

Influenza Summary Report 2007–2008 Season

Update on Avian Influenza A (H5N1)

On a global scale, 2007–2008 saw the continued spread (in poultry and wild birds) of the highly pathogenic avian influenza A (H5N1) in previously unaffected countries in Africa, Asia, and the Middle East (1). For a complete list of countries, please refer to the World Organisation for Animal Health at:

http://www.oie.int/eng/en_index.htm.

As of June 19, 2008, from 2003–2008, 385 laboratory-confirmed human cases of influenza A (H5N1) with 243 deaths (63.1% mortality rate) were detected in 15 countries across Asia, Africa, the Middle East, and southeastern Europe (2). The greatest number of cases and deaths were reported in Indonesia (135 cases and 110 deaths—81.5% mortality rate).

Only very limited human-to-human transmission has been documented. In December 2007, the World Health Organization (WHO) investigated a cluster of influenza A (H5N1) cases in Pakistan (3). Four illnesses (two of them fatal) were investigated among members of the same family who had onset in October and November. Three of the four cases were laboratory-confirmed as influenza A (H5N1). Only the index case had any direct contact with infected poultry, and it is believed that transmission to the other three was a result of close contact to the index case and the second case. Transmission outside of the family was not documented.

Seasonal Influenza in the United States

The national reporting period for influenza begins in early October (MMWR week 40) and continues through late May (MMWR week 20). The 2007–08 influenza season was characterized as more severe than previous seasons, with a severity similar to the 2004–05 influenza season (4). In the United States, influenza activity in the 2007–08 season peaked in mid-February. Influenza A (H3N2) was the predominant subtype reported for the season; however, influenza A (H1N1) viruses were reported most frequently early in the season, and influenza B viruses were reported most frequently later in the season. Higher rates of hospitalization for children aged 0–4 years were reported in the 2007–08 season, and deaths due to pneumonia and influenza remained elevated above the epidemic threshold for 19 consecutive weeks. The peak percentage of patient visits due to influenza-like illness was higher than the peak for the previous three seasons. An increase in the number of influenza A (H1N1) isolates resistant to the antiviral drug oseltamivir was also reported this season.

The Northern Hemisphere influenza vaccine composition for the 2007–08 season included A/Solomon Islands/3/2006 (H1N1)-like, A/Wisconsin/67/2005 (H3N2)-like, and B/Malaysia/2506/2004-like viruses. CDC characterized 1,161 influenza viruses submitted by U.S. laboratories for the 2007–08 season. Overall, 66% of the influenza A (H1N1) viral isolates were characterized as antigenically similar to A/Solomon Islands/3/2006-like. For the influenza A (H3N2) isolates that were tested, 23% were characterized as A/Wisconsin/67/2005-like, the influenza A (H3N2) component of the 2007–08 vaccine. The majority (98%) of influenza B viruses characterized belonged to the B/Yamagata lineage, not the B/Victoria lineage that was a component of the 2007–08 Northern Hemisphere influenza vaccine.

For more information on the 2007–08 national influenza season, please see <http://www.cdc.gov/flu/weekly/fluactivity.htm>.

Seasonal Influenza in Texas

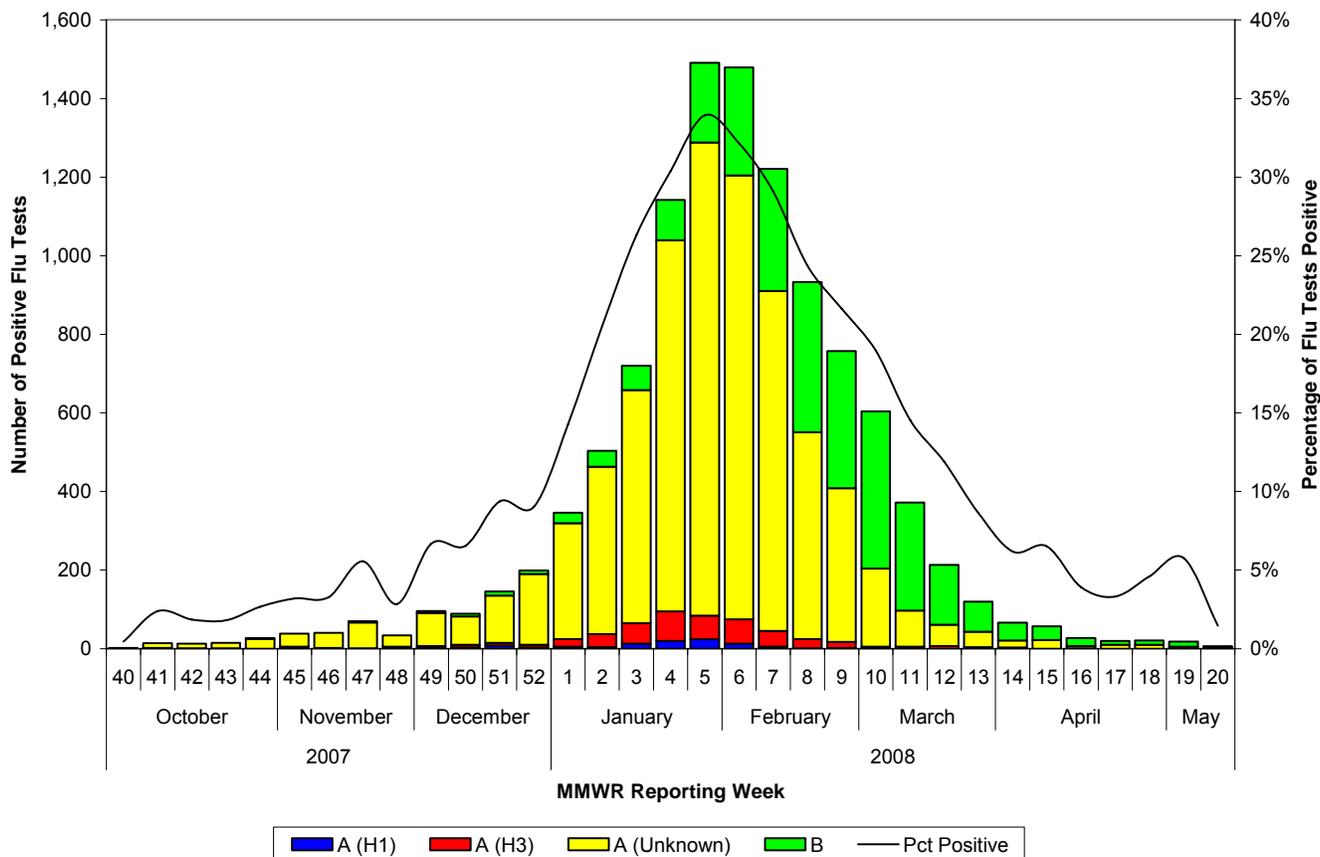
Overview of Influenza Surveillance in Texas

Influenza and influenza-like illnesses (ILI) were last reportable by law in Texas in 1992 (5). During that year, over 155,000 cases of influenza and influenza-like illness were reported to the state health department. Because there is no current reporting requirement, it is unclear how many illnesses, hospitalizations, and deaths occur each year in Texas residents. A small number of influenza cases are reported voluntarily through a sentinel surveillance network composed of laboratories, hospitals, physicians, nurses, and schools located throughout the state. Additional resources include web-based influenza and ILI reporting systems, as well as local and regional health departments that gather data from surveillance participants in their areas. Data from all sources are reported to the Texas Department of State Health Services (DSHS) Central Office in Austin, compiled, and presented weekly in the Texas Influenza Surveillance Report.

Texas NREVSS Laboratories

The National Respiratory and Enteric Virus Surveillance System ([NREVSS](#)) is a CDC-sponsored, online reporting system for laboratory results for several respiratory and enteric viruses, including influenza. During the 2007–08 season, 24 participating laboratories in most Texas [Health Service Regions](#) (HSRs) submitted data on antigen detection, virus isolation (cultures), and polymerase chain reaction (PCR) testing for influenza. Of the 60,227 influenza tests that were reported to NREVSS from Texas laboratories, 10,899 (18.1%) were positive for influenza virus. Of the 10,899 positive tests, 8,068 (74.0%) tests were positive for influenza A and 2,831 (26.0%) were positive for influenza B. The majority (93.1%) of the positive test results for influenza A reported through NREVSS were reported as influenza A (not subtyped), because most laboratories in Texas do not subtype influenza isolates. The peak of NREVSS influenza activity in Texas occurred during the week ending February 2, 2008 (week 5), when 33.9% of tests were positive for influenza virus (Figure 1).

Figure 1. Influenza Types and Subtypes Reported by NREVSS Laboratories in Texas, 2007–08 Season

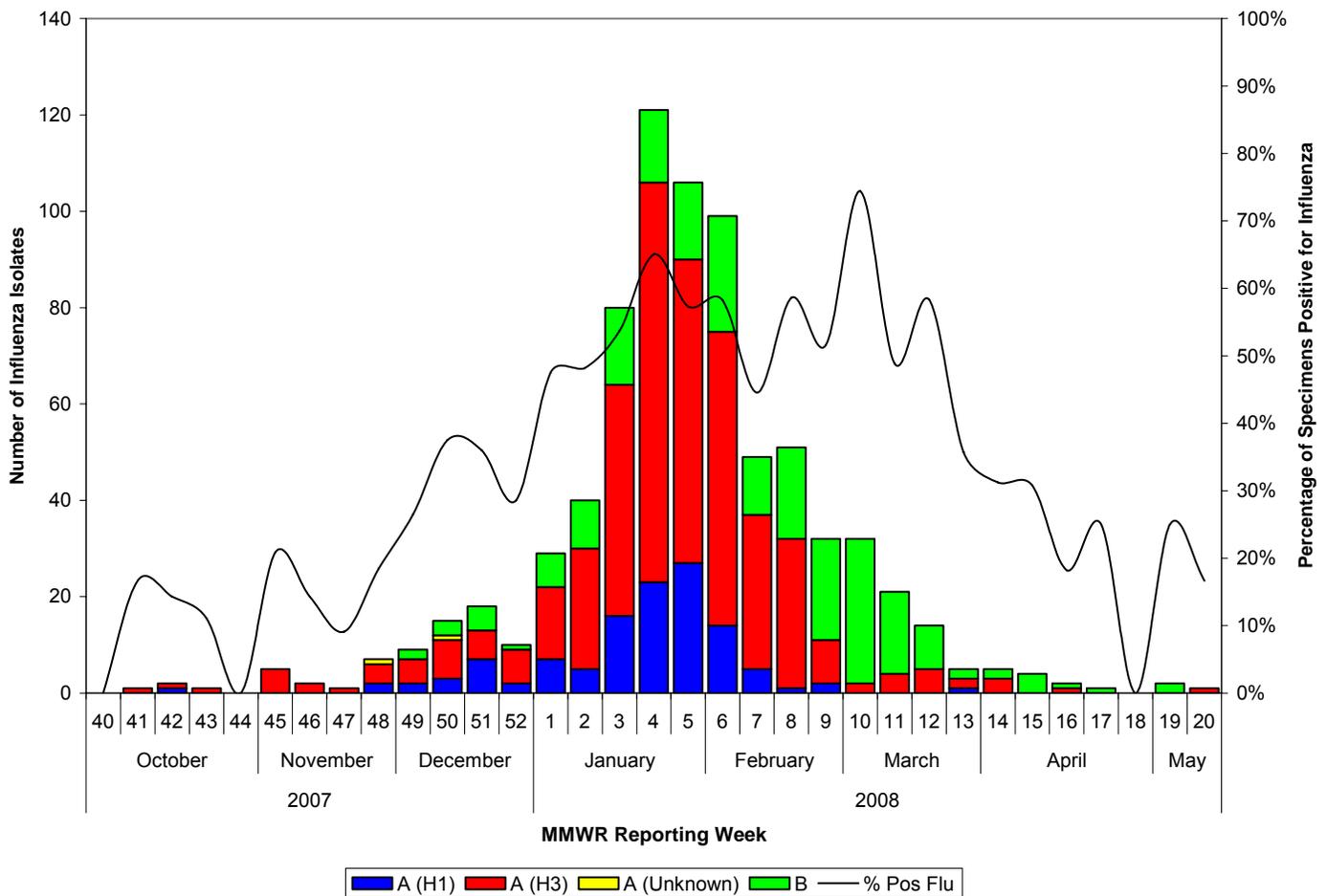


Influenza surveillance specimens are submitted to the DSHS Austin Laboratory throughout the season for viral isolation and subtyping from physicians, hospitals, clinics, and health departments throughout Texas.

The first influenza isolate of the season was collected on October 13, 2007 (week 41) and identified as influenza A (H3) by DSHS (Figure 2). The specimen was collected from an 11-year-old patient in Nueces County and further characterized by CDC as influenza A/Brisbane/10/2007-like. Influenza A (H3) was the predominant subtype of influenza A that was isolated during the 2007–08 season in Texas. Influenza A (H1) was first isolated in the week ending October 20, 2007 (week 42) from a 21-year-old resident of Travis County. This subtype was isolated consistently—although less frequently than influenza A (H3)—from the week ending December 1, 2007 (week 48) through the week ending March 1, 2008 (week 9). Influenza A (H1) was isolated only once from March through May.

Influenza B was first isolated in Texas from a specimen collected on December 4, 2007 (week 49) from a 55-year-old resident of Galveston County. CDC characterized the isolate as influenza B/Florida/04/2006-like (Yamagata lineage). Although influenza A viruses predominated during the 2007–08 season, influenza B viruses were identified more frequently from the week ending March 1, 2008 (week 9) through the week ending March 22, 2008 (week 12). The peak of the influenza B wave occurred in the week ending March 8, 2008 (week 10), when 30 of 32 positive specimens were identified as influenza B. Influenza B and influenza A (H3) viruses continued to be isolated throughout the remainder of the season.

Figure 2. Influenza Types and Subtypes Identified by DSHS Austin Laboratory, 2007–08 Season



The proportion of specimens positive for influenza virus in the 2007–08 season exceeded 10% for 22 consecutive weeks, compared to 20 weeks above 10% in the 2006–07 season. Submission of specimens for influenza surveillance began to increase during the week ending December 1, 2007 (week 48), and increased substantially in the week ending January 19, 2008 (week 3). The largest number of specimens collected for influenza surveillance, 186, occurred during the week ending January 26, 2008 (week 4). In week 4, 121 (65.1%) specimens submitted were positive for influenza virus. The highest percentage of specimens positive for influenza virus actually occurred during the week ending March 8, 2008 (week 10); the normal decline of specimen submission following peak season, coupled with the simultaneous increase in submission of influenza isolates (vs. surveillance specimens) from some agencies for subtyping and antigenic characterization, may have led to this unexpected peak. Specimen submission began to decline sharply beginning in the week ending February 16, 2008 (week 7).

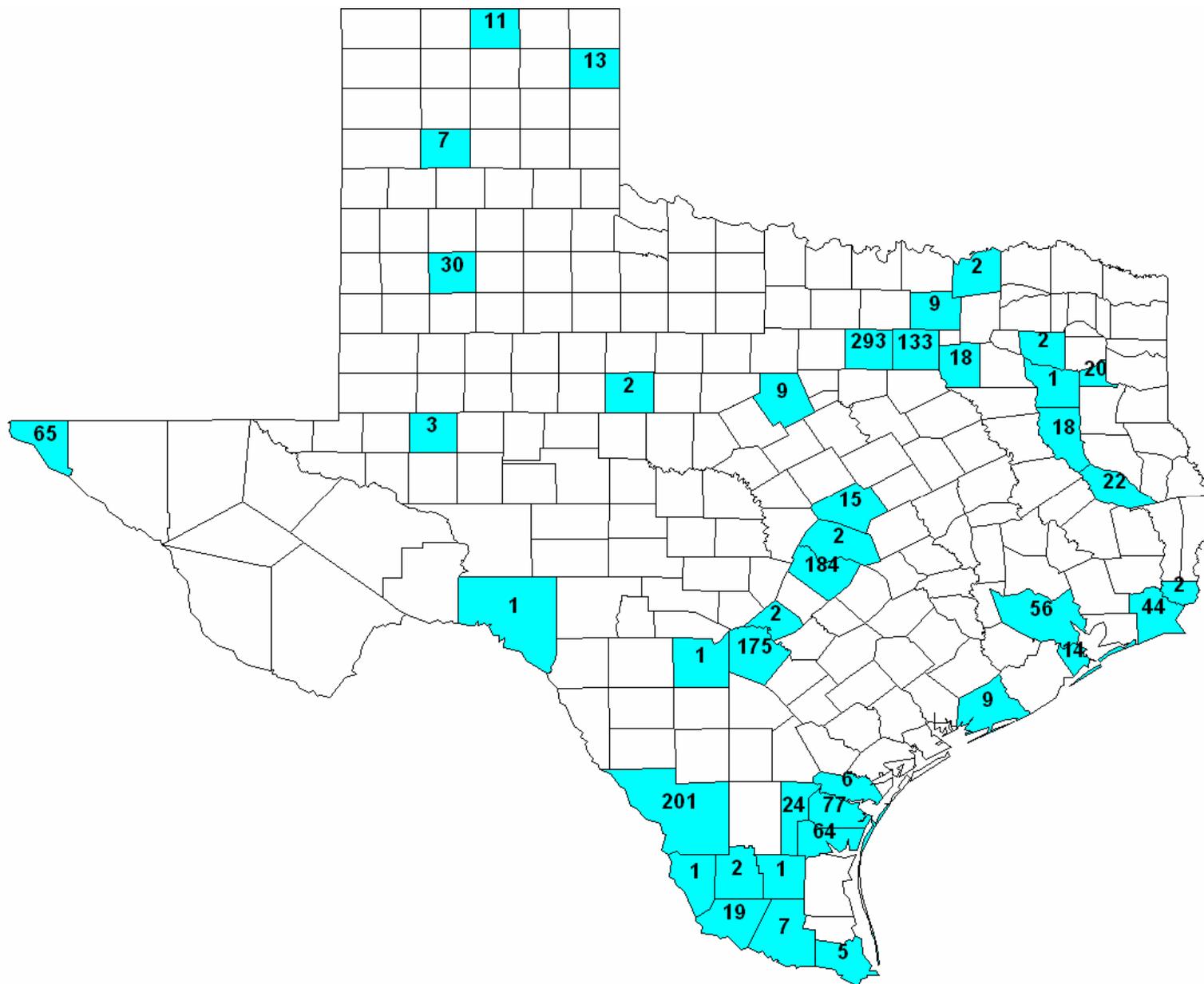
Over the course of the 2007–08 influenza season, the DSHS Laboratory in Austin received 1,570 specimens for influenza surveillance; of those, 765 (48.7%) were positive for influenza virus. Of those that were positive for influenza virus, 546 (71.4%) were identified as influenza A viruses and 219 (28.6%) were identified as influenza B viruses. All influenza A isolates were subtyped: 118 (21.6%) were identified as influenza A (H1), 426 (78.0%) were identified as influenza A (H3), and 2 (0.4%) were identified as influenza A but were unable to be subtyped. These two unsubtypable isolates were identified as influenza A (H3) by PCR testing at CDC. Influenza B viruses are divided into two distinct lineages designated B/Victoria and B/Yamagata. Hemagglutination inhibition testing by the DSHS Laboratory determined that 98.2% of influenza B isolates received in the 2007–08 season belonged to the B/Yamagata lineage; the lineage was not determined for the remaining 1.8% of influenza B isolates. Other respiratory viruses isolated from influenza surveillance specimens during the 2007–08 season included adenovirus (17 specimens), coxsackie A 16 (1), coxsackie B 1 (1), echovirus 5 (1), echovirus 6 (1), herpes simplex type 1 (3), parainfluenza 1 (2), parainfluenza 3 (6), and picornavirus (1).

The number of specimens received by the DSHS Laboratory this season for influenza surveillance was almost double the number received for the 2006–07 season (Table 1). Counties in DSHS HSRs 2/3 and 11 submitted the greatest number of specimens, with 466 (29.7%) specimens and 407 (25.9%) specimens submitted per region, respectively. The counties that submitted the greatest number of influenza surveillance specimens were Tarrant County (293 specimens), Webb County (201), Travis County (184), Bexar County (175), and Dallas County (133) (Figure 3). In most counties, multiple agencies participated in specimen submission for influenza surveillance.

Table 1. Influenza Surveillance Specimens Received at the DSHS Laboratory, by Health Service Region and Season

Health Service Region	Influenza Surveillance Specimens Received	
	2006–07 Season	2007–08 Season
1	34	61
2/3	271	466
4/5N	66	63
6/5S	16	125
7	137	201
8	113	179
9/10	49	68
11	115	407
All HSRs	801	1,570

**Figure 3. Number of Influenza Surveillance Specimens Received by County*,
 DSHS Austin Laboratory, 2007–08 Season**



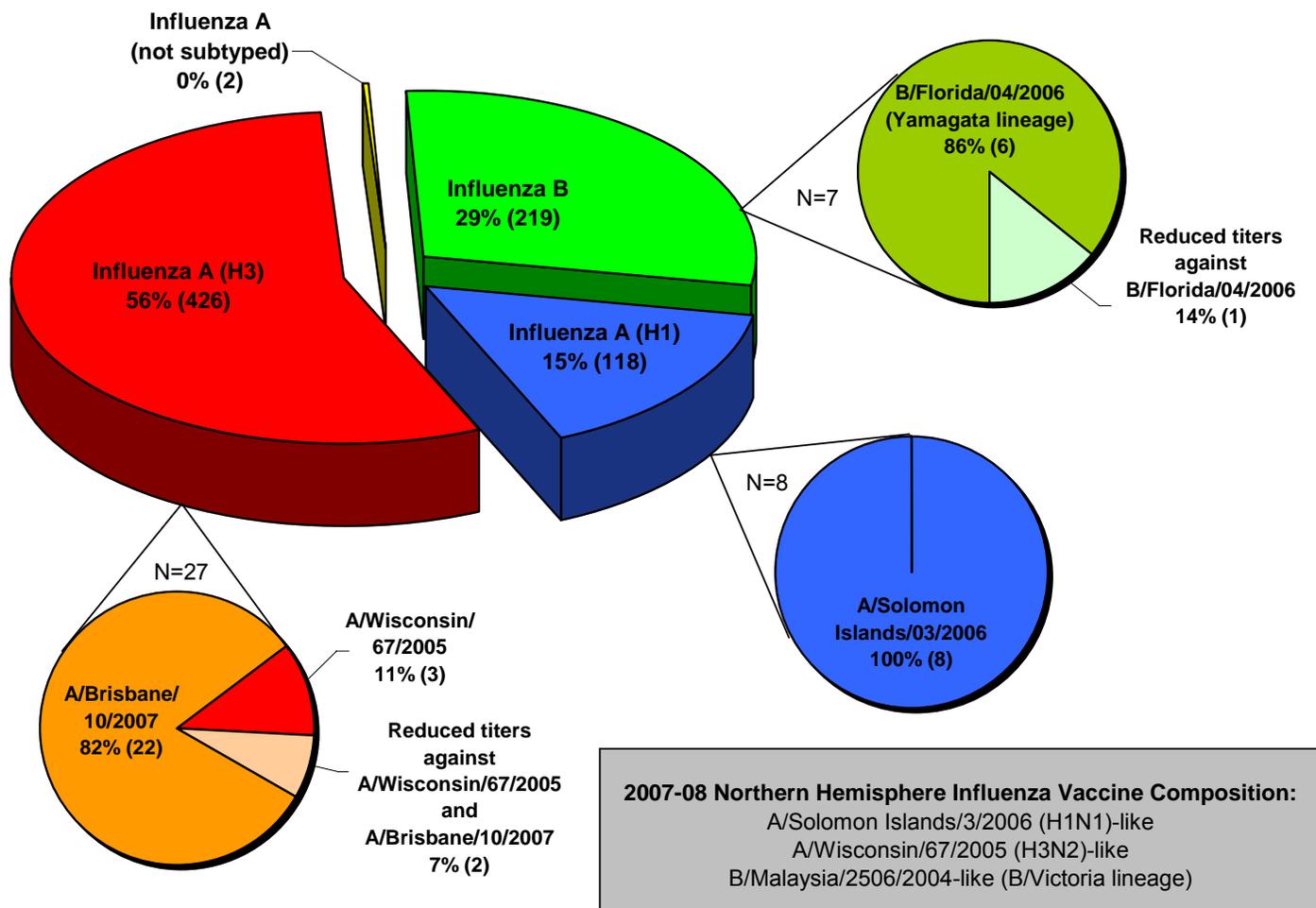
*County totals are by submitting agency and may include specimens from residents of other counties.

Antigenic Characterization of Influenza Isolates from Texas

Like other state virology laboratories in the country, DSHS submits early, mid, and late-season as well as unusual isolates to the CDC for strain characterization. Sixty-eight isolates were submitted during the 2007–08 season to CDC; however, due to an overwhelming response to CDC’s request for all influenza isolates from all states, only 51 isolates from Texas were tested. CDC was unable to isolate influenza virus from nine of the 51 isolates that were tested, although these were subtyped by PCR testing.

Forty-two influenza viruses from Texas were antigenically characterized: 8 influenza A (H1N1) viruses, 27 influenza A (H3N2) viruses, and 7 influenza B viruses (Figure 4). All eight influenza A (H1N1) viruses were characterized as antigenically similar to A/Solomon Islands/3/2006, the 2007–08 Northern Hemisphere vaccine A (H1N1) component. Of the 27 influenza A (H3N2) viruses, three (11.1%) were characterized as similar to A/Wisconsin/67/2005, the 2007–08 Northern Hemisphere influenza A (H3N2) vaccine component. Twenty-two (81.5%) viruses were characterized as A/Brisbane/10/2007-like. Two (7.4%) viruses showed somewhat reduced titers against A/Wisconsin/67/2005 and A/Brisbane/10/2007. Of the seven influenza B viruses characterized, all were part of the B/Yamagata lineage of viruses; the B/Yamagata lineage was not represented in the 2007–08 Northern Hemisphere influenza vaccine. Six (85.7%) viruses were characterized as similar to B/Florida/04/2006, and one (14.3%) virus showed reduced titers against B/Florida/04/2006.

Figure 4. Influenza Viruses Isolated by DSHS Austin Laboratory and Antigenic Characterization of Tested Subsets, 2007–08 Influenza Season



Texas Sentinel Provider Surveillance Network (SPSN)

Texas participants in the U.S. Sentinel Provider Surveillance Network (SPSN) report weekly on the number of patient visits for influenza-like illness (ILI) and the total number of patients seen for any reason. For SPSN reporting, CDC defines ILI as “fever ($\geq 100^{\circ}\text{F}$ [37.8°C], oral or equivalent) *and* cough and/or sore throat in the absence of a known cause other than influenza (6).” These data are used to calculate a weekly percentage of visits due to ILI. One hundred and twenty providers in Texas submitted data to the SPSN for at least one week during the 2007–08 influenza season (Figure 5); an average of 87 providers submitted data on an average of 22,631 patient visits each week during the season. The West South Central (WSC) Region (Arkansas, Louisiana, Oklahoma, Texas) ILI baseline calculated by CDC was 4.3% for the 2007–08 influenza season. According to data from Texas SPSN participants, the percentage of visits due to ILI first exceeded the regional baseline during the week ending November 24, 2007 (week 47), with 5.0% of visits due to ILI (Figure 6). Influenza-like illness peaked the last week of January in 2008 (week 5). During that week, SPSN providers reported that influenza-like illness accounted for 10.0% of all physician visits. The percentage of visits due to ILI fell below the regional baseline in the week ending March 22, 2008 (week 12); the percentage of visits due to ILI continued to decrease and remained below the regional baseline for the remainder of the season. Overall, ILI activity in Texas exceeded the WSC Region baseline for 12 consecutive weeks.

Figure 6. Percentage of Visits for Influenza-Like Illness Reported by Sentinel Providers in Texas, 2007–08 Season

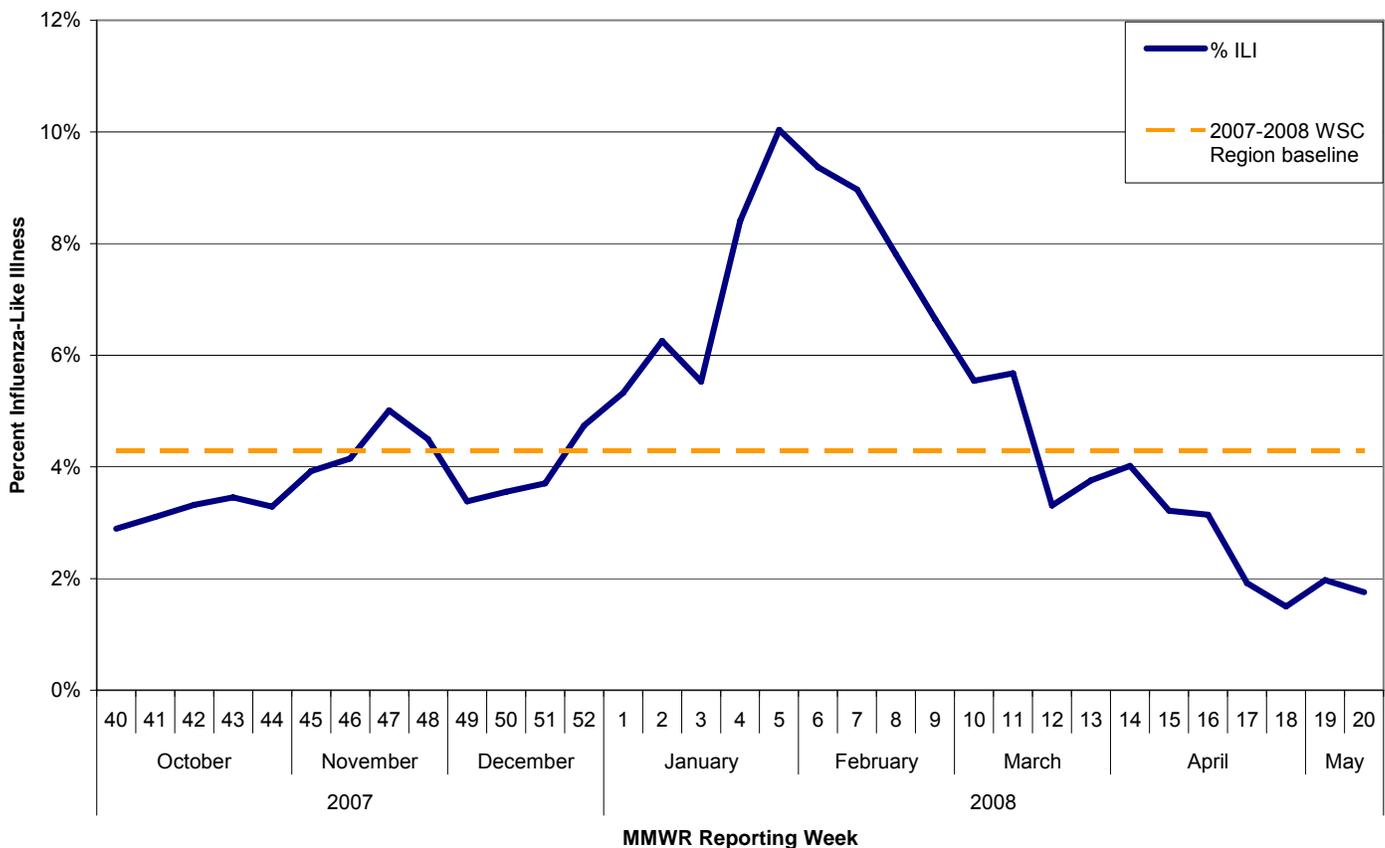
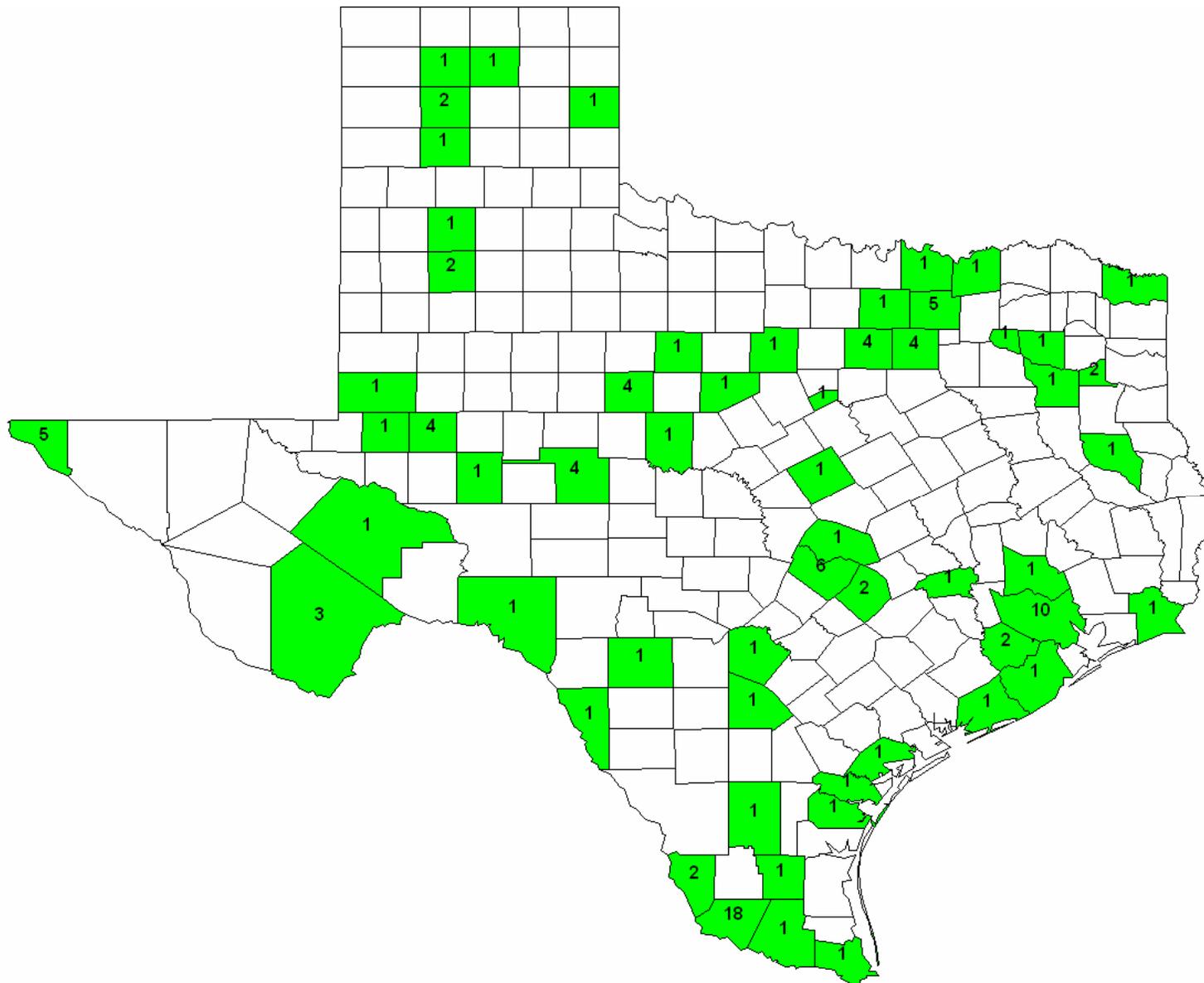


Figure 5. Number of Participants per County
in the Texas Sentinel Provider Surveillance Network (SPSN),
2007–08 Influenza Season**



**Participants did not necessarily report every week of the influenza reporting season.

School Closures and Institutional Outbreaks

Reports of high absenteeism, school closures, and institutional outbreaks due to influenza were received each week from the week ending January 19, 2008 (week 3) through the week ending February 23, 2008 (week 8). These reports were received from HSRs 1, 2/3, 4/5N, and 7. A peak of eight school closures and one institutional outbreak occurred in the week ending February 2, 2008 (week 5). One additional institutional outbreak of influenza A (not subtyped) was reported in the week ending March 22, 2008 (week 12).

Influenza-Associated Pediatric Mortality

Influenza-associated pediatric mortality is defined as a death resulting from an illness confirmed as influenza in a person under the age of 18 years (7). Influenza-associated pediatric mortality was added to the list of Texas notifiable conditions for 2007. Nine influenza-associated pediatric fatalities were reported to DSHS during the 2007–08 influenza season. The reported deaths occurred during the week ending November 10, 2007 (week 45) through the week ending April 19, 2008 (week 16). One additional influenza-associated pediatric death was reported outside of influenza season in the week ending June 14, 2008 (week 24). These ten total deaths were reported in residents of HSRs 2/3, 6/5S, 8, and 11. Eight patients had confirmed influenza A infections, and two patients had influenza B infections. Patient age was available for all ten cases; of these, three patients were less than 6 months of age, two patients were 2–4 years of age, and five patients were 5–17 years of age. The influenza vaccination status for the 2007–08 season was known for eight of the ten cases; of those eight, three were too young to be vaccinated for influenza (under 6 months of age). Of the remaining five who were old enough to be vaccinated and for whom vaccination status was known, four were not vaccinated for influenza. One of the ten patients had a methicillin-resistant *Staphylococcus aureus* (MRSA) co-infection.

Influenza Activity Levels

The geographic spread of influenza is assessed through an influenza activity code reported weekly by each state to CDC. For the 2007–08 season, influenza activity in Texas was first reported as “regional” for the week ending December 8, 2007 (week 49) and “widespread” for the week ending January 12, 2008 (week 2). The influenza activity remained “widespread” through the week ending March 8, 2008 (week 10) and then began to decline. The influenza activity level had only fallen to “sporadic” by the end of the influenza season (week 20). The previous 2006–07 season remained at “widespread” for eight consecutive weeks and declined to “no activity” beginning in the week ending May 5, 2007 (week 18). For more information on influenza activity levels, please visit <http://www.dshs.state.tx.us/idcu/disease/influenza/surveillance/>.

Updates for the 2008–09 Influenza Season

The 2008–09 influenza vaccine will include changes to all three vaccine strains. Next season’s vaccine will contain:

- An A/Brisbane/59/2007 (H1N1)-like virus;
- An A/Brisbane/10/2007 (H3N2)-like virus;
- And a B/Florida/4/2006-like virus.

For the 2008–09 influenza season, the Advisory Committee on Immunization Practices (ACIP) made new recommendations to include vaccination of all children ages 6 months to 18 years for influenza (8). This significantly expands the previous recommendation which included annual vaccination of children aged 6 months through 59 months, as well as children in high risk groups. Annual vaccination of children ages 5 years to 18 years is to go into effect as soon as feasible but not later than the 2009–10 influenza season.

More sentinel providers are needed in all major metropolitan areas throughout Texas, especially in Bexar, Dallas, and Harris counties. Sentinel providers report weekly on the total number of patient visits and the number of visits due to influenza-like illness by age group. The reporting process takes about 20 minutes per

week. Please contact [Irene Brown](#) at 512-458-7676 for more information on becoming part of the Texas Sentinel Provider Surveillance Network.

Additional laboratories are needed to report test results weekly on influenza and other respiratory viruses in the National Respiratory and Enteric Virus Surveillance System (NREVSS). Laboratories in El Paso and other areas in HSR 9/10 are particularly encouraged to begin reporting through this system. Please contact Lesley Bullion for more information.

The Texas Department of State Health Services expects to continue funding supplies and shipping costs for influenza surveillance for the 2008–09 season. For more information on submitting influenza surveillance specimens to the DSHS Austin Laboratory, contact [Lesley Bullion](#) or [Neil Pascoe](#) at 512-458-7676.

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