



HAWAII STATE DEPARTMENT OF HEALTH DISEASE OUTBREAK CONTROL DIVISION 2018–2019 INFLUENZA SEASON SUMMARY

September 30, 2018 – September 28, 2019:
MMWR¹ Week 40, 2018 – 39, 2019

SUMMARY:

The 2018–19 influenza season began on MMWR week 40 (September 30, 2018) and ended week 39 (September 28, 2019). This was a moderate season when looking at the percentage of positive specimens, influenza-like illness (ILI) rate, pneumonia and influenza (P&I) mortality, and pediatric deaths, in comparison with baseline and historic levels.

The weekly proportion of outpatient visits for ILI recorded by sentinel providers in Hawaii throughout the season ranged from 0.5% to 5.2%. The data showed a rising ILI trend between weeks 4 (2018)–15 (2019), with a peak in visits at week 8 (5.2%). The timing was slightly later and shorter compared to national ILI rates which increased during weeks 52 (2018)–13 (2019). The ILI rate for the season was 2.4%, comparable to the average ILI for the past five seasons (i.e., inside the 95% confidence interval [2.1%, 2.9%]). Reported ILI rates were most pronounced for those aged 5–24 years, constituting 60% of all ILI visits. There were 33 influenza and ILI clusters during the season, which was comparable to the number of clusters in the past five seasons (i.e., inside the 95% confidence interval [24.9, 38.3]). These clusters were confirmed as influenza-positive or other respiratory viruses.

Pneumonia and influenza (P&I) mortality surveillance monitors the proportion of all reported deaths related to pneumonia and influenza. The Hawaii P&I contributed to a measure of P&I across the United States of America through the National Center for Health Statistics (NCHS). There were 11,550 total deaths recorded in Hawaii for the 2018–19 influenza season; of these, 964 (8.3%) were related to pneumonia or influenza. This is lower than the seasonal P&I rate in the past five influenza seasons (i.e., outside the 95% confidence interval [10.5%, 12.6%]). While there were no pediatric influenza deaths in Hawaii this season, 143 influenza-associated pediatric deaths were reported nationally to the Centers for Disease Control and Prevention (CDC) during the 2018–2019 season. This was comparable to the average number of pediatric deaths reported over the last five seasons (i.e., inside the 95% confidence interval [84.0, 175.2]).

Laboratory data showed 11,784 (20.9%) of the 56,472 specimens tested for influenza were positive by any method (rapid antigen testing, polymerase chain reaction [PCR], and/or viral culture). This was comparable to the median percent positivity (18.9%) documented for the past five seasons. A total of 37,531 (66.5%) samples were tested by rapid antigen testing only, while confirmatory testing (either RT-PCR or viral culture) was performed on the remaining 18,941 (33.5%). Of all specimens tested, 9,794 were positive for influenza A (17.3%), and 1,990 were positive for influenza B (3.5%). The 9,794 influenza A specimens included 765 2009 H1N1 specimens and 382 H3N2 specimens. The remainder (8,647) were not subtyped. The 1,990 influenza B specimens included 193 Victoria lineage specimens and 28 Yamagata lineage specimens. The remainder (1,769) were not sequenced for lineage. Stratifying by age groups, those aged 1 to 4 years old had the highest positive rate per 1,000 population (29.4%).

¹ MMWR stands for “Morbidity and Mortality Weekly Report,” conventionally used by the Centers for Disease Control and Prevention (CDC). The weeks of a flu season are often referred to by their respective MMWR week. See appendix 1 for interpretation of MMWR weeks.

Overall, the number of clusters reported, and P&I mortality remained comparable to previous seasons, while ILI activity and influenza specimen positivity during the 2018–2019 influenza season was higher than prior seasons. Notably, the timing of Hawaii’s peak ILI activity was earlier than that of the mainland. Historically, the mainland’s ILI activity and peak typically coincided or preceded Hawaii’s by several weeks. This emphasizes the variability of influenza seasons; each season can vary in timing, duration, and severity. Ongoing surveillance will continue to maintain timely situational awareness of influenza.

I. INFLUENZA-LIKE ILLNESS (ILI):

ILI surveillance is the primary method used for monitoring influenza activity during the season. The data used to determine the ILI rate in Hawaii originates from sentinel healthcare providers. Each year, sentinel providers register to report ILI data to the Hawaii Department of Health (HDOH) and CDC. A patient with ILI must have the following: fever (temperature of 100°F [37.8°C] or greater) and cough and/or sore throat without a known cause other than influenza. For the 2018–2019 influenza season, 31 sentinel providers registered for the ILINet surveillance program. Of those 31, 16 routinely reported their data to CDC and HDOH. The distribution of providers by practice type is shown below (Table 1). Internal medicine was the most common practice type, followed by family practice, pediatrics and emergency medicine. Student health (2) and urgent care (1) had the lowest representation.

TYPE OF PRACTICE	# OF SENTINEL PROVIDERS ACTIVELY REPORTING
Internal Medicine	10
Family Practice	9
Pediatrician	5
Emergency medicine	4
Student Health	2
Urgent Care	1

Table 1. Practice type distribution of the 31 reporting Hawaii ILI sentinel providers registered for the 2018–2019 season

Sentinel provider geographic representation was not equally distributed among the various counties; the most populous county, Honolulu (19), had the highest number of sentinel providers. Kauai (5), Maui (4), and Hawaii (3) had the fewest sentinel providers. CDC recommends that smaller states maintain at least 10 ILI sentinel providers per state.

LOCATION	# OF ACTIVELY REPORTING SENTINEL PROVIDERS	POPULATION (2018)	ACTIVE SENTINEL PROVIDERS PER 100,000 RESIDENTS
Honolulu	19 (61.3%)	979,858 (69.0%)	2.0
Maui	4 (12.9%)	167,058 (11.8%)	2.0
Hawaii	3 (9.7%)	201,509 (14.2%)	1.5
Kauai	5 (16.1%)	72,168 (5.1%)	7.0
Total	31	1,420,593	2.0

Table 2. Geographic distribution of the 31 reporting Hawaii ILI sentinel providers, by county

During the 2018–2019 influenza season, sentinel providers reported a total of 79,815 patient visits (a median of 1,545 per week). Of these total patient visits, 1,954 (2.4%) were for ILI, with an average of 38 visits per week which was statistically comparable to the average ILI rate for the past five flu seasons (i.e., inside the 95% confidence interval [2.1%, 2.9%]). For the 2018–2019 season, weeks 4 (2019)–11 (2019) had the highest ILI rates, with a peak of 5.2% occurring in week 8. For the majority (71%) of the season, the weekly proportion of

outpatient visits for ILI were statistically comparable to the historical baseline² for Hawaii, the national ILI rate, and the national ILI baseline³ set by CDC (Figure 1). The national ILI rate appeared to peak in week 7 (2019) which was comparable to the timing of the peak seen in Hawaii. In previous influenza seasons Hawaii's ILI peak either had similar timing or followed the national peak by approximately 3–4 weeks.

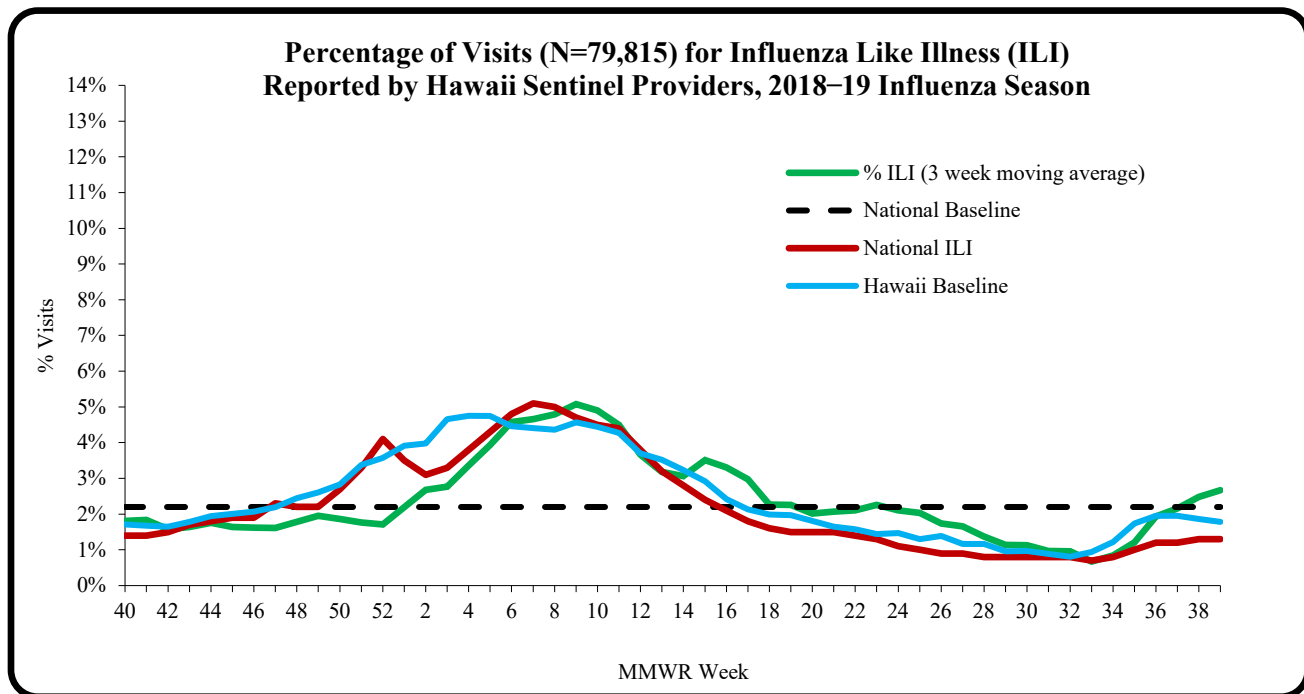


Figure 1. Comparison of the weekly Hawaii ILI rate, national baseline, national ILI rate, and Hawaii baseline by MMWR week, 2018–2019

The age group distribution of recorded ILI patients can be seen in Figure 2. The majority (60%) of all reported ILI patients were aged 5–24 yrs. Differences in distribution by age group may not only reflect differences in infection rates but may also be impacted by the practice types of the sentinel providers in our surveillance program as well as differential care-seeking behaviors in different age groups. About 3% of reported ILI patients were aged >65 yrs. However, this population may be seen by non-sentinel providers (e.g., nursing home providers) or because of age and comorbidities may have more severe presentations meriting emergency department care.

² The Hawaii historical baseline (%ILI and %P&I) is the average of 3-week moving averages over the preceding five flu seasons of historical data (2012–2013, 2013–2014, 2014–2015, 2015–2016, and 2016–2017).

³ The National Baseline is calculated by CDC as the mean percentage of visits for ILI during weeks 21–39 with two standard deviations. Because of large variability in regional ILI, comparison of the national baseline with local ILI may not be appropriate. It is provided in this report because no meaningful regional baselines are available for comparison. The national baseline combines all data reported by states to CDC, including ILI in outpatient, ER, urgent care, and inpatient settings.

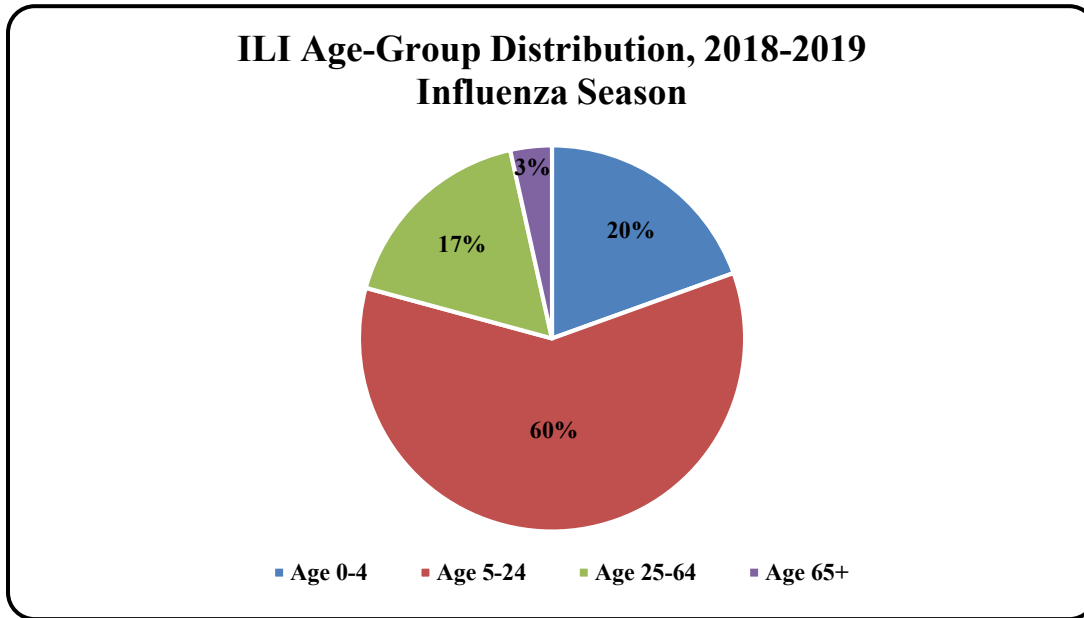


Figure 2. Age-group distribution of ILI visits for the 2017–2018 influenza season

There were 33 ILI or confirmed influenza clusters reported during the 2018–2019 season, which was comparable to the average number of clusters reported in the past five influenza seasons (i.e., inside the 95% confidence interval [24.9, 38.3]). The 2018–2019 season clusters were associated with long-term care facilities (13), hospitals (2), schools (15), and correctional facilities (3). Virus type of clusters, where known, can be seen in Figure 3. Nearly half (42.4%) of the reported clusters occurred during March 2019.

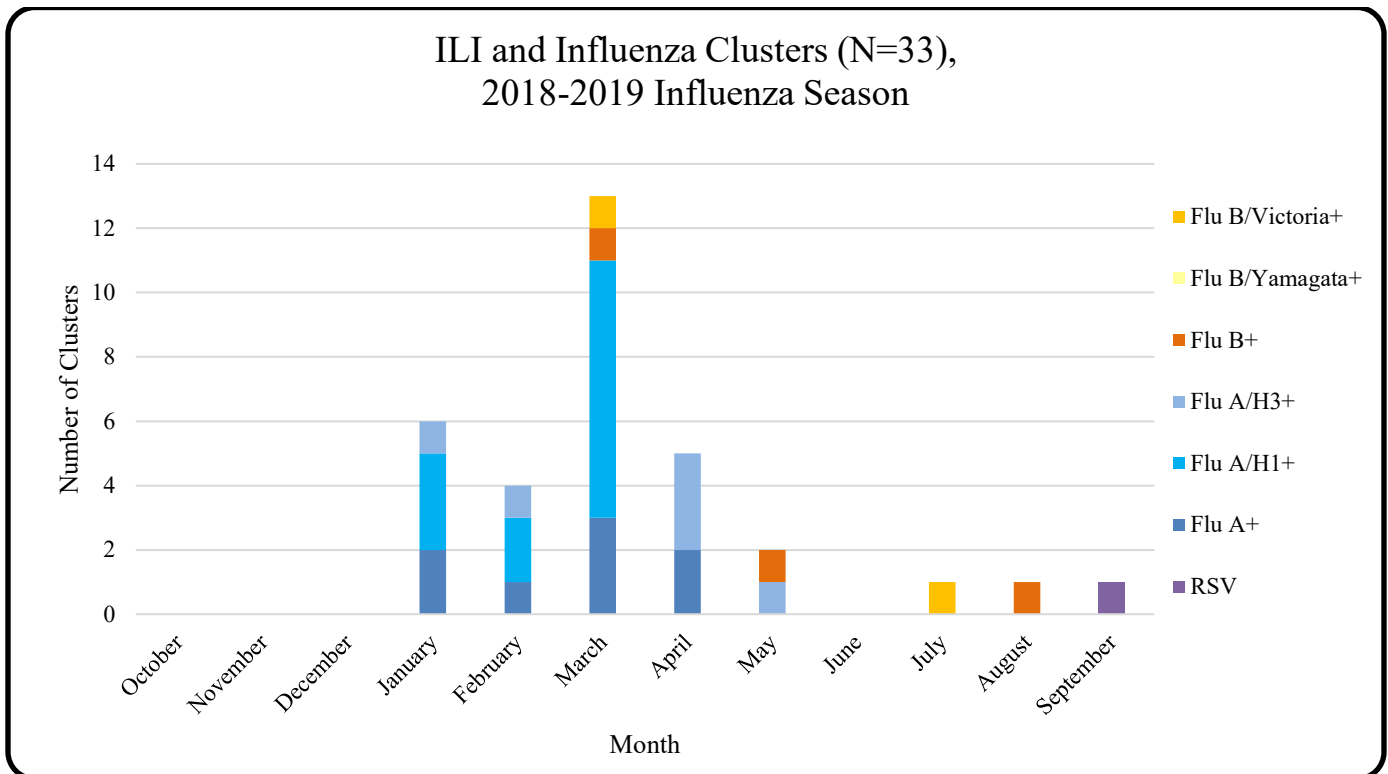


Figure 3. ILI and influenza clusters, by influenza type and MMWR week, for the 2018–2019 season

II. PNEUMONIA & INFLUENZA MORTALITY:

Pneumonia and influenza-related mortality is another method used to track influenza activity during the season. The data for pneumonia and influenza mortality comes from the Office of Vital Statistics at HDOH. The P&I rate is calculated by dividing the number of deaths related to P&I by the number of deaths from any cause.

Category	Number
Total deaths (all causes)	11,550
<i>Average/week</i>	222
Total deaths related to pneumonia/influenza	964
<i>Average/week</i>	18.6
Cumulative average P&I rate	8.3%
Peak P&I rate	11.5% (week 14)

Table 3. Pneumonia and influenza mortality statistics for the 2018–2019 influenza season

The table above shows cumulative P&I rate for the 2018–2019 season (8.3%) which was lower than the average P&I rates in the past five influenza seasons (i.e., outside the 95% confidence interval [10.5%, 12.6%]). The figure below (Figure 4) depicts the trends for the Hawaii P&I mortality 3 week moving average alongside three additional measures: a Hawaii historic baseline⁴, an epidemic threshold, and the NCHS mortality rate⁵. The peak for the Hawaii P&I rate occurred in week 14 (11.5%).

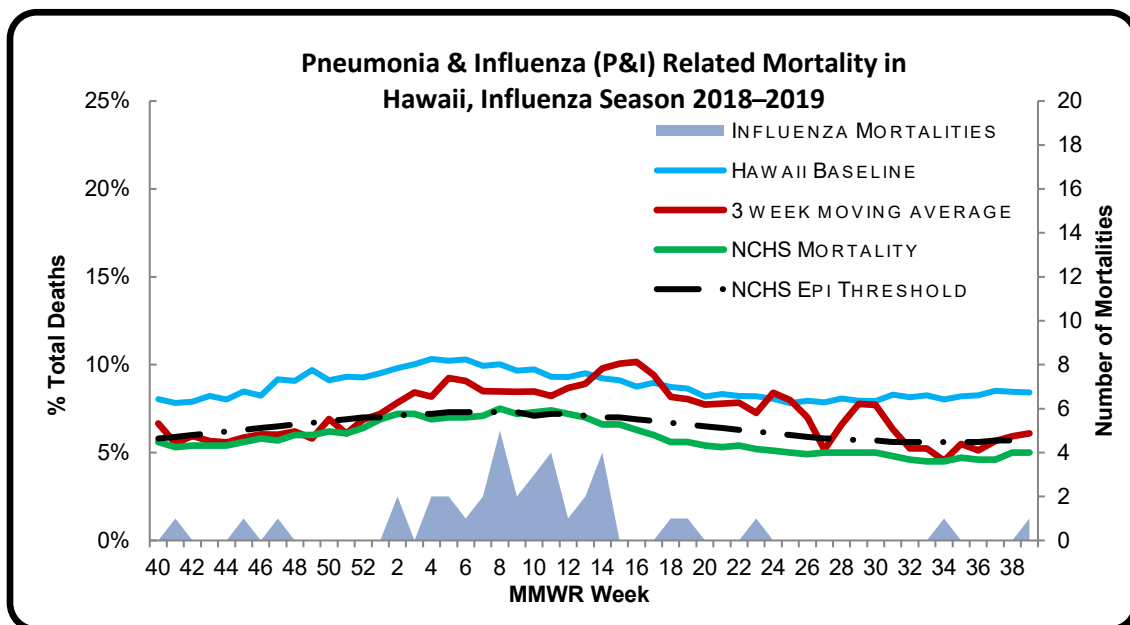


Figure 4. Pneumonia and influenza (P&I) related mortality in Honolulu by MMWR week for the 2018–19 influenza season

Additionally, influenza-associated pediatric deaths have been a nationally notifiable condition since 2004. While no such deaths were reported in Hawaii during the 2018–19 season, 143 were reported nationally to CDC, which was comparable to the average number of pediatric deaths for the past five influenza seasons (i.e., inside the 95% confidence interval [84.0, 175.2]).⁶

⁴ The Hawaii historical baseline (%ILI and %P&I) is the average of 3-week moving averages over the preceding five flu seasons of historical (2012–2013, 2013–2014, 2014–2015, 2015–2016, and 2016–2017).

⁵ Each week, the National Center for Health Statistics (NCHS) collects death certificates from state vital statistics offices for virtually all deaths occurring in the United States. The number of those for which pneumonia or influenza was listed as the underlying or contributing cause of death are reported. The percentage of deaths related to pneumonia and influenza (P&I) are compared with a seasonal baseline and epidemic threshold value calculated for each week

⁶ FluView, accessed 11/30/2018: <https://gis.cdc.gov/GRASP/Fluview/PedFluDeath.html>

III. LABORATORY SURVEILLANCE:

During the 2018–19 influenza season, the State Laboratories Division (SLD) of the Hawaii Department of Health (HDOH) tested 2,845 specimens for influenza. Specimen submissions have steadily increased over the past several years, and an algorithm was developed to accommodate the high specimen volume, reduce turnaround time, optimize data quality, and improve utilization of limited resources. DOCD drafted a list with criteria⁷ to prioritize specimens for confirmatory testing at SLD. Within the constraints of resources and funding, specimens meeting these criteria were forwarded to SLD for confirmatory testing.

TOTAL SPECIMENS TESTED FROM ALL LABORATORIES, 2018–2019: 56,472			
SPECIMENS TESTING POSITIVE, 2018–2019: 11,784 (20.9%)			
MEDIAN SPECIMEN POSITIVITY FOR THE PAST FIVE SEASONS: 8,102 (18.9%)			
TESTING TYPE	RAPID ANTIGEN ONLY	37,531	66.5%
	CONFIRMATORY (RT-PCR OR VIRAL CULTURE)	18,941	33.5%
INFLUENZA TYPING	A	9,794	17.3%
	B	1,990	3.5%
INFLUENZA A SUB-TYPING	2009 H1N1	765	1.4%
	INFLUENZA A (H3)	382	0.7%
INFLUENZA B	VICTORIA	193	0.3%
GENOTYPING	YAMAGATA	28	0.1%

Table 4. Testing, typing and subtyping for influenza during the 2018–2019 season

⁷ The list of priority specimens includes: hospitalized patients with acute respiratory distress syndrome [ARDS] or x-ray confirmed pneumonia; travelers with international travel history within 10 days of onset; specimens submitted by sentinel providers; specimens collected from healthcare workers, pregnant women, or women up to 6 weeks post-partum; those with underlying medical conditions; and patients presenting with unusual or severe manifestations of influenza infection.

The distribution of population-based rates of positive influenza cases in Hawaii by age group is shown below (Figure 5). Influenza positive rates were calculated using Hawaii’s 2018 population data. For the 11,784 positive specimens, those aged 1 to 4 years old had the highest positive rate per 1,000 population (29.4%), followed by those <1 years old (24.2%) and 5 to 24 years old (14.1%). The >65 age group had the lowest rate per 1,000 population (4.8%), followed by those aged 25-44 years old (5.3%) and 45-64 years old (5.0%).

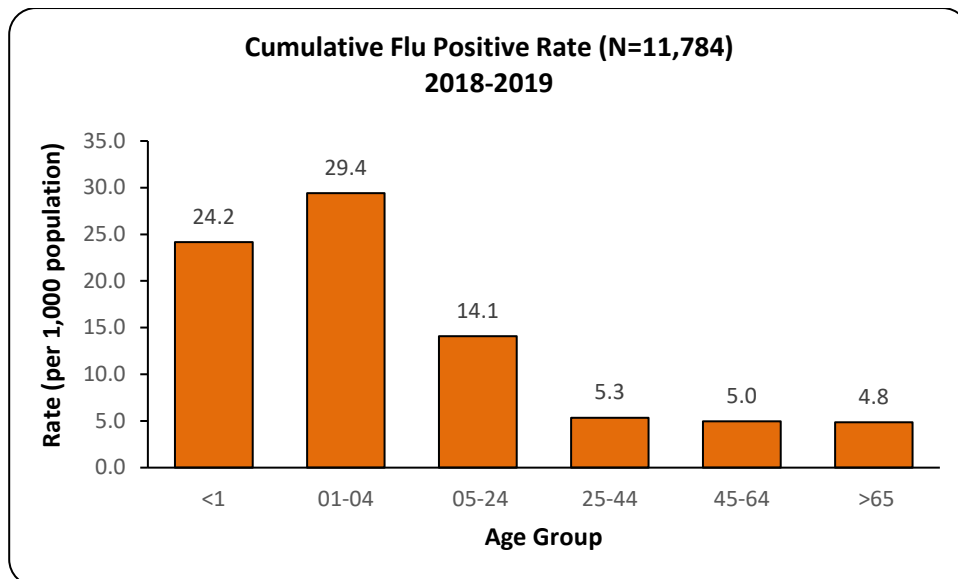


Figure 5. Age (years) group distribution of influenza specimens tested positive during the 2018–2019 season

IV. AIRPORT SURVEILLANCE:

HDOH introduced passive airport influenza surveillance in collaboration with CDC’s Daniel K. Inouye International Airport Quarantine Station and Daniel K. Inouye Airport Medical Response staff during the 2005–2006 influenza season. Travelers meeting clinical criteria⁸ are consented for testing and then swabbed at the airport. Specimens were tested at SLD by RT-PCR for influenza as well as for other respiratory viruses via a respiratory pathogen panel (GenMark Diagnostics, Carlsbad, California). During the 2018–2019 season, 13 air travelers⁹ meeting clinical criteria were swabbed and tested. One specimen was positive for influenza A(H1N1), one for influenza B Yamagata, three for influenza B Victoria, 10 were negative for influenza but positive for other respiratory pathogens, and one was negative for influenza and other respiratory pathogens¹⁰ tested, and four were co-infections of respiratory pathogens.

V. AVIAN INFLUENZA:

No cases of avian influenza infection in humans were identified in the United States during the 2018–2019 influenza season. As of the end of the 2018–2019 influenza season, human cases of avian influenza A (H5N1) have been detected in 17 countries since surveillance began in 2003. A total of 861 cases and 455 deaths have been identified globally; the countries with the highest numbers of A(H5N1) infected cases were Egypt, Indonesia, Viet Nam, Cambodia, and China. These five countries represented 795 (92.3%) of the total cases and 418 (91.9%) of the total deaths reported. There was one case of avian influenza A(H5N1) reported to WHO from

⁸ Clinical criteria were defined as a fever or history of fever (i.e., body temperature 100°F or greater) plus one or more of the following symptoms: headache, muscle aches, sore throat, cough, chills, malaise, and/or vomiting.

⁹ Denominator data are currently unavailable.

¹⁰ GenMark Diagnostics, Carlsbad, CA GenMark RPP detects: human metapneumovirus, rhinovirus, respiratory syncytial virus (RSV) A and B, parainfluenza 1-3, and adenovirus B, C, and E.

Nepal during the 2018–2019 season. Since 2013, 1,567 laboratory-confirmed cases of human infection with avian influenza A(H7N9) viruses, including at least 615 deaths, have been reported to WHO¹¹.

Country	2003-2009*		2010-2014**		2015		2016		2017		2018		2019		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	8	5	0	0	0	0	0	0	0	0	0	0	0	0	8	5
Bangladesh	1	0	6	1	1	0	0	0	0	0	0	0	0	0	8	1
Cambodia	9	7	47	30	0	0	0	0	0	0	0	0	0	0	56	37
Canada	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
China	38	25	9	5	6	1	0	0	0	0	0	0	0	0	53	31
Djibouti	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Egypt	90	27	120	50	136	39	10	3	3	1	0	0	0	0	359	120
Indonesia	162	134	35	31	2	2	0	0	1	1	0	0	0	0	200	168
Iraq	3	2	0	0	0	0	0	0	0	0	0	0	0	0	3	2
Lao People's Democratic Republic	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Myanmar	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Nepal	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Nigeria	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Pakistan	3	1	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Thailand	25	17	0	0	0	0	0	0	0	0	0	0	0	25	17	
Turkey	12	4	0	0	0	0	0	0	0	0	0	0	0	12	4	
Viet Nam	112	57	15	7	0	0	0	0	0	0	0	0	0	127	64	
Total	468	282	233	125	145	42	10	3	4	2	0	0	1	1	861	455

Table 5. Laboratory-confirmed avian influenza A(H5N1) cases, by year and county, as reported to the World Health Organization, 2003–2019¹²

APPENDIX 1: ADDITIONAL INFORMATION

For more information regarding local and national influenza surveillance programs, visit the following sites.

Centers for Disease Control and Prevention	<p>General Influenza: http://www.cdc.gov/flu/about/disease/index.htm</p> <p>National ILI and P&I Data: http://www.cdc.gov/flu/weekly/fluactivitysurv.htm</p> <p>Vaccine Virus Selection: http://www.cdc.gov/flu/about/season/vaccine-selection.htm</p>
Flu.gov	General Influenza Information: flu.gov
HDOH Flu and Pneumonia	<p>General Influenza: http://health.hawaii.gov/docd/disease_listing/influenza-flu/</p> <p>Surveillance: http://health.hawaii.gov/docd/resources/reports/influenza-reports/</p> <p>To find out more information or join the sentinel physician program, email: DOH.Influenza.Surveillance@doh.hawaii.gov</p>
World Health Organization	<p>General Global and Local Influenza: http://www.who.int/topics/influenza/en/</p> <p>Avian Influenza: http://www.who.int/influenza/human_animal_interface/avian_influenza/en/</p>

¹¹ WHO, accessed on 12/15/2020: https://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_25_11_2019.pdf?ua=1

¹² WHO, accessed on 12/15/2020: https://www.who.int/influenza/human_animal_interface/2019_11_25_tableH5N1.pdf?ua=1

APPENDIX 2: MMWR WEEK

Please refer to the table below to interpret data presented by MMWR week.

MMWR WEEK	2018	2019
1	1/6/2018	1/5/2019
2	1/13/2018	1/12/2019
3	1/20/2018	1/19/2019
4	1/27/2018	1/26/2019
5	2/3/2018	2/2/2019
6	2/10/2018	2/9/2019
7	2/17/2018	2/16/2019
8	2/24/2018	2/23/2019
9	3/3/2018	3/2/2019
10	3/10/2018	3/9/2019
11	3/17/2018	3/16/2019
12	3/24/2018	3/23/2019
13	3/31/2018	3/30/2019
14	4/7/2018	4/6/2019
15	4/14/2018	4/13/2019
16	4/21/2018	4/20/2019
17	4/28/2018	4/27/2019
18	5/5/2018	5/4/2019
19	5/12/2018	5/11/2019
20	5/19/2018	5/18/2019
21	5/26/2018	5/25/2019
22	6/2/2018	6/1/2019
23	6/9/2018	6/8/2019
24	6/16/2018	6/15/2019
25	6/23/2018	6/22/2019
26	6/30/2018	6/29/2019
27	7/7/2018	7/6/2019
28	7/14/2018	7/13/2019
29	7/21/2018	7/20/2019
30	7/28/2018	7/27/2019
31	8/4/2018	8/3/2019
32	8/11/2018	8/10/2019
33	8/18/2018	8/17/2019
34	8/25/2018	8/24/2019
35	9/1/2018	8/31/2019
36	9/8/2018	9/7/2019
37	9/15/2018	9/14/2019
38	9/22/2018	9/21/2019
39	9/29/2018	9/28/2019
40	10/6/2018	10/5/2019
41	10/13/2018	10/12/2019
42	10/20/2018	10/19/2019
43	10/27/2018	10/26/2019
44	11/3/2018	11/2/2019
45	11/10/2018	11/9/2019
46	11/17/2018	11/16/2019
47	11/24/2018	11/23/2019
48	12/1/2018	11/30/2019
49	12/8/2018	12/7/2019
50	12/15/2018	12/14/2019
51	12/22/2018	12/21/2019
52	12/29/2018	12/28/2019