



Michigan Influenza Surveillance Summary 2008-2009 Influenza Season

Michigan Department of Community Health
September 3, 2010



This report covers the time period from September 28, 2008 through April 25, 2009 and does not cover the emergence of the pandemic 2009 influenza A (H1N1) virus in late April 2009. Information on the first and second pandemic waves will be included in the surveillance summary for the 2009-2010 influenza season.

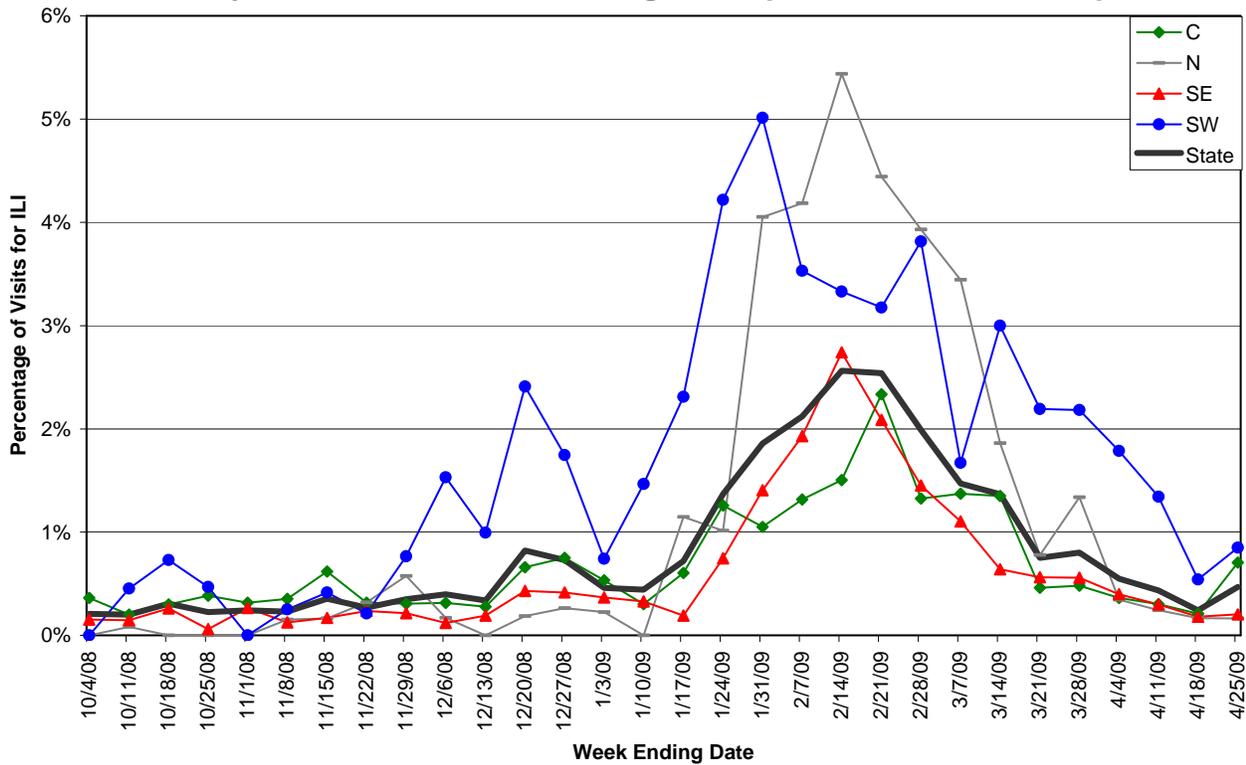
SEASONAL INFLUENZA

The 2008-2009 influenza season (defined as September 28, 2008 to April 25, 2009) can be characterized as mild, with a decreased level of activity compared to the 2007-2008 influenza season and similar to the 2005-2006 and 2006-2007 seasons. The first influenza virus isolated at the Michigan Department of Community Health (MDCH) Bureau of Laboratories was announced on November 14, 2008. Peak influenza activity occurred in mid-February. Seasonal influenza A (H1N1) viruses were the predominant virus during this season and made up the majority of viruses from early December through mid-March. Influenza A (H3N2) virus activity in Michigan was negligible this season. Influenza B viruses began consistently co-circulating in early February and were the principal viruses isolated after mid-March. Michigan did not reach “widespread” statewide influenza activity, the highest level of weekly reporting to the Centers for Disease Control and Prevention (CDC), during the 2008-2009 season. “Regional” activity, the second highest of the five activity levels, was reported for six consecutive weeks during the weeks ending February 7 (MMWR Week 5) through March 14, 2009 (MMWR Week 10).

Sentinel Provider Data

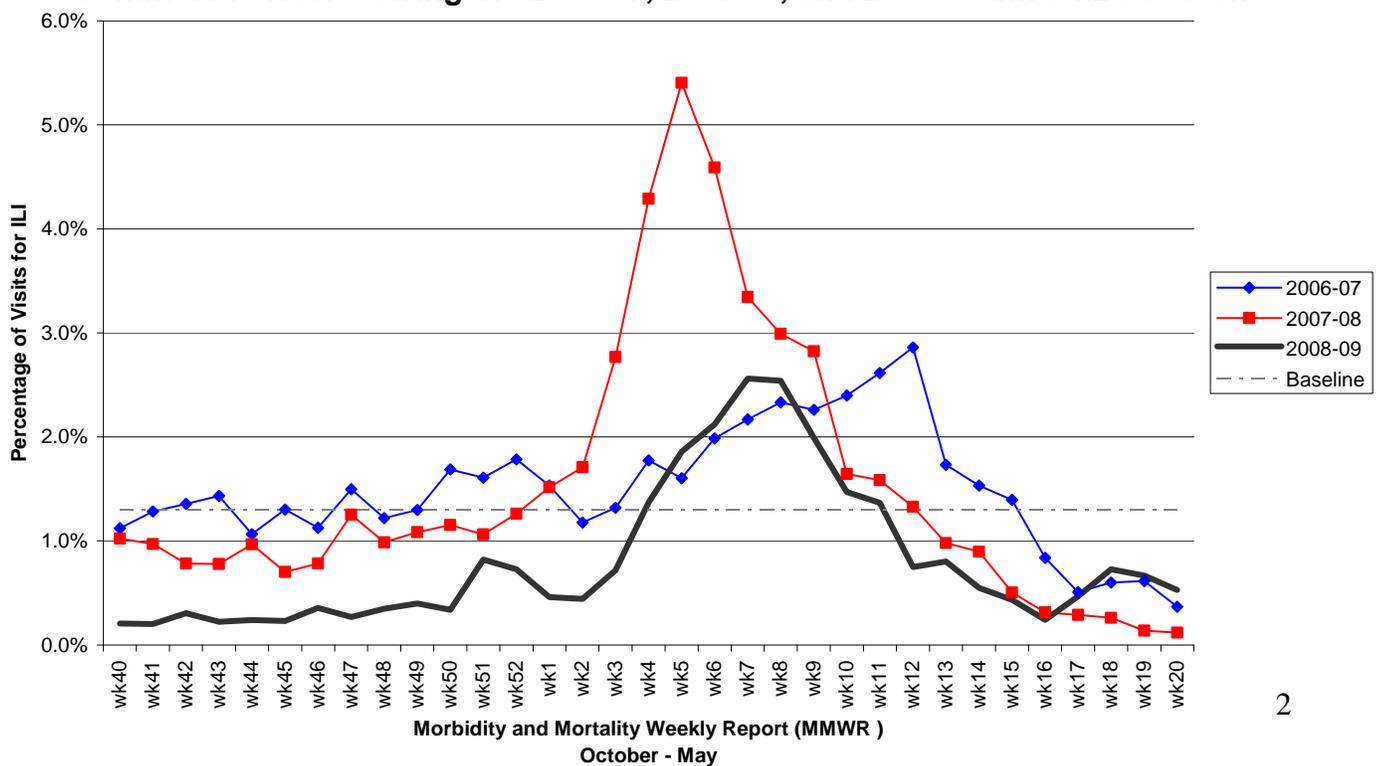
The percentage of visits to providers participating in the Michigan component of the CDC U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) began to steadily increase during the week ending January 17, peaked statewide at 2.6% during the week ending February 14, 2009, and remained elevated through the month of February (Figure 1). Influenza-like illness (ILI) visits steadily decreased throughout March and April, until the emergence of the pandemic 2009 influenza A (H1N1) virus in late April. Activity in each of the four surveillance regions followed a similar pattern, peaking between late January and early 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 between regions.

Figure 1. Percentage of Influenza-like Illness Visits Reported by Michigan Sentinel Providers, by Influenza Surveillance Region, September 28, 2008 to April 25, 2009



When comparing ILI activity to that of the two previous seasons, peak activity for the 2006-2007 season occurred later in mid-to-late March and earlier in late January during 2007-2008 (Figure 2). For the past three influenza seasons, the highest percentage of visits due to ILI was in the 2007-2008 season at 5.4%.

Figure 2. Percentage of Visits for Influenza-like Illness Reported by Michigan Sentinel Providers during the 2006-07, 2007-08, and 2008-09 Influenza Seasons



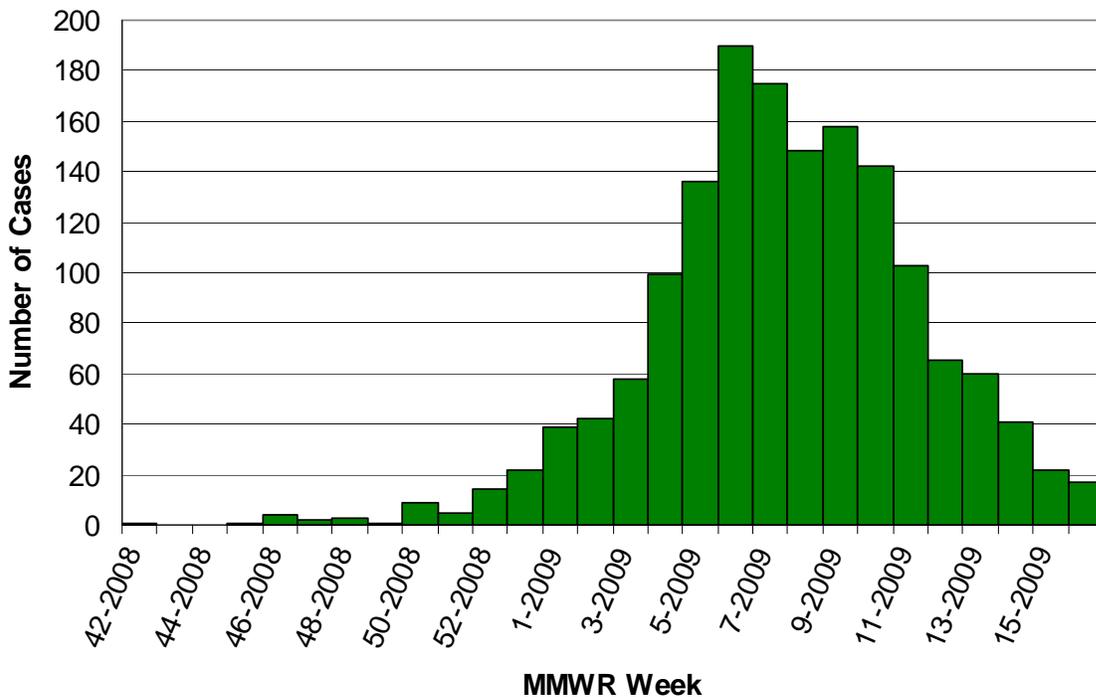
Individual Influenza Reports

Influenza cases included in the data below are probable, confirmed, suspect or unknown status, with an investigation status of completed, active or new. The data may not be representative of the statewide impact of influenza as local health departments are not required to report individual cases of influenza. In addition, the greater number of reports from large local health jurisdictions may unintentionally bias statewide results.

From September 28, 2008 – April 25, 2009, 1622 individual cases were reported in MDSS; only 1557 of these cases were used for analysis. Sixty-five cases were excluded due to incomplete serologic testing or being incorrectly reported as influenza when another etiologic agent was identified. By comparison, for the same time frame during the 2007-2008 influenza season, 2786 cases were correctly reported to MDSS. The decrease in individual cases reported during the 2008-2009 season may be due to a milder influenza season, a decline in reporting, and/or decreased influenza testing.

As illustrated in Figure 3, during the 2008-2009 season, peak activity for individually reported influenza cases in MDSS was seen during the week ending February 14, 2009 (MMWR Week 6). Similarly, for the 2007-2008 season, peak individually reported influenza activity occurred during the week ending February 9, 2008. These data indicate that the 2008-2009 season experienced a smaller, but temporally similar, peak in individually reported cases when compared to the 2007-2008 season.

Figure 3. Individually Reported Influenza Cases in MDSS With Referral Dates from September 28, 2008 – April 25, 2009



For this influenza season, the median age of individually reported cases was 13 years, with a mean of 18 years. In comparison, during the 2007-2008 season the median age

was 26 years. The highest proportion of individually reported cases was in the 19-49 year old population (28.0%), followed by the 10-18 years age group (25.2%) and the 0-4 years age group (21.2%) (Table 1). By comparison, during the previous season, 38.6% of individual cases were between 19 and 49 years, followed by 23.2% in the 50+ year age group. Therefore, it appears that the younger populations were affected more during this influenza season than in the previous season; this conclusion assumes that no age-related reporting bias occurred between this influenza season and the previous season. Fifty percent of cases were male during this influenza season.

Table 1. Individually Reported Influenza Cases in MDSS by Month and Age Group*, with Referral Dates from September 28, 2008 – April 25, 2009

Month	Age Group; Percentage of Monthly Total										
	0-4 years		5-9 years		10-18 years		19-49 years		50+ years		Total
Oct	1	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1
Nov	3	30.0%	1	10.0%	0	0.0%	4	40.0%	2	20.0%	10
Dec	10	20.0%	4	8.0%	9	18.0%	18	36.0%	9	18.0%	50
Jan	58	24.4%	37	15.5%	42	17.6%	87	36.6%	14	5.9%	238
Feb	121	18.6%	117	18.0%	207	31.9%	167	25.7%	37	5.7%	649
Mar	105	21.3%	98	19.8%	113	22.9%	136	27.5%	42	8.5%	494
Apr	32	28.1%	27	23.7%	21	18.4%	24	21.1%	10	8.8%	114
Total	330	21.2%	284	18.3%	392	25.2%	436	28.0%	114	7.3%	1556

* Age was not available for one case

As reported in MDSS, 1440 (92.5%) of influenza cases were classified as “Outpatient,” 112 (7.2%) were “Inpatient,” and 5 died (0.3%); however, “Outpatient” is the default setting and may not have been changed for some hospitalized cases. When compared to all cases, cases reporting a result of hospitalization or death were more likely to be male (58.1%), slightly older (median age of 16 years and mean age of 29 years), and infected with influenza A (60.2%). Influenza-associated hospitalizations and adult deaths are not required to be reported to public health; therefore, the data presented above may not be representative of all such cases in Michigan.

Information on influenza testing results was available for 1472 (94.5%) of cases. Influenza A was reported for 797 cases (54.1% of cases with test results) and influenza B for 675 (45.9%) cases. Subtyping results were reported for 164 (20.6%) of the influenza A cases; influenza A (H1N1) was identified in 160 (98.2%) cases, influenza A (H3N2) for 3 (1.8%) cases, and pandemic influenza A (H1N1) for 1 case (specimen collection date of April 10, 2009). The method of influenza testing was available for 1076 (73.1%) cases; the most utilized test was the rapid antigen test (59.3%), followed by viral culture (32.2%), RT-PCR (4.3%), IFA (2.4%), and DFA (1.9%).

Aggregate Influenza-like Illness

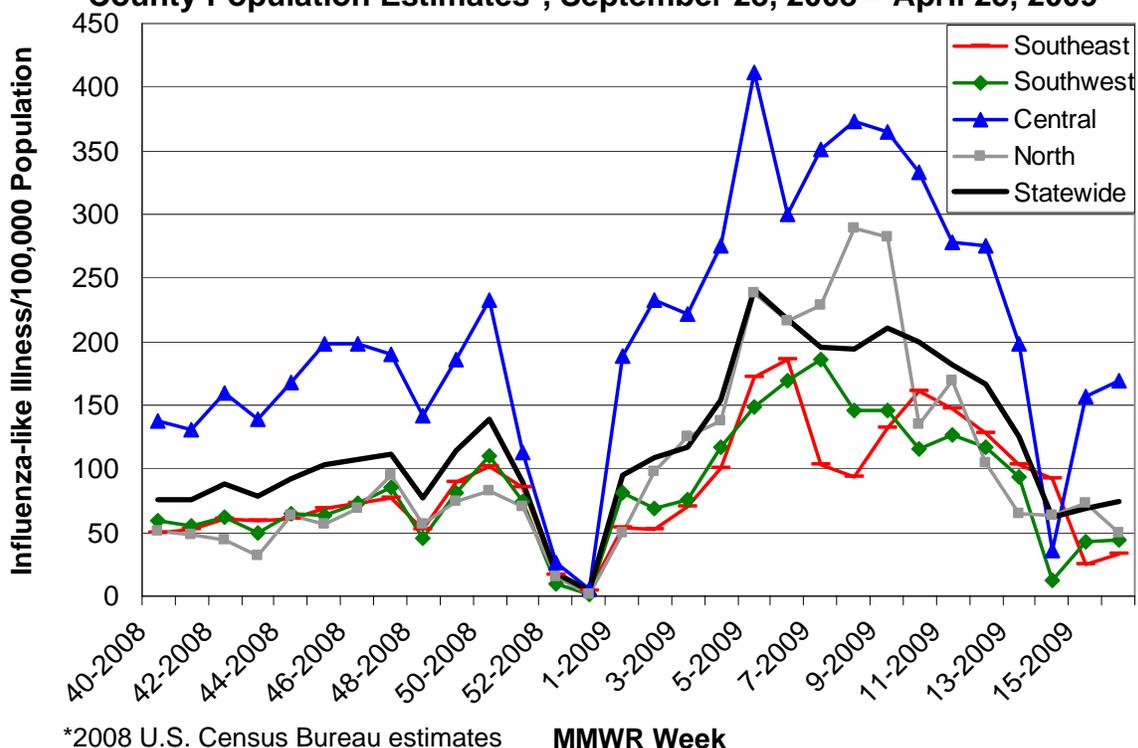
Aggregate influenza-like illness reports from local health departments are entered weekly into the MDSS as “Flu-like Disease” cases. Cases included in the data below are probable, confirmed, suspect or unknown status, with an investigation status of

completed, active or new. 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.

In the 2008-2009 season, aggregate reports increased in late January, peaked quickly in early February, and remained elevated through late March. Peak aggregate activity was seen during MMWR Week 5 (week ending February 7, 2009) with 24,030 reports. The timing of peak activity was identical to the peak of individual influenza reports and activity reported by sentinel providers. The noticeable decrease in activity during weeks 52 and 53 (and to a lesser extent weeks 48 and 14) correspond to school holiday breaks. During the 2007-2008 season, peak activity was seen during the week ending February 9, 2008 at 23,415 reports. These data indicate that aggregate influenza-like illness in Michigan for the 2008-2009 season was very similar to the previous season.

Rates of influenza-like illness for the Influenza Surveillance Regions were calculated from aggregate reports and county level population estimates (Figure 4). The Central Region experienced the highest peak rate at 412 cases/100,000 population; peak rates for the other regions include 185 cases/100,000 for both the Southeast and Southwest Regions, 290 cases/100,000 for the North Region, and 241 cases/100,000 statewide. Regions experienced their peak rate during MMWR weeks 5 through 8 (the week ending February 7, 2009 through the week ending February 28, 2009). Regional variations in influenza-like illness rates may represent disparities in the consistency of aggregate reporting or true differences in influenza transmission. Influenza-like illness rates based on aggregate reports are most likely lower than those reported by ILINet sentinel providers because ILINet surveillance is active, while most aggregate reports are collected passively.

Figure 4. Rates of Aggregate Influenza-like Illness per 100,000 Population, Based County Population Estimates*, September 28, 2008 – April 25, 2009



*2008 U.S. Census Bureau estimates

MMWR Week

Syndromic Surveillance

For the 2008-2009 season, emergency department visits due to constitutional complaints (fever, chills, body ache, flu symptoms, weakness, fatigue, anorexia, malaise, etc.) slowly increased above baseline levels starting in mid-November and then accelerated quickly from January to a peak of 9.5% of all visits in mid-February (Figure 5). From mid-February through April, constitutional visits steadily decreased. Visits due to respiratory complaints (nose, throat or lung problems, sinusitis, cold symptoms, bronchitis, cough, asthma, COPD, sore throat, etc.) had rapidly increased from baseline levels of approximately 8% of total visits in August to 13% in September. Respiratory visits fluctuated between 12.3% and 14.2% until mid-January, steadily increased to a peak of 15.5% in late February, and then declined to 13% in April (Figure 6). The peak percentage of visits due to constitutional and respiratory complaints in February correlated with other influenza surveillance indicators.

During the 2007-2008 season, visits due to constitutional complaints peaked in early February at 13% of all visits, while visits due to respiratory complaints peaked twice, once in late December and early January at 17.5% and in early February at 19.5%. These data indicate that while emergency departments experienced the burden of influenza-like illness symptoms during a similar time frame as the 2007-2008 season, the 2008-2009 influenza season appears to have generated fewer visits for these facilities than during 2007-2008. Data from this surveillance system are 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. Throughout the season, the number of facilities reporting into the system did increase from 70 to 75; therefore, past influenza seasons are best compared to this one in the form of trends, as opposed to absolute values.

Figure 5. Michigan Emergency Department Constitutional Complaints, September 28, 2008-April 25, 2009

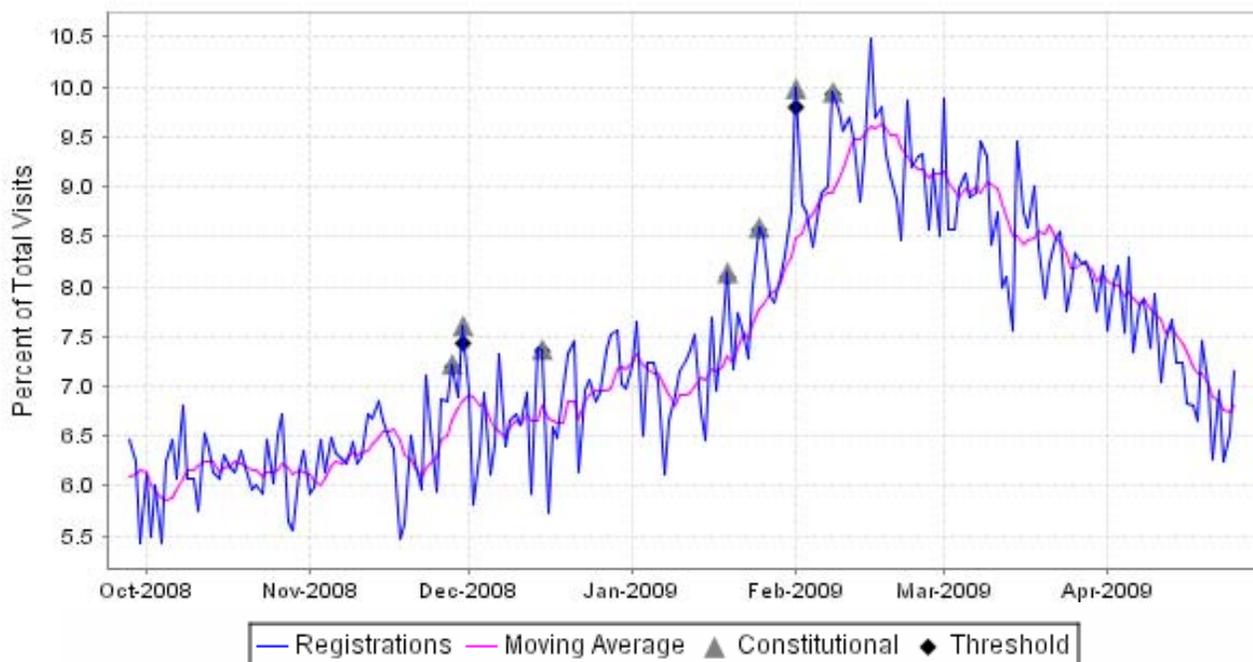
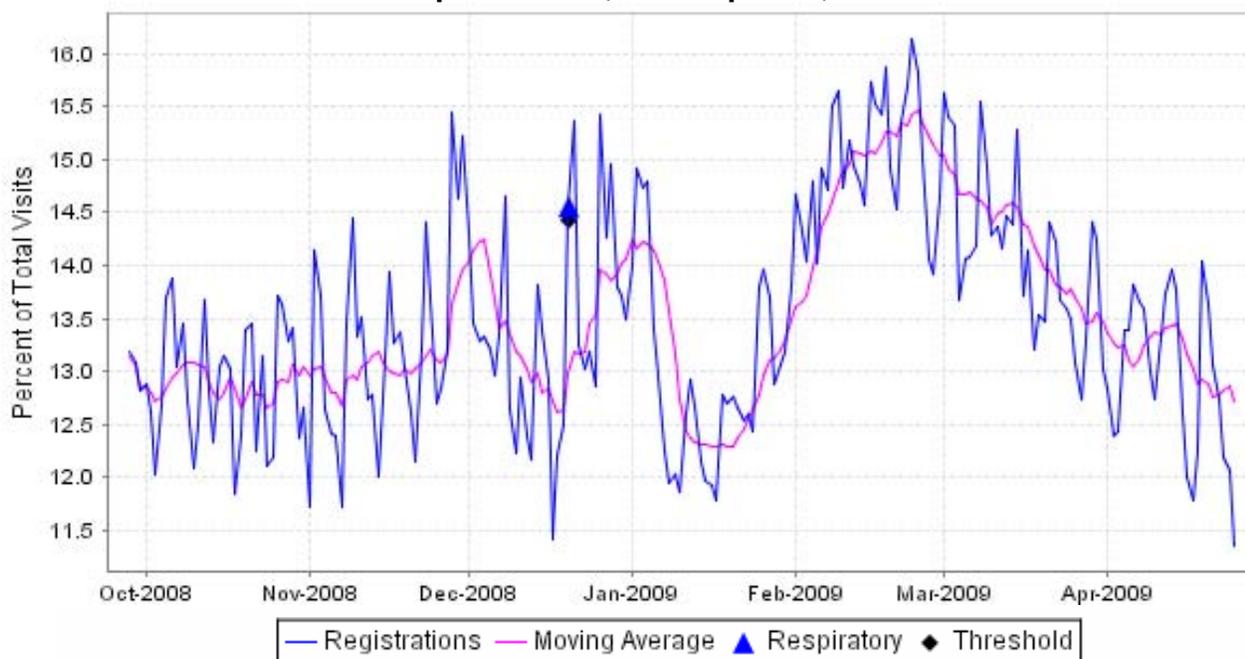


Figure 6. Michigan Emergency Department Respiratory Complaints, September 28, 2008-April 25, 2009



Pediatric Mortalities

Three confirmed pediatric influenza-associated deaths were reported to MDCH during the 2008-2009 influenza season. The first case was a two month old, unvaccinated, previously healthy female from the Central Influenza Surveillance Region who died in February in association with an influenza A infection (subtype unknown). The second case was a 6 year old female from the Southeast Region who died in April. This patient was not up to date on influenza vaccination and had a history of chronic otitis media. The final death also occurred in April in the Southeast Region in a 5 year old male with a history of asthma and one influenza vaccination during the current season. Isolates from both of the April deaths were identified as influenza B/Malaysia/2506/2004-like; this strain was not covered by the 2008-2009 influenza vaccine.

Congregate Setting Outbreaks

Three congregate setting outbreaks with positive influenza testing (1 influenza A, 1 influenza B, 1 unsubtyped) were reported to MDCH for the 2008-09 influenza season, which was a substantial decrease from the 22 outbreaks reported during the previous season. These outbreaks were reported from the Central (1) and North (2) Influenza Surveillance Regions. Two outbreaks occurred in late January and one in early March; the types of facilities were two long term care facilities and one K-12 school.

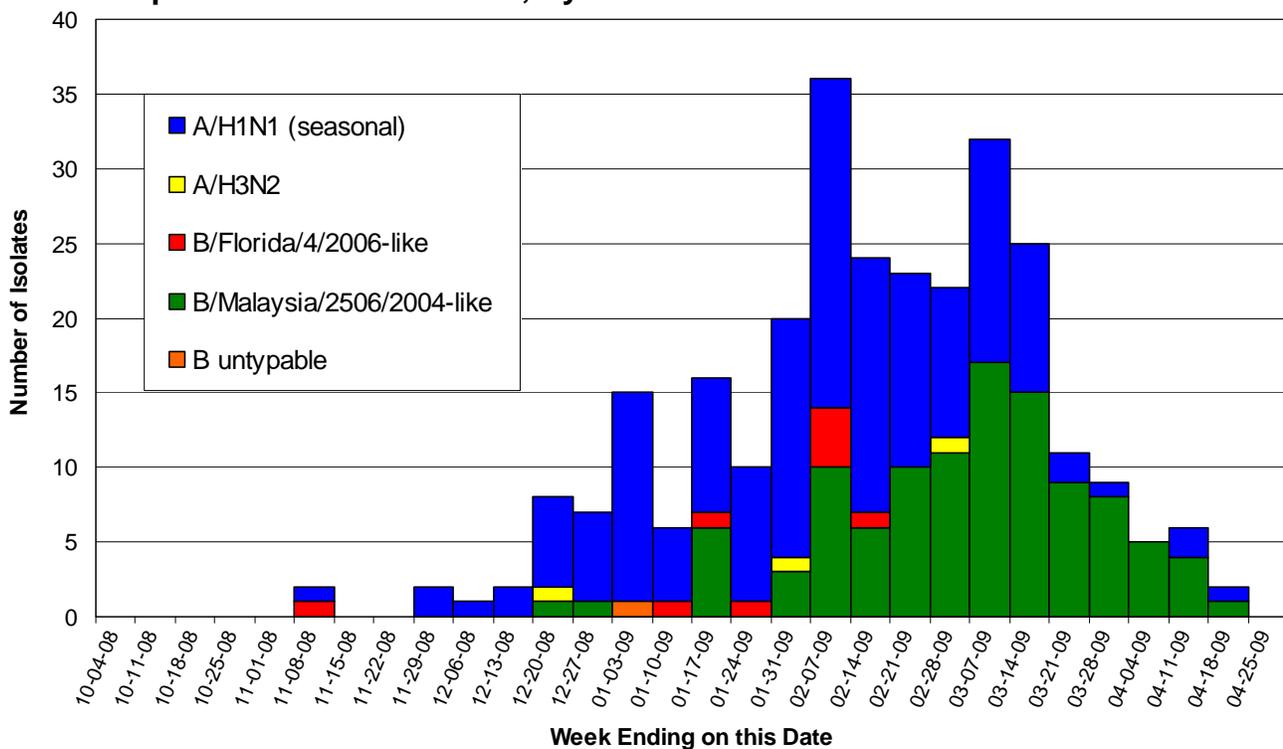
MDCH Laboratory Isolates

Sentinel physicians, sentinel laboratories and other clinical health partners provide virologic data by submitting clinical specimens and/or viral isolates for respiratory virus culture at the MDCH Bureau of Laboratories. During September 28, 2008 to April 25,

2009, 284 positive influenza isolates were identified by the MDCH lab, of which 167 (58.8%) were influenza A and 117 (41.2%) were influenza B (Figure 7). The influenza A isolates consisted of 164 (98.2%) seasonal influenza A (H1N1) isolates and 3 (1.8%) influenza A (H3N2) isolates. The influenza B isolates were classified as 107 (91.5%) B/Malaysia/2506/2004-like, 9 (7.7%) B/Florida/4/2006-like, and 1 (0.8%) untypable influenza B. The B/Florida/4/2006-like virus was the influenza B component of the 2008-2009 Northern Hemisphere influenza vaccine, which did not constitute the majority of influenza B viruses isolated in Michigan during this season.

Seasonal influenza A (H1N1) and influenza B/Malaysia/2506/2004-like viruses contributed to 57.7% and 37.7%, respectively, of MDCH laboratory-confirmed isolates. In comparison, during the previous season, influenza A (H3N2) constituted 77.0% of MDCH lab positive influenza specimens, with influenza B/Shanghai/2002-like (same lineage as B/Florida/4/2006-like) adding another 20.2%. Therefore, the influenza virus circulation in Michigan during this season was quite different than the previous season.

Figure 7. MDCH Bureau of Laboratories Influenza Positive Isolates, Based on Specimen Collection Date, By Week for the 2008-2009 Influenza Season



Sentinel Laboratories

Seventeen sentinel laboratories provided respiratory virologic testing results to MDCH during the 2008-2009 season. The first reports of positive influenza A results from sentinel labs ranged from the weeks ending October 18, 2008 through January 31, 2009. While peak influenza A activity occurred from early February to early March for the majority of the labs, on a statewide level influenza A activity was highest during the

week ending February 14, 2009. Most labs had not reported any influenza A positives for a few weeks before the 2009 pandemic began in late April 2009.

There was also a wide range of dates for the first influenza B positives, from the week ending November 15, 2008 to the week ending March 14, 2009. The majority of positive test results were reported during February through early April, with the statewide peak occurring during the week ending March 7, 2009. The majority of labs experienced their last influenza B positives during April, but a few did continue to see activity into the beginning of the 2009-2010 influenza season.

Parainfluenza viruses were reported sporadically throughout the season, with type 3 being more common than types 1 and 2. Adenoviruses were also sporadically reported, although a very slight peak did occur in November. Respiratory syncytial virus (RSV) positive test results increased steadily throughout the fall and winter, peaked during the week ending February 14, 2009, and then slowly declined through March and April.

National Data (Centers for Disease Control and Prevention)

National data suggest that the 2008-2009 influenza season was less severe than that of 2007-2008 and was more similar to the 2005-2006 and 2006-2007 seasons.

Nationwide, low levels of influenza activity were reported from October through early January, increased starting in mid-January, and peaked in mid-February, which corresponded with Michigan influenza activity. Regional or widespread influenza activity was reported for at least one week by 49 states during this season. The weekly percentage of outpatient visits for influenza-like illness peaked at 3.7% nationwide for the week ending February 14, 2009. Influenza A (H1N1) viruses predominated during the season; however, influenza B viruses became more predominant starting in mid-March. The percentage of deaths attributed to pneumonia and influenza, as reported by the 122 Cities Mortality Reporting System, did not exceed the epidemic threshold. From September 28, 2008 to April 25, 2009, 66 pediatric deaths were reported.

Widespread oseltamivir resistance was detected among influenza A (H1N1) viruses, and a high level of adamantane resistance was identified among influenza A (H3N2) viruses. On December 19, 2008, CDC issued a Health Advisory regarding the high prevalence of influenza A (H1N1) virus strains resistant to oseltamivir and the resulting interim recommendations for the use of influenza antiviral medications.

2009-2010 Seasonal Influenza Vaccine

WHO recommended that the 2009-2010 Northern Hemisphere trivalent influenza vaccine contain A/Brisbane/59/2007-like (H1N1), A/Brisbane/10/2007-like (H3N2), and B/Brisbane/60/2008-like (B/Victoria lineage) viruses. The Food and Drug Administration's Vaccines and Related Biological Products Advisory Committee recommended these same vaccine strains be included in the United States 2009-2010 influenza vaccine. The influenza B component represents a change from the 2008-2009 vaccine. These recommendations were based on antigenic and genetic analyses of recently isolated influenza viruses, epidemiologic data, post-vaccination serologic studies in humans, and the availability of candidate vaccine strains and reagents.

WORLDWIDE NOVEL AND AVIAN INFLUENZA STRAINS

The 2008-2009 influenza season saw continued circulation of highly pathogenic avian influenza A (H5N1) in humans, poultry and wild birds. Nepal was the only new country to report an H5N1 outbreak in poultry during this time period. From 2003 to April 25, 2009, there have been 421 human cases of highly pathogenic avian influenza A (H5N1), including 257 deaths, in 15 countries spanning Asia, the Middle East and Africa. During the 2008-2009 season, there were no human cases reported from new countries.

Several human infections with other novel influenza strains were noted during this time period. One case of swine influenza A (H1N1) was reported by Texas. South Dakota also reported an infection with swine influenza A (H1N1) in a 19 year old. Both of these swine influenza A (H1N1) viruses were different from the 2009 H1N1 pandemic swine-origin influenza virus. An infection with avian influenza A (H9N2) was confirmed in a 2 month old Hong Kong patient who was living in China at the time of illness.

National and international surveillance has also revealed cases of low pathogenic H5N1 avian influenza and other subtypes of highly pathogenic avian influenza. Wild birds in multiple states, including Michigan, have tested positive for a strain of low pathogenic H5N1 that is unrelated to the current highly pathogenic H5N1 outbreak in the Eastern Hemisphere. Low pathogenic avian influenza A strains, including H5N1, have been found to circulate normally in wild birds, especially waterfowl. Recent low pathogenic avian influenza outbreaks include those in poultry: United States of America (Kentucky H7N9), France (H5N3, H7), Canada (H5N2), Romania (H5N2), South Korea (H5N2), Germany (H5N3), Poland (H5N3), England (H6N1), Japan (H7N6); and those in wild birds: Czech Republic (H7), New Zealand (H5N1).

RESOURCES

- For information about influenza, go to the MDCH Influenza homepage at <http://www.michigan.gov/flu>.
- 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.
- The CDC 2008-2009 Influenza Activity Summary is available online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5814a4.htm>.
- 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/ncphi/diss/nndss/phs/mmwrweek/MMWR_Week_Fact_Sheet.doc.