# FLUVIEW

A Weekly Influenza Surveillance Report Prepared by the Influenza Division

## 2009-2010 Influenza Season
## Week 45 ending November 14, 2009

*All data are preliminary and may change as more reports are received.*

**Synopsis:** During week 45 (November 8-14, 2009), influenza activity decreased slightly in the U.S.

- 3,106 (28.8%) specimens tested by U.S. World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories and reported to CDC/Influenza Division were positive for influenza.
- Over 99% of all subtyped influenza A viruses being reported to CDC were 2009 influenza A (H1N1) viruses.
- The proportion of deaths attributed to pneumonia and influenza (P&I) was above the epidemic threshold for the seventh consecutive week.
- Twenty-one influenza-associated pediatric deaths were reported. Fifteen of these deaths were associated with 2009 influenza A (H1N1) virus infection, and six were associated with an influenza A virus for which the subtype was undetermined.
- The proportion of outpatient visits for influenza-like illness (ILI) was 5.5% which is above the national baseline of 2.3%. All 10 regions reported ILI above region-specific baseline levels.
- Forty-three states reported geographically widespread influenza activity, Puerto Rico and seven states reported regional influenza activity, the District of Columbia reported local influenza activity, and Guam and the U.S. Virgin Islands reported sporadic influenza activity.

### National and Regional Summary of Select Surveillance Components

| | Data for current week | | | Data cumulative since August 30, 2009 (Week 35)* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **HHS Surveillance Regions**** | **Out-patient ILI†** | **% positive for flu‡** | **Number of jurisdictions reporting regional or widespread activity§** | **A (H1)** | **A (H3)** | **2009 A (H1N1)** | **A (unable to sub-type)¥** | **A (Subty-ping not perfor-med)** | **B** | **Pediatric Deaths** |
| **Nation** | Elevated | 28.8% | 51 of 54 | 20 | 36 | 46,920 | 371 | 16,847 | 142 | 138 |
| **Region 1** | Elevated | 38.0% | 6 of 6 | 5 | 2 | 2,327 | 8 | 338 | 9 | 0 |
| **Region 2** | Elevated | 29.4% | 3 of 4 | 1 | 5 | 623 | 0 | 766 | 3 | 4 |
| **Region 3** | Elevated | 51.8% | 5 of 6 | 2 | 6 | 9,042 | 20 | 1,232 | 13 | 9 |
| **Region 4** | Elevated | 21.5% | 8 of 8 | 0 | 3 | 4,080 | 82 | 3,658 | 24 | 28 |
| **Region 5** | Elevated | 41.9% | 6 of 6 | 4 | 12 | 7,140 | 77 | 1,166 | 10 | 14 |
| **Region 6** | Elevated | 13.3% | 5 of 5 | 0 | 3 | 2,181 | 4 | 4,237 | 26 | 48 |
| **Region 7** | Elevated | 28.8% | 4 of 4 | 4 | 1 | 3,049 | 145 | 885 | 3 | 2 |
| **Region 8** | Elevated | 29.5% | 6 of 6 | 2 | 0 | 8,640 | 0 | 3,528 | 46 | 11 |
| **Region 9** | Elevated | 21.6% | 4 of 5 | 0 | 3 | 6,011 | 25 | 865 | 4 | 14 |
| **Region 10** | Elevated | 41.7% | 4 of 4 | 2 | 1 | 3,827 | 10 | 172 | 4 | 8 |

*Influenza season officially begins each year at week 40. This season data from week 35 will be included to show the trend of influenza activity before the official start of the 2009-10 influenza season.

**HHS regions (Region 1 CT, ME, MA, NH, RI, VT; Region 2: NJ, NY, Puerto Rico, US Virgin Islands; Region 3: DE, DC, MD, PA, VA, WV; Region 4: AL, FL, GA, KY, MS, NC, SC, TN; Region 5: IL, IN, MI, MN, OH, WI; Region 6: AR, LA, NM, OK, TX; Region 7: IA, KS, MO, NE; Region 8: CO, MT, ND, SD, UT, WY; Region 9: AZ, CA, Guam, HI, NV; and Region 10: AK, ID, OR, WA).

† Elevated means the % of visits for ILI is at or above the national or region-specific baseline.

‡ National data are for current week; regional data are for the most recent three weeks.

§ Includes all 50 states, the District of Columbia, Guam, Puerto Rico, and U.S. Virgin Islands.

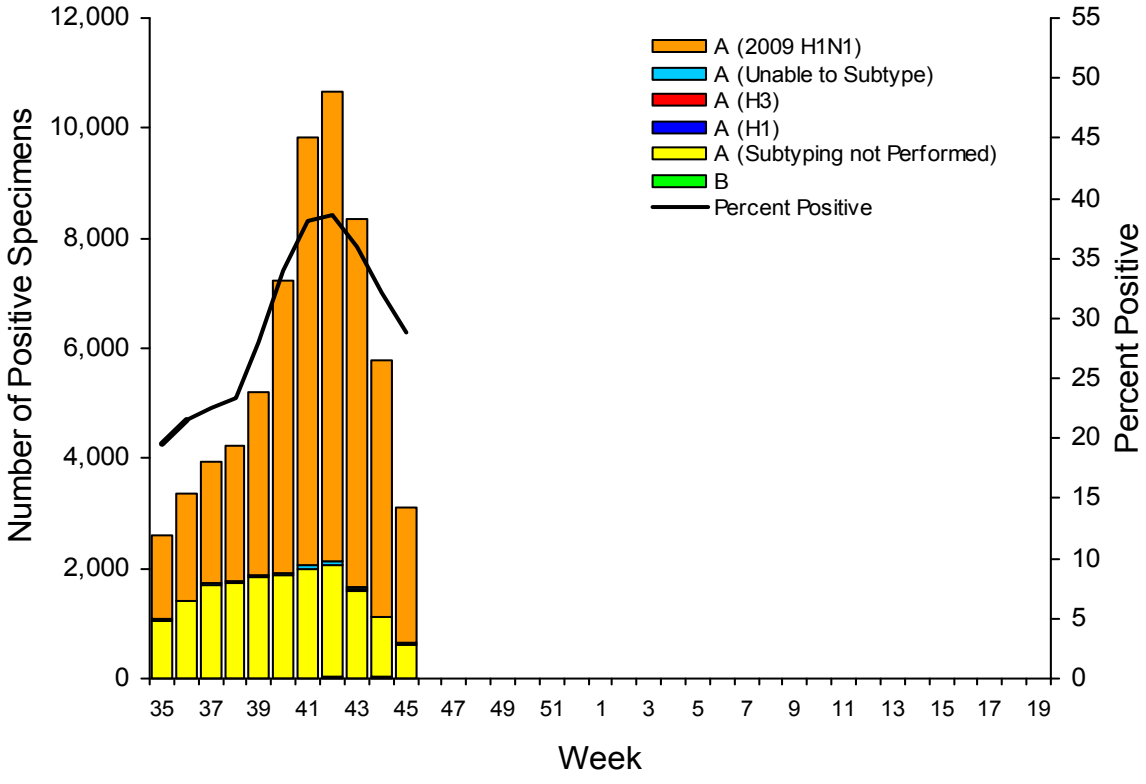
¥ The majority of influenza A viruses that cannot be sub-typed as seasonal influenza viruses are 2009 A (H1N1) influenza viruses upon further testing.

**U.S. Virologic Surveillance:** WHO and NREVSS collaborating laboratories located in all 50 states and Washington D.C., report to CDC the number of respiratory specimens tested for influenza and the number positive by influenza type and subtype. The results of tests performed during the current week are summarized in the table below.

| | **Week 45** |
|---|---|
| **No. of specimens tested** | 10,803 |
| **No. of positive specimens (%)** | 3,106 (28.8%) |
| ***Positive specimens by type/subtype*** | |
| **Influenza A** | 3,103 (99.9%) |
| **A (2009 H1N1)** | 2,468 (79.5%) |
| **A (subtyping not performed)** | 624 (20.1%) |
| **A (unable to subtype)** | 10 (0.3%) |
| **A (H3)** | 0 (0.0%) |
| **A (H1)** | 1 (0.1%) |
| **Influenza B** | 3 (0.1%) |

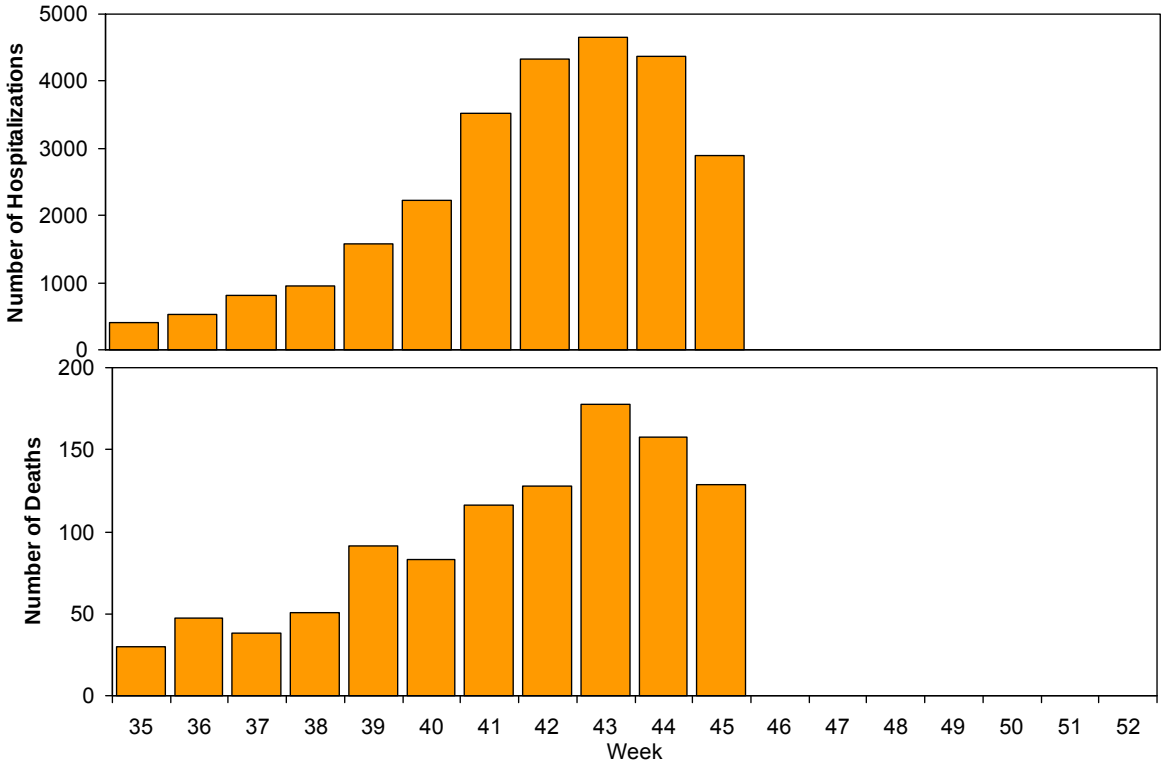
During week 45, seasonal influenza A (H1N1) and influenza B viruses co-circulated at low levels with 2009 influenza A (H1N1) viruses. Over 99% of all subtyped influenza A viruses reported to CDC this week were 2009 influenza A (H1N1) viruses.

## Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, August 30-November 14, 2009



**Pneumonia and Influenza Hospitalization and Death Tracking:** This new system was implemented on August 30, 2009, and replaces the weekly report of laboratory confirmed 2009 H1N1-related hospitalizations and deaths that began in April 2009. Jurisdictions can now report to CDC counts of hospitalizations and deaths resulting from all types or subtypes of influenza, not just those from 2009 H1N1 influenza virus. To allow jurisdictions to implement the new case definition, counts were reset to zero on August 30, 2009. From August 30 – November 14, 2009, 26,315 laboratory-confirmed influenza-associated hospitalizations and 1,049 laboratory-confirmed influenza-associated deaths were reported to CDC. CDC will continue to use its traditional surveillance systems to track the progress of the 2009-10 influenza season.

## Weekly Laboratory-Confirmed Influenza-Associated Hospitalizations and Deaths, National Summary, August 30 – November 14, 2009



**Antigenic Characterization:** CDC has antigenically characterized one seasonal influenza A (H1N1), three influenza A (H3N2), one influenza B, and 348 2009 influenza A (H1N1) viruses collected since September 1, 2009.

One seasonal influenza A (H1N1) virus was tested and is related to the influenza A (H1N1) component of the 2009-10 Northern Hemisphere influenza vaccine (A/Brisbane/59/2007).

The three influenza A (H3N2) viruses tested showed reduced titers with antisera produced against A/Brisbane/10/2007, the 2009-2010 Northern Hemisphere influenza A (H3N2) vaccine component, and were antigenically related to A/Perth/16/2009, the WHO recommended influenza A (H3N2) component of the 2010 Southern Hemisphere vaccine formulation.

Influenza B viruses currently circulating globally can be divided into two distinct lineages represented by the B/Yamagata/16/88 and B/Victoria/02/87 viruses. The influenza B component of the 2009-10 vaccine belongs to the B/Victoria lineage. The influenza B virus tested belongs to the B/Victoria lineage and is related to the influenza vaccine component for the 2009-10 Northern Hemisphere influenza vaccine (B/Brisbane/60/2008).

Three hundred forty-seven (99.7%) of 348 2009 influenza A (H1N1) viruses tested are related to the A/California/07/2009 (H1N1) reference virus selected by WHO as the 2009 H1N1 vaccine virus and one virus (0.3%) tested showed reduced titers with antisera produced against A/California/07/2009.

Annual influenza vaccination is expected to provide the best protection against those virus strains that are related to the vaccine strains, but limited to no protection may be expected when the vaccine and circulating virus strains are so different as to be from different lineages. Antigenic characterization of 2009 influenza A(H1N1) viruses indicates that these viruses are only distantly related antigenically and genetically to seasonal influenza A(H1N1) viruses, suggesting that little to no protection would be expected from vaccination with seasonal influenza vaccine. It is too early in the influenza season to determine if seasonal influenza viruses will circulate widely or how well the seasonal vaccine and circulating strains will match.

**Antiviral Resistance:** Since September 1, 2009, four influenza A (H3N2), one influenza B, and 353 2009 influenza A (H1N1) virus isolates have been tested for resistance to the neuraminidase inhibitors (oseltamivir and zanamivir), and 856 2009 influenza A (H1N1) original clinical samples were tested for a single known mutation in the virus that confers oseltamivir resistance. In addition, one influenza A (H3N2) and 182 2009 influenza A (H1N1) virus isolates have been tested for resistance to the adamantanes (amantadine and rimantadine). Additional laboratories perform antiviral testing and report their results to CDC. The results of antiviral resistance testing performed on these viruses are summarized in the table below.

**Antiviral Resistance Testing Results on Samples Collected Since September 1, 2009.**

| | Viruses tested (n) | Resistant Viruses, Number (%) Oseltamivir | Viruses tested (n) | Resistant Viruses, Number (%) Zanamivir | Isolates tested (n) | Resistant Viruses, Number (%) Adamantanes |
|---|---|---|---|---|---|---|
| **Seasonal Influenza A (H1N1)** | 0 | 0 (0) | 0 | 0 (0) | 0 | 0 (0) |
| **Influenza A (H3N2)** | 4 | 0 (0) | 0 | 0 (0) | 1 | 1 (100) |
| **Influenza B** | 1 | 0 (0) | 0 | 0 (0) | N/A* | N/A* |
| **2009 Influenza A (H1N1)** | 1,209 | 10†‡ (0.8) | 353 | 0 (0) | 182 | 181 (99.5) |

*The adamantanes (amantadine and rimantadine) are not effective against influenza B viruses.
†Two screening tools were used to determine oseltamivir resistance: sequence analysis of viral genes and a neuraminidase inhibition assay.
‡ Additional laboratories perform antiviral resistance testing and report their results to CDC. One additional oseltamivir resistant 2009 influenza A (H1N1) virus has been identified by these laboratories since September 1, 2009, bringing the total number to 11.

Over 99% of all of the subtyped influenza A viruses reported during week 45 were 2009 influenza A (H1N1) viruses, and the majority of 2009 H1N1 viruses tested since April 2009 have been resistant to the adamantanes (amantadine and rimantadine).

Antiviral treatment with oseltamivir or zanamivir is recommended for all patients with confirmed or suspected influenza virus infection who are hospitalized or who are at higher risk for influenza complications. Additional information on antiviral recommendations for treatment and chemoprophylaxis of influenza virus infection is available at http://www.cdc.gov/H1N1flu/recommendations.htm.

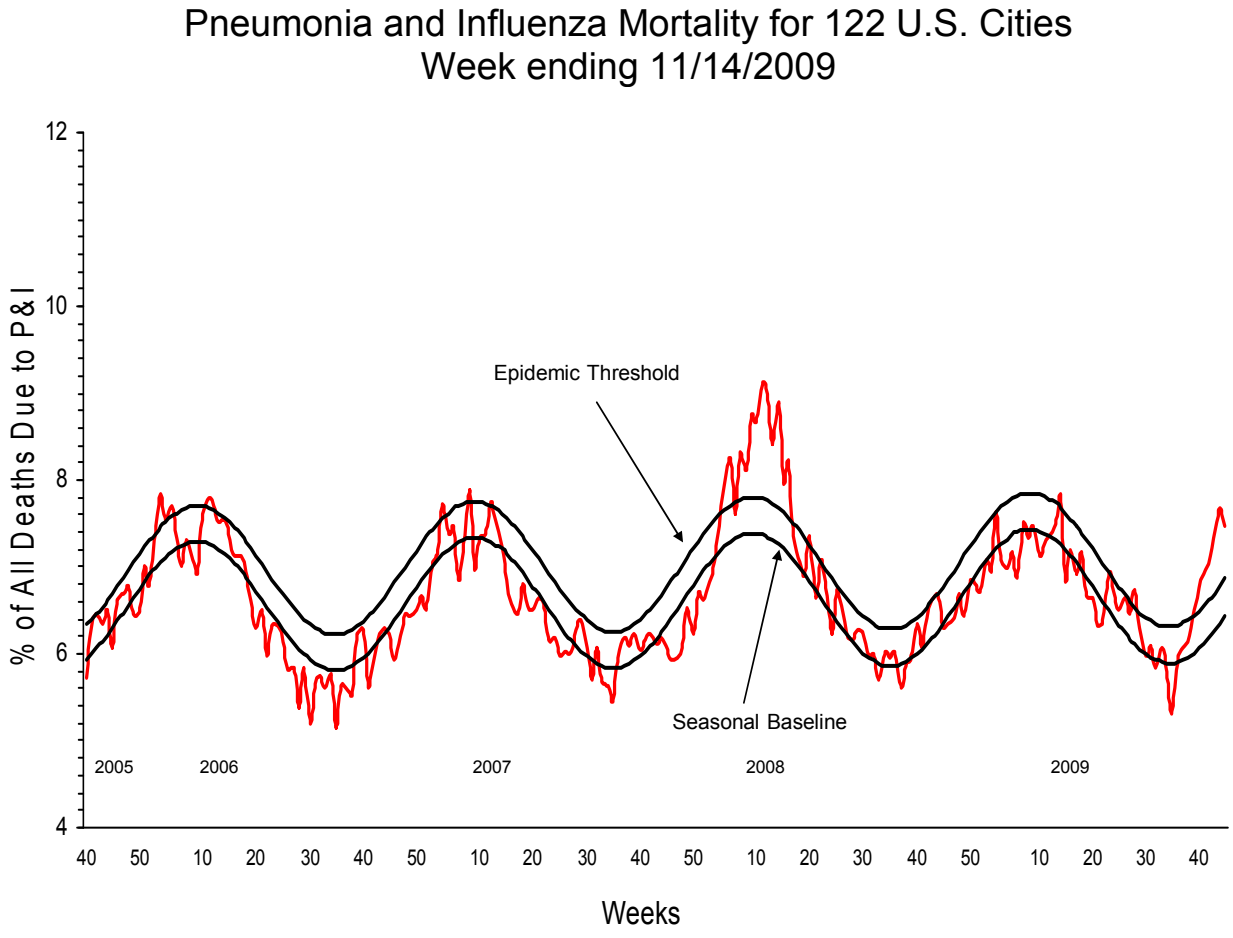
2009 influenza A (H1N1) viruses were tested for oseltamivir resistance by a neuraminidase inhibition assay and/or detection of genetic sequence mutation, depending on the type of specimen tested. Original clinical samples were examined for a single known mutation in the virus that confers oseltamivir resistance in currently circulating seasonal influenza A (H1N1) viruses, while influenza virus isolates were tested using a neuraminidase inhibition assay that determines the presence or absence of neuraminidase inhibitor resistance, followed by the neuraminidase gene sequence analysis of resistant viruses.

The majority of 2009 influenza A (H1N1) viruses are susceptible to the neuraminidase inhibitor antiviral medication oseltamivir; however, rare sporadic cases of oseltamivir resistant 2009 influenza A (H1N1) viruses have been detected worldwide. A total of 21 cases of oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified in the United States since April 2009. In specimens collected since September 1, 2009, 11 cases have been identified in the United States, including seven newly identified cases since last week and one case reported during a previous week that was reclassified. All tested viruses retain their sensitivity to the neuraminidase

inhibitor zanamivir. Of the 21 cases, 12 patients had documented exposure to oseltamivir through either treatment or chemoprophylaxis, eight patients are under investigation to determine exposure to oseltamivir, and one patient had no documented oseltamivir exposure. Occasional development of oseltamivir resistance during treatment or prophylaxis is not unexpected. Enhanced surveillance and increased availability of testing performed at CDC are expected to detect additional cases of oseltamivir resistant 2009 influenza A (H1N1) viruses, and such cases will be investigated to assess the spread of resistant strains in the community.

To prevent the spread of antiviral resistant virus strains, CDC reminds clinicians and the public of the need to continue hand and cough hygiene measures for the duration of any symptoms of influenza, even while taking antiviral medications (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5832a3.htm).

**Pneumonia and Influenza (P&I) Mortality Surveillance:** During week 45, 7.5% of all deaths reported through the 122-Cities Mortality Reporting System were due to P&I. This percentage was above the epidemic threshold of 6.9% for week 45. Including week 45, P&I mortality has been above threshold for seven consecutive weeks.



**Influenza-Associated Pediatric Mortality**: Twenty-one influenza-associated pediatric deaths were reported to CDC during week 45 (Arizona [2], Colorado [3], Georgia [2], Louisiana [2], Minnesota, Mississippi, New York, New York City, Ohio, Oklahoma, Oregon [2], Texas, Virginia, Washington, and Wisconsin). Fifteen of these deaths were associated with 2009 influenza A (H1N1) virus infection, and six were associated with an influenza A virus for which the subtype is undetermined. The deaths reported during week 45 occurred between September 20 and November 14, 2009.

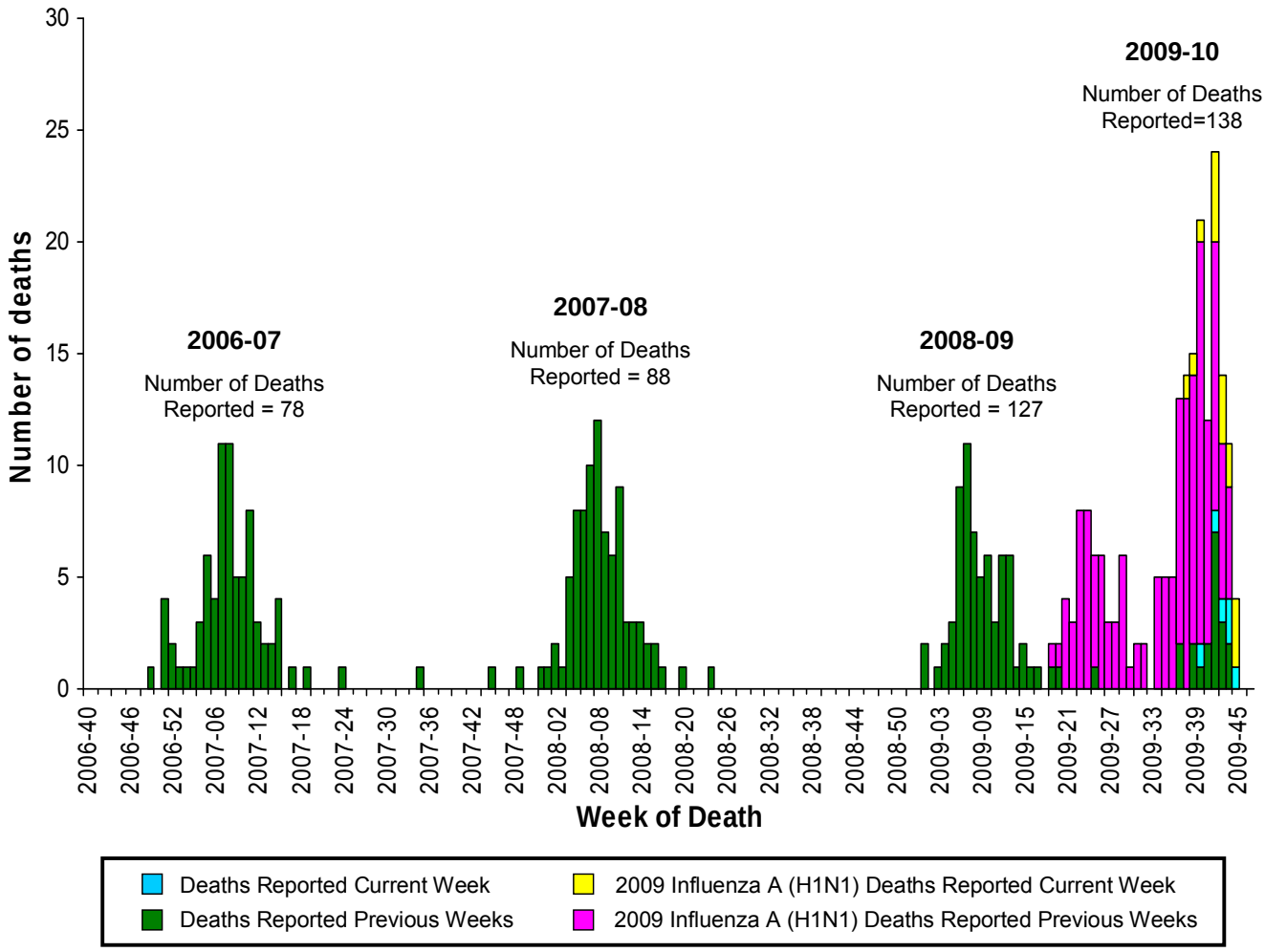
Since August 30, 2009, CDC has received 138 reports of influenza-associated pediatric deaths that occurred during the current influenza season (24 deaths in children less than 2 years old, 16 deaths in children 2-4 years old, 50 deaths in children 5-11 years old, and 48 deaths in children 12-17 years old). One hundred thirteen (82%) of the138 deaths were due to 2009 influenza A (H1N1) virus infections, and the remaining 25 were associated with influenza A virus for which the subtype is undetermined. A total of 171 deaths in children associated with 2009 influenza A (H1N1) virus infection have been reported to CDC.

Among the 138 deaths in children since August 30, 2009, 71 children had specimens collected for bacterial culture from normally sterile sites and 22 (31.0%) of the 71 were positive; *Staphylococcus aureus* was identified in eight (36.4%) of the 22 children. One *S. aureus* isolate was sensitive to methicillin, six were methicillin resistant, and one did not have sensitivity testing performed. Fifteen (68.2%) of the 22 children with bacterial coinfections were five years of age or older, and six (27.3%) of the 22 children were 12 years of age or older.

**Laboratory-Confirmed Influenza-Associated Pediatric Deaths by Date and Type/Subtype of Influenza.**

| Date | 2009 H1N1 Influenza | Influenza A-Subtype Unknown | Seasonal Influenza | Total |
|---|---|---|---|---|
| **Number of Deaths REPORTED for Current Week – Week 45 (Week ending November 14, 2009)** | 15 | 6 | 0 | 21 |
| **Number of Deaths OCCURRED since August 30, 2009** | 113 | 25 | 0 | 138 |
| **Number of Deaths OCCURRED since April 26, 2009** | 171 | 28 | 1 | 200 |

## Number of Influenza-Associated Pediatric Deaths by Week of Death: 2006-07 season to present

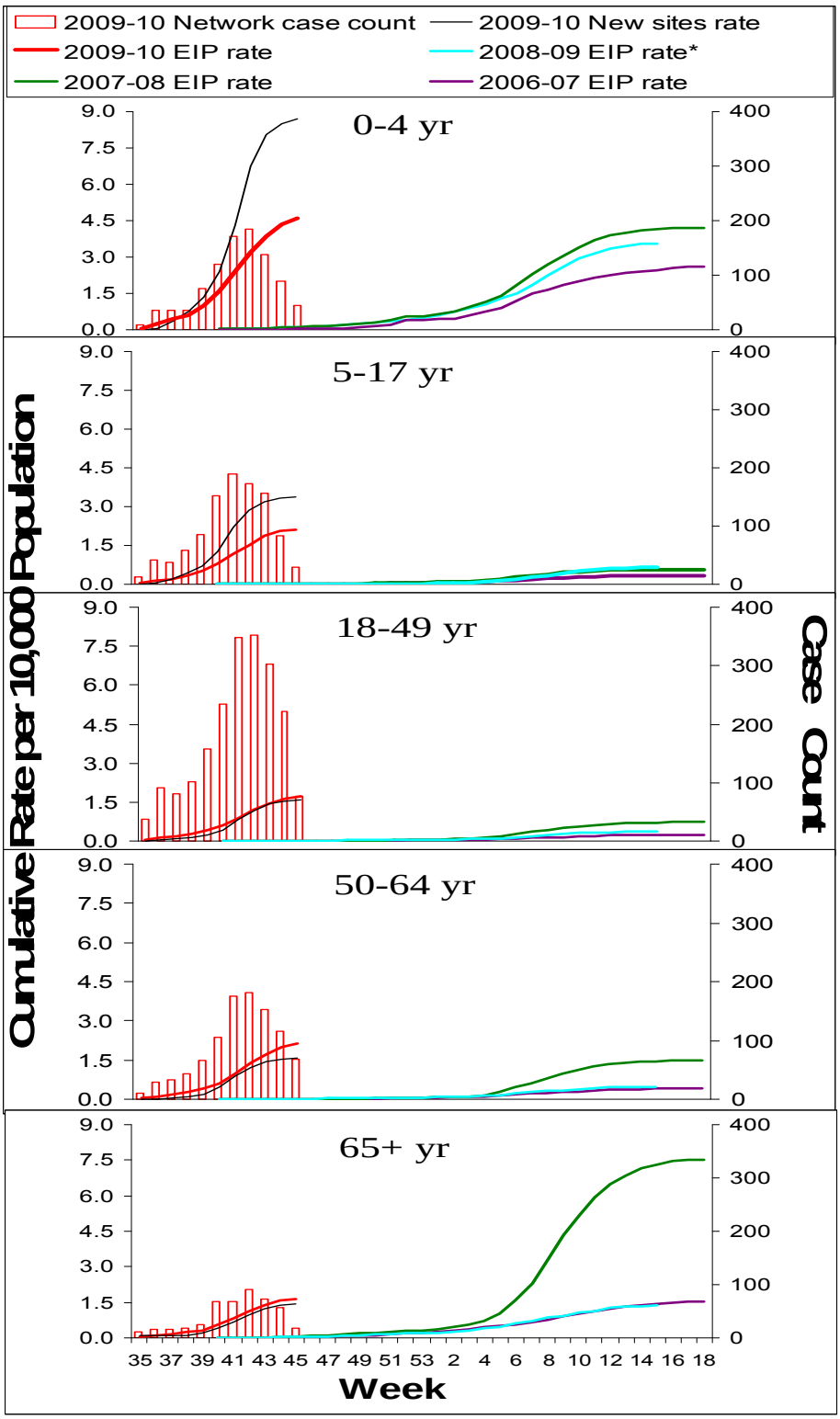



**Influenza-Associated Hospitalizations:** Laboratory-confirmed influenza-associated hospitalizations are monitored using a population-based surveillance network that includes the 10 Emerging Infections Program (EIP) sites (CA, CO, CT, GA, MD, MN, NM, NY, OR and TN) and 6 new sites (IA, ID, MI, ND, OK and SD).

During September 1, 2009 – November 14, 2009, the following preliminary laboratory-confirmed overall influenza associated hospitalization rates were reported by EIP and the new sites *(rates include influenza A, influenza B, and 2009 influenza A (H1N1)):*

Rates [EIP (new sites)] for children aged 0-4 years and 5-17 years were 4.6 (8.7) and 2.1 (3.4) per 10,000, respectively. Rates [EIP (new sites)] for adults aged 18-49 years, 50-64 years, and ≥ 65 years were 1.7 (1.6), 2.1 (1.6) and 1.7 (1.4) per 10,000, respectively.

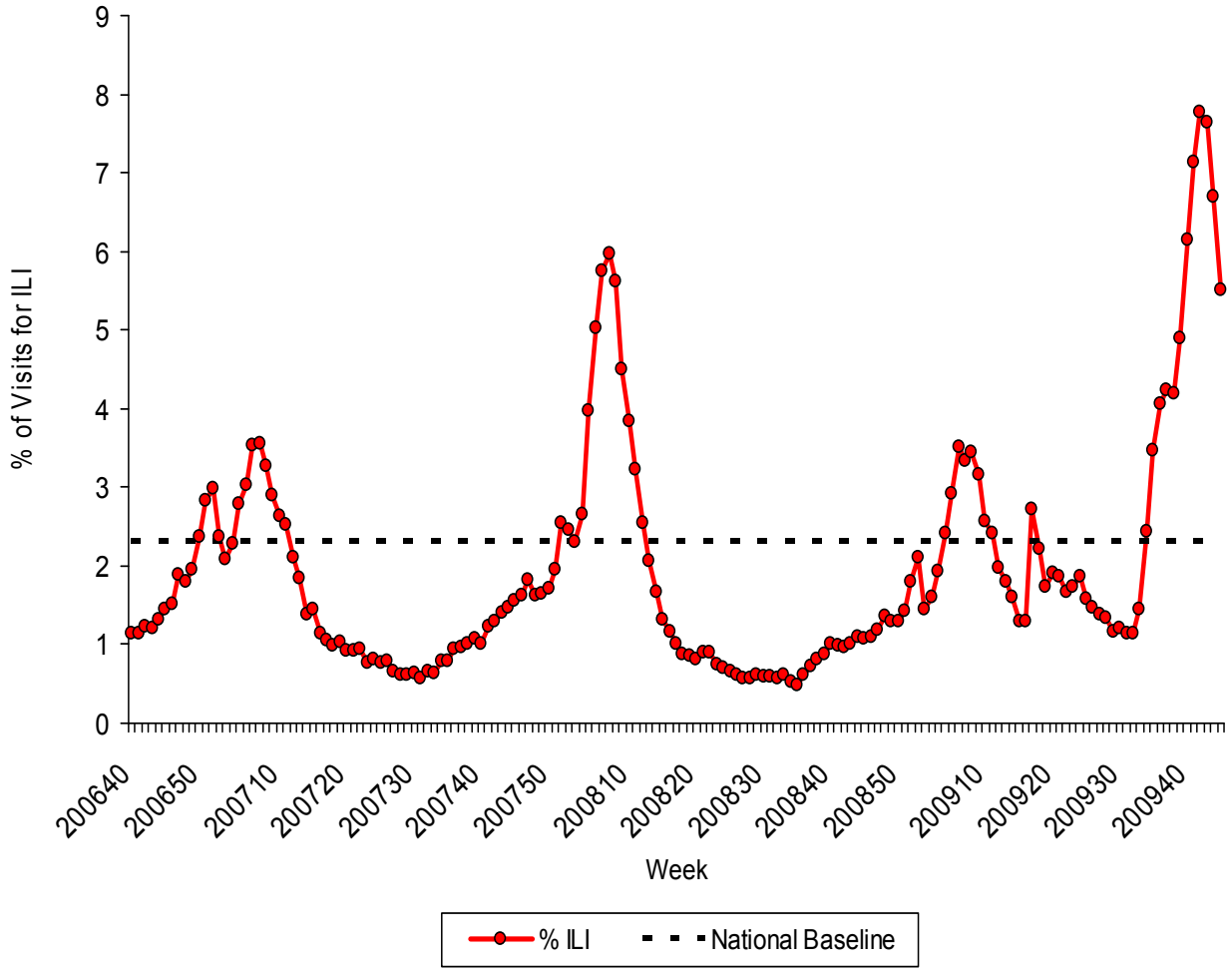
# EIP Influenza Laboratory-Confirmed Cumulative Hospitalization Rates, 2009-10 and Previous Three Seasons*




* The 2008-09 EIP rate ended as of April 14, 2009 due to the onset of the 2009 H1N1 season.

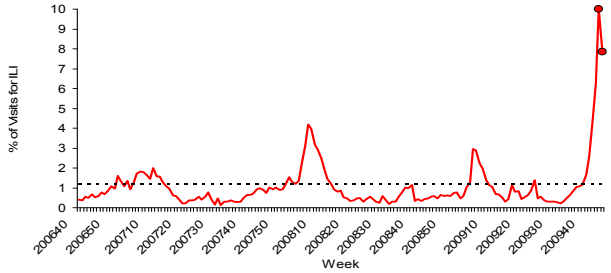
**Outpatient Illness Surveillance:** Nationwide during week 45, 5.5% of patient visits reported through the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) were due to influenza-like illness (ILI). This percentage is above the national baseline of 2.3%.

Percentage of Visits for Influenza-like Illness (ILI) Reported by the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet), Weekly National Summary, October 1, 2006 – November 14, 2009

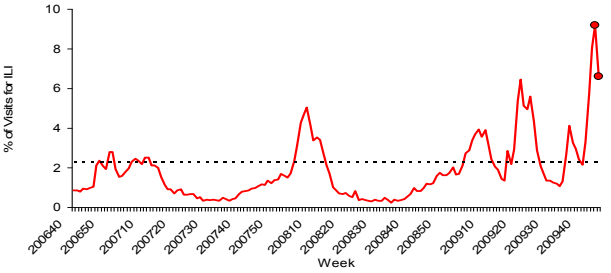



On a regional level, the percentage of outpatient visits for ILI ranged from 2.6% to 7.9% during week 45, and decreased in all 10 surveillance regions compared to the previous week. All 10 regions reported a proportion of outpatient visits for ILI above their region-specific baseline levels.

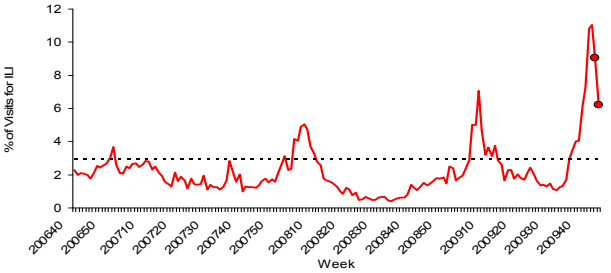
Region 1 - CT, ME, MA, NH, RI, VT



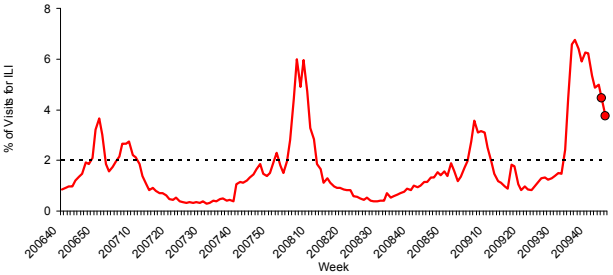

Region 2 - NJ, NY, USVI



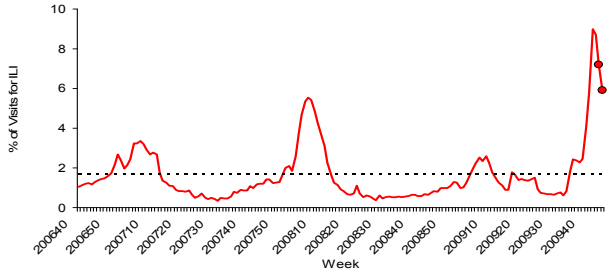

Region 3 - DE, DC, MD, PA, VA, WV



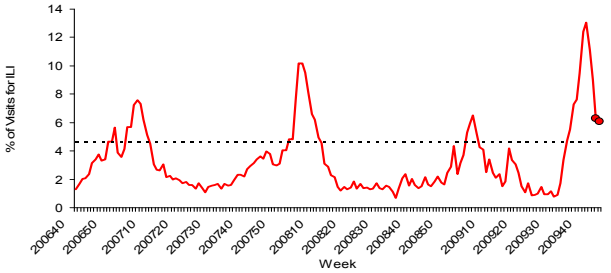

Region 4 - AL, FL, GA, KY, MS, NC, SC, TN



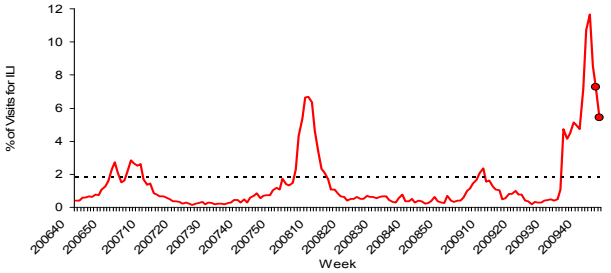

Region 5 - IL, IN, MI, MN, OH, WI



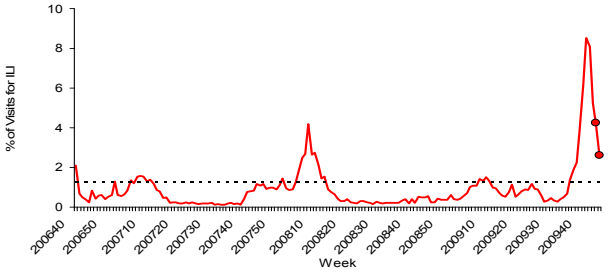

Region 6 - AR, LA, NM, OK, TX



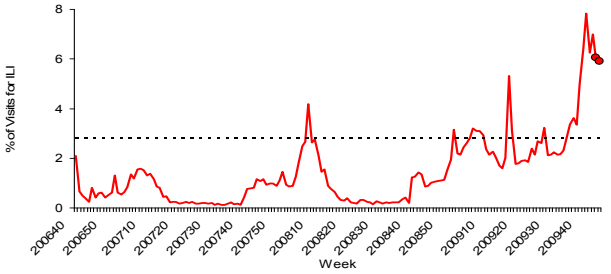

Region 7 - IA, KS, MO, NE



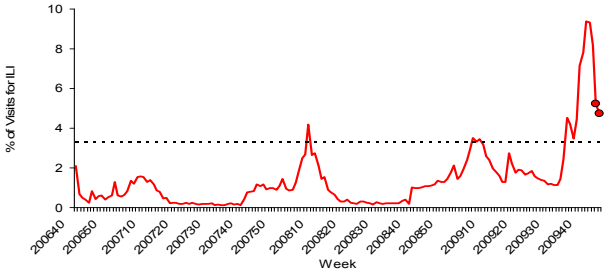

Region 8 - CO, MT, ND, SD, UT, WY




Region 9 - AZ, CA, HI, NV




Region 10 - AK, ID, OR, WA



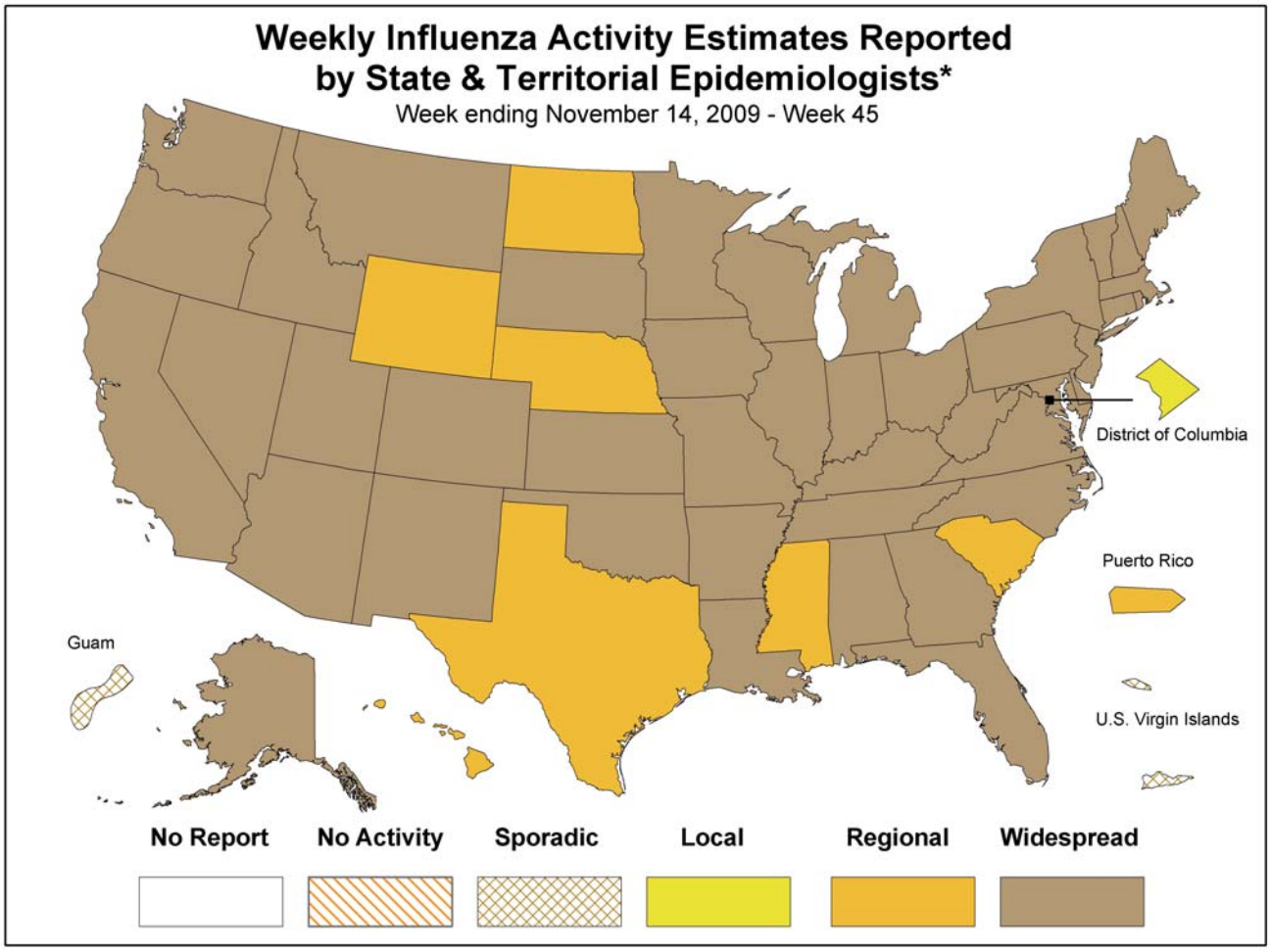


NOTE: Scales differ between regions

**Geographic Spread of Influenza as Assessed by State and Territorial Epidemiologists:** The influenza activity reported by state and territorial epidemiologists indicates geographic spread of both seasonal influenza and 2009 influenza A (H1N1) viruses and does not measure the severity of influenza activity.

During week 45, the following influenza activity was reported:

- Widespread influenza activity was reported by 43 states (Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin).
- Regional influenza activity was reported by Puerto Rico and seven states (Hawaii, Mississippi, Nebraska, North Dakota, South Carolina, Texas, and Wyoming).
- Local influenza activity was reported by the District of Columbia.
- Sporadic influenza activity was reported by the U.S. Virgin Islands and Guam.




* This map indicates geographic spread & does not measure the severity of influenza activity

A description of surveillance methods is available at: http://www.cdc.gov/flu/weekly/fluactivity.htm

Report prepared: November 20, 2009.