HAWAII STATE DEPARTMENT OF HEALTH
DISEASE OUTBREAK CONTROL DIVISION
2017–2018 INFLUENZA SEASON SUMMARY

October 2, 2017 – September 30, 2018: MMWR[1] Week 40, 2017 – 39, 2018

SUMMARY:

The 2017–18 influenza season began on MMWR week 40 (October 1, 2017) and ended week 39 (September 29, 2018). 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 0.4% to 8.6%. The data showed a rising ILI trend between weeks 48 (2017)–11 (2018), with a peak in visits at week 52 (8.6%). This came earlier and lasted longer compared to national ILI rates which increased during weeks 51 (2017)–8 (2018). The ILI rate for the season was 3.0%, higher than the average ILI for the past five seasons (i.e., outside the 95% confidence interval [2.2%, 2.5%]). Reported ILI rates were most pronounced for those aged 5–24 years, constituting 57% of all ILI visits. There were 35 ILI clusters during the season, which was similar to the number of clusters in the past five seasons (i.e., inside the 95% confidence interval [24.3, 36.9]). These ILI clusters were confirmed as influenza-positive.

Pneumonia and influenza (P&I) mortality surveillance monitors the proportion of all reported deaths related to pneumonia and influenza. The Honolulu 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 4,333 total deaths recorded in Honolulu for the 2017–18 influenza season; of these, 526 (12.7%) were related to pneumonia or influenza. This is similar to the seasonal P&I rate in the past five influenza seasons (i.e., inside the 95% confidence interval [10.4%, 12.4%]). While there were no pediatric influenza deaths in Hawaii this season, 185 influenza-associated pediatric deaths were reported nationally to the Centers for Disease Control and Prevention (CDC) during the 2017–2018 season. This was higher than the average number of pediatric deaths reported over the last five seasons (i.e., outside the 95% confidence interval [87.5, 166.1]).

Laboratory data showed 12,359 (21.0%) of the 58,748 specimens tested for influenza were positive by any method (rapid antigen testing, polymerase chain reaction [PCR], and/or viral culture). This was higher than the median percent positivity (16.3%) documented for the past five seasons. A total of 36,360 (61.9%) samples were tested by rapid antigen testing only, while confirmatory testing (either RT-PCR or viral culture) was performed on the remaining 22,388 (38.1%). Of all specimens tested, 8,110 were positive for influenza A (13.8%), and 4,249 were positive for influenza B (7.2%). The 8,110 influenza A specimens included 102 2009 H1N1 specimens and 1,082 H3N2 specimens. The remainder (6,926) were not subtyped. The 4,249 influenza B specimens included 43 Victoria lineage specimens and 501 Yamagata lineage specimens. The remainder (3,705) were not sequenced for lineage. Stratifying by age groups, those aged >65 yrs comprised the largest proportion of specimens tested for influenza (25%), but those aged 5–24 yrs comprised the largest proportion (29%) of positive influenza tests.

Overall, the number of clusters reported and P&I mortality remained similar to previous seasons, while ILI activity and influenza specimen positivity during the 2017–2018 influenza season was higher than prior seasons.

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[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.

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 2017–2018 influenza season, 30 sentinel providers registered for the ILINet surveillance program. Of those 30, 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 and pediatrics. Student health (2), urgent care (1), and emergency medicine (1) had the lowest representation.

TYPE OF PRACTICE	# OF SENTINEL PROVIDERS ACTIVELY REPORTING
Internal Medicine	9
Family Practice	7
Pediatrician	5
Student Health	2
Urgent Care	1
Emergency medicine	1

Table 1. Practice type distribution of the 25 reporting Hawaii ILI sentinel providers registered for the 2017–2018 season

Sentinel provider geographic representation was not equally distributed among the various counties; the most populous county, Honolulu (18), had the highest number of sentinel providers. Maui (3), Hawaii (3), and Kauai (1) 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 (2017)	ACTIVE SENTINEL PROVIDERS PER 100,000 RESIDENTS
Honolulu	18 (72.0%)	988,650 (69.2%)	2.0
Maui	3 (12.0%)	166,348 (11.7%)	2.0
Hawaii	3 (12.0%)	200,381 (14.0%)	1.0
Kauai	1 (4.0%)	72,159 (5.1%)	1.0
Total	**25**	**1,427,538**	**2.0**

Table 2. Geographic distribution of the 25 reporting Hawaii ILI sentinel providers, by county

During the 2017–2018 influenza season, sentinel providers reported a total of 61,935 patient visits (a median of 1,176 per week). Of these total patient visits, 1,856 (3.0%) were for ILI, with an average of 36 visits per week which was statistically higher than the average ILI rate for the past five flu seasons (i.e., outside the 95% confidence interval [2.2%, 2.5%]). For the 2017–2018 season, weeks 48 (2017)–11 (2018) had the highest ILI rates, with a peak of 8.6% occurring in week 52. For the majority (64%) of the season, the weekly proportion of

outpatient visits for ILI were statistically comparable to the historical baseline[2] for Hawaii, the national ILI rate, and the national ILI baseline[3] set by CDC (Figure 1). The national ILI rate appeared to peak in weeks 51 (2017)–8 (2018), which was later than the timing of the peak seen in Hawaii. This was not typical; for the past five out of five influenza seasons Hawaii's ILI peak either had similar timing or followed the national peak by approximately 3–4 weeks.
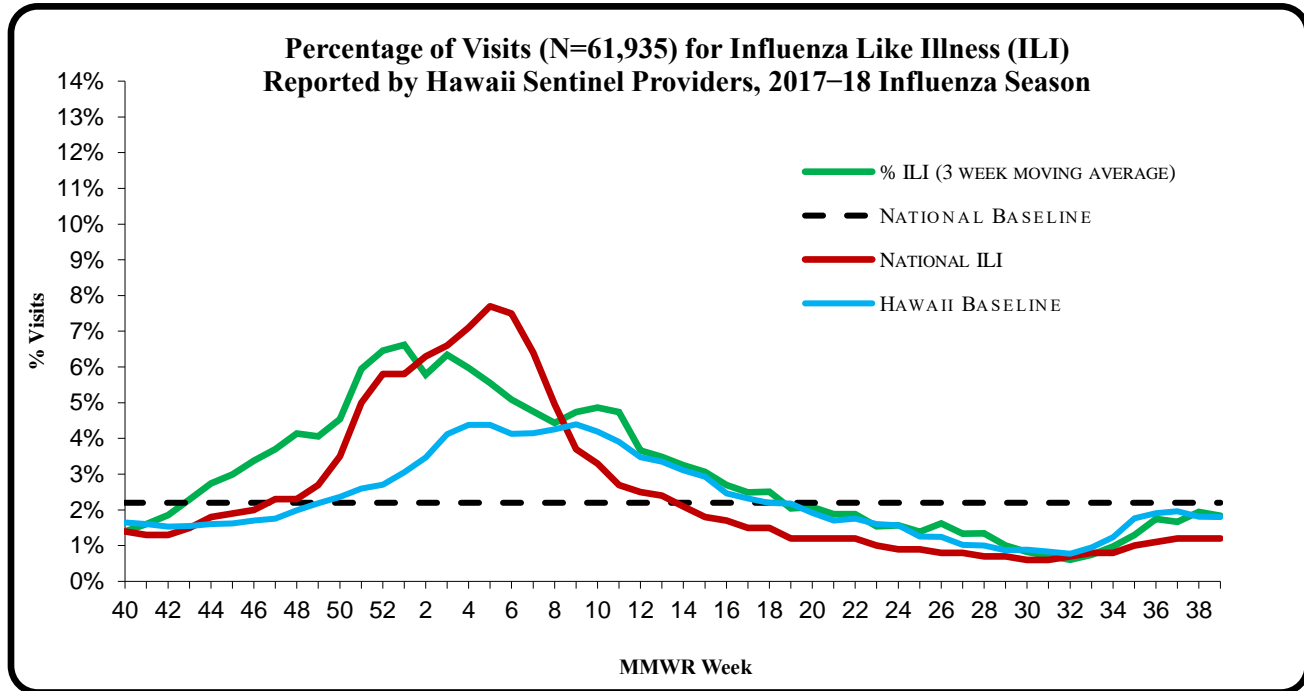

Figure 1. Comparison of the weekly Hawaii ILI rate, national baseline, national ILI rate, and Hawaii baseline by MMWR week, 2017–2018

The age group distribution of recorded ILI patients can be seen in Figure 2. More than half (57%) 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 4% 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.

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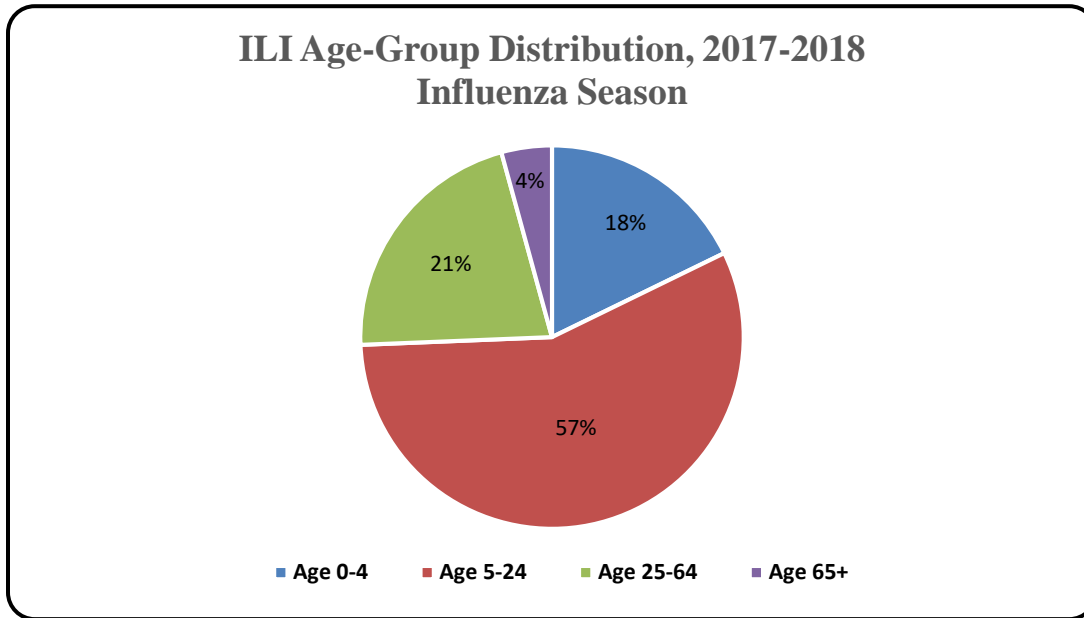
Figure 2. Age-group distribution of ILI visits for the 2017–2018 influenza season

There were 35 ILI or confirmed influenza clusters reported during the 2017–2018 season, which was comparable to the average number of clusters reported in the past five influenza seasons (i.e., inside the 95% confidence interval [24.3, 36.9]). The 2017–2018 season clusters were associated with long-term care facilities (26), hospitals (2), and schools (7). Virus type of clusters, where known, can be seen in Figure 3. Nearly half (45.7%) of the reported clusters occurred during December 2017.
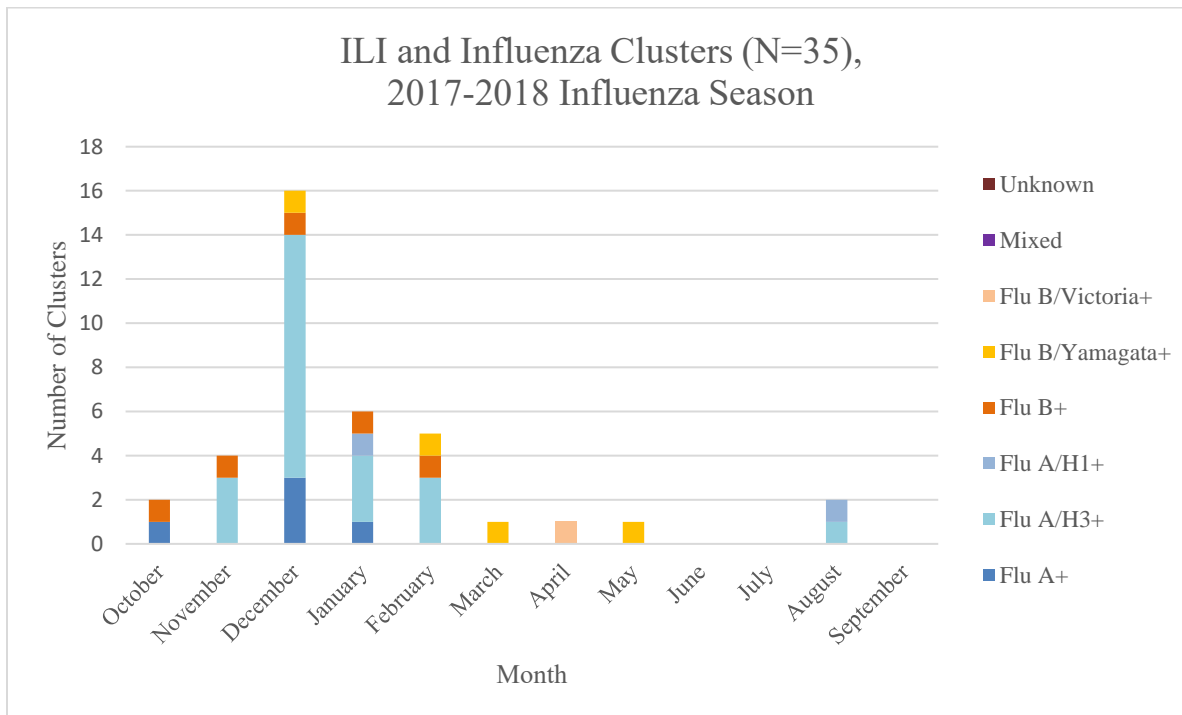

Figure 3. ILI and influenza clusters, by influenza type and MMWR week, for the 2017–2018 season

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)	4,333
Average/week	*83.3*
Total deaths related to pneumonia/influenza	526
Average/week	*10.1*
Cumulative average P&I rate	12.1%
Peak P&I rate	20.2% (week 6)

Table 3. Pneumonia and influenza mortality statistics for the 2017–2018 influenza season

The table above shows cumulative P&I rate for the 2017–2018 season (12.1%) which was comparable to the average P&I rates in the past five influenza seasons (i.e., inside the 95% confidence interval [10.4%, 12.4%]). 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 baseline[4], an epidemic threshold, and the NCHS mortality rate[5]. The peak for the Hawaii P&I rate occurred in week 6 (20.2%).
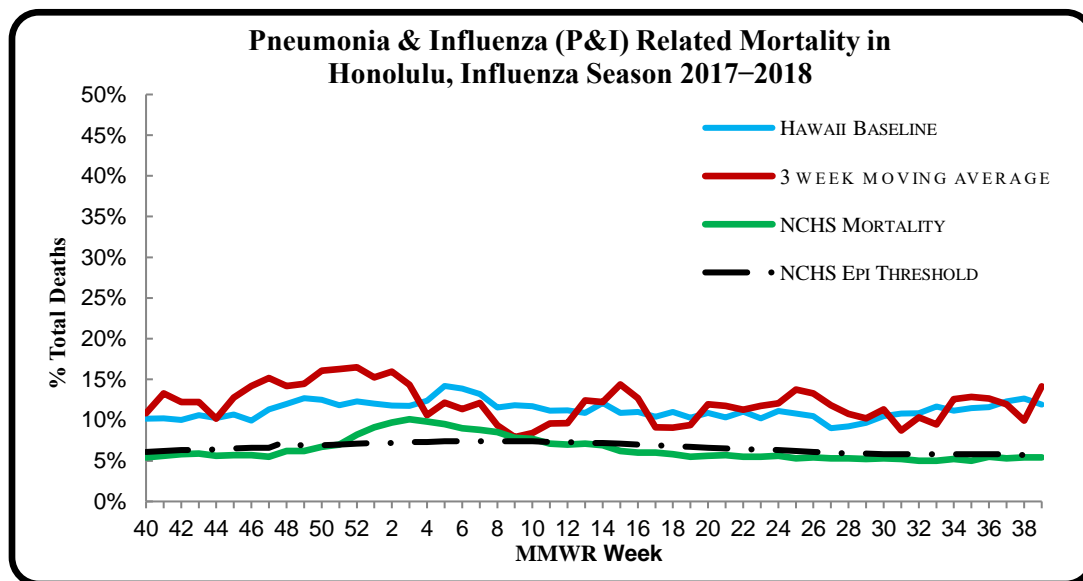

Figure 4. Pneumonia and influenza (P&I) related mortality in Honolulu by MMWR week for the 2017–18 influenza season

Additionally, influenza-associated pediatric deaths have been a nationally notifiable condition since 2004. While no such deaths were reported in Hawaii during the 2017–18 season, 185 were reported nationally to CDC, which was higher than the average number of pediatric deaths for the past five influenza seasons (i.e., outside the 95% confidence interval [87.5, 166.1]).[6]

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[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 2017–18 influenza season, the State Laboratories Division (SLD) of the Hawaii Department of Health (HDOH) tested 3,424 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 criteria[7] 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, 2017–2018: 58,748			
SPECIMENS TESTING POSITIVE, 2017–2018: 12,359 (21.0%)			
MEDIAN SPECIMEN POSITIVITY FOR THE PAST FIVE SEASONS: 8,102 (16.3%)			
TESTING TYPE	RAPID ANTIGEN ONLY	36,360	61.9%
	CONFIRMATORY (RT-PCR OR VIRAL CULTURE)	22,388	38.1%
INFLUENZA TYPING	A	8,110	13.8%
	B	4,249	7.2%
INFLUENZA A SUB-TYPING	2009 H1N1	102	0.8%
	INFLUENZA A (H3)	1,082	8.8%
INFLUENZA B GENOTYPING	VICTORIA	43	0.4%
	YAMAGATA	501	4.1%

Table 4. Testing, typing and subtyping for influenza during the 2017–2018 season

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[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 by age group for the specimens tested and positive specimens is shown below (Figure 5). For the 58,748 specimens tested, the distribution by age group was fairly uniform, although those aged >65 yrs represented the highest proportion (25%) and those aged <1 yrs represented the lowest proportion (6%). Those aged 5 to 24 yrs made up the largest proportion of positive influenza specimens (29%).
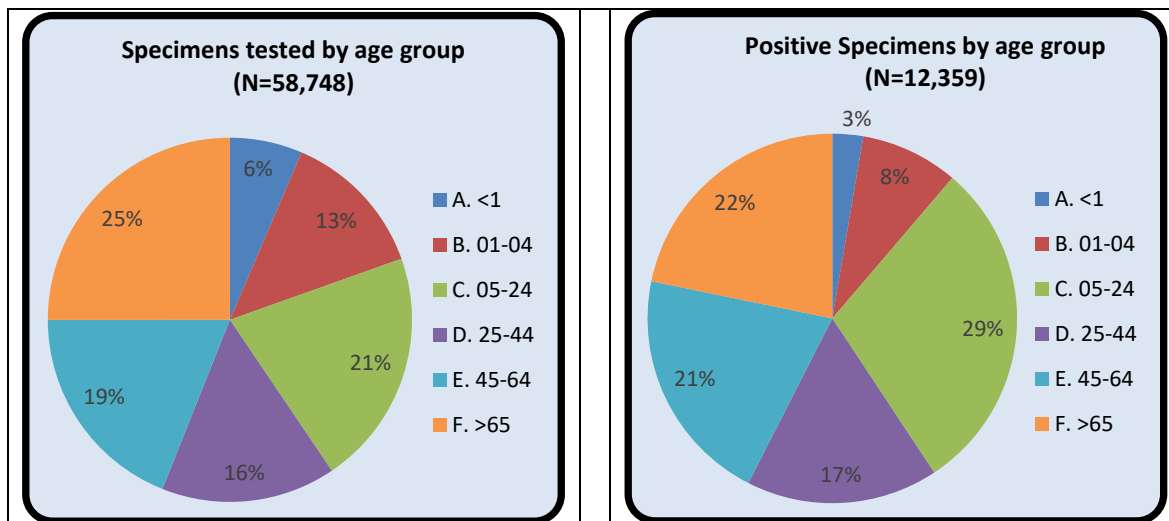
Figure 5. Age (yrs) group distribution of influenza specimens tested and positive cases during the 2017–2018 season

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 criteria[8] 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 GenMark eSensor respiratory virus panel (GenMark Diagnostics, Carlsbad, California). During the 2017–2018 season, eight air travelers[9] meeting clinical criteria were swabbed and tested. One specimen was positive for influenza A(H3), six were negative for influenza but positive for other respiratory pathogens, and one was negative for influenza and other respiratory pathogens[10] tested.

V. AVIAN INFLUENZA:

No cases of avian influenza infection in humans were identified in the United States during the 2017–2018 influenza season. As of the end of the 2017–2018 influenza season, human cases of avian influenza A (H5N1) have been detected in 16 countries since surveillance began in 2003. A total of 860 cases and 454 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 (92.4%) of the total cases and 418 (92.5%) of the total deaths reported. There were no cases of avian influenza A(H5N1) reported to WHO during the 2017–2018 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 WHO[11].

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[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 eSensor RVP detects: human metapneumovirus, rhinovirus, respiratory syncytial virus (RSV) A and B, parainfluenza 1-3, and adenovirus B, C, and E.
[11] WHO, accessed on 11/30/218: https://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_21_09_2018-revised.pdf?ua=1

Country	2003-2009* cases	deaths	2010-2014** cases	deaths	2015 cases	deaths	2016 cases	deaths	2017 cases	deaths	2018 cases	deaths	Total cases	deaths
Azerbaijan	8	5	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	8	1
Cambodia	9	7	47	30	0	0	0	0	0	0	0	0	56	37
Canada	0	0	1	1	0	0	0	0	0	0	0	0	1	1
China	38	25	9	5	6	1	0	0	0	0	0	0	53	31
Djibouti	1	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	359	120
Indonesia	162	134	35	31	2	2	0	0	1	1	0	0	200	168
Iraq	3	2	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	2	2
Myanmar	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Nigeria	1	1	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	3	1
Thailand	25	17	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	12	4
Viet Nam	112	57	15	7	0	0	0	0	0	0	0	0	127	64
Total	468	282	233	125	145	42	10	3	4	2	0	0	860	454

Table 5. Laboratory-confirmed avian influenza A (H5N1) cases, by year and county, as reported to the World Health Organization, 2003–2018[12]

APPENDIX 1: ADDITIONAL INFORMATION

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

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

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[12] WHO, accessed on 11/30/218: https://www.who.int/influenza/human_animal_interface/2018_09_21_tableH5N1.pdf?ua=1

APPENDIX 2: MMWR WEEK

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

MMWR WEEK	2017	2018
1	1/9/2016	1/7/2017
2	1/16/2016	1/14/2017
3	1/23/2016	1/21/2017
4	1/30/2016	1/28/2017
5	2/6/2016	2/4/2017
6	2/13/2016	2/11/2017
7	2/20/2016	2/18/2017
8	2/27/2016	2/25/2017
9	3/5/2016	3/4/2017
10	3/12/2016	3/11/2017
11	3/19/2016	3/18/2017
12	3/26/2016	3/25/2017
13	4/2/2016	4/1/2017
14	4/9/2016	4/8/2017
15	4/16/2016	4/15/2017
16	4/23/2016	4/22/2017
17	4/30/2016	4/29/2017
18	5/7/2016	5/6/2017
19	5/14/2016	5/13/2017
20	5/21/2016	5/20/2017
21	5/28/2016	5/27/2017
22	6/4/2016	6/3/2017
23	6/11/2016	6/10/2017
24	6/18/2016	6/17/2017
25	6/25/2016	6/24/2017
26	7/2/2016	7/1/2017
27	7/9/2016	7/8/2017
28	7/16/2016	7/15/2017
29	7/23/2016	7/22/2017
30	7/30/2016	7/29/2017
31	8/6/2016	8/5/2017
32	8/13/2016	8/12/2017
33	8/20/2016	8/19/2017
34	8/27/2016	8/26/2017
35	9/3/2016	9/2/2017
36	9/10/2016	9/9/2017
37	9/17/2016	9/16/2017
38	9/24/2016	9/23/2017
39	10/1/2016	9/30/2017
40	10/8/2016	10/7/2017
41	10/15/2016	10/14/2017
42	10/22/2016	10/21/2017
43	10/29/2016	10/28/2017
44	11/5/2016	11/4/2017
45	11/12/2016	11/11/2017
46	11/19/2016	11/18/2017
47	11/26/2016	11/25/2017
48	12/3/2016	12/2/2017
49	12/10/2016	12/9/2017
50	12/17/2016	12/16/2017
51	12/24/2016	12/23/2017
52	12/31/2016	12/30/2017
53		