



## Michigan Influenza Surveillance Summary 2009-2010 Influenza Season

Michigan Department of Community Health  
September 3, 2010



Traditionally, influenza seasons start in October and conclude at the end of the following September. However, due to the emergence of the pandemic 2009 influenza A (H1N1) in late April 2009, the 2009-2010 influenza season report will cover the time period April 26, 2009 to May 29, 2010, so that the entire pandemic may be analyzed in one report. The 2010-2011 influenza season will begin on October 3, 2010.

### **PANDEMIC 2009 H1N1 INFLUENZA AND SEASONAL INFLUENZA**

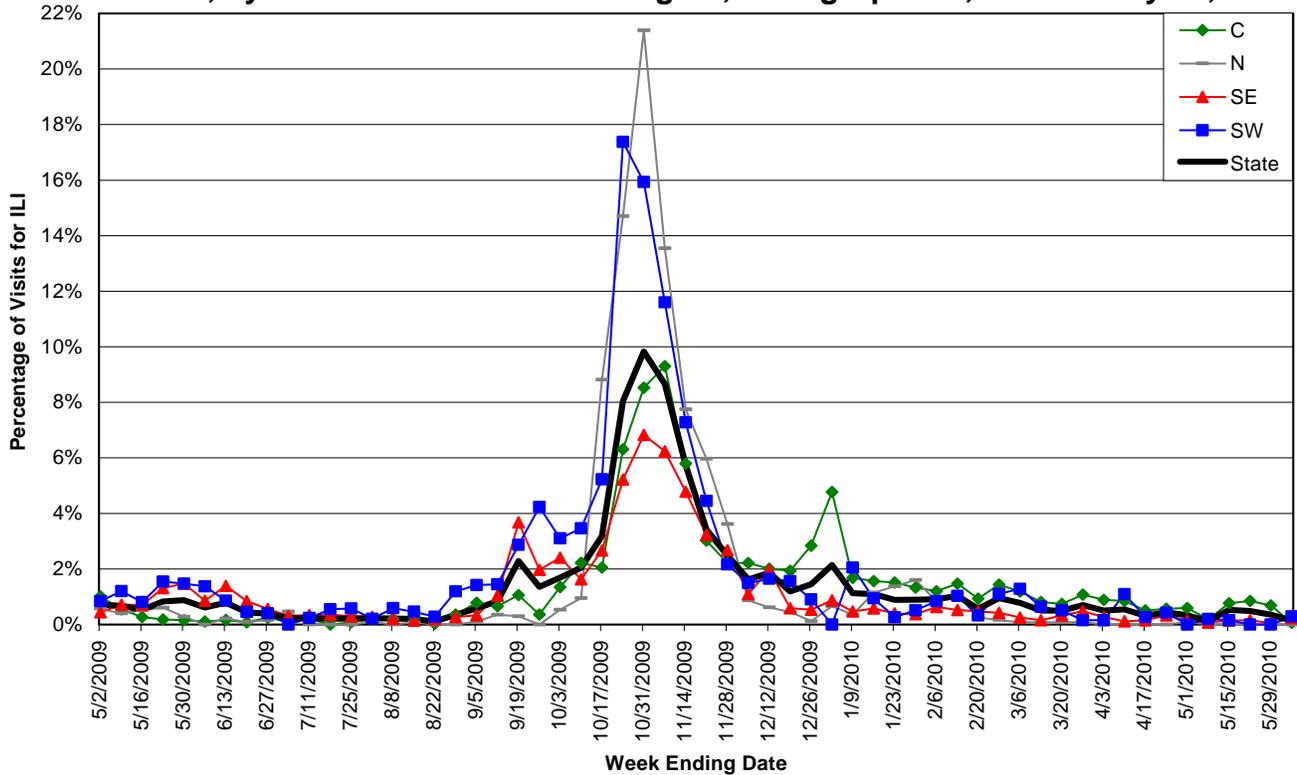
The 2009-2010 influenza season (defined as April 26, 2009 to May 29, 2010) saw the emergence and progression of a worldwide pandemic due to an influenza A (H1N1) virus. This virus was originally labeled as swine origin, but it is a human-adapted triple reassortant virus, consisting of swine, avian and human influenza genes. The 2009 influenza A (H1N1) pandemic was the first influenza pandemic in 40 years.

The 2009-2010 influenza season had a markedly elevated level of activity compared to not only the 2008-2009 influenza season, but any previous influenza seasons in which similar surveillance methods were in place. The first pandemic influenza A (H1N1) virus isolated at the Michigan Department of Community Health (MDCH) Bureau of Laboratories was announced on April 27, 2009. While a small peak of pandemic influenza A (H1N1) activity was seen at the end of May during the first pandemic wave, the true peak of the season occurred in late October during the second pandemic wave. Pandemic influenza A (H1N1) viruses predominated during this season; other influenza virus subtypes were virtually nonexistent. Michigan reported "widespread" statewide influenza activity, the highest level of reporting to the Centers for Disease Control and Prevention (CDC), for seven straight weeks from the week ending October 17, 2009 through the week ending November 28, 2009. Peak activity in Michigan during fall 2009 occurred slightly later than most other states.

### **Sentinel Provider Data**

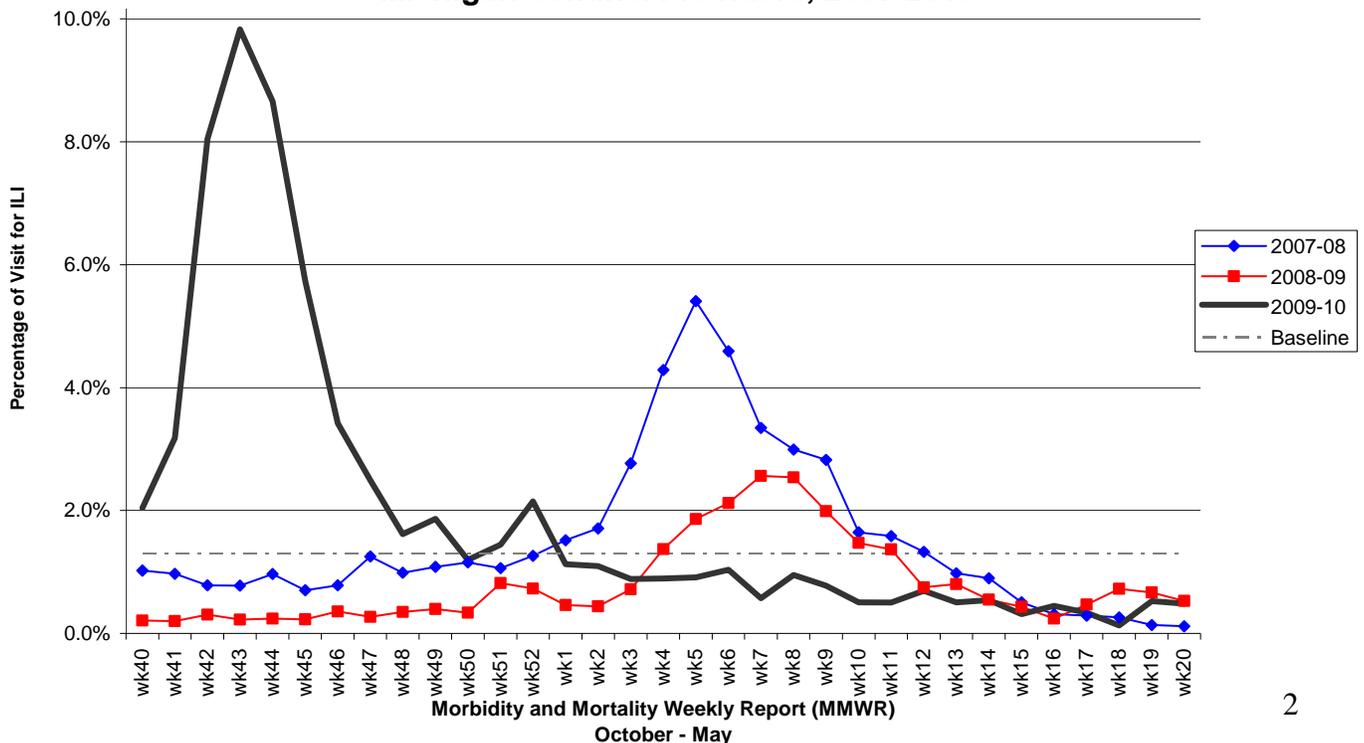
The percentage of visits to providers participating in the Michigan component of the CDC U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) peaked statewide at 9.8% during the week ending October 31, 2009; this was above historical norms. Rates of ILI began to increase during the week ending September 12, 2009, peaked at 9.8% during the week ending October 31 and remained elevated until mid-January (Figure 1). Activity in each of the four surveillance regions followed a similar pattern, peaking between late October and early November. Because 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, during April 26, 2009 to May 29, 2010**



Compared to the previous two influenza seasons, peak activity occurred earlier and at higher intensity. The percentage of visits due to ILI peaked at 9.8% this season compared to 2.6% during the 2008-09 season and 5.4% in 2007-08 (Figure 2).

**Figure 2. Percentage of Visits for Influenza-like Illness Reported by Michigan Sentinel Providers, 2007-2010**



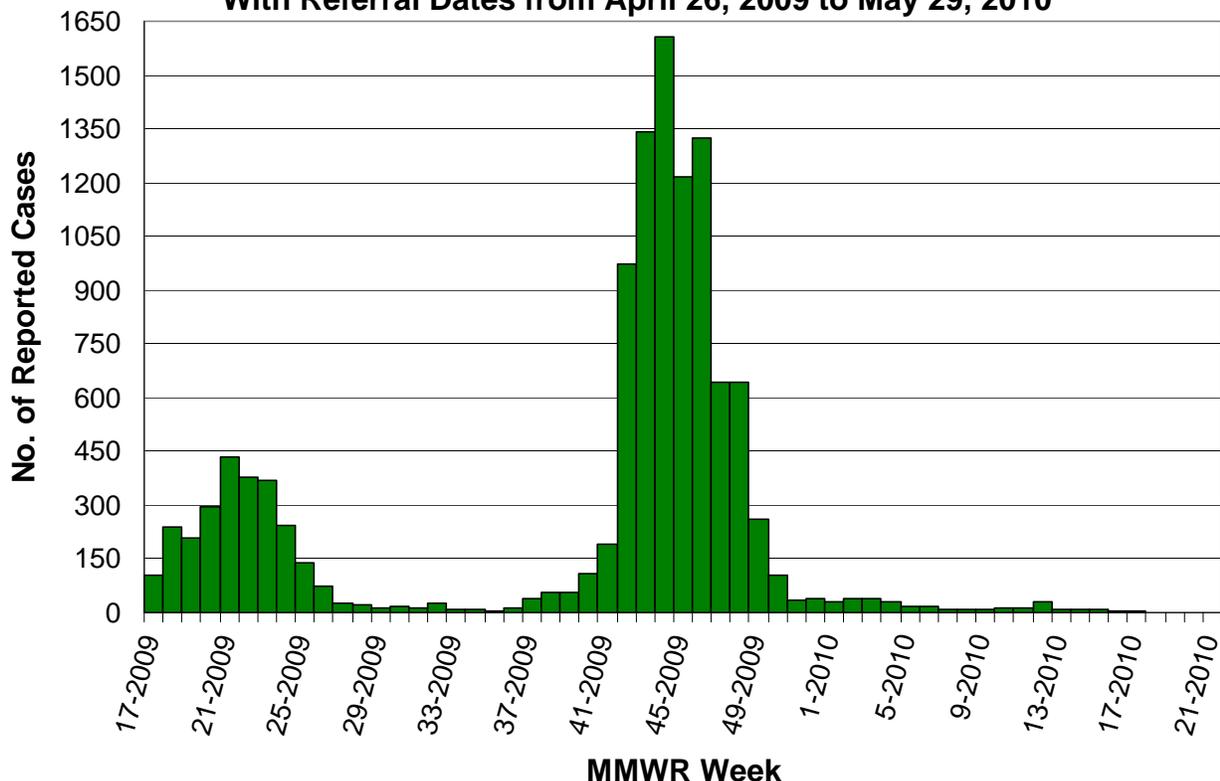
## Individual Influenza Reports

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 individually report influenza; in addition, the greater number of reports from large local health jurisdictions may unintentionally bias statewide results.

From April 26, 2009 to May 29, 2010, 11,599 individual cases were reported into the Michigan Disease Surveillance System (MDSS). These cases occurred in two “waves” of activity, the first from the beginning of May 2009 through the beginning of July 2009 and the second during mid-September 2009 to mid-December 2009 (Figure 3). By comparison, 1557 cases were reported during the 2008-2009 influenza season.

During the spring wave, individual case referrals into MDSS peaked during the week ending May 30, 2009 (MMWR Week 21) at 436 cases. The peak during the fall wave was substantially higher at 1608 cases for the week ending November 7, 2009 (MMWR Week 44); this represented a historical high for individually reported influenza cases in MDSS during one week. In comparison, during the 2008-2009 influenza season, 193 cases were seen during the peak in the week ending February 14, 2009 (MMWR Week 6), and for the 2007-2008 season, 372 cases occurred during the peak in the week ending February 9, 2008. These data indicate that the 2009-2010 influenza season varied dramatically from previous influenza seasons, with two distinct peaks occurring at times that are unusual for influenza, and a fall peak that was four times greater than individual cases reported during the previous three seasons. The increase in individual cases is most likely a result of a more severe influenza season with a pandemic strain, an increase in reporting due to the pandemic, and an increase in influenza testing.

**Figure 3. Individually Reported Influenza Cases in MDSS  
With Referral Dates from April 26, 2009 to May 29, 2010**



For this influenza season, the median age of individually reported cases was 14 years, with a mean of 21 years. Similarly, during the 2008-2009 season the median age was 13 years. The 5-18 year old age group represented 48.4% of all cases (Table 1). Since CDC altered the age categories between the 2008-2009 and 2009-2010 seasons, a direct comparison between age groups can only be done by combining some categories (Table 2). Based on this information, cases increased during the 2009-2010 season for the 5-18 year olds and the 50+ age group and decreased for the 0-4 years and 19-49 years age groups, when compared to the previous season. When interpreting these data, one should consider the possibility of age-related reporting or testing bias between the two influenza seasons. Fifty-one percent of cases were female during this season.

**Table 1. Individually Reported Influenza Cases in MDSS by Month and Age Group, with Referral Dates from April 26, 2009 to May 29, 2010**

Month	Age Group; Percentage of Monthly Total												
	0-4 years		5-18 years		19-24 years		25-49 years		50-64 years		65+ years		Total
April*	4	5.7%	32	45.7%	11	15.7%	17	24.3%	4	5.7%	2	2.9%	70
May	128	10.6%	782	64.7%	84	6.9%	168	13.9%	35	2.9%	12	1.0%	1209
June	130	11.0%	648	54.9%	104	8.8%	219	18.6%	70	5.9%	9	0.8%	1180
July	18	15.7%	47	40.9%	8	7.0%	33	28.7%	8	7.0%	1	0.9%	115
August	5	8.5%	17	28.8%	6	10.2%	19	32.2%	5	8.5%	7	11.9%	59
September	5	3.6%	43	31.4%	44	32.1%	22	16.1%	14	10.2%	9	6.6%	137
October	306	11.5%	1591	59.9%	166	6.3%	387	14.6%	152	5.7%	54	2.0%	2656
November	762	15.4%	2172	43.8%	297	6.0%	1009	20.3%	500	10.1%	221	4.5%	4961
December	153	17.0%	232	25.8%	58	6.5%	235	26.1%	129	14.3%	92	10.2%	899
January	26	18.7%	13	9.4%	12	8.6%	33	23.7%	18	12.9%	37	26.6%	139
February	6	11.1%	5	9.3%	3	5.6%	16	29.6%	8	14.8%	16	29.6%	54
March	9	12.5%	20	27.8%	9	12.5%	16	22.2%	12	16.7%	6	8.3%	72
April	8	26.7%	2	6.7%	1	3.3%	6	20.0%	4	13.3%	9	30.0%	30
May**	1	16.7%	1	16.7%	0	0.0%	1	16.7%	2	33.3%	1	16.7%	6
<b>Total</b>	<b>1561</b>	<b>13.5%</b>	<b>5605</b>	<b>48.4%</b>	<b>803</b>	<b>6.9%</b>	<b>2181</b>	<b>18.8%</b>	<b>961</b>	<b>8.3%</b>	<b>476</b>	<b>4.1%</b>	<b>11587</b>

**Table 2. Percentage of Individually Reported Influenza Cases in MDSS by Age Group, 2008-2009 and 2009-2010 Influenza Seasons**

Season	0-4 years	5-18 years	19-49 years	50+ years
<b>2008-2009</b>	21.2%	43.5%	28.0%	7.3%
<b>2009-2010</b>	13.5%	48.4%	25.7%	12.4%

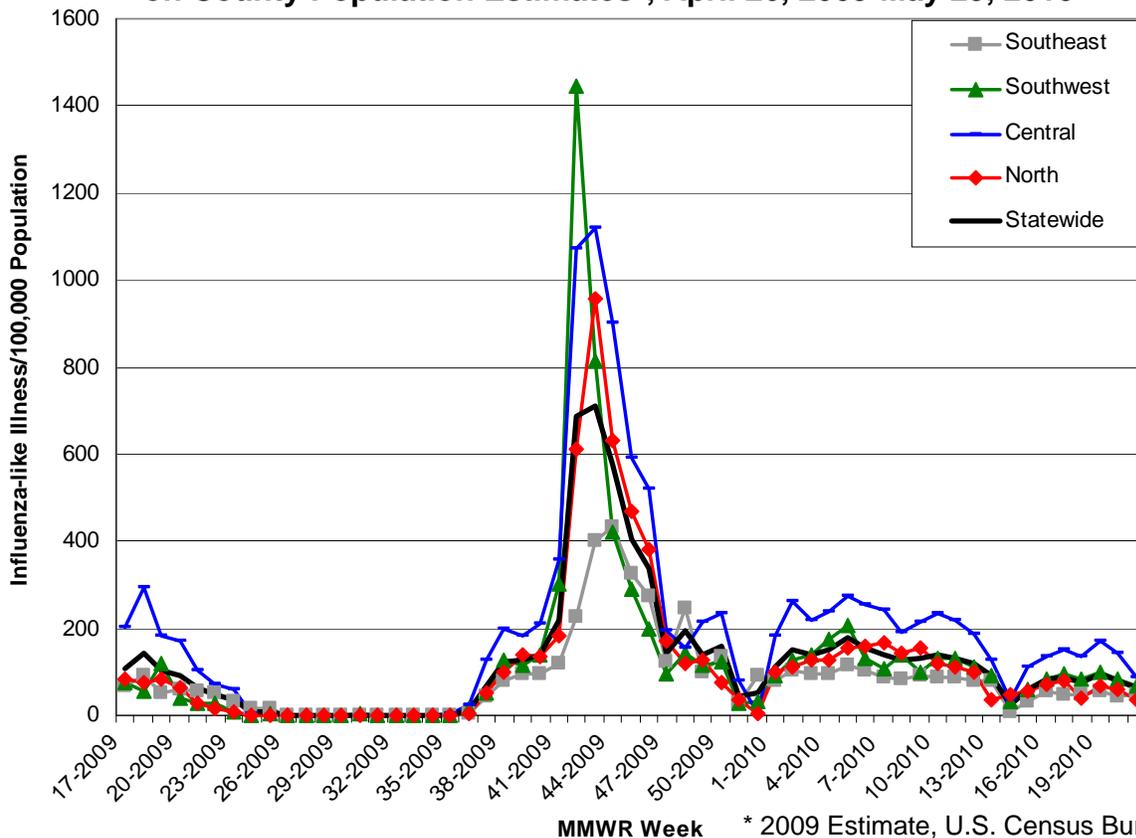
### Aggregate Influenza-like Illness

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, 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.

During the 2009-2010 season, aggregate activity was elevated for approximately one month during mid-October to mid-November. Peak aggregate activity was seen during MMWR weeks 42 and 43 (weeks ending October 24, 2009 and October 31, 2009) with 68,673 and 70,980 reports, respectively. The timing of peak activity was identical to activity reported by sentinel providers and one week earlier than the peak in individual influenza reporting. The noticeable decreases during weeks 26-35, 51-52 and 14 correspond to school breaks. During the 2008-2009 season, peak activity occurred in early February with 24,030 reports. The number of cases reported during the 2009-2010 peak was approximately 2.5 to 3 times higher than values reported during peaks of the previous four seasons, with a much earlier and more acute peak.

Rates of influenza-like illness per 100,000 population were calculated from aggregate reports of influenza-like illness and county level population estimates (Figure 4). The Southwest Region experienced the highest peak rate at 1445 cases/100,000 population; peak rates for the other regions include 432/100,000 for the Southeast Region, 955 cases/100,000 for the North Region, 1121 cases/100,000 for the Central Region, and 712 cases/100,000 statewide. All regions experienced their peak rate during MMWR weeks 42 through 44 (the week ending October 24, 2009 through the week ending November 7, 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 on County Population Estimates\*, April 26, 2009-May 29, 2010**

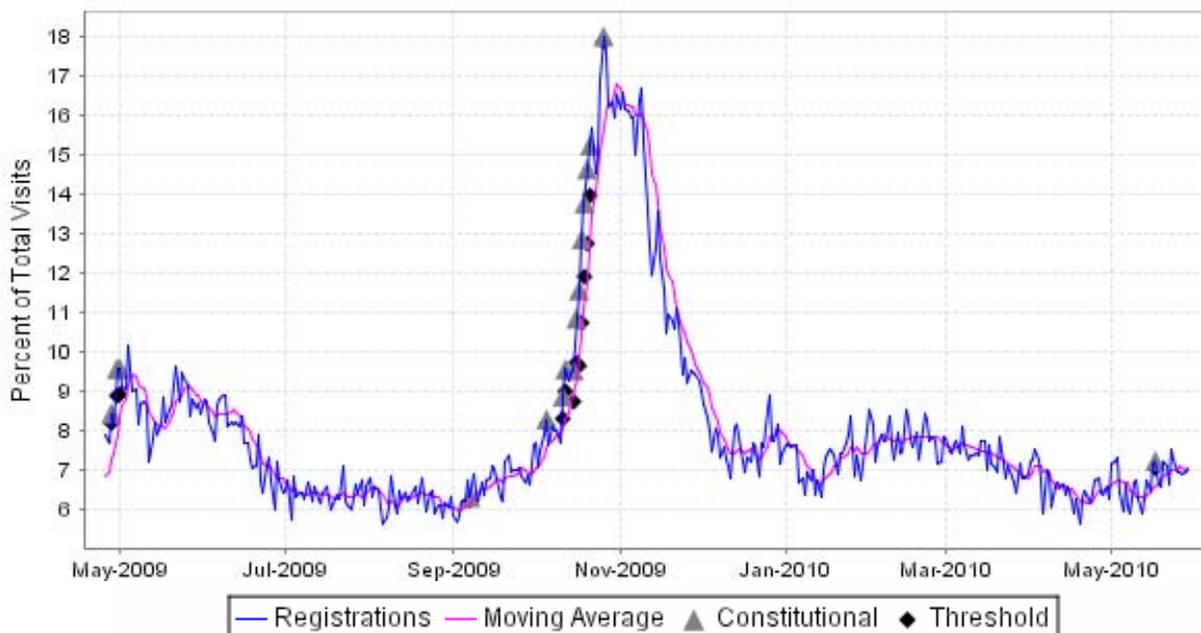


## Syndromic Surveillance

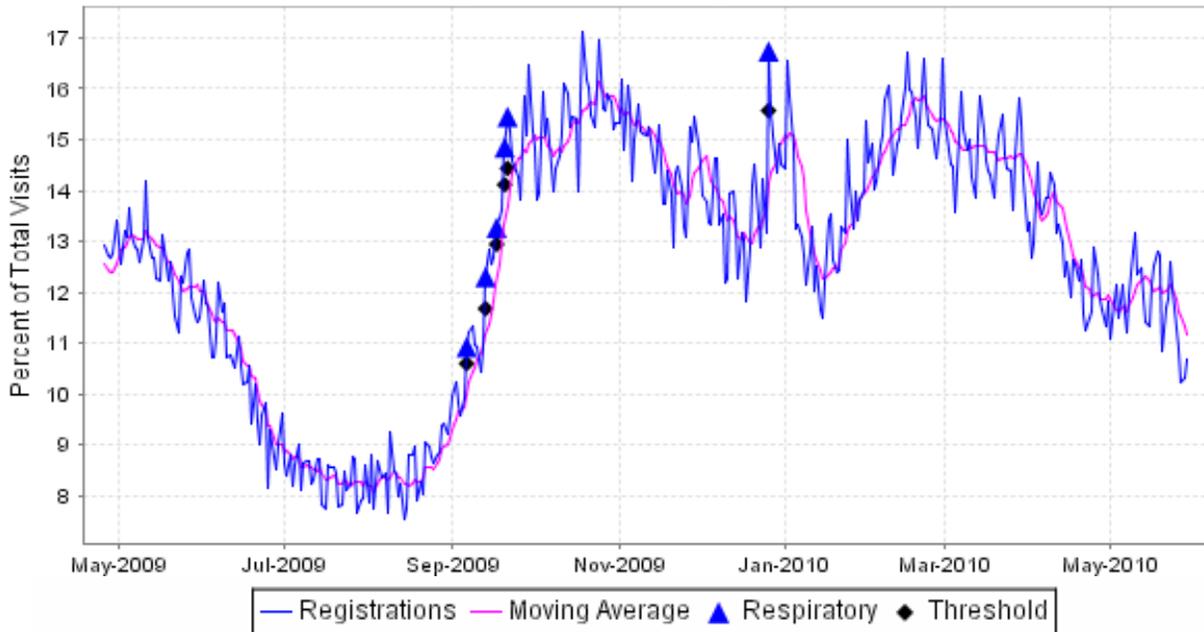
For the 2009-2010 season, emergency department visits due to constitutional complaints (fever, chills, body ache, flu symptoms, fatigue, anorexia, malaise, etc.) experienced two distinct peaks (Figure 5). The first peak at 9% of total visits occurred in May and June during the first pandemic wave. The second wave consisted of a rapid rise in constitutional complaints in October, peaked quickly at 18% in late October, and then decreased through November back to baseline levels. Visits due to respiratory complaints (nose, throat or lung problems, cold symptoms, bronchitis, asthma, COPD, sore throat, etc.) were mildly elevated at the beginning of the season at 13%, decreased to near baseline levels during the summer months, and then steadily increased through September and October to a peak of 17% in late October (Figure 6). A mid-season decrease occurred in January, followed by another peak at 16% in February. The peak percentage of visits due to constitutional and respiratory complaints correlated with other surveillance indicators, except for the February peak of respiratory visits, during which time influenza circulation in Michigan was low. This finding may indicate an increase in other respiratory pathogens or illnesses at that time.

During the 2008-2009 season, constitutional visits peaked at 9.5% of all visits in mid-February, while respiratory complaints experienced a peak of 15.5% in late February. Therefore, the 2008-2009 and 2009-2010 influenza seasons experienced marked differences in both the timing and magnitude of peak visits due to both constitutional and respiratory complaints; these differences are most likely explained by circulation of the 2009 H1N1 pandemic influenza virus. 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. Throughout the season, the number of facilities reporting into the system increased from 75 to 83; therefore, past influenza seasons are best compared to this one in the form of trends, as opposed to absolute values.

**Figure 5. Emergency Department Constitutional Complaints, Michigan, April 26, 2009 - May 29, 2010**



**Figure 6. Emergency Department Respiratory Complaints, Michigan, April 26, 2009 - May 29, 2010**

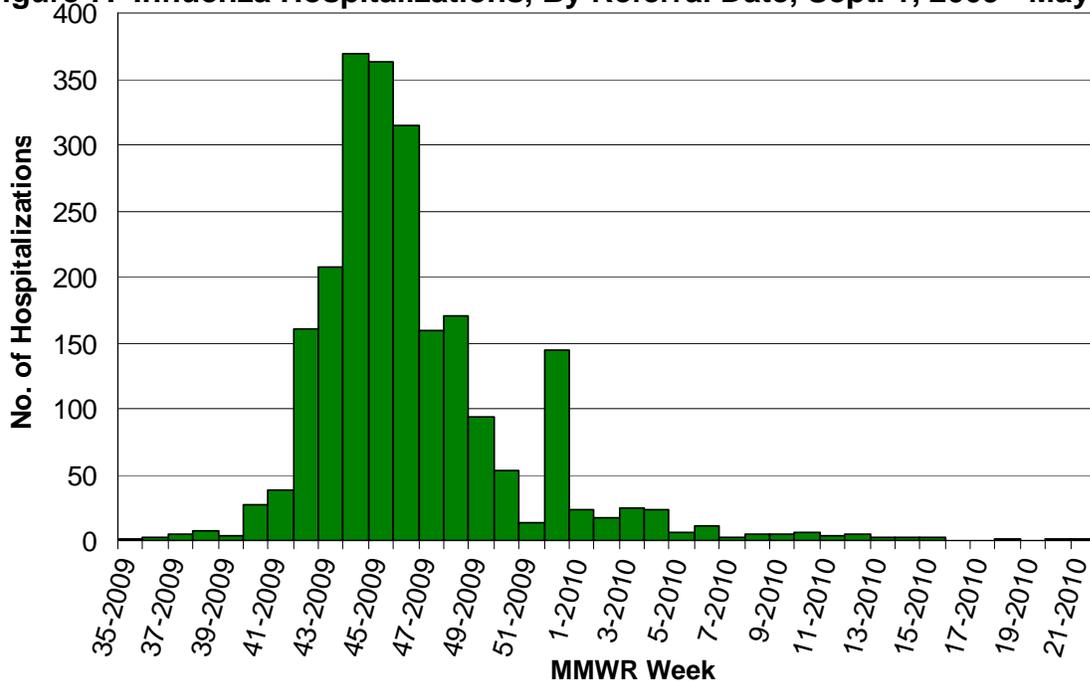


**Influenza Hospitalizations**

As requested by the CDC, all influenza-associated hospitalizations were reportable for the 2009-2010 influenza season, starting on September 1, 2009. MDCH requested that all cases be reported via the MDSS; this is the first time that these data have been systematically collected on a statewide level. Cases included in the data below are confirmed or probable cases, with an investigation status of completed, active or new.

From September 1, 2009 to May 29, 2010, 2154 influenza-associated hospitalizations were reported. The weeks ending on November 7, 2009 (MMWR Week 44) and November 14, 2009 (MMWR Week 45) experienced the most referrals (Figure 7).

**Figure 7. Influenza Hospitalizations, By Referral Date, Sept. 1, 2009 - May 29, 2010**



The median age was 34 years and the mean age was 33 years, which is notably older than those of all individually reported influenza cases. The age range was 1 month to 97 years. Females represented 53.9% of reported hospitalizations. The 25-49 year old age group comprised the most cases at 23.7% of the total hospitalizations. However, when compared to Michigan census data, the 0-4 year old age group had the largest percentage, +9.9%, over what would be expected (Table 3). The 25-49 year old age group had the lowest percentage, -10.4%, compared to expected.

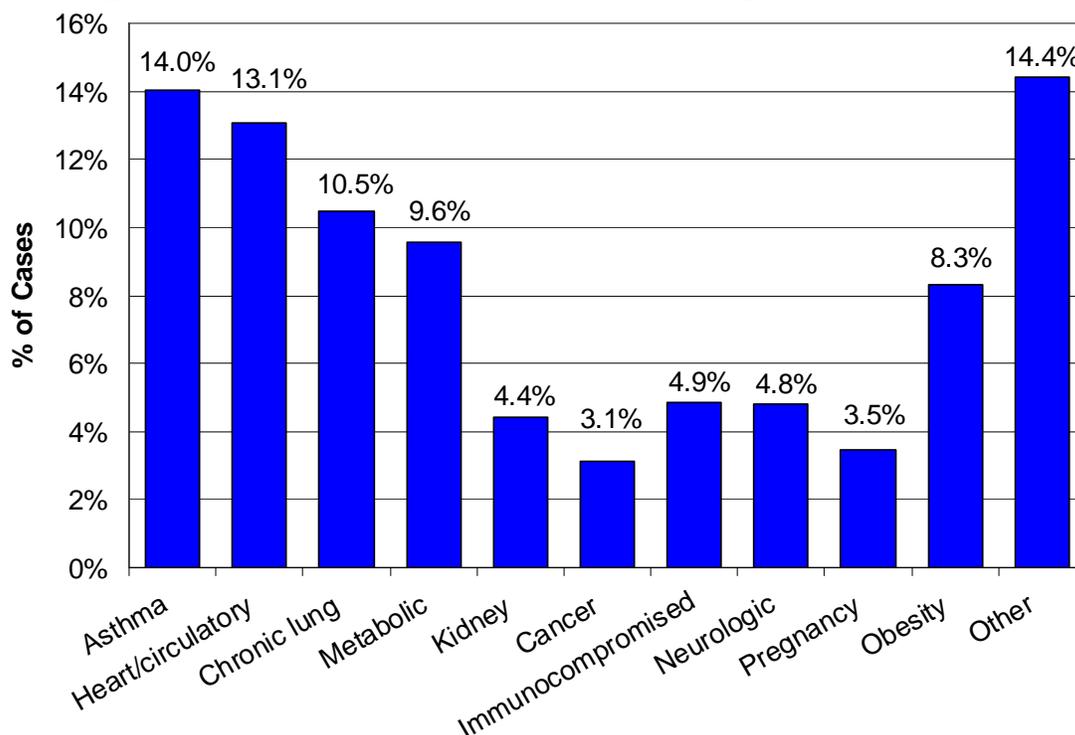
**Table 3. Age of Influenza Hospitalizations Compared with Michigan Census Data**

Age category	No. of hospitalizations	% of total hospitalizations	% of MI population*
0-4 years	349	16.2%	6.3%
5-17 years^	419	19.5%	17.6%
18-24 years^	147	6.8%	9.7%
25-49 years	510	23.7%	34.1%
50-64 years	431	20.0%	19.3%
65+ years	295	13.7%	13.0%
Unknown	3	0.1%	N/A

^Categories adjusted from CDC's to align with census data \*2008 Estimate, U.S. Census Bureau

Data on underlying medical conditions, with varying levels of completeness, was available for 1060 (49.2%) of hospitalized cases. Of the 1060 cases, 843 (79.5%) had at least one underlying medical condition reported; this represented 39.1% of all hospitalized cases. The prevalence was calculated for conditions known to be risk factors for complications from influenza infection (Figure 8). Asthma (14.0%) and heart or circulatory conditions (13.1%) were the most prevalent. The calculated rates most likely underestimate the true prevalence of these conditions in this population, as this was an optional data field. Obesity has not previously been identified as a risk factor for complications from influenza infection, but is now being evaluated.

**Figure 8. Prevalence of Reported Underlying Medical Conditions**



## Adult and Pediatric Influenza-Associated Mortalities

Five pediatric influenza-associated mortalities were reported to MDCH for the 2009-2010 influenza season. A short summary of each case is provided below. All cases were positive for pandemic 2009 influenza A (H1N1) except where indicated, and none were vaccinated with the pandemic 2009 influenza A (H1N1) vaccine.

- 4 month old from the Southeast Influenza Surveillance Region with date of death in early November. Additional epidemiologic information was unavailable.
- 6 month old from the North Region with an illness onset in early October and date of death in early November. Laboratory testing was also positive for *Stenotrophomonas* and *Pseudomonas aeruginosa*. The patient had chronic cardiac, lung and gastrointestinal illnesses.
- 2 year old from the Southeast Region with illness onset and death in early November. Influenza A was confirmed but not subtyped; additional laboratory testing was positive for *Streptococcus pneumoniae*. The patient had a previous history of neuromuscular and neurologic conditions and was premature at birth.
- 10 year old from the Southwest Region with an illness onset in late October and date of death in early November. The patient did not have any high risk underlying conditions but did have a previous medical history of obesity and other conditions.
- 15 year old from the Southeast Region with an illness onset in early November and date of death in mid-December. Laboratory testing was also positive for *Pseudomonas*, *Aspergillus*, and coagulase-negative *Staphylococcus*. The patient had a previous history of multiple neurologic, chronic lung, and metabolic disorders.

Upon a CDC request, adult influenza-associated mortalities were made reportable during the 2009-2010 influenza season; this was the first time MDCH has tracked these data. Since May 2009, 84 adult mortalities were reported; 74 were after September 1, 2009. Confirmatory pandemic H1N1 testing was available for 79 cases; the remaining cases were lab positive for influenza A. Forty-nine (58.3%) cases were male. The age range was 20-82 years with a mean of 48.1 years and a median of 52 years. Age breakdown by category is as follows: 18-24 years: 5 (6.0%); 25-49 years: 27 (32.1%); 50-64 years: 38 (45.2%); 65+ years: 14 (16.7%). A previous medical condition (chronic heart, lung, kidney, neuromuscular, metabolic, neoplastic, etc.) that put them at high risk for influenza-related complications was noted for 57 cases (67.9%), and at least 13 other cases (15.5%) had other medical conditions traditionally not thought of as high risk, including obesity. Cases were distributed throughout the state; 30 (35.7%) from the Central Influenza Surveillance Region, 28 (33.3%) from the Southeast Region, 20 (23.8%) from the Southwest Region, and 6 (7.1%) from the North Region.

## Additional Populations of Interest

For the 2009-2010 season, CDC asked that influenza-related pulmonary hemorrhage, encephalitis, and ICU-hospitalized pregnant and postpartum cases be reported.

MDCH received eight reports of hemorrhagic influenza pneumonia syndrome, for which the definition was confirmed or suspected H1N1 virus or influenza A infection with

clinical or radiographic evidence of pneumonia and a severe respiratory illness with evidence of pulmonary hemorrhage. Six cases (75.0%) were male. The age range was 28-73 years with a mean of 52.0 years and a median of 53.5 years. All cases were deaths and had laboratory-confirmed pandemic 2009 H1N1 infection. Six cases (75.0%) had a high risk underlying medical condition, while the remaining two had other, traditionally non-high risk, medical conditions. The cases were residents of the Southeast (6), Southwest (1) and Central (1) Influenza Surveillance Regions.

One confirmed case of pandemic 2009 H1N1 influenza-associated encephalitis, a 33 year old male from the Central Influenza Surveillance Region, was reported to MDCH. This case was previously healthy but did succumb to his illness. Two additional suspect cases, an 8 year old male and a 16 year old male, both from the Southeast Region, were reported to MDCH; however, neither case tested positive for influenza.

MDCH was notified of ten cases (8 confirmed, 1 probable, 1 suspect) of pregnant and postpartum women who had an influenza-associated ICU hospitalization. Nine cases were in pregnant women, and one case was five days postpartum. The age range was 17-32 years with a mean of 23.3 years and a median of 23.0 years. Fifty percent were Caucasian, and 50% were African American. Four cases had a previously diagnosed high risk medical condition. These patients were admitted anywhere from 2-30 days, with a mean of 10.2 days; all patients survived. Eight patients had healthy deliveries, one had a miscarriage, and the delivery status of one was unknown. These cases were residents of the Southeast (6) and Southwest (4) Influenza Surveillance Regions.

### **Congregate Setting Outbreaks**

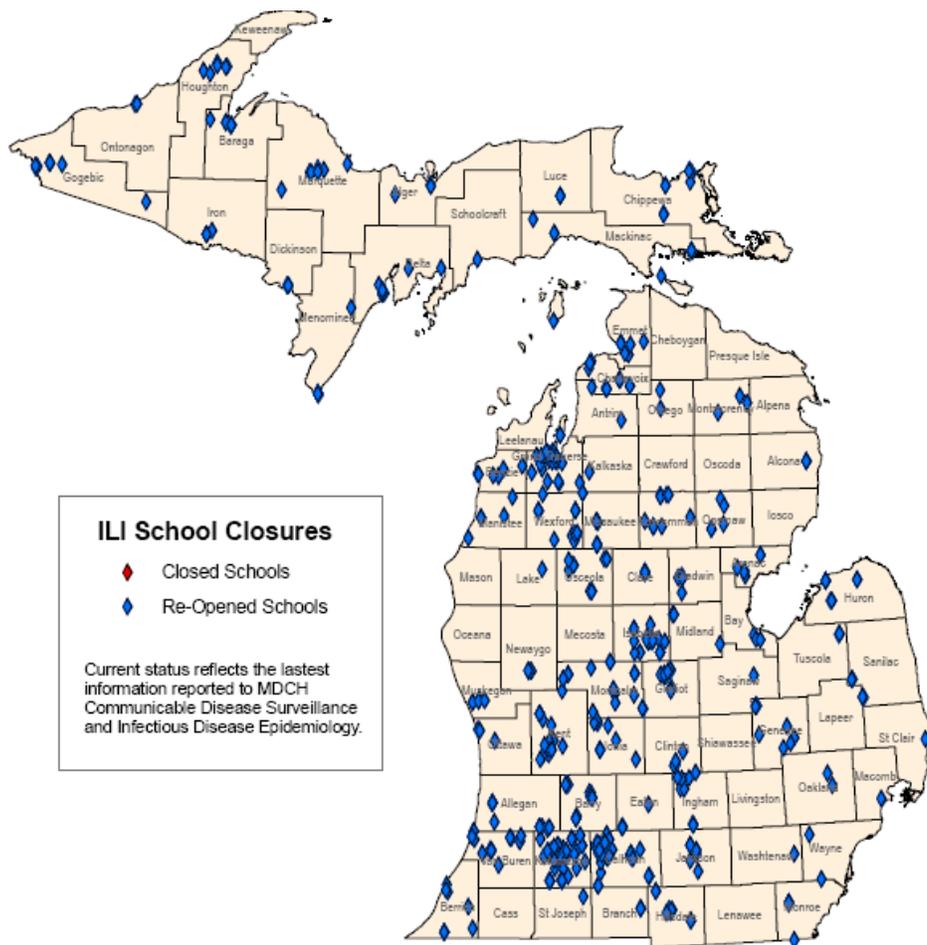
Seven congregate setting outbreaks with confirmatory pandemic influenza A (H1N1) testing were reported to MDCH during the 2009-2010 influenza season from the SE (2), SW (3), C (1), and N (1) Influenza Surveillance Regions. In addition, three outbreaks associated with positive influenza A tests were also reported from the C (2) and N (1) Regions. These outbreaks were located at 8 schools and 2 long term care facilities.

While these ten reported outbreaks represent an increase over the previous influenza season, this was less than expected given the 2009 pandemic. However, during this season many schools may have reported influenza-related school outbreaks via different mechanisms, such as the CDC’s online School Dismissal Monitoring System. In addition, these outbreaks occurred during the fall months, when 2009 influenza A (H1N1) was widely circulating, so laboratory testing for influenza may not have been documented for each outbreak. During fall 2009, 567 influenza-related school and/or district closures in Michigan were reported (Table 4).

**Table 4. Influenza-related School and District Closures in Michigan, Fall 2009**

<b>Public Health Preparedness Region</b>	<b>1</b>	<b>2N</b>	<b>2S</b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<b>Number of school and/or district closures</b>	55	4	8	54	153	100	109	84

**Figure 9. Michigan School Closings, Fall 2009**



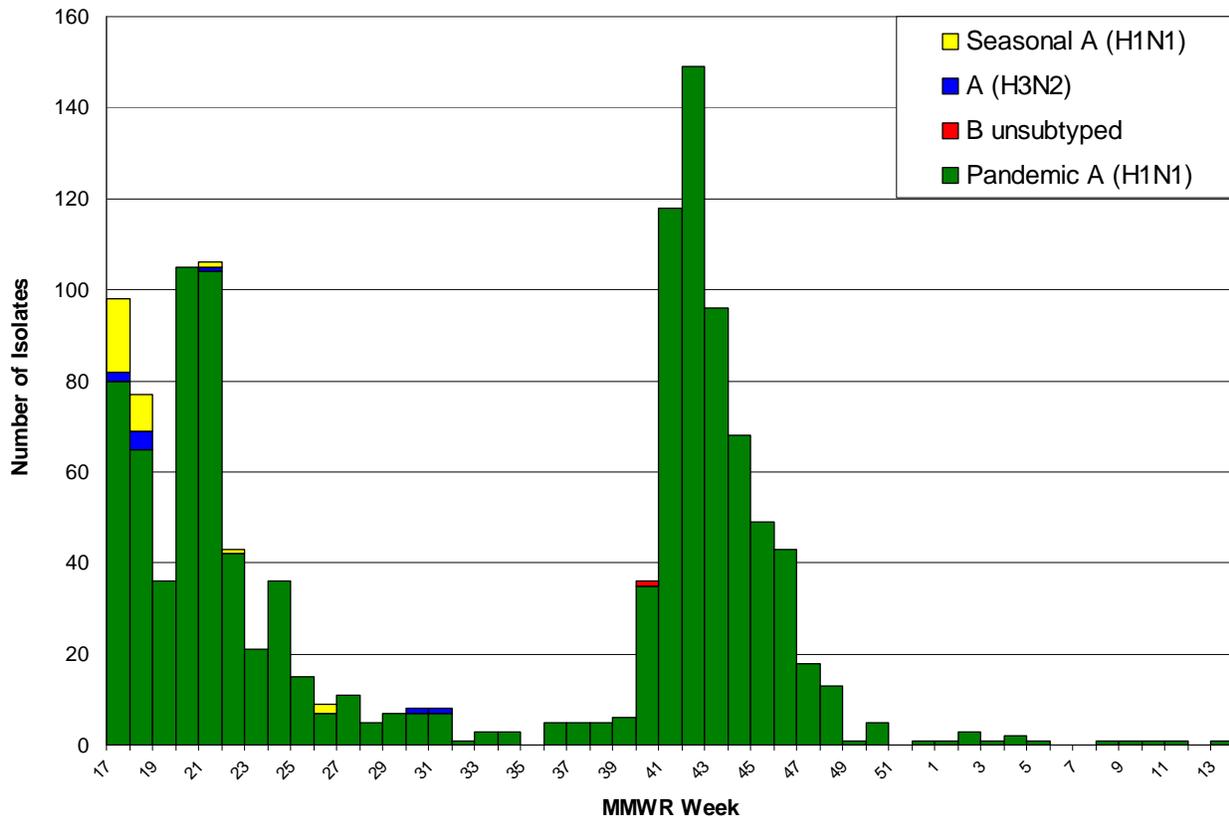
Human metapneumovirus was confirmed in one long term care facility outbreak (SW) in February. Adenovirus was isolated from one elementary school outbreak (SW) in May.

**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 April 26, 2009 through May 29, 2010, 1223 positive influenza isolates were identified by the MDCH lab, of which 1222 (99.9%) were influenza A and 1 (0.1%) was influenza B. The influenza A isolates consisted of 1185 (97.0%) pandemic 2009 influenza A (H1N1) isolates, 28 (2.3%) seasonal influenza A (H1N1) isolates, and 9 (0.7%) influenza A (H3N2) isolates. The one influenza B isolate was unsubtyped, as it was unable to be grown in viral culture, which is necessary for subtyping. In comparison, during the previous influenza season, seasonal influenza A (H1N1) and influenza B/Malaysia/2506/2004-like viruses predominated. Therefore, the influenza virus circulation in Michigan during this season was drastically different than the previous season.

Starting in late April 2009, the pandemic 2009 influenza A (H1N1) virus was the predominant influenza virus circulating in Michigan during the 2009-2010 season. The first pandemic H1N1-positive specimen was identified at MDCH on April 27, 2009. Testing during late April identified specimens with earlier collection dates (April 3<sup>rd</sup> and 10<sup>th</sup>) that were also positive for pandemic influenza H1N1. These data indicate that Michigan residents contracted this virus in early April; exposures at that time were likely related to travel.

**Figure 10. MDCH Bureau of Laboratories Influenza Positive Isolates, Based on Specimen Collection Date\*, for the 2009-2010 Influenza Season**



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

Since the start of the 2009 pandemic, the MDCH Bureau of Laboratories has processed over 2600 specimens for respiratory virus testing. After serving as the primary laboratory for pandemic influenza A (H1N1) testing during the spring pandemic wave, the Bureau of Laboratories validated RT-PCR testing protocols for eight laboratories across the state, which increased pandemic testing capacity during the fall.

### Sentinel Laboratories

Nineteen sentinel laboratories across the state submitted weekly respiratory virologic testing results to MDCH. The majority of labs started seeing influenza A positive results in late April and early May 2009. Large referral hospital labs saw moderate influenza A positives throughout May and June, with testing tapering off later in the summer, while

smaller labs experienced more sporadic positive results. During July through September low levels of influenza A positives occurred at most labs. The number of positives increased again during October, exceeding levels seen during the spring. The majority of labs experienced their peak number of influenza A positives during the week ending October 24, 2009; however, the highest number of total positive results statewide occurred during the following week, the week ending October 31. The dates when labs report their last influenza positive results are also monitored. Labs started to report their last influenza A positives as early as December, with the last positive result from a sentinel lab occurring during the week ending May 15, 2010.

Influenza B activity, as reported by the sentinel laboratories, was much lower and more sporadic than levels seen in recent influenza seasons. Nine labs had small numbers of influenza B positive test results during April, May and June 2009; these results could be related to the increased amount of influenza testing that was taking place due to the 2009 H1N1 pandemic. Throughout the remaining 2009-2010 influenza season, influenza B positives occurred very sporadically and in very low numbers; the last positive result was reported during the week ending May 1, 2010.

Parainfluenza positive results occurred sporadically throughout the season; the majority of viruses were type 1 and 2. Adenoviruses were also detected sporadically throughout the season. Respiratory syncytial virus (RSV) was sporadically detected throughout the season, with a peak of increased activity occurring in February and March.

### **National Data (Centers for Disease Control and Prevention)**

During the 2009-2010 influenza season, the first and second waves of pandemic 2009 influenza A (H1N1) occurred in the United States, with few seasonal influenza viruses being detected. Influenza activity peaked in late October, which was similar to Michigan activity. The proportion of influenza-like illness visits, as monitored by the U.S. Outpatient Influenza-like Illness Surveillance Network, was among the highest since current surveillance started in 1997. ILI activity exceeded baseline levels for 19 consecutive weeks during the week ending August 23, 2009 through January 2, 2010, with peak activity of 7.6% reported during the week ending October 24, 2009. Pediatric mortality and hospitalization rates for children and young adults were higher than previous influenza seasons. From April 26, 2009 through May 29, 2010, 353 pediatric deaths were reported to the CDC. The percentage of deaths attributed to pneumonia and influenza, as reported by the 122 Cities Mortality Reporting System, exceeded the epidemic threshold for 13 consecutive weeks during October 3 to December 26, 2009.

### **Influenza A (H1N1) 2009 Monovalent Vaccine**

On September 15, 2009, four influenza vaccine manufacturers received approval from the Food and Drug Administration for use of influenza A (H1N1) 2009 monovalent influenza vaccines in the prevention of influenza caused by the 2009 pandemic influenza A (H1N1) virus. Both live attenuated and inactivated influenza A (H1N1) 2009 monovalent vaccine formulations were available; each contained the strain A/California/7/2009(H1N1)pdm. Influenza A (H1N1) 2009 monovalent vaccine approvals were made on the basis of standards developed for vaccine strain changes

for seasonal influenza vaccines, adherence to manufacturing processes, product quality testing, and lot release procedures developed for seasonal vaccines. The age groups, precautions, and contraindications approved for the influenza A (H1N1) 2009 monovalent vaccine were identical to those approved for seasonal vaccines.

Michigan was allocated 3,366,200 doses of 2009 H1N1 influenza vaccine; according to the Michigan Care Improvement Registry (MCIR), as of August 8, 2010 there were 1,616,867 (48%) doses of 2009 H1N1 vaccine administered to Michigan residents.

### **2010-2011 Seasonal Influenza Vaccine**

WHO has recommended vaccine strains for the 2010-2011 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. A seasonal influenza A (H1N1) component is not included in the 2010-2011 formulation, and the A (H3N2) component has been changed from A/Brisbane/59/2007 in the 2009-2010 Northern Hemisphere vaccine formulation. This recommendation was based on surveillance data related to epidemiology and antigenic characteristics, serologic responses to 2009-2010 trivalent seasonal and 2009 H1N1 monovalent vaccines, and the availability of candidate strains and reagents.

### **WORLDWIDE NOVEL AND AVIAN INFLUENZA STRAINS**

The 2009-2010 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 May 29, 2010, there have been 498 human cases, including 294 deaths, in 15 countries spanning Asia, the Middle East and Africa.

Several human infections with other novel influenza strains were noted during this time period. In the United States of America, one case each in Iowa, Kansas and Minnesota were reported to have infection with contemporary North American swine-lineage influenza A (H3N2) viruses. A three year old girl from Hong Kong was confirmed to have infection with an avian influenza A (H9N2) virus. In China, a 47 year old woman was diagnosed with an avian influenza A (H9) infection.

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 an H7 outbreak in Spain. Low pathogenic avian influenza outbreaks in poultry have recently occurred in the United States of America (Tennessee H7, Minnesota H7N9), Czech Republic (H5N3), France (H5), Germany (H5), Spain (H7), Denmark (H7), Netherlands (H7), South Korea (H5N2, H7N2, H7N7) and Taiwan (H5N2).

The pandemic 2009 A (H1N1) influenza strain has been documented in other species besides humans, with resulting illnesses ranging from non-symptomatic to severe. Those species include swine (at least 19 countries from North and South America, Europe, Asia and the western Pacific region), poultry (Chile, United States of America, Canada, France), canines (China, United States of America), domestic and exotic felines (United States of America), and ferrets (United States of America).

## **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.
- Current worldwide human avian influenza activity from the World Health Organization (WHO): [http://www.who.int/csr/disease/avian\\_influenza/en/](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](http://www.cdc.gov/ncphi/diss/nndss/phs/mmwrweek/MMWR_Week_Fact_Sheet.doc).