

SUPPLEMENTARY BOX 5. Differences in vaccination coverage among adults aged ≥ 19 years for select vaccines, by race/ethnicity, increased-risk status, health insurance status, age group, access to care characteristics, nativity, number of years living in the United States, and citizenship — National Health Interview Survey, United States, 2018

Supplementary Tables	Result summary
Racial/Ethnic Differences in Vaccination Coverage Among Adults	<p>Compared with 2017, racial/ethnic differences in vaccination coverage persisted for all seven vaccines in this report (Box 3, Table 1–Table 2; Box 4, Table 1; Box 5, Table 1). With whites as the reference group, there were differences in vaccination coverage for 48 of the 66 comparisons by vaccine and age/target groups (not including comparisons of the “other” race/ethnic group). These vaccination differences ranged from 5.8 percentage points for Asians versus whites for hepatitis A vaccination among adults aged 19–49 years and among health care personnel (HCP) aged ≥ 19 years to -22.9 percentage points for blacks versus whites for tetanus toxoid-containing vaccination among adults aged 50–64 years and for blacks versus whites for tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) vaccination among HCP aged ≥ 19 years. Blacks, Hispanics, and Asians had lower vaccination coverage than whites for all vaccines routinely recommended for adults, except for influenza vaccination (among adults aged ≥ 19 years and 19–49 years: Asians had coverage similar to whites; aged 50–64 years: blacks and Asians had coverage similar to whites; aged ≥ 65 years: Hispanics and Asians had coverage similar to whites); pneumococcal vaccination (among adults aged 19–64 years with increased risk: blacks and Asians had coverage similar to whites); hepatitis A vaccination (among adults aged 19–49 years: Hispanics had coverage similar to whites and Asians had coverage higher than whites); hepatitis B (among adults aged 19–49 years: Asians had coverage similar to whites); herpes zoster vaccination (among adults aged 60–64: Asians had coverage similar to whites), and human papillomavirus (HPV) vaccination (among women aged 19–26 years: blacks and Hispanics had coverage similar to whites) (Table 1).</p>
Average Change in Racial/Ethnic Vaccination	<p>During 2010–2018, vaccination differences between whites and blacks increased for tetanus vaccination (Td or Tdap) (adults aged ≥ 19 years and 19–49 years),</p>

<p>Coverage Differences Among Adults, 2010–2018</p>	<p>Tdap (adults aged ≥ 19 years and 19–64 years), hepatitis A (adults aged 19–49 years), hepatitis B (adults aged 19–49 years and HCP aged ≥ 19 years), and herpes zoster vaccination (adults aged ≥ 60 years and ≥ 65 years). Among Hispanics, vaccination differences increased over this time period compared with whites for tetanus vaccination (Td or Tdap) (adults aged ≥ 19 years), Tdap (all age groups), hepatitis A (adults aged 19–49 years), hepatitis B (HCP aged ≥ 19 years), and herpes zoster vaccination (adults aged ≥ 60 years and ≥ 65 years). For Asians, vaccination differences increased over this time period compared with whites for Tdap (adults aged ≥ 19 years and 19–64 years), and herpes zoster vaccination (adults aged ≥ 65 years). However, for Asians, vaccination differences decreased over this time period compared with whites for tetanus (Td or Tdap) vaccination (adults aged 19–49 years). Among persons reporting other race, vaccination differences increased over this time period compared with whites for Tdap (adults aged ≥ 19 years), and hepatitis B vaccination (HCP aged ≥ 19 years). Vaccination differences between whites, blacks, Hispanics, and persons reporting other race for the other vaccines and age groups did not change during this period (Table 2).</p>
<p>Proportion of Adult Who Received Influenza Vaccination By Age And Race/Ethnicity</p>	<p>Influenza vaccination coverage for the 2017–18 season overall among adults aged ≥ 19 years was 46.1%, similar to the estimate for the 2016–17 season. Coverage among whites aged ≥ 19 years (49.3%) was higher than that for blacks (39.0%), Hispanics (37.5%), and those of other or multiple race (41.4%). Among adults aged 19–49 years, influenza vaccination coverage for the 2017–18 season was 34.8%, similar to the estimate for the 2016–17 season. Coverage among whites aged 19–49 years (36.5%) was higher than that for blacks (30.2%) and Hispanics (30.5%). Coverage among whites aged 50–64 years (49.4%) was higher compared with Hispanics (42.0%). Coverage among whites aged ≥ 65 years (73.5%) was higher compared with blacks (59.7%). Coverage among adults aged ≥ 65 years (72.2%) was higher compared with younger age groups (Table 3).</p>

<p>Proportion of Adult Who Received Tetanus Vaccination, and Tetanus Vaccination Including Pertussis Vaccine By Age And Race/Ethnicity</p>	<p>In 2018, whites had higher tetanus vaccination (Td or Tdap) coverage across all age groups compared with blacks, Hispanics, and Asians.</p> <p>Whites had higher Tdap vaccination coverage across all age groups compared with blacks and Hispanics, and Asians.</p> <p>Coverage among adults aged 19–64 years who reported living with an infant aged <1 year was 45.9%, similar to the estimate for 2017 but was higher than the 32.9% coverage among adults aged 19–64 years without household contact with an infant aged <1 year.</p> <p>The difference in vaccination coverage between whites and other racial/ethnic groups in 2018 increased for respondents aged ≥19 years and 19–64 years compared with differences measured in 2017 (Table 4).</p>
<p>Proportion of Adult Who Received Herpes Zoster Vaccination By Age And Race/Ethnicity</p>	<p>Among adults aged 50–64 years, 11.5% reported herpes zoster vaccination, similar to the estimate for 2017. Whites aged 50–64 years had higher herpes vaccination coverage (13.4%) compared with blacks (6.0%) and Hispanics (6.9%).</p> <p>Among adults aged 50–59 years, 5.8% reported herpes zoster vaccination, similar to the estimate for 2017. Whites aged 50–59 years had higher herpes vaccination coverage (6.5%) compared with blacks (4.0%) and Hispanics (3.5%).</p> <p>Among adults aged 60–64 years, 22.5% reported herpes zoster vaccination, similar to the estimate for 2017. Whites aged 60–64 years had higher herpes vaccination coverage (25.4%) compared with blacks (10.8%), and Hispanics (15.3%).</p> <p>Among adults aged ≥65 years, 39.5% reported herpes zoster vaccination, similar to the estimates for 2017. Whites aged ≥65 years had higher herpes zoster vaccination coverage (44.0%) compared with blacks (22.6%), Hispanics aged (21.7%), and Asians (32.5%) (Table 5).</p>
<p>Association of Health Insurance Status with Vaccination Coverage Among Adult Populations</p>	<p>Adults without health insurance reported vaccination less often than those with health insurance: influenza vaccination (among adults aged ≥19 years, 19–49 years, and 50–64 years); pneumococcal (among adults aged 19–64 years at increased risk); tetanus (among all age groups); Tdap (among adults aged ≥19 years and 19–64 years); hepatitis A (among adults aged ≥19 years</p>

	<p>overall and among travelers); hepatitis B (among adults aged ≥ 19 years, 19–49 years, and among travelers aged ≥ 19 years); herpes zoster (among adults aged ≥ 60 years), and HPV vaccination (among men and women aged 19–26 years). For influenza, pneumococcal, Tdap, herpes zoster, and HPV vaccination, coverage was two to five times higher among those with health insurance versus those without insurance. Adult vaccination coverage differed by type of health insurance. Except for overall influenza vaccination among adults aged ≥ 19 years and pneumococcal vaccination among those aged 19–64 years with increased risk for infection, vaccination coverage generally was higher among adults with private health insurance compared with those reporting public health insurance (Table 6).</p>
<p>Adult Vaccination Coverage Adjusted for Selected Demographic and Access to Care Characteristics</p>	<p>Adults without health insurance were less likely than those with health insurance to be vaccinated after adjusting for select demographic, access to care factors, and confounders for influenza (adults aged ≥ 19 years); pneumococcal (adults aged 19–64 years at increased risk and ≥ 65 years); Tdap (adults aged ≥ 19 years); hepatitis A (adults aged ≥ 19 years and travelers aged ≥ 19 years); hepatitis B (adults aged ≥ 19 years and 19–49 years); and HPV (males aged 19–26 years and men aged 19–26 years who reported first HPV dose at 19–26 years). The difference in adjusted vaccination coverage between respondents with and without health insurance for whom the difference was statistically significant ranged from 2.7% (hepatitis A vaccination among adults aged ≥ 19 years) to 25.4% (pneumococcal vaccination among adults aged ≥ 65 years) (Table 7).</p>
<p>Association of Health Insurance Status and Having a Usual Place for Health Care with Vaccination Coverage</p>	<p>Generally, adults with a usual place for health care were more likely to report having received recommended vaccinations than those who did not have a usual place for health care, regardless of whether they had health insurance. Among adults with health insurance, coverage was significantly higher among those who reported having a usual place for health care compared with those who did not have a usual place for health care, except for hepatitis A vaccination (among adults aged ≥ 19 years overall and travelers) and hepatitis B vaccination (among adults aged ≥ 19 years, travelers aged ≥ 19 years, and those aged 19–49 years). Among adults without health</p>

	<p>insurance, coverage was significantly higher among adults who had a usual place for health care compared with those who did not have a usual place for health care for influenza vaccination (among adults aged ≥ 19 years, 19–49 years, and 50–64 years) and tetanus vaccination (among adults aged ≥ 19 years and ≥ 65 years (Table 8).</p>
<p>Adult Vaccination Coverage by Health Insurance Status and Physician Contacts</p>	<p>With a few exceptions (overall hepatitis A vaccination among adults aged ≥ 19 years and travelers aged ≥ 19 years, and hepatitis B vaccination among travelers aged ≥ 19 years), vaccination coverage was significantly higher among those reporting ≥ 1 physician contact(s) in the past year compared with those who had not visited a physician in the past year, regardless of whether they had health insurance. Additionally, vaccination coverage generally increased as the number of physician contacts increased (e.g., influenza vaccination coverage among adults aged ≥ 19 years with health insurance was 22.0% for those without a physician contacts, 48.1% for those with 1–3 physician contacts, 59.9% for those with 4–9 physician contacts, and 60.4% for those with ≥ 10 physician contacts in the past 12 months). Among adults who had health insurance and ≥ 10 physician contacts within the past year, 20.1%–87.5% reported not receiving vaccinations that are either recommended for all persons or recommended for those with some specific indication (not receiving influenza vaccination, 39.6% [aged ≥ 19 years], 52.6% [aged 19–49 years], 41.8% [aged 50–64 years], 20.1% [aged ≥ 65 years]; not receiving pneumococcal vaccination, 64.0% [at increased risk, aged 19–64 years], 22.0% [aged ≥ 65 years]; not receiving tetanus vaccination, 29.2% [aged ≥ 19 years]; not receiving Tdap, 60.8% [aged 19–64 years], 75.3% [aged ≥ 65 years]; not receiving hepatitis A vaccination, 79.3% [travelers aged ≥ 19 years], 75.6% [persons aged ≥ 19 years with chronic liver conditions]; not receiving hepatitis B vaccination, 57.7% [travelers aged ≥ 19 years], 65.7% [adults aged ≥ 19 years with chronic liver conditions], 63.8% [adults aged 19–59 with diabetes], 86.1% [adults aged ≥ 60 years with diabetes]; herpes zoster, 61.3% [adults aged ≥ 60 years] ; HPV, 39.0% [women aged 19–26 years]; and HPV, 41.8% [men aged 19–26 years]) (Table 9).</p>

<p>Association of Respondent Age with Adult Vaccination Coverage</p>	<p>Influenza and pneumococcal vaccination coverage among adults aged ≥ 65 years was higher compared with coverage among adults aged 19–64 years; however, overall tetanus vaccination (Td or Tdap) and Tdap vaccination coverage among adults aged ≥ 65 years was lower compared with coverage among adults aged < 65 years. Hepatitis B vaccination coverage among adults aged ≥ 60 years with diabetes was lower compared with coverage among adults aged 19–59 years with diabetes.* Herpes zoster coverage among adults ≥ 65 years was higher compared with coverage among adults aged 60–64 years (Tables 6,8, and 9).</p>
<p>Adult Vaccination Coverage by Nativity, Years Living in the United States, and Citizenship</p>	<p>Overall, vaccination coverage among U.S.–born adults was higher than that of foreign–born adults including influenza vaccination (aged ≥ 19 years), pneumococcal vaccination (all ages), tetanus vaccination (all ages), Tdap vaccination (all ages), hepatitis B vaccination (aged ≥ 19 years, 19–49 years, and travelers aged ≥ 19 years), herpes zoster vaccination (all ages), and HPV vaccination among females aged 19–26 years. Vaccination coverage was higher for foreign–born persons living in the United States ≥ 10 years compared with those living in the United States < 10 years for influenza vaccination (aged ≥ 19 years), but lower for hepatitis A vaccination (adults aged ≥ 19 years overall and among travelers aged ≥ 19 years) and hepatitis B vaccination (adults aged ≥ 19 years overall, and travelers aged ≥ 19 years). Coverage among foreign–born adults who were U.S. citizens was higher than that for foreign–born adults who were not U.S. citizens for influenza vaccination (aged ≥ 19 years, 19–49 years, and 50–64 years); tetanus vaccination (aged 19–49 years); tetanus vaccination including pertussis vaccine (aged 19–64 years); hepatitis B vaccination (aged ≥ 19 years and 19–49 years); and herpes zoster vaccination (aged ≥ 60 years). (Table 10).</p>

* In 2011, the Advisory Committee on Immunization Practices (ACIP) recommended hepatitis B vaccination for persons with diabetes 19–59 years and stated that persons with diabetes aged 60 years and older should be considered for vaccination.

SUPPLEMENTARY BOX 5, TABLE 1. Summary table of racial/ethnic* differences in vaccination coverage among adults aged ≥19 years, by age group and increased-risk status[†] – National Health Interview Survey, United States, 2018

Vaccination, age group, increased-risk status	% Vaccinated whites	Vaccination difference [§] , blacks	Vaccination differences, Hispanics	Vaccination differences, Asians	Vaccination differences, other
Influenza vaccination, 2017-18 season[†]					
≥19 yrs	49.3	-10.3**	-11.8**	1.4	-7.9**
19-49 yrs	36.5	-6.3**	-6.0**	5.1	-1.4
50-64 yrs	49.4	-3.1	-7.4**	2.8	-3.5
≥65 yrs	73.5	-13.8**	-4.6	5.7	-6.7
HCP ^{††} , ≥19 yrs	71.9	0.3	-0.2	0.7	-6.4
Pneumococcal vaccination, ever^{§§}					
19-64 yrs, increased risk	23.6	2.1	-5.1**	1.4	2.2
≥65 yrs	72.6	-12.8**	-18.4**	-17.6**	-6.5
Tetanus vaccination (received in past 10 years)^{†††}					
≥19 yrs	68.3	-18.1**	-14.3**	-13.6**	-6.4**
19-49 yrs	71.2	-18.3**	-15.5**	-12.9**	-7.7**
50-64 yrs	69.1	-22.9**	-18.1**	-20.3**	-10.6**
≥65 yrs	61.9	-15.1**	-13.0**	-12.6**	-3.0
Tetanus vaccination including pertussis vaccine (received in past 10 years)^{††††}					
≥19 yrs	36.7	-16.6**	-16.2**	-11.1**	-4.7
19-64 yrs	40.6	-19.6**	-18.9**	-13.1**	-7.5**
≥65 yrs	24.6	-8.8**	-13.0**	-8.9**	0.2
HCP, ≥19 yrs	60.9	-22.9**	-14.4**	2.6	2.1
Hepatitis A vaccination (at least 2 doses)^{†††††}					
19-49 yrs	18.2	-5.4**	-2.5	5.8**	3.7
Hepatitis B vaccination (at least 3 doses)^{§§§}					
19-49 yrs	43.6	-8.2**	-10.5**	1.6	-5.8
HCP, ≥19 yrs	70.9	-14.5**	-13.6**	5.8	-9.6
Herpes zoster (shingles) vaccination, ever^{§§§§}					
≥60 yrs	38.6	-19.9**	-19.1**	-9.5**	-7.7
60-64 yrs	25.4	-14.6**	-10.2**	-5.7	-7.8
≥65 yrs	44.0	-21.4**	-22.2**	-11.4**	-8.4
HPV vaccination among females (at least 1 dose), ever^{§§§§§}					
19-26 yrs	56.5	-11.3	-6.9	-17.2**	1.4

Abbreviations: HCP = Health care personnel; HPV = Human papillomavirus; Td = Tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

* Race/ethnicity was categorized as follows: white, black, Hispanic, Asian and "other." In this report, persons identified as white, black, Asian, or other race are non-Hispanic. Persons identified as Hispanic might be of any race. "Other" includes American Indian/Alaska Native and persons who identified multiple races. The five racial/ethnic categories are mutually exclusive.

[†] Adults were considered at increased risk for pneumococcal disease if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers.

[§] Percentage point difference in vaccination coverage compared with whites as the reference group.

^{††} Respondents were asked if they had received an influenza shot in the past 12 months and if so, in which month and year. Missing month and year were imputed (3.8%) and interviews conducted during August 2017-June 2018 were used to estimate vaccination coverage during July 2017-May 2018 using Kaplan-Meier survival analysis. Differences were measured as the simple difference between the 2016-17 and 2017-18 influenza seasons.

** p<0.05 by t-test for comparisons with whites as the reference group.

^{†††} Adults were classified as HCP if they reported that they currently volunteer or work in a hospital, medical clinic, doctor's office, dentist's office, nursing home or some other health care facility including part-time and unpaid work in a health care facility as well as professional nursing care provided in the home.

^{§§} Respondents were asked if they had ever had a pneumonia shot.

^{††††} Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

^{†††††} Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,495 [9.9%]), or refused to answer or for whom data were not obtained (n=5 [0.02%]) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

^{§§§} Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many doses were received.

^{§§§§} Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received at least 3 doses or less than 3 doses.

^{§§§§§} Respondents were asked if they had ever received a herpes zoster (shingles) vaccine.

^{§§§§§§} Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

SUPPLEMENTARY BOX 5, TABLE 2. Average change in racial/ethnic* percentage point differences[†] in vaccination coverage among adults aged ≥19 years compared with whites, by age group and increased-risk status[§] – National Health Interview Survey, United States, 2010-2018

Vaccination, age group, increased-risk status	Black		Hispanic		Asian		Other	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Influenza vaccination, 2009-10 through 2017-18 season[‡]								
≥19 yrs	0.1	(-0.4, 0.7)	0.2	(-0.4, 0.7)	0.3	(-0.2, 0.9)	0.1	(-0.8, 0.9)
19-49 yrs	0.0	(-0.7, 0.8)	-0.1	(-0.7, 0.5)	0.3	(-0.4, 1.0)	-0.1	(-0.8, 0.6)
50-64 yrs	0.5	(-0.6, 1.7)	0.5	(-0.0, 0.9)	0.2	(-1.4, 1.7)	-0.7	(-2.5, 1.2)
≥65 yrs	0.3	(-0.6, 1.2)	0.4	(-0.4, 1.1)	0.7	(-0.3, 1.8)	1.4	(-0.2, 3.1)
HCP ^{††} , ≥19 yrs	1.4	(0.2, 2.7)	0.9	(-0.2, 2.0)	-1.0	(-2.1, 0.0)	-1.8	(-4.2, 0.5)
Pneumococcal vaccination, ever^{§§}								
19-64 yrs, increased risk	-0.1	(-0.7, 0.5)	0.1	(-0.6, 0.7)	0.8	(-0.2, 1.8)	0.2	(-1.0, 1.3)
≥65 yrs	0.5	(-0.0, 1.0)	0.4	(-0.5, 1.2)	0.5	(-0.6, 1.6)	-0.2	(-2.5, 2.1)
Tetanus vaccination (received in past 10 years)^{†††}								
≥19 yrs	-0.8	(-1.1, -0.5)**	-0.3	(-0.5, -0.0)**	0.4	(0.0, 0.8)	-0.6	(-1.5, 0.3)
19-49 yrs	-0.9	(-1.3, -0.4)**	-0.3	(-0.6, 0.1)	0.6	(0.3, 0.9)**	-0.6	(-1.9, 0.7)
50-64 yrs	-0.8	(-1.5, 0.0)	0.0	(-0.6, 0.5)	0.0	(-1.0, 1.0)	-0.1	(-1.9, 1.7)
≥65 yrs	-0.1	(-0.8, 0.6)	-0.2	(-0.9, 0.5)	0.2	(-0.9, 1.3)	-1.3	(-3.4, 0.7)
Tetanus vaccination including pertussis vaccine (received in past 10 years)**								
≥19 yrs	-2.0	(-2.9, -1.1)**	-1.6	(-1.8, -1.3)**	-1.4	(-2.3, -0.4)**	-1.2	(-2.2, -0.2)**
19-64 yrs	-2.3	(-3.1, -1.5)**	-1.7	(-2.0, -1.4)**	-1.5	(-2.8, -0.2)**	-1.4	(-2.6, -0.1)
≥65 yrs	-1.4	(-2.9, 0.2)	-1.4	(-2.0, -0.8)**	-0.6	(-1.7, 0.4)	-1.0	(-2.3, 0.4)
HCP, ≥19 yrs	-2.3	(-5.0, 0.3)	-0.6	(-1.5, 0.4)	1.1	(-2.2, 4.3)	-0.4	(-4.3, 3.6)
Hepatitis A vaccination (at least 2 doses)^{††††}								
19-49 yrs	-0.6	(-0.8, -0.4)**	-0.3	(-0.5, -0.1)**	-0.1	(-0.8, 0.5)	-0.5	(-1.2, 0.2)
Hepatitis B vaccination (at least 2 doses)^{§§§}								
19-49 yrs	-0.8	(-1.2, -0.3)**	-0.2	(-0.9, 0.6)	-0.1	(-0.8, 0.5)	-0.7	(-1.7, 0.4)
HCP, ≥19 yrs	-1.6	(-2.6, -0.6)**	-0.9	(-1.4, -0.5)**	-0.1	(-1.4, 1.2)	-2.1	(-3.7, -0.6)**
Herpes zoster (shingles) vaccination, ever^{†††††}								
≥60 yrs	-1.5	(-2.2, -0.9)**	-1.2	(-1.9, -0.5)**	-1.2	(-2.4, 0.1)	-0.3	(-1.5, 0.9)
60-64 yrs	-1.2	(-2.5, 0.1)	-0.5	(-1.9, 0.8)	-0.6	(-2.1, 1.0)	0.6	(-1.0, 2.2)
≥65 yrs	-1.6	(-2.2, -1.0)**	-1.4	(-2.0, -0.8)**	-1.5	(-2.8, -0.1)**	-0.6	(-1.8, 0.6)
HPV vaccination among females (at least 1 dose), ever^{****}								
19-26 yrs	-0.9	(-2.1, 0.2)	0.1	(-2.1, 2.3)	-0.5	(-3.9, 2.9)	0.0	(-1.4, 1.5)

Abbreviations: HCP = health care personnel; HPV = Human papillomavirus; Td = Tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

* Race/ethnicity was categorized as follows: white, black, Hispanic, Asian and "other." In this report, persons identified as white, black, Asian, or other race are non-Hispanic. Persons identified as Hispanic might be of any race. "Other" includes American Indian/Alaska Native and persons who identified multiple races. The five racial/ethnic categories are mutually exclusive.

[†] Estimated slope from weighted linear regression of percentage point difference in vaccination coverage between a racial/ethnic group and non-Hispanic whites on survey year/influenza season. For influenza, interviews from August through June of each season were used to estimate coverage from July through May using Kaplan Meier survival analysis. Tdap vaccination coverage data among adults aged ≥65 years are available beginning in the NHIS 2012 survey.

[§] Adults were considered at increased risk for pneumococcal disease if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease (beginning in 2012), coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or they were current smokers.

[‡] Respondents were asked if they had received an influenza shot or nasal spray in the past 12 months and if so, in which month and year. Interviews from August through June of each season were used to estimate coverage from July through May using Kaplan Meier survival analysis.

** p<0.05 by linear trend test.

^{††} Adults were classified as HCP if they reported that they currently volunteer or work in a hospital, medical clinic, doctor's office, dentist's office, nursing home or some other health care facility including part-time and unpaid work in a health care facility as well as professional nursing care provided in the home.

^{§§} Respondents were asked if they had ever had a pneumonia shot.

^{§§} Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

*** Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,495 [9.9%]), or refused to answer or for whom data were not obtained (n=5 [0.02%]) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

^{††} Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many doses were received.

^{§§§} Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received at least 3 doses or less than 3 doses.

^{§§§} Respondents were asked if they had ever received a shingles vaccine.

**** Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

SUPPLEMENTARY BOX 5, TABLE 3. Estimated proportion of adults aged ≥ 19 years who received influenza vaccination, by age group and race/ethnicity – National Health Interview Survey, United States, 2017–18 influenza season

Vaccination,* age group, and race/ethnicity [†]	Sample size	% (95% CI)	Simple difference from 2016–17
≥ 19 years			
Total	21,675	46.1 (45.0, 47.3)	0.7
White	14,917	49.3 (48.2, 50.5)	1.1
Black	2,322	39.0 (35.5, 42.7) [§]	0.5
Hispanic	2,757	37.5 (34.5, 40.8) [§]	0.5
Asian	1,082	50.7 (46.4, 55.2)	0.5
Other	597	41.4 (35.5, 47.9) [§]	-6.1
19–49 years			
Total	10,093	34.8 (33.3, 36.3)	0.3
White	6,220	36.5 (34.8, 38.3)	1.2
Black	1,112	30.2 (25.5, 35.6) [§]	0.6
Hispanic	1,791	30.5 (27.2, 34.1) [§]	-1.1
Asian	637	41.6 (35.9, 47.7)	-1.0
Other	333	35.1 (27.8, 43.6)	-5.1
50–64 years			
Total	5,710	48.1 (46.2, 50.1)	0.7
White	4,176	49.4 (47.1, 51.7)	0.6
Black	616	46.3 (40.8, 52.2)	4.5
Hispanic	550	42.0 (36.7, 47.7) [§]	2.0
Asian	226	52.2 (43.8, 61.3)	-6.0
Other	142	45.9 (35.3, 58.0)	0.6
≥ 65 years			
Total	5,872	72.2 (70.2, 74.1)	0.9
White	4,521	73.5 (71.6, 75.4)	1.1
Black	594	59.7 (53.9, 65.5) [§]	-4.7
Hispanic	416	68.9 (57.5, 79.7)	3.4
Asian	219	79.2 (69.8, 87.2)	10.1
Other	122	66.8 (53.7, 79.3)	-8.4

Abbreviations: CI = confidence interval

* Respondents were asked if they had received an influenza shot in the past 12 months and if so, in which month and year. Missing month and year were imputed (3.8%) and interviews conducted during August 2017–June 2018 were used to estimate vaccination coverage during July 2017–May 2018 using Kaplan–Meier survival analysis. Differences were measured as the simple difference between the 2016–17 and 2017–18 influenza seasons.

[†] Race/ethnicity was categorized as follows: white, black, Hispanic, Asian and "other." In this report, persons identified as white, black, Asian, or other race are non-Hispanic. Persons identified as Hispanic might be of any race. "Other" includes American Indian/Alaska Native and persons who identified multiple races. The five racial/ethnic categories are mutually exclusive.

[§] $p < 0.05$ by t-test for comparisons with white as the reference.

SUPPLEMENTARY BOX 5, TABLE 4. Estimated proportion of adults aged ≥ 19 years who received any tetanus and Tdap vaccination, by age group, increased-risk status, and race/ethnicity* – National Health Interview Survey, United States, 2018

Vaccination, age group, increased-risk status, and race/ethnicity	Sample size	% (95% CI)	Simple difference from 2017
Any tetanus vaccination (received in past 10 years)[†]			
≥ 19 years			
Total	23,813	62.9 (61.8, 64.0)	-0.5
White	16,360	68.3 (67.2, 69.4)	-0.4
Black	2,649	50.2 (47.7, 52.8)**	-0.9
Hispanic	2,933	54.0 (51.5, 56.5)**	0.3
Asian	1,174	54.7 (50.6, 58.8)**	0.7
Other	697	61.9 (57.1, 66.4)**	-6.9
19-49 years			
Total	10,739	64.5 (63.1, 65.8)	0.7
White	6,594	71.2 (69.7, 72.6)	0.5
Black	1,259	52.9 (49.3, 56.4)**	2.1
Hispanic	1,829	55.7 (52.6, 58.7)**	1.5
Asian	679	58.2 (53.1, 63.2)**	1.2
Other	378	63.5 (57.3, 69.2)**	-5.0
50-64 years			
Total	6,246	62.8 (61.2, 64.5)	-1.9
White	4,501	69.1 (67.3, 70.9)	0.1
Black	702	46.3 (41.7, 50.9)**	-6.9
Hispanic	618	51.1 (46.0, 56.1)**	-4.3
Asian	252	48.8 (41.5, 56.1)**	-3.0
Other	173	58.6 (49.2, 67.4)**	-16.7 [¶]
≥ 65 years			
Total	6,828	58.9 (57.2, 60.5)	-1.9
White	5,265	61.9 (60.2, 63.7)	-2.6
Black	688	46.9 (42.4, 51.5)**	-2.1
Hispanic	486	48.9 (43.7, 54.2)**	2.1
Asian	243	49.4 (41.0, 57.8)**	4.9
Other	146	58.9 (47.6, 69.3)	1.3
Tetanus vaccination including pertussis vaccine (received in past 10 years)[§]			
≥ 19 years			
Total	15,118	31.2 (30.0, 32.5)	-0.5
White	10,174	36.7 (35.3, 38.2)	0.2
Black	1,791	20.1 (17.9, 22.6)**	-0.1
Hispanic	1,911	20.5 (18.2, 23.1)**	-0.5
Asian	802	25.6 (22.2, 29.4)**	-4.2
Other	440	32.0 (26.2, 38.3)	-8.4 ^{††}
19-64 years			
Total	10,850	33.5 (32.1, 34.9)	0.1
White	6,947	40.6 (39.0, 42.2)	1.3
Black	1,320	20.9 (18.4, 23.7)**	-0.2
Hispanic	1,603	21.6 (19.1, 24.4)**	-0.5

Asian	632	27.5 (23.6, 31.8)**	-4.2
Other	348	33.1 (26.6, 40.2)**	-9.3 ^{††}
Living with an infant <1 year	423	45.9 (40.0, 51.9)	-0.3
Not living with an infant <1 year	10,427	32.9 (31.5, 34.3) ^{§§}	0.1
≥65 years			
Total	4,268	22.2 (20.5, 24.0)	-2.2
White	3,227	24.6 (22.6, 26.7)	-2.7
Black	471	15.8 (11.9, 20.8)**	0.7
Hispanic	308	11.6 (7.9, 16.8)**	-0.4
Asian	170	15.7 (10.4, 23.0)**	-4.2
Other	92	24.8 (15.8, 36.8)	-1.4
Living with an infant <1 year	7	-- ^{¶¶} --	--
Not living with an infant <1 year	4,261	22.2 (20.5, 24.1)	-2.2

Abbreviations: CI = confidence interval; Td = tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

* Race/ethnicity was categorized as follows: white, black, Hispanic, Asian and "other." In this report, persons identified as white, black, Asian, or other race are non-Hispanic. Persons identified as Hispanic might be of any race. "Other" includes American Indian/Alaska Native and persons who identified multiple races. The five racial/ethnic categories are mutually exclusive.

[†] Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

[§] Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,495 [9.9%]), or refused to answer or for whom data were not obtained (n=5 [0.02%]) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

[§] p<0.05 by t-test for comparisons between 2018 and 2017 within each level of each characteristic.

** p<0.05 by t-test for comparisons with white as the reference.

^{††} p<0.05 by t-test for comparisons between 2018 and 2017 for changes in vaccination differences, "difference in difference" analysis, with white as the reference.

^{§§} p<0.05 by t-test for comparisons between persons living with an infant aged < 1 and persons not living with an infant aged <1 year.

^{¶¶} Estimate is not reliable due to small sample size (n<30) or relative standard error (standard error/estimates) >0.3.

SUPPLEMENTARY BOX 5, TABLE 5. Estimated proportion of adults aged ≥ 60 years who received herpes zoster vaccination, by age group and race/ethnicity* – National Health Interview Survey, United States, 2018

Vaccination, age group, and race/ethnicity	Sample size	%	(95% CI)	Simple difference from 2017
Herpes zoster (shingles) vaccination, ever[†]				
50–64 years				
Total	6,395	11.5	(10.5, 12.5)	0.2
White	4,617	13.4	(12.3, 14.7)	1.0
Black	713	6.0	(4.4, 8.2) [§]	-0.5
Hispanic	638	6.9	(4.7, 9.9) [§]	-0.6
Asian	250	10.5	(6.7, 15.9)	-5.2
Other	177	8.8	(5.1, 14.9)	-3.3
50–59 years				
Total	4,085	5.8	(5.0, 6.7)	0.1
White	2,856	6.5	(5.5, 7.6)	0.5
Black	472	4.0	(2.5, 6.2) [§]	0.3
Hispanic	455	3.5	(2.2, 5.5) [§]	0.0
Asian	177	-- [¶]	--	--
Other	125	--	--	--
60–64 years				
Total	2,310	22.5	(20.4, 24.8)	0.1
White	1,761	25.4	(23.0, 28.1)	0.7
Black	241	10.8	(7.0, 16.3) [§]	-1.9
Hispanic	183	15.3	(8.9, 24.9) [§]	-2.0
Asian	73	19.7	(12.0, 30.7)	-2.6
Other	52	-- [¶]	--	--
≥ 65 years				
Total	7,091	39.5	(37.9, 41.1)	-0.8
White	5,470	44.0	(42.3, 45.7)	-1.0
Black	704	22.6	(19.2, 26.4) [§]	3.1
Hispanic	508	21.7	(17.8, 26.3) [§]	0.3
Asian	259	32.5	(25.8, 40.1) [§]	-4.3
Other	150	35.5	(26.2, 46.1)	4.2

Abbreviations: CI = confidence interval

* Race/ethnicity was categorized as follows: white, black, Hispanic, Asian and "other." In this report, persons identified as white, black, Asian, or other race are non-Hispanic. Persons identified as Hispanic might be of any race. "Other" includes American Indian/Alaska Native and persons who identified multiple races. The five racial/ethnic categories are mutually exclusive.

[†] Respondents were asked if they had ever received a herpes zoster vaccine.

[§] $p < 0.05$ by t-test for comparisons with white as the reference.

[¶] Estimate is not reliable due to small sample size ($n < 30$) or relative standard error (standard error/estimates) > 0.3 .

SUPPLEMENTARY BOX 5, TABLE 6. Estimated proportion of adults aged ≥19 years who received selected vaccinations, by age group, increased-risk status,* and health insurance status† – National Health Interview Survey, United States, 2018

Vaccination, age group, increased-risk status	Overall		With health insurance		Without health insurance	
	%	(95% CI)	%	(95% CI)	%	(95% CI)
Influenza vaccination (2017-18 season)[§]						
≥19 yrs	49.4	(48.2, 50.6) [‡]	52.4	(50.4, 54.5) ^{‡***}	48.2	(46.8, 49.6) [‡]
19-49 yrs	38.0	(36.4, 39.7) [‡]	34.1	(30.8, 37.7) ^{‡***}	39.0	(37.2, 40.8) [‡]
50-64 yrs	51.1	(49.0, 53.2) ^{‡***}	51.4	(47.0, 56.1) ^{‡***}	50.9	(48.6, 53.3) ^{‡***}
≥65 yrs	72.3	(70.4, 74.3) [‡]	68.5	(66.0, 71.0) ^{***}	76.5	(73.7, 79.3) [‡]
Pneumococcal vaccination, ever^{¶¶}						
19-64 yrs, increased risk	25.2	(23.8, 26.7) [‡]	33.4	(30.6, 36.3) ^{‡***}	21.6	(19.9, 23.3) [‡]
≥65 yrs	69.3	(67.8, 70.7) [‡]	65.1	(63.0, 67.2) ^{***}	73.6	(71.7, 75.3) [‡]
Tetanus vaccination, past 10 years^{***}						
≥19 yrs	64.4	(63.3, 65.5) [‡]	58.3	(56.6, 59.9) ^{‡***}	66.7	(65.5, 67.8) [‡]
19-49 yrs	66.7	(65.3, 68.1) [‡]	59.5	(56.6, 62.3) ^{‡***}	68.5	(67.0, 69.9) [‡]
50-64 yrs	64.7	(62.9, 66.4) ^{‡***}	60.8	(57.0, 64.4) ^{‡***}	65.7	(63.8, 67.5) ^{‡***}
≥65 yrs	59.0	(57.4, 60.7) ^{‡***}	56.0	(53.8, 58.2) ^{‡***}	62.1	(59.9, 64.3) ^{‡***}
Tetanus vaccination including pertussis vaccine, past 10 years^{†††}						
≥19 yrs	32.9	(31.6, 34.2) [‡]	23.3	(21.5, 25.1) ^{‡***}	36.5	(35.0, 38.0) [‡]
19-64 yrs	36.0	(34.5, 37.5) [‡]	26.3	(23.8, 28.8) ^{‡***}	38.4	(36.8, 40.0) [‡]
≥65 yrs	22.4	(20.6, 24.2) [‡]	19.3	(17.2, 21.5) ^{***}	25.6	(23.1, 28.1) [‡]
Hepatitis A vaccination (at least 2 doses), ever^{§§§}						
≥19 yrs, all adults	12.3	(11.5, 13.1) [‡]	8.7	(7.7, 9.8) ^{**}	13.7	(12.8, 14.6) [‡]
≥19 yrs, traveler ^{††††}	19.6	(18.3, 21.0) [‡]	15.9	(13.5, 18.7) ^{‡***}	20.5	(19.0, 22.0) [‡]
≥19 yrs, with chronic liver conditions	16.1	(11.6, 21.9)	15.8	(9.9, 24.2)	16.5	(10.5, 24.9)
Hepatitis B vaccination (at least 3 doses), ever^{§§§§}						
≥19 yrs, all adults	30.9	(29.9, 32.0) [‡]	22.8	(21.3, 24.3) ^{**}	34.0	(32.8, 35.2) [‡]
19-49 yrs	42.9	(41.3, 44.5) [‡]	35.6	(32.6, 38.8) ^{‡***}	44.7	(43.0, 46.5) [‡]
≥19 yrs, traveler	39.8	(38.2, 41.4) [‡]	30.7	(27.6, 34.0) ^{**}	42.0	(40.2, 43.7) [‡]
≥19 yrs, with chronic liver conditions	31.7	(25.7, 38.3)	26.1	(18.8, 35.0)	37.4	(28.6, 47.2)
≥19 yrs, with diabetes	22.7	(20.5, 24.9)	18.1	(15.4, 21.2) ^{**}	26.5	(23.5, 29.7)
19-59 yrs, with diabetes	34.2	(30.1, 38.4)	31.7	(25.3, 38.8)	35.6	(30.6, 41.0)
≥60 yrs, with diabetes	15.4	(13.4, 17.6) [‡]	12.1	(9.6, 15.1) ^{**}	18.9	(15.9, 22.4) [‡]
Herpes zoster (shingles) vaccination, ever^{†††††}						
≥60 yrs	35.2	(33.9, 36.6) [‡]	32.0	(30.2, 33.9) ^{‡***}	37.6	(35.9, 39.3) [‡]
60-64 years	23.6	(21.4, 26.0)	17.5	(13.8, 22.1) ^{**}	25.6	(23.0, 28.3)
≥65 yrs	39.7	(38.1, 41.3) [‡]	34.7	(32.7, 36.8) ^{**}	44.8	(42.7, 46.8) [‡]
HPV vaccination among females (at least 1 dose), ever^{§§§§§}						
19-26 yrs	55.9	(51.8, 59.9) [‡]	47.4	(39.2, 55.7) ^{‡***}	58.5	(53.9, 63.1) [‡]
HPV vaccination among males (at least 1 dose), ever^{§§§§§}						
19-26 yrs	30.4	(26.4, 34.6) [‡]	32.6	(23.1, 43.8) [‡]	29.9	(25.8, 34.4) [‡]
HPV vaccination among females (at least 1 dose), ever^{§§§§§} who reported first HPV dose at 19-26 yrs^{†††††}						
19-26 yrs	11.6	(8.6, 15.5)	--	--	13.4	(9.5, 18.7)
HPV vaccination among males (at least 1 dose), ever^{§§§§§} who reported first HPV dose at 19-26 yrs^{†††††}						
19-26 yrs	5.3	(3.5, 7.9)	--	--	5.2	(3.2, 8.2)

Abbreviations: CI = confidence interval; HPV = Human papillomavirus; Td = Tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

* Adults were considered at increased risk for pneumococcal disease if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding non-melanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers. For hepatitis A and hepatitis B vaccination, data were collected on selected respondent characteristics that increase the risk for infection (travel to countries where hepatitis A infections are endemic and having chronic liver disease; having diabetes, travel to countries where hepatitis B infections are endemic, and having chronic liver disease, respectively).

† Adults were considered insured if they reported having public health insurance coverage (Medicare, Medicaid, military health care (TRICARE/VA/CHAMP-VA), Indian Health Service, state-sponsored health plan, or other government program insurance) or private health insurance coverage.

§ Respondents were asked if they had received an influenza vaccine in the past 12 months and if so, in which month and year. Missing month and year were imputed (3.8%) and interviews conducted during August 2017–June 2018 were used to estimate vaccination coverage during July 2017–May 2018 using Kaplan-Meier survival analysis.

‡ p<0.05 by t-test for comparisons with "without health insurance" as the reference group.

** p<0.05 by t-test for comparisons between private and public health insurance within each level of each characteristic.

†† p<0.05 by t-test comparing persons aged 50-64 years and aged ≥65 years with persons aged 19-49 years for influenza; persons aged 19-64 years at increased risk with persons aged ≥65 years for pneumococcal; persons aged 50-64 years and ≥65 years with persons aged 19-49 years for tetanus; persons aged 19-64 years with persons aged ≥65 years for Tdap; persons aged 19-59 years with diabetes with persons aged ≥60 years with diabetes for hepatitis B; and persons aged 60-64 years with persons aged ≥65 years for shingles.

‡‡ Estimate is not reliable due to small sample size (n<30) or relative standard error (standard error/estimates) >0.3.

††† Respondents were asked if they had ever had a pneumonia shot.

*** Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

†††† Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,495 [9.9%]), or refused to answer or for whom data were not obtained (n=5 [0.02%]) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

§§§ Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many doses were received.

§§§§ Had traveled outside the United States to countries other than countries in Europe, Japan, Australia, New Zealand, or Canada since 1995.

§§§§§ Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received at least 3 doses or less than 3 doses.

††††† Respondents were asked if they had ever received a herpes zoster (shingles) vaccine.

§§§§§ Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

††††† The denominator includes persons aged 19-26 years without HPV vaccination prior to age 19 years, and the numerator includes those in the denominator who reported first HPV dose at age 19-26 years.

SUPPLEMENTARY BOX 5, TABLE 7. Adjusted vaccination coverage among adults aged ≥19 years, by age group, increased-risk status,* and health insurance status† – National Health Interview Survey, United States, 2018

Vaccination, age group, increased-risk status	With health insurance		Without health insurance		Adjusted prevalence ratio [‡]	(95% CI)	Adjusted prevalence difference**
	Adjusted [§] vaccination coverage	(95% CI)	Adjusted vaccination coverage	(95% CI)			
Influenza vaccination (2017-18 season)^{††}							
≥19 yrs	44.4	(43.5, 45.3)	30.8	(27.8, 33.8)	0.8	(0.8, 0.8) ^{§§}	13.6
Pneumococcal vaccination, ever^{§§§}							
19-64 yrs, increased risk	24.0	(22.5, 25.4)	14.9	(11.4, 18.5)	0.9	(0.9, 0.9) ^{§§}	9.0
≥65 yrs	69.5	(68.0, 71.0)	44.1	(21.4, 66.9)	0.5	(0.4, 0.8) ^{§§}	25.4
Tetanus vaccination, past 10 years***							
≥19 yrs	63.7	(62.6, 64.9)	61.3	(58.4, 64.2)	0.9	(0.9, 1.0)	2.4
Tetanus vaccination including pertussis vaccine, past 10 years^{†††}							
≥19 yrs	32.3	(30.9, 33.6)	28.0	(24.4, 31.6)	0.9	(0.9, 1.0) ^{§§}	4.3
Hepatitis A vaccination (at least 2 doses), ever^{§§§§}							
≥19 yrs, all adults	12.3	(11.5, 13.1)	9.6	(7.7, 11.4)	1.0	(0.9, 1.0) ^{§§}	2.7
≥19 yrs, traveler ^{§§§§}	19.6	(18.2, 20.9)	12.9	(9.3, 16.4)	0.9	(0.9, 1.0) ^{§§}	6.7
Hepatitis B vaccination (at least 3 doses), ever^{§§§§§}							
≥19 yrs, all adults	31.1	(30.1, 32.2)	24.8	(22.2, 27.5)	0.9	(0.9, 1.0) ^{§§}	6.3
19-49 years	41.5	(39.8, 43.1)	34.9	(31.0, 38.8)	0.9	(0.8, 1.0) ^{§§}	6.6
≥19 yrs, with diabetes	23.0	(20.7, 25.3)	20.5	(13.3, 27.7)	1.0	(0.9, 1.1)	2.5
Herpes zoster (shingles) vaccination, ever^{††††}							
≥60 yrs	34.7	(33.3, 36.1)	27.7	(15.7, 39.8)	0.9	(0.8, 1.1)	7.0
HPV vaccination among females (at least 1 dose), ever^{§§§§§}							
19-26 yrs	53.9	(49.8, 58.0)	41.5	(29.5, 53.4)	0.8	(0.6, 1.0)	12.5
HPV vaccination among males (at least 1 dose), ever^{§§§§§}							
19-26 yrs	29.3	(25.3, 33.3)	13.6	(6.6, 20.5)	0.8	(0.7, 0.9) ^{§§}	15.7
HPV vaccination among females (at least 1 dose), ever^{§§§§§} who reported first HPV dose at 19-26 yrs^{†††††}							
19-26 yrs	11.3	(7.9, 14.7)	6.9	(-1.0, 14.9)	1.0	(0.9, 1.0)	4.3
HPV vaccination among males (at least 1 dose), ever^{§§§§§} who reported first HPV dose at 19-26 yrs^{†††††}							
19-26 yrs	5.8	(3.2, 8.3)	0.9	(-0.5, 2.4)	1.0	(0.9, 1.0) ^{§§}	4.8

Abbreviations: CI = confidence interval; HPV = Human papillomavirus; Td = Tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

* Adults were considered at increased risk for pneumococcal disease if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers. For hepatitis A and hepatitis B vaccination, data were collected on selected respondent characteristics that increase the risk for infection (travel to countries where hepatitis A infections are endemic and having chronic liver disease; having diabetes, travel to countries where hepatitis B infections are endemic, and having chronic liver disease, respectively).

† Adults were considered insured if they reported having public health insurance coverage (Medicare, Medicaid, military health care [TRICARE/VA/CHAMP-VA], Indian Health Service, state-sponsored health plan, or other government program insurance) or private health insurance coverage.

‡ Adjusted coverage estimates are based on predicted marginals from a multivariable logistic regression model. Estimates were adjusted for age, gender, race/ethnicity, marital status, education, employment status, poverty level, number of physician contacts in the past year, usual source of care, self-reported health status, nativity, and region of U.S. residence.

§ "With health insurance" is the reference group. The adjusted prevalence ratio is calculated by dividing adjusted vaccination coverage among those without health insurance by adjusted coverage among those with health insurance.

** Adjusted coverage among those with health insurance minus adjusted coverage among those without health insurance.

†† Respondents were asked if they had received an influenza vaccine in the past 12 months and if so, in which month and year. Missing month and year were imputed (3.8%) and interviews conducted during August 2017–June 2018 were used to estimate vaccination coverage during July 2017–May 2018 using Kaplan–Meier survival analysis.

§§ p<0.05 by t-test comparing adjusted coverage among those with health insurance to adjusted coverage among those without health insurance.

§§§ Respondents were asked if they had ever had a pneumonia shot.

*** Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

††† Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,495 [9.9%]), or refused to answer or for whom data were not obtained (n=5 [0.02%]) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

§§§§ Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many doses were received.

§§§§§ Had traveled outside the United States to countries other than countries in Europe, Japan, Australia, New Zealand, or Canada since 1995.

**** Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received at least 3 doses or less than 3 doses.

†††† Respondents were asked if they had ever received a herpes zoster (shingles) vaccine.

§§§§ Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

§§§§ The denominator includes persons aged 19-26 years without HPV vaccination prior to age 19 years, and the numerator includes those in the denominator who reported first HPV dose at age 19-26 years.

SUPPLEMENTARY BOX 5, TABLE 8. Estimated proportion of adults aged ≥19 years who received selected vaccinations, by age group, increased-risk status,* health insurance status,† and having a usual place for health care – National Health Interview Survey, United States, 2018

Vaccination, age group, increased-risk status	With health insurance				Without health insurance			
	Have a usual place for health care [§]		Do not have a usual place for health care		Have a usual place for health care		Do not have a usual place for health care	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Influenza vaccination (2017-18 season)¹								
≥19 yrs	52.4	(51.2, 53.6)	22.2	(19.5, 25.0)**	21.2	(17.7, 25.3)	11.3	(8.7, 14.6)**
19-49 yrs	40.7	(39.0, 42.5)	22.4	(19.2, 26.0)**	17.4	(13.8, 21.9)	11.4	(8.5, 15.3)**
50-64 yrs	53.4	(51.3, 55.6) ^{††}	14.5	(10.5, 19.8)**, ^{††}	29.1	(21.5, 38.7) ^{††}	10.2	(5.9, 17.3)**
≥65 yrs	73.9	(71.9, 75.9) ^{††}	33.9	(26.4, 42.9)**, ^{††}	-- ^{§§}	--	--	--
Pneumococcal vaccination, ever^{¶¶}								
19-64 yrs, increased risk	26.1	(24.6, 27.8)	16.8	(12.9, 21.5)**	12.6	(9.3, 17.0)	10.2	(7.3, 14.0)
≥65 yrs	70.4	(68.9, 71.9) ^{††}	36.7	(30.1, 43.7)**, ^{††}	--	--	--	--
Tetanus vaccination, past 10 years^{***}								
≥19 yrs	65.2	(64.1, 66.3)	56.7	(53.7, 59.8)**	54.2	(50.5, 57.9)	46.8	(42.7, 50.9)**
19-49 yrs	67.8	(66.3, 69.3)	60.3	(56.8, 63.6)**	54.2	(49.5, 58.8)	50.7	(46.0, 55.4)
50-64 yrs	65.7	(63.9, 67.4) ^{††}	46.9	(39.9, 54.1)**, ^{††}	55.6	(49.3, 61.7)	31.1	(24.3, 38.8)**, ^{††}
≥65 yrs	59.7	(58.0, 61.4) ^{††}	41.6	(34.3, 49.2)**, ^{††}	--	--	--	--
Tetanus vaccination including pertussis vaccine, past 10 years^{†††}								
≥19 yrs	33.6	(32.2, 35.0)	26.9	(23.8, 30.2)**	20.2	(16.9, 24.0)	15.6	(12.3, 19.6)
19-64 yrs	37.0	(35.5, 38.6)	28.1	(24.8, 31.7)**	20.5	(17.1, 24.3)	15.8	(12.5, 19.7)
≥65 yrs	22.7	(20.9, 24.6) ^{††}	16.0	(10.3, 23.9) ^{††}	--	--	--	--
Hepatitis A vaccination (at least 2 doses), ever^{§§§}								
≥19 yrs, all adults	12.0	(11.3, 12.8)	14.8	(12.6, 17.2)**	8.1	(6.4, 10.2)	8.5	(6.4, 11.4)
≥19 yrs, traveler ^{§§§§}	19.4	(18.1, 20.8)	21.6	(18.0, 25.7)	12.1	(8.6, 16.7)	9.8	(6.0, 15.4)
≥19 yrs, with chronic liver conditions	16.0	(11.5, 21.8)	--	--	--	--	--	--
Hepatitis B vaccination (at least 3 doses), ever^{§§§§§}								
≥19 yrs, all adults	30.6	(29.6, 31.7)	33.8	(30.9, 36.9)**	22.5	(19.4, 25.9)	22.3	(19.0, 26.0)
19-49 yrs	43.4	(41.6, 45.1)	40.1	(36.4, 43.9)	27.1	(23.2, 31.4)	23.8	(19.9, 28.2)
≥19 yrs, traveler	39.6	(37.9, 41.3)	41.5	(37.3, 45.9)	31.5	(25.3, 38.4)	24.0	(18.6, 30.3)
≥19 yrs, with chronic liver conditions	31.5	(25.5, 38.2)	--	--	--	--	--	--
≥19 yrs, with diabetes	22.7	(20.5, 25.0)	20.9	(11.2, 35.7)	22.2	(14.4, 32.6)	--	--
19-59 yrs, with diabetes	34.4	(30.2, 38.8)	--	--	25.1	(15.9, 37.3)	--	--
≥60 yrs, with diabetes	15.5	(13.5, 17.7) ^{††}	--	--	--	--	--	--
Herpes zoster (shingles) vaccination, ever^{††††}								
≥60 yrs	36.0	(34.6, 37.4)	15.1	(11.2, 20.0)**	--	--	--	--
60-64 yrs	24.3	(22.0, 26.7)	--	--	--	--	--	--
≥65 yrs	40.4	(38.8, 42.1) ^{††}	18.1	(13.1, 24.5)**	--	--	--	--
HPV vaccination among females (at least 1 dose), ever^{§§§§§}								
19-26 yrs	55.4	(51.0, 59.8)	58.3	(48.7, 67.3)	29.7	(18.3, 44.3)	34.3	(21.6, 49.7)
HPV vaccination among males (at least 1 dose), ever^{§§§§§}								
19-26 yrs	32.8	(28.1, 37.9)	23.4	(17.4, 30.8)**	--	--	--	--
HPV vaccination among females (at least 1 dose), ever^{§§§§§} who reported first HPV dose at 19-26 yrs^{§§§§§}								
19-26 yrs	10.7	(7.8, 14.6)	--	--	--	--	--	--
HPV vaccination among males (at least 1 dose), ever^{§§§§§} who reported first HPV dose at 19-26 yrs^{§§§§§}								
19-26 yrs	5.7	(3.5, 9.0)	--	--	--	--	--	--

Abbreviations: CI = confidence interval; HPV = Human papillomavirus; Td = Tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

* Adults were considered at increased risk for pneumococcal disease if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers. For hepatitis A and hepatitis B vaccination, data were collected on selected respondent characteristics that increase the risk for infection (travel to countries where hepatitis A infections are endemic and having chronic liver disease; having diabetes, travel to countries where hepatitis B infections are endemic, and having chronic liver disease, respectively).

¹ Adults were considered insured if they reported having public health insurance coverage (Medicare, Medicaid, military health care [TRICARE/VA/CHAMP-VA], Indian Health Service, state-sponsored health plan, or other government program insurance) or private health insurance coverage.

[§] Respondents were asked if there is a place they usually go when sick or need advice on their health. Respondents answering "yes" are defined as having a usual place for health care.

[§] Respondents were asked if they had received an influenza vaccine in the past 12 months and if so, in which month and year. Missing month and year were imputed (3.8%) and interviews conducted during August 2017-June 2018 were used to estimate vaccination coverage during July 2017-May 2018 using Kaplan-Meier survival analysis.

** p<0.05 by t-test for comparisons with "have a usual place for healthcare" as the reference group.

^{††} p<0.05 by t-test comparing persons aged 50-64 years and ≥65 years with persons aged 19-49 years for influenza; persons aged 19-64 years with at increased risk with persons aged ≥65 years for pneumococcal; persons aged 50-64 years and aged ≥65 years with persons aged 19-49 years for tetanus; persons aged 19-64 years with persons aged ≥65 years for Tdap; and persons aged 19-59 years with diabetes with persons aged ≥60 years with diabetes for hepatitis B.

^{§§} Estimate is not reliable due to small sample size (n<30) or relative standard error (standard error/estimates) >0.3.

^{§§} Respondents were asked if they had ever had a pneumonia shot.

^{***} Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

^{†††} Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,495 [9.9%]), or refused to answer or for whom data were not obtained (n=5 [0.02%]) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

^{§§§} Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many doses were received.

^{§§§§} Had traveled outside the United States to countries other than countries in Europe, Japan, Australia, New Zealand, or Canada since 1995.

^{§§§§§} Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received at least 3 doses or less than 3 doses.

^{††††} Respondents were asked if they had ever received a shingles vaccine.

^{§§§§§} Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

^{§§§§§} The denominator includes persons aged 19-26 years without HPV vaccination prior to age 19 years, and the numerator includes those in the denominator who reported first HPV dose at age 19-26 years.

SUPPLEMENTARY BOX 5, TABLE 9. Estimated proportion of adults aged ≥19 years who received selected vaccinations, by age group, increased-risk status,¹ health insurance status,² and physician contacts³ – National Health Interview Survey, United States, 2018

Vaccination, age group, risk status	With health insurance					Without health insurance				
	No. of physician contacts in the past 12 months					No. of physician contacts in the past 12 months				
	None	1-3	4-9	≥10		None	1-3	4-9	≥10	
% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	
Influenza vaccination (2017-18 season)⁴										
≥19 yrs	22.0 (19.9, 24.4)	48.1 (46.3, 49.8)**	59.9 (57.5, 62.3)**	60.4 (57.9, 63.0)**	8.4 (6.2, 11.3)	23.0 (18.5, 28.3)**	22.4 (14.6, 33.5)**	35.0 (24.0, 49.2)**		
19-49 yrs	18.2 (15.9, 20.9)	40.3 (37.8, 42.9)**	44.5 (41.0, 48.2)**	47.4 (43.3, 51.7)**	8.7 (6.2, 12.0)	20.8 (16.0, 26.8)**	14.0 (7.8, 24.4)	33.2 (18.9, 54.0)**		
50-64 yrs	25.3 (20.4, 31.0)**	49.4 (46.5, 52.3)**	59.4 (55.6, 63.2)**	58.2 (53.3, 63.3)**	--**	31.0 (20.1, 46.0)	30.4 (17.7, 49.1)	33.6 (20.1, 52.6)		
≥65 yrs	40.9 (34.3, 48.1)**	68.0 (64.8, 71.1)**	78.5 (74.8, 82.0)**	79.9 (76.5, 83.1)**	--**	--**	--**	--**		
Pneumococcal vaccination, ever⁵										
19-64 yrs, increased risk	12.7 (10.0, 16.1)	20.2 (18.0, 22.7)**	28.9 (26.1, 31.7)**	36.0 (32.7, 39.5)**	8.3 (5.4, 12.7)	9.0 (5.9, 13.4)	20.5 (12.4, 32.0)**	22.7 (12.6, 37.4)**		
≥65 yrs	37.7 (32.3, 43.3)**	66.6 (64.3, 68.8)**	72.9 (70.6, 75.2)**	78.0 (75.2, 80.6)**	--**	--**	--**	--**		
Tetanus vaccination, past 10 years⁶										
≥19 yrs	51.2 (48.5, 53.9)	64.8 (63.4, 66.1)**	67.3 (65.7, 68.9)**	70.8 (68.8, 72.6)**	43.1 (39.0, 47.2)	55.4 (51.0, 59.7)**	62.8 (54.8, 70.1)**	60.7 (50.1, 70.3)**		
19-49 yrs	34.3 (31.0, 37.6)	66.6 (64.8, 68.4)**	72.4 (69.9, 74.7)**	77.0 (74.0, 79.8)**	45.9 (41.2, 50.7)	56.9 (53.5, 62.2)**	64.6 (54.7, 73.5)**	58.3 (45.3, 70.3)		
50-64 yrs	46.8 (42.1, 51.9)**	65.4 (63.1, 67.7)**	67.7 (64.8, 70.4)**	70.0 (66.3, 73.5)**	33.4 (26.5, 41.1)**	51.1 (43.4, 58.8)**	59.3 (46.4, 71.3)**	66.5 (48.5, 80.7)**		
≥65 yrs	39.2 (33.9, 44.7)**	58.8 (56.3, 61.2)**	60.7 (58.2, 63.2)**	62.8 (58.5, 66.0)**	--**	--**	--**	--**		
Tetanus vaccination including pertussis vaccine, past 10 years⁷										
≥19 yrs	21.6 (19.1, 24.2)	33.7 (32.0, 35.4)**	34.8 (32.8, 37.0)**	39.2 (36.6, 41.9)**	13.3 (10.4, 16.8)	20.5 (16.4, 25.3)**	26.1 (18.5, 35.5)**	28.8 (18.8, 41.4)**		
19-49 yrs	23.0 (20.3, 26.0)	36.4 (34.4, 38.5)**	39.8 (37.3, 42.3)**	45.4 (42.2, 48.6)**	13.4 (10.5, 17.0)	20.7 (16.5, 25.6)**	26.5 (18.8, 36.0)**	29.1 (19.0, 41.8)**		
≥65 yrs	9.5 (6.2, 14.1)**	22.2 (19.8, 24.8)**	24.1 (21.4, 27.0)**	24.7 (21.2, 28.6)**	--**	--**	--**	--**		
Hepatitis A vaccination (at least 2 doses), ever⁸										
≥19 yrs, all adults	11.9 (10.2, 13.9)	12.6 (11.6, 13.7)	11.7 (10.5, 13.0)	12.5 (11.1, 14.0)	8.8 (6.6, 11.5)	8.1 (5.9, 11.0)	7.4 (4.2, 13.0)	--**		
≥19 yrs, traveler ⁹	18.6 (15.2, 22.5)	20.0 (18.2, 21.9)	18.7 (16.5, 21.1)	20.7 (17.9, 23.9)	11.4 (7.3, 17.5)	11.1 (7.1, 17.1)	--**	--**		
≥19 yrs, with chronic liver conditions	--**	--**	11.7 (6.4, 20.4)	24.4 (16.0, 35.5)	--**	--**	--**	--**		
Hepatitis B vaccination (at least 3 doses), ever¹⁰										
≥19 yrs, all adults	28.9 (26.4, 31.5)	31.8 (30.5, 33.2)**	29.4 (27.7, 31.1)	32.5 (30.3, 34.7)**	19.5 (16.4, 22.9)	24.9 (21.1, 29.2)**	20.5 (15.0, 27.3)	36.6 (26.7, 47.7)**		
19-49 yrs	34.7 (31.2, 38.2)	42.6 (40.7, 44.6)**	46.6 (43.4, 49.9)**	50.4 (46.8, 54.1)**	21.2 (17.7, 25.3)	29.2 (24.3, 34.7)**	23.9 (16.5, 33.3)	44.3 (30.8, 58.7)**		
≥19 yrs, traveler	37.4 (33.3, 41.8)	40.5 (38.4, 42.6)	38.1 (35.5, 40.8)	42.3 (38.9, 45.8)	23.4 (17.1, 31.1)	29.2 (22.5, 36.8)	33.1 (21.4, 47.8)	38.8 (24.7, 55.0)		
≥19 yrs, with chronic liver conditions	--**	--**	26.2 (16.1, 39.7)	34.6 (24.6, 46.2)	--**	--**	--**	--**		
≥19 yrs, with diabetes	24.9 (15.1, 38.2)	23.5 (19.8, 27.6)	21.8 (18.4, 25.6)	22.4 (18.9, 26.3)	--**	25.8 (14.1, 42.4)	--**	--**		
19-59 yrs, with diabetes	39.1 (21.4, 60.3)	35.4 (28.2, 43.3)	30.7 (24.1, 38.3)	36.2 (29.3, 43.8)	--**	30.2 (16.6, 48.6)	--**	--**		
≥60 yrs, with diabetes	--**	15.5 (12.2, 19.6)**	16.4 (13.2, 20.1)**	13.9 (10.7, 17.8)**	--**	--**	--**	--**		
Herpes zoster (shingles) vaccination, ever¹¹										
≥60 yrs	14.6 (11.6, 18.3)	34.9 (33.0, 36.9)**	37.9 (35.7, 40.2)**	38.7 (36.1, 41.4)**	--**	--**	--**	--**		
60-64 yrs	7.8 (4.4, 13.5)	25.5 (22.3, 29.0)**	24.4 (20.5, 28.8)**	26.4 (21.5, 32.0)**	--**	--**	--**	--**		
≥65 yrs	18.6 (14.8, 23.2)**	38.8 (36.5, 41.2)**	42.5 (40.0, 45.1)**	43.0 (40.0, 46.0)**	--**	--**	--**	--**		
HPV vaccination among females (at least 1 dose), ever¹²										
19-26 yrs	34.7 (25.7, 45.0)	56.4 (50.6, 62.1)**	64.5 (56.6, 71.7)**	61.0 (51.3, 69.9)**	--**	33.4 (20.8, 48.9)	--**	--**		
19-26 yrs	21.4 (15.6, 28.5)	31.7 (26.3, 37.6)**	35.5 (25.4, 47.1)**	58.2 (41.5, 73.3)**	--**	--**	--**	--**		
HPV vaccination among females (at least 1 dose), ever¹³ who reported first HPV dose at 19-26 yrs¹⁴										
19-26 yrs	--**	11.0 (7.2, 16.3)	--**	--**	--**	--**	--**	--**		
HPV vaccination among males (at least 1 dose), ever¹⁵ who reported first HPV dose at 19-26 yrs¹⁶										
19-26 yrs	--**	--**	--**	--**	--**	--**	--**	--**		

Abbreviations: CI = confidence interval; HPV = Human papillomavirus; Td = Tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

¹ Adults were considered at increased risk for pneumococcal disease if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding non-melanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers. For hepatitis A and hepatitis B vaccination, data were collected on selected respondent characteristics that increase the risk for infection (travel to countries where hepatitis A infections are endemic and having chronic liver disease; having diabetes, travel to countries where hepatitis B infections are endemic, and having chronic liver disease, respectively).

² Adults were considered insured if they reported having public health insurance coverage (Medicare, Medicaid, military health care [TRICARE/VA/CHAMP-VA], Indian Health Service, state-sponsored health plan, or other government program insurance) or private health insurance coverage.

³ Respondents were asked the number of times in the past 12 months that they saw a doctor or other health care professional about their own health.

⁴ Respondents were asked if they had received an influenza vaccine in the past 12 months and if so, in which month and year. Missing month and year were imputed (3.8%) and interviews conducted during August 2017-June 2018 were used to estimate vaccination coverage during July 2017-May 2018 using Kaplan-Meier survival analysis.

⁵ * p<0.05 by t-test for comparisons with no physician contacts in the past 12 months as the reference group.

⁶ Estimate is not reliable due to small sample size (n<30) or relative standard error (standard error/estimate) >0.3.

⁷ p<0.05 by t-test comparing persons aged 50-64 years and aged >65 years with persons aged 19-49 years for influenza; persons aged 19-64 years at increased risk with persons aged ≥65 years for pneumococcal; persons aged 50-64 years and aged ≥65 years with persons aged 19-49 years for tetanus; persons aged 19-64 years with persons aged ≥65 years for Tdap; and persons aged 19-59 years with diabetes with persons aged ≥60 years with diabetes for hepatitis B.

⁸ Respondents were asked if they had ever had a pneumonia shot.

⁹ Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

¹⁰ Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,485 [9.9%]), or refused to answer or for whom data were not obtained (n = 10,024) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

¹¹ Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many doses were received.

¹² Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received at least 3 doses or less than 3 doses.

¹³ Respondents were asked if they had ever received a herpes zoster (shingles) vaccine.

¹⁴ Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

¹⁵ The denominator includes persons aged 19-26 years without HPV vaccination prior to age 19 years, and the numerator includes those in the denominator who reported first HPV dose at age 19-26 years.

SUPPLEMENTARY BOX 5, TABLE 10. Estimated proportion of adults aged ≥19 years who received selected vaccinations, by age group, increased-risk status,* nativity,[†] number of years living in the United States, and citizenship – National Health Interview Survey, United States, 2018

Vaccination, age group, increased-risk status	U.S.-born		Foreign-born		Foreign-born							
	%	(95% CI)	%	(95% CI)	Living in U.S. <10 years		Living in U.S. ≥10 years		U.S. citizen		Non-U.S. citizen	
					%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Influenza vaccination (2017-18 season)[§]												
≥19 yrs	47.0	(45.9, 48.2)	42.2	(39.4, 45.2) [‡]	32.0	(26.7, 38.1)	45.0	(41.7, 48.4)**	50.0	(46.2, 54.0)	31.2	(27.2, 35.6) ^{††}
19-49 yrs	35.2	(33.6, 36.9)	33.2	(29.7, 37.0)	28.7	(23.3, 35.0)	35.4	(31.2, 39.9)	39.8	(34.9, 45.1)	27.6	(23.3, 32.5) ^{††}
50-64 yrs	49.0	(46.9, 51.1) ^{§§}	44.6	(39.8, 49.8) ^{§§}	43.6	(27.0, 64.7)	45.3	(40.2, 50.7) ^{§§}	49.4	(43.6, 55.6) ^{§§}	34.7	(26.8, 44.2) ^{††}
≥65 yrs	72.7	(70.8, 74.5) ^{§§}	68.8	(61.5, 75.9) ^{§§}	68.7	(42.8, 91.1) ^{§§}	69.3	(61.8, 76.6) ^{§§}	69.3	(61.3, 77.0) ^{§§}	66.5	(50.0, 82.1) ^{§§}
Pneumococcal vaccination, ever^{¶¶}												
19-64 yrs, increased risk	24.2	(22.8, 25.7)	17.4	(14.3, 20.9) [‡]	12.5	(7.0, 21.4)	18.5	(15.0, 22.5)	19.6	(15.2, 24.9)	14.6	(10.6, 19.6)
≥65 yrs	72.1	(70.6, 73.4) ^{§§}	51.3	(47.3, 55.2) ^{‡,§§}	-- ^{§§§}	--	51.7	(47.8, 55.6) ^{§§}	52.6	(48.3, 56.9) ^{§§}	47.5	(37.9, 57.4) ^{§§}
Tetanus vaccination, past 10 years***												
≥19 yrs	65.8	(64.7, 66.8)	51.1	(48.9, 53.3) [‡]	52.2	(47.2, 57.1)	50.9	(48.5, 53.4)	52.3	(49.6, 55.0)	49.1	(45.8, 52.5)
19-49 yrs	67.2	(65.9, 68.6)	54.0	(51.2, 56.8) [‡]	50.7	(45.4, 56.1)	55.1	(51.8, 58.5)	58.7	(54.8, 62.4)	49.9	(45.9, 53.8) ^{††}
50-64 yrs	66.7	(65.0, 68.3)	47.5	(43.6, 51.5) ^{‡,§§}	58.1	(44.2, 70.9)	46.9	(42.7, 51.1) ^{§§}	48.8	(44.4, 53.3) ^{§§}	43.9	(37.1, 50.9)
≥65 yrs	61.0	(59.3, 62.7) ^{§§}	46.6	(42.4, 50.8) ^{‡,§§}	--	--	46.1	(41.7, 50.5) ^{§§}	44.2	(39.6, 48.8) ^{§§}	54.6	(45.4, 63.6) ^{††}
Tetanus vaccination including pertussis vaccine, past 10 years^{†††}												
≥19 yrs	34.4	(33.1, 35.8)	18.1	(16.2, 20.2) [‡]	20.7	(16.5, 25.7)	17.6	(15.5, 19.9)	19.6	(17.0, 22.4)	16.4	(13.8, 19.4)
19-64 yrs	37.2	(35.8, 38.7)	19.5	(17.3, 21.8) [‡]	20.9	(16.6, 26.1)	19.0	(16.6, 21.7)	22.2	(19.2, 25.6)	16.5	(13.8, 19.6) ^{††}
≥65 yrs	24.2	(22.3, 26.2) ^{§§}	11.2	(8.5, 14.6) ^{‡,§§}	--	--	11.3	(8.6, 14.7) ^{§§}	10.4	(7.8, 13.7) ^{§§}	--	--
Hepatitis A vaccination (at least 2 doses), ever^{††††}												
≥19 yrs, all adults	11.6	(10.8, 12.4)	13.1	(11.4, 14.9)	18.0	(14.4, 22.2)	12.1	(10.4, 14.1)**	13.6	(11.5, 16.0)	12.5	(10.4, 15.0)
≥19 yrs, traveler****	19.3	(18.0, 20.7)	17.9	(15.5, 20.6)	23.9	(18.9, 29.7)	16.6	(14.0, 19.5)**	17.5	(14.5, 21.0)	18.7	(15.3, 22.6)
≥19 yrs, with chronic liver conditions	16.7	(11.9, 22.8)	--	--	--	--	--	--	--	--	--	--
Hepatitis B vaccination (at least 3 doses), ever^{†††††}												
≥19 yrs, all adults	30.7	(29.6, 31.8)	27.2	(25.1, 29.3) [‡]	35.5	(30.9, 40.4)	25.4	(23.2, 27.8)**	29.0	(26.4, 31.8)	24.6	(21.9, 27.6) ^{††}
19-49 yrs	42.4	(40.7, 44.1)	32.1	(29.2, 35.1) [‡]	33.9	(29.0, 39.1)	31.5	(28.1, 35.1)	39.1	(34.8, 43.5)	26.3	(22.9, 30.0) ^{††}
≥19 yrs, traveler	40.6	(38.9, 42.3)	34.2	(31.3, 37.3) [‡]	41.8	(35.9, 48.0)	32.6	(29.3, 36.0)**	34.2	(30.6, 38.0)	34.1	(29.7, 38.8)
≥19 yrs, with chronic liver conditions	35.2	(28.7, 42.4)	--	--	--	--	--	--	--	--	--	--
≥19 yrs, with diabetes	22.9	(20.7, 25.3)	21.5	(16.9, 27.0)	--	--	19.2	(14.7, 24.6)	21.6	(16.2, 28.1)	21.8	(13.9, 32.6)
19-59 yrs, with diabetes	33.2	(29.0, 37.6)	32.4	(24.0, 42.2)	--	--	29.3	(21.1, 39.1)	38.1	(27.0, 50.6)	25.8	(14.8, 41.0)
≥60 yrs, with diabetes	15.9	(13.8, 18.3) ^{§§}	12.4	(8.5, 17.8) ^{§§}	--	--	11.3	(7.6, 16.5) ^{§§}	11.7	(7.7, 17.3) ^{§§}	--	--
Herpes zoster (shingles) vaccination, ever^{§§§§}												
≥60 yrs	36.8	(35.4, 38.2)	21.3	(18.5, 24.4) [‡]	--	--	22.0	(19.1, 25.3)	22.9	(19.7, 26.4)	15.2	(10.3, 21.8) ^{††}
60-64 yrs	24.6	(22.3, 26.9)	11.6	(7.9, 16.7) [‡]	--	--	11.9	(8.0, 17.4)	13.1	(8.5, 19.7)	--	--
≥65 yrs	41.9	(40.2, 43.5) ^{§§}	25.6	(22.1, 29.5) ^{‡,§§}	--	--	26.4	(22.8, 30.5) ^{§§}	26.7	(22.9, 31.0) ^{§§}	20.3	(13.1, 30.1)
HPV vaccination among females (at least 1 dose), ever^{††††††}												
19-26 yrs	54.7	(50.6, 58.8)	39.5	(29.9, 49.9) [‡]	31.7	(19.5, 47.0)	47.2	(33.1, 61.8)	47.8	(32.1, 63.9)	34.7	(22.7, 49.0)
HPV vaccination among males (at least 1 dose), ever^{††††††}												
19-26 yrs	27.5	(23.8, 31.4)	20.0	(13.7, 28.3)	--	--	23.3	(14.6, 34.9)	21.8	(12.7, 34.8)	18.6	(10.5, 30.6)
HPV vaccination among females (at least 1 dose), ever^{††††††} who reported first HPV dose at 19-26 yrs****												
19-26 yrs	9.8	(7.2, 13.1)	--	--	--	--	--	--	--	--	--	--
HPV vaccination among males (at least 1 dose), ever^{††††††} who reported first HPV dose at 19-26 yrs****												
19-26 yrs	4.2	(2.7, 6.6)	--	--	--	--	--	--	--	--	--	--

Abbreviations: CI = confidence interval; HPV = Human papillomavirus; Td = Tetanus and diphtheria toxoids; Tdap = Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

* Adults were considered at increased risk for pneumococcal disease if they had ever been told by a doctor or other health professional that they had diabetes, emphysema, chronic obstructive pulmonary disease, coronary heart disease, angina, heart attack, or other heart condition; had a diagnosis of cancer during the previous 12 months (excluding nonmelanoma skin cancer); had ever been told by a doctor or other health professional that they had lymphoma, leukemia, or blood cancer; had been told by a doctor or other health professional that they had chronic bronchitis or weak or failing kidneys during the preceding 12 months; had an asthma episode or attack during the preceding 12 months; or were current smokers. For hepatitis A and hepatitis B vaccination, data were collected on selected respondent characteristics that increase the risk for infection (travel to countries where hepatitis A infections are endemic and having chronic liver disease; having diabetes, travel to countries where hepatitis B infections are endemic, and having chronic liver disease, respectively).

[†] Nativity was categorized as U.S.-born (persons born in one of the 50 States or the District of Columbia); or foreign-born (persons who were not born in the United States).

[‡] Respondents were asked if they had received an influenza vaccine in the past 12 months and if so, in which month and year. Missing month and year were imputed (3.6%) and interviews conducted during August 2017-June 2018 were used to estimate vaccination coverage during July 2017-May 2018 using Kaplan-Meier survival analysis.

[§] p<0.05 by t-test for comparisons between U.S.-born and foreign-born.

^{§§} p<0.05 by t-test for comparisons between those living in the U.S. <10 years and those living in the United States ≥10 years.

^{§§§} p<0.05 by t-test comparing U.S. citizens and non-U.S. citizens.

^{§§§§} p<0.05 by t-test comparing persons aged 50-64 years and aged ≥65 years with persons 19-49 years for influenza; persons aged 19-64 years at increased risk with persons aged ≥65 years for pneumococcal; persons aged 50-64 years and aged ≥65 years with persons aged 19-49 years for tetanus; persons aged 19-64 years with persons aged ≥65 years for Tdap; and persons aged 19-59 years with diabetes with persons aged ≥60 years with diabetes for hepatitis B.

[¶] Respondents were asked if they had ever had a pneumonia shot.

^{¶¶} Respondents were asked if they had received a tetanus shot in the past 10 years. Vaccinated respondents included adults who received Td or Tdap during the past 10 years.

^{††} Respondents who reported receiving a tetanus shot in the past 10 years were asked if their most recent shot included the pertussis or whooping cough vaccine. Among 25,207 respondents aged ≥19 years, those without a "yes" or "no" classification for tetanus vaccination status within the preceding 10 years (n = 1,394 [5.5%]), those who reported tetanus vaccination in the past 10 years but were not told vaccine type by the provider (n = 6,195 [24.6%]), did not know vaccine type (Td or Tdap) (n = 2,495 [9.9%]), or refused to answer or for whom data were not obtained (n=5 [0.02%]) were excluded, yielding a sample of 15,118 (60.0% of total) respondents aged ≥19 years for whom Tdap vaccination status could be assessed. In February 2012, the Advisory Committee on Immunization Practices (ACIP) recommended Tdap vaccination for all adults aged ≥19 years, including adults aged ≥65 years.

^{†††} Estimate is not reliable due to small sample size (n<30) or relative standard error (standard error/estimates)>0.3.

^{††††} Respondents were asked if they had ever received the hepatitis A vaccine, and if yes, were asked how many doses were received.

^{†††††} Had traveled outside the United States to countries other than countries in Europe, Japan, Australia, New Zealand, or Canada since 1995.

^{††††††} Respondents were asked if they had ever received the hepatitis B vaccine, and if yes, if they had received at least 3 doses or less than 3 doses.

^{§§§§} Respondents were asked if they had ever received a herpes zoster (shingles) vaccine.

^{§§§§§} Respondents were asked if they had ever received the HPV shot or cervical cancer vaccine.

^{****} The denominator includes persons aged 19-26 years without HPV vaccination prior to age 19 years, and the numerator includes those in the denominator who reported first HPV dose at age 19-26 years.