



Michigan Influenza Surveillance Summary 2010-2011 Influenza Season

Michigan Department of Community Health
August 11, 2011



SEASONAL INFLUENZA

The 2010-2011 influenza season (defined as October 3, 2010 through October 1, 2011) was a moderate influenza season. For the purposes of this report, data for the 2010-2011 season will be described from October 3, 2010 through May 28, 2011 unless otherwise indicated.

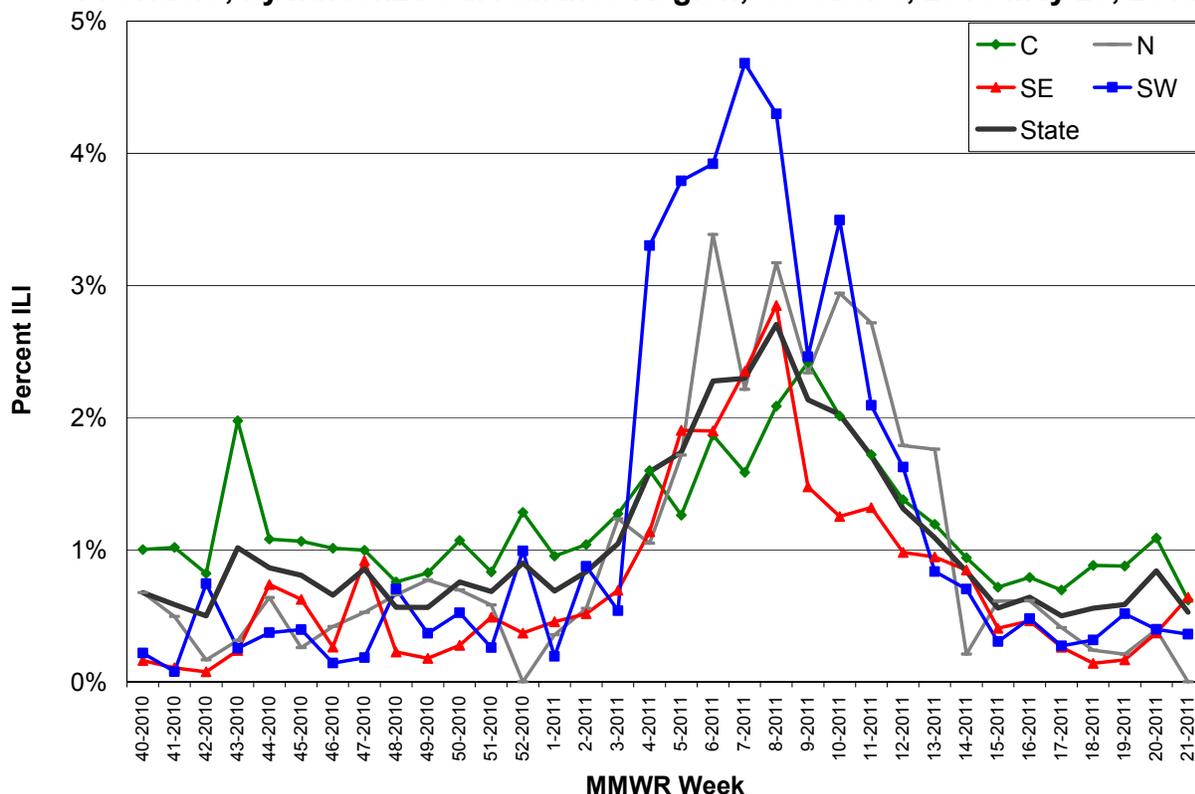
The 2010-2011 influenza season had a moderate level of activity that was typical of most non-pandemic influenza seasons in Michigan; influenza activity was much lower than that seen during the pandemic 2009-2010 influenza season. The majority of Michigan Department of Community Health (MDCH) influenza surveillance systems indicated that influenza activity peaked in late February of 2011. Michigan reported “widespread” statewide influenza activity, the highest level of reporting to the Centers for Disease Control and Prevention (CDC), for six straight weeks from the week ending February 12, 2011 through the week ending March 19, 2011 (MMWR Weeks 6-11). Peak activity in Michigan occurred slightly later than the majority of the nation but was similar to the timing of peak activity in other Midwestern states.

The first positive influenza specimen at the MDCH Bureau of Laboratories was announced on October 18, 2010. In contrast to the 2009-2010 influenza season in which 2009 influenza A (H1N1) viruses constituted almost 100% of circulating influenza viruses, the 2010-2011 season saw a mix of circulating influenza A (H3N2), 2009 A (H1N1) and B viruses.

Sentinel Provider Data

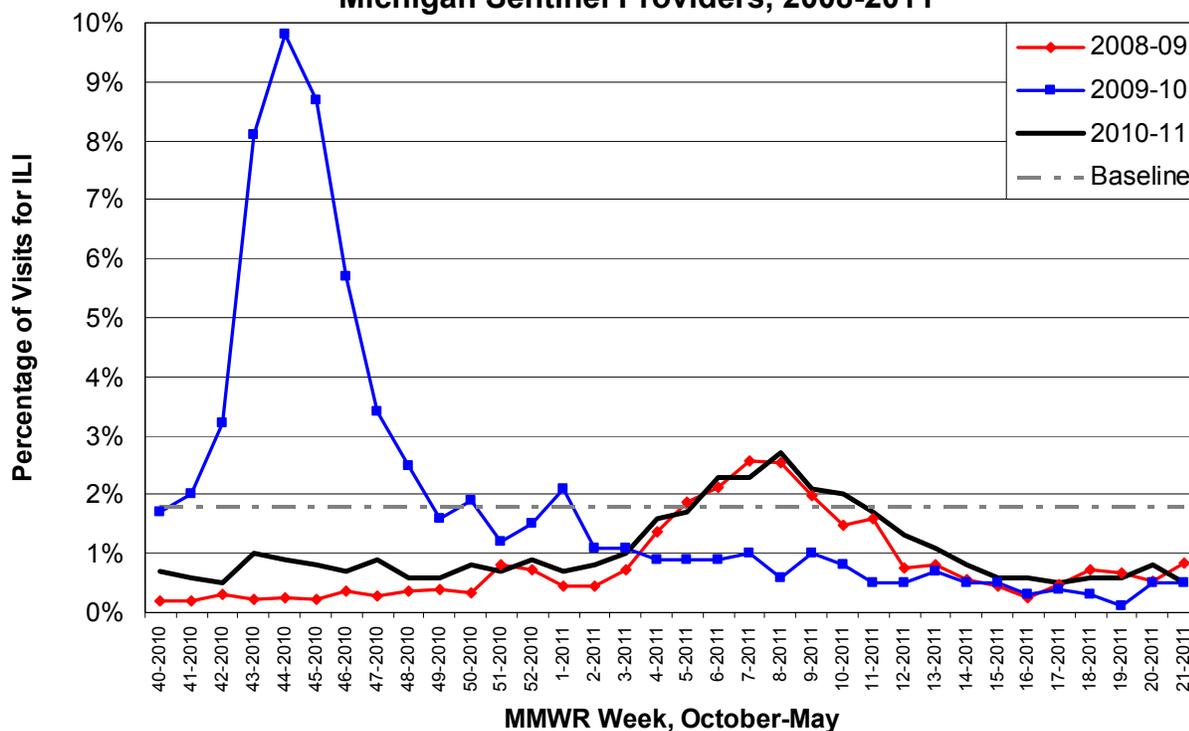
Healthcare providers participating in the Michigan component of the CDC U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) report weekly the percentage of healthcare visits due to influenza-like illness (ILI). Rates of ILI began to increase during the week ending January 8, 2011, peaked at 2.7% during the week ending February 26 (MMWR Week 8) and started a gradual decline the following week (Figure 1). Activity in each of the four surveillance regions followed a similar pattern, peaking between mid-to-late February. Since sentinel practices in each region vary by type, size, and number, these data should not be used to make direct comparisons of intensity among regions.

Figure 1. Percentage of Influenza-like Illness Visits Reported by Michigan Sentinel Providers, by Influenza Surveillance Region, October 3, 2010-May 28, 2011



The 2010-2011 season was very similar to the 2008-2009 season; both peaked in late February with comparable ILI activity (2.7% vs. 2.6%, respectively) (Figure 2). During the pandemic 2009-2010 influenza season, ILI activity peaked in late October at 9.8%, well above historic norms.

Figure 2. Percentage of Visits for Influenza-like Illness Reported by Michigan Sentinel Providers, 2008-2011



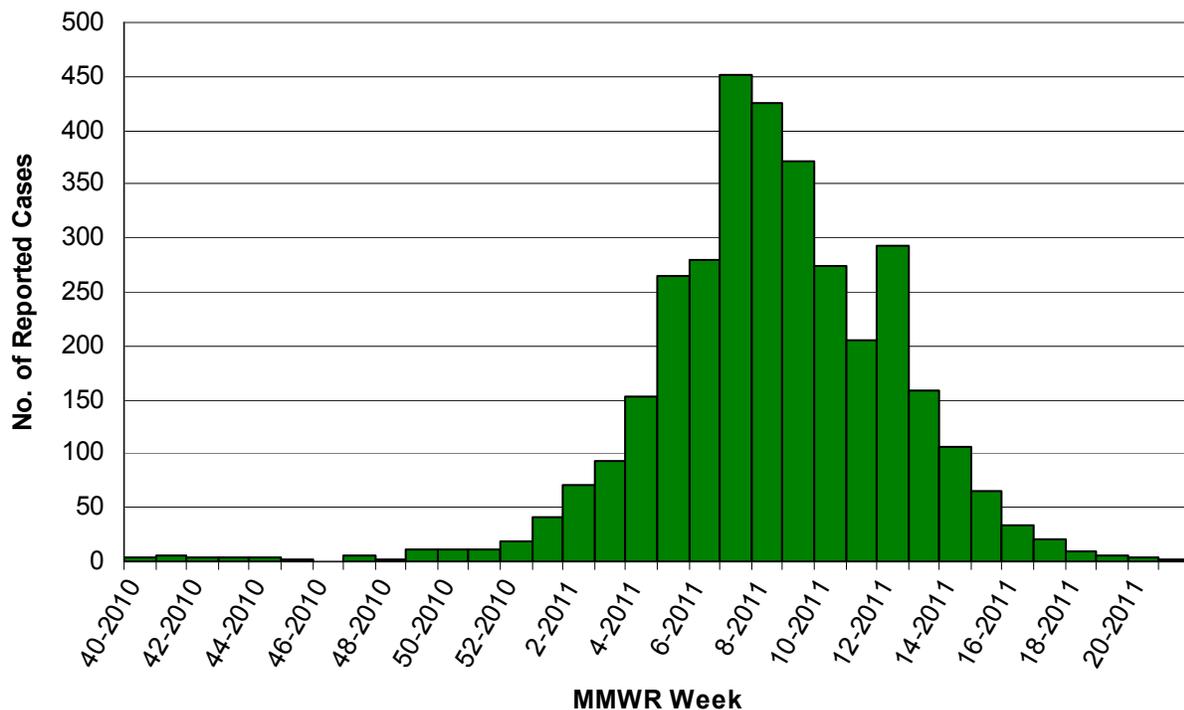
Individual Influenza Reports

Cases included in the data below are probable, confirmed, suspect or unknown status, with an investigation status of completed, completed-followup, active, review or new. Data may not be representative of the statewide impact of influenza as local health departments are not required to individually report influenza; in addition, the greater number of reports from large local health departments may unintentionally bias statewide results.

From October 3, 2010 to May 28, 2011, 3406 individual cases were reported into the Michigan Disease Surveillance System (MDSS). By comparison, 11,599 cases were reported during the 2009-2010 influenza season, which covered a longer time period (April 2009-September 2010) because of the emergence of the pandemic 2009 influenza A (H1N1) virus.

Individual case referrals into MDSS peaked during the week ending February 19, 2011 (MMWR Week 7) at 451 cases (Figure 3). In comparison, during the 2009-2010 influenza season, 1608 cases were seen during the peak in the week ending November 7, 2009 (MMWR Week 44). While the number and timing of individually reported influenza cases was much lower and later for the 2010-2011 season when compared to the 2009-2010 season, these data were similar to reports from the 2007-2008 and 2008-2009 non-pandemic influenza seasons. Data during the 2009-2010 season were higher due to the emergence of the pandemic 2009 influenza A (H1N1) virus and an increase in influenza laboratory testing for individual patients.

Figure 3. Individually Reported Influenza Cases in the Michigan Disease Surveillance System, with Referral Dates from October 3, 2010 to May 28, 2011



For this influenza season, the median age of individually reported cases was 25 years, with a mean of 30 years. Age was unknown for 8 cases. In contrast, during the 2009-2010 season the median age was 14 years. The 25-49 year old age group represented 27.5% of all cases (Table 1). When comparing the 2009-2010 and 2010-2011 seasons (Table 2), cases increased for all age groups during the 2010-2011 season except the 5-18 year olds, which had a notable decrease. When interpreting these data, one should consider the possibility of age-related reporting or testing bias between different influenza seasons. Fifty-three percent of cases were female during this season.

Table 1. Individually Reported Influenza Cases in the Michigan Disease Surveillance System by Month and Age Group, with Referral Dates from October 3, 2010-May 28, 2011

Month	Number of Cases and Percentage of Monthly Total, by Age Group												Total	
	0-4 years		5-18 years		19-24 years		25-49 years		50-64 years		≥65 years			
October	6	40.0%	0	0.0%	1	6.7%	3	20.0%	1	6.7%	4	26.7%	15	0.4%
November	2	20.0%	0	0.0%	2	20.0%	5	50.0%	1	10.0%	0	0.0%	10	0.3%
December	6	10.9%	12	21.8%	8	14.5%	13	23.6%	7	12.7%	9	16.4%	55	1.6%
January	52	12.1%	94	22.0%	53	12.4%	146	34.1%	38	8.9%	45	10.5%	428	12.6%
February	254	17.4%	376	25.7%	139	9.5%	400	27.3%	176	12.0%	118	8.1%	1463	43.0%
March	199	17.1%	294	25.3%	70	6.0%	302	25.9%	153	13.1%	146	12.5%	1164	34.2%
April	37	15.0%	52	21.1%	13	5.3%	61	24.8%	35	14.2%	48	19.5%	246	7.2%
May	3	16.7%	2	11.1%	1	5.6%	6	33.3%	3	16.7%	3	16.7%	18	0.5%
Total	559	16.4%	830	24.4%	287	8.4%	936	27.5%	414	12.2%	373	11.0%	3399	100.0%

Table 2. Percentage of Individual Influenza Cases in the Michigan Disease Surveillance System by Age Group, 2009-2010 and 2010-2011 Influenza Seasons

Season	0-4 years	5-18 years	19-24 years	25-49 years	50-64 years	≥65 years
2009-2010	13.5%	48.4%	6.9%	18.8%	8.3%	4.1%
2010-2011	16.4%	24.4%	8.4%	27.5%	12.2%	11.0%

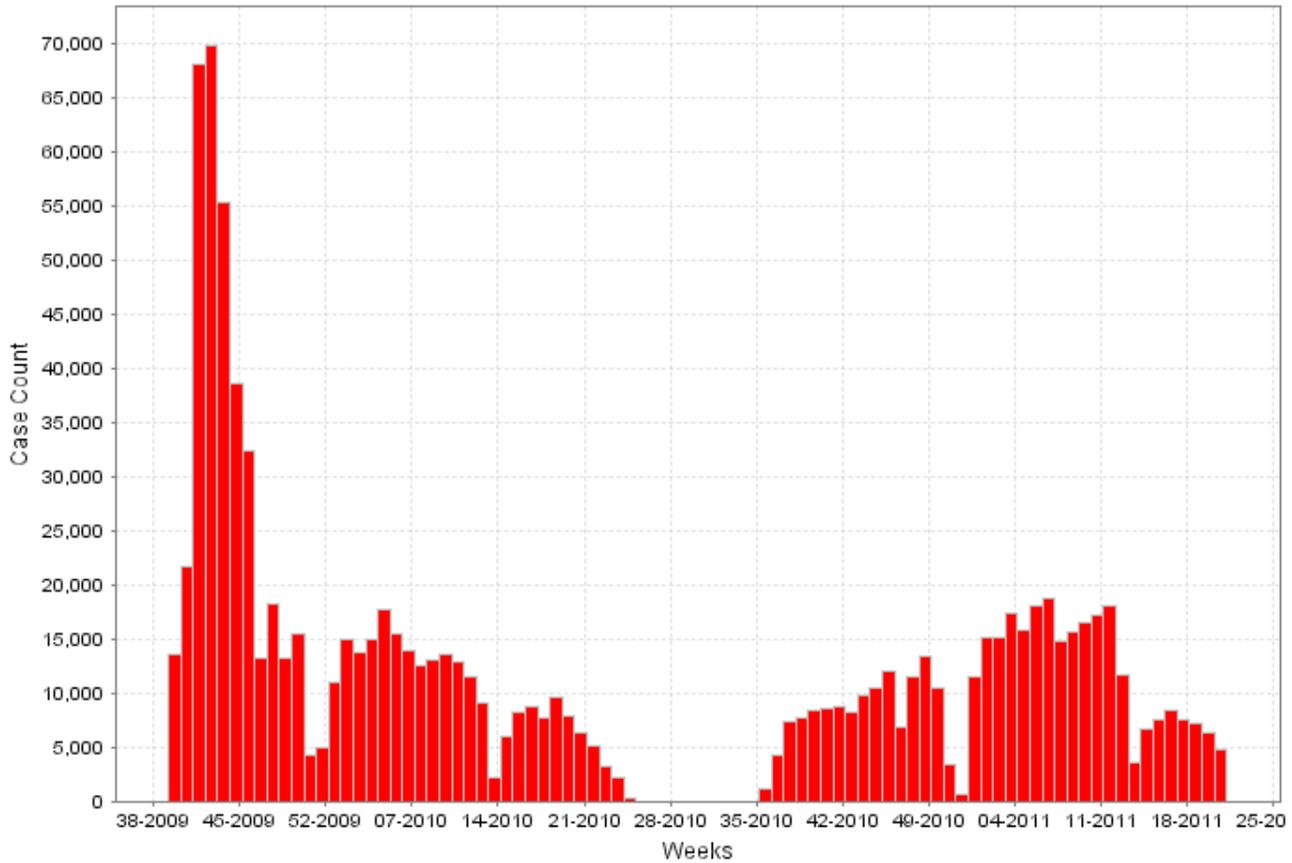
Aggregate Influenza-like Illness

Aggregate influenza-like illness reports from local health departments are entered into MDSS as “Flu-like Disease” cases on a weekly basis. Cases included in the data below are probable, confirmed, suspect or unknown status. As a reminder, while the majority of aggregate reports come from school-based absenteeism due to influenza-like illness, sometimes these reports capture absenteeism due to other causes. However, even with possible confounding data, aggregate reporting trends with confirmed cases of influenza in most years.

During the 2010-2011 season, peak aggregate activity occurred during the week ending February 19, 2011 (MMWR Week 7) at 18,919 reports. The timing of peak activity was identical to activity reported by other influenza surveillance indicators. The noticeable decreases during MMWR Weeks 51, 52 and 14 correspond to school breaks. In comparison, during the 2009-2010 season, peak aggregate activity occurred in late

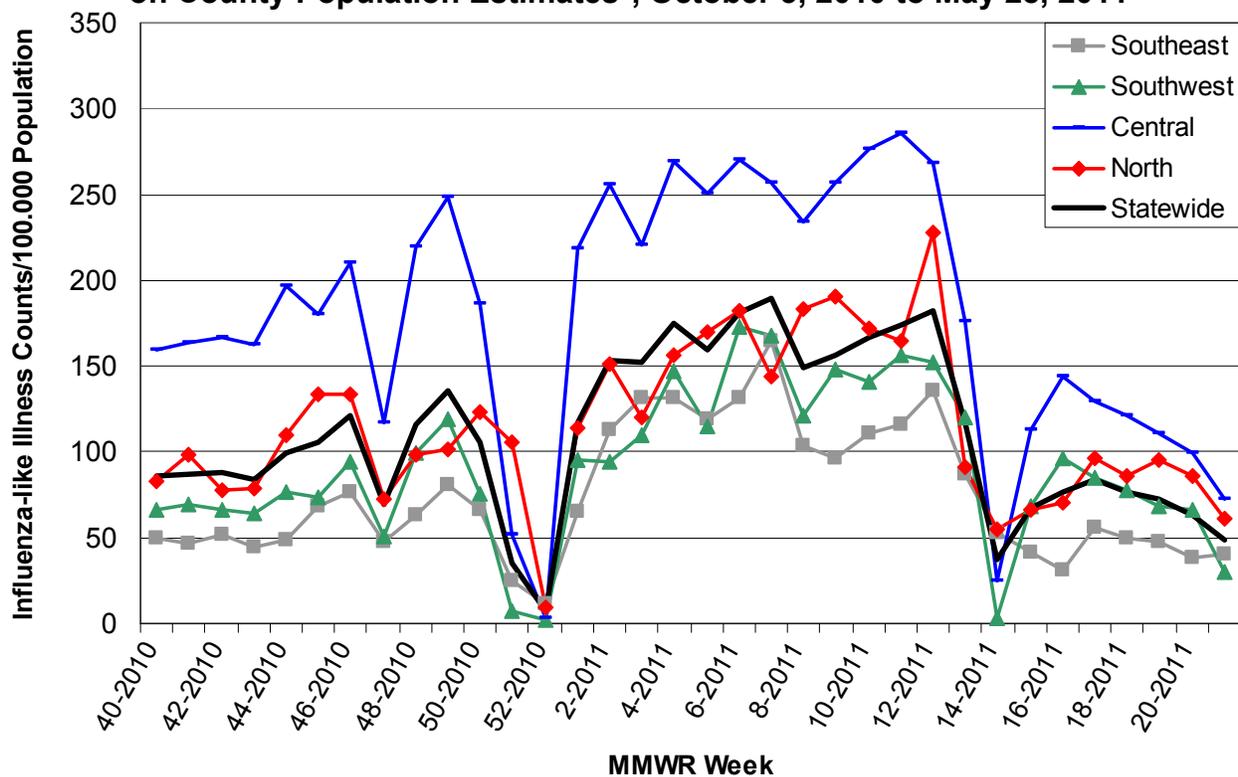
October with 70,980 reports (Figure 4). The number of cases reported during this season's peak was 3.75 times lower than peak values of the previous season, and resulted in a much later and more gradual peak. The number and timing of aggregate reports from the 2010-2011 season were similar to previous non-pandemic influenza seasons.

Figure 4. Aggregate Influenza-like Illness Reports, October 4, 2009-May 28, 2011



Rates of influenza-like illness per 100,000 population were calculated from aggregate reports of influenza-like illness and county level population estimates (Figure 5). The Central Region experienced the highest peak rate at 286 cases/100,000 population; peak rates for the other regions include 228 cases/100,000 for the North Region, 173 cases/100,000 for the Southwest Region, 168/100,000 for the Southeast Region, and 189 cases/100,000 statewide. The Southwest and Southeast Regions peaked during MMWR Weeks 6 and 7 (weeks ending February 12 and 19, 2011), respectively, while the Central and North Regions peaked later during MMWR Weeks 11 and 12 (weeks ending March 19 and 26, 2011). Regional variations in influenza-like illness rates may represent disparities in the consistency of aggregate reporting or true differences in influenza transmission.

Figure 5. Rates of Aggregate Influenza-like Illness per 100,000 Population, Based on County Population Estimates*, October 3, 2010 to May 28, 2011



* 2009 Estimates, U.S. Census Bureau

Syndromic Surveillance

For the 2010-2011 season, emergency department visits due to constitutional complaints (fever, chills, body ache, flu symptoms, fatigue, anorexia, malaise, etc.) slowly rose through December, steadily increased during January and February, peaked at 11.9% of total visits in late February, and then decreased through March and April back to baseline levels (Figure 6). Visits due to respiratory complaints (nose, throat or lung problems, cold symptoms, bronchitis, asthma, COPD, sore throat, etc.) increased rapidly during September from 8.5% to 14.6% (not shown), fluctuated between 10.9% and 15.8% during October through December, peaked at 17.2% in late February, and then slowly decreased to 10.9% by the end of May (Figure 7). The peak percentage of visits due to constitutional and respiratory complaints correlated with other surveillance indicators, except for the rapid rise of respiratory visits in September, during which time influenza circulation in Michigan was low. This finding may indicate an increase in other respiratory pathogens or illnesses (e.g. asthma, allergies) at that time.

During the 2009-2010 season, constitutional visits peaked at 18% of all visits in late October, while respiratory complaints experienced a peak of 17% in late October. Therefore, the 2009-2010 and 2010-2011 influenza seasons experienced marked differences in the timing of peak visits due to both constitutional and respiratory complaints and in the magnitude of peak visits due to constitutional complaints. These differences are most likely explained by the introduction of the pandemic influenza A

(2009) virus during the 2009-2010 season. Data from this surveillance system is based on individuals who present at emergency departments and may not be representative of the entire Michigan population. In addition, this system only captures chief complaints, not clinical or laboratory diagnoses. The individual facilities reporting into the system change throughout the years; therefore, past influenza seasons are best compared to this one in the form of trends, as opposed to absolute values.

Figure 6. Emergency Department Constitutional Complaints, Michigan, October 3, 2010 to May 28, 2011

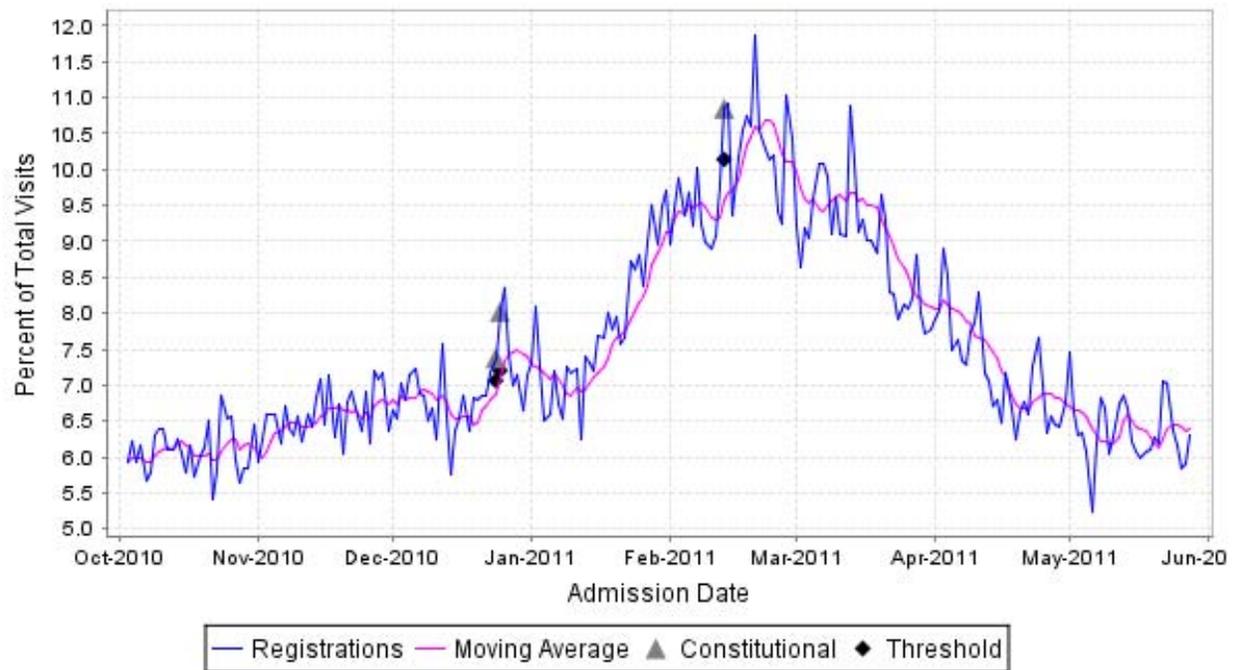
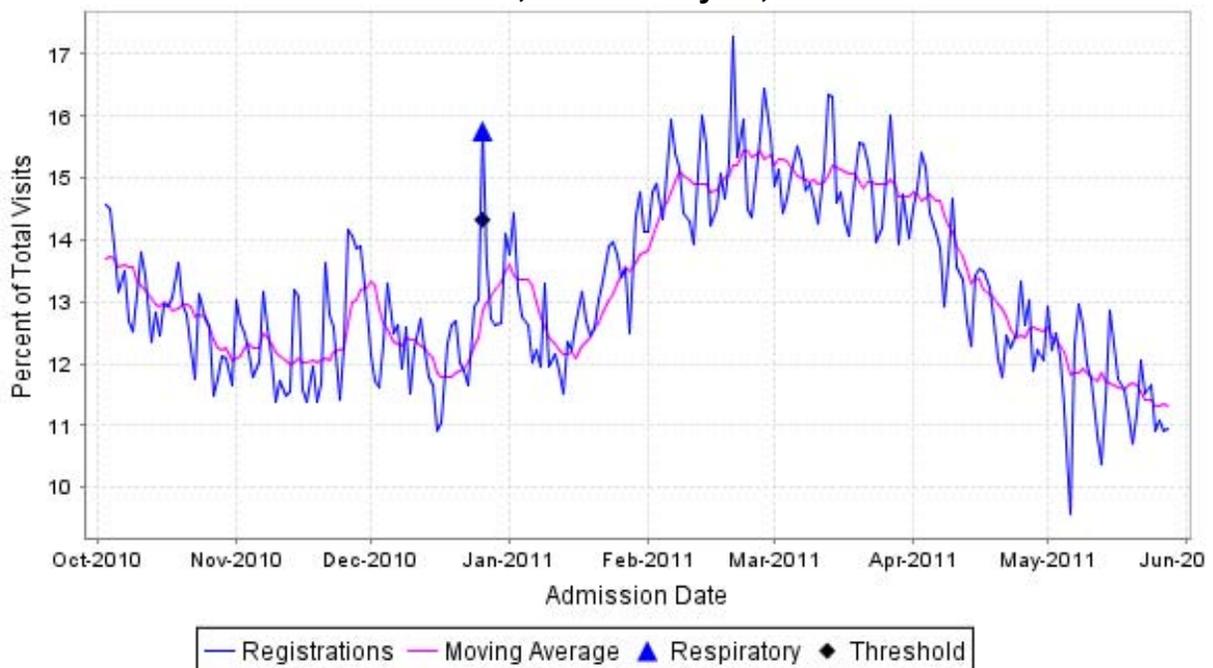


Figure 7. Emergency Department Respiratory Complaints, Michigan, October 3, 2010 to May 28, 2011

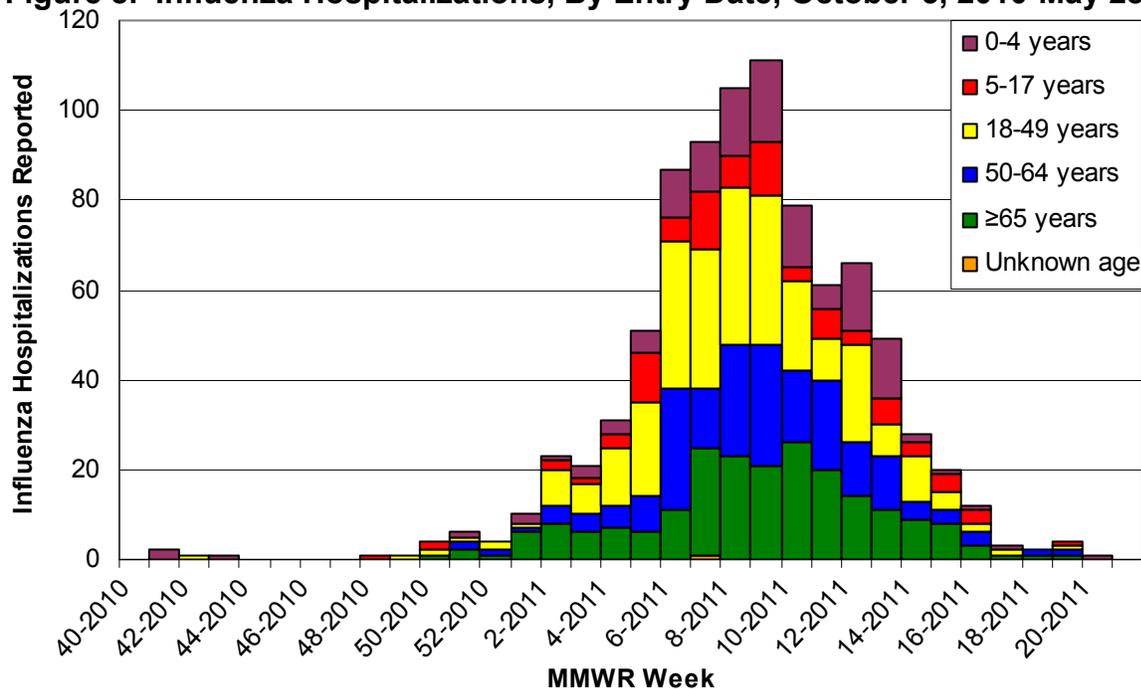


Individually Reported Influenza Hospitalizations

Influenza hospitalizations are voluntarily entered into the MDSS by local health departments or healthcare providers. Cases included in these data are confirmed or probable cases, with an investigation status of completed, completed-followup, active, review or new. Since cases are entered voluntarily, data may not be representative and may be dependent on available resources at the local level. Data reported here is most likely an underestimation of the total number of influenza hospitalizations.

From October 3, 2010 to May 28, 2011, 867 influenza-associated hospitalizations were reported. The week ending on March 5, 2011 (MMWR Week 9) experienced the most referrals (Figure 8). In contrast, required reporting during the pandemic 2009-2010 season (September 2009 through May 2010) resulted in 2154 reported cases.

Figure 8. Influenza Hospitalizations, By Entry Date, October 3, 2010-May 28, 2011



The highest percentage of hospitalizations occurred in the 18-49 year age group (30.4%). When compared to census data, the ≥65 year olds had the largest percentage, +11.2%, over what would be expected, and the 18-49 year olds had the lowest percentage, -13.4% (Table 3).

Table 3. Number and Percentage of Influenza Hospitalizations, by Age Group, Compared with the Michigan Population

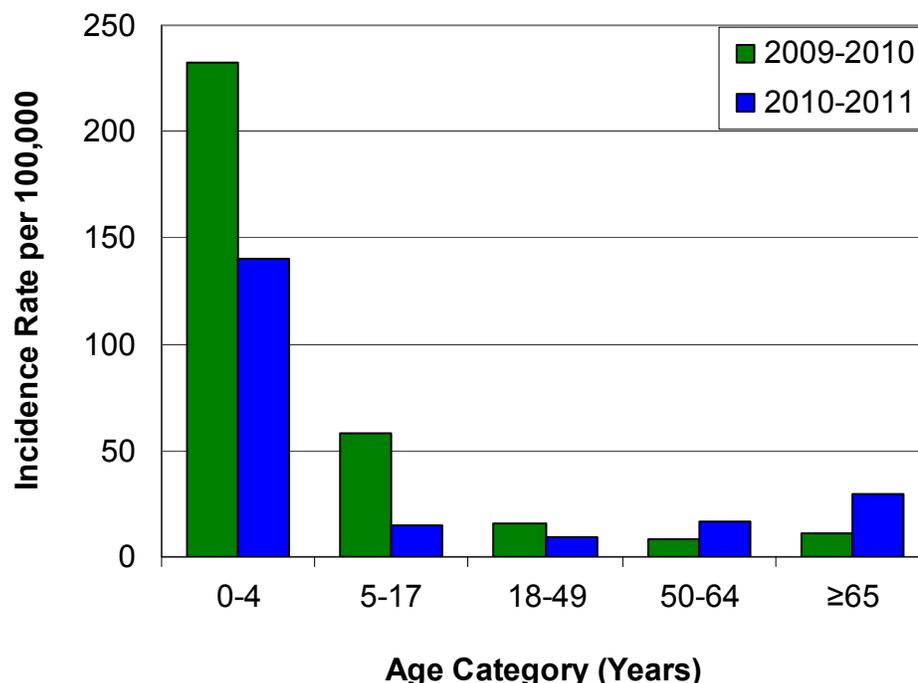
Age category	No. of hospitalizations	% of total hospitalizations	% of MI population*
0-4 years	126	14.5%	6.3%
5-17 years	87	10.0%	17.6%
18-49 years	264	30.4%	43.8%
50-64 years	189	21.8%	19.3%
≥65 years	210	24.2%	13.0%
Unknown	1	0.1%	N/A

*2009 Estimates, U.S. Census Bureau

Influenza Hospitalization Surveillance Project

Influenza hospitalizations are also monitored through the CDC Influenza Hospitalization Surveillance Project (IHSP), which provides population-based rates of influenza hospitalizations in Clinton, Eaton and Ingham counties through active surveillance. The reporting period for the 2010-2011 influenza season was from October 1, 2010 through April 30, 2011. 100 cases (49 pediatric and 51 adult) were reported; the first case was admitted on October 10, 2010 and the last on April 25, 2011. Incidence rates per 100,000 population were calculated (Figure 9); the 0-4 year old age category had the highest rate at 140 hospitalizations per 100,000. Forty-three percent of pediatric cases had an underlying medical condition; the most common was asthma at 18% of all pediatric cases. Among adults, 89% had underlying medical conditions; diabetes was the most common at 41% of all adult cases. Antiviral treatment was started in 39% of children and 69% of adults. None of the 3 children and 14 of 23 adults admitted to an intensive care unit required mechanical ventilation. There were 5 adult deaths. Fourteen pediatric and 14 adult cases had reports of at least one influenza vaccination during the 2010-2011 influenza season prior to their illness. Compared to the 2009-2010 season, there were fewer hospitalizations during 2010-2011, primarily among pediatric patients. The average age of patients during the 2010-2011 influenza season was 29 years compared with 16 years during the 2009-2010 season.

Figure 9. IHSP Influenza Hospitalization Incidence Rates per 100,000 Population, By Age Category, 2009-2010 and 2010-2011 Influenza Seasons



Pediatric Influenza-Associated Mortalities

Six pediatric influenza-associated mortalities were reported to MDCH for the 2010-2011 influenza season. A short summary of each case is provided below. The majority of

cases were infected with influenza B viruses and had not been vaccinated during the 2010-2011 influenza season.

- 1 month old from the Central Influenza Surveillance Region with date of death in late January. RT-PCR testing was positive for influenza B. Co-infections with respiratory syncytial virus, *Streptococcus pneumoniae* and *Klebsiella pneumoniae* were present. The patient was not eligible for influenza vaccination.
- 6 year old from the Central Region with date of death in late February. RT-PCR testing was positive for influenza B. Further identification at CDC indicated this influenza virus was from the B/Victoria/02/87 lineage, which is the B lineage covered by the 2010-2011 influenza vaccine. Co-infections with adenovirus, enterovirus, and non-hemolytic *Streptococcus* group D were present. The patient had a history of asthma. The patient had not been vaccinated for influenza during the current or previous seasons.
- 13 year old from the Southeast Region with date of death in mid-February. RT-PCR testing was positive for 2009 influenza A (H1N1). The patient had a co-infection with Group A *Streptococcus* and developed pneumonia and sepsis. The patient was not vaccinated for influenza during the current or previous seasons.
- 4 month old from the Central Region with date of death in mid-March. RT-PCR testing was positive for influenza B. The patient had a history of congenital cardiac disease, renal disease, airway disease, moderate to severe developmental delay, apnea, dysphagia and vertebral and limb abnormalities. The patient was not eligible for influenza vaccination.
- 9 month old from the Southeast Region with date of death in late March. RT-PCR testing was positive for influenza B. Further identification at MDCH indicated this influenza virus was a B/Brisbane/60/2008-like virus, which is a match for the influenza B component of the 2010-2011 influenza vaccine. The patient had a history of cardiomyopathy and generalized hypotonia. The patient had not been vaccinated for influenza during the current or previous seasons.
- 8 year old from the Central Region with date of death in early April. RT-PCR testing was positive for influenza B. Further identification at CDC indicated this influenza virus was from the B/Victoria/02/87 lineage, which is the B lineage covered by the 2010-2011 influenza vaccine. Co-infections with adenovirus and rhinovirus were present, and the patient developed seizures, shock and encephalitis. The patient had a history of asthma, myocarditis, and gastroesophageal reflux. The patient had been vaccinated during both the current and 2009-2010 influenza seasons.

Additional Populations of Interest

During the 2010-2011 influenza season, MDCH monitored reports of influenza-related encephalitis and ICU hospitalizations of pregnant and postpartum women. No laboratory-confirmed cases of influenza-associated encephalitis were specifically reported; however, one pediatric influenza death, reported above, did develop encephalitis.

MDCH was notified of eight confirmed cases of pregnant and postpartum women who had an influenza-associated ICU hospitalization. Seven cases were in pregnant women, and one case was postpartum. The age range was 15-38 years with a mean of 24.9 years and a median of 24.0 years. Four cases were Caucasian, three were African American and one was "Other Race." Six cases had a previously diagnosed medical condition. These cases were admitted anywhere from 4-37 days, with a mean hospital stay of 19.4 days and a median of 15.5 days. One patient died. Five cases had healthy deliveries, one had a stillbirth, one delivery is still pending, and the delivery status of one was unknown. These cases were residents of the Southeast (5), Central (2) and Southwest (1) Influenza Surveillance Regions. Seven cases had confirmed 2009 influenza A (H1N1) infections, and one case had an unsubtype influenza A infection. The high percentage of pregnant and postpartum cases with 2009 influenza A (H1N1) infection may represent a reporting bias resulting from the 2009 A (H1N1) pandemic or a true burden of infection in this population.

Congregate Setting Influenza-like Illness Outbreaks

Twenty-five congregate setting outbreaks were reported to MDCH during the 2010-2011 influenza season (through June 23, 2011) from the SE (6), SW (9), C (5), and N (5) Influenza Surveillance Regions. Twenty outbreaks were reported from long-term care or assisted living facilities, three from K-12 schools and two from universities. Outbreak reports peaked during the month of March. Test results for these outbreaks are listed below:

<u>Test Result (number of facilities)</u>	<u>Regions</u>
• Influenza A/H3 (11)	(4SE, 3SW, 1C, 3N)
• Influenza 2009 A/H1N1 (2)	(2SW)
• Influenza A/H3 and B both found (1)	(SW)
• Influenza A and B both found (1)	(C)
• Influenza B (1)	(C)
• Influenza positive, subtype unknown (1)	(SW)
• RSV and parainfluenza 3 (1)	(C)
• RSV (1)	(C)
• No testing or negative (6)	(2SE, 2SW, 2N)

MDCH Laboratory Isolates

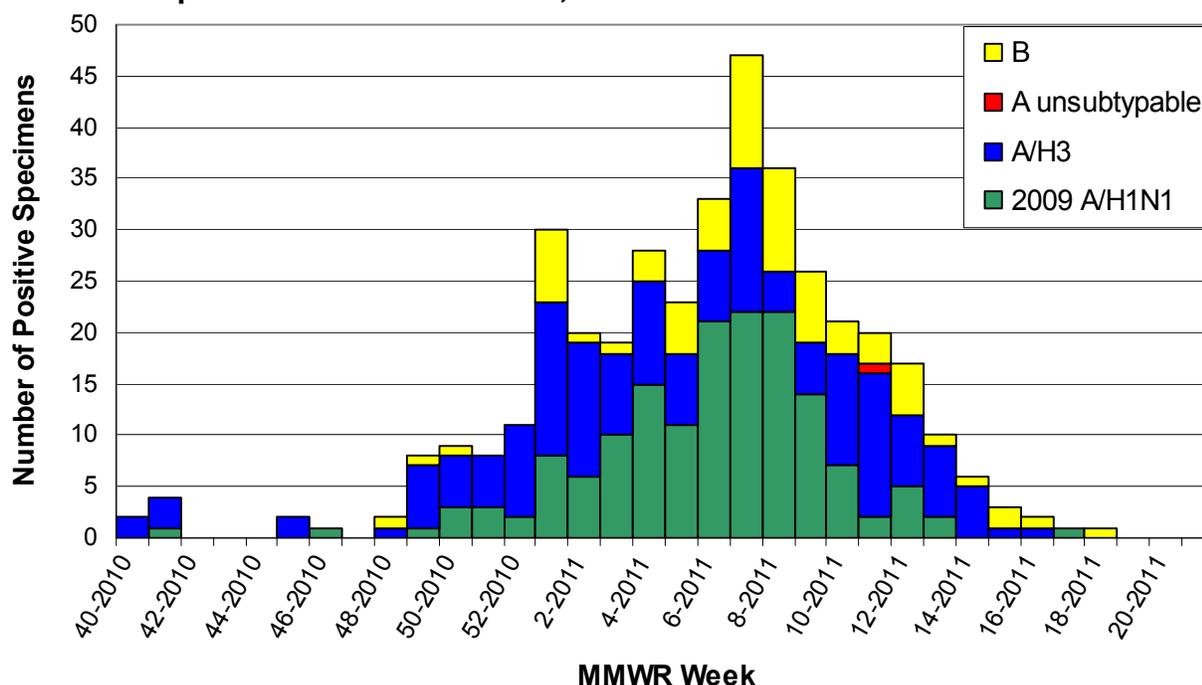
Sentinel physicians, sentinel laboratories and other clinical health partners provide virologic data by submitting clinical specimens and/or viral isolates for respiratory virus culture and RT-PCR testing at the MDCH laboratory. During October 3, 2010 through May 28, 2011, 390 positive influenza specimens were identified by the MDCH lab, of which 320 (82.1%) were influenza A and 70 (17.9%) were influenza B. The number of positive specimens peaked during the week ending February 19, 2011 (MMWR Week 7), based on specimen collection dates.

The influenza A specimens consisted of 157 (49.1%) 2009 influenza A (H1N1) specimens, 162 (50.6%) influenza A (H3N2) specimens, and 1 (0.3%) influenza A specimen that was unable to be subtyped (Figure 10). Of the 70 influenza B viruses, 61

(87.1%) were identified as B/Brisbane/60/2008-like viruses, which was the influenza B strain for the 2010-2011 Northern Hemisphere influenza vaccine.

In comparison, during the 2009-2010 season, the 2009 influenza A (H1N1) virus made up over 99% of positive specimens at MDCH. Therefore, influenza virus circulation in Michigan during this season was drastically different than the previous season.

Figure 10. MDCH Bureau of Laboratories Influenza Positive Specimens, Based on Specimen Collection Date*, for the 2010-2011 Influenza Season



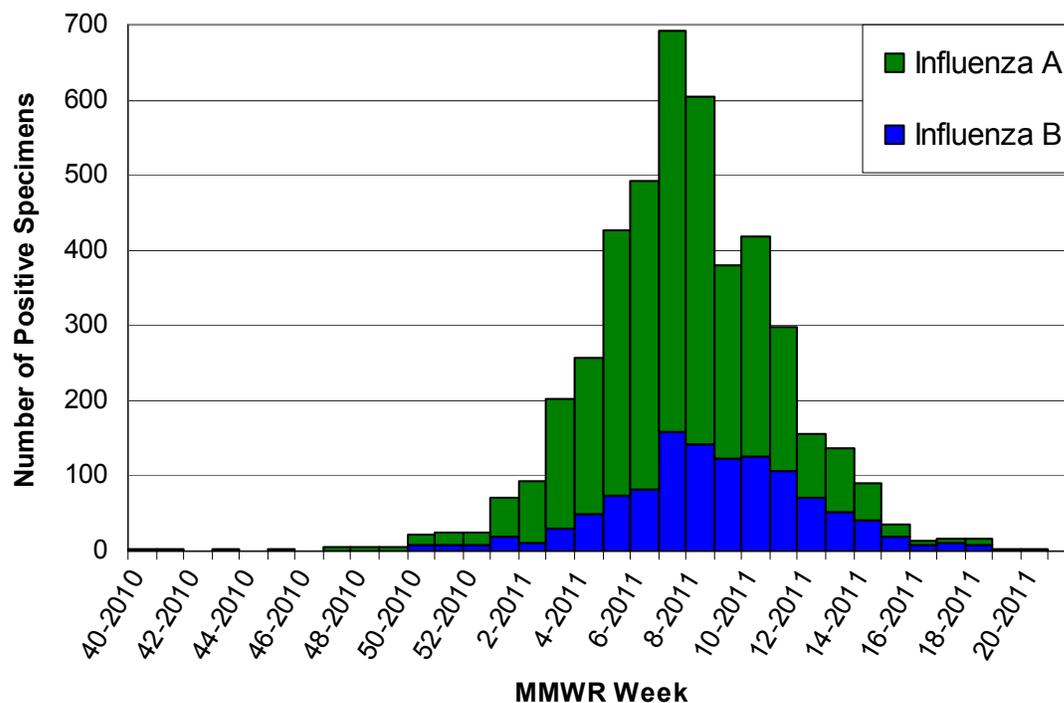
* If specimen collection date was unavailable, date of receipt at MDCH was substituted

Sentinel Laboratories

Eighteen sentinel laboratories across the state submitted weekly respiratory virologic testing results to MDCH. The majority of labs started seeing influenza A positive results in mid-December and January. Influenza A activity continued throughout the late winter and early spring, tapering off in April and early May. The majority of labs experienced their peak number of influenza A positives during the weeks ending February 19 and February 26, 2011; the highest statewide number of total positive influenza A results occurred during the week ending February 19, 2011 (Figure 11).

Influenza B activity reported by the sentinel laboratories was much lower than influenza A activity, but was similar to influenza B levels seen in recent non-pandemic influenza seasons. Most laboratories started having influenza B positive results in mid-December through January, with activity continuing until April or early May. Peak activity varied between different laboratories, ranging from mid-February through the end of March. The highest statewide number of total influenza B positive results occurred during the week ending February 19, 2011 (Figure 11).

Figure 11. Positive Influenza Specimens from MDCH Influenza Sentinel Laboratories, by Date Reported, October 3, 2010-May 28, 2011



Respiratory syncytial virus (RSV) was sporadically detected throughout the season, with increased activity reported during January through April. The majority of laboratories experienced peak RSV activity during the week ending March 12, 2011. Parainfluenza positive results occurred sporadically throughout the season; the majority of viruses were type 3. Adenoviruses were also detected sporadically throughout the season.

National Data (Centers for Disease Control and Prevention)

According to the CDC, during the 2010-2011 influenza season, influenza activity in the United States peaked nationally in early February. The proportion of specimens testing positive for influenza first exceeded 10%, indicating higher levels of virus circulation, during the week ending November 27, 2010 and peaked at 36% during the week ending February 5, 2011. During the week ending February 26, 2011 (MMWR Week 8), 44 states reported widespread influenza activity and five states reported regional influenza activity.

Influenza A (H3N2) remained the predominant virus throughout the season; however, 2009 influenza A (H1N1) and influenza B viruses also circulated. Ninety-seven percent of influenza A (H3N2) viruses, 99.8% of 2009 influenza A (H1N1) viruses and 99.9% of the B/Victoria lineage influenza B viruses matched their respective 2010-2011 influenza vaccine components. Antiviral testing indicated that 0.9% of 2009 influenza A (H1N1) specimens, 0.2% of influenza A (H3N2) specimens, and 0% of influenza B specimens were resistant to oseltamivir. No influenza viruses tested were resistant to zanamivir. High levels of resistance to the adamantanes persist among 2009 influenza A (H1N1) and influenza A (H3N2) viruses.

Overall, the percentages of outpatient visits for influenza-like illness (ILI) were lower during the 2010-2011 season than the previous season. The weekly percentage of outpatient visits for ILI exceeded national baseline levels (2.5%) during the weeks ending December 25, 2010, through March 19, 2011 (MMWR Weeks 51-11) and peaked at 4.6% during the week ending February 19, 2011 (MMWR Week 7).

Compared with 2009-2010, higher rates of hospitalization were observed for persons aged ≥ 65 years during the 2010-2011 season, whereas lower hospitalization rates were observed in younger populations. The number of hospitalizations reported through the Aggregate Hospitalization and Death Reporting Activity surveillance system peaked during the week ending February 26, 2011 (MMWR Week 8), and the number of deaths peaked during the week ending March 12, 2011 (MMWR Week 10). The percentage of deaths attributed to pneumonia and influenza (P&I) exceeded the epidemic threshold for 13 consecutive weeks (MMWR Weeks 4-16). The percentage of deaths attributed to P&I peaked at 8.9% during the week ending February 12, 2011 (MMWR Week 6).

From October 3, 2010, to May 21, 2011, 105 laboratory-confirmed influenza-associated pediatric deaths were reported. Of the 105 deaths, 40 were associated with influenza B viruses, 27 with 2009 influenza A (H1N1) virus, 18 with influenza A (H3N2) viruses, and 20 with influenza A virus for which the subtype was not determined.

2010-2011 Seasonal Influenza Vaccine

The World Health Organization has recommended vaccine strains for the 2011-2012 Northern Hemisphere trivalent influenza vaccine, and the Food and Drug Administration has made the same recommendations for influenza vaccine composition for the United States. Both agencies recommend that vaccines contain A/California/7/2009-like (2009 H1N1), A/Perth/16/2009-like (H3N2), and B/Brisbane/60/2008-like (B/Victoria lineage) viruses. These are the same strains as the 2010-2011 Northern Hemisphere vaccine formulation. This recommendation was based on surveillance data related to epidemiology and antigenic characteristics, serologic responses to the 2010-2011 influenza vaccine, and the availability of candidate strains and reagents. The CDC recommends an annual influenza vaccine as the first and best way to protect against influenza, and this recommendation is the same even during years when the vaccine composition remains unchanged from the previous season.

WORLDWIDE NOVEL AND AVIAN INFLUENZA STRAINS

The 2010-2011 influenza season saw the continuation of the highly pathogenic avian influenza A (H5N1) outbreak in humans, poultry and wild birds. No new countries reported the detection of highly pathogenic H5N1 during this time period. From 2003 to June 1, 2011, there have been 554 human cases, including 324 deaths, in 15 countries spanning Asia, the Middle East and Africa.

Five cases of human infection with a novel influenza A virus, all due to swine-origin influenza A (H3N2) viruses, were reported in the United States. Two cases occurred in September (Pennsylvania and Wisconsin), one case in October (Pennsylvania), and two cases in November (Minnesota).

National and international surveillance is conducted for other subtypes of highly pathogenic and low pathogenic avian influenza viruses. Recent highly pathogenic avian influenza outbreaks of subtypes other than H5N1 in poultry include H5N2 outbreaks in ostrich farms in South Africa. Low pathogenic avian influenza outbreaks in poultry have recently occurred in the United States of America (H7N3 in Missouri, H7N9 in Nebraska), Canada (H5N2), the Republic of Korea (H7N2, H7N6, H7N7), Chinese Taipei (H5N2, H7N3), Germany (H5N2), Romania (H5N3) and the Netherlands (H7N1).

RESOURCES

- For information about influenza, go to the MDCH influenza homepage at <http://www.michigan.gov/influenza>.
- From October to May, the most current U.S. influenza data is available from the CDC at <http://www.cdc.gov/flu/weekly/fluactivity.htm>. Archived reports are also available at this website.
- Information on national data from the 2010-2011 influenza season is described in the MMWR article “Update: Influenza Activity --- United States, 2010--11 Season, and Composition of the 2011--12 Influenza Vaccine”, available at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6021a5.htm?s_cid=mm6021a5_w.
- Current worldwide human avian influenza activity from the World Health Organization (WHO): http://www.who.int/csr/disease/avian_influenza/en/.

For more information on the designation of MMWR weeks, please visit http://www.cdc.gov/osels/ph_surveillance/nndss/phs/mmwrweek/MMWR_Week_Fact_Sheet.doc.