

INFLUENZA & RSV ANNUAL REPORT

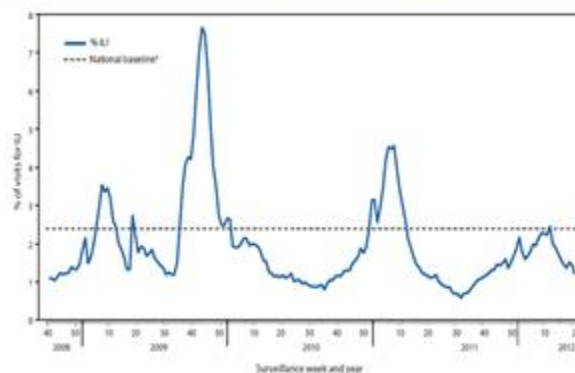
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Phoenix AZ



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SUMMARY

This report summarizes the influenza activity in Maricopa County for the 2016-2017 Season (October 2, 2016 [MMWR WK 40] to September 30, 2017 [MMWR WK 39]). Maricopa County Department of Public Health (MCDPH) influenza surveillance is a collaborative effort between MCDPH, Arizona Department of Health Services (ADHS), Centers for Disease Control and Prevention (CDC), and local community partners such as health care providers, emergency departments, community health clinics, Office of Vital Statistics, Office of the Medical Examiner, and local schools. Information on influenza activity is based on several influenza indicators such as: laboratory-confirmed cases, influenza like illness (ILI) activity, absenteeism information from schools, pneumonia and influenza (P&I) mortality, influenza –associated pediatric mortality, and summer surveillance activity. Typically, influenza peaks in January or February; however, widespread influenza activity can occur as early as October or as late as May during a flu season. Influenza cases reported to MCDPH represent a small proportion of the true number of cases of influenza. Many people do not visit the doctor when ill and not every patient exhibiting ILI symptoms is tested.



Based on influenza indicators in Maricopa County, this season was mild compared to last season, which saw 14,353 cases, experiencing widespread activity throughout the state of Arizona for 4 weeks. The previous season recorded widespread activity for 10 weeks. The first locally-acquired case of influenza in Maricopa County was laboratory confirmed on October 3, 2016 ([table 1](#)). Peak influenza activity occurred in the first week of February, which was two weeks earlier compared to the previous season ([table 1](#)). Influenza type A accounted for the majority of laboratory confirmed cases ([graph 2](#)). Reverse transcription polymerase chain reaction (RT-PCR) and viral culture testing suggested that the A/H3 virus was the most common viral subtype circulating during the 2016-2017 season ([graph 3](#)).

Influenza-like illness (ILI) activity in hospitals during the 2016-2017 season saw a different trend than previous seasons, not reaching the highs that other seasons had seen, but staying above the Maricopa County epidemic threshold for a significantly longer period of time. In hospital emergency departments, the percentage of visits due to ILI reported this season was lower and later in the season compared to the previous season ([graph 5](#)).

Pneumonia and influenza (P&I) mortality overall was lower compared to the previous season ([table 4](#)). The 2016-2017 Influenza season claimed 1 Pediatric death, the previous three seasons claimed 3 pediatric deaths.

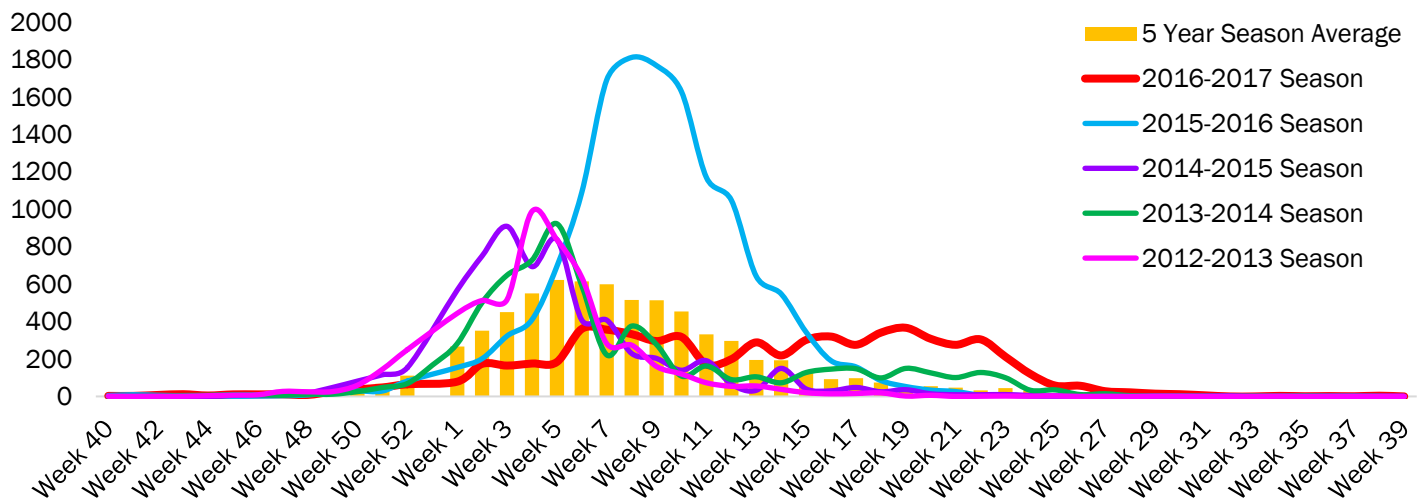
Respiratory Syncytial Virus (RSV) activity was considerably higher compared to last season and peaked in early February ([graph 13](#)).

Table 1: Influenza Activity	2016-2017	2015-2016	2014-2015	2013-2014
First Confirmed Case (no travel)	10/3/2016	10/4/2015	10/3/2014	10/4/2013
Weeks w/Widespread Activity (AZ)	Week 6 - 9	Week 5 - 14	Week 1 - 6	Week 3 - 8
Weeks w/Hospital ILI above Regional Threshold	Week 49 & 52-23	Week 51 - 16	Week 50 - 11	Week 52 - 9
Weeks w/Outpatient visits above Threshold	Weeks 47, 48, 50-3, 5-10, 14 & 17-21	Weeks 45-52, 1-21, 23, 35 & 36	Weeks 48, 50-10 & 12-14	Weeks 51 - 11
Peak Week	Week 6(2/5-2/11/2016) & Week 19(5/6-5/12/2017)	Week 8(2/21-2/27/2016)	Week 3(1/18-1/24/2015)	Week 6(2/9-2/15/2014)
Pediatric Deaths	1	3	1	1
Total Cases	6,606	14,353	6,601	6,658

LABORATORY CONFIRMED INFLUENZA

Influenza is a laboratory reportable disease under Arizona Administrative Code R9-204. Influenza seasons run from week 40 to week 39. The first locally acquired case (without travel history) in the 2016 - 2017 season was recorded on October 3, 2016. This season there were 6,606 laboratory confirmed cases of influenza in Maricopa County. This represents a 54% decrease in the total number of cases from the 2015 - 2016 influenza season, which had a total of 14,353 confirmed cases ([table 1](#)). Influenza activity was widespread from weeks 6 - 9 (2/5/2017 - 3/4/2017) and peaked in week 6 when 361 cases were reported and again in May during week 19 when 367 cases were reported ([graph 1](#)). (NOTE: For graphs of multiple years, MMWR dates refer to the 2016-2017 season.)

Graph 1: Number of Laboratory Confirmed Influnza Cases Reported by Week in Maricopa County, 2012 - 2017



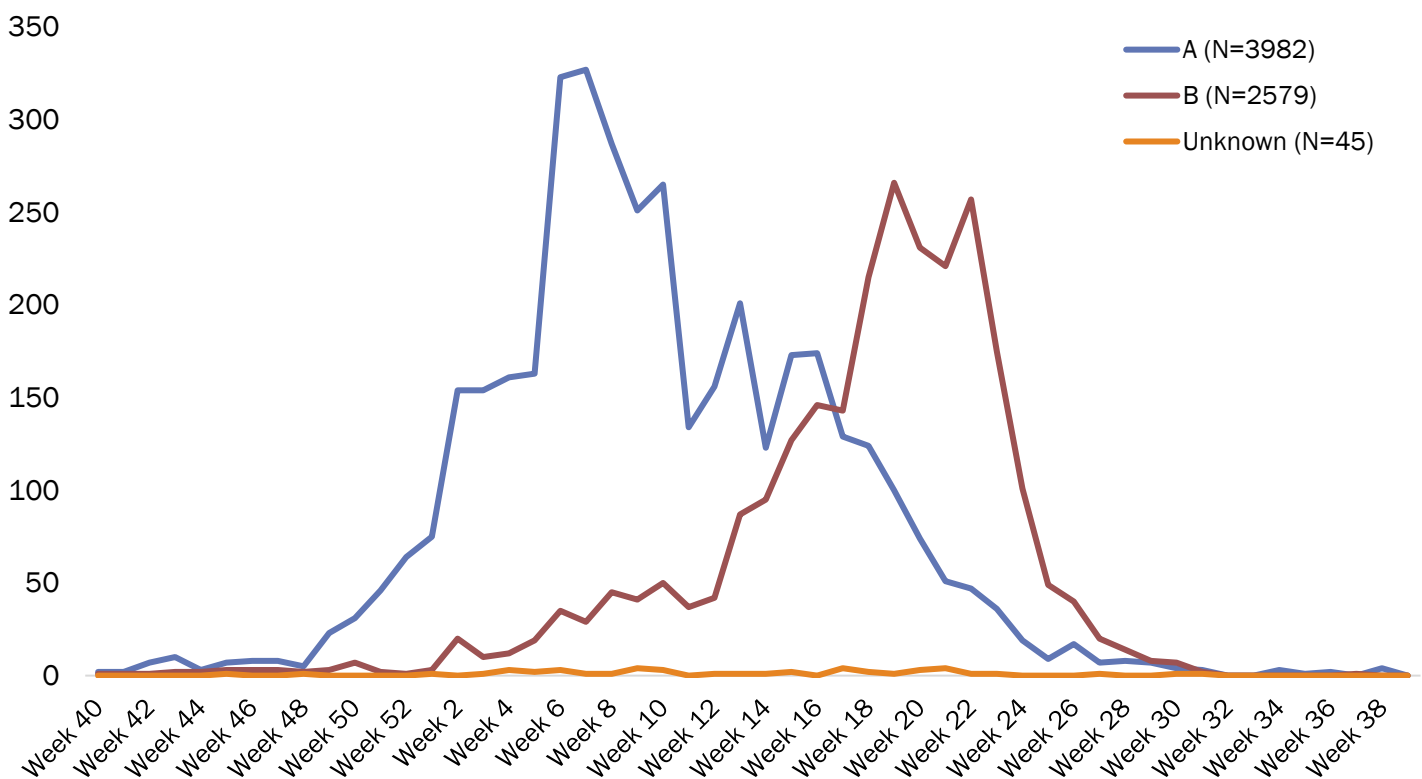
INFLUENZA TYPES AND SUBTYPES

Table 2: Influenza Types/Subtypes, 2016-2017 Season, Maricopa County

Types/Subtypes	Count	%
Type A	3971	60
Subtype 2009 H1N1	33	1
Subtype H3	1212	31
Subtyping not performed or unknown	2726	69
Type B	2590	39
Unknown	45	1
Total	6606	100

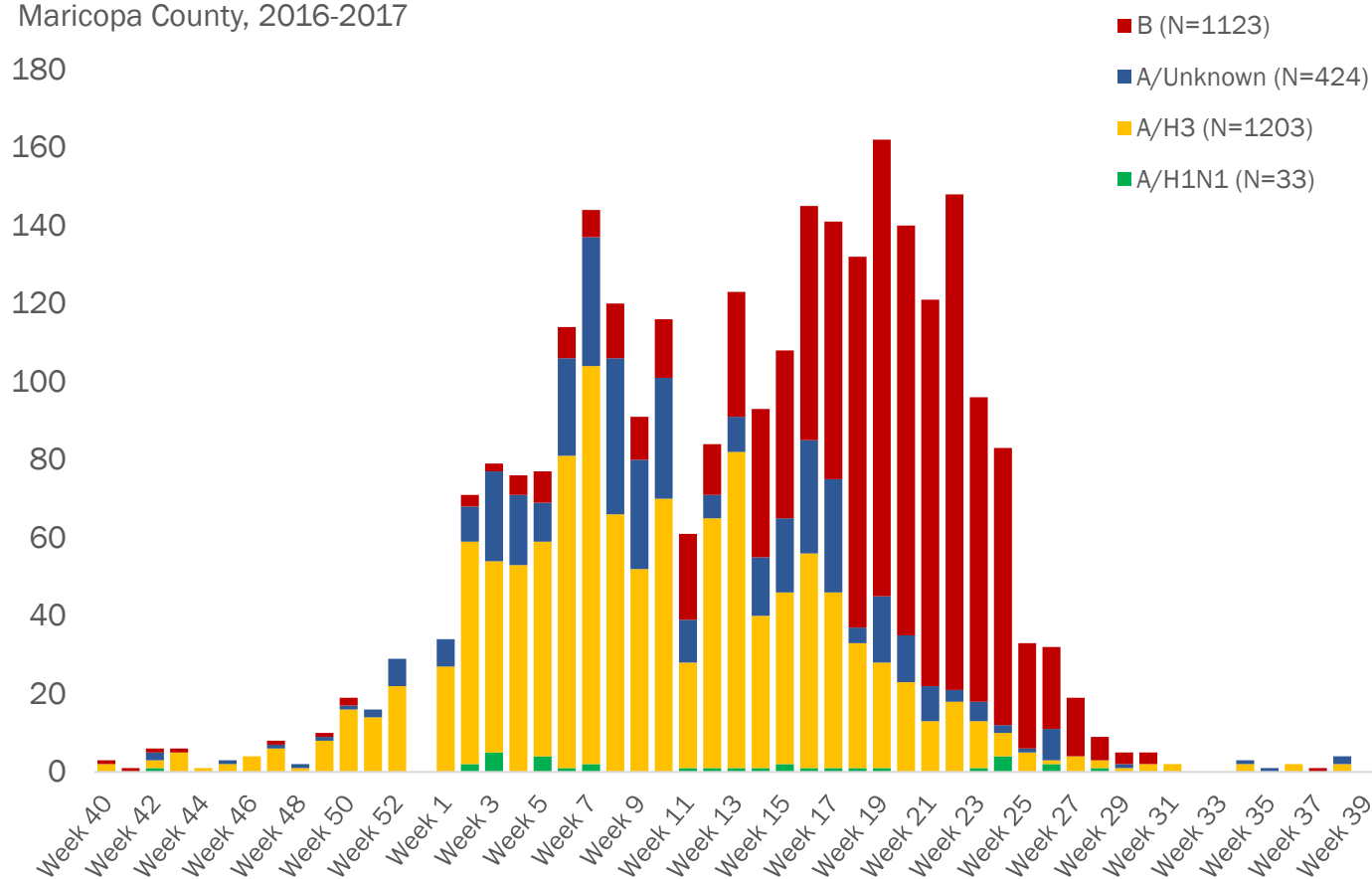
Influenza type A (60%) was the dominant strain circulating this season. Type B (39%) also circulated in the 2016 - 2017 Influenza season and 1% was type unknown ([table 2](#)). Influenza A activity peaked during week 7 (2/12 - 2/18/2017) and Influenza B activity peaked during week 20 (5/14 - 5/20/2017) ([graph 2](#)).

Graph 2: Influenza Activity by Type in Maricopa County, 2016-2017



When influenza subtype testing was performed, A/H3 was the most common influenza subtype. Laboratories in Maricopa County reported 6,606 confirmed influenza cases this season, 2,783 cases tested positive by RT-PCR or viral culture. Overall, 69 % of these specimens tested positive for Type A/Unknown or were not subtyped at all. 31% were A/H3, only 1% were A/H1N1 and Type B were 39% ([graph 3](#)). Type B was only 25% of the confirmed cases in 2015 - 2016 season.

Graph 3: Influenza Cases Confirmed by RT-PCR or Culture from All Labs in Maricopa County, 2016-2017



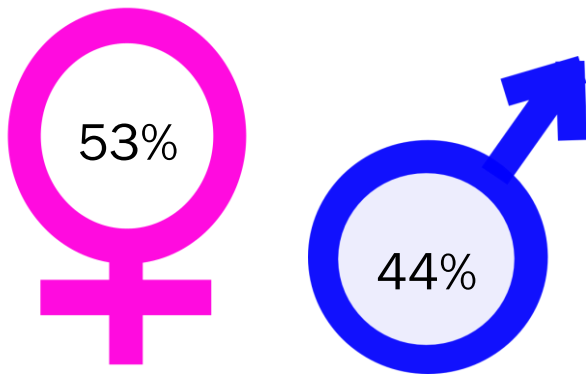
The CDC says
 "Everyone 6 months
 of age and older
 should get a flu
 vaccine every
 season."



INFLUENZA ACTIVITY BY AGE AND GENDER

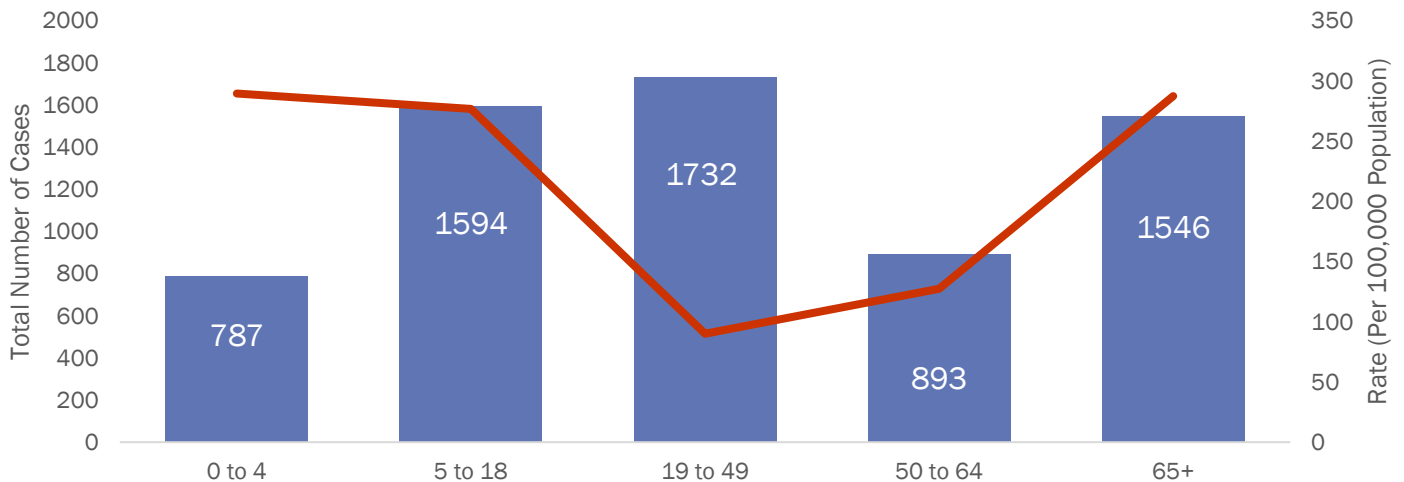
The demographic breakdown of laboratory confirmed cases in Maricopa County is shown in table 3 ([table 3](#)). Slightly more than half of reported cases were female. The majority of all cases were reported in those ages 5-18 and 19-49. However the rate of reported cases was highest among children 0-4 years of age, followed by ages 65+ ([graph 4](#)).

Graph 4: Influenza Cases by Gender in Maricopa County, 2016-2017



	TOTAL	%
GENDER		
Female	3,471	53
Male	2,935	44
Unknown	200	3
Total	6,606	100
AGE GROUP		
0-4	787	12
5-18	1,594	24
19-49	1,732	26
50-64	893	14
65+	1,546	23
Unknown	54	1
Total	6,606	100

Graph 5: Below are the Rates of Influenza infections per 100,000 people in Maricopa County. Age groups 5-18 year old and 65 and older are the most susceptible, as shown in the graph below.



* Based on 2014 Census population estimates for Maricopa County

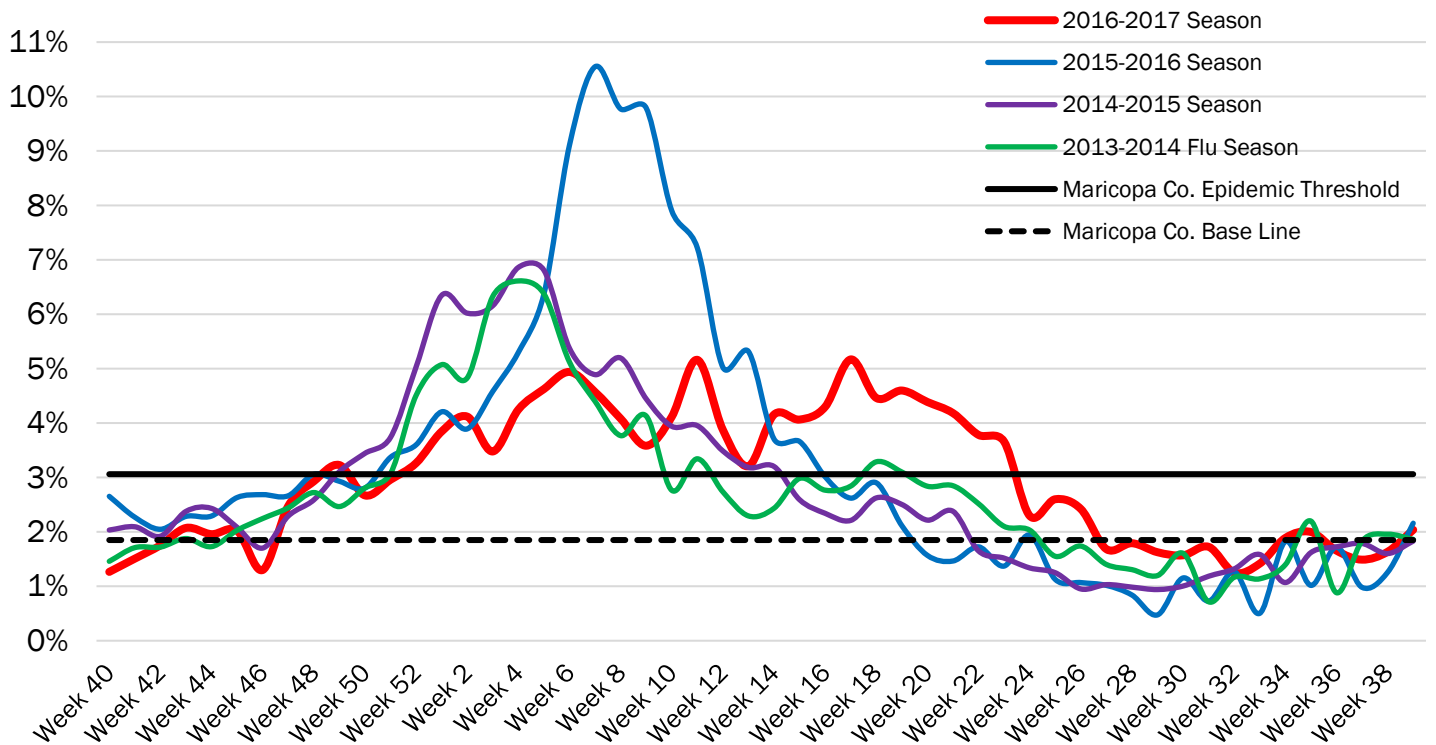
ILI INDICATORS

In order to estimate the severity of an influenza season, MCDPH collects data on influenza-like illness because not all suspect cases of influenza can be tested. Influenza Like Illness (ILI) is defined as a fever greater than or equal to 100°F **AND** cough or sore throat in the absence of a known cause other than influenza. MCDPH uses the following sources to estimate the incidence of ILI: emergency department visits, sentinel site (outpatient clinic) visits, and student absenteeism.

Emergency Department Visits:

Every week local emergency departments report visits due to ILI and total number of emergency department visits. The percent of visits due to ILI is compared to the MCDPH baseline and epidemic threshold for emergency departments each week to show the level of influenza activity (see [Appendix](#) and [\(graph 6\)](#). The MCDPH baseline for this season is 1.85% and MCDPH epidemic threshold is 3.06%. ILI activity was lower this season compared to the 2015-2016 season. Peak ILI activity occurred during week 17 (4/23-4/29/2017), when 5.17% of all emergency department visits were due to ILI. This peak occurred 10 weeks later than it did in the 2015-2016 season, when 10.55% of all emergency department visits were due to ILI.

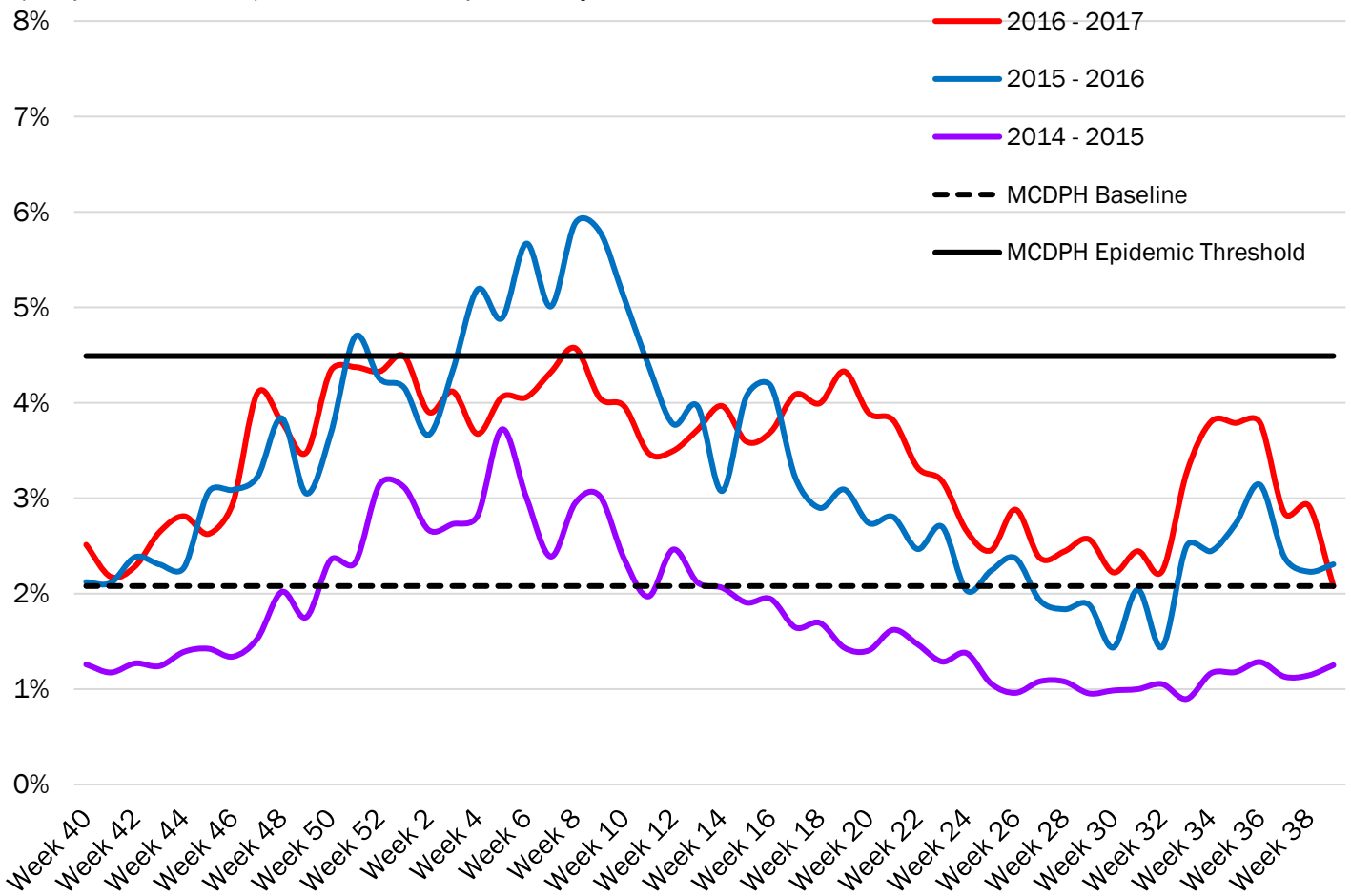
Graph 6: Visits by Individuals with Influenza-Like Symptoms as a Percentage of All Emergency Department Visits in Maricopa County, 2013-2017



Sentinel Site Surveillance

Maricopa County sentinel sites (outpatient clinics) report each week the total number of visits as well as influenza-like illness visits to CDC. The percentage of ILI visits is compared to the MCDPH baseline and epidemic threshold each week to show the level of influenza activity ([graph 7](#)). Our participating sentinel sites in influenza surveillance includes CIGNA clinics, Adelante clinics and ASU Student Healthcare Center.

Graph 7: Visits by Individuals w/ILI Symptoms as a Percent of All Sentinal Site (Outpatient Clinics) Visits in Maricopa County, 2013-2016



Ten emergency departments participating in ILI reporting

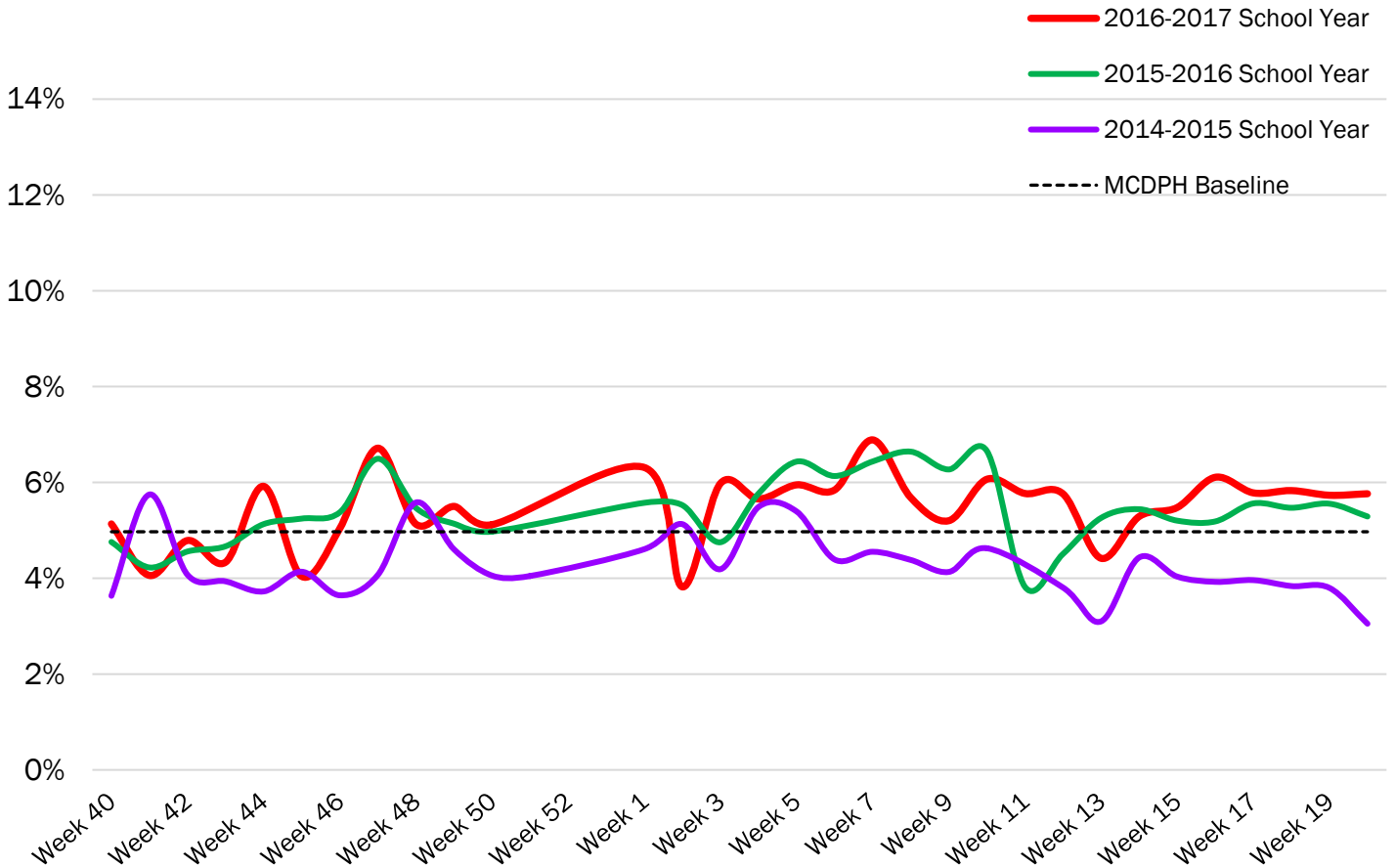


Note: The baseline is developed by calculating the mean percentage of patient visits for ILI at Emergency Departments or Out-patient Clinics respectively during non-influenza weeks for the previous three seasons and adding two standard deviations. A non-influenza week is defined as periods of two or more consecutive weeks in which each week accounted for less than 2% of the season's total number of specimens that tested positive for influenza in public health laboratories.

School Surveillance

Maricopa County uses a web-based school surveillance system to collect student absenteeism data. Participation of schools in 2016 - 2017 remained constant with 132 schools in representing 7 school districts. During the 2016-2017, week 7 (2/12 - 2/18/2017) had the highest percent of absenteeism due to ILI ([graph 8](#)).

Graph 8: Student Absenteeism as a Percent of Total Enrollment in Schools in Maricopa County, 2015-2017



INFLUENZA MORTALITY

Pediatric Influenza-associated deaths are reportable in Arizona. Many influenza-related fatalities are attributed to complications of influenza infection, including pneumonia.

Individuals who died of influenza-associated pneumonia may or may not have influenza listed as a cause of death. As a result, it is suspected that influenza deaths are often underreported. In order to estimate the burden of influenza mortality, pneumonia and influenza (P&I) deaths are grouped together and used as an indicator of the severity of a flu season.

The table below shows the number of P&I deaths recorded during the current and previous influenza seasons ([table 4](#)). The number of all P&I deaths is lower in this season compared to last season, those directly attributed to influenza was 2% compared to the 6% from last season, including one pediatric flu death.

Graph 9: Pediatric Influenza Deaths by Season in Maricopa County, 2016-2017

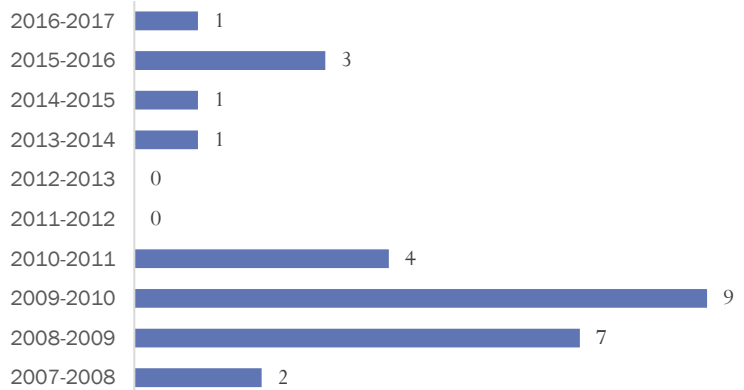


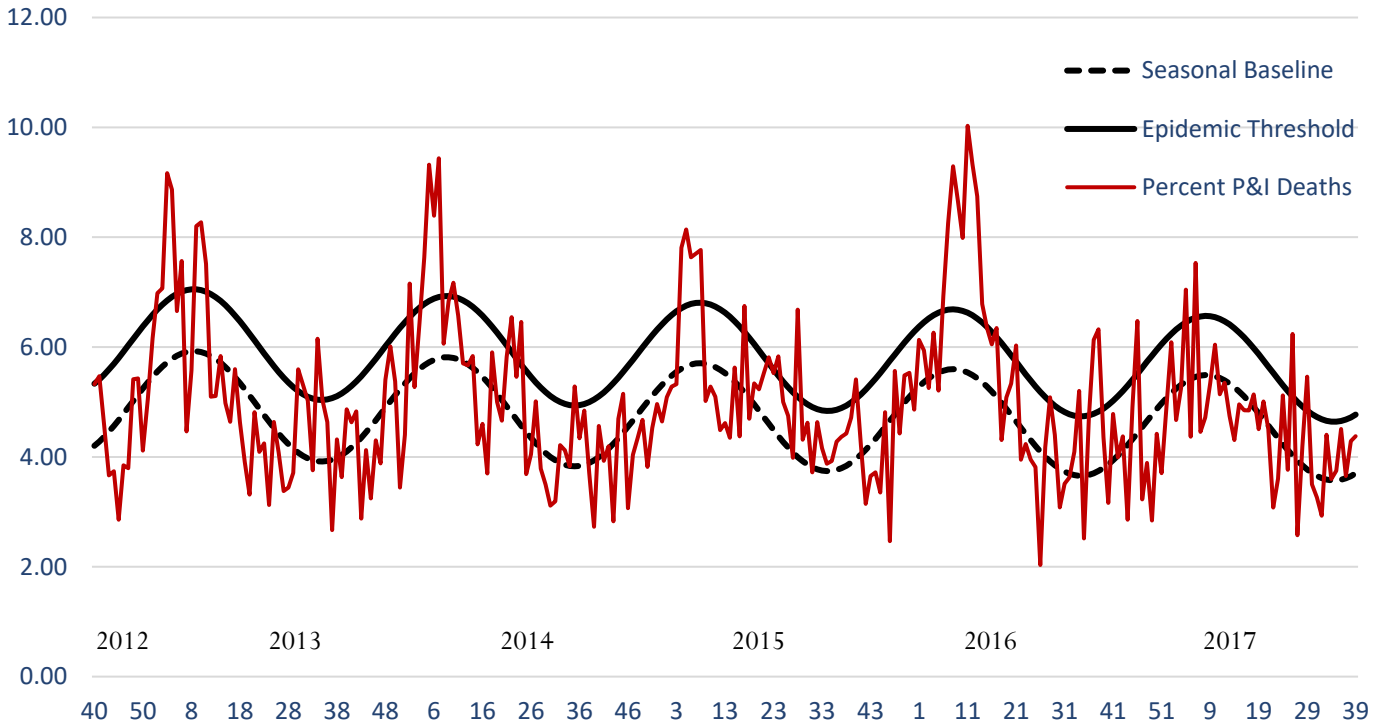
Table 4: Pneumonia and Influenza (P&I) Deaths, 2016 - 2017 & 2015 - 2016 Seasons, Maricopa County

	Current Season (2016 - 2017) As of [10/02/2017]		Last Season (2015 - 2016) As of [10/01/2016]	
	Pneumonia and Influenza	Influenza	Pneumonia and Influenza	Influenza
Pediatric (Under Age 18)	9	1	13	3
Adult (18 and Over)	1263	27	1496	88

Source: MCDPH Office of Vital Statistics

The percent of all deaths due to P&I is plotted against the baseline and threshold value calculated for each week. Baselines and thresholds are calculations using historical P&I data to estimate what levels are expected for that time of the year. When levels exceed the epidemic threshold, this indicates elevated influenza activity. During the 2016-2017 season, the percent of deaths due to P&I exceeded the epidemic threshold 4 times ([graph 10](#)).

Graph 10: Pneumonia & Influenza Mortality Surveillance, Maricopa County 2012-2013 Season thru 2016-2017 Season

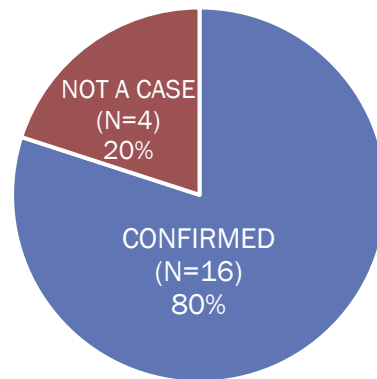


SUMMER INFLUENZA SURVEILLANCE

Each year Maricopa County stops counting rapid tests if they are collected 14 days after the collection date of the last RT-PCR or viral culture confirmed case at the Arizona State Laboratory. This is because there is a high likelihood of false positive results from rapid tests during the summer. After July 17, 2017, individuals that only had positive rapid tests were not considered cases. During the summer surveillance period, a case is only considered confirmed if they have a positive RT-PCR or viral culture test. Confirmed cases are further investigated by MCDPH in order to

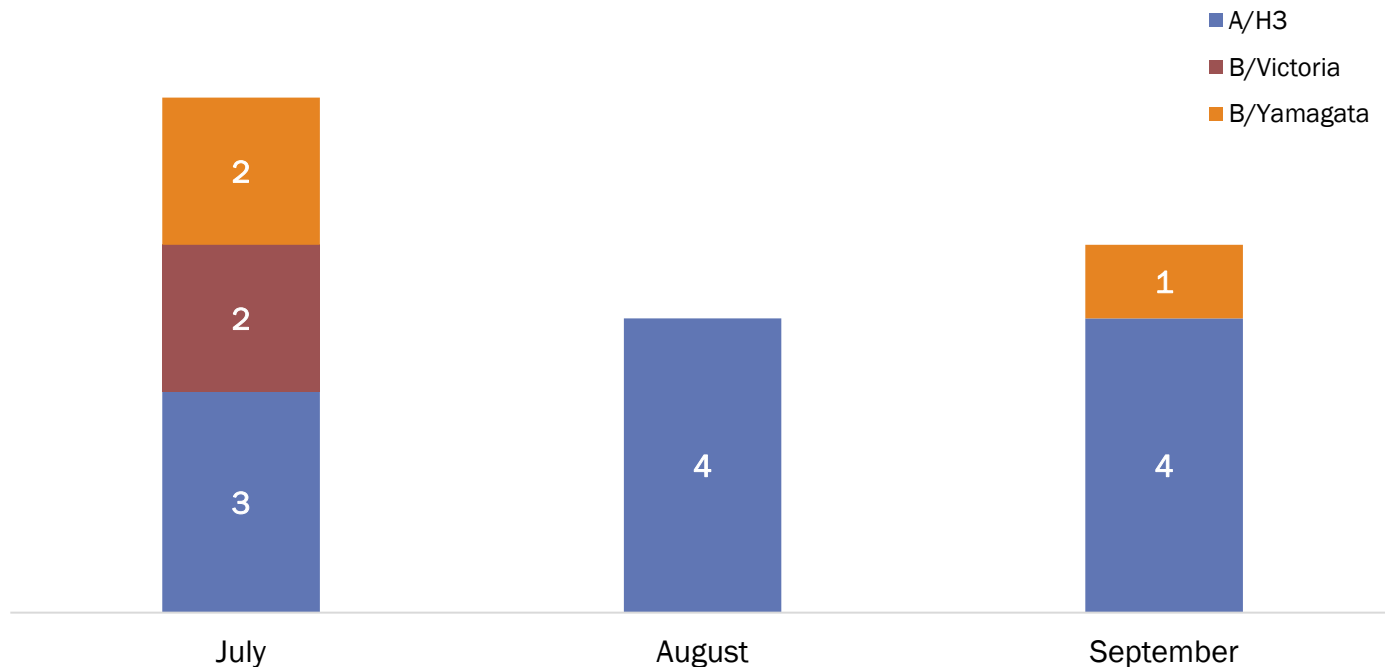
acquire hospitalization status and travel history. A total of 20 cases were reported during this period, of which 16 were confirmed and then investigated. ([graph 11](#)). The majority of these cases tested positive for

Graph 11: Summer Cases Reported in Maricopa County, 2016-2017 (N=20)



influenza A ([graph 12](#)) . Furthermore, the majority of the cases acquired influenza outside of Maricopa County and almost 50% of confirmed summer influenza cases were hospitalized ([table 5](#)).

Graph 12: Summer Influenza Confirmed Cases by Month and Subtype in Maricopa County, 2016-2017



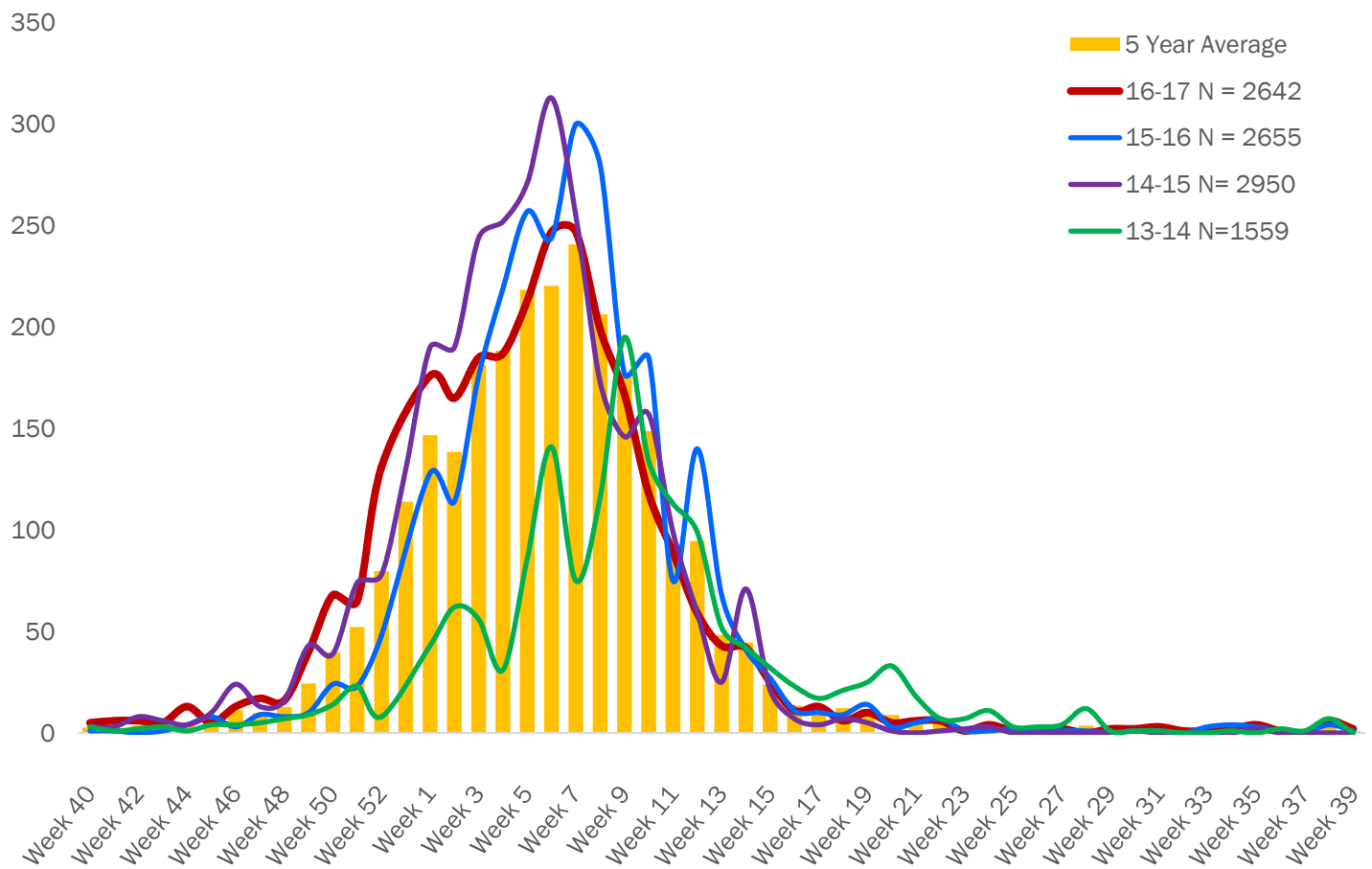
by Place of Infection			by Hospitalization Status		
	#	%		#	%
In Maricopa County	2	12	Hospitalized	4	25
Outside of Arizona	3	19	Not Hospitalized	7	44
Outside of Maricopa County	3	19	Unknown	5	31
Unknown	8	50			
Total	16	100%	Total	16	100

RSV SURVEILLANCE

Respiratory syncytial virus (RSV) is a laboratory reportable disease in the state of Arizona. Activity is usually highest during the winter and early spring. RSV infections are most common in children. To learn more about RSV, visit the following link: <http://www.cdc.gov/rsv/>

The number of individuals with confirmed RSV tests by week from 2013-2017 are shown in [graph 13](#). In total, there were 2,642 individuals confirmed with an RSV test this season. RSV activity was highest from January to the end of March. Peak activity occurred during week 5 (1/29 - 2/4/2017), with 387 laboratory confirmed RSV cases. The 2015-2016 RSV season saw just thirteen (13) cases more than 2016-2017 season, however it does seem to have run 2 weeks earlier than previous season.

Graph 13: Number of Laboratory Confirmed RSV Cases Reported by Week, 2013-2017



Graph 14: Laboratory Confirmed RSV Cases in Maricopa County by Week, 16-17 N = 2642

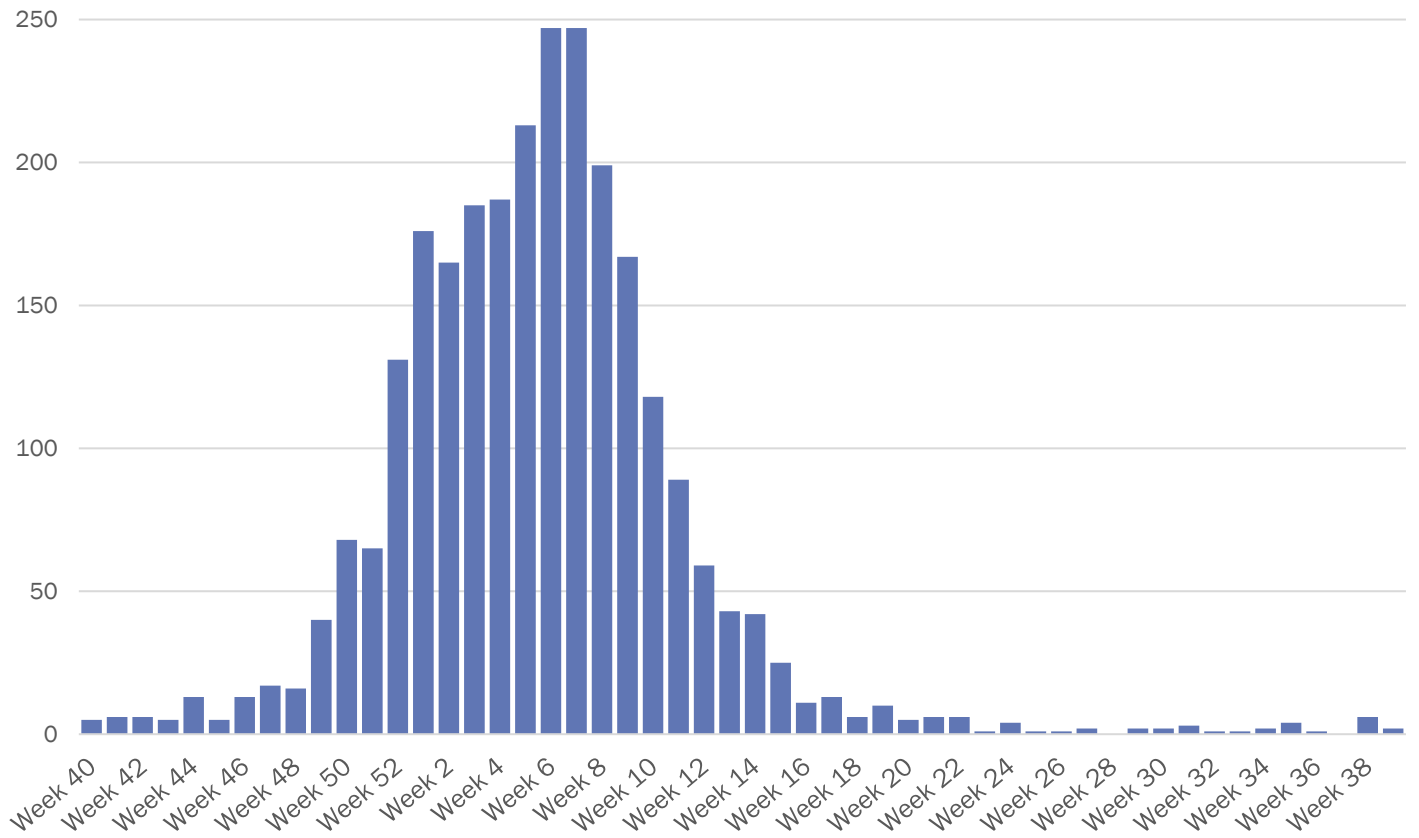


Table 6: Laboratory-Confirmed RSV Cases by Age Group in Maricopa County, 2016-2017

Age Group	Cases	Cases per 100,000 population
Age <1	1357	2499
Age 1 - 4	723	316
Age 5 - 17	115	16
Age 18 - 64	388	17
Age 65 +	596	129



APPENDIX

Influenza Season: The season is defined by MMWR surveillance weeks. The influenza seasons begins on the first day of week 40 and ends on the last day of week 39 of the previous year.

Influenza Case Definition: The Centers for Disease Control and Prevention defines an influenza-like illness as having the following symptoms:

Fever of 100° degrees Fahrenheit or higher AND one of the following:

- Cough
- Sore throat

Baseline and Threshold

The baseline is developed by calculating the mean percentage of patient visits for ILI at Emergency Departments or Out-patient Clinics respectively during non-influenza weeks for the previous three seasons and adding two standard deviations. A non-influenza week is defined as periods of two or more consecutive weeks in which each week accounted for less than 2% of the season's total number of specimens that tested positive for influenza in public health laboratories.

The baseline is defined as the mean of the county ILI% in weeks in the previous flu seasons in which two or more consecutive weeks each accounted for less than 2% of the season's total number of ILI cases reported by our Emergency Departments or Outpatient Facilities. The epidemic threshold is defined as the mean plus two standard deviations.

Baseline analysis is important for monitoring any disease that is endemic in a population. For viruses like influenza, which exists year round within a population, it is important to track cases of the disease in order to prevent potential outbreaks as well as create viable public health interventions. While most influenza cases are seen during the yearly "flu season," the disease persists within the population year-round and determining the baselines will provide advanced warning of the influenza activity even during the off-season in Maricopa County.

Regions: Regions in Arizona are defined by county: Central (Gila, Maricopa, Pinal); Northern (Apache, Coconino, Navajo, Yavapai); Southern (Cochise, Graham, Greenlee, Pima, Santa Cruz); Western (La Paz, Mohave, Yuma)

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.

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