FLUVIEW

A Weekly Influenza Surveillance Report Prepared by the Influenza Division

2008-2009 Influenza Season
Week 34 ending August 29, 2009

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

Synopsis: During week 34 (August 23-29, 2009), influenza activity increased in the United States.

- Since mid-April to August 30, 2009, a total of 9,079 hospitalizations and 593 deaths associated with 2009 influenza A (H1N1) viruses have been reported to CDC an increase from 8,843 hospitalizations and 556 deaths from the prior week.
- During week 34:
  - 1,109 (17.3%) 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.
  - 97% of all subtyped influenza A viruses being reported to CDC were 2009 influenza A (H1N1) viruses.
  - One human infection with a novel influenza A virus was reported.
  - The proportion of deaths attributed to pneumonia and influenza (P&I) was below the epidemic threshold.
  - One influenza-associated pediatric death was reported and was associated with a 2009 influenza A (H1N1) virus infection.
  - The proportion of outpatient visits for influenza-like illness (ILI) was below the national baseline. Region IV reported ILI above its region-specific baseline.
  - Six states and Puerto Rico reported geographically widespread influenza activity, 13 states reported regional influenza activity, 10 states and the District of Columbia reported local influenza activity, 19 states reported sporadic influenza activity, two states reported no influenza activity, and Guam and the U.S. Virgin Islands did not report.

National and Regional Summary of Select Surveillance Components

	Data for current week			Data cumulative for the season						
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	Normal	17.3%	20 of 54	8,211	4,026	38,112	830	19,997	10,821	111
Region I	Normal	8.3%	0 of 6	585	305	2,933	13	1,706	820	4
Region II	Normal	2.9%	2 of 4	297	228	1,831	21	2,391	714	20
Region III	Normal	15.7%	2 of 6	1,251	220	4,378	20	1,045	1,363	10
Region IV	Elevated	19.9%	8 of 8	910	444	4,850	84	3,530	1,298	10
Region V	Normal	12.0%	0 of 6	1,661	212	8,365	199	884	1,422	18
Region VI	Normal	24.6%	2 of 5	830	309	3,698	7	5,013	2,667	16
Region VII	Normal	15.4%	1 of 4	537	86	1,149	118	553	537	0
Region VIII	Normal	13.8%	1 of 6	540	219	1,569	80	1,784	503	9
Region IX	Normal	24.3%	3 of 5	1,210	1,679	6,681	74	2,559	806	21
Region X	Normal	20.6%	1 of 4	390	324	2,658	214	532	691	3

* HHS regions (Region I: CT, ME, MA, NH, RI, VT; Region II: NJ, NY, Puerto Rico, US Virgin Islands; Region III: DE, DC, MD, PA, VA, WV; Region IV: AL, FL, GA, KY, MS, NC, SC, TN; Region V: IL, IN, MI, MN, OH, WI; Region VI: AR, LA, NM, OK, TX; Region VII: IA, KS, MO, NE; Region VIII: CO, MT, ND, SD, UT, WY; Region IX: AZ, CA, Guam, HI, NV; and Region X: 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.

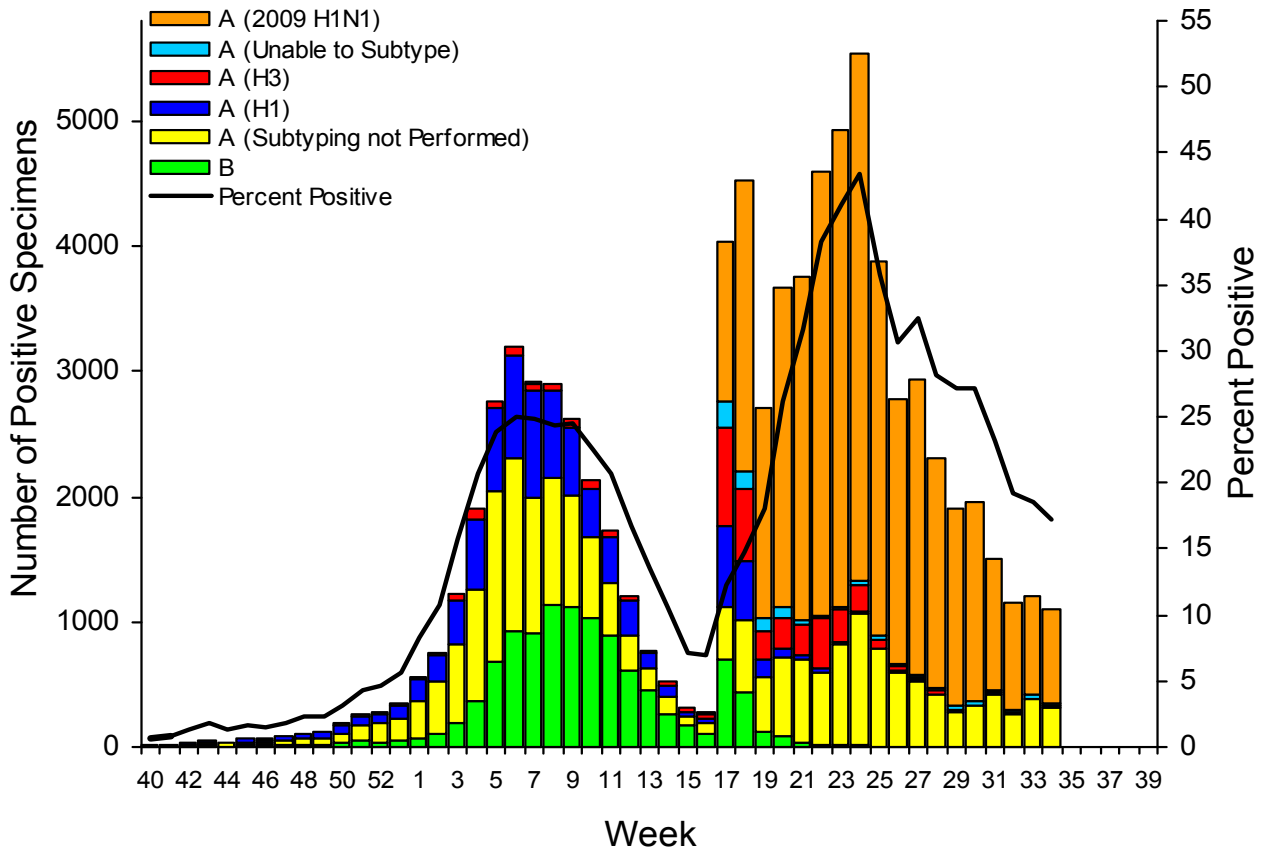
	Week 34
No. of specimens tested	6,410
No. of positive specimens (%)	1,109 (17.3%)
Positive specimens by type/subtype	
Influenza A	1,105 (99.6%)
A (2009 H1N1)	755 (68.3%)
A (subtyping not performed)	311 (28.1%)
A (unable to subtype)	18 (1.6%)
A (H3)	11 (1.0%)
A (H1)	10 (0.9%)
Influenza B	4 (0.4%)

During week 34, seasonal influenza A (H1) and A (H3) and B viruses co-circulated at low levels with 2009 influenza A (H1N1) viruses. 97% of all subtyped influenza A viruses being reported to CDC this week were 2009 influenza A (H1N1) viruses.

The unusually high percentage of specimens testing positive for influenza by WHO and NREVSS collaborating laboratories remained higher during week 34 than is typically seen this time of year, and may be due to a combination of factors including higher than normal circulation of influenza in the summer with the emergence of the 2009 H1N1 virus, changes in testing practices by health care providers, triaging of specimens by public health laboratories, an increase in the number of specimens collected from outbreaks, and other factors.

As of September 4, 2009, 9,079 hospitalizations and 593 deaths (16 deaths in individuals 0-4 years, 93 deaths in individuals 5-24 years, 249 deaths in adults 25-49 years, 171 deaths in adults 50-64 years, 57 deaths in adults age 65 and older, and 7 deaths for which age was no reported) associated with 2009 influenza A (H1N1) virus have been identified by CDC and state and local public health departments (http://www.cdc.gov/h1n1flu/update.htm).

Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2008-09



Novel Influenza A Virus: One case of human infection with a novel influenza A virus was reported by the Kansas Department of Health and Environment. The case patient was infected with a swine influenza A (H3N2) virus and reported contact with pigs in the week preceding symptom onset, July 28, 2009. The patient did not require hospitalization and has fully recovered. Although the investigation is ongoing, there does not appear to have been sustained human-to-human transmission with this virus. Early identification and investigation of these cases is critical to evaluate the extent of the outbreak and possible human-to-human transmission. Surveillance for human infections with novel influenza A viruses continues, even with the sustained community transmission of the 2009 H1N1 virus.

Antigenic Characterization: CDC has antigenically characterized 2,112 seasonal human influenza viruses [1,189 influenza A (H1), 227 influenza A (H3) and 696 influenza B viruses] collected by U.S. laboratories since October 1, 2008, and 493 2009 influenza A (H1N1) viruses.

All 1,189 seasonal influenza A (H1) viruses are related to the influenza A (H1N1) component of the 2008-09 influenza vaccine (A/Brisbane/59/2007). Two hundred sixteen (95%) of 227 influenza A (H3N2) viruses tested are related to the A (H3N2) vaccine component (A/Brisbane/10/2007) and 11 viruses (5%) tested showed reduced titers with antisera produced against A/Brisbane/10/2007.

All 493 2009 influenza A (H1N1) viruses are related to the A/California/07/2009 (H1N1)pdm reference virus selected by WHO as a potential candidate for 2009 influenza A (H1N1) vaccine.

Influenza B viruses currently circulating can be divided into two distinct lineages represented by the B/Yamagata/16/88 and B/Victoria/02/87 viruses. Seventy-six (11%) of 696 influenza B viruses tested belong to the B/Yamagata lineage and are related to the vaccine strain (B/Florida/04/2006). The remaining 620 (89%) viruses belong to the B/Victoria lineage and are not related to the vaccine strain.

Data on antigenic characterization should be interpreted with caution given that antigenic characterization data are based on hemagglutination inhibition (HI) testing using a panel of reference ferret antisera, and results may not correlate with clinical protection against circulating viruses provided by influenza vaccination.

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, as is seen with the two lineages of influenza B viruses. Antigenic characterization of 2009 influenza A (H1N1) viruses indicates that these viruses are antigenically and genetically unrelated to seasonal influenza A (H1N1) viruses, suggesting that little to no protection would be expected from vaccination with seasonal influenza vaccine.

Antiviral Resistance: Since October 1, 2008, 1,148 seasonal influenza A (H1N1), 255 influenza A (H3N2), 652 influenza B, and 560 2009 influenza A (H1N1) virus isolates have been tested for resistance to the neuraminidase inhibitors (oseltamivir and zanamivir). In addition, 717 2009 influenza A (H1N1) original clinical samples were tested for a single known mutation in the virus that confers oseltamivir resistance. Also, 1,152 seasonal influenza A (H1N1), 252 influenza A (H3N2), and 486 2009 influenza A (H1N1) viruses have been tested for resistance to the adamantanes (amantadine and rimantadine). Three state public health laboratories perform antiviral testing and report their results to CDC. Two additional oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified by these laboratories. The results of antiviral resistance testing performed on these viruses are summarized in the table below.

	Viruses tested (n)	Resistant Viruses, Number (%) Oseltamivir	Viruses tested (n)	Resistant Viruses, Number (%) Zanamivir	Viruses tested (n)	Resistant Viruses, Number (%) Adamantanes
Seasonal Influenza A (H1N1)	1,148	1,143 (99.6%)	1,148	0 (0)	1,152	6 (0.5%)
Influenza A (H3N2)	255	0 (0)	255	0 (0)	252	245 (100%)
Influenza B	652	0 (0)	652	0 (0)	N/A*	N/A*
2009 Influenza A (H1N1)	1,277	7†‡ (0.6)	560	0 (0)	486	486 (100%)

*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.
‡ Three state public health laboratories perform antiviral resistance testing and report their results to CDC. An additional two oseltamivir resistant 2009 influenza A (H1N1) viruses have been identified by these laboratories, bringing the total number to nine.

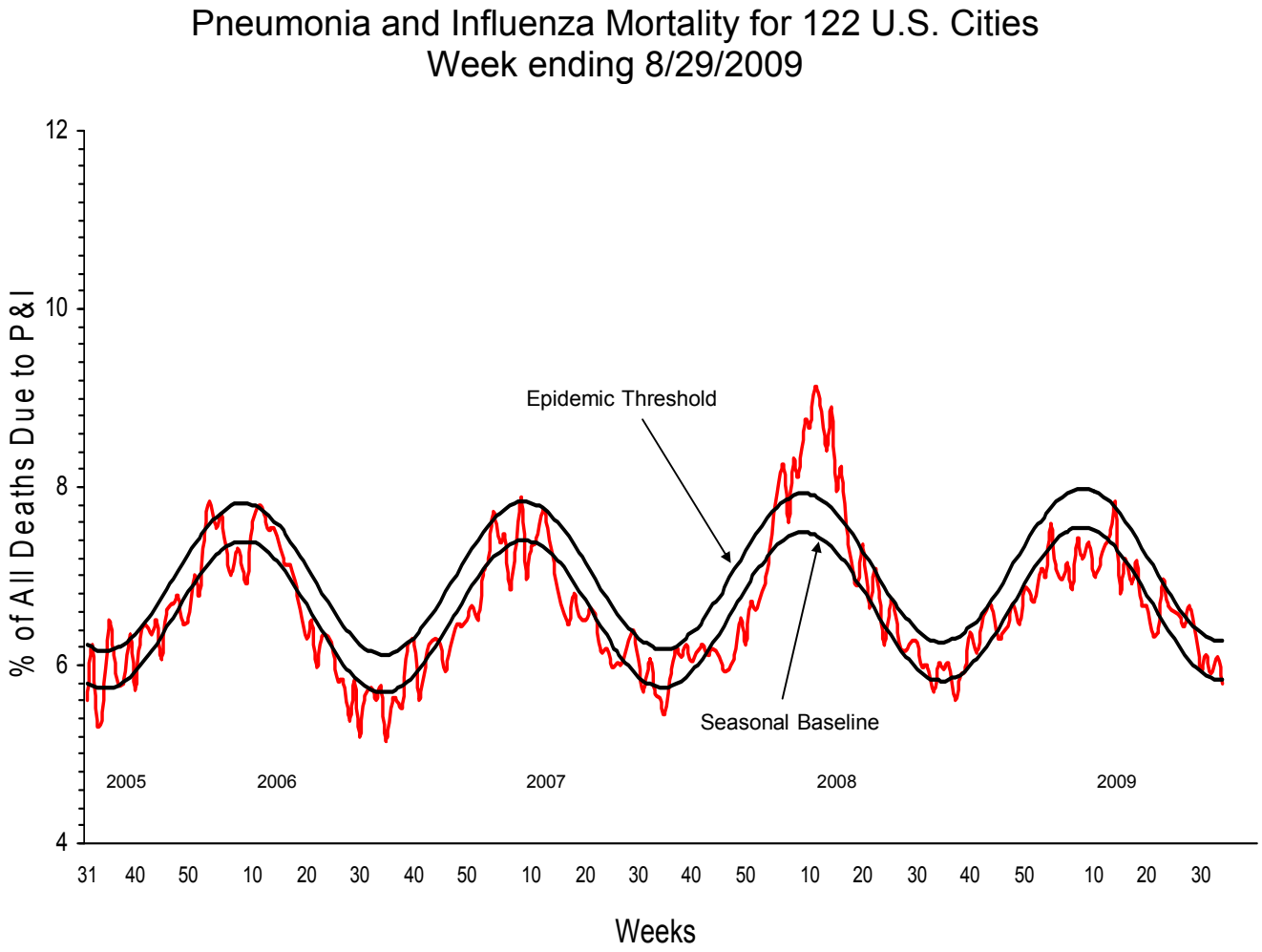
2009 influenza A (H1N1) viruses were tested for oseltamivir resistance by a neuraminidase inhibition assay and/or detection of genetic sequence mutation, depending on the type of specimen tested: original clinical samples were examined for a single known mutation in the virus that confers oseltamivir 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, including nine cases in the United States. All tested viruses retain their sensitivity to the other neuraminidase inhibitor zanamivir. Additional information on antiviral recommendations for treatment and chemoprophylaxis of 2009 influenza A (H1N1) infection is available at http://www.cdc.gov/h1n1flu/recommendations.htm. All 2009 influenza A (H1N1) viruses tested to date are resistant to the adamantane antiviral medications, amantadine and rimantadine. Antiviral treatment with either oseltamivir or zanamivir is recommended for all patients with confirmed, probable or suspected cases of 2009 influenza A (H1N1) virus infection who are hospitalized or who are at higher risk for seasonal influenza complications.

Eight of the nine patients had documented exposure to oseltamivir through either treatment or chemoprophylaxis, and the remaining patient is currently under investigation to determine exposure to oseltamivir. Occasional development of oseltamivir resistance during treatment or prophylaxis is not unexpected. Enhanced surveillance is 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 (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5832a3.htm).

Three seasonal influenza A (H1N1) viruses collected between February 8 and May 11, 2009, were found to be resistant to both oseltamivir and the adamantanes (amantadine and rimantadine). All seasonal influenza A (H1N1) viruses tested retain their sensitivity to zanamivir. The three dually-resistant viruses represent less than 1% of all seasonal influenza A (H1N1) viruses tested during the 2008-09 influenza season, and as a result, no changes to the influenza antiviral treatment or prophylaxis recommendations will be made at this time. CDC will continue to monitor trends in antiviral resistance over the summer and throughout the upcoming 2009-10 influenza season.

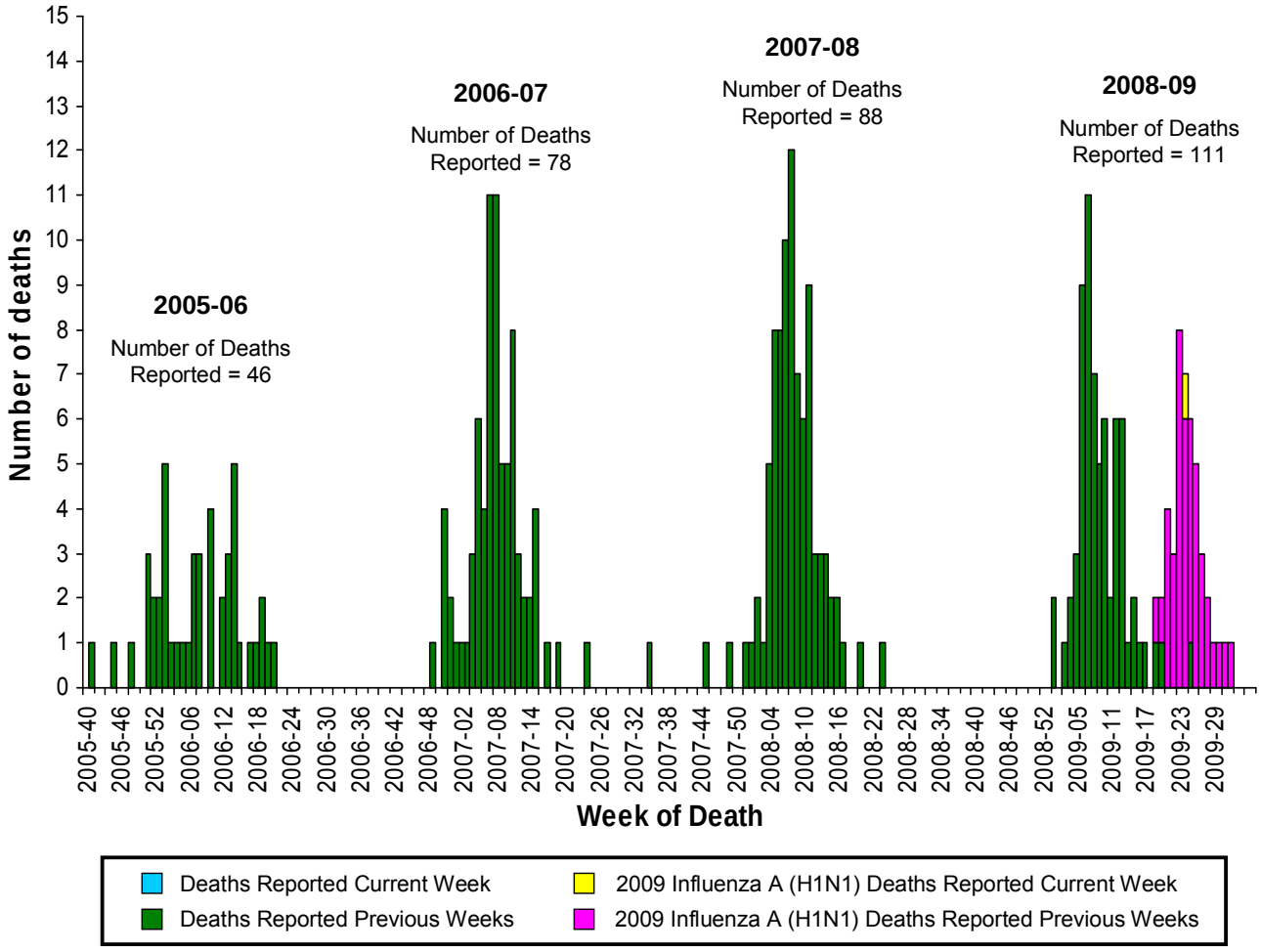
Pneumonia and Influenza (P&I) Mortality Surveillance: During week 34, 5.8% of all deaths reported through the 122-Cities Mortality Reporting System were due to P&I. This percentage was below the epidemic threshold of 6.3% for week 34.



Influenza-Associated Pediatric Mortality: One influenza-associated pediatric death was reported to CDC during week 34 (New York). This death was associated with 2009 influenza A (H1N1) virus infection. The death reported this week occurred between June 14 and June 20, 2009. Since September 28, 2008, CDC has received 111 reports of influenza-associated pediatric deaths that occurred during the current influenza season, 43 of which were due to 2009 influenza A (H1N1) virus infections.

Of the 45 children who had specimens collected for bacterial culture from normally sterile sites, 17 (37.8%) were positive; *Staphylococcus aureus* was identified in 11 (64.7%) of the 17 children. Five of the *S. aureus* isolates were sensitive to methicillin and six were methicillin resistant. Fifteen (88.2%) of the 17 children with bacterial coinfections were five years of age or older and 11 (64.7%) of the 17 children were 12 years of age or older. Fourteen (32.6%) of the 43 children with confirmed 2009 influenza A (H1N1) infection had a specimen collected from a normally sterile site; three (21.4%) of the 14 children had a positive bacterial culture (methicillin sensitive *S. aureus*, methicillin resistant *S. aureus* and *Streptococcus constellatus*).

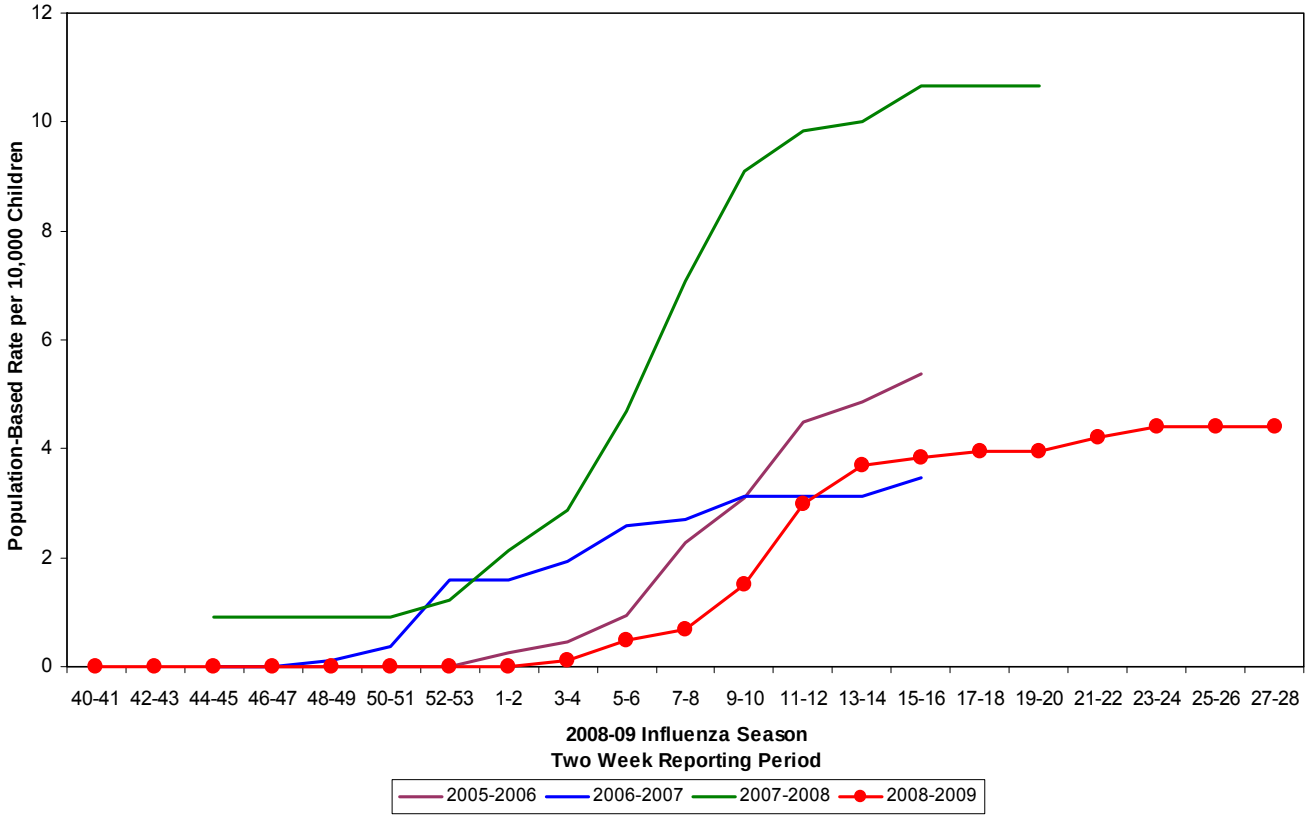
Number of Influenza-Associated Pediatric Deaths by Week of Death: 2005-06 season to present



Influenza-Associated Hospitalizations: Laboratory-confirmed influenza-associated hospitalizations are monitored in two population-based surveillance networks: the New Vaccine Surveillance Network (NVSN) and the Emerging Infections Program (EIP).

During October 12, 2008 to July 11, 2009, the preliminary laboratory-confirmed influenza-associated hospitalization rate for children 0-4 years old in the NVSN was 4.42 per 10,000. Data collection for influenza-associated hospitalizations through the NVSN has been completed for the 2008-09 influenza season. There will be no updates to this system.

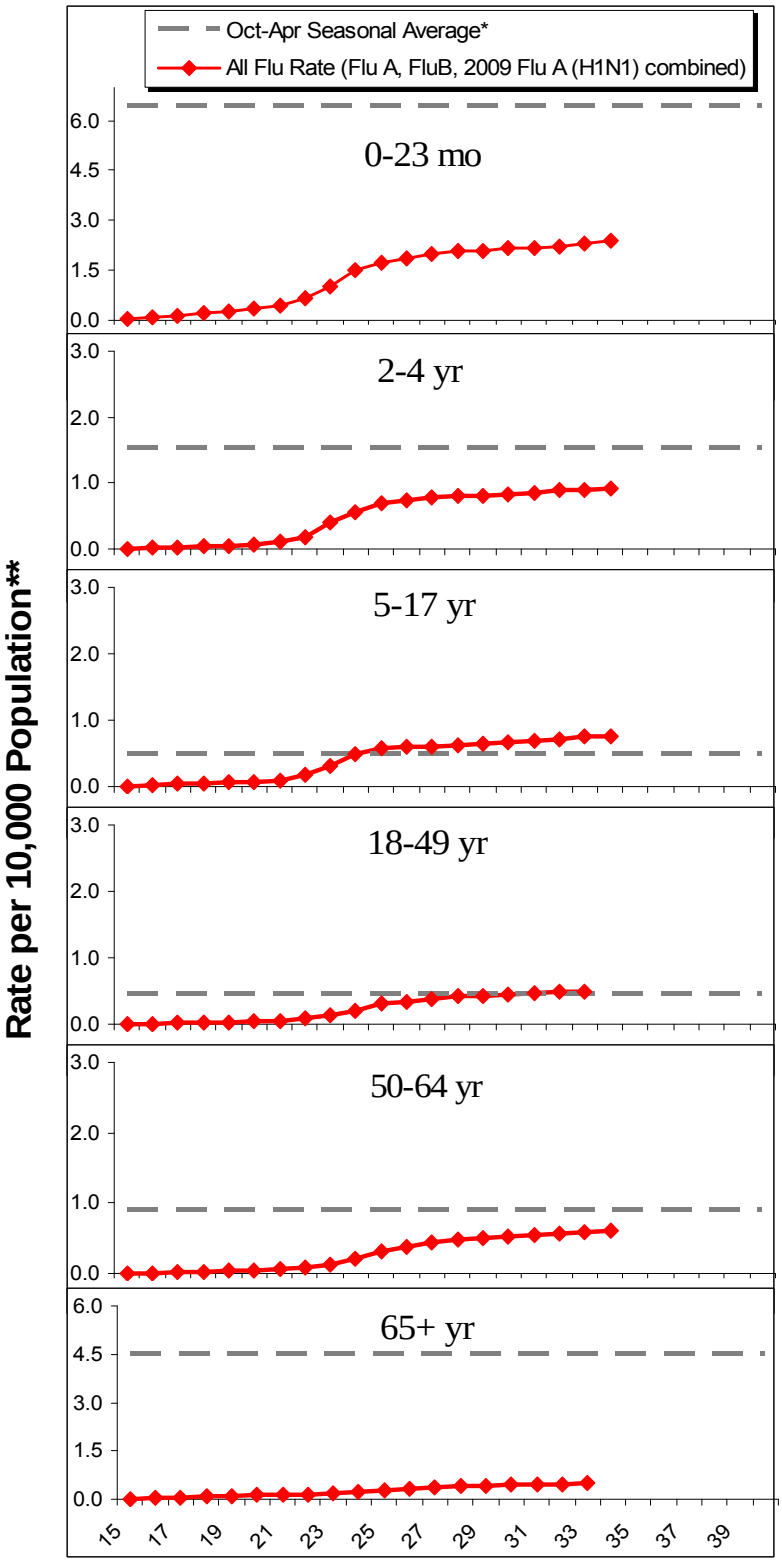
NVSN Influenza Laboratory-Confirmed Cumulative Hospitalization Rates for Children 0 - 4 Years, 2008-09 and Previous Three Seasons



During April 15, 2009 – August 29, 2009, the following preliminary laboratory-confirmed overall influenza associated hospitalization rates were reported by the EIP *(rates include influenza A, influenza B, and 2009 influenza A (H1N1))*:

Rates for children aged 0-23 months, 2-4 years, and 5-17 years were 2.4, 0.9, and 0.8 per 10,000, respectively. Rates for adults aged 18-49 years, 50-64 years, and ≥ 65 years, the overall flu rates were 0.5, 0.6, and 0.5 per 10,000, respectively.

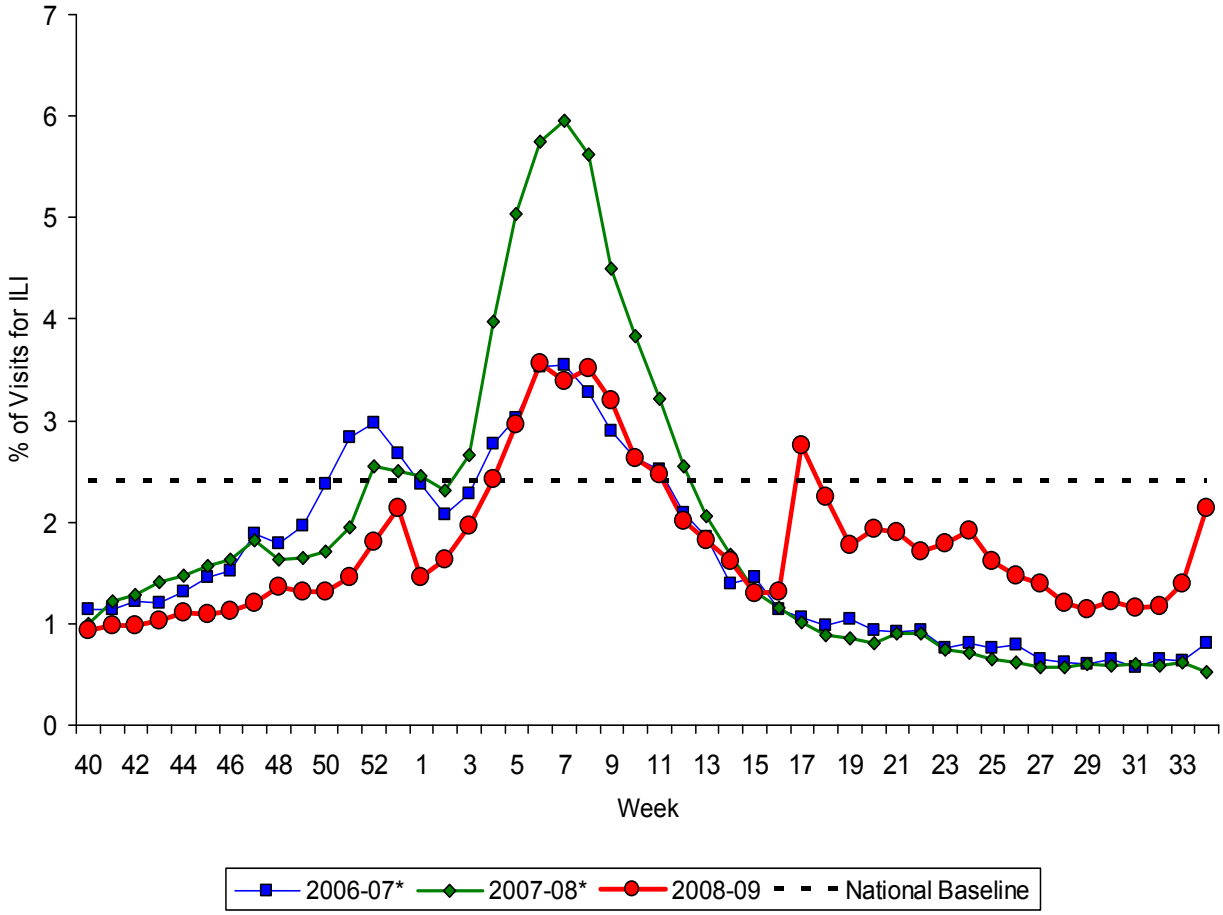
EIP Influenza Laboratory-Confirmed Cumulative Hospitalization Rates, Spring/Summer 2009



*This value represents an age group-specific average influenza rate from October 1 to April 30 from the 2005-06, 2006-07, and 2007-08 influenza seasons.
**Note: The scales for the 0-23 month and the ≥65 year age groups differ from other age groups.

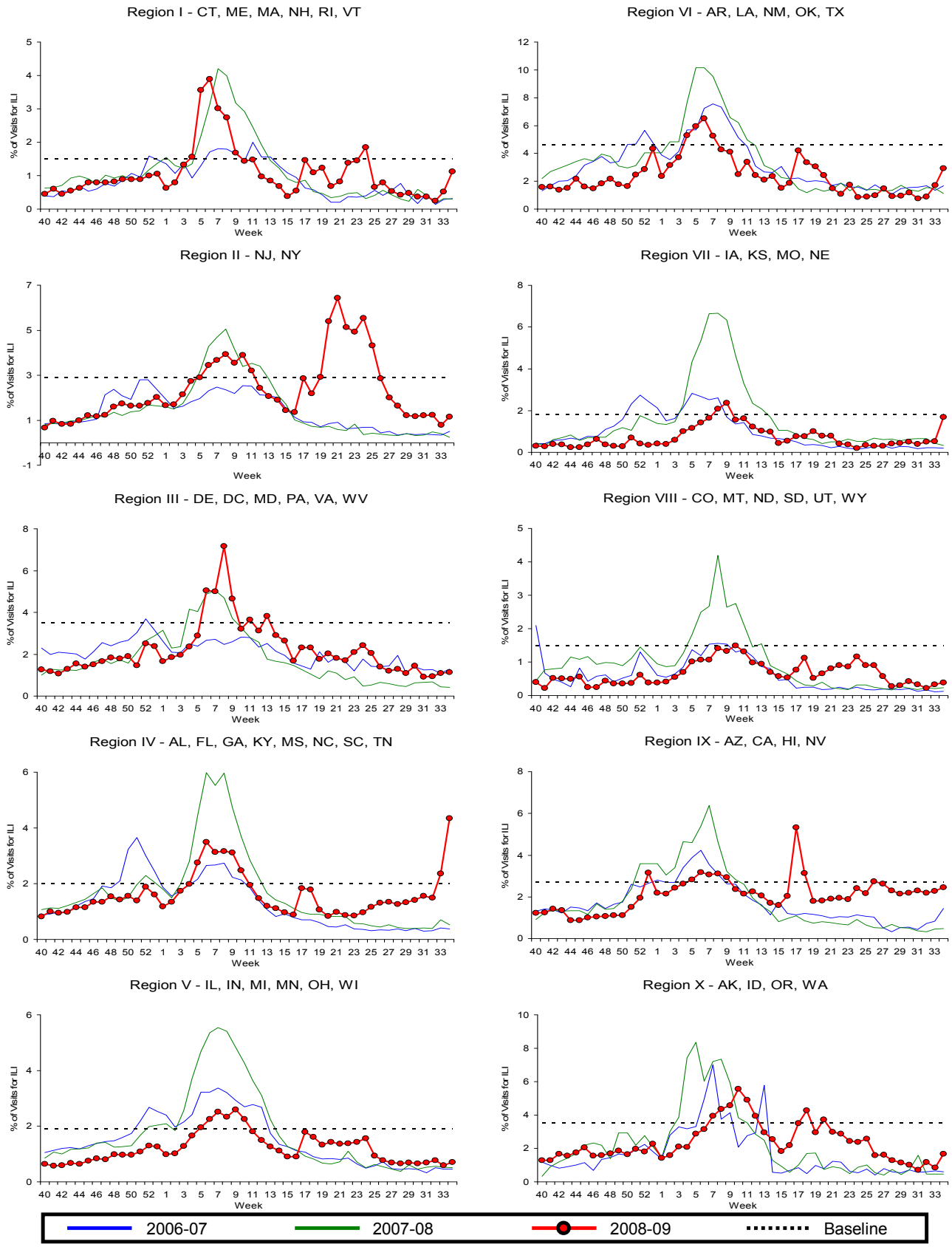
Outpatient Illness Surveillance: Nationwide during week 34, 2.1% of patient visits reported through the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) were due to influenza-like illness (ILI). This percentage is below the national baseline of 2.4%.

Percentage of Visits for Influenza-like Illness (ILI) Reported by the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet), National Summary, 2008-09 and Previous Two Seasons



*There was no week 53 during the 2006-07 and 2007-08 seasons, therefore the week 53 data point for those seasons is an average of weeks 52 and 1.

On a regional level, the percentage of outpatient visits for ILI ranged from 0.4% to 4.3%. One region (Region IV) reported 4.3% of outpatient visits for ILI, which is above its region-specific baseline of 2.0%, while the remaining nine regions reported percentages of visits for ILI below region-specific baseline levels.



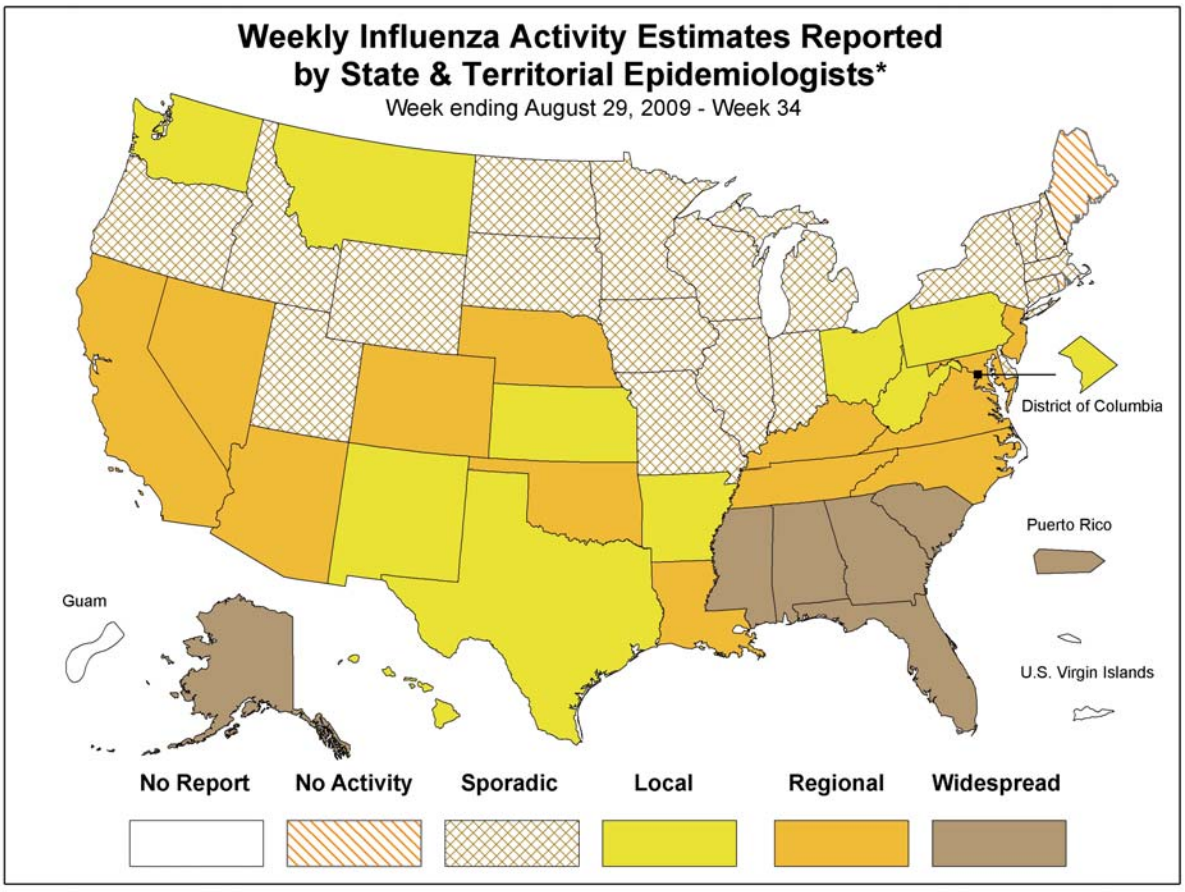
NOTE: Scales differ between regions

NOTE: There was no week 53 during the 2006-07 and 2007-08 seasons, therefore the week 53 data point for those seasons is an average of weeks 52 and 1.

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 34, the following influenza activity was reported:

- Widespread influenza activity was reported by Puerto Rico and six states (Alabama, Alaska, Florida, Georgia, Mississippi, and South Carolina).
- Regional influenza activity was reported by 13 states (Arizona, California, Colorado, Kentucky, Louisiana, Maryland, Nebraska, Nevada, New Jersey, North Carolina, Oklahoma, Tennessee, and Virginia).
- Local influenza activity was reported by the District of Columbia and 10 states (Arkansas, Hawaii, Kansas, Montana, New Mexico, Ohio, Pennsylvania, Texas, Washington, and West Virginia).
- Sporadic activity was reported by 19 states (Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New York, North Dakota, Oregon, South Dakota, Utah, Vermont, Wisconsin, and Wyoming).
- No influenza activity was reported by two states (Maine and Rhode Island).
- Guam and the U.S. Virgin Islands did not report.



* 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

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