



Cumulative Incidence Estimates of Medically Attended Seasonal Influenza from 2011-2016 for the Central Texas Baylor Scott & White Health - Temple Population Research Area (BSWH-TPRA).

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Abstract

Background: Severity and burden of influenza can be estimated with the cumulative incidence of lab-confirmed influenza among medically-attended acute respiratory illnesses (MAARI) during local circulation.

Methods: BSWH is one of 5 CDC US Flu Vaccine Effectiveness network sites since 2011. The BSWH-TPRA source population was defined as residents from zip codes within East Bell County, Central Texas (CTX), who have seen a primary care provider for any reason in the past 3 years. We enrolled outpatients with acute respiratory illness of ≤ 7 days, with cough and tested nasal-throat swabs for influenza A&B by RT-PCR. Vaccination was verified with electronic records. We divided the population into 4 age strata and 2 vaccination statuses. Within each stratum and status, we formed 3 subgroups based on number of MAARIs: (None, 1, and ≥ 2). Applying proportions observed in the enrollees, we estimated the cumulative incidence of medically-attended seasonal influenza.

Results:
 Table: Cumulative Incidence of Seasonal Influenza in the BSWH-TPRA 2011-12 to 2015-16.

Influenza Season (Severity)	Percentages of predominant Influenza Type, A Subtype and B lineage in enrollees	Cumulative Incidence % (95% CI)
2011-12 (Mild)	A (H1N1)pdm09 (84%)	0.72% (0.53-0.92)
2012-13 (Moderately-severe)	A (H3N2) (51%), B-Yamagata (36%), B-Victoria (10%)	5.95% (5.52-6.38)
2013-14 (Moderate)	pH1N1 (77%)	2.44% (2.12-2.77)
2014-15 (Moderately-severe)	A (H3N2) (75%)	4.14% (3.73-4.55)
2015-16 (Moderate)	A (H1N1)pdm09 (27%), B-Victoria (46%)	2.61% (2.23-2.99)

The highest incidence during 2011-12, 2012-13 and 2014-15 was among persons ages 6 months - 8 years, 1.61%; 95% CI (0.88-2.33), 8.96%; 95% CI (7.48-10.43) and 7.27%; 95% CI (5.83-8.72) respectively. During 2013-14, it was among those ages ≥ 50 years: 2.79%; 95% CI (2.17-3.42) and during 2015-16, it was seen among those 9 years -18 years: 5.05%; 95% CI (3.91-6.19).

Conclusions: The cumulative incidence of medically-attended influenza in 2013-14, when the burden of A (H1N1)pdm09 shifted to those aged ≥ 50 years was higher than in 2011-12. The highest incidence was seen in 2012-13 season when A H3N2 and both B-lineages circulated. Influenza immunization programs should especially target age-groups 6 months to 18 years and ≥ 50 years.

Background

- Severity and burden of influenza can be estimated with the cumulative incidence of lab-confirmed influenza among medically-attended acute respiratory illnesses (MAARI) during local circulation
- Cumulative incidence can be used to guide local influenza vaccination programs
- The CDC US Flu VE network is comprised of 5 sites in Michigan, Pennsylvania, Texas, Washington and Wisconsin

Objective

- To estimate cumulative incidence of lab-confirmed influenza among medically-attended acute respiratory illnesses (MAARI) during local circulation from 2011-16

Methods

Source Population

BSWH-Temple Population Research Area (TPRA):

- All residential zip codes in East Bell County, Central Texas
- Born before March 1 of each year and have seen a primary care service provider for any reason in the past 3 years
- Prospective study of outpatients with acute respiratory illness of ≤ 7 days, with cough
- Tested combined nasal and throat swabs for influenza A&B by RT-PCR.
- Exclusion criteria:
 - Received Oseltamivir (Tamiflu) or Zanamivir (Relenza) in the past 7 days
- Vaccination verified with electronic medical records
- Source and Enrolled Population Stratification
 - Age: 6 months – 8 years; 9-18 years; 19-49 years, ≥ 50 years
 - Immunization status: vaccinated; unvaccinated
 - Number of MAARIs: None; 1; ≥ 2
- Applying proportions observed in the enrollees, we estimated the cumulative incidence of medically-attended seasonal influenza.

Results

Figure 1. Number of Positive Influenza A/B PCR Tests by CDC Week, 2012-16

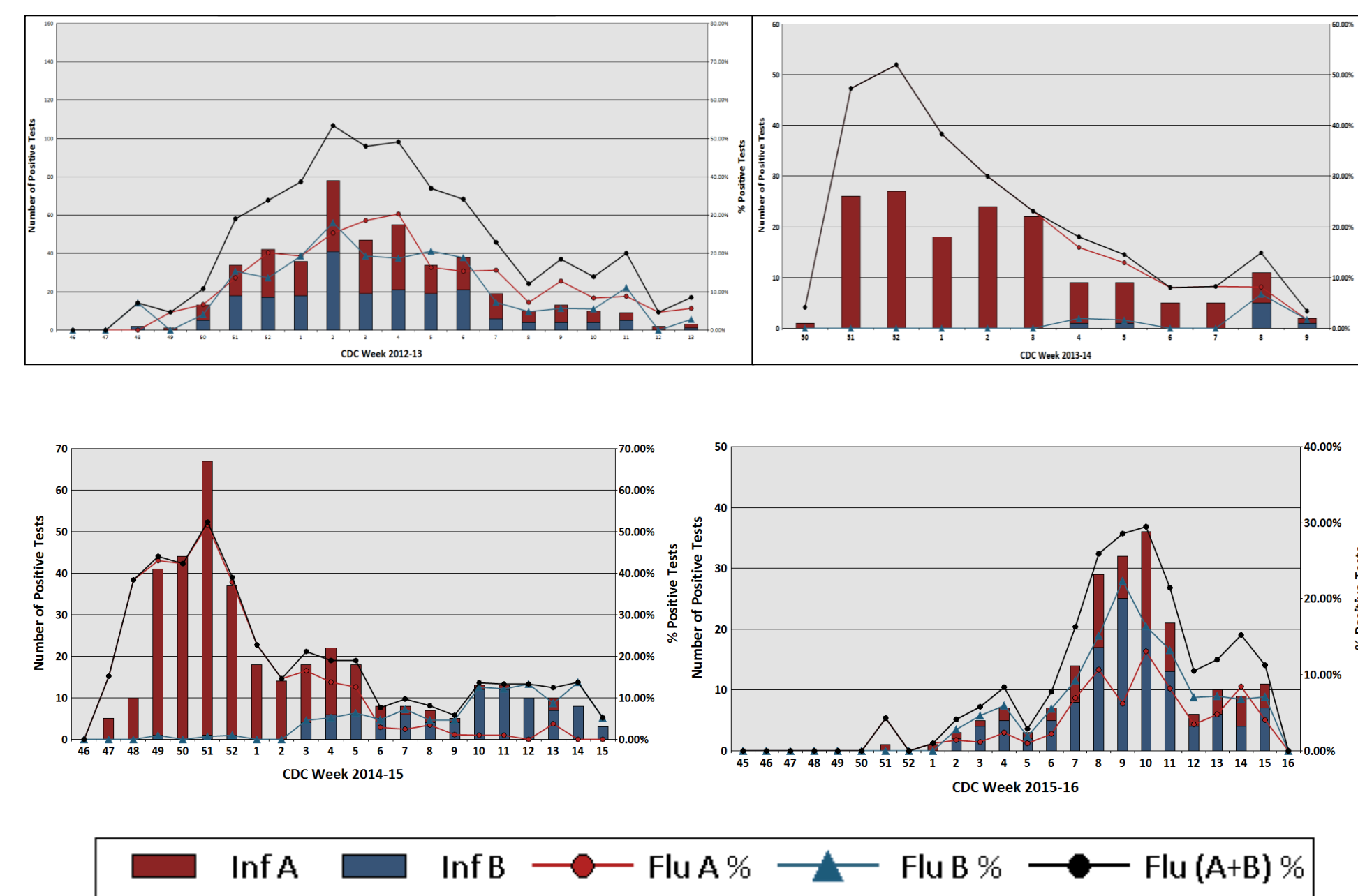


Table 1. 2011-16 BSWH-TPRA Source and Enrolled Population by Age Group.

Age Group Population	2011-12 N (%)	2012-13 N (%)	2013-14 N (%)	2014-15 N (%)	2015-16 N (%)
6 mos. – 8 years Source Enrolled	15723 (14%) 280 (35%)	15040 (15%) 385 (27%)	18308 (14%) 249 (24%)	17117 (14%) 459 (29%)	17026 (14%) 338 (25%)
9–18 years Source Enrolled	16209 (14%) 141 (18%)	13519 (14%) 271 (19%)	18301 (14%) 149 (14%)	17917 (15%) 303 (19%)	17827 (15%) 249 (19%)
19–49 years Source Enrolled	44671 (40%) 221 (28%)	38495 (39%) 452 (31%)	52994 (41%) 357 (35%)	47334 (39%) 478 (30%)	44951 (38%) 469 (35%)
≥ 50 years Source Enrolled	35915 (32%) 161 (20%)	32123 (32%) 337 (23%)	40252 (31%) 280 (27%)	39099 (32%) 348 (22%)	38324 (32%) 278 (21%)
Total Source Enrolled	112,518 803	99,177 1,445	129,855 1,035	121,467 1,588	118,128 1,334

Table 2. Example of Calculation of Total Cumulative Incidence of Medically Attended Seasonal Influenza in Children ages 6 months - 8 years during 2015-16

Vaccination Status	Total N In Cohort	N Enrolled	N Flu positive	Flu Positive Rate of Enrolled	N Persons with MAARI not tested	Estimate of Flu positive cases not enrolled	Estimated flu cases (enrolled+ not enrolled)	Cumulative seasonal incidence (%) (95% CI)
Unvaccinated								
0	9056	15	4	26.67%	0	0	4	0.04%
1	2255	80	11	13.75%	2175	299	310	13.75%
≥ 2	1143	88	9	10.23%	1055	108	117	10.24%
Vaccinated**								
0	2389	12	1	8.33%	0	0	1	0.04%
1	1211	53	6	11.32%	1158	131	137	11.31%
≥ 2	972	90	4	4.44%	882	39	43	4.42%
Subtotal	17,026	338	35	10.36%	16688	577	612 (401-823)	3.59% (2.35-4.83%)

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Table 3. Cumulative Incidence of Medically Attended Seasonal Influenza in the BSWH-TPRA Source Population from 2011-12 to 2015-16.

Influenza Season (Severity)	Predominant Influenza Type A (subtype) and B Lineage (%)	Cumulative Incidence % (95% CI)
2011-12 (Mild)	A(H1N1) pdm09 (84%)	0.72% (0.53-0.92%)
2012-13 (Moderately severe)	A(H3N2) (51%), B-Yamagata (36%), B-Victoria (10%)	5.95% (5.52-6.38%)
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2015-16 (Moderate)	A(H1N1) pdm09 (27%), B-Victoria (46%)	2.61% (2.23-2.99%)

Table 4. Cumulative Incidence of Medically Attended Seasonal Influenza in the BSWH-TPRA Source Population by Season and Age Group

Age Group	2011-12	2012-13	2013-14	2014-15	2015-16
6 mos. – 8 years	1.61% (0.88-2.33%)	8.96% (7.48-10.43)	2.74% (1.73-3.75%)	7.27% (5.83-8.72%)	3.59% (2.35-4.83%)
9–18 years	0.43% (0.03-0.83%)	7.71% (6.47-8.94)	2.03% (1.23-2.83%)	5.93% (4.76-7.11%)	5.05% (3.91-6.19%)
19–49 years	0.73% (0.43-1.02%)	4.6% (4.02-5.18%)	2.21% (1.75-2.67%)	3.00% (2.45-3.56)	1.60% (1.17-2.03%)
≥ 50 years	0.47% (0.14-0.80%)	5.42% (4.68-6.16%)	2.79% (2.17-3.42%)	3.32% (2.61-4.03%)	2.22% (1.47-2.97%)

Conclusions

- Highest cumulative incidence was found in:
 - 2012-13 season when Influenza A(H3N2) and both B-lineages circulated
 - Children ages 6 months - 8 years during 2011-12, 2012-13 & 2014-15
 - Adults aged ≥ 50 years during 2013-14
 - Children aged 9-18 years during 2015-16
- Influenza vaccination programs should aim to improve vaccination coverage among children ages 6 months – 18 years and adults aged ≥ 50 years