Estimates of Influenza Vaccination Coverage among Adults—United States, 2017–18 Flu Season

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FluVaxView webpage report posted online October 25, 2018

Summary

Influenza (flu) vaccination is the primary way to prevent sickness and death caused by flu. The Advisory Committee on Immunization Practices (ACIP) recommends annual flu vaccination for all persons aged ≥6 months who do not have contraindications to vaccination.(1) The 2017–18 flu season was a high severity season with high levels of outpatient clinic and emergency department visits for flu-like illness, high flu-related hospitalization rates, and elevated and geographically widespread flu activity across the United States for an extended period.(2) The Centers for Disease Control and Prevention (CDC) analyzed data from the Behavioral Risk Factor Surveillance System (BRFSS) to estimate flu vaccination coverage for the U.S. population of adults aged ≥18 years during the 2017–18 flu season. Flu vaccination coverage among adults was 37.1%, a decrease of 6.2 percentage points from the previous flu season. Vaccination coverage varied by age group and state, and coverage decreased in all age groups and in most states. However, interpretation of these results should take into account limitations of the survey, including reliance on self-report of vaccination status and decreasing response rates. Preliminary estimates from other data sources do not show decreases in flu vaccination coverage. To improve flu vaccination coverage for

the 2018–19 flu season, healthcare providers are encouraged to strongly recommend and offer flu vaccination to all of their patients. People not visiting a provider during the flu season have many convenient places they can go for a flu vaccination.

Methods

For this report, CDC analyzed data from BRFSS for adults aged ≥18 years to estimate flu vaccination coverage from the 2017-18 flu season. Estimates for children for the 2017-18 season have been published.(3) BRFSS data were collected from September 2017 through June 2018 from all 50 states to estimate vaccination coverage for vaccines administered from July 2017 through May 2018. Estimates for the District of Columbia represent vaccination coverage through November 2017 based on interviews conducted September through December 2017. The 2017-18 flu season estimates were compared with 2016–17 flu season estimates.

The state-based BRFSS is an ongoing, landline and cellular telephone survey which collects information on health conditions and risk behaviors from randomly selected adults aged ≥18 years in the U.S. population. BRFSS included survey questions asking whether the respondent had received a flu vaccination in the past 12 months, and if so, in which month and year. Responses to the flu vaccination status questions were not verified by medical records. The survey question varied in placement within the overall survey instrument between 2017 and 2018, with the flu vaccination questions being near the end of the instrument in 2017 and near the beginning in 2018. The median state BRFSS response rate for a complete or partially complete interview was 45.8% for September–December 2017 and 49.7% for January–June 2018.

Flu vaccination coverage estimates were calculated using Kaplan-Meier survival analysis to determine the cumulative flu vaccination coverage (≥1 dose) during July 2017 through May 2018 using monthly interview data collected September 2017 through June 2018. Respondents who did not have either a yes or no response to the flu vaccination status question were excluded from the analysis; this included 0.3% who reported they did not know, 0.1% who refused to answer the question, and 6.2% who most likely ended the interview before the flu question was asked. For 6.6% of BRFSS participants who indicated they had been vaccinated but had a missing month and year of vaccination, the month of vaccination was imputed from donor pools matched for week of interview, age group, state of residence, and race/ethnicity. Information on high-risk conditions was missing for 1.2% of adults and were not included in the estimates by risk condition. All estimates were weighted to the U.S. adult population with analysis conducted using SAS and SUDAAN statistical software to account for the complex survey design. Differences between groups and between 2016–17 and 2017–18 seasons were determined using t-tests with significance at $p<0.05$. Differences mentioned in this report were statistically significant.

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Results

Among adults aged ≥18 years, coverage was 37.1%, 6.2 percentage points lower than coverage during the 2016–17 season (43.3%; Figure 1).

Coverage for 2017-18 was lower for every age group compared to the 2016–17 season (Figure 2). For all adult age groups, flu vaccination coverage estimates in the 2017–18 season were at their lowest levels compared with the seven prior flu seasons. For the 2017-18 season, flu vaccination coverage increased with age, from 26.9% among adults 18-49 years to 59.6% among adults ≥65 years (Figure 2).

There was large between-state variability in flu coverage among adults, ranging from 29.2% in Louisiana to 46.3% in West Virginia (Figure 3). The decrease in coverage among adults for 2017-18 compared to 2016-17 occurred in 37 states; in 13 states and DC the coverage did not change from the last season.

Among adults, coverage during the 2017–18 season decreased for all racial/ethnic groups compared with the 2016–17 season except for American Indian/Alaska Natives (Table 1). Similar to the 2016–17 season, significant differences in flu vaccination coverage were observed between racial/ethnic groups: Non-Hispanic white adults and Asian adults had higher coverage than all other racial/ethnic groups; Hispanic adults had lower flu vaccination coverage than all other racial/ethnic groups.

Among adults, 78% of vaccinations during the 2017–18 season had been received by the end of November, similar to the 2016–17 season (77%) (Figure 4). Coverage by end of November 2017 was 3.0 percentage points lower than by end of November 2016; by end of January 2018, coverage was 5.5 percentage points lower compared with January 2017.

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Discussion

Vaccination coverage among adults during the 2017–18 season remains low, at only 37.1%. Survey data indicated a six-percentage point drop in coverage compared with the 2016–17 season; however, preliminary estimates from several other data sources did not show a similar decrease in coverage and there are limitations of the BRFSS estimates as described below. We assessed consistency of the change in the BRFSS estimates compared to the prior season with other currently available data sources. Flu vaccination coverage in the past 12 months among adults ≥18 years based on National Health Interview Survey (NHIS) data from the first quarter of 2018 was 43.8%, similar to 44.8% from 2017 first quarter data.(4) Flu vaccination coverage estimates for vaccinations received through mid-November of the flu season from the National Internet Flu Survey were similar for 2016–17 (39.8%) and 2017–18 (38.6%)[5] Additionally, Medicare fee for service claims did not indicate a decrease in flu vaccine claims filed during the 2017–18 flu season (personal communication, Jeff Kelman, Centers for Medicare and Medicaid Services, 8/24/18). Preliminary estimates from these three data sources did not show a decrease or magnitude of decrease seen with BRFSS data. These findings should be interpreted with caution, however. Differences in the precision of estimates and survey methods (including different sampling frames, survey mode, survey questions, order of survey questions, interview period, operations, response rates, and weighting) might lead to different estimates. Some flu vaccinations received by Medicare beneficiaries may not be billed to Medicare, and data are only available for the Medicare fee for service population, which is not representative of the general adult population. Further analyses are needed to assess the final season estimates based on the NHIS when data are available in mid-2019. CDC is also exploring other potential non-survey data sources to track flu vaccination coverage.

Despite potential limitations of all of the mentioned data sources, flu vaccination coverage among adults remains low with only about 4 in 10 adults reporting receipt of a flu vaccination, as reported for the past eight flu seasons (Figure 1). As the 2018–19 season is underway, it is important that providers prioritize flu vaccination for their patients. This includes client reminders when flu vaccine supplies become available, assessing the vaccination

status at every visit, making an effective recommendation for vaccination, and offering the vaccine. For more information about flu, including flu vaccine recommendations, flu activity and surveillance, and resources for discussing flu vaccination with patients, visit the CDC flu webpage.

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Figure 1. Flu Vaccination Coverage Among Adults, by Season, United States, 2010–2018

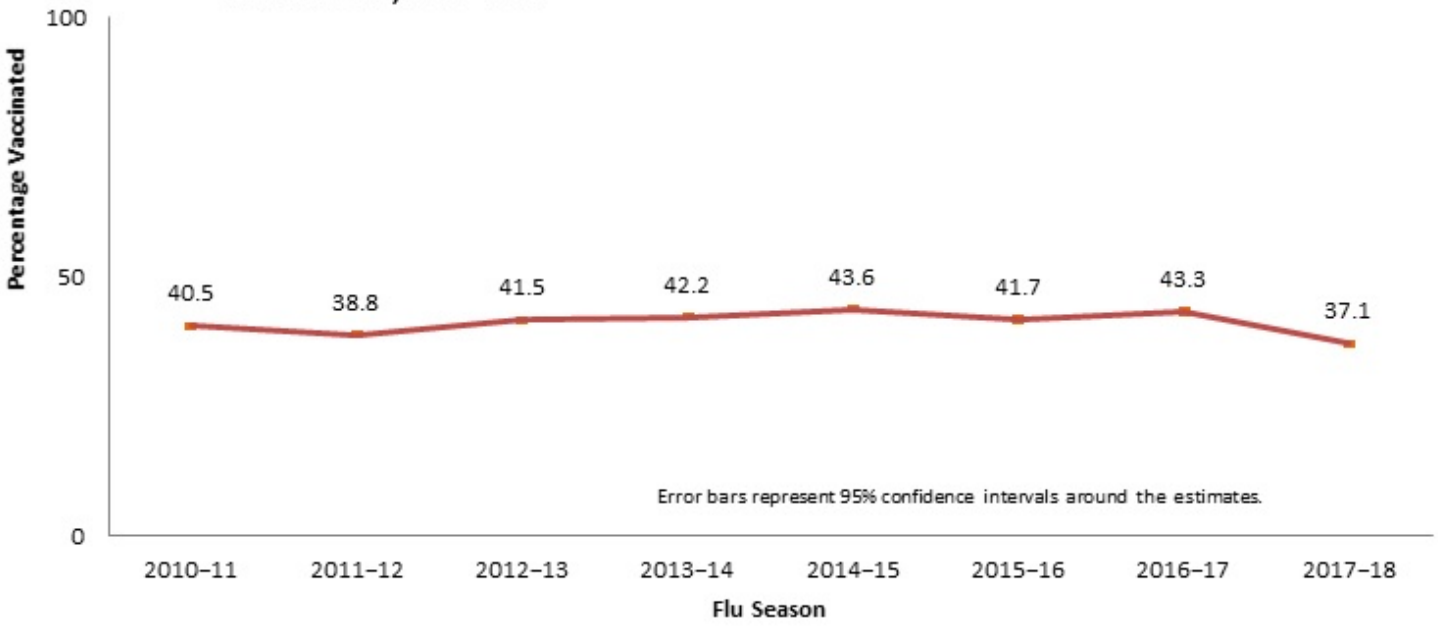

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Figure 2. Flu Vaccination Coverage Among Adults, by Age Group and Season, United States, 2010–2018

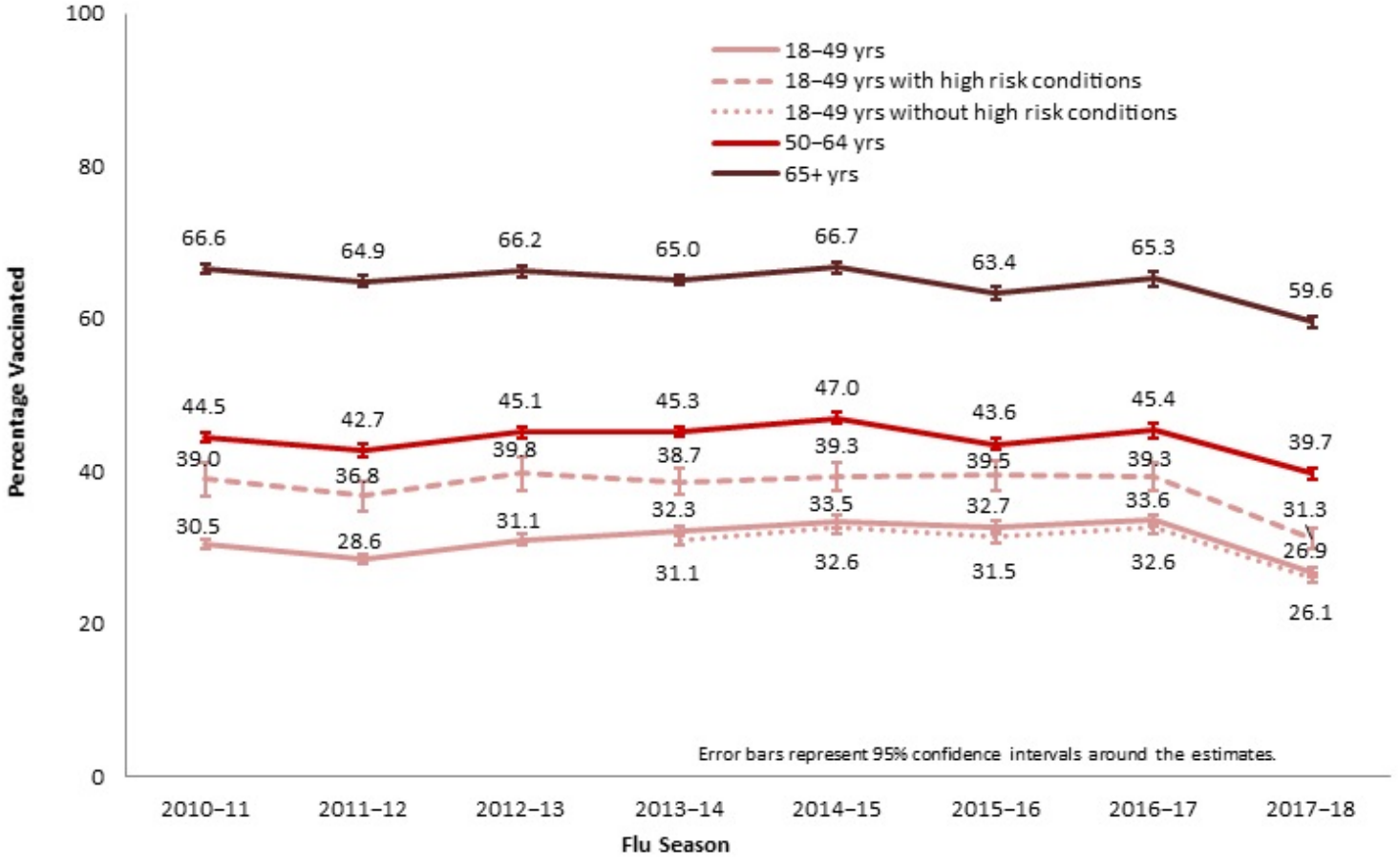

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Figure 3. Flu Vaccination Coverage among Adults, by State, United States, 2017–18 Season

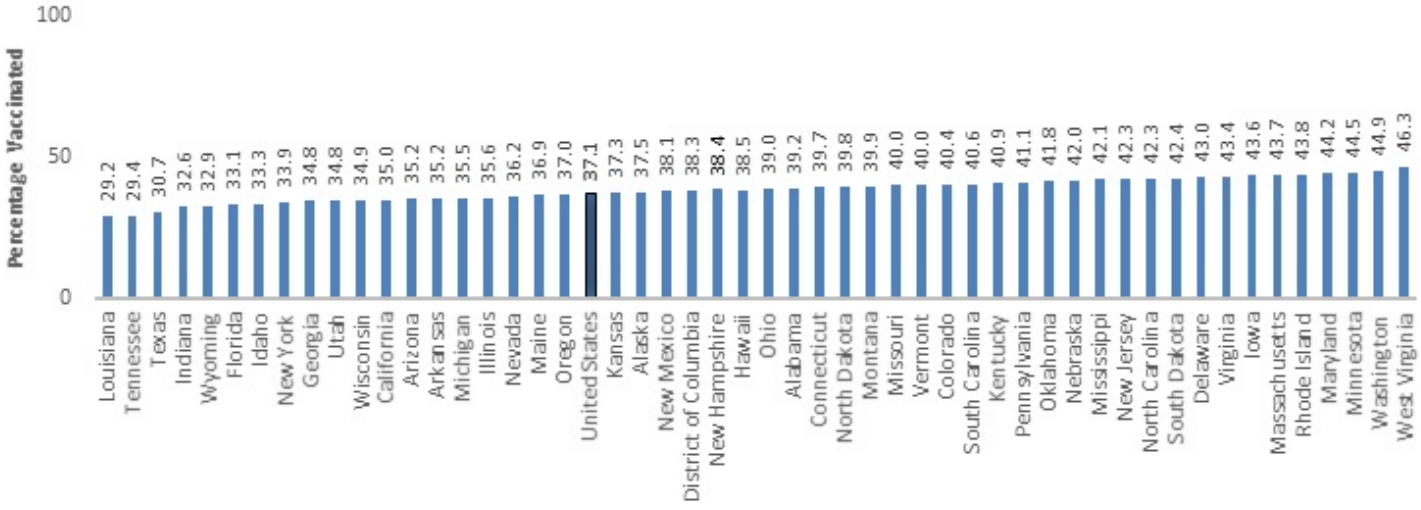

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Figure 4. Cumulative Monthly Flu Vaccination Coverage among Adults, United States

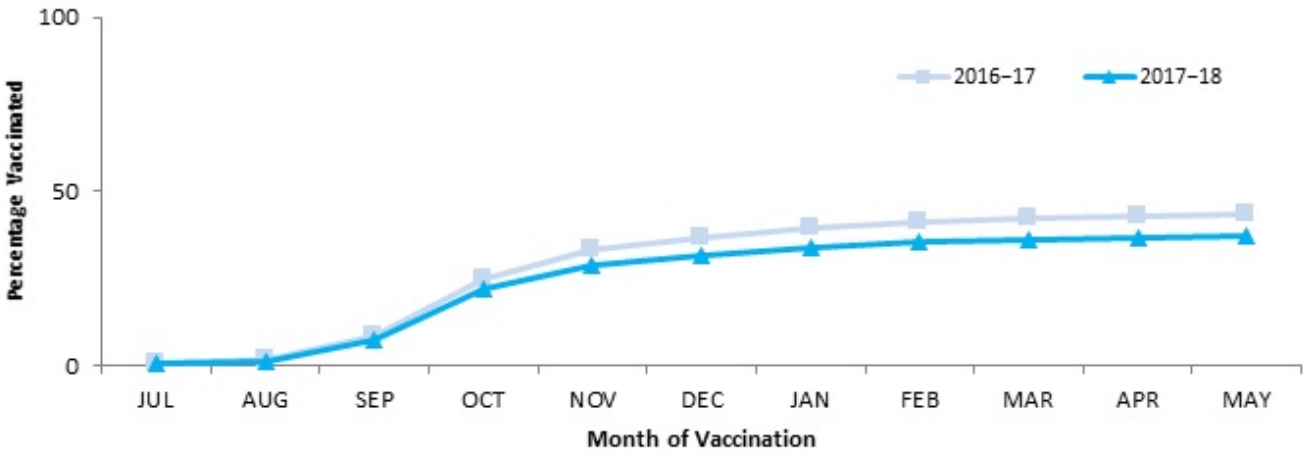

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Table 1. Flu Vaccination Coverage* among Adults, by Race/Ethnicity, United States,† 2017–18 Season

Race/Ethnicity¶	Unweighted Sample Size	%‡ ± 95% CI§	Difference from the 2016–17 Season ± 95% CI
Overall	313,143	**37.1** ± 0.4	-6.2 ± 0.7‖
White only, non-Hispanic	239,376	**40.2** ± 0.4	-5.7 ± 0.7‖
Black only, non-Hispanic	23,772	**32.3** ± 1.2	-5.1 ± 2.0‖
Hispanic	22,899	**28.4** ± 1.2	-8.5 ± 2.3‖
Other, non-Hispanic Overall	21,105	**36.7** ± 1.8	-6.9 ± 3.1‖
Asian	6,501	**42.0** ± 2.7	-5.1 ± 5.1‖
American Indian/Alaska Native (AI/AN)	5,695	**33.1** ± 3.7	-4.4 ± 5.2
Other or multiple race **	8,909	**32.4** ± 2.7	-9.3 ± 4.8‖

* Estimates of the percentage of people vaccinated are based on interviews conducted beginning September 2017 through June 2018 and reported vaccinations from July 2017 through May 2018.

† Excludes U.S. territories.

‡ Percentage vaccinated. Percentages are weighted to the U.S. population. Month of vaccination was imputed for respondents with missing month of vaccination data.

§ Confidence interval half-widths.

|| Statistically significant difference between the 2017–18 season and the 2016–17 season by t-test ($p<0.05$).

¶ Race is reported by respondent; people of Hispanic ethnicity may be of any race.

** Includes Native Hawaiian or other Pacific Islander, multiracial, and other races.

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Additional Flu Vaccination Coverage Estimates

Additional flu vaccination coverage estimates for the 2017–18 and earlier flu seasons by state and Health and Human Services (HHS) region are provided on FluVaxView as interactive maps, figures, and tables. Flu vaccination coverage was estimated nationally for additional age groups, and by gender, race/ethnicity, and select local areas including territories (see box).

Links to additional tables:

- Flu Vaccination Coverage, by Age Group, Adults, United States, 2017–18 Season [10 KB]
- Flu Vaccination Coverage by Gender, Adults, United States, 2017–18 Season [13 KB]
- Flu Vaccination Coverage by Race/Ethnicity and Age Group, Adults, United States, 2017–18 Season [15 KB]
- Flu Vaccination Coverage for Local Areas and Territories, Adults, 2017–18 Season [49 KB]

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Limitations

The estimates in this report are subject to at least two main limitations. First, the response rate for BRFSS was low and nonresponse bias may remain even after weighting adjustments. Second, flu vaccination status was based on self-report and not validated with medical records, and is subject to recall bias. If representativeness of the weighted sample or accuracy of self-reported vaccination status changes over time, comparisons of estimates across flu seasons would be biased.

The median state BRFSS response rates were lower for the 2017-18 season compared with the 2016-17 season (45.8% vs. 47.4% for persons interviewed September-December, and 45.5% vs. 49.7% for persons interviewed January-June). However, the weighted distributions of sociodemographic and health care access characteristics were generally similar between the samples used for flu vaccination coverage estimation for the 2017-18 and 2016-17 seasons. There was an increase in the percent of adults whose last physical exam was within the past 12 months, from 71.6% in 2016-17 to 74.4% in 2017-18. Having a physical exam in the past 12 months is associated

with higher chance of flu vaccination.(6) All else held equal, this shift to a higher percent with a recent physical exam could lead to an increase in vaccination coverage of a few percentage points. In a comparison of prevalence of other health indicators collected by BRFSS (diabetes, COPD, blindness, HIV testing, and alcohol consumption), little differences were found between estimates based on interview months used for the 2016-17 compared with the 2017-18 seasons (personal communication, Machell Town, CDC, 8/29/18). Thus, we found no evidence for substantial change across seasons in representativeness of the overall BRFSS samples used to estimate flu vaccination coverage.

Respondents with missing data on flu vaccination status were excluded from the analysis, which could also affect representativeness of the sample used for analysis. For respondents interviewed during September 2017 through June 2018, 6.3% were missing a response to the question about receipt of flu vaccine in the past 12 months. This was similar to the 6.7% for interviews from September 2016 through June 2017. However, the prevalence of missing data varied by survey year and time of year, ranging by month from 4.7%-5.5% during September-December 2016, 5.9%-8.9% during January-June 2017, 8.7%-9.8% during September-December 2017, and 1.9%-4.6% during January-June 2018. Lower prevalence of missing flu vaccination status corresponded with earlier order of the flu vaccination questions during the BRFSS interview; flu vaccination questions were the 12^{th} section of the interview in 2016, 15^{th} in 2017, and 11^{th} in 2018. Missing data on flu vaccination status was primarily due to respondents breaking off the interview before reaching these questions, which was more likely to happen when the questions came later during the interview. Respondents with non-missing data on flu vaccination status interviewed during January-June 2018 were more likely to report having a physical exam in the past 12 months (77%) compared with those interviewed during September-December 2017 (72%). Among respondents interviewed during September 2017 through June 2018, those with non-missing flu vaccination data were more likely to have characteristics associated with higher flu vaccination coverage than those with missing data (e.g., being non-Hispanic white, having higher education level, higher income, medical insurance, a personal physician, and having chronic conditions placing them at higher risk of complications from flu).

We conducted sensitivity analysis to evaluate the impact of this pattern of missing data on estimates of flu vaccination coverage. Estimated 2017-18 flu vaccination coverage among adults would have been 34.8% if all those with missing data were unvaccinated and 47.3% if all were vaccinated. Using available factors associated with vaccination coverage, the estimate based on multiple imputation of vaccination status was 36.9%, similar to the observed estimate of 37.1%. Similar calculations were done for the 2016-17 flu season estimates. The drop in coverage in 2017-18 compared with 2016-17 was 4.3 percentage points assuming all those with missing data were unvaccinated; the drop was 5.2 percentage points using multiply imputed estimates. Thus, missing data may partly contribute to, but cannot fully explain, the drop in coverage.

Survey estimates of flu vaccination coverage based on parental and self-reported vaccination status have generally over-estimated coverage.(7) From selected studies of validity of self-reported flu vaccination among adults, errors in reporting vaccination status resulted in net over-estimation of 5 to 19 percentage points; sensitivity of self-report ranged from 93-100%, and specificity from 66-81%.(8-10) It is possible that accuracy of self-reporting flu vaccination status can change within and across seasons. For example, the heightened media attention to a more severe flu season could increase accuracy of recall. Estimated flu vaccination coverage adjusting for missing data on flu vaccination status was 42.1% for 2016-17 and 36.9% for 2017-18. We conducted a sensitivity analysis to assess the extent to which accuracy of recall would need to have improved across seasons to explain this 5.2 percentage

point drop. We assumed for the 2016-17 season that sensitivity of self-reported flu vaccination was 96%, and specificity was 80%. We also assumed that true vaccination coverage in 2017-18 was the same as in 2016-17. Then, if sensitivity increased from 96% to 98%, specificity would have had to increase from 80% to 88% to fully explain the observed difference in coverage. This would mean that the percent of unvaccinated adults who incorrectly reported they were vaccinated would have had to decrease from 20% to 12%.

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References

1. Grohskopf LA, Sokolow LZ, Broder KR, Walter EB, Fry AM, Jernigan DB. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices–United States, 2018-19 influenza season. MMWR Recomm Rep 2018 Aug 25;67(3):1-20.
2. Garten R, Blanton L, Elal A, et al. Update: influenza activity in the United States during the 2017-18 season and composition of the 2018-19 influenza vaccine. MMWR 2018 Jun 8;67(22):634-42.
3. CDC. FluVaxView: Estimates of flu vaccination coverage among children–United States, 2017-18 flu season. https://www cdc gov/flu/fluvaxview/coverage-1718estimates-children htm 2018 September 27 [cited 2018 Oct 4];Available from: URL: https://www.cdc.gov/flu/fluvaxview/coverage-1718estimates-children.htm (http://www.cdc.gov/flu/fluvaxview/coverage-1718estimates-children.htm)
4. CDC. Early release of selected estimates based on data from January-March 2018 National Health Interview Survey. https://www cdc gov/nchs/nhis/releases/released201809 htm 2018 September 18 [cited 2018 Oct 4];Available from: URL: https://www.cdc.gov/nchs/nhis/releases/released201809.htm (http://www.cdc.gov/nchs/nhis/releases/released201809.htm)
5. CDC. National early-season flu vaccination coverage, United States, November 2017. https://www cdc gov/flu/fluvaxview/nifs-estimates-nov2017 htm 2017 December 9 [cited 2018 Oct 4];Available from: URL: https://www.cdc.gov/flu/fluvaxview/nifs-estimates-nov2017.htm (http://www.cdc.gov/flu/fluvaxview/nifs-estimates-nov2017.htm)
6. O'Halloran AC, Lu PJ, Williams WW, Bridges CB, Singleton JA. Influenza vaccination coverage among people with high-risk conditions in the U.S. Am J Prev Med 2016;50:e15-e26.
7. CDC. FluVaxView: Flu vaccination coverage, United States, 2016-17 influenza season. https://www cdc gov/flu/fluvaxview/coverage-1617estimates htm 2017 September 28 [cited 2018 Jun 15];Available from: URL: https://www.cdc.gov/flu/fluvaxview/coverage-1617estimates.htm (http://www.cdc.gov/flu/fluvaxview/coverage-1617estimates.htm)
8. Rolnick SJ, Parker ED, Nordin JD, et al. Self-report compared to electronic medical records across eight adult vaccines: do results vary by demographic factors? Vaccine 2013;31:3928-35.
9. MacDonald R, Baken L, Nelson A, Nichol KL. Validation of self-report of influenza and pneumococcal vaccination status in elderly outpatients. Am J Prev Med 1999;16(3):173-7.
10. Irving SA, Donahue JG, Shay DK, Ellis-Coyle TL, Belongia EA. Evaluation of self-reported and registry-based influenza vaccination status in a Wisconsin cohort. Vaccine 2009;27:6546-9.

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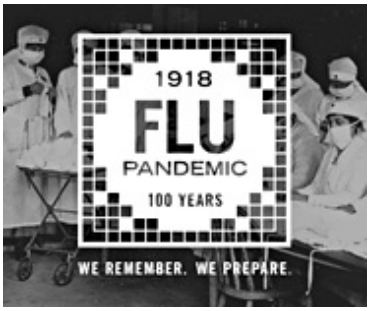

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Swine
Variant
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