Michigan Influenza Surveillance Summary
2012-2013 Influenza Season

Michigan Department of Community Health
November 12, 2013

SEASONAL INFLUENZA

For the purposes of this report, data for the 2012-2013 season will be described from September 30, 2012 through May 25, 2013 unless otherwise indicated. This time frame is used as it mirrors the standard influenza season surveillance period of Morbidity and Mortality Weekly Report (MMWR) weeks 40-20 used by the Centers for Disease Control and Prevention (CDC).

The 2012-2013 influenza season had a moderately severe level of activity compared to most non-pandemic influenza seasons in Michigan. The first positive influenza specimens detected at the MDCH Bureau of Laboratories were announced on October 12, 2012 and included influenza A(H3), influenza A(H1N1) pdm09, and influenza B specimens. Similar to the 2011-2012 influenza season, the 2012-2013 season saw a mix of circulating influenza A(H3N2), influenza A(H1N1) pdm09 (pH1N1) and B viruses, with influenza A(H3N2) viruses predominating.

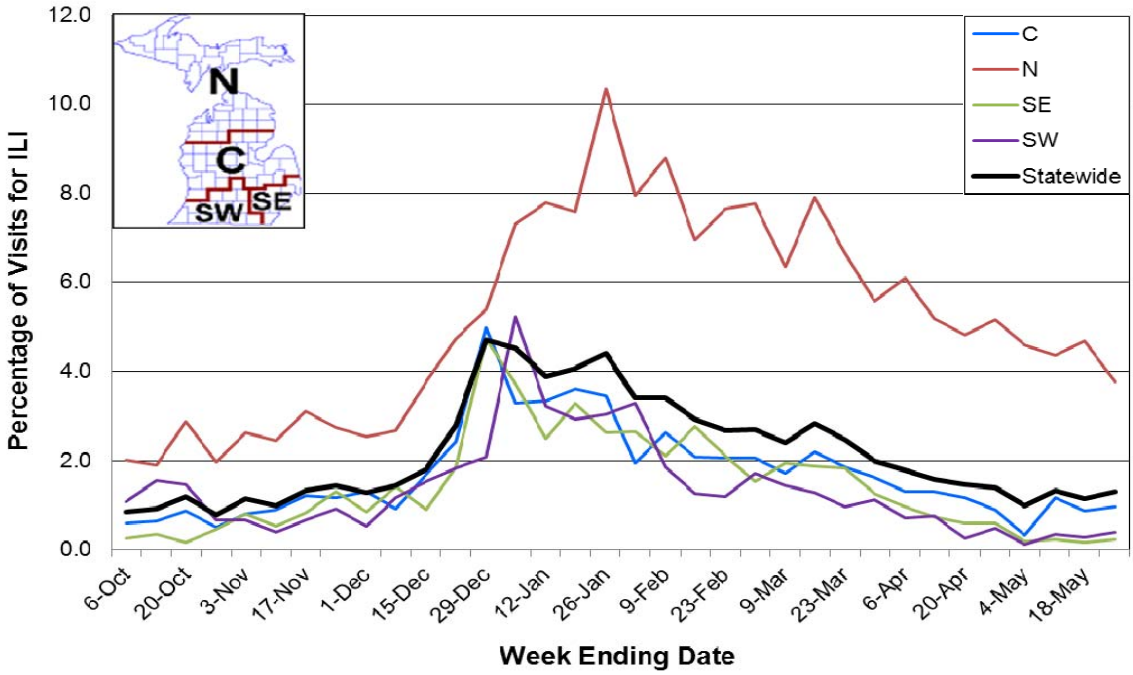
Michigan Department of Community Health (MDCH) influenza surveillance systems indicated that influenza activity peaked during the weeks ending December 29, 2012 through January 12, 2013 (MMWR Weeks 52-2). Michigan reported “widespread” statewide influenza activity, the highest level of reporting to the CDC, for nine straight weeks from the week ending December 29, 2012 through the week ending February 23, 2013 (MMWR Weeks 52-8). Peak activity in Michigan occurred during a similar time frame as the majority of the nation and other Midwestern states. Influenza circulation in Michigan continued at high levels through February and then at lower levels through early May. This activity made for an early, long and moderately severe 2012-2013 Michigan influenza season.

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). Eighty sentinel sites are enrolled for Michigan; an average of 52 sites reported data on over 14,800 weekly patient visits. By surveillance region, the average number of ILINet providers that submitted reports each week was: Central (20), North (12), Southeast (12), and Southwest (7). The percentage of visits due to ILI peaked statewide at 4.7% during the week ending December 29, 2012 (MMWR Week 52) (Figure 1). Influenza activity in the Central, Southwest and Southeast Regions was similar to activity statewide with peaks in the end of December to early January. Activity in the North Region was much higher than the rest of the state, with a peak of 10.4% visits due to ILI at the end of January. All regions stayed above Michigan’s baseline level of 1.5% for multiple consecutive

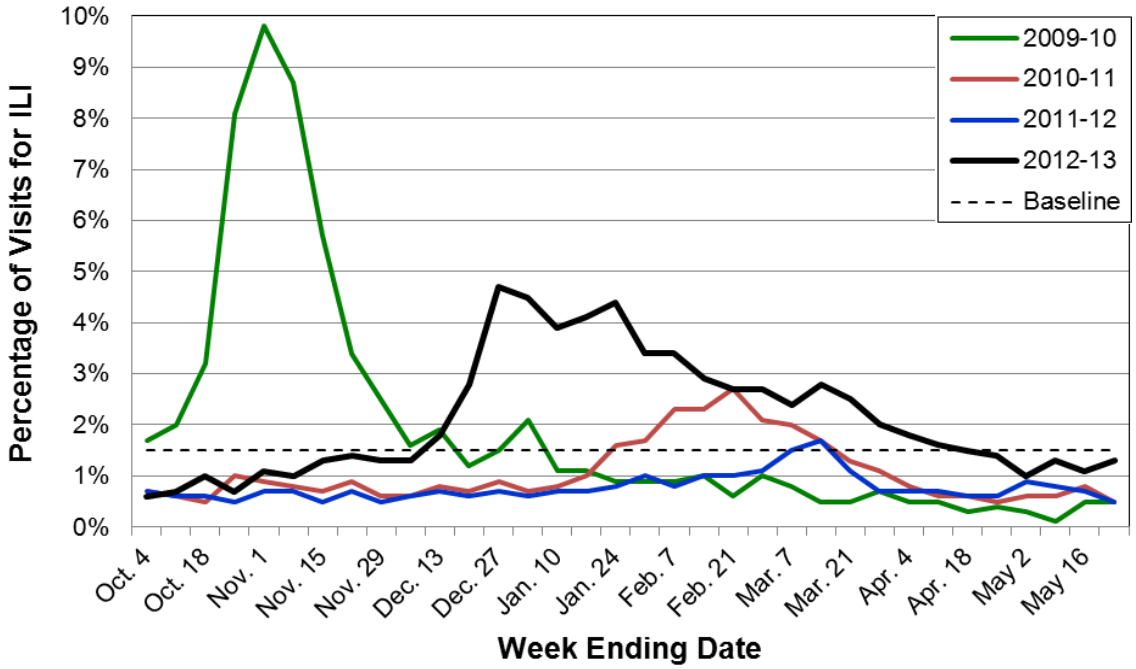
weeks. Since sentinel practices in each region vary by type, size, and number, these data should not be used to make direct comparisons of intensity among regions.

Figure 1. Percentage of Influenza-like Illness Visits Reported by Michigan Sentinel Providers, by Influenza Surveillance Region, September 30, 2012-May 25, 2013



Compared to the two previous influenza seasons, 2012-2013 was a moderate season with an earlier peak in activity than normal (Figure 2). The percentage of visits due to ILI peaked at 4.7% this season, compared to 2.7% during the 2010-2011 season and 1.7% in 2011-2012. During the pandemic 2009-2010 influenza season, ILI activity peaked in late October at an activity level above historic norms, 9.8%. The 2012-2013 season had a gradual decrease in activity following the peak; ILI activity remained at or above baseline for 19 consecutive weeks.

Figure 2. Percentage of Visits for Influenza-like Illness Reported by Michigan ILINet Sentinel Providers, 2009-2013



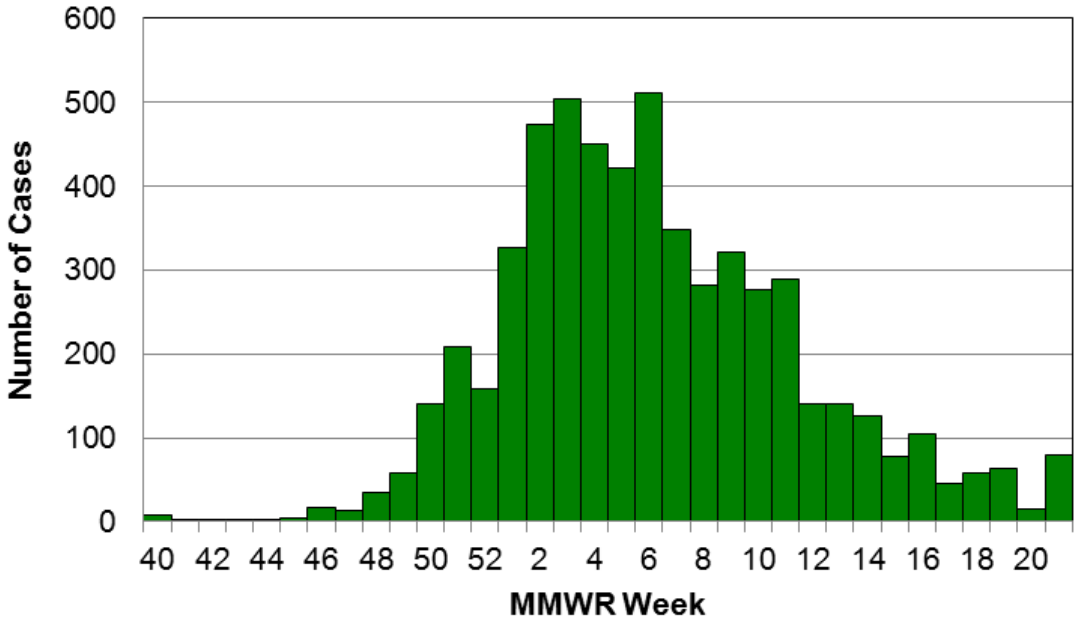
Individual Influenza Reports

Cases included in the data below are of probable, confirmed, suspect or unknown status, with a completed, completed-followup, active, review or new investigation status. Data may not represent 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. When interpreting these data, one should consider the possibility of age-related reporting or testing bias between different influenza seasons (e.g., variant H3N2 guidance that encouraged testing of children <18 years during the 2011-2012 season).

From September 30, 2012 to May 25, 2013, 5731 individual cases were reported into the Michigan Disease Surveillance System (MDSS). Only 5705 of these cases were used for analysis; 26 cases were excluded due to incomplete serologic testing or being incorrectly reported as influenza when another etiologic agent was identified. By comparison, 2135 cases were reported during the 2011-2012 influenza season.

Individual MDSS case referrals peaked at 511 cases during the week ending February 9, 2013 (MMWR Week 6) (Figure 3). High numbers of cases were also seen during mid- to late January. In comparison, during the 2011-2012 influenza season, 300 cases were seen during the peak in the week ending March 24, 2012 (MMWR Week 12). Therefore, the number and timing of individually reported influenza cases was much higher and earlier for the 2012-2013 season when compared to the 2011-2012 season.

Figure 3. Individually Reported Influenza Cases in the Michigan Disease Surveillance System, with Referral Dates from September 30, 2012-May 25, 2013



For this influenza season, the median age of individual cases was 37 years, with a mean of 38.9 years; these data indicated an older population than the previous season (median: 22 years, mean: 30.5 years). Age was unknown for 23 cases. The ≥65 year old age group had the most cases (25.6%) (Table 1). All age groups, except 5-17 year

olds, had the most cases reported during the month of January (Table 1). When comparing the past two influenza seasons, the percentage of cases increased in adults over 50 years of age during 2012-2013, while decreasing in children and adults aged 18-49 years (Table 2). Of 5670 cases with available gender status, 52.2% were female.

Table 1. Individually Reported Influenza Cases in the Michigan Disease Surveillance System by Month and Age Group, Referred During September 30, 2012-May 25, 2013

Month	Number of Cases and Percentage of Monthly Total, by Age Group											
	0-4 years		5-17 years		18-49 years		50-64 years		≥65 years		Total	
October	4	0.5%	3	0.2%	4	0.3%	3	0.4%	2	0.1%	16	0.3%
November	9	1.1%	18	1.3%	23	1.8%	10	1.2%	10	0.7%	70	1.2%
December	82	10.5%	175	13.0%	151	11.7%	72	8.9%	134	9.2%	614	10.8%
January	245	31.3%	341	25.3%	460	35.8%	292	35.9%	703	48.3%	2041	35.9%
February	241	30.8%	447	33.2%	281	21.9%	197	24.2%	298	20.5%	1464	25.8%
March	118	15.1%	245	18.2%	203	15.8%	152	18.7%	189	13.0%	907	16.0%
April	49	6.3%	56	4.2%	116	9.0%	69	8.5%	86	5.9%	376	6.6%
May	35	4.5%	61	4.5%	48	3.7%	18	2.2%	32	2.2%	194	3.4%
Total	**783**	**13.8%**	**1346**	**23.7%**	**1286**	**22.6%**	**813**	**14.3%**	**1454**	**25.6%**	**5682**	**100.0%**

Table 2. Percentage of Individual Influenza Cases, by Age Group, 2011-2013

Season	0-4 years	5-17 years	18-49 years	50-64 years	≥65 years
2011-2012	20.4%	26.4%	27.2%	9.7%	16.4%
2012-2013	13.8%	23.7%	22.6%	14.3%	25.6%

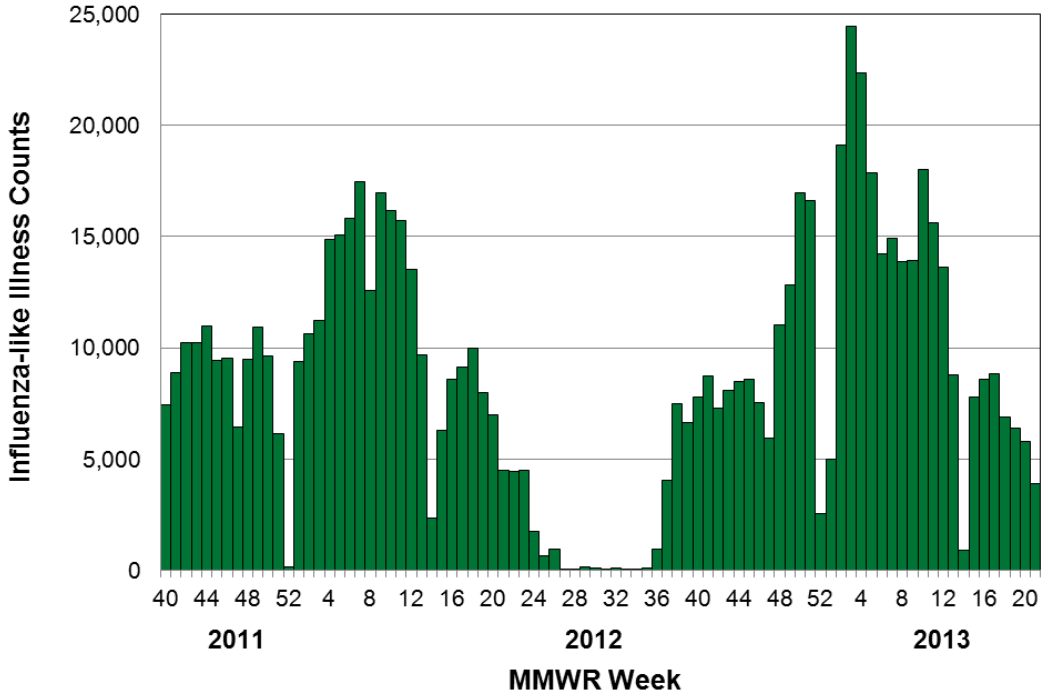
Information on the type of influenza identified via laboratory testing was available for 3008 (52.7%) cases. Influenza A was reported for 1970 cases (65.5% of cases with typing results) and influenza B for 1038 (34.5%) cases. Subtyping results were reported for 692 (35.1%) of the influenza A cases; influenza A(H3N2) was identified in 641 (92.6%) cases and influenza A(pH1N1) for 51 (7.4%) cases.

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. The data below includes cases of probable, confirmed, suspect or unknown status. While the majority of aggregate reports come from school-based absenteeism due to influenza-like illness, these reports sometimes capture absenteeism due to other causes. Even with possible confounding data, aggregate reporting trends with confirmed cases of influenza in most years.

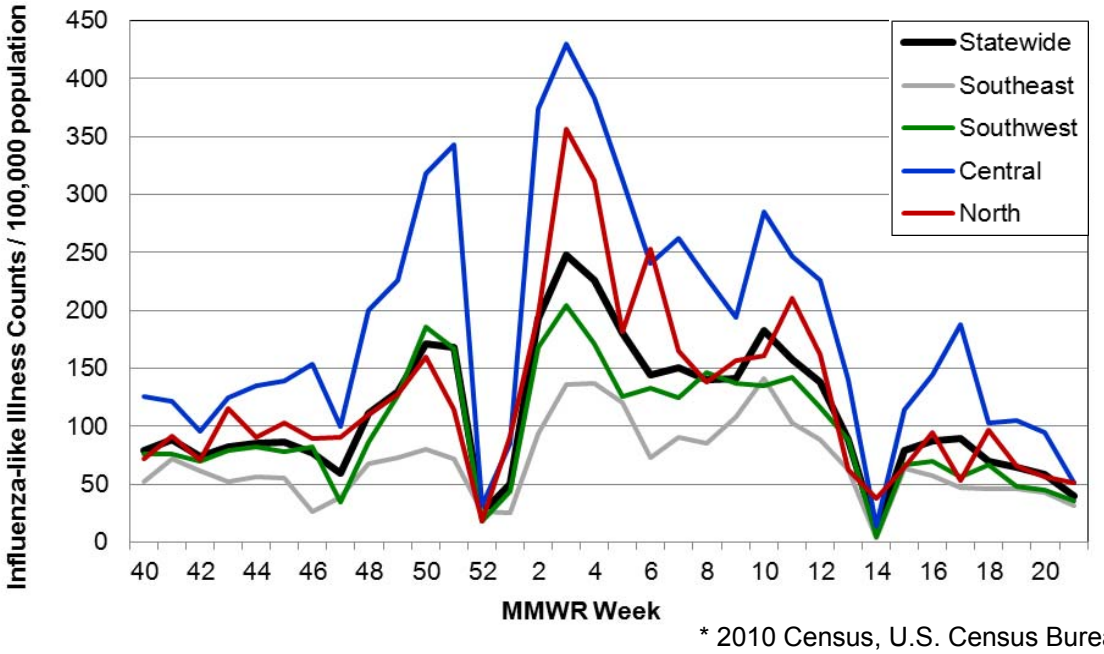
During the 2012-2013 season, peak aggregate activity occurred during the week ending January 19, 2013 (MMWR Week 3) at 24,469 reports. The noticeable decreases during MMWR Weeks 1, 14, 25-36 and 52 correspond to school breaks. In comparison, during the 2011-2012 season, peak aggregate activity occurred in mid-February with 17,478 reports (Figure 4). The timing of activity during this season was earlier than the previous season, and there were 28,672 additional reports during 2012-2013.

Figure 4. Aggregate Influenza-like Illness Counts, October 2, 2011-May 25, 2013



Rates of influenza-like illness per 100,000 population were calculated from aggregate influenza-like illness reports and U.S. Census Bureau population estimates (Figure 5). The Central Region had the highest peak rate at 429 cases/100,000; peak rates for other regions included 356 cases/100,000 for the North, 204 cases/100,000 for the Southwest, 140/100,000 for the Southeast, and 248 cases/100,000 statewide. The Southwest, Central, North and statewide rates peaked during MMWR Week 3 (week ending January 19, 2013), while the Southeast peaked during Week 10 (week ending March 9, 2013). Regions had a 45-85% increase in the rate of influenza-like illness during 2012-2013 when compared to 2011-2012, except for the Southeast which had similar rates. Regional variations in influenza-like illness rates may indicate 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*, September 30, 2012-May 25, 2013



* 2010 Census, U.S. Census Bureau

Syndromic Surveillance

For the 2012-2013 season, emergency department visits due to constitutional complaints (fever, chills, body ache, flu symptoms, fatigue, anorexia, malaise, etc.) rapidly increased in mid-December, peaking twice at 11.3% of total visits in late December and at 11.7% in mid-January, and then slowly decreased from February through May 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 9.0% to 14.0% (not shown) and fluctuated between 10.3% and 14.7% during October through December. Respiratory complaints rapidly peaked in late December at 18.7% of all visits, and then quickly decreased to around 12-13% for mid-January through April, after which visits decreased to baseline levels by the end of May (Figure 7). The rapid rise of respiratory visits in September, during which time influenza circulation in Michigan was low, was most likely due to an increase in other respiratory pathogens or illnesses (e.g. asthma, allergies). The peaks in both constitutional and respiratory complaints during late December and January correspond to other influenza activity indicators.

During the 2011-2012 season, constitutional visits peaked at 9.9% in mid-March and respiratory complaints peaked at 16.8% in late December and at 15.9% in the third week of February. Therefore, during 2012-2013 the timing of peak visits due to constitutional and respiratory complaints was slightly higher and much earlier than during 2011-2012. Data from this surveillance system are based on individuals who present at emergency departments and may not be representative of the entire Michigan population. 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 Visits due to Constitutional Complaints, September 30, 2012-May 25, 2013

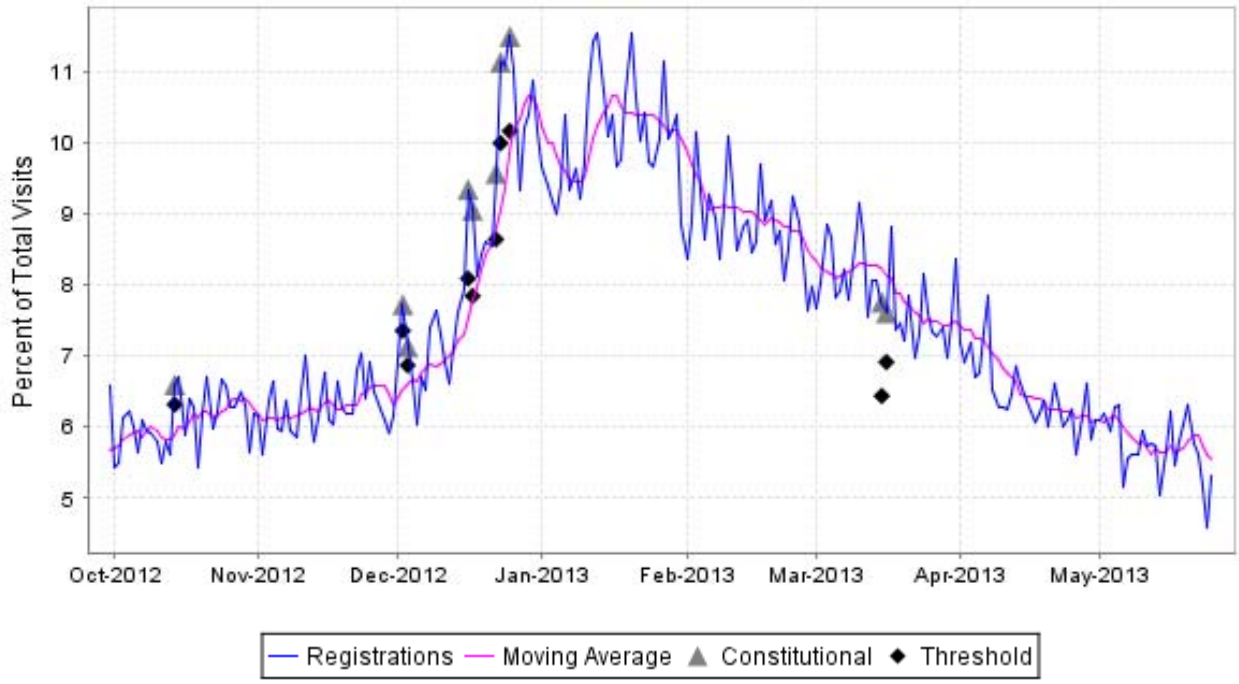
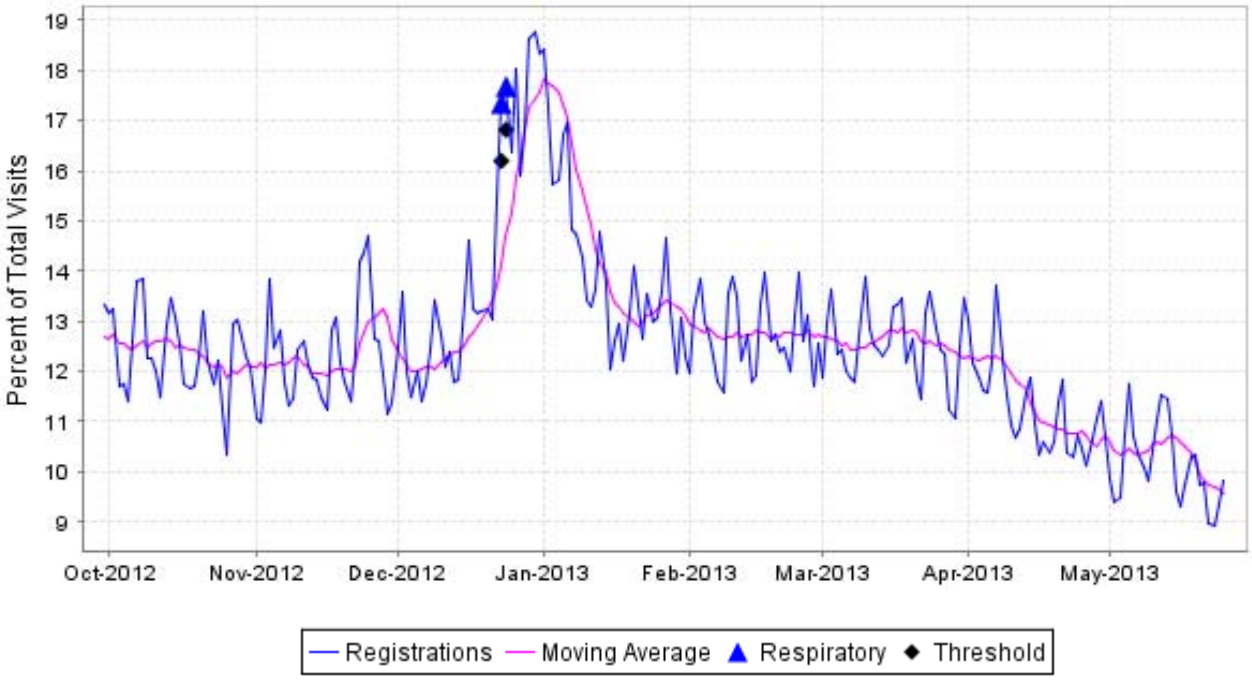


Figure 7. Emergency Department Visits due to Respiratory Complaints, September 30, 2012-May 25, 2013

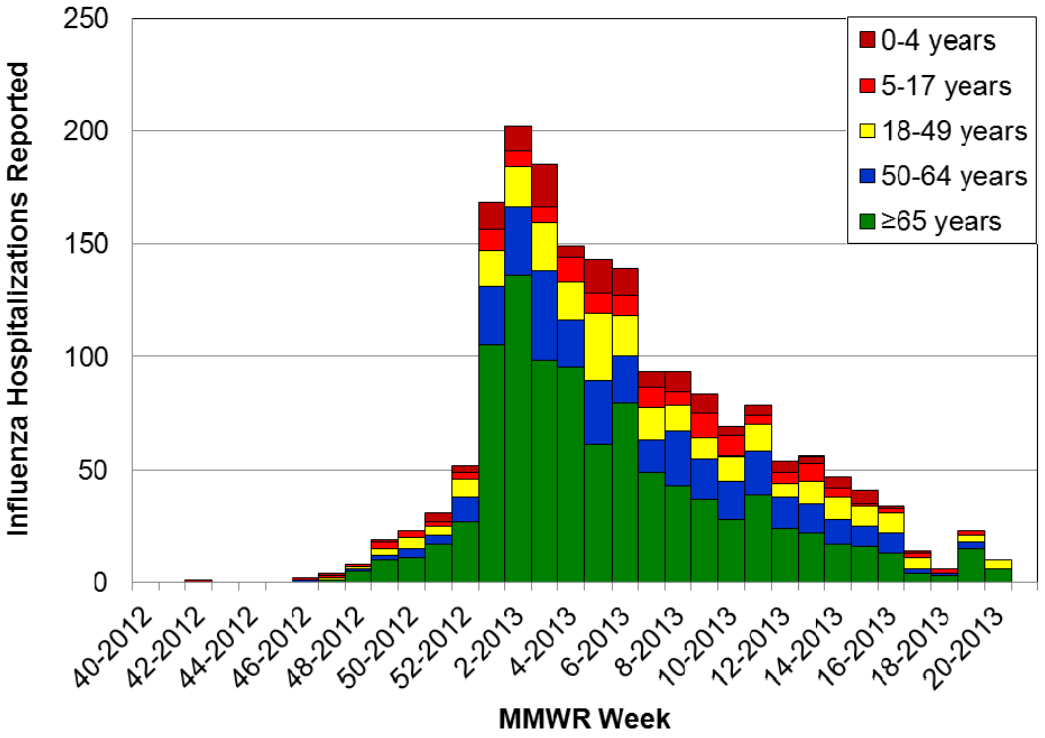


Individually Reported Influenza Hospitalizations

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 are most likely underestimations of the total number of influenza hospitalizations.

From September 30, 2012 to May 25, 2013, 1828 influenza-associated hospitalizations were reported. The highest number of referrals occurred during the week ending on January 12, 2013 (MMWR Week 2) (Figure 8). In contrast, required reporting during the pandemic 2009-2010 season (September 2009 through May 2010) resulted in 2154 reported cases, and voluntary reporting during the 2010-2011 and 2011-2012 influenza seasons resulted in 867 and 414 cases, respectively. The peak week for case referrals during the 2011-2012 season was during MMWR Week 11 (mid-March).

Figure 8. Influenza Hospitalizations Reported into the Michigan Disease Surveillance System, By Entry Date, September 30, 2012-May 25, 2013



Among the five age groups, the highest percentage of hospitalizations occurred in the ≥65 year age group (52.6%). When compared to U.S. Census Bureau data, the ≥65 year olds had the largest percentage point difference, +38.8, and the 18-49 year olds had the lowest percentage point difference, -28.2, than what would be expected if influenza hospitalizations were proportionate to the age distribution of Michigan's population (Table 3). During recent influenza seasons, the 18-49 year (2009-2010 and 2010-2011) and ≥65 year (2011-2012) age groups had the highest percentage of hospitalizations, while the ≥65 year age group had the largest percentage point difference over what was expected during each influenza season from 2009-2012.

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	137	7.5%	6.0%
5-17 years	131	7.2%	17.7%
18-49 years	255	13.9%	42.1%
50-64 years	343	18.8%	20.4%
≥65 years	961	52.6%	13.8%

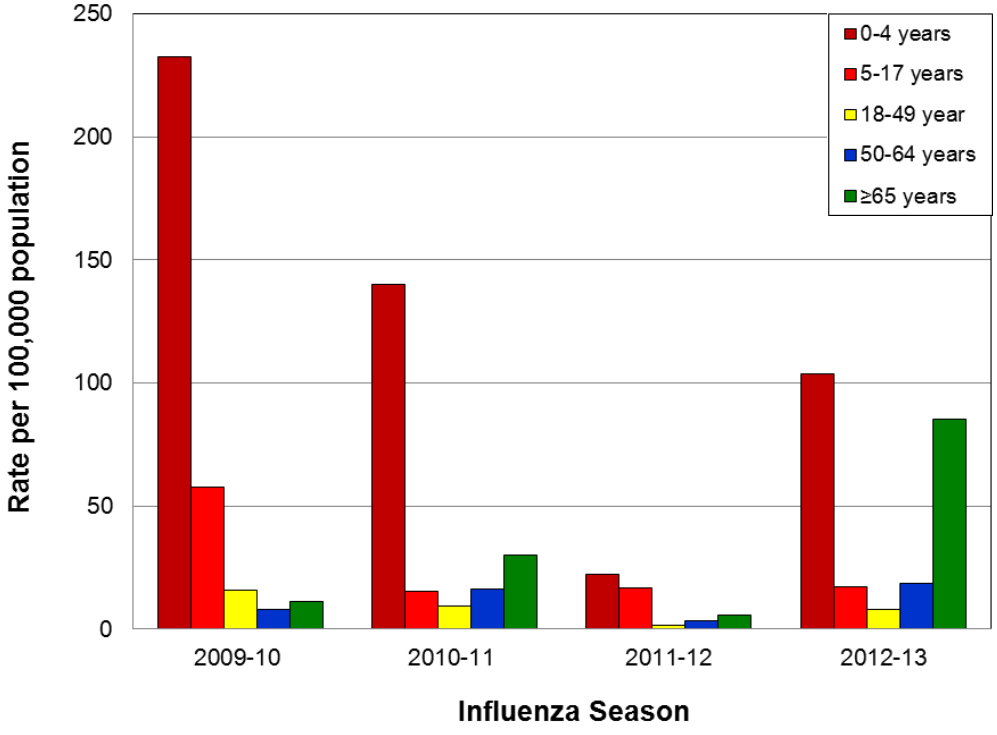
*2010 Census, U.S. Census Bureau

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, Ingham and Genesee counties through active

surveillance. The reporting period for the 2012-2013 season was from October 1, 2012 through April 30, 2013. Two hundred forty three cases (83 pediatric and 160 adult) were reported. The first case was admitted on October 24, 2012 and the last on April 26, 2013; admissions were seen much earlier than during the 2011-2012 season. The majority (67.1%) of cases were admitted during January and February. Incidence rates per 100,000 persons were calculated (Figure 9); the 0-4 year old age category had the highest rate at 104 hospitalizations per 100,000. Among pediatric cases, 56.6% had an underlying medical condition, the most common being asthma at 20.5% of all pediatric cases. Among adult cases, 89.4% had an underlying medical condition; cardiovascular conditions were the most common type at 56.3% of adult cases. Antiviral treatment was started in 170 (70.0%) of cases. Fifty-four (22.2%) of cases were admitted to an intensive care unit and 18 (7.4%) required mechanical ventilation. There were three pediatric and four adult deaths. Nineteen pediatric and 43 adult cases (25.5% of all cases) had reports of at least one influenza vaccination during the 2012-2013 season at least two weeks prior to their illness. Compared to 2011-2012, there were more hospitalizations during 2012-2013, particularly among those patients aged 0-4 years and ≥65 years (Figure 9). The median age of pediatric cases was 2 years and for adult cases was 71 years. There were 157 (64.6%) influenza A cases and 86 (35.4%) influenza B cases; of the 71 influenza A cases with subtyping results, 95.8% were A(H3) and 4.2% were pH1N1.

Figure 9. IHSP Influenza Hospitalization Incidence Rates per 100,000 Population, By Age Category, 2009-2010 through 2012-2013



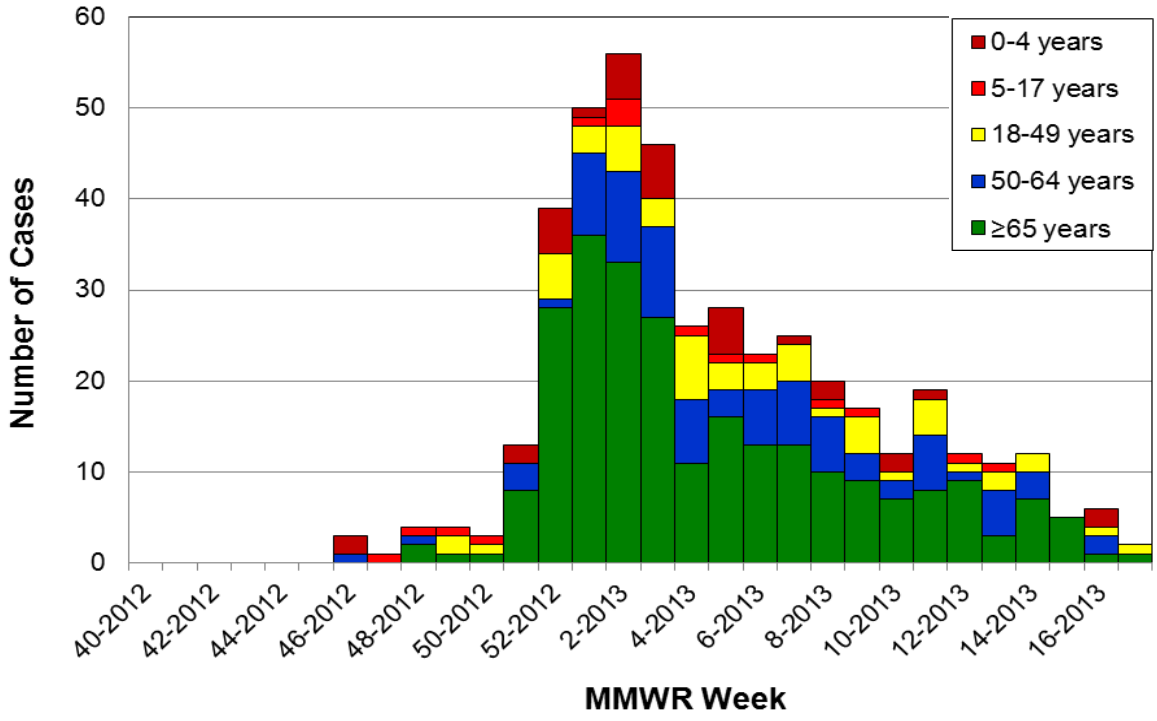
Influenza Hospital Sentinel Network

During the 2009-2010 pandemic influenza season, MDCH mandated that healthcare providers report all influenza-associated hospitalizations. This surveillance effort

yielded vital information on the burden and age distribution of influenza hospitalizations, but could not be continued statewide due to the demands it placed on healthcare providers. To continue these efforts and to supplement the IHSP, MDCH established a network of sentinel hospitals that report influenza-associated hospitalizations. Participants report weekly the number of influenza-associated hospitalizations in each of five age categories and the total number of admissions during that time frame.

Twelve hospitals representing all four influenza surveillance regions reported 437 hospitalizations during September 30, 2012-April 27, 2013. The number of hospitalizations ranged between 0 and 70 with a mean of 17.9 hospitalizations per hospital. During 2011-2012, there was a mean of 10.5 hospitalizations per hospital. The ≥65 year age group had the highest number of hospitalizations among the five age groups at 249 (57%). Although hospitalizations were sporadically distributed throughout the season, 78.5% of reported hospitalizations occurred during mid-December through early March. The number of reported hospitalizations peaked during the week ending January 12, 2013 (MMWR Week 2) (Figure 10). For the hospitals reporting admission data, influenza-associated hospitalizations ranged between 0.0% and 5.7% (mean 2.4%) of total admissions during the facility's peak week of influenza hospitalizations.

Figure 10. Influenza-associated Hospitalizations reported by the MDCH Influenza Hospital Sentinel Network, September 30, 2012-April 27, 2013



Pediatric Influenza-Associated Mortalities

Seven pediatric influenza-associated mortalities were reported to MDCH for the 2012-2013 influenza season, which was the highest number since reporting has become mandatory in 2004. In comparison, no pediatric influenza-associated mortalities were reported to MDCH during the 2011-2012 influenza season and six were reported during

2010-2011. Three cases were confirmed to be infected with influenza A(H3) and four with influenza B. Two cases were 0-4 years of age, and 5 were 5-17 years of age. Five cases had bacterial co-infections. Only one case was properly vaccinated during the 2012-2013 season; two cases were too young for influenza vaccination.

Congregate Setting Influenza-like Illness Outbreaks

One hundred fifteen congregate setting outbreaks were reported to MDCH during the 2012-2013 influenza season (through September 26, 2013), which is the most ever reported to MDCH during a single influenza season. The outbreaks were from the SE (23), SW (30), C (42), and N (20) Influenza Surveillance Regions. Seventy-six outbreaks were reported from long-term care facilities, 13 from assisted or independent living facilities, 23 from K-12 schools, one from a correctional facility and one from an inpatient psychiatric facility. The majority of outbreaks occurred in late December and January. Laboratory testing results for these outbreaks are listed below:

Lab Test Result (number of facilities)	Regions
• Influenza A(H3) (16)	(7SW, 9C)
• Influenza A (55)	(10SE, 13SW, 20C, 12N)
• Influenza B (8)	(1SE, 3SW, 2C, 2N)
• Influenza A and B (2)	(1SE, 1SW)
• Influenza A(H3) and B (1)	(1C)
• Influenza positive (4)	(1SE, 1SW, 2C)
• Influenza and RSV positive (1)	(1C)
• Influenza B and RSV positive (1)	(1SE)
• Human metapneumovirus (1)	(1SW)
• Mycoplasma pneumoniae (1)	(1SE)
• Negative/no testing (25)	(8SE, 4SW, 7C, 6N)

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 Bureau of Laboratories (MDCH BOL). During September 30, 2012 through May 25, 2013, 948 specimens were tested for influenza. MDCH BOL identified 675 positive influenza specimens, of which 533 (79%) were influenza A and 142 (21%) were influenza B. The number of positive specimens peaked during the week ending January 12, 2013 (MMWR Week 2), based on the dates results were reported (Figure 11). Influenza specimen submissions to MDCH BOL were increased over what would be expected during mild influenza seasons but were less than during the 2011-2012 season, when MDCH requested additional specimen submissions for influenza A(H3N2) variant virus surveillance.

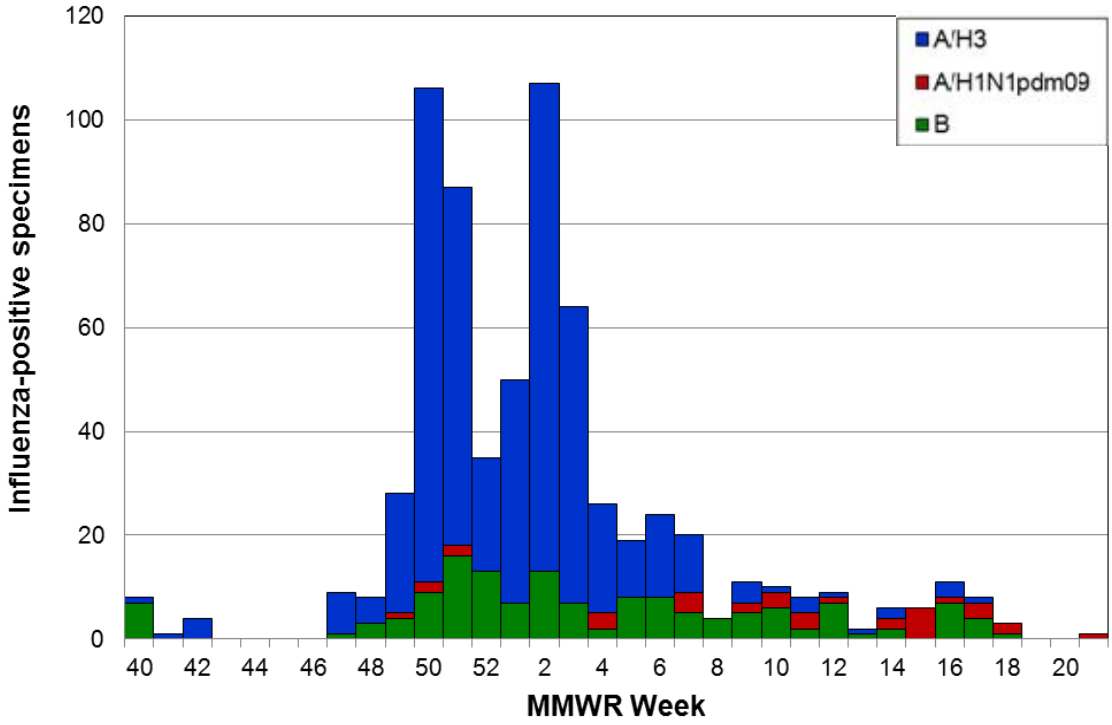
The influenza A specimens were composed of 497 (93%) influenza A(H3N2) specimens and 36 (7%) pH1N1 specimens (Figure 11). Of the influenza B viruses submitted to MDCH BOL by September 27, 2013 that have undergone further characterization, 101 (84.2%) were identified as B/Wisconsin/01/2010-like viruses, which was the influenza B strain for the 2012-2013 Northern Hemisphere influenza vaccine. The remaining

influenza B specimens (19, 15.8%) were B/Brisbane/60/2008-like viruses, which were not included in the 2012-2013 vaccine.

In comparison, during the 2011-2012 season, a similar high proportion of influenza A viruses, especially A(H3N2) viruses, was seen, but with a later peak in mid-March.

MDCH BOL has the capacity to perform antiviral resistance testing on influenza A(H3N2) and A(pH1N1) specimens for public health surveillance and for diagnostic testing of severe influenza cases in which antiviral resistance is suspected. Of the 32 influenza A(H3N2) and 27 influenza A(pH1N1) specimens submitted to MDCH BOL by May 26, 2013 that have undergone antiviral resistance testing, 100% have been identified as wild type (i.e. no antiviral resistance).

Figure 11. MDCH Bureau of Laboratories Influenza Positive Specimens, Based on Date Result Reported, September 30, 2012-May 25, 2013



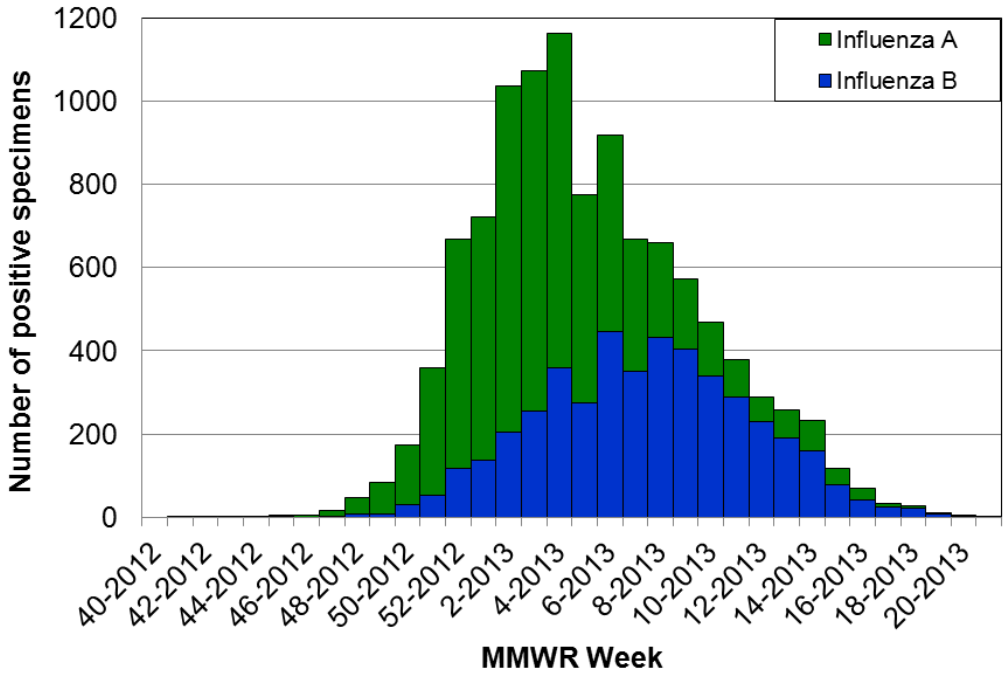
Sentinel Laboratories

Nineteen sentinel clinical laboratories statewide voluntarily submitted weekly respiratory virologic testing results to MDCH. The month in which sentinel labs started seeing influenza A positive results varied from October to December, with the majority of labs first seeing activity in December. Increased influenza A activity was reported during late December through early March, with sporadic positives still being reported throughout the month of May. The majority of labs experienced their peak number of influenza A positives during the weeks ending January 5 and January 12, 2013. The highest statewide number of total positive influenza A results also occurred during the week ending January 12, 2013 (MMWR Week 2) (Figure 12). Influenza A positive specimens comprised 59% of influenza positive specimens reported by sentinel laboratories. Influenza A activity was higher than levels seen in recent non-pandemic influenza

seasons (approximately 2 times higher than in 2010-2011 and 3 times higher than in 2011-2012).

Influenza B activity reported by the sentinel laboratories was lower than influenza A activity but higher than influenza B levels seen in recent non-pandemic influenza seasons (approximately 3 times higher than in 2010-2011 and 22 times higher than in 2011-2012). While the majority of laboratories started reporting influenza B positive results in December, the timing of the start of influenza B activity varied from November to January depending on the lab. Peak activity varied between different laboratories, ranging from mid-December through the beginning of March. The highest statewide number of total influenza B positive results occurred during the week ending February 9, 2013 (MMWR Week 6) (Figure 12).

Figure 12. Positive Influenza Specimens from MDCH Influenza Sentinel Laboratories, by Date Reported, September 30, 2012-May 25, 2013



Respiratory syncytial virus (RSV) was sporadically detected throughout the season, with increased activity reported during mid-December through March. The majority of laboratories experienced peak RSV activity during January or February; the highest number of positive lab specimens were reported during the week ending January 26, 2013. Parainfluenza positive results occurred sporadically throughout the season; types 1, 2 and 3 were all detected with type 3 being most commonly detected. Adenoviruses were also detected sporadically throughout the season. Human metapneumovirus was detected during early December through mid-May, with the majority of positive results occurring during March and April.

National Data (Centers for Disease Control and Prevention)

During the 2012-2013 influenza season in the United States, influenza activity increased starting in November and peaked in late December. The proportion of specimens

testing positive for influenza first exceeded 10% during the week ending November 10, 2012 (MMWR Week 45) and peaked at 38% during the week ending December 29, 2012 (MMWR Week 52). The geographic distribution of influenza activity was most extensive during the week ending January 12, 2013 (MMWR Week 2), when 48 states reported widespread influenza activity. This season was moderately severe, with a higher percentage of outpatient visits for influenza-like illness (ILI), higher hospitalization rates, and more deaths attributed to pneumonia and influenza than in recent years.

Influenza A(H3N2) viruses predominated overall, but influenza B viruses and, to a lesser extent, A(pH1N1) viruses also were reported. Of the positive specimens during September 30, 2012–May 18, 2013, 71% were influenza A viruses, and 29% were influenza B viruses. Among seasonal influenza A viruses, 96% of those subtyped were influenza A(H3N2), and 4% were pH1N1. Influenza A viruses predominated until the end of February, after which influenza B viruses predominated.

Ninety-nine percent of influenza A(H3N2) viruses and 99% of influenza A(pH1N1) viruses matched their respective 2012-2013 influenza vaccine components. Only 66% of influenza B viruses tested belonged to the B/Yamagata lineage, with 34% belonging to the B/Victoria lineage. Antiviral testing indicated that 0.4% of influenza A(pH1N1) specimens, 0.05% of influenza A(H3N2) specimens, and 0% of influenza B specimens were resistant to oseltamivir. No resistance to zanamivir was detected. High levels of resistance to the adamantanes persist among A(pH1N1) and A(H3N2) viruses.

The weekly percentage of outpatient visits for ILI to healthcare providers exceeded the national baseline level of 2.2% for 15 weeks and exceeded region-specific baselines in all 10 regions. The peak percentage of visits for ILI was 6.1% and occurred in the week ending December 29, 2012 (MMWR Week 52). In contrast, the peak percentage of ILI during the previous season was 2.4% and occurred in mid-March. During the 2007-2008 and 2010-2011 A(H3N2)-predominant influenza seasons, the peak ILI percentage was 6.0% and 4.6%, respectively; both peaks occurred in mid-February.

Based on data from the FluSurv-NET surveillance system, cumulative hospitalization rates (per 100,000 population) were highest in the ≥65 years age category. Among adult hospitalized patients, the most frequent underlying medical conditions were cardiovascular disease (45%), metabolic disorders (39%) and chronic lung disease (27%). Among pediatric hospitalizations, 46% did not have any known underlying conditions, and 22% had asthma or reactive airway disease. Among hospitalized women of childbearing age (15-44 years), 28% were pregnant.

The percentage of deaths attributed to pneumonia and influenza (P&I) exceeded the epidemic threshold for 13 consecutive weeks spanning December 30, 2012 to March 30, 2013 (MMWR Weeks 1-13). The percentage of deaths attributed to P&I peaked at 9.9% during the week ending January 19, 2013. From 2008-2009 through 2011-2012, the peak percentage of P&I deaths ranged from 7.9% to 9.1%, and the total number of consecutive weeks at or above the epidemic threshold ranged from 1 to 13.

As of June 7, 2013, 149 laboratory-confirmed, influenza-associated pediatric deaths were reported for 2012-2013. The median age was 8.2 years. Seventy-nine deaths

were associated with influenza B viruses, 32 with A(H3) viruses, 4 with pH1N1 viruses, 31 with an influenza A virus for which the subtype was not determined, 1 with an influenza virus for which the type was not determined, and 2 with both an influenza B and influenza A virus. Since 2004, the number of influenza-associated pediatric deaths has previously ranged from 34 to 123 per season, excluding the 2009 pandemic.

One case of human infection with a variant influenza A(H3N2) (H3N2v) virus was reported in each of two states, Minnesota and Iowa. Both infections occurred in children, one with known exposure to swine. Both patients recovered fully.

2013-2014 Seasonal Influenza Vaccine

The World Health Organization has recommended vaccine strains for the 2013-2014 Northern Hemisphere trivalent influenza vaccine, and the Food and Drug Administration has made the same recommendations for influenza vaccine composition for the United States. It is recommended that trivalent vaccines contain an A/California/7/2009 (H1N1)pdm09-like virus, an A(H3N2) virus antigenically like the cell-propagated prototype virus A/Victoria/361/2011, and a B/Massachusetts/2/2012-like virus (B/Yamagata lineage). It is recommended that quadrivalent vaccines contain a second influenza B virus, B/Brisbane/60/2008-like virus (B/Victoria lineage). For the trivalent vaccine, this represents a change in the influenza B component from the 2012-2013 Northern Hemisphere influenza vaccine formulation. This recommendation was based on surveillance data related to epidemiology and antigenic characteristics, serologic responses to the 2012-2013 influenza vaccine, and the availability of candidate strains and reagents.

WORLDWIDE NOVEL AND AVIAN INFLUENZA STRAINS

The 2012-2013 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 October 7, 2013, there have been 641 human cases, including 380 deaths, in 15 countries spanning Asia, the Middle East and Africa. All cases are considered to be sporadic, with no evidence of community-level transmission at this time.

From March 2013 through October 24, 2013, 137 human cases of influenza A(H7N9) virus infection in China were reported, with 45 deaths. Most human cases presented with pneumonia. Most human A(H7N9) cases have reported contact with poultry or live animal markets. This virus has also been identified in local poultry. Knowledge about the main reservoirs and the extent and distribution of the virus in animals remains limited and, because it causes only subclinical infections in poultry, it is possible that the virus continues to circulate in China and perhaps in neighboring countries.

Since August 14, 2013, a total of six outbreaks of highly pathogenic avian influenza A(H7N7) in poultry have been reported in Italy. Three human cases of infection with influenza A(H7N7) virus were identified in men involved in outbreak culling operations. All individuals recovered without treatment. Genetically, these viruses are similar to low pathogenic viruses circulating in European wild birds and those causing sporadic poultry outbreaks in Central and Northern Europe.

Other human infections with novel influenza viruses since October 2012 include a case of low pathogenic avian influenza H6N1 from Chinese Taipei and a case of swine H1N1 in Ontario, Canada.

Cases of human infection with influenza A(H3N2) variant viruses (H3N2v) associated with exposure to swine continue to be reported in the United States. During 2012, 309 cases were reported from Hawaii (1), Illinois (4), Indiana (138), Iowa (1), Maryland (12), Michigan (6), Minnesota (5), Ohio (107), Pennsylvania (11), Utah (1), West Virginia (3) and Wisconsin (20). During 2013, 19 cases have been reported from Illinois (1), Indiana (14), Iowa (1), Michigan (2), and Ohio (1). Since July 2012, 17 of reported H3N2v cases were hospitalized, with one death.

National and international surveillance is conducted for other high and low pathogenic and avian influenza virus subtypes. Since October 2012, highly pathogenic avian influenza outbreaks of subtypes other than H5N1 in poultry occurred in Australia (H7), Chinese Taipei (H5N2), Mexico (H7N3) and South Africa (H5N2). Highly pathogenic avian influenza was found in wild birds in Denmark (H7).

Since October 2012, low pathogenic avian influenza outbreaks in poultry occurred in Australia (H5N3), Chinese Taipei (H5N2, H5N3), Denmark (H7N7), Germany (H5N1, H7N7), Netherlands (H7N1, H7N7), Spain (H7N1), South Africa (H5N2, H7N1, H7N7) and United States of America (Arkansas: H7N7, New York: H5).

RESOURCES

- For information about influenza, go to the MDCH influenza homepage at http://www.michigan.gov/influenza.
- The most current U.S. influenza data and archived reports are available from the CDC at http://www.cdc.gov/flu/weekly/fluactivitysurv.htm.
- Information on national data from the 2012-2013 influenza season is described in the MMWR article “Influenza Activity --- United States, 2012--13 Season and Composition of the 2013--14 Influenza Vaccine”, available at http://www.cdc.gov/mmwr/pdf/wk/mm6223.pdf.
- 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://wwwn.cdc.gov/nndss/document/MMWR_Week_overview.pdf.

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