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**Summary**

This report summarizes influenza activity for the 2012-2013 season (October 2012 through September 2013). This was a severe influenza season as seen by numerous surveillance indicators. Surveillance activities performed by ADHS remained unchanged overall from the 2012-2013 season.

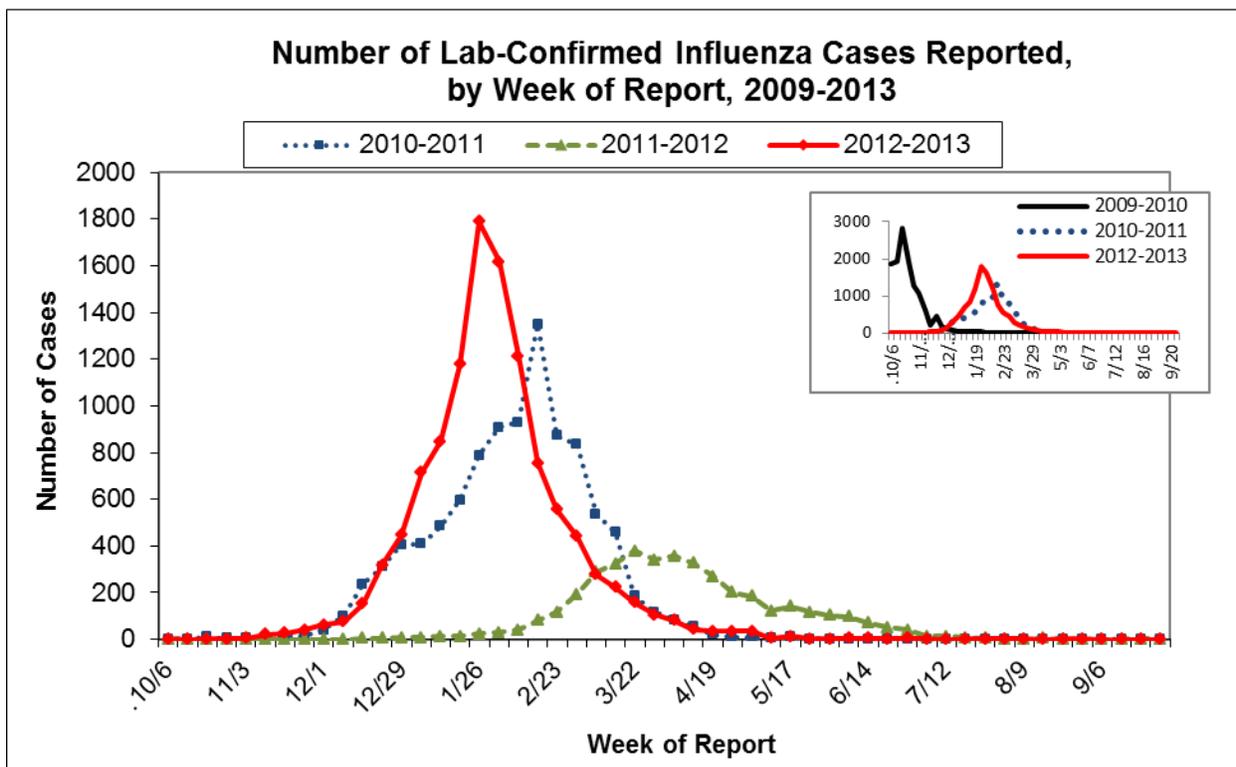
The first case of influenza with apparent in-state acquisition was confirmed at the Arizona State Public Health Laboratory in week 44 (late-October). Influenza activity increased more substantially in December, with peak activity in January and February, and confirmed cases continuing into May. The 2012-2013 season was similar to the 2010-2011 season in that there was unusual co-circulation of viruses throughout the season: influenza A (H3) predominating followed by influenza B, with very low levels of influenza A (H1N1) pdm09 circulating.

## Laboratory-Confirmed Influenza Activity

Positive influenza tests are reported to ADHS by laboratories under Arizona Administrative Code R9-6-204. This reporting includes many types of tests, such as rapid antigen tests, direct fluorescent antigen tests, viral cultures, or molecular testing.

The 2012-2013 influenza season was severe, and the weekly number of laboratory-confirmed influenza cases reported approached the numbers reported during the second wave of the 2009 H1N1 pandemic. After the 2010-2011 season we reflected that the higher weekly numbers during the peak of activity in that season could result from either increased levels of disease in the community or also increased popularity of rapid diagnostic testing. For the 2012-2013 season, we know of no specific changes in testing or reporting practices, though it is possible that increased media coverage may have affected testing or reporting practices, leading to an increase in reported laboratory-confirmed cases. However, our other surveillance indicators and national data corroborate that the 2012-2013 numbers likely truly reflect a severe season.

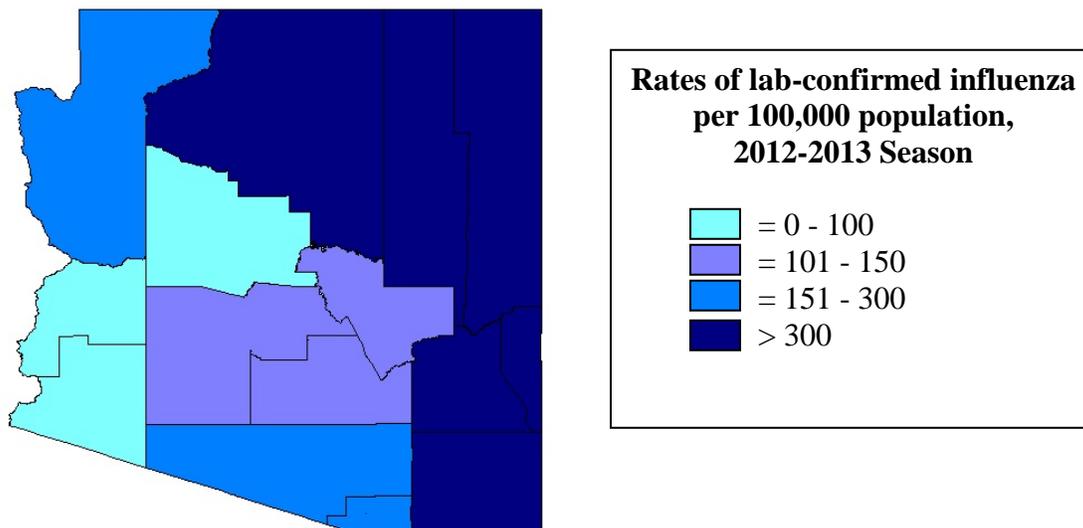
Influenza A (H3) infection was confirmed at the Arizona State Public Health Laboratory in a case without recent travel history in week 44 (late-October). Reporting of laboratory-confirmed cases began to increase in December, with peak activity in January and February.



## Laboratory-Confirmed Cases Reported, by County

The table below includes all reported laboratory-confirmed influenza reports, regardless of testing method. While Maricopa and Pima Counties have the most cases, Greenlee, Navajo, and Coconino Counties reported the highest population rates. Differences in rates may reflect not only differences in the level of influenza virus circulating in the community, but also testing and reporting practices.

County	Number of Laboratory-Confirmed Cases	Rate per 100,000 population
Apache	256	354
Cochise	452	346
Coconino	632	471
Gila	67	125
Graham	172	461
Greenlee	106	1,233
La Paz	4	19
Maricopa	5,639	145
Mohave	592	292
Navajo	527	488
Pima	1,991	201
Pinal	546	140
Santa Cruz	105	215
Yavapai	113	53
Yuma	99	48
<b>Total</b>	<b>11,301</b>	<b>174</b>



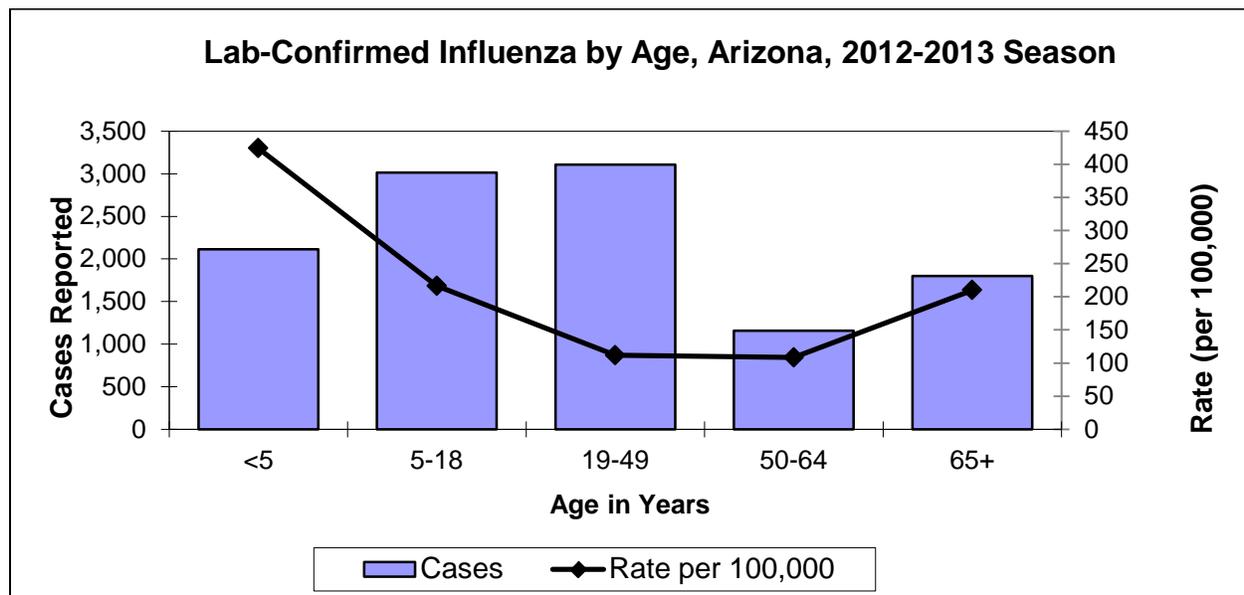
## Influenza Activity by Age

The age groups affected by influenza vary somewhat season-to-season, depending in part on the circulating influenza types and subtypes and any previous immunity in the community. Variations in age groups of reported influenza cases can also be caused by differences in laboratory testing and reporting practices year-to-year. The age distribution of cases reported in the 2012-2013 season is similar to other seasons, with exception of a somewhat higher proportion of cases reported among adults 65 years or older.

**Age Group of Reported Influenza Cases, 2009-2010 through 2012-2013 Seasons**

Age Group	2012-2013 Season (N=11,301)	2011-2012 Season (N=4,004)	2010-2011 Season (N=9,822)	2009-2010 Season (N=13,030)
0 to 4 years	2,114 (19%)	750 (19%)	2,244 (23%)	2,531 (19%)
5 to 18 years	3,013 (27%)	1,053 (26%)	2,677 (27%)	4,943 (38%)
19 to 49 years	3,107 (27%)	1,352 (34%)	2,982 (30%)	4,137 (32%)
50 to 64 years	1,156 (10%)	400 (10%)	799 (8%)	951 (7%)
65 years or older	1,799 (16%)	436 (11%)	1,043 (11%)	315 (2%)
Unknown age	112 (1%)	13 (0.3%)	77 (1%)	153 (1%)

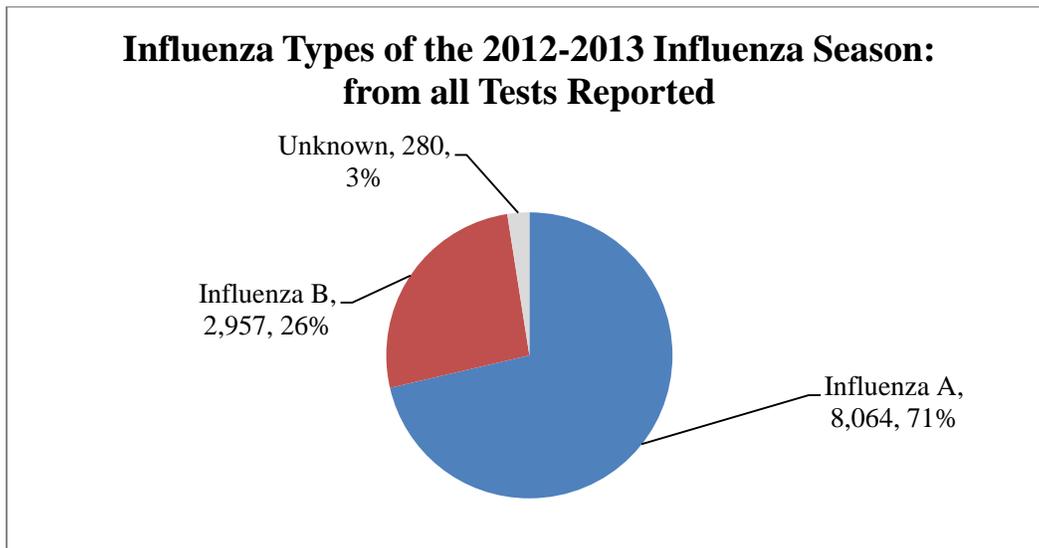
While large numbers of laboratory-confirmed cases were reported among older children and young and middle-aged adults, the rate of reported influenza cases was by far highest in children less than five years of age and decreased with age, increasing again among adults 65 years or older.



## Influenza Types and Subtypes

There are two main types of influenza – Type A and Type B – that cause illness in people. Influenza A viruses can be further divided into subtypes such as A (H1) or A (H3). While most tests can distinguish between influenza A and B, only specialized testing, such as that done at the State Public Health Laboratory, can differentiate subtypes.

During the 2012-2013 season, 71% of reported cases were influenza A, which was similar to the past season. Influenza B cases were somewhat more likely to be in school-aged children than influenza A cases, with 37% of influenza B cases in the 5 to 18 year age group, compared to 23% of influenza A cases.



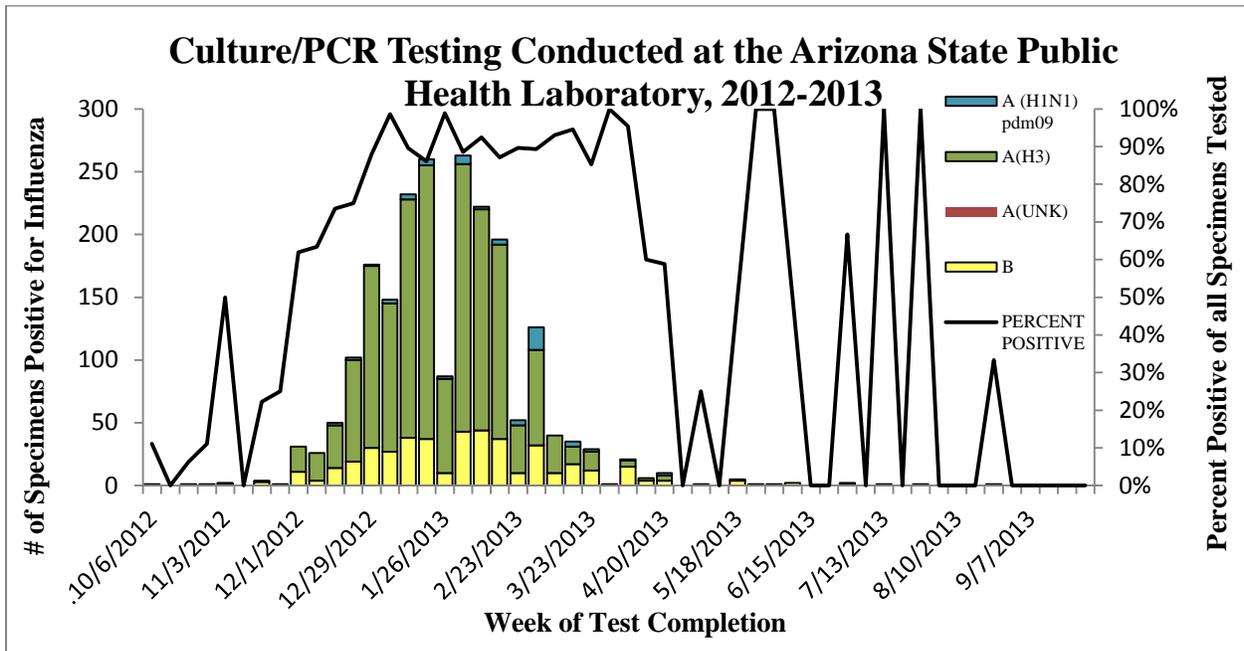
### Influenza Type, by Season

	2012-2013 Number (Percent)	2011-2012 Number (Percent)	2010-2011 Number (Percent)	2009-2010 Number (Percent)
<b>Total</b>	11,301 (100%)	4,004 (100%)	9,822 (100%)	13,030 (100%)
<b>Influenza A</b>	8,064 (71%)	2,820 (70%)	7,244 (74%)	12,931 (99%)
<b>Influenza B</b>	2,957 (26%)	1,078 (27%)	2,279 (23%)	34 (0.3%)
<b>Unknown</b>	280 (3%)	106 (3%)	299 (3%)	65 (0.5%)

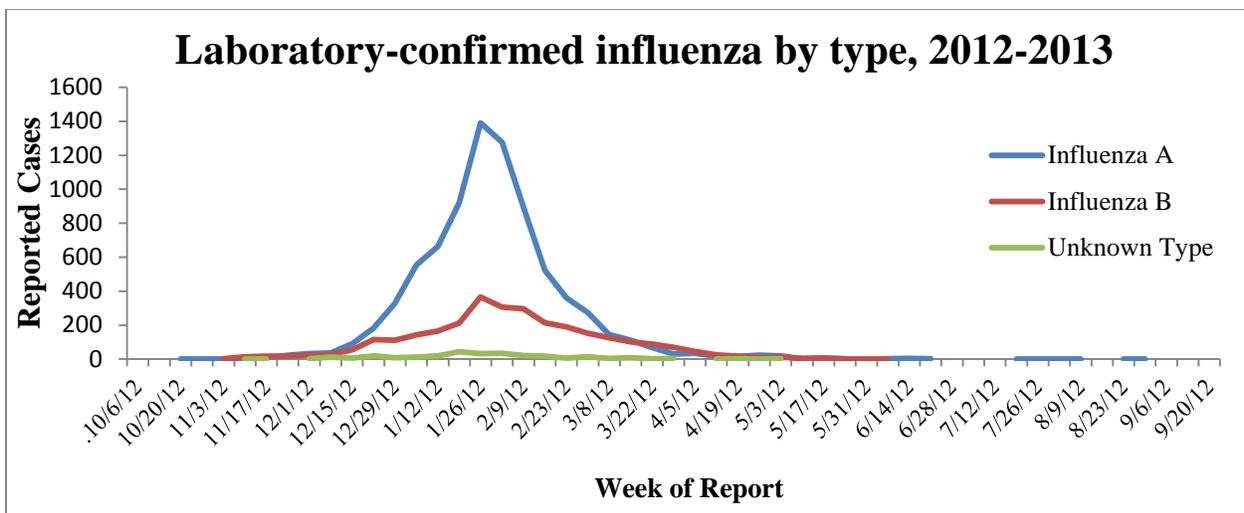
### Influenza Type, by Age Group, 2012-2013 Influenza Season

Age Group	All Confirmed Cases (N=11,301)	Influenza A (N=8,064)	Influenza B (N=2,957)	Unknown Type (N=280)
<b>0 to 4 years</b>	2,114 (19%)	1,485 (18%)	564 (19%)	65 (23%)
<b>5 to 18 years</b>	3,013 (27%)	1,842 (23%)	1,084 (37%)	87 (31%)
<b>19 to 49 years</b>	3,107 (27%)	2,316 (29%)	710 (24%)	81 (29%)
<b>50 to 64 years</b>	1,156 (10%)	845 (10%)	288 (10%)	23 (8%)
<b>65 years or older</b>	1,799 (16%)	1,502 (19%)	277 (9%)	20 (7%)
<b>Unknown age</b>	112 (1%)	74 (1%)	34 (1%)	4 (1%)

Viral culture and molecular testing (reverse transcriptase polymerase chain reaction or RT-PCR) are the methods used to identify subtypes of circulating influenza viruses, which can help health professionals make the best treatment and vaccination decisions. The influenza subtype can be determined by a test called hemagglutination inhibition (HI) using viral isolates or by using subtype-specific primers for RT-PCR. Another indicator used to evaluate the level of influenza activity is the percent of specimens submitted for influenza testing that are positive for influenza; during the peak of an influenza season, high percentages of specimens are positive.



During the 2012-2013 season, 77% of positive specimens at the Arizona State Public Health Laboratory (ASPHL) were influenza A (H3), 20% were influenza B, and 3% were influenza A (H1N1) pdm09. The epidemiologic curve of all reported tests, below, further illustrates the concomitant circulation of A and B viruses, though in different proportions, which appear to have peaked around the same time.



RT-PCR and culture data from all laboratories that perform these tests are shown in the table below.

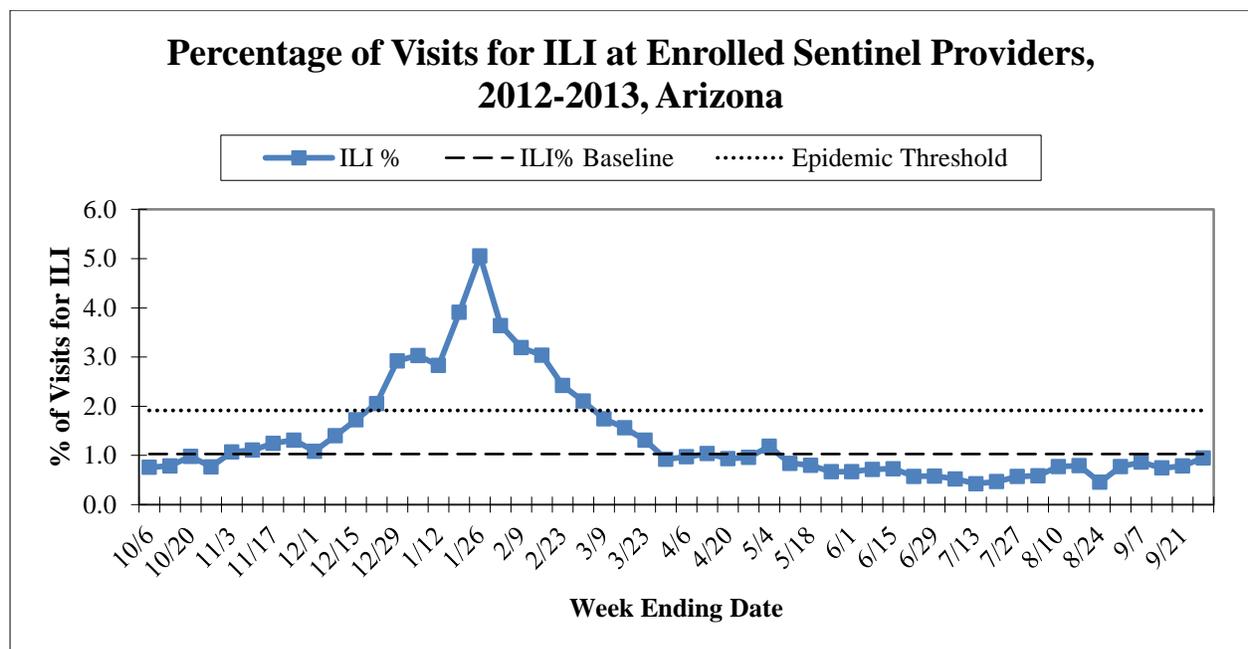
**Influenza confirmed by RT-PCR or culture, by season, from any laboratory**

	2012-2013 Number (Percent)	2011-2012 Number (Percent)	2010-2011 Number (Percent)	2009-2010 Number (Percent)
<b>Influenza Type/Subtype</b>	3,245 (100%)	1,564 (100%)	3,176 (100%)	7,497 (100%)
Influenza A (H1N1) pdm09	80 (2%)	594 (38%)	483 (15%)	6,392 (85%)
Influenza A (H3)	1,586 (49%)	351 (22%)	1,239 (39%)	1 (0.01%)
Influenza A (Unsubtyped)	830 (26%)	255 (16%)	748 (24%)	1,101 (15%)
Influenza B	749 (23%)	364 (23%)	706 (22%)	3 (0.04%)

**Influenza-Like Illness (ILI) Surveillance from Sentinel Providers**

ILI is defined as a fever of at least 100°F plus either a cough or a sore throat. Approximately 30 sentinel providers around the state report the total number of outpatient visits to their offices and the number of visits for ILI each week. We use the percentage of visits for ILI as an indicator of likely influenza activity. The state ILI baseline is 1.1% and the epidemic threshold is 1.9% for 2012-2013. The baseline is defined as the mean of the state ILI% in weeks in the 2009-2012 flu seasons in which two or more consecutive weeks each accounted for less than 2% of the season’s total number of specimens testing positive for influenza at the Arizona State Public Health Laboratory. The epidemic threshold is defined as the mean plus two standard deviations.

The percentage of visits for ILI showed similar seasonality to the laboratory-reported influenza data. It exceeded the epidemic threshold from late December through early March and peaked in late January.



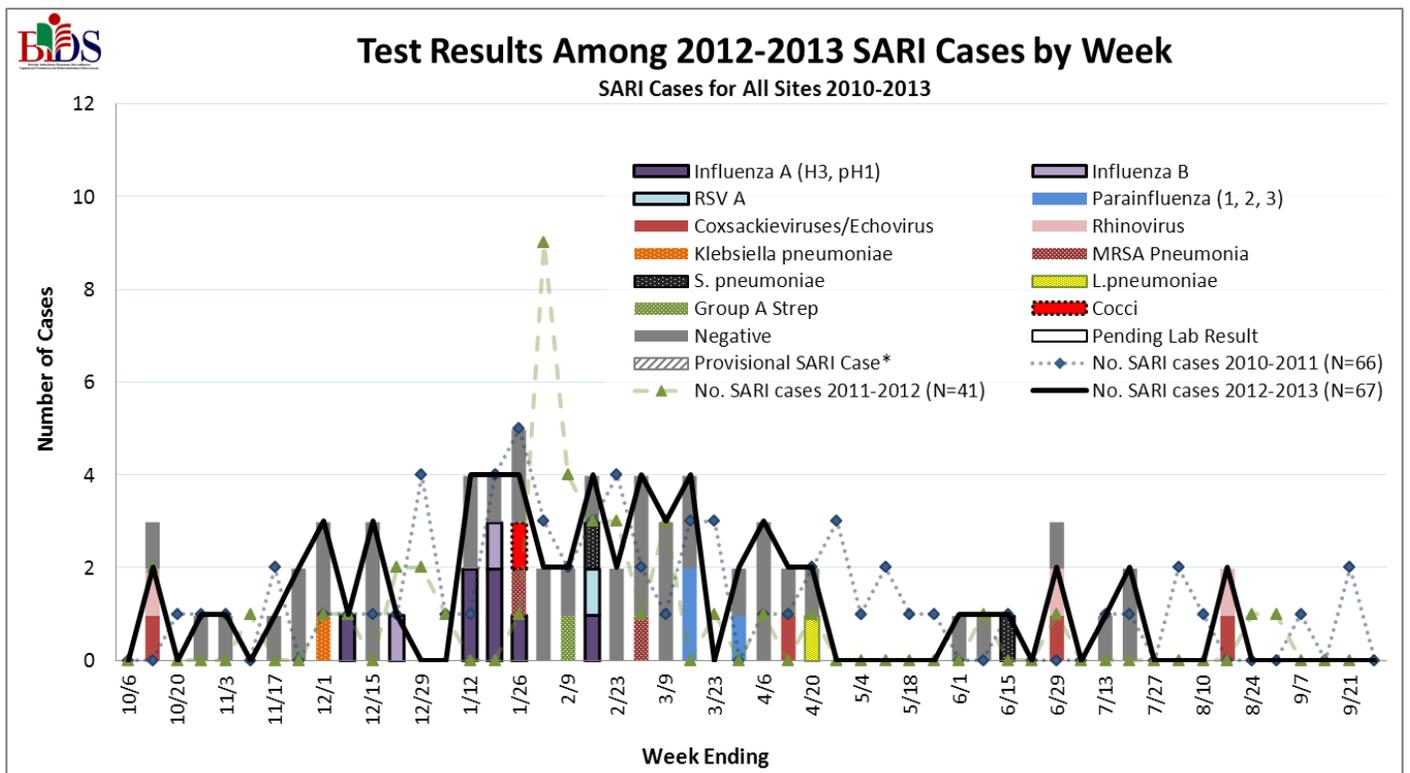
## Severe Acute Respiratory Infections (SARI) Surveillance

Severe acute respiratory infections (SARI) surveillance is conducted at selected hospitals in counties along the Sonora, Mexico, border by the Office of Border Health's Border Infectious Disease Surveillance (BIDS) program. SARI is defined as a hospital admission with a fever of at least 100°F plus either a cough or a sore throat. This surveillance facilitates the detection of circulating influenza strains and allows us to monitor various causes of morbidity and mortality among inpatients with SARI.

SARI cases are tested using an RT-PCR viral panel that detects: influenza A and B; respiratory syncytial virus A and B; parainfluenza virus 1, 2, 3, and 4; human metapneumoviruses A/B; rhinovirus; adenovirus (ADVB and ADVE); coronavirus (NL63, HKU1, 229E, and OC43); coxsackieviruses/echovirus; and bocavirus. If a lower respiratory specimen is collected it is tested by RT-PCR for *Chlamydomphila pneumoniae*, *Mycoplasma pneumoniae*, *Bordetella pertussis*, and *Legionella pneumophila* and bacteriology culture for bacterial etiologies and coinfections. Serum from these patients is also tested for coccidioidomycosis.

Among the 67 cases identified in the 2012-2013 season, nine (13%) were positive for influenza and one (1%) was positive for RSV. Forty-two (63%) were negative for all tested etiologies. Forty (60%) of the 67 cases were male. Thirty-two (48%) were 65 years of age or older, 21 (31%) were between the ages of 50 and 64, and 10 (15%) were between the ages of 25 and 49 years of age. Forty (60%) of the cases were non-Hispanic white, 20 (30%) were of Hispanic racial/ethnic background, and 5 (7%) were Native American.

Of the 29 SARI cases with negative rapid diagnostic influenza results, five (17%) were eventually confirmed as influenza by PCR. Among 62 patients with symptom duration collected, the median was 5 days, with a mean of 8 days and range of 1 to 60 days.

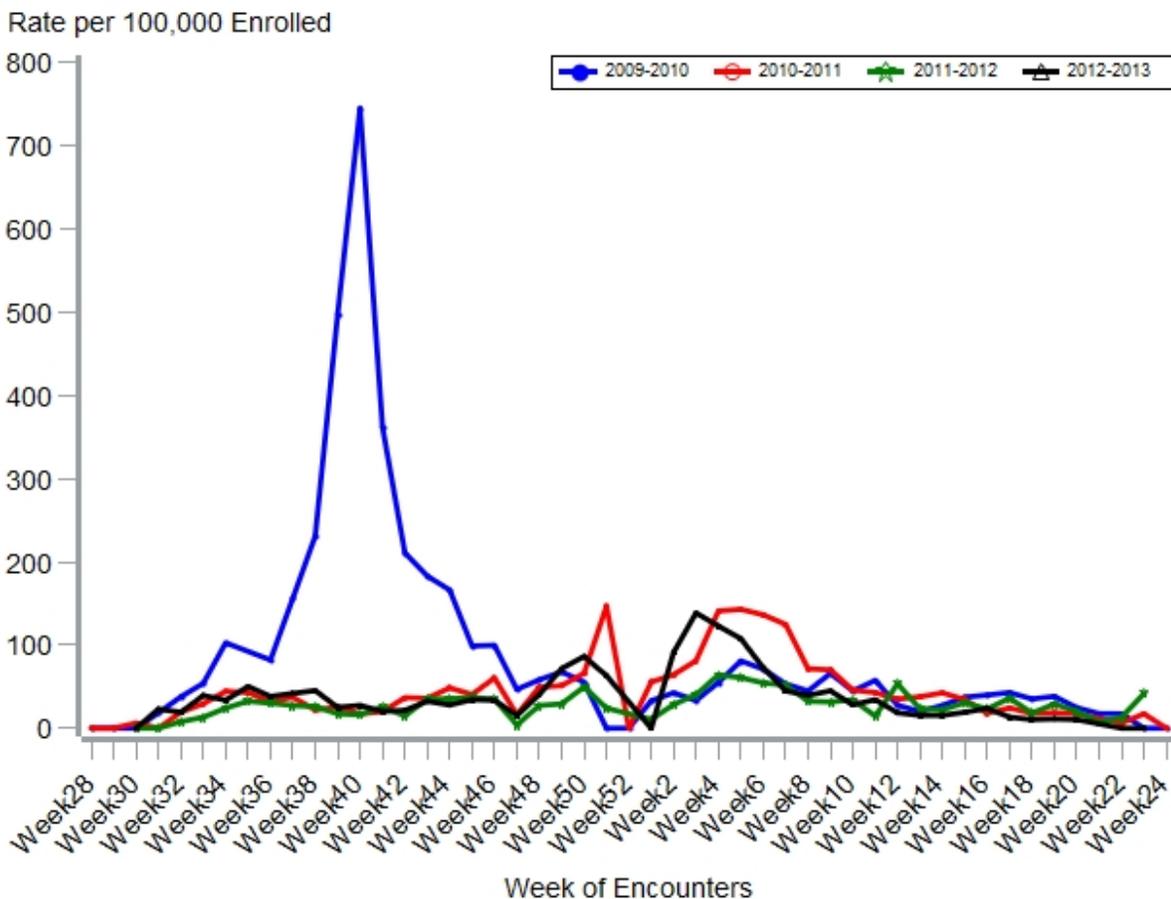


## Influenza-Like Illness (ILI) Surveillance from Participating Arizona Schools

School nurses in approximately 200 Arizona schools around the state use a specific computer program (the Child Health Indicator Program) for electronic management of student health records. The graph presents the weekly trend of ILI syndromes reported among students during the school years of 2009-2010, 2010-2011, 2011-2012, and 2012-2013. The school nurse encounters are not diagnosed cases of communicable diseases but are based on the nursing codes that school nurses enter to track student conditions. The numbers in the graph are only from schools that used CHIP during the school year.

ILI among school children was relatively high compared to last season, and showed a small peak in December (weeks 49 and 50) with the largest increase in January and February (weeks 3 through 7). ILI during the fall wave of the 2009 pandemic far exceeded any activity seen in our school surveillance system before or since.

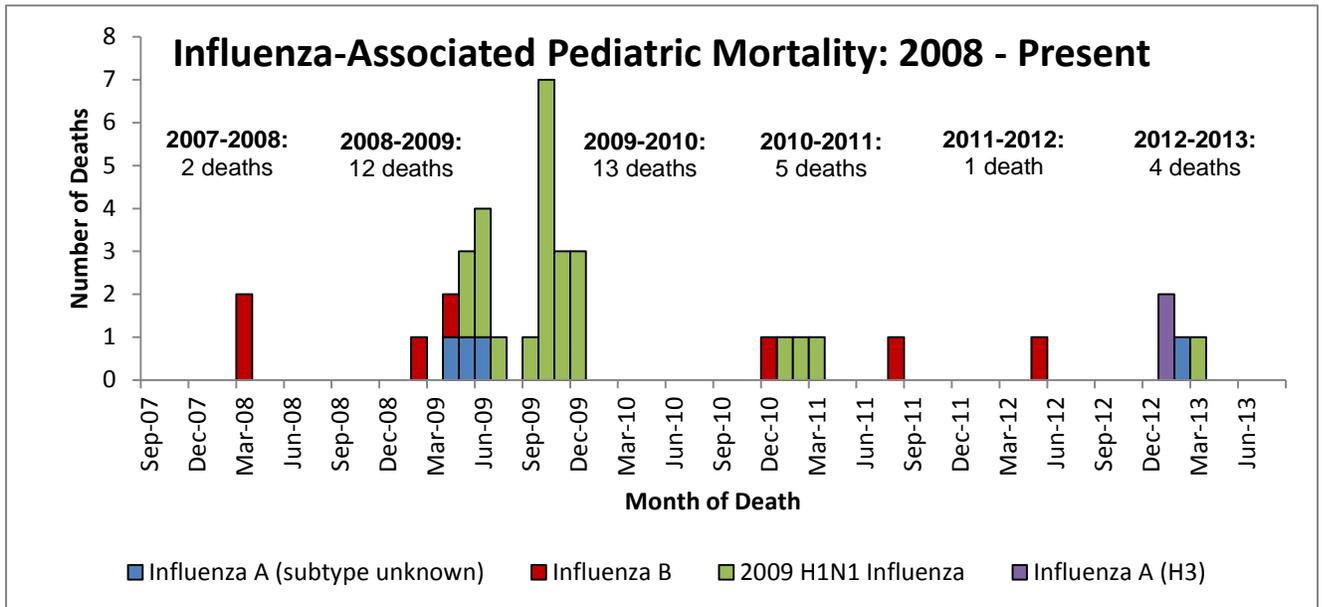
### Influenza-Like Illness per 100,000 Students Enrolled in Participating Schools, Arizona, 2009-2013



## Influenza-Associated Pediatric Mortality

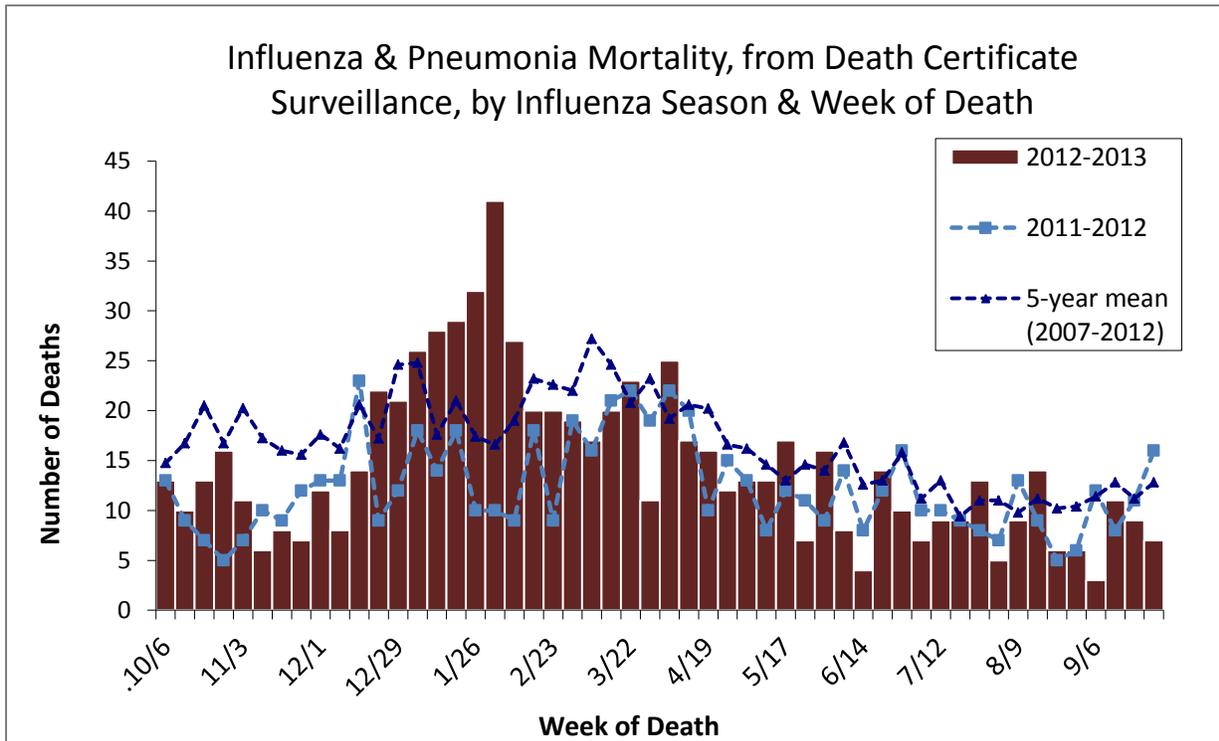
Influenza-associated pediatric deaths are reportable to public health departments in Arizona (R9-6-202). One influenza-associated pediatric death was reported and investigated during the 2011-2012 season compared to five during the 2010-2011 season. The 2008-2009 and 2009-2010 seasons showed an increase in influenza-associated deaths in children related to the circulation of the 2009 H1N1 virus, with 12 and 13 deaths reported in those seasons, respectively. Two deaths were reported in the 2007-2008 season.

Four influenza-associated pediatric deaths were reported in the 2012-2013 season: two in week 4, one in week 14, and one in week 17. A Yavapai County child with underlying medical conditions had an influenza A (H3) and RSV coinfection, confirmed by PCR. Two Navajo County children were confirmed with influenza by PCR at the ASPHL, one with A (H3) and one with A (H1N1) pdm09. The last reported case was a Coconino County child with underlying medical conditions and an influenza A infection confirmed by direct fluorescent antibody staining.



## Pneumonia and Influenza Mortality from Death Certificates

Influenza-associated deaths in adults are not reportable in Arizona, and thus the number of laboratory-confirmed deaths each year is not available. Many influenza-related deaths are due to complications of influenza infection, including pneumonia, and influenza is infrequently listed as the cause of death on death certificates. Influenza mortality surveillance often uses the category of “pneumonia and influenza” (P & I) on death certificates as an indicator of the severity of an influenza season or of the trends within a season, even though not all pneumonias are associated with influenza. See the CDC website for more information [http://www.cdc.gov/flu/about/disease/us\\_flu-related\\_deaths.htm](http://www.cdc.gov/flu/about/disease/us_flu-related_deaths.htm).



During the 2012-2013 season, 754 pneumonia or influenza deaths occurred. This is higher than the previous two seasons: 627 in the 2011-2012 season and 697 in 2010-2011. The mean and median ages for the 754 P & I deaths in the 2012-2013 season were 78 and 83 years, respectively. Eleven (2%) deaths were in persons less than 25 years of age; 109 (14%) in persons ages 25 through 64 years; and 634 (84%) in persons aged 65 years or older. Fifty percent of deaths were among males. Four hundred five (54%) deaths occurred in an inpatient setting.

## Summer Laboratory-Reported Influenza

Each year, Arizona stops counting rapid diagnostic tests as confirmed cases if they are collected 14 days after the collection date of the last PCR- or culture-confirmed test at ASPHL. This is done because of the high likelihood that rapid diagnostic tests performed in periods with no known virus circulation are false positives. For 2013, rapid tests with collection dates after April 29<sup>th</sup>, 2013, were not counted as confirmed. Positive results of other tests were still counted.

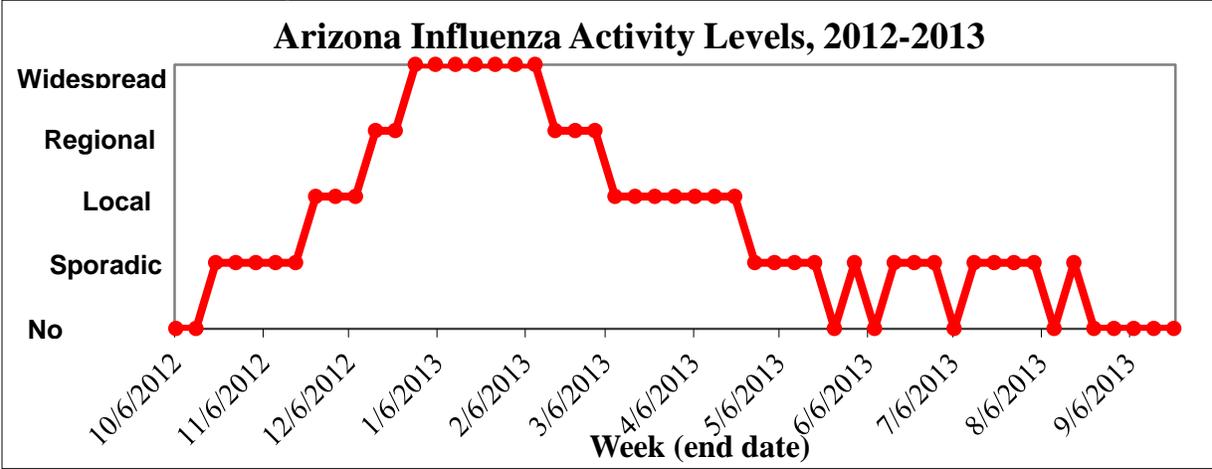
Eighteen laboratory-confirmed influenza cases were identified during the period when rapid tests were no longer counted. Twelve were confirmed by RT-PCR or culture at ASPHL and were residents of Maricopa, Mohave, Navajo, Pima, and Yavapai County. Of the 18 confirmed cases, six were originally identified by rapid diagnostic tests, four by direct fluorescent antibody testing, six by PCR, and two by culture. Additional information is below:

MMWR Week	Month	Influenza (sub)type	Age group	Out of state travel?
19	May	1 Influenza B	Adult	Yes
20	May	1 Influenza A (H3), 1 Influenza (H1N1) pdm09, 4 Influenza B	4 Adults, 2 Children	1 Yes, 3 No, 2 Unknown
21	May	Influenza B	Adult	Unknown
22	May	Influenza B	Adult	Yes
23	June	Influenza B	Child	No
25	June	Influenza A (H3)	Adult	Yes
26	June	2 Influenza B	1 Adult, 1 Child	2 Unknown
27	June	Influenza (H1N1) pdm09	Child	No
29	July	Influenza (H1N1) pdm09	Adult	Yes
31	August	Influenza A	Child	Unknown
32	August	Influenza (H1N1) pdm09	Adult	No
34	August	Influenza (H1N1) pdm09	Adult	Yes

An additional 45 positive rapid diagnostic tests that could not be confirmed were reported from the time when rapid tests were no longer counted until the first confirmed case of locally-acquired influenza in the 2013-2014 season; 21 (47%) of these were reported between weeks 20 and 26. Specimens were submitted to ASPHL for confirmatory tests for 25 (40%); hospitalization status was known for 55 (87%), of which 27 (49%) were hospitalized.

# Arizona Influenza Activity Levels

Each week, October through May, ADHS reports an influenza activity level to CDC. (See definitions at the end of this report.) Widespread activity in Arizona is often in February or March. During the 2012-2013 season, Arizona reported widespread activity during January and the first half of February.



## Glossary of Key Terms

2012-2013 Influenza Season – The season is defined by surveillance weeks. The first day of the 2012-2013 influenza season was September 30th, 2012, or week 40 and the 2012-2013 surveillance season continued through September 28th, 2013, or week 39.

Rates: All rates described in this report are calculated using 2012 population denominators from the Vital Statistics Office at ADHS, and are derived from data from the National Vital Statistics and State Demographer’s Offices. County- or age-specific denominators are used when appropriate. For further information, see <http://www.azdhs.gov/plan/menu/info/pop/pop12/pd12.htm>.

Activity Levels: Indicator of the geographic spread of influenza activity, reported to CDC by all states each week.

Widespread: Increased influenza-like illness from sentinel providers (ILI) in three or more regions and large numbers of laboratory-confirmed influenza cases in those regions.

Regional: Increased ILI in two regions and elevated numbers of laboratory-confirmed influenza cases in those regions.

Local: Increased ILI in one region and elevated numbers of laboratory-confirmed influenza cases in that region.

Sporadic: No increase in ILI activity and only isolated laboratory-confirmed influenza cases.

No Activity: No increase in ILI activity and no laboratory-confirmed influenza cases.

Pneumonia and Influenza Mortality: Many influenza-related deaths are due to complications of influenza infection, including pneumonia, and influenza is infrequently listed as the cause of death on death certificates. Surveillance from death certificates often uses the category of “pneumonia and influenza” as an indicator, although not all pneumonias are associated with influenza. See the CDC website for more information [http://www.cdc.gov/flu/about/disease/us\\_flu-related\\_deaths.htm](http://www.cdc.gov/flu/about/disease/us_flu-related_deaths.htm).