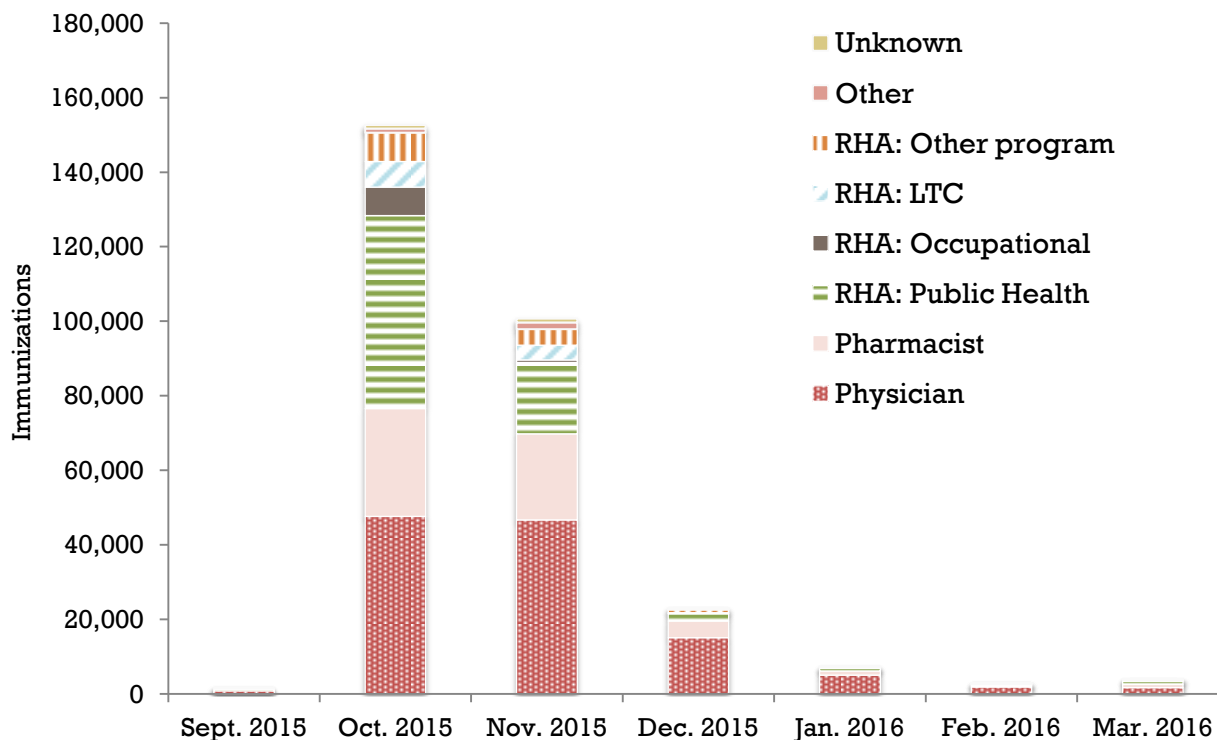
**Figure 15 Influenza immunization coverage rate (%) by RHAs and age group, Manitoba, 2015–2016**

***Service Providers***

Immunization providers in this report were categorized by the organizations or programs that the providers belonged to when delivering immunizations. More information pertaining to the provider and the regional program the provider worked for was captured if an immunization record was entered directly into Panorama by staff in RHAs. For this report, providers were categorized as:

- physician,
- pharmacist,
- RHA–Public health,
- RHA–Occupational,
- RHA–Long term care (LTC),
- RHA–Other programs,
- other providers including private physicians, pharmacists and correction facilities,
- unknown providers due to missing values.

In 2015–2016, physicians, pharmacists and various RHA programs delivered 98% of the total influenza immunizations. Similar to previous seasons, public health nurses and physicians were the two major service providers in 2015–2016. Each group delivered 25.6% and 40.7% of the total immunizations respectively. Compared with last season, physicians administered over 7,000 more immunizations in 2015–2016. In their second year eligible to administer the seasonal influenza vaccine, pharmacists delivered 58,915 immunizations, or 20.2% of the total, in Manitoba in 2015–2016 (Table 4), an increase from 49,642 (17%) in 2014–2015.



**Figure 16 Influenza immunizations by provider type and month, Manitoba, 2015–2016**

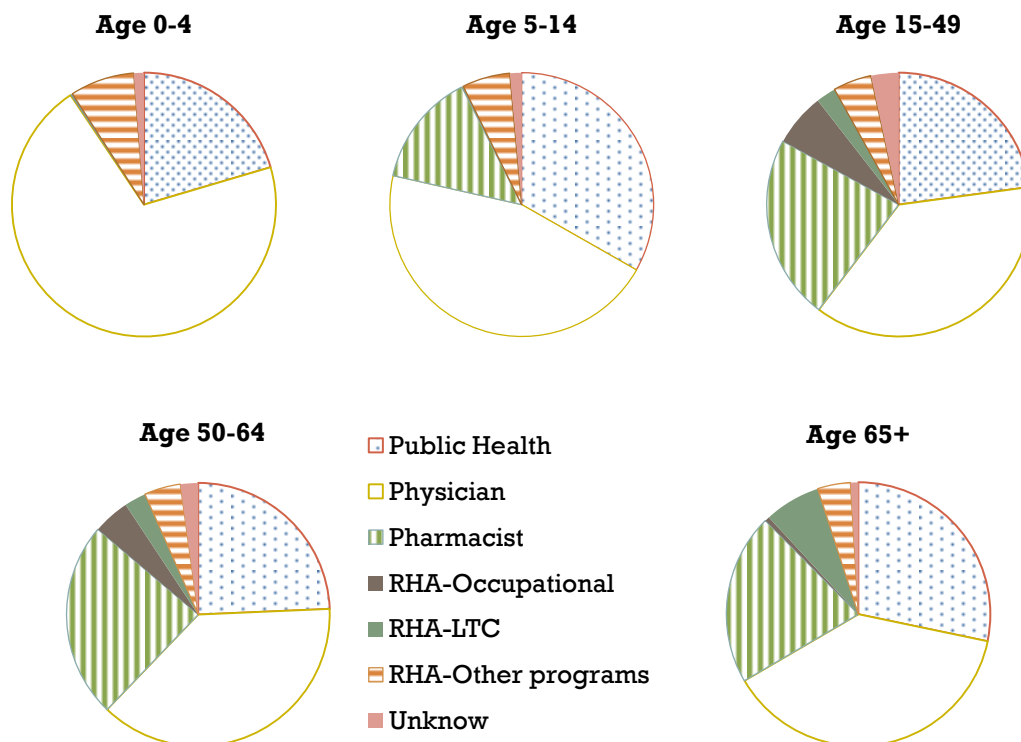
The majority of immunizations (86%) were delivered in October and November of 2015, before seasonal activity increased. Additionally, immunization providers distributed their service with a different schedule. Public health nurses delivered immunizations most rigorously in October. Physicians and pharmacists delivered a similar amount of immunizations in October and November (Figure 16).

**Table 4 Influenza immunizations by provider type, Manitoba, 2015–2016**

Age	Public Health	Physician	Pharmacist	Occupational	LTC	Other Programs	Unknown	Total
<b>0-4</b>	20.4%	70.2%	0.2%	0.0%	0.0%	7.9%	1.3%	19,932
<b>5-14</b>	33.2%	45.3%	14.0%	0.0%	0.2%	5.8%	1.4%	21,415
<b>15-49</b>	22.9%	37.5%	22.6%	6.5%	2.5%	4.7%	3.4%	75,454
<b>50-64</b>	24.3%	37.9%	24.0%	4.5%	2.7%	4.5%	2.2%	67,163
<b>65+</b>	28.3%	38.3%	21.0%	0.6%	6.9%	4.0%	1.0%	108,102
<b>Total</b>	<b>75,349</b> (25.8%)	<b>118,818</b> (40.7%)	<b>58,915</b> (20.2%)	<b>8,524</b> (2.9%)	<b>11,144</b> (3.8%)	<b>13,708</b> (4.7%)	<b>5,608</b> (1.9%)	<b>292,066</b>

*Note. As per The Manitoba Pharmaceutical Act and Regulations, pharmacists are authorized to administer seasonal influenza immunizations to people 7 years of age and older.*

Each type of immunization provider served different age groups (Table 4). As expected, physicians were the major service provider for all age groups, especially in young children below five years of age. In this age group, 70% of the total immunizations were delivered by physicians. Public health nurses were also a major service provider for all age groups, delivering 22.9%–33.2% of the total. Pharmacists have become important in immunizing patients older than seven years of age (consistent with provincial regulations) (Figure 17).



**Figure 17 Influenza immunizations by provider type and patient age, Manitoba, 2015–2016**

### ***Adverse Events Following Immunization (AEFIs)***

AEFIs are reported from different sources. Per *The Food and Drugs Act* and Regulations, vaccine manufacturers are required to report to PHAC all serious AEFI reports with vaccines for which they are the Market Authorization Holder within 15 days of knowledge of their occurrence. No other legal requirement for reporting AEFI exists nationally.

In Manitoba, an AEFI is reportable under *The Public Health Act* as prescribed in the Immunization Regulation (C.C.S.M. c.P210) if it is temporally associated with an immunizing agent, cannot be attributed to a co-existing condition, and if it meets at least one of the following criteria:

- a. The event is serious in nature:
  - life-threatening;
  - could result in permanent disability;
  - requires hospitalization or urgent medical attention;
  - or for any other reason considered to be of a serious nature.
- b. The event is unusual or unexpected, including but without limitation:
  - an event not previously identified;

- an event previously identified but with an increased frequency.
- c. At the time of the report, the event cannot be explained by anything in the patient’s medical history, such as a recent disease or illness, or the taking of medication.

Health care professionals who become aware of reportable AEFIs are to report them within seven days by creating an AEFI report in Panorama or completing the AEFI form<sup>6</sup> and submitting to their regional MOHs. Data for this report were extracted from a provincial AEFI database. AEFI data for 2015–2016 in the provincial AEFI database and Panorama were synchronized during the transition of systems. It is expected that AEFI data for 2016–2017 will be extracted from Panorama.

A total of 57 reports of influenza vaccine related AEFIs were received by MHSAL during the 2015–2016 influenza season, dated between October 9, 2015 and January 28, 2016. The incidence rate of AEFI was 19.5 reports per 100,000 doses administered. The majority of those AEFI reports (93%) were related to Fluzone® Quadrivalent.

The mean age of patients with AEFIs at the time of reporting was 38 years. Patients at the highest risk for AEFIs were children under 15 years of age (Table 5). Particularly, the only two patients (4%) admitted to hospital due to severity were four and five years of age respectively. There were more female patients (68%).

**Table 5 Adverse events following influenza immunization by age group, Manitoba, 2015–2016**

Age group	Reports	Rate per 100, 000 doses
0–4	7	35.1
5–14	9	42.0
15–49	18	23.9
50–64	15	22.3
65+	8	7.4
<b>Total</b>	<b>57</b>	<b>19.5</b>

<sup>6</sup> [http://www.gov.mb.ca/health/publichealth/cdc/docs/aeifi\\_form.pdf](http://www.gov.mb.ca/health/publichealth/cdc/docs/aeifi_form.pdf)

Each AEFI report may contain multiple adverse events. Overall, allergic and allergic-like events were the most commonly reported AEFIs (52.6%) in all ages (Table 6). Three types of allergic reactions were captured in AEFI reports: anaphylaxis, oculo-respiratory syndrome (ORS), and the other allergic events. ORS occurred with at least one of the following symptoms: red eyes, cough, wheeze, chest tightness, difficulty breathing, sore throat, or facial swelling, that started within 2 to 24 hours of influenza vaccination and resolved within 48 hours of symptom onset<sup>7</sup>. First observed during the 2000–2001 season, ORS was linked to all influenza vaccines used in Canada. In 2015–2016, one third of the allergic and allergic-like reactions were reported to be ORS. Local reactions at or near the vaccination site were the second most commonly reported adverse events (49.1%).

**Table 6 Adverse events following influenza immunization by event type, Manitoba, 2015–2016**

	Adverse events	% of reports
Allergic or allergic-like event	30	52.6%
Local reaction	28	49.1%
Neurologic events	4	7.0%
Other defined event of interest	12	22.2%

Most AEFIs this season were mild. However, two patients were hospitalized and 11 patients were treated in Emergency Rooms (Table 7).

<sup>7</sup> <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/05vol31/dr3121a-eng.php>

**Table 7 Severity of adverse events following influenza immunization, Manitoba, 2015–2016**

Care required	Reports	%
None	15	26.3%
Non-urgent visit	17	29.8%
Telephone advice from health professional	10	17.5%
Emergency visit	11	19.3%
Hospitalization	2	3.5%
Prolongation of existing hospitalization	0	0.0%
Unknown	2	3.5%
<b>Total</b>	<b>57</b>	

The majority of the patients with AEFIs required only low-level care or no care. At the time of reporting, there were no deaths as a result of AEFI, and over half patients had fully recovered (Table 8).

**Table 8 Outcomes of adverse events following influenza immunization, Manitoba, 2015–2016**

Patient outcome	Reports	%
Fully recovered	30	52.6%
Not yet recovered	20	35.1%
Permanent disability	0	0.0%
Death	0	0.0%
Unknown	7	12.3%
<b>Total</b>	<b>57</b>	



### Strain Characterization and Antiviral Resistance

Influenza and Respiratory Viruses Section (IRVS) at the National Microbiology Laboratory (NML) undertakes enhanced surveillance, investigations and research on influenza and other respiratory pathogens. IRVS develops, evaluates and improves molecular techniques and reagents to early detect and identify potential epidemic and pandemic influenza strains and other new emerging respiratory viruses. As a routine practice, NML also antigenically characterizes influenza viruses received from Canadian laboratories. In Manitoba, a random sample of positive influenza specimens isolated by culture is referred from CPL to NML for strain characterization. Routine testing for antiviral resistance is also performed by NML. The aggregate results of strain characterization and antiviral resistance are shared with Canadian provinces and territories on a weekly basis.

The same as in Canada overall, the 2015–2016 season in Manitoba was predominated by the A/California/7/2009(H1N1)-like strain. Influenza viruses of the B/Victoria lineage predominating the influenza B detections were characterized as B/Brisbane/60/2008-like, the vaccine virus included only in the quadrivalent vaccines.

**Table 9 Strain characterization of influenza isolates, Manitoba and Canada, 2015–2016**

Influenza Strain	Canada	Manitoba
A/Switzerland/9715293/2013(H3N2)-like	76	3
A/California/7/2009(H1N1)-like	1,458	46
B/Phuket/3073/2013-like	251	6
B/Brisbane/60/2008-like	942	27

*Note. Reports between September 1, 2015 and June 30, 2016*

Between September 1, 2015 and June 30, 2016, NML reported that all influenza isolates submitted from Manitoba were susceptible to the antivirals, Oseltamivir and Zanamivir. However, nationally, ten influenza A(H1N1) isolates demonstrated resistance to Oseltamivir (Table 10). In comparison, all Manitoba viruses tested were resistant to Amantadine.

Table 10 Antiviral resistance of influenza isolates, Manitoba and Canada, 2015–2016

Virus	Zanamivir		Oseltamivir		Amantadine	
	Resistant	Sensitive	Resistant	Sensitive	Resistant	Sensitive
<b>Manitoba</b>						
<b>A(H3N2)</b>	0	3	0	3	8	0
<b>A(H1N1)</b>	0	33	0	33	46	0
<b>B</b>	0	20	0	20	N/A	N/A
<b>Canada</b>						
<b>A(H3N2)</b>	0	186	0	186	245	1
<b>A(H1N1)</b>	0	1,098	10	1,088	1,471	0
<b>B</b>	0	721	0	721	N/A	N/A

*Note. Reports between September 1, 2015 and June 30, 2016*

## Conclusion

This annual report aims to summarize the season in its broad trends while being cautious about possible causes of a change in data. However, there are a number of challenges in influenza surveillance. First, influenza surveillance is inherently biased towards more severe outcomes. The real burden of influenza is likely underestimated because not all individuals experiencing symptoms will seek medical attention and not all ILI cases will be tested for influenza. As such, a set of indicators monitoring different severity levels of illness were selected for surveillance. Second, surveillance data can be affected by multiple factors, such as public awareness, laboratory technique, test ordering pattern, circulating strains, vaccine formulation, staff change, and people's behaviour, etc. The change in data caused by those factors may or may not represent a real change in seasonal activity.

The 2015–2016 influenza season started in late January 2016 and peaked at the end of February 2016, much later than the three previous seasons. Influenza A(H1N1)pdm09 viruses has been predominating. Unlike influenza A(H3N2), the A(H1N1)pdm09 strain has been associated with severe illness in younger populations after the virus emerged in the 2009 pandemic and again in 2013–2014. This season, as expected, there were higher rates of illness in younger populations, especially those below five years of age. A higher number of ICU admissions were also observed as a result. Overall, the 2015–2016 season was less severe compared with 2014–2015, the influenza A(H3N2)-predominant season, and was similar to 2013–2014, the last influenza A(H1N1)-predominant season.

The majority of viruses characterized this season were antigenically similar to the reference viruses representing the recommended components for the 2015–2016 Northern Hemisphere quadrivalent influenza vaccine. As a result, vaccine effectiveness was higher in 2015–2016 compared with 2014–2015, when there was a mismatch between circulating strains and components in the vaccine. The mid-season estimate of vaccine effectiveness in Canada was 64% (95%ICs: 44–77%) against medically attended and laboratory-confirmed

A(H1N1)pdm09 illness<sup>8</sup>. In the United States, the seasonal vaccine effectiveness estimate was 47% against influenza infections (95% CIs: 39%–53%)<sup>9</sup>.

The population coverage of influenza immunizations has been relatively stable over the past several seasons, between 20% and 22%. Regional variance continued to be present in 2015–2016, especially in certain age groups. In young children 0–4 years of age, the coverage rate in Winnipeg RHA was almost three times the coverage in Northern Health Region, Prairie-Mountain Health, and Southern Health-Santé Sud.

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<sup>8</sup> Skowronski, D.M. et al. (2016). Interim estimates of 2015/16 vaccine effectiveness against influenza A(H1N1)pdm09, Canada, February 2016. *Euro Surveill*, 20(4).

<sup>9</sup> Centers for Disease Control and Prevention (2016). *Seasonal Influenza Vaccine Effectiveness, 2005-2016*. Retrieved from <https://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm>