# National and state-specific estimates of place of influenza vaccination among adult populations–United States, 2011–12 influenza season

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## Abstract

**Background**—Annual influenza vaccination has been recommended for all persons 6 months since the 2010–11 season. New partnerships between public health agencies and medical and nonmedical vaccination providers have increased the number of vaccination providers and locations where vaccination services are delivered.

**Methods**—Data from the 2011–12 Behavioral Risk Factor Surveillance System (BRFSS) were analyzed. Point estimates of place of vaccination and 95% confidence intervals were calculated. Multivariable logistic regression and predictive marginal modeling were conducted to identify factors associated with vaccination settings.

**Results**—Among adults vaccinated during the 2011–12 influenza season, a doctor's office was the most common place (38.4%) for receipt of influenza vaccination, with stores (e.g., supermarkets or drug stores) (20.1%) the next common, and workplaces (17.6%) the third common. Overall, reported vaccination in nonmedical settings by state ranged from 32.2% in California to 60.4% in Nevada, with a median of 45.8%. Characteristics significantly associated with an increased likelihood of receipt of vaccination in nonmedical settings were higher education, not having certain identified high-risk conditions, not having had a routine checkup in the previous 12 months, and not having a primary doctor for health care. Being a member of a racial/ethnic minority group, unemployed or not in the work force were significantly associated with a decreased likelihood of receipt of vaccination in nonmedical settings.

**Conclusion**—Doctor's offices were the most common medical setting for adult influenza vaccination; workplaces and stores were important nonmedical settings. Increasing access to vaccination services in medical and nonmedical settings should be considered as important strategies for improving vaccination coverage. These results also can help guide development of strategies for achieving Healthy People 2020 objectives for influenza vaccination of adult populations.

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## Introduction

Seasonal influenza is associated with substantial morbidity and mortality in the United States (1–3). Incidence of serious illness and death are higher among adults 65 years, children younger than 5 years (but especially those younger than 2 years), pregnant women, and persons of any age who have medical conditions that place them at increased risk for complications from influenza (1). The economic impact of influenza illness is substantial (1, 2, 4, 5). Influenza vaccination is the primary tool for preventing and controlling influenza (1). Annual influenza vaccination has been recommended by the Advisory Committee on Immunization Practices (ACIP) for all persons 6 months since the 2010–11 season (1). By the 2011–12 season, influenza vaccination coverage was 38.8% for persons aged 18 years (6).

During the 2009 influenza A pdm09 (H1N1) pandemic, new partnerships between public health agencies and medical and nonmedical vaccination providers were formed. These partnerships increased the number of vaccination providers and locations where vaccination services are delivered (7, 8). Although a doctor's office was the most common place for receipt of influenza vaccine during the 2010–11 season, vaccination in nonmedical settings, including stores (e.g., supermarkets or drug stores) and workplaces was also common (8). Nonmedical settings provide expanded convenient access to vaccinations and potentially lower costs for the person being vaccinated (9). Vaccination in nonmedical settings could both increase vaccination coverage (1) and enhance the overall capacity of the health care system to effectively deliver vaccinations.

To assess national and state-level influenza vaccination in medical versus nonmedical settings among persons 18 years and examine factors associated with vaccination in medical or nonmedical settings, data from the 2011–12 Behavioral Risk Factor Surveillance System (BRFSS) were analyzed.

## Methods

The BRFSS is a continuous, population-based telephone survey collecting information from adults aged 18 years selected randomly using a multistage cluster design among the non-institutionalized civilian population in 50 states and the District of Columbia (DC). The objective of the BRFSS is to collect uniform, state-specific data on self-reported preventive health practices and risk behaviors that are linked to preventable infectious diseases, chronic diseases, and injuries. Data are weighted by age, sex, and, in some states, race/ethnicity, to reflect each area's estimated adult populations (10).

The BRFSS median Council of American Survey Research Organizations (CASRO) state response and cooperation rates for the 2011–12 season were 49.2% (range: 31.7%-65.1%)

and 73.7% (range: 49.6%-84.9%) for September-December 2011, respectively, and 47.5% (range: 32.1%-62.7%) and 58.9% (range: 38.1%-76.1%) for January-June 2012, respectively (6).

Respondents were asked whether they had received a flu vaccination during the past 12 months and if so, in which month and year and at what type of place. Individuals who were interviewed September 2011 through June 2012 and reported receiving influenza vaccination from August 2011 through May 2012 were included in the analysis (132,743). Individuals for whom place of influenza vaccination data were missing (n=94, 0.07%) those who said they received their vaccinations in Canada or Mexico (n=53, 0.04%), those who said they did not know where they received their vaccination (n=224, 0.17%), and those who declined to answer the question (n=50, 0.04%) were excluded from the analysis. Differences in the reported place of vaccination were analyzed by month of interview and reported by month of vaccination.

Responses to the question on place of vaccination were divided into medical and nonmedical settings. Medical settings were doctor's office or health maintenance organizations, health departments, other types of clinics or health centers (ex: a community health center), and hospitals (ex: inpatient) or emergency departments. Nonmedical settings were senior, recreation, or community centers, workplaces, stores (ex: supermarket, drug store), schools, and places other than those indicated here.

Covariates were selected from coded survey questions to measure associations of influenza vaccination with medical and nonmedical settings, including: age, sex, race/ethnicity, employment status, education, history of certain chronic conditions that increase the risk for influenza complications (i.e., asthma, diabetes, cardiovascular disease, chronic obstructive pulmonary disease, emphysema, chronic bronchitis, and cancer), health insurance status, time since last routine checkup, having a personal doctor, and cost as a barrier to seeing a doctor in the past 12 months.

SUDAAN (Software for the statistical analysis of correlated data, Research Triangle Institute, Research Triangle Park, NC) was used to calculate point estimates and 95% confidence intervals (CIs). T tests were used to determine significance within strata for medical and nonmedical settings. Statistical significance was defined as $p<0.05$. Multivariable logistic regression and predictive marginal modeling under the logistic procedure were conducted to calculate prevalence ratios and identify factors independently associated with medical and nonmedical vaccination settings.

## Results

A total of 132,743 participants who were interviewed September 2011 through June 2012 and reported receiving influenza vaccination from August 2011 through May 2012 were included in the analysis. Overall for the 2011–12 season, 56.9% of adults 18 years received influenza vaccination at medical settings and 43.1% at nonmedical settings. A greater proportion (48.8%) of younger adults 18–49 years reported vaccination at nonmedical settings compared with adults 50–64 years (43.2%) and 65 years (35.7%) (Table 1).

Overall, doctor's office was the most common place of vaccination (38.4%), followed by stores (20.1%), and workplaces (17.6%) (Table 1). Doctor's office was also the most common place of vaccination in each age groups: 18–49 years (30.1%), 50–64 years (38.2%), and 65 years (49.1%). For those 18–49 years and 50–64 years, workplace was the second most common place of influenza vaccination (28.0% and 20.3%, respectively) with stores the next most common (14.6% and 18.8%, respectively). For persons 65 years, a store was the second most common place of influenza vaccination (28.4%) (Table 1). There were no differences in reported place of vaccination by month of interview or month of vaccination (data not shown).

Among adults who reported influenza vaccination receipt in the 2011–12 season, the proportion reporting vaccination in nonmedical settings compared to the prior season was 1.7% higher among those 18 years overall, 3.1% higher among those aged 18–49 years, and 2.7% higher among those 65 years (Table 1).

Overall, and in each age group, non-Hispanic whites were more likely to report vaccination in nonmedical settings compared with non-Hispanic blacks, Hispanics, and those reporting other race and ethnicity (Table 2).

Overall and across all age groups, nonmedical settings were the most likely places of influenza vaccination for adults who had attended college (47.0%) versus had high school education (39.4%) or had less than high school education (30.0%), were employed (53.5%) versus unemployed (32.6%) or not in the workforce (32.9%), reported no identified high-risk conditions (48.4%) versus had high-risk conditions (34.9%), whose last routine checkup was 1 year (54.9%) versus <1 year (40.5%), or had no primary doctor (54.7%) versus had a primary doctor (41.9%) (Table 2). Vaccinees reporting cost was not an obstacle to medical care were more likely to report receiving influenza vaccination in nonmedical settings (43.4%) compared to vaccinees reporting cost was a barrier (40.4%) (Table 2).

Multivariable logistic regression and predictive marginal modeling were performed with setting of receipt of influenza vaccination as the outcome (Table 3). Overall, among adults 18 years, characteristics significantly associated with an increased likelihood of receipt of vaccination in nonmedical settings were: higher education, not having certain identified high-risk conditions (i.e., asthma, diabetes, cardiovascular disease, chronic obstructive pulmonary disease, emphysema, chronic bronchitis, and cancer), not having had a routine checkup in the previous 12 months, and not having a primary doctor for health care. Individuals who were unemployed and not in the work force were less likely to receive vaccination in nonmedical settings when compared to employed individuals. Non-Hispanic blacks, Hispanics, and those reporting other race and ethnicity were also less likely to receive vaccination in a nonmedical setting compared to Non-Hispanics whites (Table 3). Factors independently associated with setting of receipt of influenza vaccination were similar across all three adult age groups (18-49 years, 50–64 years, and 65 years) (Table 3).

Additionally, reported vaccination in nonmedical settings ranged from 32.2% in California to 60.4% in Nevada, with a median of 45.8% (Table 4).

## Discussion

This study assessed national estimates of the distribution reported place of influenza vaccination for adults during the 2011–12 season. This study also assessed national and state-specific estimates of vaccination by medical and nonmedical settings and identified factors associated with influenza vaccination in these settings. The most common place of vaccination for all age groups was a doctor's office but over 40% of adults reported nonmedical settings as their place for influenza vaccination. This study demonstrates both the continued importance of medical settings as places where adults receive influenza vaccination and the increasing importance of nonmedical vaccination providers. This information will be useful for planning and implementing strategies for achieving the *Healthy People 2020* objectives for influenza vaccination (8, 11, 12).

Overall, 57% of adults reported influenza vaccination in medical settings, the majority in a doctor's office. Older persons, those with high-risk medical conditions, those having a checkup in the past year, and those having a primary doctor were more likely to have been vaccinated in a medical setting. This might reflect increased frequency of contact with health-care providers because of illness, increased likelihood of provider offering, recommending, or reminding patients about vaccination, greater acceptance of vaccination by these patients, decreased access to vaccination in non-medical settings, or patient preference for vaccination in medical settings (8, 11). These findings might also be related to the age of respondents. Older adults (persons 50 years) were more likely to receive vaccination in medical settings which might reflect that they were more likely to have chronic conditions and as a result, were more likely to have a personal doctor or a recent doctor visit. To improve vaccination rates for adults, especially those with high risk conditions, physicians and other healthcare providers should continue recommending and encouraging their adult patients to receive influenza vaccination at every opportunity.

Even though the majority of adults received influenza vaccination in medical settings, a large proportion of influenza vaccinations took place in nonmedical settings compared to previous seasons. The proportion of adults vaccinated in a store (20.1%) in the 2011–12 season increased compared to the 1998–99 (10), 2001–02 (BRFSS, CDC unpublished data), 2004–05 (BRFSS, CDC unpublished data), and 2010–11 influenza seasons (8), when 5%, 6%, 6%, and 18% of adults, respectively, were vaccinated in a store. Changes in state laws allowing more pharmacists to administer influenza vaccinations to adults and more pharmacies offering influenza vaccinations might have contributed to this increase (8, 13). In 1999, only 22 states allowed pharmacists to administer influenza vaccinations to adults; by June 2009, all 50 states allowed pharmacists to administer influenza vaccinations to adults. Some states also allowed influenza vaccination of children, with the minimum age for people who can be vaccinated by pharmacists varying state to state (8, 13).

Overall, workplace settings were the third most common place that adults reported receiving influenza vaccination. The proportion of adults vaccinated in workplaces remained stable over the last decade, 17.9% in the 1998–99 season (11) and 17.6% in the 2011–12 season. The stable proportion of adults vaccinated in workplace over time may be due to other place(s) of vaccination increased at a higher rate over time than workplace, so the share of

vaccinations taking place in workplace did not change. Vaccination programs in the workplace could provide for more convenient access to all routine adult vaccinations in addition to influenza vaccine (9, 11) for working adults with and without high risk conditions and enhance the overall capacity of the health care system to effectively deliver vaccinations. Availability of influenza vaccination in the workplace is especially important for persons who do not regularly access the health-care system (9, 11).

Studies have shown that influenza vaccination in nonmedical settings is safe and adverse events are low (approximately 0.02%) (14–19). However, concern about the safety of influenza vaccinations administered in nonmedical settings may affect people's attitude toward vaccination in these settings. Education of both medical providers and the general public should emphasize the safety of vaccination in nonmedical settings and encourage those who may not visit their usual health-care provider during the influenza vaccination season to seek vaccination in a convenient nonmedical setting (15–19).

Several demographic and access to care variables were significantly associated with vaccination setting based on multivariable analysis. Overall, non-Hispanic whites were more likely than non-Hispanic blacks and Hispanics to receive their vaccinations in nonmedical settings. Additionally, persons in all age groups who had attended college were more likely to receive their influenza vaccination in a nonmedical setting than those who had not attended college. Non-Hispanic white race/ethnicity and higher education have been associated with vaccination in nonmedical settings in previous studies (8, 11, 20). This association might result from place of vaccination preferences, differences in vaccine-seeking behavior, or differences in availability of nonmedical settings offering vaccinations; workplace vaccination might not be equally available to all socioeconomic groups (8). We found that adults without a primary doctor and whose last doctor visit for a routine checkup was 1 year ago were more likely to be vaccinated in a nonmedical setting suggesting that the availability of influenza vaccination in nonmedical settings can complement health-care provider efforts by reaching populations less likely to be seen by providers.

Adults without high-risk conditions were more likely to receive vaccination in nonmedical settings. This finding might be due to adults without high-risk conditions being less likely to have a physician visit during the influenza season than adults with high-risk conditions. The universal vaccination recommendation eliminates the need to determine whether each person has one or more specific indications for vaccination and emphasizes the importance of preventing influenza among adults of all ages (1).

The proportion of adults vaccinated in nonmedical and medical settings varied widely by state. The wide variability in state-specific vaccination by settings might be due to the variability of certain vaccination delivery factors among states (e.g., medical-care delivery infrastructure, population norms, availability of nonmedical settings offering vaccinations, availability of workplace vaccination) (11, 21, 22). Allowing pharmacies to provide vaccinations has been shown to be associated with higher influenza vaccination coverage (23). One cross-sectional study showed that states that allowed pharmacists to provide immunizations had significantly more adults 18–64 years immunized (25.5%) than states without this legislation (21.6%) (p<0.01) (23). These states also had significantly more

adults   65 years immunized against influenza (68.4%) than states that did not allow pharmacists to give immunizations (64.7%) (p< 0.01) (23).

The findings in this study are subject to at least four limitations. First, influenza vaccination status and place of vaccination were based on self-reported data and were not verified by medical record. Second, health-care workers vaccinated in medical settings might have reported that they were vaccinated at the workplace; therefore, the percentage of vaccinations in nonmedical settings might be overestimated. Third, BRFSS data did not ask about reasons for participants at a particular setting, and did not collect data on distribution of vaccination providers by state or geography, thus we were unable to comment on whether where people are vaccinated is driven by personal preference versus accessibility issues.

This study demonstrates the importance of both medical and nonmedical settings for annual influenza and can help guide development of strategies for achieving *Healthy People 2020* objectives for influenza vaccination of adult populations. Medical settings continue to be the most common place of vaccination among all adults, while nonmedical settings are increasingly utilized for adult vaccination and should be considered as an important strategy for improving vaccination coverage (1). Monitoring place of vaccination can help identify new trends in place of influenza vaccination among adults, help shape future influenza immunization programs targeted at specific groups, and identify potential new partnerships. CDC will rotate a place of influenza vaccination question on the BRFSS core every three years, but states interested in monitoring place of vaccination annually can include the question as an optional module. Future studies regarding place of influenza vaccination should collect more information and try to understand why certain types of individuals access services in one or the other setting. Federal, state, local government, traditional and nontraditional vaccination providers, and community partners should collaborate to increase annul influenza vaccination coverage (1, 24, 25).

## Acknowledgments

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**TABLE 1**

Reported place of influenza vaccination among adults aged ≥ 18 years, by age group – Behavioral Risk Factor Surveillance System, United States, 2011–12 influenza season *

| Place | Overall | | | 18–49 yrs | | | 50–64 yrs | | | 65 yrs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % (95% CI) | Difference from the 2010–11 season | N | % (95% CI) | Difference from the 2010–11 season | N | % (95% CI) | Difference from the 2010–11 season | N | % (95% CI) | Difference from the 2010–11 season |
| **Medical settings** | 75,831 | 56.9 (56.3-57.6) | -1.7[†] | 15,913 | 51.2 (50.0-52.5) | -3.1[†] | 22,735 | 56.8 (55.7-57.9)[§] | 0.5 | 37,183 | 64.3 (63.4-65.1)[§] | -2.7[†] |
| Doctor's office/HMO | 50,949 | 38.4 (37.8-39.1) | -1.4[†] | 9,233 | 30.1 (29.0-31.3) | -2.1 | 14,656 | 38.2 (37.1-39.4)[§] | -0.6 | 27,060 | 49.1 (48.2-50.0)[§] | -2.5[†] |
| Hospital/emergency department | 8,944 | 7.6 (7.2-8.0) | 0.4 | 2,706 | 8.9 (8.1-9.7) | -0.1 | 3,168 | 7.8 (7.2-8.4)[§] | 0.8 | 3,070 | 5.8 (5.3-6.4)[§] | 1.0[†] |
| Another type of clinic/health center | 11,872 | 8.4 (8.0-8.9) | 1.3[†] | 3,021 | 9.5 (8.8-10.4) | 1.7[†] | 3,628 | 8.4 (7.7-9.1)[§] | 1.8[†] | 5,223 | 7.1 (6.7-7.6)[§] | 0.4 |
| Health department | 4,066 | 2.5 (2.3-2.7) | -1.9[†] | 953 | 2.7 (2.4-3.1) | -2.6[†] | 1,283 | 2.4 (2.1-2.7) | -1.6[†] | 1,830 | 2.2 (2.0-2.4)[§] | -1.6[†] |
| **Nonmedical settings** | 56,912 | 43.1 (42.4-43.7) | 1.7[†] | 16,190 | 48.8 (47.5-50.0) | 3.1[†] | 19,091 | 43.2 (42.1-44.3)[§] | -0.5 | 21,631 | 35.7 (34.9-36.6)[§] | 2.7[†] |
| Store[‖] | 28,370 | 20.1 (19.6-20.6) | 1.7[†] | 4,245 | 14.6 (13.7-15.5) | 0.0 | 7,831 | 18.8 (17.9-19.7)[§] | 0.8 | 16,294 | 28.4 (27.6-29.3)[§] | 4.1[†] |
| Workplace | 20,854 | 17.6 (17.1-18.1) | 0.2 | 10,119 | 28.0 (26.9-29.0) | 2.2[†] | 9,325 | 20.3 (19.5-21.2)[§] | -0.8 | 1,410 | 1.9 (1.7-2.2)[§] | 0.0 |
| Senior/recreation/ community center | 2,309 | 1.1 (1.0-1.3) | -0.3[†] | 149 | 0.5 (0.4-0.8) | 0.1 | 387 | 0.6 (0.5-0.8) | -0.2 | 1,773 | 2.4 (2.1-2.6)[§] | -1.0[†] |
| School | 1,175 | 1.1 (1.0-1.2) | -0.1 | 650 | 2.1 (1.8-2.5) | 0.1 | 375 | 0.7 (0.6-0.9)[§] | -0.4[†] | 150 | 0.2 (0.1-0.3)[§] | -0.1 |
| Other | 4,204 | 3.1 (2.9-3.4) | 0.2 | 1,027 | 3.6 (3.2-4.2) | 0.7 | 1,173 | 2.7 (2.3-3.2)[§] | 0.2 | 2,004 | 2.8 (2.6-3.1)[§] | -0.3 |

Abbreviations: CI=confidence interval; HMO= health maintenance organization.

*
Individuals reported receiving influenza vaccination during August 2011 through May 2012.

[†]
p<0.05 by t test for comparisons between 2011–12 and 2010–11 seasons.

[§]
p<0.05 by t test for comparisons between age groups with 18–49 year olds as the reference group.

[‖]
Supermarket or drug store.

**Table 2**

Percentage of adults aged ≥ 18 years receiving influenza vaccination in medical versus nonmedical settings, by age group and selected characteristics – Behavioral Risk Factor Surveillance System, United States, 2011–12 influenza season[*]

| Characteristic | Overall | | 18-49 yrs | | 50-64 yrs | | ≥65 yrs | |
|---|---|---|---|---|---|---|---|---|
| | Medical[†] % (95% CI) | Nonmedical[§] % (95% CI) | Medical % (95% CI) | Nonmedical % (95% CI) | Medical % (95% CI) | Nonmedical % (95% CI) | Medical % (95% CI) | Nonmedical % (95% CI) |
| Total | 56.9 (56.3-57.6) | 43.1 (42.4-43.7) | 51.2 (50.0-52.5) | 48.8 (47.5-50.0) | 56.8 (55.7-57.9) | 43.2 (42.1-44.3) | 64.3 (63.4-65.1) | 35.7 (34.9-36.6) |
| Sex | | | | | | | | |
| Men[‖] | 56.2 (55.1-57.3) | 43.8 (42.7-44.9) | 48.2 (46.1-50.4) | 51.8 (49.6-53.9) | 57.3 (55.5-59.1) | 42.7 (40.9-44.5) | 65.2 (63.9-66.6) | 34.8 (33.4-36.1) |
| Women | 57.5 (56.7-58.3) | 42.5 (41.7-43.3) | 53.6 (52.1-55.1) ** | 46.4 (44.9-47.9) ** | 56.4 (55.0-57.9) | 43.6 (42.1-45.0) | 63.5 (62.4-64.6) | 36.5 (35.4-37.6) |
| Race/Ethnicity | | | | | | | | |
| White, non-Hispanic[‖] | 55.0 (54.3-55.6) | 45.0 (44.4-45.7) | 48.3 (46.9-49.6) | 51.7 (50.4-53.1) | 53.8 (52.7-55.0) | 46.2 (45.0-47.3) | 62.4 (61.5-63.3) | 37.6 (36.7-38.5) |
| Black, non-Hispanic | 67.9 (65.5-70.1) ** | 32.1 (29.9-34.5) ** | 60.6 (56.6-64.4) ** | 39.4 (35.6-43.4) ** | 71.1 (67.4-74.5) ** | 28.9 (25.5-32.6) ** | 79.5 (76.1-82.5) ** | 20.5 (17.5-23.9) ** |
| Hispanic | 61.1 (58.1-64.1) ** | 38.9 (35.9-41.9) ** | 56.2 (52.1-60.3) ** | 43.8 (39.7-47.9) ** | 64.9 (58.7-70.6) ** | 35.1 (29.4-41.3) ** | 74.8 (70.1-79.0) ** | 25.2 (21.0-29.9) ** |
| Other | 59.1 (55.6-62.5) ** | 40.9 (37.5-44.4) ** | 53.6 (48.6-58.6) ** | 46.4 (41.4-51.4) ** | 62.3 (56.0-68.2) ** | 37.7 (31.8-44.0) ** | 73.5 (68.3-78.1) ** | 26.5 (21.9-31.7) ** |
| Education level | | | | | | | | |
| Less than high school[‖] | 70.0 (67.6-72.3) ** | 30.0 (27.7-32.4) ** | 66.0 (60.9-70.7) ** | 34.0 (29.3-39.1) ** | 72.0 (66.8-76.6) ** | 28.0 (23.4-33.2) ** | 71.8 (68.7-74.6) ** | 28.2 (25.4-31.3) ** |
| High school graduate | 60.6 (59.4-61.9) ** | 39.4 (38.1-40.6) ** | 56.6 (53.8-59.5) ** | 43.4 (40.5-46.2) ** | 59.9 (57.7-62.0) ** | 40.1 (38.0-42.3) ** | 64.7 (63.3-66.1) ** | 35.3 (33.9-36.7) ** |
| Attended college | 53.0 (52.2-53.8) ** | 47.0 (46.2-47.8) ** | 47.5 (46.1-48.9) ** | 52.5 (51.1-53.9) ** | 53.4 (52.0-54.7) ** | 46.6 (45.3-48.0) ** | 62.1 (60.9-63.2) ** | 37.9 (36.8-39.1) ** |
| Employment status | | | | | | | | |
| Employed[‖] | 46.5 (45.6-47.5) | 53.5 (52.5-54.4) | 44.1 (42.7-45.5) | 55.9 (54.5-57.3) | 48.3 (46.8-49.8) | 51.7 (50.2-53.2) | 56.8 (54.3-59.3) | 43.2 (40.7-45.7) |
| Unemployed | 67.4 (64.1-70.6) ** | 32.6 (29.4-35.9) ** | 67.6 (62.4-72.3) ** | 32.4 (27.7-37.6) ** | 66.5 (61.9-70.8) ** | 33.5 (29.2-38.1) ** | 70.1 (62.3-76.8) ** | 29.9 (23.2-37.7) ** |
| Not in work force | 67.1 (66.2-67.9) ** | 32.9 (32.1-33.8) ** | 69.6 (66.8-72.2) ** | 30.4 (27.8-33.2) ** | 69.8 (67.9-71.6) ** | 30.2 (28.4-32.1) ** | 65.2 (64.3-66.2) ** | 34.8 (33.8-35.7) ** |
| Certain chronic conditions[††] | | | | | | | | |
| Yes[‖] | 65.1 (64.2-66.0) | 34.9 (34.0-35.8) | 59.8 (57.1-62.4) | 40.2 (37.6-42.9) | 65.9 (64.2-67.5) | 34.1 (32.5-35.8) | 67.1 (65.9-68.2) | 32.9 (31.8-34.1) |
| No | 51.6 (50.7-52.5) ** | 48.4 (47.5-49.3) ** | 48.7 (47.3-50.0) ** | 51.3 (50.0-52.7) ** | 49.8 (48.3-51.4) ** | 50.2 (48.6-51.7) ** | 60.5 (59.2-61.8) ** | 39.5 (38.2-40.8) ** |
| Time since last routine checkup | | | | | | | | |
| <1 yr[‖] | 59.5 (58.8-60.2) | 40.5 (39.8-41.2) | 53.8 (52.4-55.3) | 46.2 (44.7-47.6) | 59.7 (58.5-60.9) | 40.3 (39.1-41.5) | 65.3 (64.4-66.2) | 34.7 (33.8-35.6) |

| Characteristic | Overall | | 18-49 yrs | | 50-64 yrs | | 65 yrs | |
|---|---|---|---|---|---|---|---|---|
| | Medical[†] % (95% CI) | Nonmedical[§] % (95% CI) | Medical % (95% CI) | Nonmedical % (95% CI) | Medical % (95% CI) | Nonmedical % (95% CI) | Medical % (95% CI) | Nonmedical % (95% CI) |
| 1 yrs | 45.1 (43.4-46.8)** | 54.9 (53.2-56.6)** | 43.5 (41.0-46.1)** | 56.5 (53.9-59.0)** | 42.8 (40.0-45.6)** | 57.2 (54.4-60.0)** | 54.3 (51.4-57.1)** | 45.7 (42.9-48.6)** |
| Health insurance coverage | | | | | | | | |
| Yes¶ | 57.0 (56.3-57.7) | 43.0 (42.3-43.7) | 50.9 (49.5-52.2) | 49.1 (47.8-50.5) | 56.7 (55.6-57.9) | 43.3 (42.1-44.4) | 64.3 (63.4-65.1) | 35.7 (34.9-36.6) |
| No | 55.9 (52.8-59.0) | 44.1 (41.0-47.2) | 54.2 (50.0-58.5) | 45.8 (41.5-50.0) | 57.4 (52.6-62.1) | 42.6 (37.9-47.4) | 67.4 (59.6-74.3) | 32.6 (25.7-40.4) |
| Personal doctor | | | | | | | | |
| Yes¶ | 58.1 (57.4-58.7) | 41.9 (41.3-42.6) | 52.7 (51.3-54.0) | 47.3 (46.0-48.7) | 57.4 (56.2-58.5) | 42.6 (41.5-43.8) | 64.5 (63.6-65.4) | 35.5 (34.6-36.4) |
| No | 45.3 (42.8-47.9)** | 54.7 (52.1-57.2)** | 43.8 (40.6-46.9)** | 56.2 (53.1-59.4)** | 46.4 (41.3-51.5)** | 53.6 (48.5-58.7)** | 56.0 (50.5-61.4)** | 44.0 (38.6-49.5)** |
| Cost an obstacle to medical care | | | | | | | | |
| Yes¶ | 59.6 (57.4-61.7) | 40.4 (38.3-42.6) | 55.8 (52.4-59.1) | 44.2 (40.9-47.6) | 62.7 (59.3-66.0) | 37.3 (34.0-40.7) | 66.5 (62.0-70.8) | 33.5 (29.2-38.0) |
| No | 56.6 (56.0-57.3)** | 43.4 (42.7-44.0)** | 50.6 (49.2-51.9)** | 49.4 (48.1-50.8)** | 56.0 (54.8-57.2)** | 44.0 (42.8-45.2)** | 64.2 (63.3-65.1) | 35.8 (34.9-36.7) |

Abbreviations: CI= confidence interval.

*
Individuals reported receiving influenza vaccination during August 2011 through May 2012.

[†]
Doctor's office/health maintenance organization, health department, another type of clinic/health center, or hospital/emergency department.

[§]
Workplace, store, senior/recreation/community center, school, or other place.

¶
Reference group used for pairwise significance testing.

**
p<0.05 by t-test when compared to reference group.

[††]
Persons with certain chronic conditions (i.e., asthma, diabetes, cardiovascular disease, chronic obstructive pulmonary disease, emphysema, chronic bronchitis, and cancer.

**Table 3**

Multivariable logistic regression analysis of persons ≥ 18 years who reported receiving influenza vaccination in a nonmedical setting versus medical setting[*], by demographic and access-to-care variables, Behavioral Risk Factor Surveillance System, United States, 2011–12 influenza season[†]

| Characteristic | Overall Adjusted Prevalence Ratio (95% CI) | 18-49 years Adjusted Prevalence Ratio (95% CI) | 50-64 years Adjusted Prevalence Ratio (95% CI) | 65+ years Adjusted Prevalence Ratio (95% CI) |
|---|---|---|---|---|
| Sex | | | | |
| Men | Referent | Referent | Referent | Referent |
| Women | 1.0 (1.0-1.0) | 1.0 (0.9-1.0) | 1.0 (1.0-1.1) | 1.0 (1.0-1.1) |
| Race/Ethnicity | | | | |
| White, non-Hispanic | Referent | Referent | Referent | Referent |
| Black, non-Hispanic | 0.8 (0.7-0.8)[§] | 0.8 (0.8-0.9)[§] | 0.7 (0.6-0.8)[§] | 0.6 (0.5-0.7)[§] |
| Hispanic | 0.9 (0.8-0.9)[§] | 0.9 (0.8-1.0)[§] | 0.9 (0.8-1.1) | 0.7 (0.6-0.9)[§] |
| Other | 0.9 (0.8-1.0)[§] | 1.0 (0.9-1.1) | 0.8 (0.7-0.9)[§] | 0.7 (0.6-0.9)[§] |
| Education level | | | | |
| Less than high school | Referent | Referent | Referent | Referent |
| High school graduate | 1.2 (1.1-1.3)[§] | 1.1 (1.0-1.3) | 1.2 (1.0-1.4)[§] | 1.2 (1.0-1.3)[§] |
| Attended college | 1.2 (1.2-1.3)[§] | 1.3 (1.1-1.5)[§] | 1.3 (1.1-1.5)[§] | 1.2 (1.1-1.4)[§] |
| Employment status | | | | |
| Employed | Referent | Referent | Referent | Referent |
| Unemployed | 0.6 (0.6-0.7)[§] | 0.6 (0.5-0.7)[§] | 0.7 (0.6-0.8)[§] | 0.7 (0.5-0.8)[§] |
| Not in work force | 0.7 (0.7-0.7)[§] | 0.6 (0.5-0.7)[§] | 0.7 (0.6-0.7)[§] | 0.8 (0.8-0.9)[§] |
| Certain chronic conditions | | | | |
| Yes | Referent | Referent | Referent | Referent |
| No | 1.2 (1.1-1.2)[§] | 1.1 (1.1-1.2)[§] | 1.3 (1.2-1.3)[§] | 1.2 (1.1-1.2)[§] |
| Time since last routine checkup | | | | |
| <1 yr | Referent | Referent | Referent | Referent |
| ≥1 yrs | 1.2 (1.2-1.3)[§] | 1.1 (1.1-1.2)[§] | 1.3 (1.2-1.4)[§] | 1.3 (1.2-1.4)[§] |
| Health insurance coverage | | | | |
| Yes | Referent | Referent | Referent | Referent |
| No | 1.0 (0.9-1.1) | 1.0 (0.9-1.1) | 1.1 (0.9-1.2) | 1.0 (0.8-1.2) |
| Personal doctor | | | | |
| Yes | Referent | Referent | Referent | Referent |
| No | 1.2 (1.1-1.2)[§] | 1.2 (1.1-1.2)[§] | 1.1 (1.0-1.3)[§] | 1.3 (1.1-1.4)[§] |
| Cost an obstacle to medical care | | | | |
| Yes | Referent | Referent | Referent | Referent |
| No | 1.0 (1.0-1.1) | 1.0 (0.9-1.1) | 1.1 (1.0-1.2) | 1.0 (0.9-1.1) |

Abbreviations: CI=confidence interval.

*Workplace, store, senior/recreation/community center, school, or other.

†Individuals reported receiving influenza vaccination during August 2011 through May 2012.

§$p<0.05$ by t test for comparisons within each variable with the indicated reference level.

**Table 4**

Place of seasonal influenza vaccination of adults aged   18 years by state, Behavioral Risk Factor Surveillance System, United States, 2011–12 influenza season[*]

| | Medical setting[†] | | Nonmedical setting[§] | |
|---|---|---|---|---|
| | N | % (95% CI) | N | % (95% CI) |
| Nevada | 468 | 39.6 (35.2-44.2) | 661 | 60.4 (55.8-64.8) |
| Arizona | 902 | 47.4 (43.4-51.5) | 1,003 | 52.6 (48.5-56.6) |
| Nebraska | 4,450 | 47.6 (46.0-49.3) | 3,719 | 52.4 (50.7-54.0) |
| Illinois | 800 | 48.2 (44.2-52.1) | 783 | 51.8 (47.9-55.8) |
| Oregon | 781 | 48.7 (45.6-51.7) | 776 | 51.3 (48.3-54.4) |
| Rhode Island | 917 | 49.2 (46.2-52.2) | 984 | 50.8 (47.8-53.8) |
| Texas | 1,341 | 49.4 (46.3-52.5) | 1,397 | 50.6 (47.5-53.7) |
| South Dakota | 931 | 49.8 (45.3-54.2) | 794 | 50.2 (45.8-54.7) |
| Indiana | 1,050 | 49.8 (46.9-52.7) | 941 | 50.2 (47.3-53.1) |
| Utah | 1,482 | 50.0 (47.5-52.5) | 1,337 | 50.0 (47.5-52.5) |
| Connecticut | 1,230 | 50.5 (47.5-53.5) | 1,127 | 49.5 (46.5-52.5) |
| South Carolina | 1,920 | 51.3 (48.6-53.9) | 1,551 | 48.7 (46.1-51.4) |
| Colorado | 1,921 | 51.6 (49.0-54.2) | 1,849 | 48.4 (45.8-51.0) |
| Arkansas | 733 | 52.5 (48.4-56.6) | 595 | 47.5 (43.4-51.6) |
| Iowa | 1,331 | 52.8 (50.3-55.3) | 1,117 | 47.2 (44.7-49.7) |
| Florida | 995 | 52.9 (48.9-56.8) | 758 | 47.1 (43.2-51.1) |
| Virginia | 884 | 52.9 (49.2-56.6) | 808 | 47.1 (43.4-50.8) |
| District of Columbia | 690 | 53.2 (48.8-57.5) | 576 | 46.8 (42.5-51.2) |
| Montana | 1,248 | 53.3 (50.2-56.4) | 1,082 | 46.7 (43.6-49.8) |
| Oklahoma | 1,330 | 53.6 (50.8-56.3) | 1,013 | 46.4 (43.7-49.2) |
| Kansas | 3,005 | 53.9 (52.2-55.7) | 2,380 | 46.1 (44.3-47.8) |
| Missouri | 894 | 54.0 (50.6-57.5) | 663 | 46.0 (42.5-49.4) |
| Washington | 2,563 | 54.0 (51.7-56.3) | 2,160 | 46.0 (43.7-48.3) |
| Delaware | 857 | 54.1 (50.8-57.5) | 716 | 45.9 (42.5-49.2) |
| Maryland | 2,056 | 54.2 (51.1-57.4) | 1,579 | 45.8 (42.6-48.9) |
| Ohio | 1,615 | 54.2 (51.6-56.7) | 1,293 | 45.8 (43.3-48.4) |
| Alaska | 419 | 54.4 (49.2-59.5) | 308 | 45.6 (40.5-50.8) |
| Idaho | 797 | 54.6 (49.8-59.3) | 654 | 45.4 (40.7-50.2) |
| North Carolina | 2,377 | 55.3 (53.1-57.5) | 1,809 | 44.7 (42.5-46.9) |
| Kentucky | 2,040 | 55.5 (53.0-58.0) | 1,388 | 44.5 (42.0-47.0) |
| Wyoming | 886 | 55.7 (51.9-59.4) | 779 | 44.3 (40.6-48.1) |
| Tennessee | 1,195 | 55.8 (49.7-61.8) | 835 | 44.2 (38.2-50.3) |
| Georgia | 1,080 | 56.1 (52.7-59.4) | 721 | 43.9 (40.6-47.3) |
| Wisconsin | 654 | 56.4 (51.7-61.0) | 449 | 43.6 (39.0-48.3) |
| Minnesota | 2,897 | 57.0 (55.0-59.1) | 2,214 | 43.0 (40.9-45.0) |
| Mississippi | 1,311 | 57.6 (54.6-60.6) | 743 | 42.4 (39.4-45.4) |

| | Medical setting[†] | | Nonmedical setting[§] | |
|---|---|---|---|---|
| | N | % (95% CI) | N | % (95% CI) |
| Maine | 1,935 | 57.8 (55.5-60.1) | 1,293 | 42.2 (39.9-44.5) |
| New Jersey | 1,968 | 57.9 (55.3-60.5) | 1,339 | 42.1 (39.5-44.7) |
| New Hampshire | 1,182 | 58.3 (55.4-61.2) | 764 | 41.7 (38.8-44.6) |
| North Dakota | 867 | 58.9 (55.6-62.2) | 566 | 41.1 (37.8-44.4) |
| New Mexico | 1,401 | 59.6 (57.0-62.2) | 983 | 40.4 (37.8-43.0) |
| Alabama | 1,534 | 59.7 (56.8-62.5) | 887 | 40.3 (37.5-43.2) |
| West Virginia | 1,105 | 60.0 (57.2-62.8) | 659 | 40.0 (37.2-42.8) |
| Massachusetts | 4,209 | 60.4 (58.4-62.3) | 2,707 | 39.6 (37.7-41.6) |
| Vermont | 1,311 | 61.4 (58.5-64.2) | 727 | 38.6 (35.8-41.5) |
| Louisiana | 1,561 | 62.1 (58.8-65.4) | 832 | 37.9 (34.6-41.2) |
| Michigan | 1,712 | 62.4 (59.0-65.8) | 958 | 37.6 (34.2-41.0) |
| Pennsylvania | 3,089 | 63.0 (60.9-65.1) | 1,673 | 37.0 (34.9-39.1) |
| Hawaii | 1,192 | 64.8 (61.3-68.2) | 636 | 35.2 (31.8-38.7) |
| New York | 1,113 | 66.9 (63.8-69.8) | 565 | 33.1 (30.2-36.2) |
| California | 1,602 | 67.8 (65.1-70.5) | 761 | 32.2 (29.5-34.9) |
| *median* | | 54.2 | | 45.8 |
| *range* | | 39.6-67.8 | | 32.2-60.4 |

Abbreviations: CI=confidence interval

[*] Individuals reported receiving influenza vaccination during August 2011 through May 2012

[†] Doctor's office/health maintenance organization, health department, another type of clinic/health center, or hospital/emergency department

[§] Workplace, store, senior/recreation/community center, school, or other