

Texas Influenza Summary Report, 2009–2010 Season (April 12, 2009 – October 2, 2010)ⁱ

Overview

Season summary

The 2009 influenza A (H1N1) pandemic virus was detected in the United States beginning in April 2009 after a relatively mild 2008–2009 influenza season¹⁻². The first two human cases of “swine influenza A (H1N1)”ⁱⁱⁱ in the United States were detected on April 17, 2009 in children in California who became ill in late March; one of these cases traveled to Texas shortly after illness onset, but no secondary cases were found among his Texas contacts². On April 24, 2009, Texas reported the state’s first two human cases of swine influenza A (H1N1) in two 16-year-old boys from Guadalupe County with illness onsets in early to mid-April³. These early cases were identified through routine influenza surveillance activities²⁻³.

Although a heightened level of pandemic surveillance and response was underway and public concern was high during the spring and early summer of 2009, the peak of influenza activity for the 2009–2010 season occurred during October 2009 for the nation as well as for Texas⁴. Texas and US outpatient illness data indicated that the peak percentage of visits due to influenza-like illness (ILI) was much higher in 2009–10 compared to the 2008–09 season. The number of influenza-associated pediatric deaths reported in the US in 2009–10 was more than twice the number reported in the previous season. Additionally, the percentage of deaths attributed to pneumonia and influenza exceeded the US epidemic threshold for 14 weeks in the 2009–10 season, compared to only one week above the threshold in the 2008–09 season. Only 1.1% of the 2009 influenza A (H1N1) viruses tested by the Centers for Disease Control and Prevention (CDC) were resistant to oseltamivir, but almost all of these viruses were resistant to the adamantanes.

Pandemic-Related Surveillance Activities in Texas

Texas surveillance activities related to 2009 influenza A (H1N1) evolved over the course of the pandemic. In the early pandemic, thorough investigations were performed on the earliest confirmed cases and their contacts to determine illness severity and the spread of disease. Initial reporting and testing also included all cases of influenza-like illness, although in May reporting was quickly narrowed to confirmed 2009 influenza A (H1N1) cases only. In June, reporting was narrowed further to include only severe manifestations of 2009 influenza A (H1N1) illness (i.e., hospitalizations and deaths). Beginning in September, data on hospitalizations were collected through aggregate counts by age group, while data on intensive care unit (ICU) admissions and deaths were collected as aggregate counts and through completion of a detailed investigation form. Seasonal influenza surveillance for all types and subtypes of influenza continued throughout the 2009–10 season, but influenza types and subtypes other than 2009 influenza A (H1N1) were not included in the enhanced surveillance (i.e., case investigations, hospitalizations, and deaths) for the pandemic. Texas also participated in national surveillance for pregnant or postpartum ICU admissions and deaths due to 2009 influenza A (H1N1).

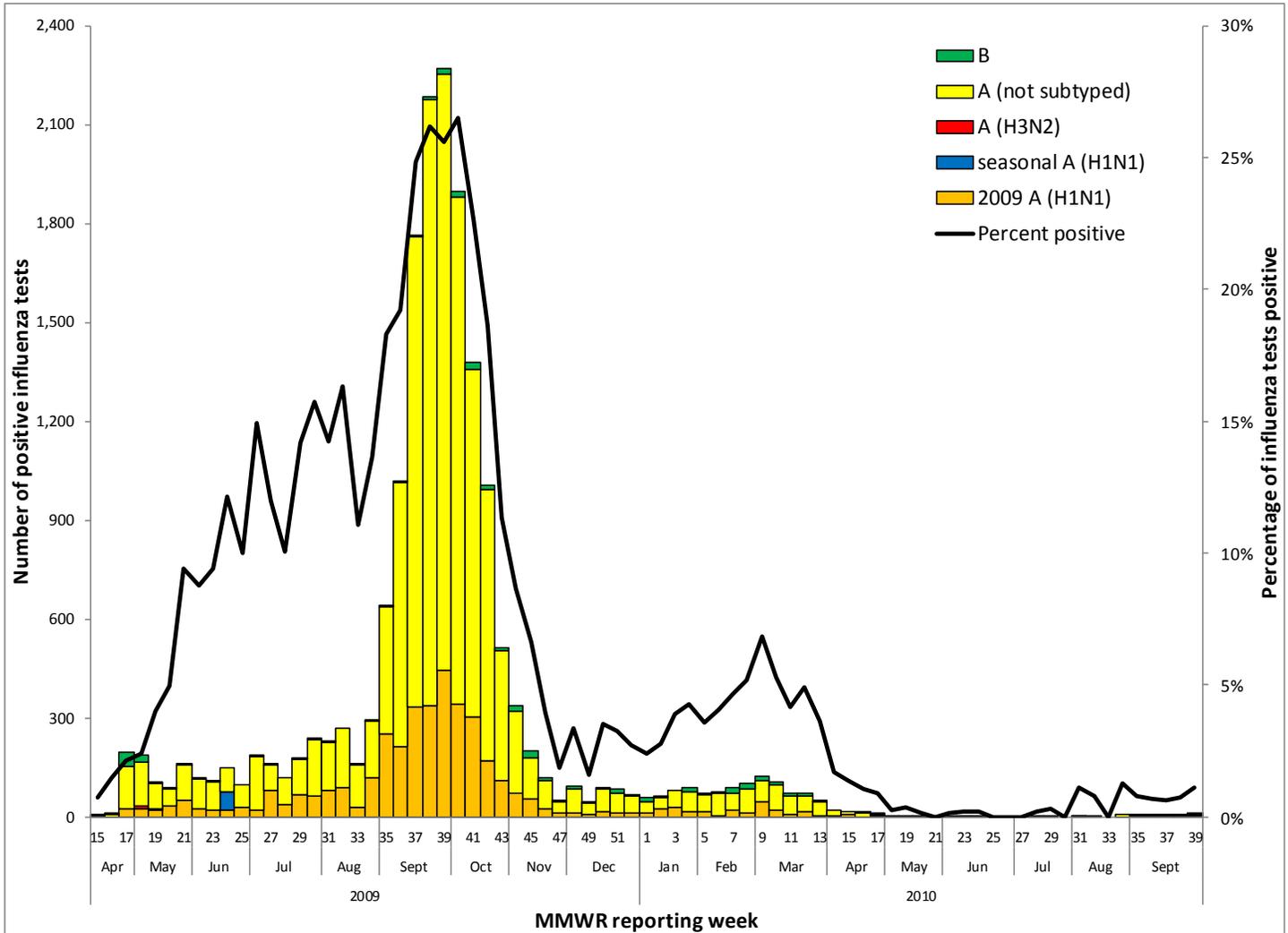
Viral Surveillance

National Respiratory and Enteric Virus Surveillance System (NREVSS)ⁱⁱⁱ

During the 2009–10 season, 30 participating laboratories in most Texas Health Service Regions (HSRs) submitted data on antigen detection, virus isolation (i.e., culture), and polymerase chain reaction (PCR) testing for influenza. Of the 166,895 influenza tests that were reported to NREVSS from Texas laboratories, 17,976 (10.8%) were positive for influenza virus. Of the 17,976 positive tests, 17,588 (97.8%) tests were positive for influenza A and 388 (2.2%) were positive for influenza B. The majority (78%) 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 perform subtyping. Of the 3,879 results for which subtyping was reported, 98.0% were identified as 2009 influenza A (H1N1) (i.e., the pandemic virus), 1.5% were identified as seasonal influenza A (H1N1), and 0.5% were identified as influenza A (H3N2).

As shown in Figure 1, in the first few months following the emergence of 2009 influenza A (H1N1), NREVSS laboratories continued to detect seasonal influenza A (H1N1) and influenza A (H3N2) sporadically. Although 2009 influenza A (H1N1) predominated during the 2009–10 season, influenza B continued to circulate at low levels throughout the season. For Texas, the peak of NREVSS influenza activity occurred during the week ending October 10, 2009 (MMWR week 40), when 26.5% of tests were positive for influenza virus during the fall wave of the pandemic. Unlike data for the US as a whole, Texas NREVSS data did not demonstrate a dramatic peak during the early months of the pandemic, even though Texas detected some of the first 2009 influenza A (H1N1) cases and was heavily involved in the initial response⁴.

Figure 1. Influenza types and subtypes reported by National Respiratory and Enteric Virus Surveillance System laboratories in Texas, 2009–10 season



Texas Department of State Health Services (DSHS) Austin Laboratory^{iv}
 Over 38,000 specimens were received by Texas public health laboratories during the 2009–10 influenza season^v. The DSHS Austin Laboratory received 13,621 specimens during the 2009–10 season and tested 11,625 of these. The untested specimens were either unsatisfactory for testing or were forwarded to other public health laboratories for testing.

The bulk of the specimens submitted to DSHS Austin were received during weeks 17 and 18 (April 26, 2009–May 9, 2009), when a total of 8,865 specimens were received for influenza testing. Specimen submission declined precipitously beginning in mid-May in response to revisions to Texas laboratory

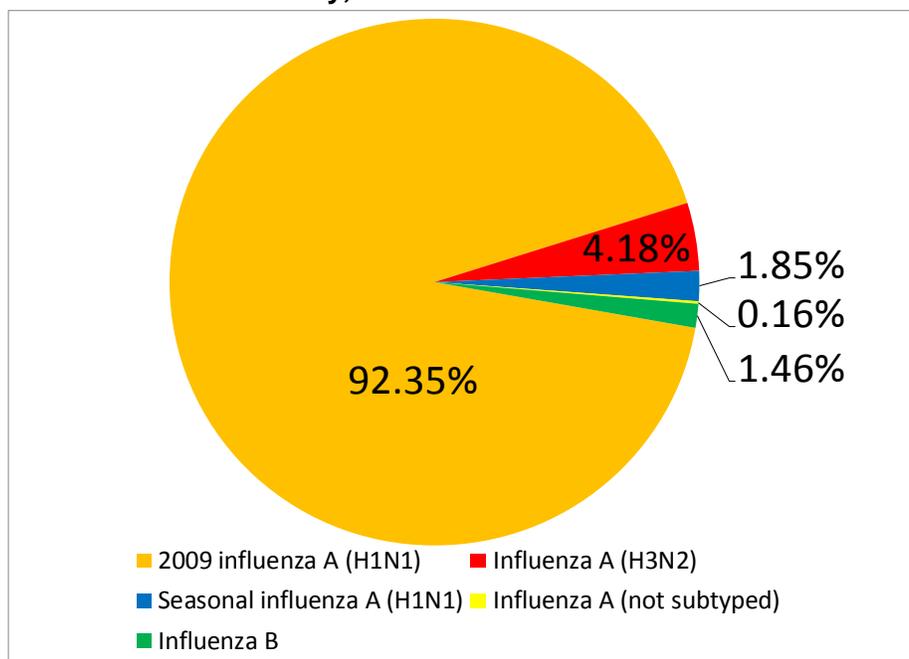
submission criteria. Specimen submission criteria were tightened initially to exclude general influenza-like illnesses that were less likely to be influenza, and were further narrowed in June to include only severe cases of illness. Restrictions to laboratory submission criteria were necessary during the early pandemic in order to prioritize testing for true influenza cases and severe cases, and these changes resulted in a dramatic increase in the percentage of specimens positive for influenza at state public health laboratories. However, multiple specimen submission criteria changes during the summer had an unintentional consequence: as the second pandemic wave hit in October, it was difficult to maintain or increase specimen submission for influenza surveillance testing even after specimen submission criteria were lifted. By mid-October, fewer than 50 specimens were submitted each week for influenza testing, and this number continued to decline throughout the remainder of the season.

Results were available for 11,472 of the 11,625 specimens that the DSHS Austin Laboratory tested. Overall, 3,086 (26.6%) specimens were positive for influenza virus. Most (92.4%) of the positive results were 2009 influenza A (H1N1) (Table 1, Figure 2). Just over 4% of positive results were influenza A (H3N2), and a small number of specimens tested positive for influenza A but were not subtyped. Seasonal influenza A (H1N1) and influenza B positive results were responsible for less than 2% of the total, each.

Table 1. Number of specimens positive for influenza and the proportion of positive results by type/subtype, DSHS Austin Laboratory, 2009–10 influenza season

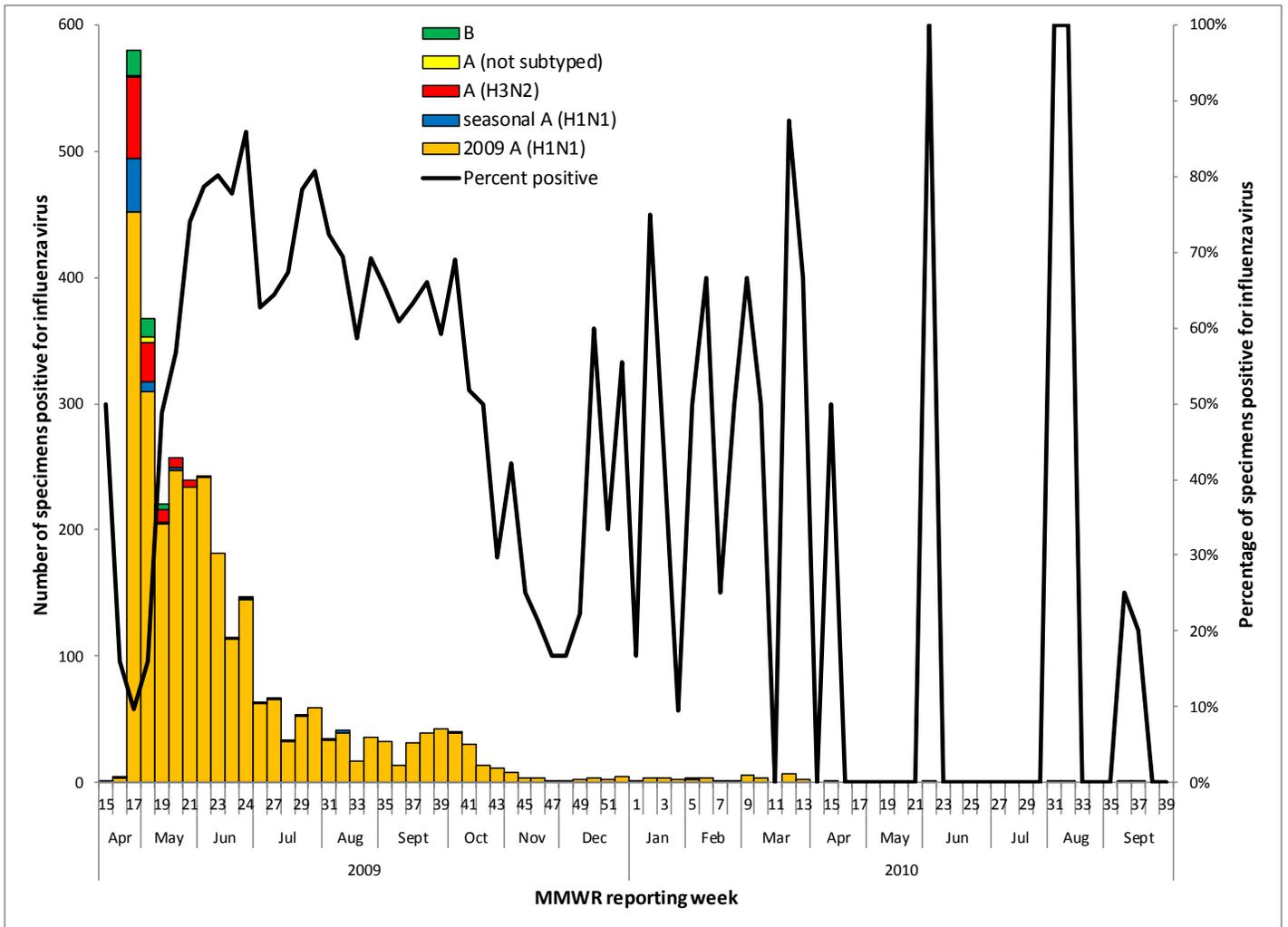
Influenza testing result	Number (%) of specimens positive
2009 influenza A (H1N1)	2,850 (92.35%)
Influenza A (H3N2)	129 (4.18%)
Seasonal influenza A (H1N1)	57 (1.85%)
Influenza A (not subtyped)	5 (0.16%)
Influenza B	45 (1.46%)
Total	3,086 (100%)

Figure 2. Percentage of influenza positive specimens according to each type and subtype, DSHS Austin Laboratory, 2009–10 influenza season



Although 2009 influenza A (H1N1) was the predominant strain seen in the 2009–10 season, seasonal influenza viruses were detected sporadically by DSHS Austin throughout the summer months of 2009 and even into 2010 (Figure 3). The last specimens that tested positive for seasonal influenza A (H1N1) were received by the DSHS Austin Laboratory during week 32 (week ending August 15, 2009). Only one specimen was positive for influenza A (H3N2) after early August, but influenza B was detected sporadically during the remainder of the 2009–10 season.

Figure 3. Influenza types and subtypes identified by the DSHS Austin Laboratory, 2009–10 season



Antigenic Characterization of Influenza Isolates Received by the DSHS Austin Laboratory^{vi}

Sixty-three isolates or original clinical materials were submitted to CDC from Texas during the 2009–10 season. CDC was unable to grow influenza virus from 10 of the 63 isolates that were tested, although these were subtyped by PCR testing.

From April 12, 2009 through October 2, 2010, 53 influenza viruses from Texas were antigenically characterized: 49 influenza A (H1N1) viruses, 1 influenza A (H3N2) virus, and 3 influenza B viruses. Forty-eight (98%) of the influenza A (H1N1) viruses were characterized as antigenically similar to A/California/07/2009 (H1N1), the candidate strain for the monovalent 2009 pandemic H1N1 vaccine. One (2%) virus was characterized as having reduced titers to A/Brisbane/59/2007 (H1N1), the 2009–10 Northern Hemisphere vaccine influenza A (H1N1) component. The single influenza A (H3N2) virus was

collected in August 2010 and was characterized as similar to A/Perth/16/2009 (H3N2), the 2010–11 Northern Hemisphere influenza A (H3N2) vaccine component.

Influenza B viruses are divided into two lineages—Yamagata and Victoria. Influenza B viruses from distinct lineages provide little cross protection from infection. The three influenza B viruses characterized were part of the B/Victoria lineage, the lineage that was included in the 2009–10 Northern Hemisphere influenza vaccine. Two of the B/Victoria lineage viruses were similar to B/Brisbane/60/2008 and one was characterized as having reduced titers against B/Brisbane/60/2008. These results are similar to those found in the summary of all influenza isolates characterized during the 2009–10 season in the United States⁴.

Antiviral Resistance Data for Influenza Isolates

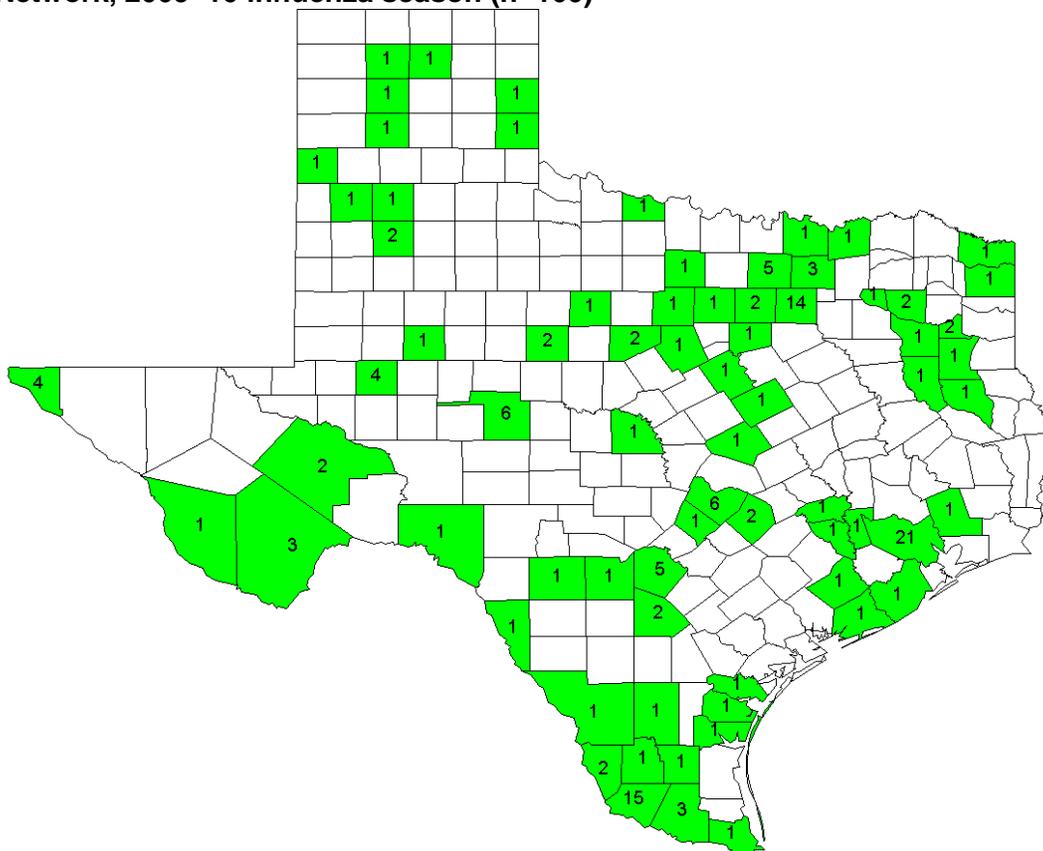
One hundred and eleven 2009 influenza A (H1N1) viruses submitted by multiple Texas laboratories were tested for antiviral resistance by CDC from June 9, 2009 through October 2, 2010. Three (2.7%) of these viruses were resistant to oseltamivir but all were sensitive to zanamivir. Forty-two of the 111 2009 influenza A (H1N1) viruses were tested for resistance to the adamantanes, and all were found to be resistant. No seasonal influenza A (H1N1) viruses, influenza A (H3N2) viruses, or influenza B viruses from Texas were tested for antiviral resistance during this period.

Morbidity Surveillance

U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet)^{vii}

One hundred and sixty providers in Texas submitted data to ILINet for at least one week during the 2009–10 season (Figure 4). Data from one provider were excluded from weekly ILI calculations due to a reporting error. An average of 73 providers (range: 42–112 providers) submitted data on an average of 24,603 patient visits each week (range: 9,965–34,330 patient visits).

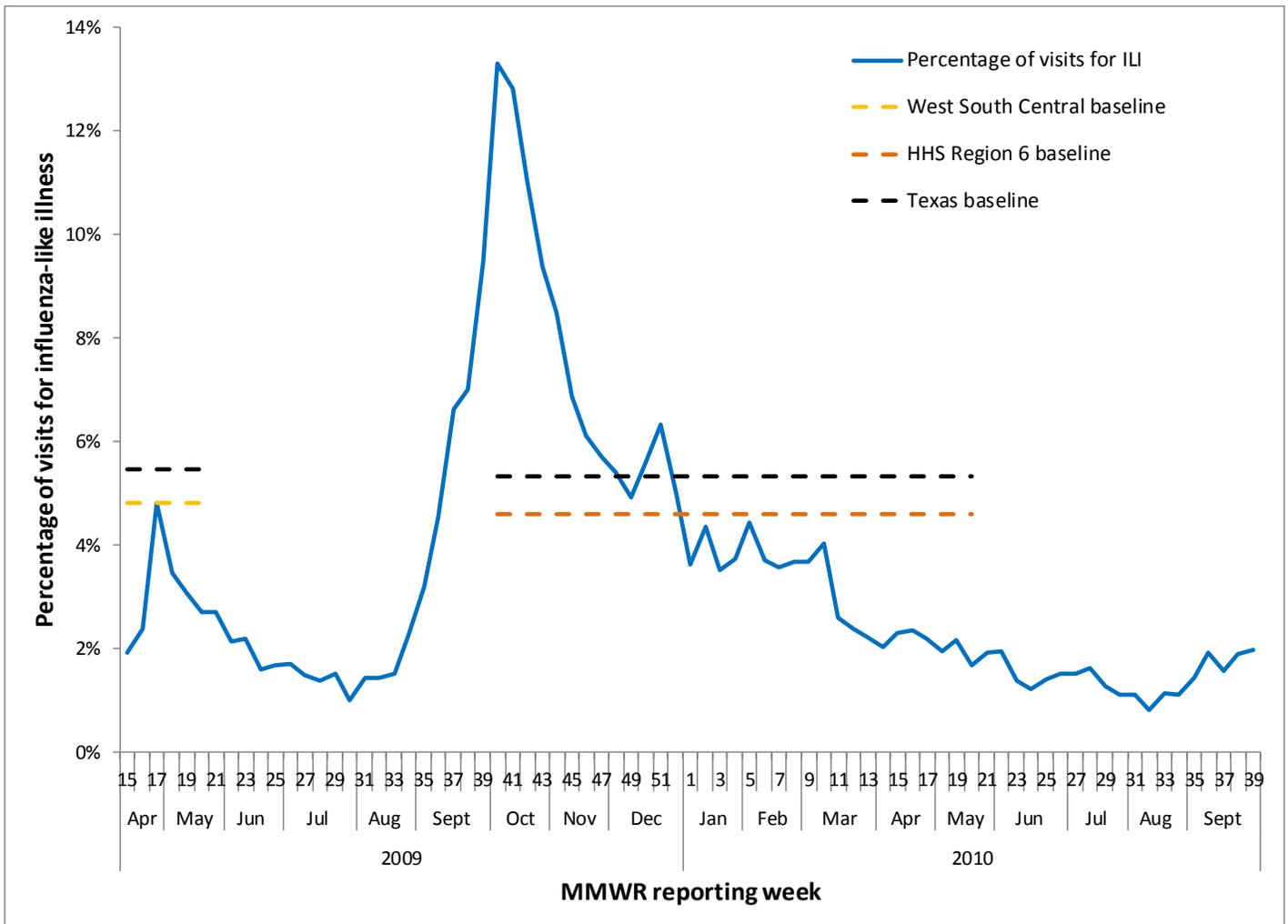
Figure 4. Number of active^{viii} Texas participants per county in the US Outpatient Influenza-like Illness Surveillance Network, 2009–10 influenza season (n=160)



The West South Central Region^{ix} ILI baseline calculated by CDC was 4.8% for the 2008–09 influenza season; however, after 2009 week 20, CDC created new regions and calculated new baselines. The new region that included Texas was HHS Region 6^x, and its baseline was 4.6% for the 2009–10 season. The Texas baselines for the 2008–09 and the 2009–10 seasons were 5.47% and 5.33%^{xi}, respectively.

According to data from Texas ILINet participants, the percentage of visits due to ILI exceeded the West South Central Region baseline during the week ending May 2, 2009 (week 17), with 4.81% of visits due to ILI (Figure 5). This was unexpected because in most other influenza seasons, influenza activity usually peaks in January or February and then declines steadily through week 20 and the summer months. After week 17, the percentage of visits due to ILI began to decrease and continued to decrease until the week ending August 29, 2009 (week 34), when it began increasing again, coinciding with the beginning of the new school year. Influenza-like illness peaked during the week ending October 10, 2009 (week 40). During that week, ILINet providers reported that influenza-like illness accounted for 13.3% of all physician visits, the highest Texas ILINet peak reported since the 2003–2004 season. After week 40, the percentage of visits due to ILI began to decrease and fell below the regional baseline for the remainder of the season during the week ending January 9, 2010 (week 1). Overall, ILI activity in Texas exceeded the HHS Region 6 baseline for 13 consecutive weeks in the fall. During the fall, the percentage of visits due to ILI exceeded the Texas baseline for 11 weeks.

Figure 5. Percentage of visits for influenza-like illness reported by the US Outpatient Influenza-like Illness Surveillance Network in Texas, 2009–10 season



School Closures and Institutional Outbreaks

Initial guidance from CDC beginning on April 26, 2009 recommended closure of schools in communities with cases of 2009 influenza A (H1N1)⁶; however, this guidance was revised on May 5, 2009 (during week 18) and all schools that were closed were encouraged to reopen⁷. During both the spring and fall waves of the 2009 influenza A (H1N1) pandemic, the Texas Education Agency provided data on schools and districts that had closed temporarily. In the spring, 853 campuses with an estimated total enrollment of over 500,000 students closed in response to the pandemic⁸. The first campus closure in Texas occurred during week 16 (week ending April 25, 2009), and the last campus closure began during week 19 (week ending May 16, 2009). These schools were closed for an average of 6 days (range: 2–14 days). Closures in the spring occurred in Regions 2, 3, 4, 6, 7, 8, and 11, with the majority of campus closures occurring in Regions 3, 8, and 11. In particular, 284 campuses closed in Region 3 during the week ending May 2, 2009 (week 17), and 233 campuses closed in Region 11 during the week ending May 9, 2009 (week 18). Sixty-four percent of closed schools reopened during week 18 (week ending May 9, 2009) and another 33% reopened during week 19, in response to changes in CDC guidance. An average of 596 students was enrolled in each of the schools that closed during the spring.

In the fall of 2009, 108 campuses with an estimated total enrollment of over 29,000 students reported closures⁹. The majority (94%) of campus closures occurred during the week ending September 19, 2009 (week 37) through the week ending October 24, 2009 (week 42), although sporadic school closures were reported from weeks 43–49 (weeks ending October 31, 2009 through December 12, 2009). These schools were closed for an average of 4 days (range: 1–8 days). Closures in the fall occurred in Regions 1, 2, 3, 4, 5, 6, and 7, with the majority of campus closures occurring in Regions 3 and 4. The average number of students enrolled in each of the schools that closed during the fall was 274. There were five additional reports during the fall of grade schools or universities with outbreaks of ILI or influenza; however, these schools did not close.

Outbreaks of influenza and ILI were reported in summer camps in weeks 23–25 (weeks ending June 13, 2009 through June 27, 2009) and in week 28 (week ending July 18, 2009). These outbreaks were reported in Regions 3, 4, 5, and 7. Outbreaks of 2009 influenza A (H1N1) and ILI were reported in daycares during weeks 26, 31, and 38. These outbreaks were reported in Regions 3 and 11. During week 33, two ILI or influenza outbreaks involving a sports team and a club were reported in Region 7.

There were an additional 19 outbreaks reported in institutions (e.g., nursing homes, correctional facilities, businesses) during the 2009–10 season. During week 32 (week ending August 15, 2009), influenza outbreaks were reported in two institutions in Region 3 and one business in Region 5. In week 36 (week ending September 12, 2009), one nursing home outbreak of 2009 influenza A (H1N1) and one institutional outbreak of influenza (type and subtype not specified) were reported in Regions 3 and 4, respectively. One additional nursing home ILI cluster was reported during week 38 (week ending September 26, 2009) in Region 7. During week 9 (week ending March 6, 2010), 2009 influenza A (H1N1) outbreaks were reported in three correctional facility units in Regions 4 and 6; eight additional units also reported ILI outbreaks during the same week.

Novel Influenza A Infections in Humans

All novel influenza A viruses detected from April 12, 2009 to October 2, 2010 were identified as the 2009 influenza A (H1N1) pandemic strain. Please see the pandemic-related surveillance data section for more information.

Mortality Surveillance

Influenza-Associated Pediatric Mortality^{xii}

Forty-nine influenza-associated pediatric fatalities were reported to DSHS during the period from April 12, 2009 through October 2, 2010. The first of these deaths occurred in a non-US citizen but was reported with Texas data throughout the pandemic; however, data from this death are not reported in this summary. The remaining reported deaths occurred during the week ending May 30, 2009 (week 21)

through the week ending June 12, 2010 (week 23). The majority (67%) of deaths occurred in September and October of 2009. Deaths were reported in residents of all Texas Health Service Regions, although 47% of the deaths were reported in HSRs 3 and 6. All reported deaths were from influenza A infections. Subtyping was performed on specimens from 36 (73%) of the 49 cases; all 36 subtyped viruses were identified as 2009 influenza A (H1N1).

Cases ranged in age from 16 days to 17 years. The average age at death was 7.3 years. Seasonal influenza vaccination status was known for 33 of the 49 cases; of these, only 5 (10%) were vaccinated for seasonal influenza for the current season. None of the children had received the monovalent 2009 influenza A (H1N1) vaccine, but this vaccine was not widely available until late in 2009¹¹. Thirty-two (65%) of the 49 cases were known to have received antiviral therapy after illness onset. Of the 28 cases for whom antiviral medication start date was known, the median number of days from onset until antiviral treatment was started 3.82 days (range: 0–18 days). Forty (82%) of the 49 patients had at least one significant underlying medical condition or a significant bacterial co-infection. Four (8%) of the 49 patients had a methicillin-resistant *Staphylococcus aureus* (MRSA) infection.

Pandemic-Related Surveillance Data

Hospitalizations and Intensive Care Unit (ICU) Admissions

Systematic data collection for hospitalizations and ICU admissions associated with 2009 influenza A (H1N1) began on September 20, 2009 (week 38) and continued through May 22, 2010 (week 20). During this time, 2,316 hospital admissions (including 585 ICU admissions) were reported in Texas (Table 2). The largest number of hospitalizations by age group was reported in adults aged 25-49 years; however, children under 1 year of age had the highest incidence rate of hospitalization (73.7 hospitalizations per 100,000 population), followed by children 1-4 years of age (15.5 hospitalizations per 100,000 population)¹². The largest number of ICU admissions by age group was reported in adults aged 25-49 years; however, children under 1 year of age had the highest incidence rate of ICU admission (11.8 ICU admissions per 100,000 population), followed by adults aged 50-64 years (3.9 ICU admissions per 100,000 population) (Table 3). Fifty-five percent of the total hospitalizations and 52% of all ICU admissions were reported in late September (when reporting began) and throughout October.

Table 2. Final aggregate data on the number of 2009 influenza A (H1N1) hospitalizations (including ICU admissions) by age group and Texas Health Service Region, September 20, 2009 – May 22, 2010^{xiii}

Hospitalizations (Including ICU Admissions) by Age Group	HSR 1	HSR 2/3	HSR 4/5N	HSR 6/5S	HSR 7	HSR 8	HSR 9/10	HSR 11	State Total
< 6 months	1	64	4	30	3	24	54	13	193
6-11 months	1	36	3	15	5	7	28	6	101
1-4 years	0	66	13	44	6	24	64	23	240
5-9 years	6	109	8	39	6	13	62	23	266
10-18 years	1	96	9	37	11	24	40	27	245
19-24 years	2	58	8	18	14	18	33	31	182
25-49 years	22	162	12	97	36	47	67	105	548
50-64 years	10	100	20	63	24	50	45	83	395
65+ years	2	35	7	24	8	15	21	34	146
Total	45	726	84	367	113	222	414	345	2,316

Table 3. Final aggregate data on the number of 2009 influenza A (H1N1) intensive care unit (ICU) admissions by age group and Texas Health Service Region, September 20, 2009 – May 22, 2010

ICU Admissions by Age Group	HSR 1	HSR 2/3	HSR 4/5N	HSR 6/5S	HSR 7	HSR 8	HSR 9/10	HSR 11	State Total
< 6 months	0	5	1	13	0	2	5	2	28
6-11 months	0	4	2	3	1	1	5	3	19
1-4 years	0	13	2	10	1	4	6	6	42
5-9 years	3	10	0	11	1	0	5	3	33
10-18 years	0	20	0	10	3	2	2	4	41
19-24 years	0	3	3	13	3	2	1	5	30
25-49 years	13	34	7	49	10	15	15	38	181
50-64 years	4	20	14	34	12	22	11	42	159
65+ years	2	7	3	12	4	4	8	12	52
Total	22	116	32	155	35	52	58	115	585

Deaths

Systematic data collection for deaths associated with 2009 influenza A (H1N1) began during the week ending April 18, 2009 (week 15) and continued through the week ending May 22, 2010 (week 20). During this time, 240 deaths^{xiv} related to 2009 influenza A (H1N1) were reported in Texas, and 36 (15.0%) of these occurred in children 17 years of age or younger (Table 4). The average age at death was 40 years (median: 42 years) with a range of 16 days to 90 years of age. The overall mortality rate for 2009 influenza A (H1N1) in Texas was 0.97 deaths per 100,000 population. When categorizing cases by 10-year age groups, the largest number of deaths (n=49), occurred in the 50–59-year-old age group; this age group also had the highest mortality rate (1.65 deaths per 100,000 population). For children 17 years of age or younger, the highest mortality rate occurred in children under the age of 1 year (2.25 deaths per 100,000 population).

Just over half (53.5%) of the cases who died were male. The highest number of deaths occurred in Hispanics (136 deaths) followed by non-Hispanic Whites (71 deaths), non-Hispanic Blacks (18 deaths), and non-Hispanic persons of another race (6 deaths). The highest race/ethnicity-specific mortality rate occurred in Hispanics (1.44 deaths per 100,000 population), followed by non-Hispanic Blacks (0.63 deaths per 100,000 population), non-Hispanic Whites (0.62 deaths per 100,000 population), and non-Hispanic persons of another race (0.55 deaths per 100,000 population).

Length of illness was known for 229 (95.4%) of the 240 cases who died. Of these 229, the median time from onset of illness to death was 14 days (average: 18 days) with a range of 1 day to 109 days. Chronic health conditions were known for 204 (85.0%) of the 240 cases who died. The majority (85.3%) of the cases for which chronic health conditions were known had at least one underlying medical condition (including obesity).

Table 4. 2009 influenza A (H1N1)-associated deaths by age group and Texas Health Service Region, April 15, 2009 – May 22, 2010

Deaths by Age Group	HSR 1	HSR 2/3	HSR 4/5N	HSR 6/5S	HSR 7	HSR 8	HSR 9/10	HSR 11	State Total
< 6 months	0	2	0	1	0	0	0	0	3
6-11 months	0	1	1	1	0	1	2	0	6
1-4 years	0	2	1	0	0	0	0	1	4
5-9 years	0	0	2	2	2	0	1	0	7
10-18 years	0	6	0	3	3	2	1	3	18
19-24 years	0	3	1	3	2	2	1	0	12
25-49 years	5	18	2	22	8	11	6	34	106
50-64 years	2	14	4	11	4	12	5	15	67
65+ years	1	6	1	1	1	2	3	2	17
Total	8	52	12	44	20	30	19	55	240

Deaths and ICU Admissions in Pregnant or Postpartum Women

Voluntary reporting of ICU admissions and deaths associated with 2009 influenza A (H1N1) in pregnant or up to 6 weeks postpartum women began in August 2009 in Texas and continued throughout the 2009–10 season¹³.

During the 2009–10 season, 22 cases involving death or ICU admission in pregnant or recently postpartum women were reported in Texas. All 22 cases were admitted to the ICU and eight (36.4%) died. For all cases, the average age at illness onset was 25 years with a range of 16 years to 34 years; this age profile was similar for the pregnant or postpartum women who died. Half of the cases who died were pregnant when their illness began and half were in their first week postpartum. Infant outcome was known for 20 of the 22 pregnant or postpartum women whose severe illnesses were reported; of these cases, 16 resulted in live births, one resulted in a spontaneous abortion, and three mothers were still pregnant at the time of hospital discharge. Chronic health conditions were known for 21 of the 22 cases who were admitted to the ICU or who died. Eight (38.1%) of the 21 cases had underlying health conditions; four cases who died had underlying health conditions.

Texas Influenza Surveillance System

Background

Influenza and influenza-like illnesses were last reportable by law in any county in Texas in 1993¹⁴. During that year, over 275,000 cases of influenza and influenza-like illness were reported to the Texas Department of State Health Services. The influenza categories reportable by law in Texas for the 2009–10 season included influenza-associated pediatric fatalities, outbreaks associated with influenza, and novel influenza A infections in humans (reportable as an exotic disease). Because there is no current reporting requirement for the majority of influenza illnesses, 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 sentinel surveillance networks composed of laboratories, hospitals, physicians, nurses, schools, and universities 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 jurisdictions. Data from all sources are reported to the DSHS Central Office in Austin, compiled, and presented weekly in the Texas Influenza Surveillance Report.

The national influenza reporting period begins in early October [Morbidity and Mortality Weekly Report (MMWR) week 40] and continues through late May (MMWR week 20); however, during the 2009–10 season, national influenza surveillance continued throughout the summer and early fall due to the emergence of a novel influenza A (H1N1) virus. This summary includes data from April 12, 2009 through October 2, 2010, when the first 2009 influenza A (H1N1) pandemic cases were identified in Texas. Influenza surveillance in Texas continues year-round, although usually in reduced capacity during the

summer months. The goals of influenza surveillance are to determine when and where influenza viruses are circulating, if the circulating viruses match the vaccine strains, what changes are occurring in the viruses, what impact influenza is having on hospitalizations and deaths, and the severity of influenza activity.

Components

The three main Texas influenza surveillance components are viral, morbidity, and mortality surveillance. Viral influenza surveillance at the state level consists of influenza test results reported by Texas laboratories in the National Respiratory and Enteric Virus Surveillance System (NREVSS) and specimens sent to the DSHS Austin laboratory and the Laboratory Response Network (LRN) laboratories for influenza surveillance testing. Morbidity surveillance consists of reports of novel influenza A virus infections in humans, reports of patients with ILI from Texas participants in the US Outpatient Influenza-like Illness Surveillance Network (ILINet) (formerly known as the US Influenza Sentinel Provider Surveillance Network), ILI reports submitted through local and regional health departments, and reports of influenza or ILI outbreaks. Mortality surveillance consists of reports of influenza-associated deaths in children under 18 years of age. Additionally, surveillance activities were expanded during the 2009 influenza pandemic to include reporting of hospitalizations, intensive care unit admissions, and deaths in any age group related to 2009 influenza A (H1N1).

References

1. Centers for Disease Control and Prevention. 2008-2009 Influenza Season Summary. 2009. Available from <http://www.cdc.gov/flu/weekly/weeklyarchives2008-2009/08-09summary.htm>.
2. Ginsberg M, Hopkins J, Maroufi A, Dunne G, Sunega DR, Giessick J, McVay P, et al. (2009). Swine influenza A (H1N1) infection in two children-Southern California, March-April 2009. *Morbidity and Mortality Weekly Report*, 58(15), 400-402.
3. Centers for Disease Control and Prevention. (2009). Update: Swine influenza A (H1N1) infections--California and Texas, April 2009. *MMWR*, 58(16), 435-7.
4. Centers for Disease Control and Prevention. 2009–10 Influenza Season Summary. Available at <http://www.cdc.gov/flu/weekly/weeklyarchives2009-2010/09-10summary.htm>. Accessed on May 24, 2012.
5. Centers for Disease Control and Prevention. U.S. Influenza Sentinel Provider Surveillance Network: 2008–09 Workfolder. 55.20E, Rev. 06/2008.
6. Klaiman T, Kraemer JD, Stoto MA. (2011). Variability in school closure decisions in response to 2009 H1N1: a qualitative systems improvement analysis. *BMC Public Health*, 11(73). Available from <http://www.biomedcentral.com/content/pdf/1471-2458-11-73.pdf>.
7. Centers for Disease Control and Prevention Press Office. 5 May 2009. "Statement by HHS Secretary Kathleen Sebelius and by Acting CDC Director Dr. Richard Besser Regarding the Change in CDC's School and Child Care Closure Guidance." Available from <http://www.hhs.gov/news/press/2009pres/05/20090505a.html>. Accessed on August 14, 2013.
8. Texas Education Agency. H1N1 Flu Related Information: Known School Closings. Available at: <http://ritter.tea.state.tx.us/swineflu/schclosings.html>. Accessed on June 12, 2009.
9. Texas Education Agency. H1N1 Known School Closings. Available at: <http://www.tea.state.tx.us/index4.aspx?id=5402>. Accessed on May 23, 2012.
10. Centers for Disease Control and Prevention. Influenza-Associated Pediatric Mortality, 2004 case definition. Available from <http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=729&DatePub=1/1/2004 12:00:00 AM>.
11. 2009 H1N1 Vaccine Doses Allocated, Ordered, and Shipped by Project Area [Internet]. 2 Feb 2010. Centers for Disease Control and Prevention. Available from <http://www.cdc.gov/h1n1flu/vaccination/vaccinesupply.htm>. Accessed on August 14, 2013.
12. Texas Center for Health Statistics. 2009 Population Estimates – Detailed Age Data. Available at: <http://www.dshs.state.tx.us/chs/popdat/detailX.shtm>. Accessed on May 23, 2012.
13. Texas Influenza Surveillance Handbook. (2012). Emerging and Acute Infectious Disease Branch, Texas Department of State Health Services. Available from <http://www.dshs.state.tx.us/idcu/disease/influenza/Texas-Influenza-Surveillance-Handbook/>.
14. Texas Department of Health. Epidemiology in Texas 1993 Annual Report. Available at: <http://www.dshs.state.tx.us/idcu/data/documents/1993%20Texas%20Annual%20Report.pdf>.

ⁱ This summary includes data starting from April 12, 2009 in order to include all of the data from the 2009 influenza A (H1N1) pandemic.

ⁱⁱ Later in the pandemic, “2009 influenza A (H1N1)” became the official name of the virus.

ⁱⁱⁱ NREVSS is an online laboratory results reporting system for several respiratory and enteric viruses that is maintained by the CDC. NREVSS reporters in Texas are primarily hospital laboratories, although two public health laboratories (Tarrant County Public Health Laboratory Response Network Lab and the DSHS Austin Laboratory) also participate. See <http://www.cdc.gov/surveillance/nrevss/> for more information.

^{iv} Influenza surveillance specimens are submitted for PCR testing to the DSHS Austin laboratory throughout the season by physicians, hospitals, clinics, and health departments throughout Texas.

^v Texas public health laboratories include the DSHS Austin Laboratory and the Laboratory Response Network Laboratories (LRNs). The Texas LRN laboratories have been participating in influenza surveillance since the 2008–2009 influenza season; the participating LRN laboratories are located in Corpus Christi, Dallas, El Paso, Fort Worth, Harlingen, Houston, Lubbock, San Antonio, and Tyler. This summary includes the DSHS Austin laboratory data only since the LRN data were unavailable at the writing of this report.

^{vi} Like other state virology laboratories in the country, DSHS submits early, mid, and late-season as well as unusual influenza viruses to the CDC for strain characterization. Specimens and influenza viruses are also submitted at regular intervals according to CDC’s instructions.

^{vii} Texas participants in ILINet report weekly on the number of patient visits for ILI by age group and the total number of patients seen for any reason. For ILINet reporting, ILI is defined 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”⁵. ILINet data are used to calculate a weekly percentage of visits due to ILI.

^{viii} In order to be considered an active participant in ILINet, a provider must report at least one week during the season. Therefore, active providers did not necessarily report every week of the influenza reporting season.

^{ix} The West South Central Region includes Arkansas, Louisiana, Oklahoma, and Texas.

^x HHS Surveillance Region 6 includes Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.

^{xi} The baseline is the mean percentage of patient visits for ILI during non-influenza weeks for the previous three seasons plus two standard deviations. Baselines are calculated for official influenza reporting season only (i.e., MMWR weeks 40 through 20). A “non-influenza week” is defined as a week in which less than 10% of specimens tested positive for influenza.

^{xii} “An influenza-associated death is defined for surveillance purposes as a death resulting from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test. There should be no period of complete recovery between the illness and death. Influenza-associated deaths in all persons aged <18 years should be reported”¹⁰.

^{xiii} Final aggregate data for the pandemic can be found at <http://www.dshs.state.tx.us/idcu/disease/influenza/surveillance/2010/Flu-Pandemic/>.

^{xiv} The 2009 influenza A (H1N1)-associated death total in this summary does not include a resident of Mexico who was reported in the Texas data during the 2009-2010 influenza season. Therefore, the death total in this summary does not match the death total posted in other DSHS reports from the 2009-2010 season.