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National Latinx AIDS Awareness Day — October 15, 2019

National Latinx AIDS Awareness Day, October 15, is observed each year to focus on the continuing and disproportionate impact of human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS) on Hispanics/Latinos in the United States. In 2017, 26% of newly diagnosed HIV infections occurred in Hispanics/Latinos (*1*). Seventy-five percent of these newly diagnosed HIV infections in Hispanics/Latinos were in men who have sex with men (MSM), and an additional 3% were in MSM who inject drugs (*1*).

An analysis of the behaviors of Hispanic/Latino MSM included in CDC's National HIV Behavioral Surveillance system found that nearly 75% reported having had condomless anal sex during 2017 (*2*). However, because some of these MSM reported using preexposure prophylaxis (PrEP), fewer than 60% of those who were non–U.S.-born and fewer than 50% of those who were U.S.-born were having unprotected anal sex (*2*).

National Latinx AIDS Awareness Day is an opportunity to encourage increased HIV prevention efforts among Hispanics/Latinos. CDC supports testing, linkage to and engagement in care and treatment, and other efforts to reduce the risk for acquiring or transmitting HIV infection. More information is available at https://www.cdc.gov/hiv/group/racialethnic/hispaniclatinos/index.html and https://www.cdc.gov/hiv/group/msm/hispanic-latino.html.

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Trends in Sexual Risk Behaviors Among Hispanic/Latino Men Who Have Sex with Men — 19 Urban Areas, 2011–2017

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Correct and consistent condom use and human immunodeficiency virus (HIV) preexposure prophylaxis (PrEP) are protective against sexual transmission of HIV (*1*,*2*). The incidence of HIV infection among Hispanic/Latino men who have sex with men (MSM) in the United States is increasing (*3*). HIV risk among Hispanic/Latino MSM differs based on their place of birth and years of U.S. residence (*4*). Data from CDC's National HIV Behavioral Surveillance (NHBS)* for 2011–2017 were analyzed to assess changes in sexual risk

* NHBS is a cross-sectional biobehavioral surveillance system conducted in urban areas with high HIV prevalence. The number of urban areas participating differs temporally.

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behaviors among Hispanic/Latino MSM by place of birth and years of U.S. residence. Overall, condomless anal sex during the previous 12 months increased from 63% in 2011 to 74% in 2017, and PrEP use during the previous 12 months increased from 3% in 2014 to 24% in 2017. Regardless of place of birth, nearly 75% of Hispanic/Latino MSM reported condomless anal sex during 2017. However, because of PrEP use, <60% of non-U.S.–born Hispanic/Latino MSM and <50% of U.S.-born Hispanic/Latino MSM reported unprotected anal sex (condomless anal sex and no PrEP use) during 2017. Results indicate that PrEP can be a vital tool for reducing HIV transmission among Hispanic/Latino MSM, especially those who have condomless anal sex. Interventions to prevent HIV acquisition, including increasing PrEP uptake, could address cultural and linguistic needs of Hispanic/Latino MSM, as well as other barriers to prevention of HIV infection typically faced by all MSM.

In 2011, 2014, and 2017, NHBS conducted behavioral surveys and HIV testing among MSM by using venue-based sampling. The analysis was limited to eligible participants[†] from 19 urban areas[§] who self-identified as Hispanic/Latino, reported having sex with another man during the previous 12 months, and had an HIV-negative test result after the NHBS interview.[¶] Participants' place of birth was dichotomized as U.S.-born (50 states and the District of Columbia) or non-U.S.–born. Among non-U.S.–born participants, number of years of U.S. residence was used as a proxy for acculturation (i.e., language preference), with a cutoff of ≤5 years to define recent migration (*5,6*). Sexual risk behavior was measured by two variables: 1) condomless anal sex during the previous 12 months and 2) unprotected anal sex, defined as condomless anal sex without having taken PrEP at any time during the previous 12 months. Log-linked Poisson regression models with generalized estimating equations clustered on recruitment event and adjusted

[†] Eligible participants included men who were born male and self-identified as male, reported having ever had oral or anal sex with another man, resided in the interview area, were aged ≥18 years, could complete a standardized interview in English or Spanish, and provided informed consent to participate. Surveys were administered in person by trained interviewers. All participants were offered anonymous HIV testing and incentives for the interview and HIV test. The type (cash or gift card) and amount of incentive varied by urban area based on formative assessment and local policy. A typical incentive included $25 for completing the interview and $25 for providing a specimen for HIV testing.

[§] The following 20 urban areas collected data during 2011–2017: Atlanta, Georgia; Baltimore, Maryland; Boston, Massachusetts; Chicago, Illinois; Dallas, Texas; Denver, Colorado; Detroit, Michigan; Houston, Texas; Los Angeles, California; Miami, Florida; Nassau and Suffolk counties, New York; New Orleans, Louisiana; New York, New York; Newark, New Jersey; Philadelphia, Pennsylvania; San Diego, California; San Francisco, California; San Juan, Puerto Rico; Seattle, Washington; District of Columbia. Participants residing and interviewed in San Juan, Puerto Rico, were excluded from the analysis because of important public health differences (e.g., access to Medicaid and limited number of PrEP providers) between Puerto Rico and the 50 states and the District of Columbia.

[¶] HIV testing was performed for participants who consented. Blood specimens were collected for rapid testing in the field or laboratory-based testing. A nonreactive rapid test result was considered negative. A reactive rapid test was confirmed either with a second rapid test in the field or supplemental laboratory-based testing, typically Western blot or indirect immunofluorescence assay.

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for age and region were used to estimate adjusted prevalence ratios (aPRs) and 95% confidence intervals (CIs). Differences in the trends by place of birth and years of U.S. residence were determined using score tests to obtain interaction p-values that assessed the interaction between 1) year and 2) place of birth and length of U.S. residence. Because PrEP was approved for use in 2012,** comparisons of unprotected anal sex during the previous 12 months were made only for data collected in 2014 and in 2017. Analyses were conducted using SAS (version 9.4; SAS Institute).

This analysis included 4,731 sexually active, HIV-negative Hispanic/Latino MSM interviewed during three cross-sectional data collection cycles (2011, N = 1,581; 2014, N = 1,479; and 2017, N = 1,671) in 19 urban areas. Overall during the preceding 12 months, the prevalence of condomless anal sex increased from 63% in 2011 to 74% in 2017, and the prevalence of PrEP use increased from 3% in 2014 to 24% in 2017 (Table 1). In 2017, PrEP use in the past year was reported by 283 of 1,024 (28%) U.S.-born Hispanic/Latino MSM, 87 of 457 (19%), non-U.S.–born and resided in the United States for ≥6 years, and 30 of 188 (16%) non-U.S.–born and resided in the United States for ≤5 years.

Increases in condomless anal sex were identified among Hispanic/Latino MSM who were U.S.-born (2014 versus 2011, aPR = 1.07; 95% CI = 1.01–1.15; 2017 versus 2014, aPR = 1.06; 95% CI = 1.00–1.12) and who were non-U.S.–born and resided in the United States for ≥6 years (2014 versus 2011, aPR = 1.13; 95% CI = 1.02–1.24; 2017 versus 2014, aPR = 1.10; 95% CI = 1.01–1.20) (Table 2). Temporal changes did not differ significantly across all groups (interaction p-values: 2014 versus 2011, p = 0.72; 2017 versus 2014, p = 0.37). The prevalence of unprotected anal sex decreased during 2014–2017 among all groups, with

** https://aidsinfo.nih.gov/news/1254/fda-approves-first-drug-for-reducing-the-risk-of-sexually-acquired-hiv-infection.

TABLE 1. Characteristics of Hispanic/Latino men who have sex with men — National HIV Behavioral Surveillance (NHBS), 19 urban areas,* 2011–2017†

Characteristic	Year, no. (%)			Chi-square p-value§
	2011	2014	2017	
Place of birth, yrs of U.S. residence				
U.S.-born	1,010 (63.9)	942 (63.7)	1,024 (61.4)	<0.001
Non–U.S.-born, ≥6	498 (31.5)	446 (30.2)	457 (27.4)	
Non–U.S.-born, ≤5	72 (4.6)	90 (6.1)	188 (11.3)	
Age group (yrs)				
18–24	550 (34.8)	410 (27.7)	360 (21.5)	<0.001
25–29	340 (21.5)	351 (23.7)	455 (27.2)	
30–39	384 (24.3)	428 (28.9)	510 (30.5)	
≥40	307 (19.4)	290 (19.6)	346 (20.7)	
U.S. Census region				
Northeast	383 (24.2)	335 (22.7)	294 (17.6)	<0.001
Midwest	126 (8.0)	103 (7.0)	95 (5.7)	
South	565 (35.7)	527 (35.6)	690 (41.3)	
West	507 (32.1)	514 (34.7)	592 (35.4)	
Condomless anal sex in previous 12 mos				
Yes	1,001 (63.4)	1,024 (69.3)	1,235 (74.0)	<0.001
No	577 (36.6)	453 (30.7)	433 (26.0)	
PrEP use in previous 12 mos				
Yes	—¶	45 (3.0)	400 (24.0)	<0.001
No	—¶	1,434 (97.0)	1,270 (76.0)	
Unprotected anal sex in previous 12 mos**				
Yes	—¶	985 (66.7)	876 (52.5)	<0.001
No	—¶	492 (33.3)	792 (47.5)	
Total	**1,581 (100)**	**1,479 (100)**	**1,671 (100)**	**NA**

Abbreviations: HIV = human immunodeficiency virus; NA = not applicable; PrEP = preexposure prophylaxis.

* NHBS collects data for 20 urban areas. Data for Puerto Rico was not included because of important public health differences (e.g., access to Medicaid and limited number of PrEP providers) between Puerto Rico and the 50 states and District of Columbia. The remaining 19 urban areas for which data was analyzed included the following (by U.S. Census region): *Northeast:* Boston, Massachusetts; Nassau and Suffolk counties, New York; New York City, New York; Newark, New Jersey; and Philadelphia, Pennsylvania; *Midwest:* Chicago, Illinois and Detroit, Michigan; *South:* Atlanta, Georgia; Baltimore, Maryland; Dallas, Texas; Houston, Texas; Miami, Florida; New Orleans, Louisiana; and Washington, DC; *West:* Denver, Colorado; Los Angeles, California; San Diego, California; San Francisco, California; and Seattle, Washington.

† Numbers might not sum to total because of missing data; percentages might not sum to 100 because of rounding.

§ Chi-square is testing whether the distribution of characteristics within a column changed temporally.

¶ Data regarding PrEP use before 2014 are unavailable.

** Defined as condomless anal sex without having taken PrEP at any time during the previous 12 months.

TABLE 2. Sexual risk behaviors during the previous 12 months among Hispanic/Latino men who have sex with men, by place of birth and years of U.S. residence — National HIV Behavioral Surveillance (NHBS), 19 urban areas,* 2011–2017†

Characteristic	Year, no. (%)			2014 vs 2011 aPR§ (95% CI)	p-value	2017 vs 2014 aPR§ (95% CI)	p-value
	2011	2014	2017				
Condomless anal sex							
Overall	**1,001 (63.4)**	**1,024 (69.3)**	**1,235 (74.0)**	**1.09 (1.02–1.18)**	**0.018**	**1.05 (0.99–1.11)**	**0.121**
Place of birth, yrs of U.S. residence							
U.S.-born	648 (64.3)	651 (69.3)	754 (73.8)	1.07 (1.01–1.15)	0.027	1.06 (1.00–1.12)	0.046
Non-U.S.–born, ≥6	302 (60.6)	305 (68.4)	341 (74.6)	1.13 (1.02–1.24)	0.014	1.10 (1.01–1.20)	0.025
Non-U.S.–born, ≤5	50 (69.4)	68 (75.6)	139 (73.9)	1.08 (0.90–1.30)	0.418	0.98 (0.86–1.13)	0.823
Unprotected anal sex¶							
Overall	**—****	**985 (66.7)**	**876 (52.5)**	**—**	**—**	**0.79 (0.74–0.85)**	**<0.001**
Place of birth, yrs of U.S. residence							
U.S.-born	—	623 (66.3)	501 (49.1)	—	—	0.74 (0.68–0.80)	<0.001
Non-U.S.–born, ≥6	—	294 (65.9)	263 (57.5)	—	—	0.87 (0.79–0.96)	0.008
Non-U.S.–born, ≤5	—	68 (75.6)	111 (59.0)	—	—	0.78 (0.67–0.91)	0.002

Abbreviations: aPR = adjusted prevalence ratio; CI = confidence interval; HIV = human immunodeficiency virus; PrEP = preexposure prophylaxis.

* NHBS collects data for 20 urban areas. Data for Puerto Rico was not included because of important public health differences (e.g., access to Medicaid and limited number of PrEP providers) between Puerto Rico and the 50 states and District of Columbia. The remaining 19 urban areas for which data was analyzed included the following (by U.S. Census region): *Northeast:* Boston, Massachusetts; Nassau and Suffolk counties, New York; New York City, New York; Newark, New Jersey; and Philadelphia, Pennsylvania; *Midwest:* Chicago, Illinois and Detroit, Michigan; *South:* Atlanta, Georgia; Baltimore, Maryland; Dallas, Texas; Houston, Texas; Miami, Florida; New Orleans, Louisiana; and Washington, DC; *West:* Denver, Colorado; Los Angeles, California; San Diego, California; San Francisco, California; and Seattle, Washington.

† Numbers might not sum to total because of missing data.

§ Models adjusted for place of birth and years of U.S. residence, age, and region and clustered on venue recruitment events.

¶ Defined as condomless anal sex without having taken PrEP at any time during the previous 12 months.

** Dashes indicate that data regarding PrEP use before 2014 are unavailable.

the largest decrease occurring among U.S.-born Hispanic/Latino MSM (aPR = 0.74; 95% CI = 0.68–0.80; interaction p = 0.04). Percentages of condomless anal sex were similar among all groups during 2017 (nearly 75%). Fewer U.S.-born Hispanic/Latino MSM had unprotected anal sex (49%) than did non-U.S.–born as a result of PrEP use, regardless of years of U.S. residence (≥6 years = 58%; ≤5 years = 59%) (Figure).

Discussion

PrEP use overall has increased among all Hispanic groups, offsetting declines in condom use. However, sexual behavioral HIV acquisition risk among Hispanic/Latino MSM differed by place of birth and years of residence in the United States. Recent residents might benefit from improved HIV prevention education and services, including access to PrEP and condoms. Further, non-U.S.–born Hispanic/Latino MSM, regardless of duration of U.S. residence, might encounter more barriers to PrEP use than do their U.S.-born counterparts (*6*). Hispanic/Latino MSM in the U.S. who prefer to use educational materials in Spanish language might be at a disadvantage for learning about PrEP and how to access it because such materials might be sparse (*7*). In addition to addressing typical barriers to PrEP use among all MSM (e.g., cost of care and stigma), HIV prevention programs and services that support Hispanic/Latino MSM, who are all facing disparities in PrEP use (*8*), might benefit from offering culturally and linguistically appropriate linkage to PrEP. CDC's Let's Stop HIV Together†† initiative has developed multiple prevention campaigns that reach MSM (e.g., Start Talking. Stop HIV§§ and Prescribe HIV Prevention¶¶) and promote PrEP awareness and use for Spanish speakers. In addition, The Latino Commission on AIDS coordinates the National Latinx AIDS Awareness Day*** observance to distribute HIV testing kits and information regarding prevention services such as PrEP though community-based organizations, health departments, and leaders among Hispanic/Latino communities In addition to other barriers to HIV prevention typically faced by all MSM (e.g., cost of care and stigma), tailoring PrEP strategies for non-U.S.–born Hispanic/Latino MSM to include improving Spanish-language materials and culturally competent patient navigation services and increasing awareness of drug assistance programs and other support services, might help reduce risk for HIV among this population.

The findings in this report are subject to at least five limitations. First, years of U.S. residence was used as a proxy for acculturation; other indicators of acculturation were unavailable for analysis. Although broadly delineating between nativity and acculturation highlights selected cultural complexities within the Hispanic/Latino MSM population, categorization into three groups remains

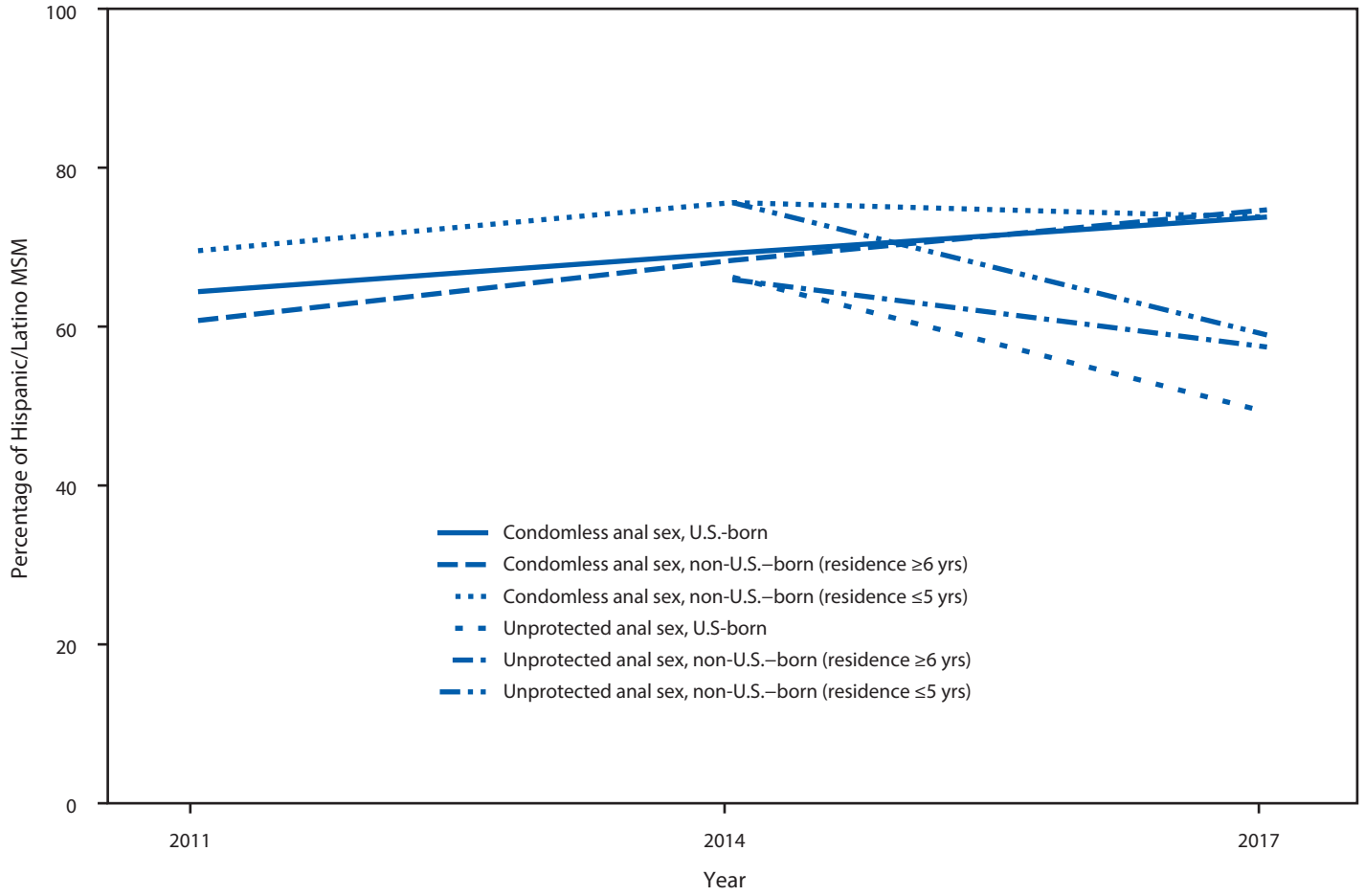
†† https://www.cdc.gov/stophivtogether/index.html.

§§ https://www.cdc.gov/stophivtogether/campaigns/start-talking-stop-hiv/index.html.

¶¶ https://www.cdc.gov/stophivtogether/campaigns/prescribe-hiv-prevention/index.html.

*** http://nlaad.org/.

FIGURE. Sexual risk behaviors during the preceding 12 months among Hispanic/Latino men who have sex with men, by U.S. versus non-U.S. birth and years of U.S. residence — National HIV Behavioral Surveillance, 19 urban areas,* 2011–2017†



Abbreviations: HIV = human immunodeficiency virus; PrEP = preexposure prophylaxis.

* Atlanta, Georgia; Baltimore, Maryland; Boston, Massachusetts; Chicago, Illinois; Dallas, Texas; Denver, Colorado; Detroit, Michigan; Houston, Texas; Los Angeles, California; Miami, Florida; Nassau and Suffolk counties, New York; New Orleans, Louisiana; New York, New York; Newark, New Jersey; Philadelphia, Pennsylvania; San Diego, California; San Francisco, California; Seattle, Washington; and District of Columbia.

† Unprotected anal sex is defined as condomless anal sex without having taken PrEP at any time during the past 12 months.

an oversimplification of the diversity and various challenges these men face. Analysis by specific nation of birth or years of U.S. residence as a continuous variable was not possible in this study. Second, measures of PrEP use changed from 2014 to 2017; specifically, PrEP use was more narrowly defined in 2017 than in 2014.††† Although PrEP use and condomless anal sex were both 12-month measures, the two might not have coincided, which might have resulted in an underestimation of the percentage of unprotected anal sex. Third, NHBS is not nationally representative, and data were not weighted to account for the complex sampling methods. Therefore, these results are not generalizable to all Hispanic/Latino MSM or to all geographic areas. Fourth, the analysis excluded interview data from San Juan, Puerto Rico, because of public health differences between Puerto Rico and the 50 states and District of Columbia (e.g., access to Medicaid and the limited number of PrEP providers). In 2017, 71% of MSM interviewed in Puerto Rico reported condomless anal sex, but only 4% reported using PrEP (*9*). Finally, data regarding self-reported behaviors, which were asked about among participants for a 12-month period, might be subject to recall error or social desirability bias, which can lead to overreporting PrEP use or underreporting condomless anal sex.

The proposed Ending the HIV Epidemic§§§ initiative highlights MSM and Hispanics/Latinos as priority populations for reaching to achieve national HIV prevention goals (*10*).

††† In 2014, participants were asked whether, in the past 12 months, they had taken anti-HIV medicines before sex because they thought it would keep them from getting HIV. In 2017, participants were asked whether, in the past 12 months, they had taken PrEP (i.e., an antiretroviral medicine such as Truvada, that is taken for months or years by a person who is HIV-negative) to reduce the risk for getting HIV.

§§§ https://www.hiv.gov/federal-response/ending-the-hiv-epidemic/overview?s_cid = ht_endinghivinternet0002.

Summary

What is already known about this topic?

Among Hispanic/Latino men who have sex with men (MSM), human immunodeficiency virus (HIV) infection is associated with place of birth and length of U.S. residence. Unprotected anal sex (condomless anal sex and no HIV preexposure prophylaxis [PrEP] use) increases the risk for HIV acquisition.

What is added by this report?

In 2017, nearly 75% of Hispanic/Latino MSM reported condomless anal sex. However, because of PrEP use, <60% of non-U.S.–born Hispanic/Latino MSM and <50% of U.S.-born Hispanic/Latino MSM reported unprotected anal sex.

What are the implications for public health practice?

Interventions to prevent HIV acquisition, including PrEP uptake, should address cultural and linguistic needs of Hispanic/Latino MSM.

The analyses in this report indicate that PrEP will be a crucial tool for reducing HIV transmission among Hispanic/Latino MSM. HIV prevention interventions, including linkage to PrEP, could address specific linguistic and cultural needs of Hispanic/Latino MSM and account for differences in needs by place of birth and acculturation.

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Update: Influenza Activity — United States and Worldwide, May 19–September 28, 2019, and Composition of the 2020 Southern Hemisphere Influenza Vaccine

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During May 19–September 28, 2019,* low levels of influenza activity were reported in the United States, with cocirculation of influenza A and influenza B viruses. In the Southern Hemisphere seasonal influenza viruses circulated widely, with influenza A(H3) predominating in many regions; however, influenza A(H1N1)pdm09 and influenza B viruses were predominant in some countries. In late September, the World Health Organization (WHO) recommended components for the 2020 Southern Hemisphere influenza vaccine and included an update to the A(H3N2) and B/Victoria-lineage components. Annual influenza vaccination is the best means for preventing influenza illness and its complications, and vaccination before influenza activity increases is optimal. Health care providers should recommend vaccination for all persons aged ≥6 months who do not have contraindications to vaccination (*1*).

Surveillance Update: United States and Worldwide

The U.S. Influenza Surveillance System† is a collaboration between CDC and federal, state, local, and territorial partners and uses eight data sources, six of which operate year-round, to collect clinical and laboratory information on influenza. During May 19–September 28, 2019 (surveillance weeks 21–39), public health laboratories in the United States tested 7,637 respiratory specimens for influenza viruses; 1,737 (22.7%) were positive (Figure 1), including 1,213 (69.8%) for influenza A viruses and 524 (30.2%) for influenza B viruses. Among the 1,154 seasonal influenza A-positive specimens that were subtyped, 324 (28.1%) were influenza A(H1N1)pdm09, and 830 (71.9%) were influenza A(H3N2). Among the 440 influenza B viruses for which lineage was determined, 413 (93.9%) belonged to the B/Victoria lineage and 27 (6.1%) to the B/Yamagata lineage.

During May 19–September 28, 2019, the weekly percentage of outpatient visits to health care providers for influenza-like illness (ILI) from the U.S. Outpatient Influenza-Like Illness Surveillance Network (ILINet) was below the national baseline, and all regions were below their region-specific baselines. One human infection with a novel influenza A virus§ was reported, an influenza A(H1N1) variant virus. This virus had hemagglutinin (HA) and neuraminidase gene segments derived from the seasonal human influenza A(H1N1)pdm09 virus that were likely introduced into swine by a recent reverse zoonosis and were closely related to influenza A(H1N1) viruses now circulating in the U.S. swine population. The percentage of deaths attributed to pneumonia and influenza from CDC's National Center for Health Statistics Mortality Surveillance System was below the epidemic threshold during this period. Five influenza-associated pediatric deaths occurring during this period were reported to CDC. Additional information on influenza surveillance methods is available at https://www.cdc.gov/flu/weekly/overview.htm, and a full description of U.S. influenza activity over the summer months is available in the influenza surveillance report, FluView (https://www.cdc.gov/flu/weekly/).

The timing of influenza activity and the predominant circulating virus in the Southern Hemisphere during May 19–September 28, 2019 varied by region.¶ Influenza A(H3N2) viruses were predominant in most regions; however, influenza A(H1N1)pdm09 and influenza B/Victoria viruses predominated in several countries. Additional information on global influenza virus circulation is available at https://www.who.int/influenza/surveillance_monitoring/updates/en/.

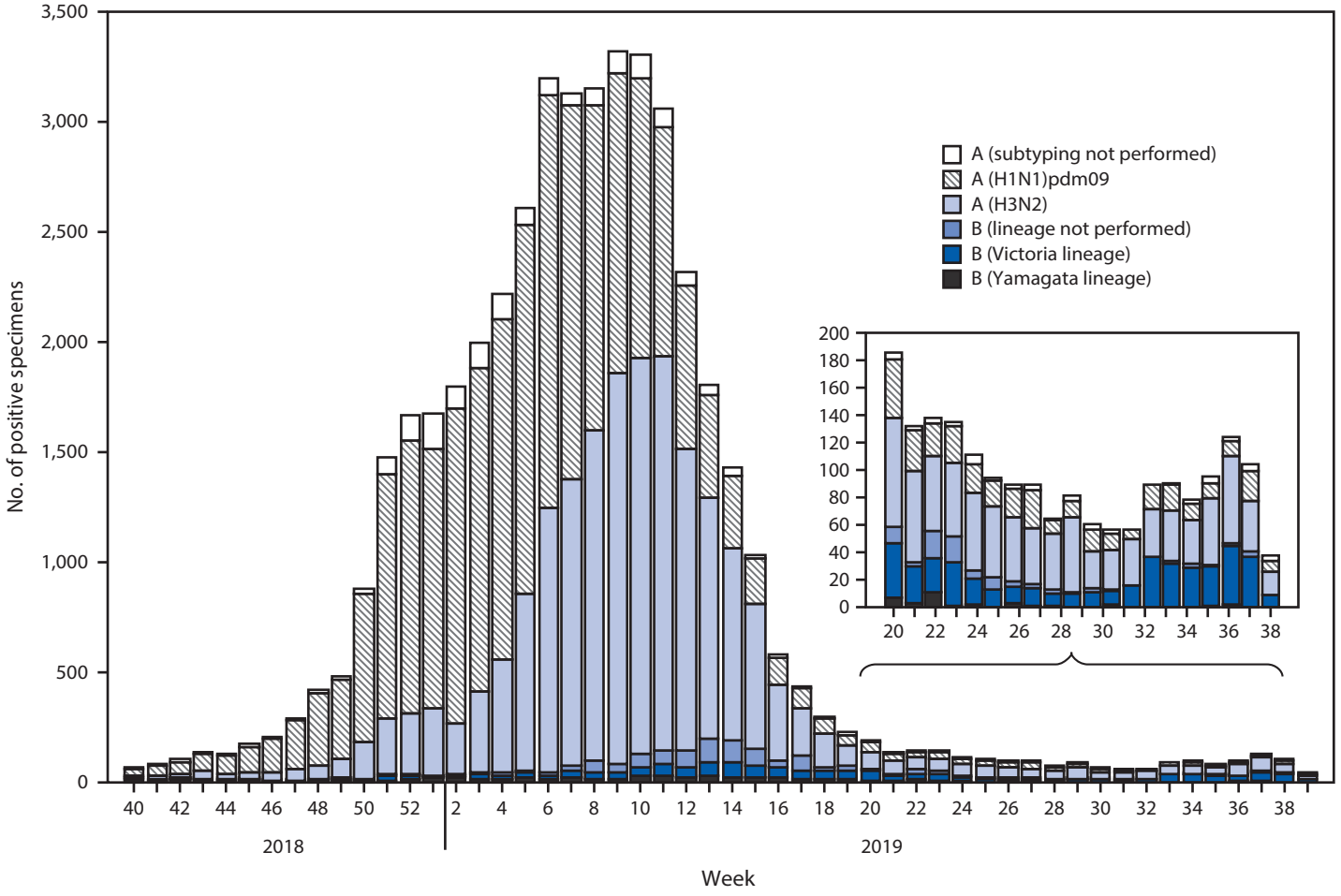
* Data reported as of October 4, 2019.

† The CDC influenza surveillance system collects five categories of information from eight data sources: 1) viral surveillance (U.S. World Health Organization collaborating laboratories, the National Respiratory and Enteric Virus Surveillance System, and novel influenza A virus case reporting); 2) outpatient illness surveillance (U.S. Outpatient Influenza-Like Illness Surveillance Network); 3) mortality (the National Center for Health Statistics Mortality Surveillance System and influenza-associated pediatric mortality reports); 4) hospitalizations (FluSurv-NET, which includes the Emerging Infections Program and surveillance in three additional states); and 5) summary of the geographic spread of influenza (state and territorial epidemiologist reports). https://www.cdc.gov/flu/weekly/fluactivitysurv.htm.

§ Influenza viruses that circulate in swine are called swine influenza viruses when isolated from swine but are called variant influenza viruses when isolated from humans. Seasonal influenza viruses that circulate worldwide in the human population have important antigenic and genetic differences form influenza viruses circulating in swine. https://www.cdc.gov/flu/swineflu/variant/preventspreadfactsheet.htm.

¶ In temperate climates, the onset and peak of influenza activity might vary substantially from one influenza season to the next, but generally begins to increase in the late fall. In the Northern Hemisphere's temperate regions, annual epidemics of influenza typically occur during October–February, but the peak of influenza activity can occur as late as April or May. In temperate regions of the Southern Hemisphere, influenza activity typically peaks during May–August. Although temperate regions of the world experience a seasonal peak in influenzaa activity, influenza viruses can be isolated year-round. The timing of seasonal peaks in influenza activity in tropical and subtropical countries varies by region. Multiple peaks of activity during the same year have been observed in some areas, and influenza infection can occur year-round.

FIGURE 1. Number of respiratory specimens testing positive for influenza* reported by public health laboratories, by influenza virus type, subtype/lineage, and surveillance week — United States, September 30, 2018–September 28, 2019†



* N = 45,619.
† As of October 4, 2019.

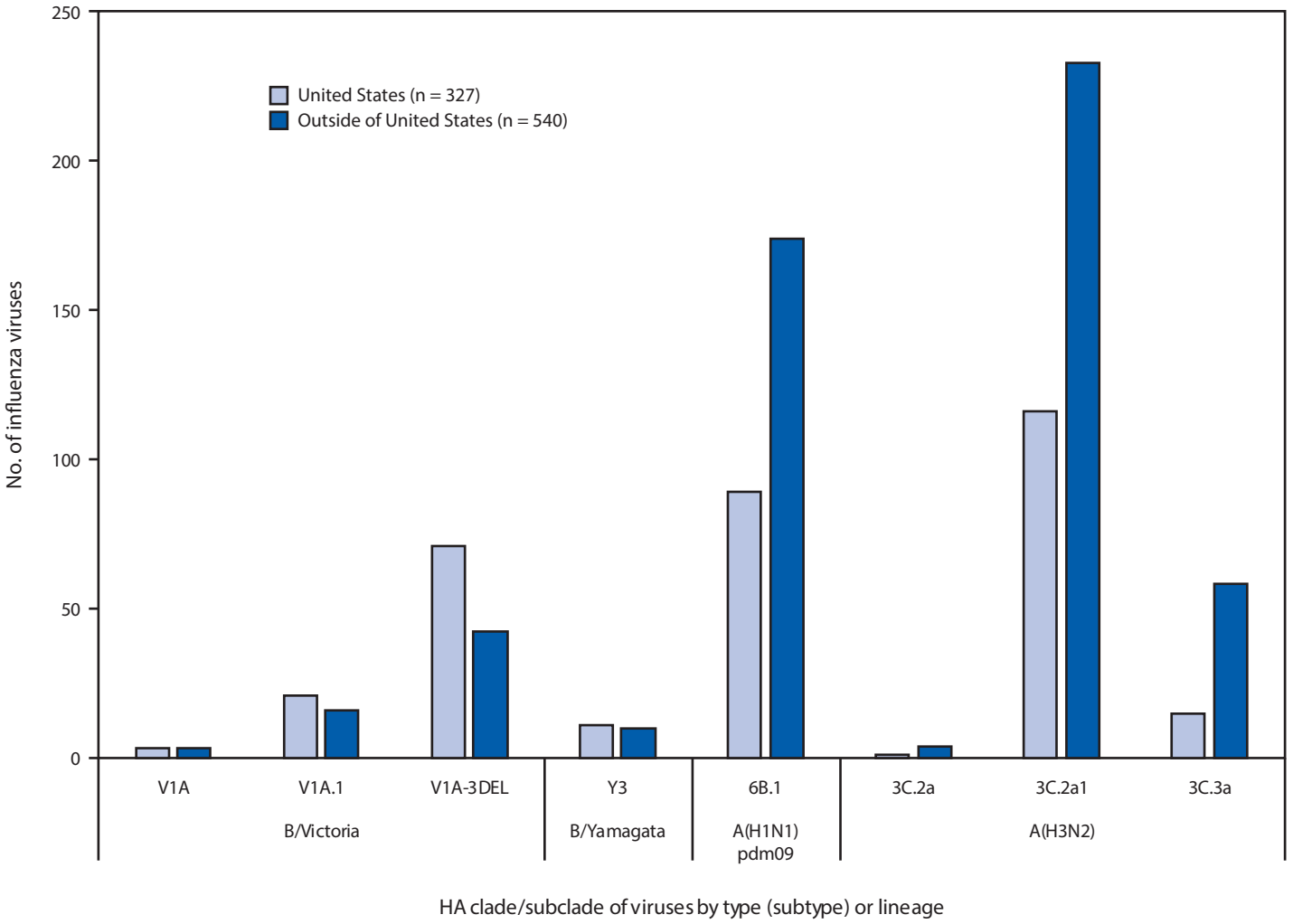
Genetic and Antigenic Characterization of Influenza Viruses

CDC genetically characterized 867 influenza viruses submitted by U.S. and international laboratories during May 19–September 28, 2019, including 263 influenza A(H1N1)pdm09 viruses, 427 influenza A(H3N2) viruses, and 177 influenza B viruses. All A(H1N1)pdm09 viruses belonged to genetic subclade 6B.1A. Among 25 antigenically characterized A(H1N1)pdm09 viruses, 96% were similar** to the cell-culture propagated 2019–20 Northern Hemisphere vaccine virus component. The 427 influenza A(H3N2) viruses analyzed belonged to either clades 3C.2a (354; 83%) or 3C.3a (73; 17%) (Figure 2). Multiple subclades within the 3C.2a clade cocirculated with the majority of viruses belonging to subclade 3C.2a1, with regional differences in which subgroup of 3C.2a1 predominated. A(H3N2) viruses with a clade 3C.3a HA, which reemerged last season, continue to circulate in the WHO Region of the Americas. Among the 74 representative A(H3N2) viruses antigenically characterized, 70% were similar to the cell-culture propagated 2019–20 Northern Hemisphere vaccine virus component. Thus, although ferret antisera clearly distinguish antigenic differences between 3C.2a and 3C.3a viruses there is some cross-reactivity.

All 21 of the influenza B/Yamagata lineage viruses analyzed belonged to clade Y3. All seven B/Yamagata lineage viruses antigenically characterized were similar to the cell culture–propagated 2019–20 Northern Hemisphere vaccine virus component. Multiple genetically and antigenically distinct B/Victoria lineage viruses cocirculated. Viruses with

** A virus is considered similar to a vaccine virus if it is well inhibited by ferret antisera raised against the cell culture– or egg culture–propagated reference virus representing the appropriate vaccine component for the specified season and hemisphere. The 2019–20 Northern Hemisphere vaccine components were A(H1N1)pdm09 subtype, A/Brisbane/02/2018-like (genetic group 6B.1A); A(H3N2) subtype, A/Kansas/14/2017-like (genetic group 3C.3a); B/Yamagata lineage, B/Phuket/3073/2013-like; and B/Victoria lineage, B/Colorado/06/2017-like (V1A.1) viruses.

FIGURE 2. Genetic characterization of U.S. and global viruses collected during May 19–September 28, 2019



a two-amino acid deletion (162–163) in the HA protein belonged to subclade V1A.1, and viruses with a three-amino acid deletion (162–164) in the HA protein belonged to subclade V1A-3Del. Among the 156 influenza B/Victoria lineage viruses analyzed, the HA gene belonged to clade V1A (six viruses; 4%), subclade V1A.1 (37; 24%), or subclade V1A-3Del (113; 72%). Among the 53 B/Victoria lineage viruses antigenically characterized, the V1A.1 viruses were similar to the cell culture–propagated 2019–20 Northern Hemisphere vaccine component. Ferret antisera raised to recent V1A.1 viruses, however, had reduced reactivity with many viruses expressing V1A and V1A-3Del HA proteins indicating some antigenic differences between viruses in the different B/Victoria lineage subclades. Nevertheless, sera from humans vaccinated with a V1A.1 virus cross reacted well with V1A-3Del viruses.

Antiviral Resistance of Influenza Viruses

CDC tested 812 influenza virus specimens collected during May 19–September 28 from the United States and worldwide for resistance to oseltamivir, peramivir, and zanamivir. All but two of the viruses tested (245 influenza A(H1N1)pdm09 viruses [161 international and 84 U.S. viruses], 406 influenza A(H3N2) viruses [284 international and 122 U.S.], and 161 influenza B viruses [71 international and 90 U.S.]) were susceptible to these influenza antiviral medications. One (0.1%) influenza A(H1N1)pdm09 virus contained the H275Y amino acid substitution in the neuraminidase and exhibited highly reduced inhibition by oseltamivir and peramivir, and one (0.1%) influenza B virus contained the amino acid substitution I221T and exhibited reduced inhibition by the same two neuraminidase inhibitors. Among 824 influenza virus specimens (253 A(H1N1)pdm09, 406 A(H3N2) and 165 type B assessed for susceptibility to baloxavir, one (0.1%) A(H3N2)

virus contained amino acid substitution I38L in the polymerase acidic (PA) protein, which was previously associated with at least a threefold decreased baloxavir susceptibility. High levels of resistance to the adamantanes (amantadine and rimantadine) persisted among influenza A(H1N1)pdm09 and influenza A(H3N2) viruses, which is consistent with the current recommendation to avoid use of these medications against influenza. Influenza antiviral recommendations are available at https://www.cdc.gov/flu/professionals/antivirals/links.htm.

Composition of the 2020 Southern Hemisphere Influenza Vaccine

WHO recommendations for influenza vaccine composition for the Southern Hemisphere 2020 season were made at the WHO Consultation and Information Meeting on the Composition of Influenza Virus Vaccines held September 23–27, 2019, in Geneva, Switzerland.[††] The recommended components for the 2020 Southern Hemisphere egg-based influenza trivalent vaccines are an A/Brisbane/02/2018 (H1N1)pdm09-like virus, an A/South Australia/34/2019 (H3N2)-like virus, and a B/Washington/02/2019-like virus (B/Victoria lineage). For egg-based quadrivalent vaccines, an additional component, B/Phuket/3073/2013-like virus (B/Yamagata lineage), is recommended. It was recommended that the A(H3N2) component of non–egg-based vaccines be a cell-propagated A/Iowa/60/2018-like virus.

Discussion

From May to September 2019, influenza activity remained low in the United States, as is typical for that time of year. Influenza A and B viruses cocirculated throughout the summer months with influenza A(H3N2) viruses predominating overall and influenza B/Victoria, subclade V1A-3Del, viruses the most common influenza B virus reported by public health laboratories. Influenza A and B viruses also circulated widely in the Southern Hemisphere with the predominant virus varying by region and country. It is too early in the season to know which viruses will circulate in the United States later this fall and winter or how severe the season might be; however, regardless of what is circulating, the best protection against influenza is an influenza vaccination. Influenza vaccination has been shown to reduce the risk for influenza illness associated with outpatient health care visits and hospitalizations and reduces the risk for serious influenza outcomes that can result in hospitalization or death. CDC recommends that all persons aged 6 months and older who do not have contraindications get vaccinated, but vaccination is especially important for persons at high risk for serious influenza-associated complications, including persons aged ≥65 years, children aged <5 years, pregnant women, and persons with certain underlying medical conditions.

In late September, WHO issued its recommendations for the 2020 Southern Hemisphere influenza vaccine. Compared with the composition of the 2019–20 Northern Hemisphere influenza vaccine formulation, these recommendations reflect changes to the A(H3N2) and B/Victoria-lineage components. The update for the B/Victoria-lineage component reflects the global spread and increase of V1A-3Del viruses, which had reduced reactivity to ferret antisera raised to V1A.1 viruses used in 2019–20 Northern Hemisphere vaccines. Apart from North and South America, the majority of A(H3N2) viruses circulating elsewhere globally belonged to subclade 3C.2a1 and were antigenically different from the Northern Hemisphere 3C.3a vaccine component, leading to a change in the A(H3N2) component to a 3C.2a1 subclade virus for the Southern Hemisphere. These recommendations were made specifically for the Southern Hemisphere using many factors, including evolutionary approaches to forecast specific subgroups likely to circulate 6 months into the future, determining which candidate vaccine viruses induce immunity that blocks the largest variety of viruses and which viruses escape population immunity from prior infection or vaccination. These factors vary among countries within the Southern Hemisphere and certainly vary between the Southern and Northern Hemispheres. For example, activity in Australia during recent seasons has not reflected influenza virus activity in the subsequent U.S. season. Changes to the Southern Hemisphere vaccine composition, therefore, might not be a good predictor of the upcoming U.S. influenza season. Although Australia experienced an early start to its 2019 season with influenza A(H1N1)pdm09 viruses circulating initially and A(H3N2) virus eventually predominating (*2*), influenza is unpredictable, and circumstances can

Summary

What is already known about this topic?

Although influenza activity is typically low in the United States during the summer months, CDC collects, compiles, and analyzes data to monitor influenza activity throughout the year.

What is added by this report?

In the United States, influenza activity remained low with cocirculation of influenza A and influenza B viruses. Influenza viruses circulated widely in the Southern Hemisphere, with A(H3) viruses predominating in most regions, although influenza A(H1N1)pdm09 and influenza B/Victoria viruses predominated in several countries.

What are the implications for public health practice?

Receiving a seasonal influenza vaccine each year remains the best way to protect against seasonal influenza and its potentially severe consequences.

[††]https://www.who.int/influenza/vaccines/virus/recommendations/2020_south/en/.

change very quickly. Analysis of surveillance and laboratory data to date continues to support the appropriateness of the Northern Hemisphere vaccine viruses used in production of influenza vaccines for the upcoming U.S. season.

Except for one influenza A(H1N1)pdm09 virus and one influenza B virus, all influenza viruses tested remained susceptible to oseltamivir, peramivir, and zanamivir, and only one virus contained a genetic mutation that has previously been associated with reduced susceptibility to baloxavir. Influenza antiviral medications are a valuable adjunct to annual influenza vaccination, and early treatment with influenza antiviral medication, especially within 48 hours of symptom onset, is recommended for patients with confirmed or suspected influenza who 1) have severe, complicated, or progressive illness; 2) require hospitalization; or 3) are at high risk for influenza-related complications [§§] (*3*). Early treatment has been shown to decrease time to symptom improvement (*4*–*7*) and to reduce secondary complications associated with influenza (*8*,*9*). Health care providers should not delay treatment until test results become available because treatment is most effective when given early in the illness. Additional information regarding influenza viruses, influenza surveillance, influenza vaccines, influenza antiviral medications, and novel influenza A virus infections in humans is available at https://www.cdc.gov/flu.

[§§] Persons at high risk include 1) children aged <5 years; 2) adults aged ≥65 years; 3) persons with chronic pulmonary conditions (including asthma), cardiovascular disease (except hypertension alone), renal, hepatic, hematologic (including sickle cell) disease, metabolic disorders (including diabetes mellitus), or neurologic and neurodevelopmental conditions (including disorders of the brain, spinal cord, peripheral nerves, and muscles, such as cerebral palsy, epilepsy [seizure disorders], stroke, intellectual disability [mental retardation], moderate to severe developmental delay, muscular dystrophy, or spinal cord injury); 4) persons with immunosuppression, including that caused by medications or by human immunodeficiency virus infection; 5) women who are pregnant or postpartum (within 2 weeks after delivery); 6) persons aged ≤18 years who are receiving long-term aspirin therapy; 7) American Indians/Alaska Natives; 8) persons with extreme obesity (i.e., body mass index ≥40); and 9) residents of nursing homes and other chronic care facilities.

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Vital Signs: Burden and Prevention of Influenza and Pertussis Among Pregnant Women and Infants — United States

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Abstract

Introduction: Vaccinating pregnant women with influenza vaccine and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) can reduce influenza and pertussis risk for themselves and their infants.

Methods: Surveillance data were analyzed to ascertain influenza-associated hospitalization among pregnant women and infant hospitalization and death associated with influenza and pertussis. An Internet panel survey was conducted during March 27–April 8, 2019, among women aged 18–49 years who reported being pregnant any time since August 1, 2018. Influenza vaccination before or during pregnancy was assessed among respondents with known influenza vaccination status who were pregnant any time during October 2018–January 2019 (2,097). Tdap receipt during pregnancy was assessed among respondents with known Tdap status who reported a live birth by their survey date (817).

Results: From 2010–11 to 2017–18, pregnant women accounted for 24%–34% of influenza-associated hospitalizations per season among females aged 15–44 years. From 2010 to 2017, a total of 3,928 pertussis-related hospitalizations were reported among infants aged <2 months (annual range = 262–743). Maternal influenza and Tdap vaccination coverage rates reported as of April 2019 were 53.7% and 54.9%, respectively. Among women whose health care providers offered vaccination or provided referrals, 65.7% received influenza vaccine and 70.5% received Tdap. The most commonly reported reasons for nonvaccination were believing the vaccine is not effective (influenza; 17.6%) and not knowing that vaccination is needed during each pregnancy (Tdap; 37.9%), followed by safety concerns for the infant (influenza =15.9%; Tdap = 17.1%).

Conclusions and Implications for Public Health Practice: Many pregnant women do not receive the vaccines recommended to protect themselves and their infants, even when vaccination is offered. CDC and provider organizations' resources are available to help providers convey strong, specific recommendations for influenza and Tdap vaccination that are responsive to pregnant women's concerns.

Introduction

Pregnancy confers an increased risk for hospitalization with influenza; one analysis estimated a 2.4 greater odds of influenza-associated hospitalization among pregnant women compared with nonpregnant patients (*1*). Influenza is also dangerous for infants aged <6 months, who have the highest incidence of influenza-associated hospitalizations and highest influenza-associated mortality risk among children (*2*). Similarly, pertussis morbidity and mortality are highest among infants aged <1 year, who have the highest per-population disease and hospitalization incidence and account for 88% of reported pertussis deaths (*3*). Infants routinely receive their first doses of pertussis-containing vaccine at age 2 months and influenza vaccine at age 6 months (*4*).

Vaccinating pregnant women with influenza vaccine and Tdap can provide their infants with transplacentally transferred passive immunity against influenza and pertussis during the first few months of life and also reduce women's own risk for infection (*5*–*7*). The Advisory Committee on Immunization Practices (ACIP) recommends that all women who are or will be pregnant during influenza season receive influenza vaccination, which can be administered anytime during pregnancy (*8*). ACIP also recommends that women receive a dose of Tdap during each pregnancy, preferably during the early part of gestational weeks 27–36 (*9*). CDC analyzed influenza and pertussis data from national surveillance systems to assess

disease burden* among pregnant women and infants and estimated maternal influenza and Tdap vaccination coverage using panel survey data.

Methods

Data from the Influenza Hospitalization Surveillance Network (FluSurv-NET) and the Influenza-Associated Pediatric Mortality Surveillance System† for the 2010–11 through 2017–18 influenza seasons were analyzed to quantify the proportion of influenza-associated hospitalizations among females aged 15–44 years that occurred among pregnant women and the number of influenza-associated hospitalizations per 100,000 and influenza-associated mortality among infants aged <6 months. Data from the National Notifiable Diseases Surveillance System (NNDSS)§ for 2010–17 were analyzed to obtain pertussis case counts, hospitalization proportion (calculated among the 64% of infants with known outcome), and mortality in infants aged <2 months.

An Internet panel¶ survey was conducted to estimate influenza and Tdap vaccination coverage among pregnant women (*10*); female panel members aged 18–49 years living in the United States were invited via e-mail or through a link on the panel website to access the survey site and complete screening questions. The survey was fielded during March 27–April 8, 2019, among women aged 18–49 years who reported being pregnant any time since August 1, 2018. Among 20,315 women who entered the survey site, 2,762 reported being eligible; 2,626 completed the survey (cooperation rate = 95.1%).** Data were weighted to reflect age, race/ethnicity, and geographic distribution of the U.S. population of pregnant women (*10*).

Influenza vaccination coverage was calculated among 2,097†† women who reported being pregnant any time during October 2018–January 2019; those reporting vaccination before or during pregnancy since July 1, 2018, were considered vaccinated. Report of receipt of Tdap at any point during pregnancy was assessed among 817 women who knew their Tdap vaccination status during their recent pregnancy and reported a live birth by their survey date§§; women excluded from Tdap coverage analyses differed on several factors from those included. Pregnancy and vaccination status were self-reported and not verified via medical record review. Receipt of both recommended vaccines was calculated among the Tdap analytic sample (817). Receipt of each vaccine was examined by maternal age, race/ethnicity, education, marital status, employment status, poverty status, insurance type, and residency by U.S. Census region and rurality. Influenza vaccination coverage was calculated by reported number of provider visits since July 2018 and presence of medical condition(s) other than pregnancy indicating increased risk for influenza complications; Tdap vaccination coverage by provider visits was not calculated as reported visits could not be attributed to the specific window (27–36 weeks gestation) during which Tdap is recommended. Receipt of a vaccination offer or referral from a health care provider was calculated and vaccination coverage among women who received an offer or referral was estimated for all demographic subgroups. Because the survey was conducted among a nonprobability sample, statistical significance cannot be inferred. Differences of ≥5 percentage points between proportions compared are noted.¶¶

Results

During the 2010–11 through 2017–18 influenza seasons, 2,341 influenza-associated hospitalizations among pregnant women were reported to FluSurv–NET (seasonal range = 84–523). Pregnant women accounted for 24%–34% of reported influenza-associated hospitalizations per season among females aged 15–44 years with known pregnancy status.*** During the

* In this report, influenza burden is defined as the total number and seasonal range of influenza-associated hospitalizations among pregnant women and influenza-associated deaths in infants aged <6 months, the proportion of influenza-associated hospitalizations among women of childbearing age occurring among pregnant women, and the influenza-associated hospitalization rate per 100,000 population for infants aged <6 months. Pertussis burden is defined as the number of cases, reported hospitalizations, and deaths among children aged <1 year and the proportion of each of these occurring among infants aged <2 months.

† Descriptions of CDC's influenza surveillance systems are available at https://www.cdc.gov/flu/weekly/overview.htm.

§ https://wwwn.cdc.gov/nndss/. Detailed annual reports of pertussis surveillance data are available at https://www.cdc.gov/pertussis/surv-reporting.html.

¶ https://www.dynata.com.

** An opt-in Internet panel survey is a nonprobability sampling survey. The denominator for a response rate calculation cannot be determined because no sampling frame with a selection probability is involved at the recruitment stage. Instead, the survey cooperation rate is provided.

†† Among 2,626 respondents, 2,098 (79.9%) were pregnant any time during October 2018–January 2019. One respondent did not provide her influenza vaccination status and was excluded from analysis. Therefore, influenza vaccination coverage before or during pregnancy was assessed among 2,097 respondents.

§§ Among 2,626 respondents, 1,494 (56.9%) were still pregnant at the time of the survey, and 202 (7.7%) reported a pregnancy outcome other than live birth. Among 930 respondents reporting a live birth, 113 women (12.8%) who reported not knowing if they had received Tdap ever (10.3%) or during their recent pregnancy (2.5%) were excluded from analysis. Therefore, Tdap receipt during pregnancy was assessed among 817 respondents.

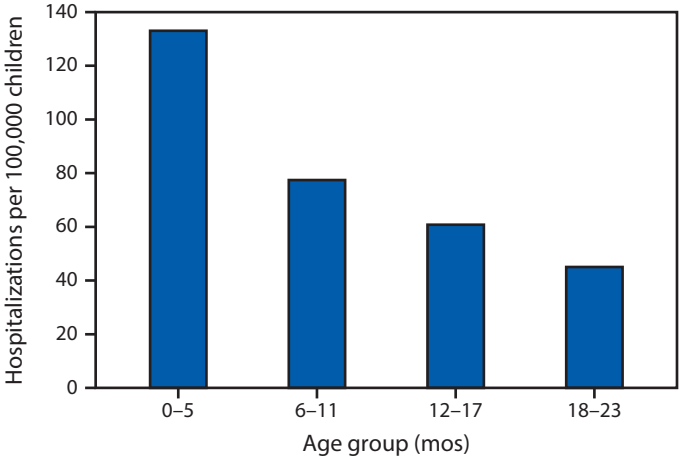
¶¶ Additional information on obstacles to inference in nonprobability samples is available at https://www.aapor.org/AAPOR_Main/media/MainSiteFiles/NPS_TF_Report_Final_7_revised_FNL_6_22_13.pdf and https://www.aapor.org/getattachment/Education-Resources/For-Researchers/AAPOR_Guidance_Nonprob_Precision_042216.pdf. Although the estimates reported here have variance, there has been no attempt to quantify the size of the variance.

*** The proportion of FluSurv-NET cases with known pregnancy status was not ascertained during the 2010–11 influenza season. Pregnancy status was known for 88% of females aged 15–44 years reported to FluSurv-NET during the 2011–12 influenza season and >99% during the 2012–13 through 2017–18 seasons.

same period, the average influenza-associated hospitalization rate per season among infants aged <6 months was 133.0 per 100,000 with lower rates in older age groups (Figure 1); 100 laboratory-confirmed influenza-associated deaths among infants aged <6 months were reported (seasonal range = 6–19). From 2010 to 2017, pertussis was reported in 27,370 infants aged <12 months; 9,199 cases (33.6%) occurred among infants aged <2 months. Among 7,731 infant pertussis hospitalizations during 2010–17, a total of 3,928 (50.8%) were among infants aged <2 months (Figure 2). During the same period, infants aged <2 months accounted for 69% (77) of NNDSS-reported pertussis deaths.

In the Internet panel survey, 53.7% of eligible respondents reported influenza vaccination before or during pregnancy, and 54.9% reported Tdap vaccination during pregnancy (Table 1).

FIGURE 1. Average number of influenza-associated hospitalizations per 100,000 children aged 0–23 months — Influenza Hospitalization Surveillance Network (FluSurv-NET), United States, 2010–11 through 2017–18 influenza seasons



Receipt of both influenza vaccine and Tdap was reported by 34.8% of 817 women with a recent live birth. For both vaccines, vaccination coverage was lower among non-Hispanic black (black) women and women who had less than a college education, were unmarried, lived below the poverty line, lived in the South, were publicly insured, and did not report a vaccination offer or referral from a health care provider than was coverage among referent groups. Influenza vaccination coverage was lower among nonworking women; Tdap coverage was lower among working women. Influenza vaccination coverage was also lower among uninsured women and those with five or fewer provider visits since July 2018. For Tdap, but not for influenza vaccination, Hispanic women had lower coverage, and women aged 18–34 years had higher coverage than did referent groups.

Receipt of offer or referral for vaccination from a health care provider was reported by 73.3% of respondents for influenza vaccine and 76.0% of respondents for Tdap (Table 1); among those who received an offer or referral, 65.7% received influenza vaccine, and 70.5% received Tdap. Vaccination offers or referrals were less commonly reported for both influenza vaccine and Tdap by black women and unmarried women (Table 2). Offers or referrals for influenza vaccine were reported less often by women with a college degree or less education, uninsured women, women living in the South, women living below the poverty level, women without other high-risk medical conditions, and women with 10 or fewer health care visits since July 2018. Offers or referrals for Tdap were less frequently reported among women aged 35–49 years, working women, and women with the highest or lowest education levels. Among women reporting offers or referrals for vaccination,

FIGURE 2. Number of infants with pertussis who were hospitalized, by age in months (N = 7,731) — National Notifiable Diseases Surveillance System, United States, 2010–2017

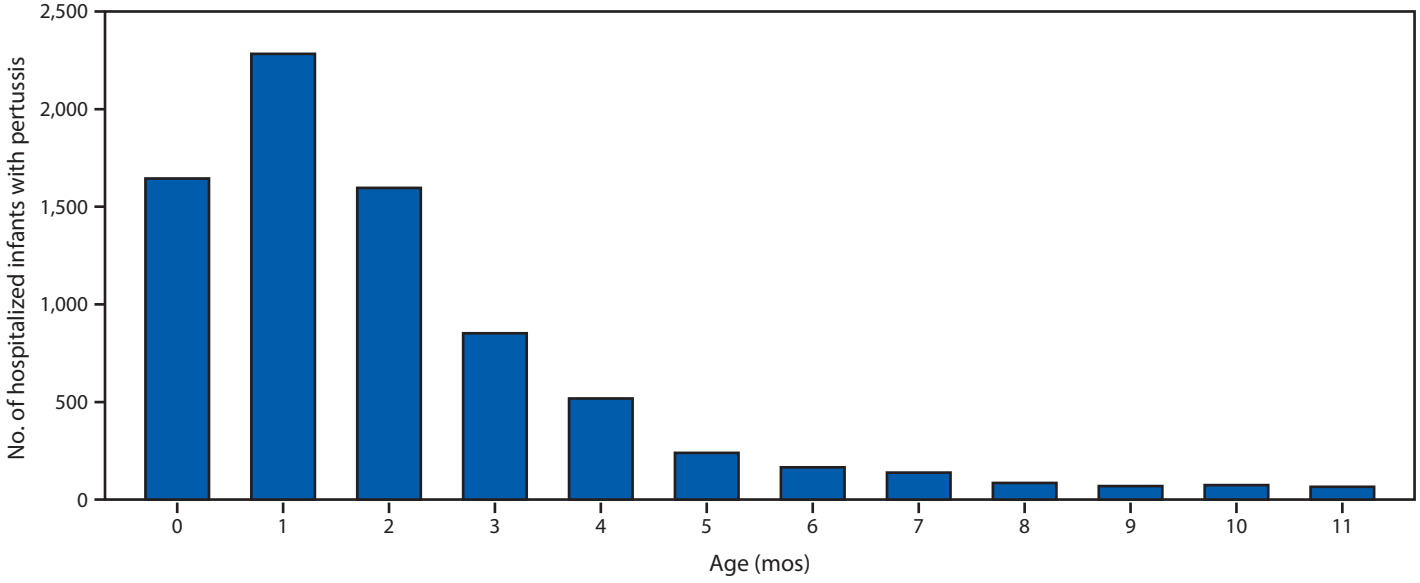


TABLE 1. Influenza vaccination and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) coverage among pregnant women, by selected characteristics — Internet panel survey, United States, March–April 2019

Characteristic	Influenza		Tdap	
	No. (weighted %)	% (weighted) vaccinated	No. (weighted %)	% (weighted) vaccinated
Total	**2,097 (100)**	**53.7**	**817 (100)**	**54.9**
Age group (yrs)				
18–24	450 (25.8)	52.9	155 (23.6)	57.9*
25–34	1,165 (54.3)	53.2	480 (57.8)	57.5*
35–49†	482 (19.9)	56.2	182 (18.6)	43.1
Race/Ethnicity§				
White, non-Hispanic†	1,262 (49.7)	57.0	542 (55.8)	61.4
Black, non-Hispanic	239 (19.5)	38.0*	87 (18.8)	37.7*
Hispanic	372 (23.1)	57.3	113 (18.6)	51.4*
Other, non-Hispanic	224 (7.7)	61.7	75 (6.9)	58.5
Education				
Less than high school diploma	526 (27.0)	46.1*	205 (25.6)	49.3*
Some college, no degree	484 (23.5)	47.9*	206 (26.3)	55.6*
College degree (2- or 4-year)	838 (38.4)	60.0	314 (37.9)	56.7
More than college degree†	249 (11.1)	63.0	92 (10.2)	60.6
Marital status¶				
Married†	1,231 (54.9)	62.4	547 (62.0)	58.3
Unmarried	865 (45.1)	43.1*	270 (38.0)	49.4*
Employment status**				
Working†	1,178 (56.2)	57.8	396 (48.5)	52.1
Not working	919 (43.8)	48.5*	421 (51.5)	57.5*
Poverty status††				
At or above poverty†	1,609 (75.3)	57.5	624 (75.6)	56.9
Below poverty	485 (24.7)	42.4*	192 (24.4)	49.5*
Area of residence§§				
Nonrural†	1,691 (82.8)	54.6	638 (79.9)	55.2
Rural	406 (17.2)	49.7	179 (20.1)	53.8
Region¶¶				
Northeast†	342 (17.8)	56.4	126 (17.2)	56.5
Midwest	488 (20.2)	56.0	206 (21.7)	59.4
South	861 (38.0)	50.0*	335 (37.8)	51.4*
West	406 (23.9)	55.9	150 (23.3)	55.3

See table footnotes on next page.

vaccination receipt varied by demographic characteristics, with some of the largest gaps in coverage for either vaccine (>20 percentage points) identified between black and non-Hispanic white (white) women. Influenza vaccination coverage was 28 percentage points lower among uninsured women than among privately insured women; sample size was inadequate to analyze this for Tdap.

The most commonly reported primary reason for not receiving influenza vaccination was believing the vaccine is not effective (17.6%) (Supplementary Figure, https://stacks.cdc.gov/view/cdc/81478). For Tdap, the most commonly reported primary reason for nonvaccination was not knowing vaccination is needed during each pregnancy (37.9%): 24.5% of women who were not vaccinated during their recent pregnancy reported previous receipt of Tdap, and 13.4% reported not knowing they were supposed to receive Tdap during their recent pregnancy. For both vaccines, the second most common reason for nonvaccination was concern about safety risks to their infant (influenza = 15.9%; Tdap = 17.1%).

Discussion

Eight years of surveillance data corroborate earlier findings (*1*–*3*) regarding the disproportionate burden of influenza-associated hospitalization among pregnant women as well as influenza- and pertussis-associated hospitalization among infants too young to be vaccinated. Approximately half of pregnant women in the United States received influenza vaccine during the 2018–19 influenza season, and findings were similar for Tdap. Approximately three quarters of pregnant women reported an offer or referral for either vaccine from a health care provider, and vaccination coverage was higher among women reporting receipt of an offer or referral. However, ≥30% of women whose providers did offer or refer them for vaccination remained unvaccinated.

TABLE 1. (*Continued*) Influenza vaccination and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) coverage among pregnant women, by selected characteristics — Internet panel survey, United States, March–April 2019

Characteristic	Influenza		Tdap	
	No. (weighted %)	% (weighted) vaccinated	No. (weighted %)	% (weighted) vaccinated
Prenatal insurance status* **				
Private/military†	1,042 (47.3)	62.0	410 (47.7)	61.2
Public	968 (48.7)	47.5*	389 (49.8)	50.4*
Uninsured	87 (4.0)	31.0*	<30 (—†††)	—†††
Provider vaccination recommendation/offer§§§				
Offered or referred†	1,523 (73.3)	65.7	624 (76.0)	70.5
Recommended, no offer or referral	153 (7.1)	35.9*	43 (5.8)	19.5*
No recommendation	391 (19.6)	18.5*	150 (18.1)	1.0*
No. of provider visits since July 2018				
None	30 (1.7)	20.3*	N/A	N/A
1–5	395 (18.5)	46.3*	N/A	N/A
6–10	784 (37.1)	55.4	N/A	N/A
>10†	888 (42.7)	56.8	N/A	N/A
High-risk condition for influenza¶¶¶				
Yes†	895 (48.3)	56.3	N/A	N/A
No	979 (51.7)	52.5	N/A	N/A

Abbreviation: N/A = not applicable.

* ≥5 percentage-point difference compared with referent group.

† Referent group for comparison within subgroups.

§ Race/ethnicity was self-reported. Women identified as Hispanic might be of any race. The "other" race category included Asians, American Indians or Alaska Natives, Native Hawaiians or other Pacific Islanders, and women who selected "other" or multiple races.

¶ Excludes one woman who did not report marital status.

** Women who were employed for wages and self-employed were categorized as working; those who were out of work, homemakers, students, retired, or unable to work were categorized as not working.

†† Poverty status was defined based on the reported number of people and children living in the household and annual household income, according to U.S. Census poverty thresholds (https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html).

§§ Rurality was defined using ZIP codes where >50% of the population resides in either a nonmetropolitan county and/or a rural U.S. Census tract, according to the Health Resources and Services Administration's definition of rural population (https://www.hrsa.gov/rural-health/about-us/definition/index.html).

¶¶ *Northeast:* Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

*** Women pregnant on their survey date were asked about current insurance; women who had already delivered were asked about insurance "during your most recent pregnancy." Women considered to have public insurance selected at least one of the following when asked what kind of medical insurance they had: Medicaid, Medicare, Indian Health Service, state-sponsored medical plan, or other government plan. Women considered to have private/military insurance selected private medical insurance and/or military medical insurance and did not select any type of public insurance.

††† Estimates with sample size <30 are not reported.

§§§ Referral is defined as a "yes" response to the question "Did any doctor, nurse, or medical professional suggest that you go someplace else to get the [flu/Tdap] vaccination?"

¶¶¶ Conditions other than pregnancy associated with increased risk for serious medical complications of influenza include chronic asthma, a lung condition other than asthma, a heart condition, diabetes, a kidney condition, a liver condition, obesity, or a weakened immune system caused by a chronic illness or by medicines taken for a chronic illness. Women who were missing information (223) were excluded from analysis.

Whereas approximately 9% of U.S. females aged 15–44 years are pregnant at any given time each year,††† pregnant women in this age group accounted for 24%–34% of influenza-associated hospitalizations per season. Influenza vaccination reduces pregnant women's risk for influenza-associated hospitalization by an average of 40% (*7*); maternal vaccination also reduces influenza-associated hospitalization risk in infants aged <6 months by an average of 72% (*5*). Third-trimester maternal Tdap vaccination is 77.7% effective in preventing pertussis cases and 90.5% effective in preventing pertussis hospitalizations in infants aged <2 months (*6*), who account for half of all infant pertussis hospitalizations. Infant protection can motivate pregnant women to receive recommended vaccines, and intention to vaccinate is higher among women who perceive more serious consequences of influenza or pertussis disease for their own or their infant's health (*11*). It is important to emphasize the well-documented effectiveness of maternal vaccination in preventing the most severe outcomes of influenza and pertussis infection, particularly among very young infants, in patient-facing materials and discussions promoting vaccination during pregnancy. The second most common reason for not receiving either vaccine was concerns about safety risks posed to the

††† Based on 2014 estimates of the pregnancy rate from https://www.guttmacher.org/report/pregnancy-desires-and-pregnancies-state-level-estimates-2014 and U.S. Census population estimates of U.S. females aged 15–44 years in 2014 (https://data.census.gov/cedsci/table?q=females%2015-44&hidePreview=false&table=S0101&tid=ACSST1Y2014.S0101&lastDisplayedRow=20); approximately 9% of reproductive-aged women in the United States are pregnant at any time.

TABLE 2. Influenza vaccination and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) coverage among pregnant women who reported a recommendation and offer or referral for vaccination by their health care provider, by selected characteristics — Internet panel survey, United States, March–April 2019

Characteristic	Influenza*			Tdap		
	No.	% (weighted) offered/referred for vaccination	% (weighted) vaccinated among those offered/referred	No.	% (weighted) offered/referred for vaccination	% (weighted) vaccinated among those offered/referred
Total	**2,067**	**73.3**	**65.7**	**817**	**76.0**	**70.5**
Age group (yrs)						
18–24	441	69.8†	65.4	155	80.0†	70.1†
25–34	1,153	74.4	64.7	480	78.0†	72.5†
35–49§	473	74.9	68.5	182	65.0	63.8
Race/Ethnicity¶						
White, non-Hispanic§	1,252	74.2	69.0	542	78.2	77.4
Black, non-Hispanic	230	69.0†	46.6†	87	68.3†	53.3†
Hispanic	365	74.3	70.8	113	75.2	66.1†
Other, non-Hispanic	220	75.6	72.3	75	82.1	66.7†
Education						
Less than high school diploma	511	69.7†	58.4†	205	73.1	65.7†
Some college, no degree	480	70.5†	60.2†	206	78.8†	68.6†
College degree (2- or 4-year)	833	75.2†	70.3†	314	77.6†	72.2†
More than college degree§	243	81.4	75.8	92	70.6	81.7
Marital status**						
Married§	1,224	76.7	73.7	547	78.2	73.2
Unmarried	842	69.0†	54.4†	270	72.6†	65.8†
Employment status††						
Working§	1,166	75.3	69.5	396	72.7	69.0
Not working	901	70.8	60.4†	421	79.1†	71.7
Poverty status§§						
At or above poverty§	1,596	75.4	68.5	624	76.9	72.5
Below poverty	469	66.8†	55.4†	192	74.2	63.9†
Area of residence¶¶						
Nonrural§	1,670	73.8	66.4	638	76.6	70.1
Rural	397	71.2	61.9	179	73.9	72.2
Region***						
Northeast§	340	78.4	67.9	126	74.8	75.5
Midwest	483	74.7	67.3	206	78.5	72.8
South	844	69.9†	63.2	335	75.6	66.7†
West	400	73.8	66.2	150	75.4	70.8

See table footnotes on next page.

fetus, yet studies consistently affirm the safety of maternal vaccination for women and infants (*5*,*8*,*9*). Providers treating pregnant women can take advantage of resources from CDC§§§ and provider organizations¶¶¶ to help convey strong, specific recommendations for influenza and Tdap vaccination in a manner that is responsive to women's concerns.

Consistent with prior findings (*10*,*12*), current survey data show that vaccination coverage was lower among black pregnant women and those of lower socioeconomic status (i.e., less educated, living in poverty, and publicly insured or uninsured). Because provider recommendations are a powerful predictor of vaccination among pregnant women (*10*,*11*), previous efforts have focused on encouraging providers to strongly recommend needed vaccines and either offer them or provide referrals to another vaccinator if vaccines are not stocked onsite (*13*). This analysis found overall high levels of reported provider offers or referrals for both vaccines although differences in some demographic subgroups were noted. Lower reported provider offers or referrals were sometimes associated with lower vaccination coverage. Further, many women whose providers offered or referred them for vaccination remained unvaccinated. This finding was particularly striking among black women, fewer than half of whom (46.6%) accepted influenza vaccine when offered or referred, compared with approximately two thirds (69.0%) of white women; similarly, Tdap coverage was 53.3% among black women, compared with 77.4% among white women (and 66.1% among Hispanic women), offered or referred for vaccination. One study in the general population found that black adults had lower levels of trust in influenza

§§§ https://www.cdc.gov/pertussis/materials/hcp.html.

¶¶¶ http://immunizationforwomen.org/providers/pregnancy/pregnancy-resources.php.

TABLE 2. (*Continued*) Influenza vaccination and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) coverage among pregnant women who reported a recommendation and offer or referral for vaccination by their health care provider, by selected characteristics — Internet panel survey, United States, March–April 2019

Characteristic	Influenza*			Tdap		
	No.	% (weighted) offered/referred for vaccination	% (weighted) vaccinated among those offered/referred	No.	% (weighted) offered/referred for vaccination	% (weighted) vaccinated among those offered/referred
Prenatal insurance status†††						
Private/Military§	1,035	76.4	73.1	410	77.4	77.0
Public	955	71.9	58.9†	389	75.4	65.2†
Uninsured	77	51.0†	45.1†	<30	—§§§	—§§§
No. of provider visits since July 2018						
None	N/A	N/A	N/A	N/A	N/A	N/A
1–5	395	63.4†	60.1†	N/A	N/A	N/A
6–10	784	72.8†	67.4	N/A	N/A	N/A
>10§	888	78.0	66.2	N/A	N/A	N/A
High-risk condition for influenza¶¶¶						
Yes§	886	78.4	65.4	N/A	N/A	N/A
No	971	69.8†	66.7	N/A	N/A	N/A

Abbreviation: N/A = not applicable.

* Women who did not report any provider visits since July 2018 (30) were excluded from the influenza analysis as they could not have received a provider offer of or referral for vaccination during influenza season. No women were excluded from the Tdap analysis.

† ≥5 percentage-point difference compared with referent group.

§ Referent group for comparison within subgroups.

¶ Race/ethnicity was self-reported. Women identified as Hispanic might be of any race. The "other" race category included Asians, American Indians or Alaska Natives, Native Hawaiians or other Pacific Islanders, and women who selected "other" or multiple races.

** Excludes one woman who did not report marital status.

†† Women who were employed for wages and self-employed were categorized as working; those who were out of work, homemakers, students, retired, or unable to work were categorized as not working.

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¶¶ Rurality was defined using ZIP codes where >50% of the population resides in either a nonmetropolitan county and/or a rural U.S. Census tract, according to the Health Resources and Services Administration's definition of rural population (https://www.hrsa.gov/rural-health/about-us/definition/index.html).

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§§§ Estimates with sample size <30 are not reported.

¶¶¶ Conditions other than pregnancy associated with increased risk for serious medical complications of influenza include chronic asthma, a lung condition other than asthma, a heart condition, diabetes, a kidney condition, a liver condition, obesity, or a weakened immune system caused by a chronic illness or by medicines taken for a chronic illness. Women who were missing information (223) were excluded from analysis.

vaccine, in their doctor, and in information from CDC, compared with white adults (*14*); similar beliefs among black pregnant women might explain the lower vaccine acceptance found in this analysis. Differential effects of provider vaccination offers or referrals might also be explained by less patient-centered provider communication with black patients (*15*).

Surveillance and survey data presented here are subject to several previously described limitations that might affect their representativeness (*10*,*16*–*18*). Importantly, surveillance data likely underestimate outcomes of interest, while self-reported vaccination data might under- or overestimate true coverage. In addition, respondents excluded from Tdap coverage analysis differed from those included on race/ethnicity, education level, insurance type, poverty status, and region of residence.

These findings highlight influenza and pertussis disease burden among pregnant women and infants and vaccination coverage among pregnant women in the United States and suggest that disease burden could be reduced by improving vaccination coverage. Many pregnant women do not receive both vaccines recommended during pregnancy, increasing their and their newborns' risk for influenza and pertussis infection and their potentially devastating consequences. Although pregnant women differ in responses to vaccination offers and referrals, health care providers remain their most trusted source of vaccine information (*11*). Starting maternal vaccination discussions with patients early in pregnancy can offer providers multiple opportunities to share information tailored to individual patients' needs and address vaccination-related concerns.

Summary

What is already known about this topic?

Vaccinating pregnant women with influenza vaccine and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine (Tdap) can reduce their own risk for disease and protect their young infants against influenza and pertussis.

What is added by this report?

Influenza and pertussis cause substantial disease burden among pregnant women and infants too young to be vaccinated. Approximately half of pregnant women reported receiving each vaccine. Even among pregnant women reporting vaccination offers or referrals from a health care provider, approximately one third remained unvaccinated.

What are the implications for public health practice?

CDC and provider organizations' resources are available to help providers convey strong, specific recommendations for influenza and Tdap vaccination that are responsive to pregnant women's concerns.

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National Update on Measles Cases and Outbreaks — United States, January 1–October 1, 2019

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During January 1–October 1, 2019, a total of 1,249 measles cases and 22 measles outbreaks were reported in the United States. This represents the most U.S. cases reported in a single year since 1992 (*1*), and the second highest number of reported outbreaks annually since measles was declared eliminated* in the United States in 2000 (*2*). Measles is an acute febrile rash illness with an attack rate of approximately 90% in susceptible household contacts (*3*). Domestic outbreaks can occur when travelers contract measles outside the United States and subsequently transmit infection to unvaccinated persons they expose in the United States. Among the 1,249 measles cases reported in 2019, 1,163 (93%) were associated with the 22 outbreaks, 1,107 (89%) were in patients who were unvaccinated or had an unknown vaccination status, and 119 (10%) measles patients were hospitalized. Closely related outbreaks in New York City (NYC) and New York State (NYS; excluding NYC), with ongoing transmission for nearly 1 year in large and close-knit Orthodox Jewish communities, accounted for 934 (75%) cases during 2019 and threatened the elimination status of measles in the United States. Robust responses in NYC and NYS were effective in controlling transmission before the 1-year mark; however, continued vigilance for additional cases within these communities is essential to determine whether elimination has been sustained. Collaboration between public health authorities and undervaccinated communities is important for preventing outbreaks and limiting transmission. The combination of maintenance of high national vaccination coverage with measles, mumps, and rubella vaccine (MMR) and rapid implementation of measles control measures remains the cornerstone for preventing widespread measles transmission (*4*).

Measles cases are classified according to the Council of State and Territorial Epidemiologists' case definition for measles (*5*). Cases are considered internationally imported if at least part of the exposure period (7–21 days before rash onset) occurred outside the United States and rash occurred within 21 days of entry into the United States, with no known exposure to measles in the United States during the exposure period. An outbreak of measles is defined as a chain of transmission of three or more cases linked in time and place as determined by local and state health department investigations.

During January 1–October 1, 2019, a total of 1,249 measles cases were reported in 31 states and New York City,† including 1,211 (97%) among U.S. residents. Median patient age was 6 years (interquartile range [IQR] = 2–22 years); 13% were infants aged <12 months (not routinely recommended to receive MMR vaccine), 31% were children aged 1–4 years, 27% were school-aged children aged 5–17 years, and 29% were adults aged ≥18 years (Table). Among all measles patients, 1,107 (89%) were unvaccinated or vaccination status was unknown, and 142 (11%) had received ≥1 MMR vaccination. Most cases (1,054, 84%) were laboratory-confirmed; among 714 (57%) cases for which specimens were available for molecular sequencing, genotypes B3 (49, 7%) and D8 (665, 93%) were identified. Overall, 119 (10%) patients were hospitalized (median age 6 years, IQR = 1–33 years; 20% were infants aged <12 months), 60 (5%) had pneumonia, and one (0.1%) had encephalitis; no deaths were reported to CDC. Eighty-one cases were imported from other countries§ including 52 (64%) cases in U.S. residents returning from travel abroad. Among these 81 internationally imported measles cases, 73 (90%) were in unvaccinated persons or persons for whom vaccination status was unknown.

In 2019, 22 outbreaks occurred in 17 states (seven were multistate outbreaks); outbreaks accounted for 1,163 (93%) of all reported cases. Eight outbreaks that occurred in underimmunized, close-knit communities accounted for 85% of all cases; outbreaks associated with NYS and NYC accounted for 934 (75%) of all cases. The median outbreak size and duration were six cases (range = 3–646 cases) and 27.5 days

* According to the World Health Organization, measles elimination status is based on the absence of endemic measles transmission in a defined geographical area (e.g., region or country) for ≥12 months in the presence of a well-performing surveillance system. https://www.who.int/immunization/policy/position_papers/measles/en/.

† Alaska (1), Arizona (1), California (68), Colorado (1), Connecticut (3), Florida (3), Georgia (7), Hawaii (1), Idaho (2), Illinois (9), Indiana (1), Iowa (2), Kentucky (2), Maine (1), Maryland (5), Massachusetts (2), Michigan (46), Missouri (1), Nevada (1), New Hampshire (1), New Jersey (18), New Mexico (1), New York State (309; excludes New York City), New York City (605; excludes New York State), Ohio (1), Oklahoma (4), Oregon (24), Pennsylvania (16), Tennessee (5), Texas (21), Virginia (1), and Washington (86).

§ Algeria (1), Asia (2), Bangladesh (2), Brazil (3), Canada (1), China/Thailand (1), England/France (1), Europe (3; excludes numbers for countries within Europe), France (2), Georgia (1), Germany (2), India (1), Israel (8), Israel/Georgia (1), Italy/Singapore (1), Japan (1), Lithuania (2), New Zealand (2), Pakistan (1), Philippines (16), Poland (2), Russia (1), Switzerland/Czech Republic (1), Taiwan (1), Thailand (3), Thailand/Cambodia (1), Ukraine (10), Ukraine/Israel (1), United Kingdom (5), and Vietnam (4).

TABLE. Number and vaccination status of measles cases, by age group — United States, January 1–October 1, 2019

Age group	Measles cases no. (%)	Vaccination status no. (%)*		
		Unvaccinated	Vaccinated	Unknown
0–5 mos	43 (3)	43 (100)	0 (0)	0 (0)
6–11 mos	116 (9)	110 (95)	5 (4)	1 (1)
12–15 mos	118 (9)	106 (90)	12 (10)	0 (0)
16 mos–4 yrs	274 (22)	238 (87)	33 (12)	3 (1)
5–17 yrs	339 (27)	295 (87)	26 (8)	18 (5)
18–29 yrs	144 (12)	49 (34)	41 (28)	54 (38)
30–49 yrs	160 (13)	25 (16)	22 (14)	113 (71)
≥50 yrs	55 (4)	6 (11)	3 (5)	46 (84)
Overall	**1,249**	**872 (70)**	**142 (11)**	**235 (19)**

* Received ≥1 dose of measles, mumps, and rubella vaccine.

(range = 5–230 days), respectively. The median age of patients with outbreak-related cases was 6 years (IQR = 2–19 years). Most outbreak-related cases occurred in persons who were unvaccinated, or in those for whom vaccination status was unknown (1,032, 89%). Most (57, 70%) of the 81 internationally imported cases were not associated with outbreaks.

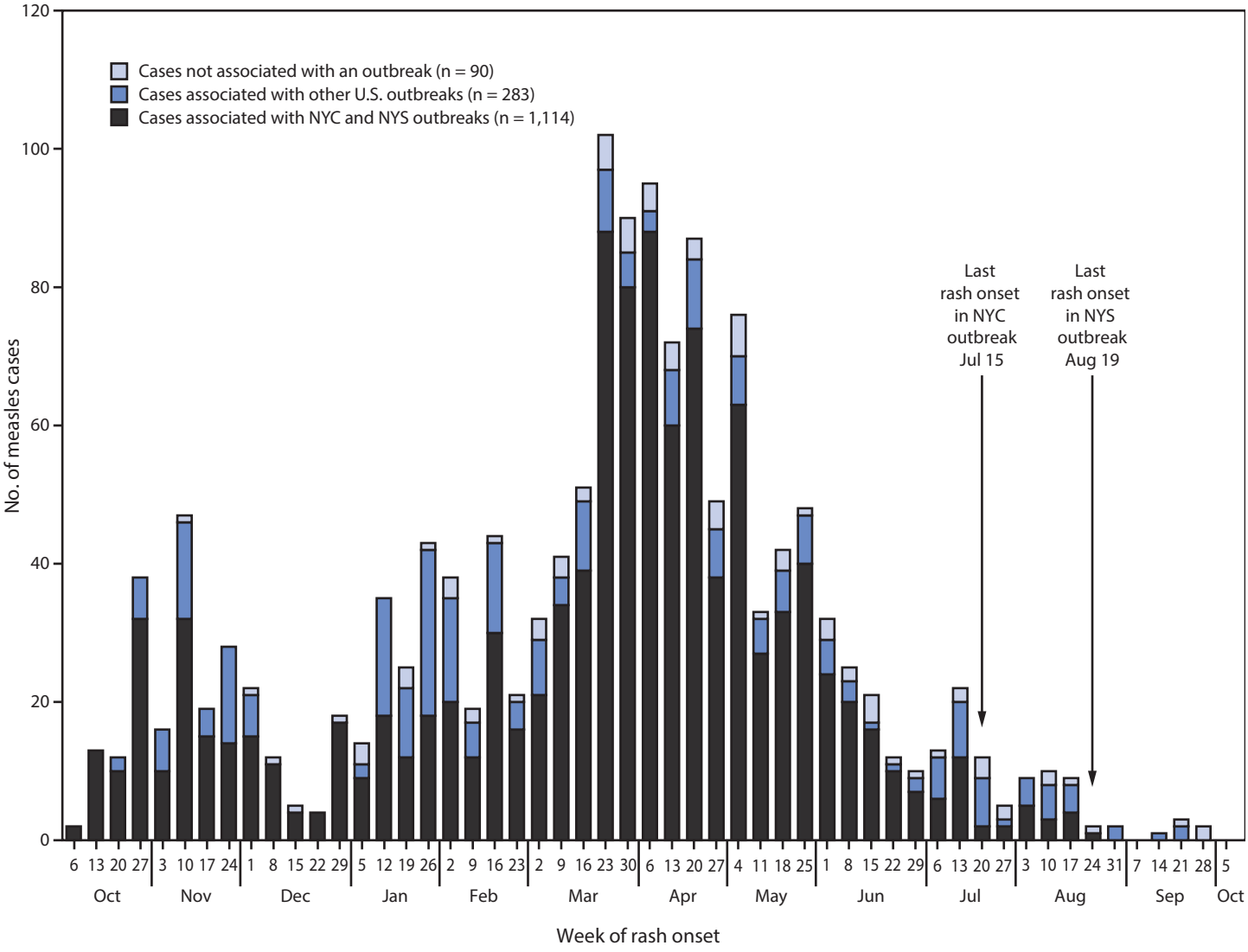
Beginning in late 2018, two closely related outbreaks within Orthodox Jewish communities were reported in NYC and NYS. The first began in NYC with an internationally imported case in a returning U.S. traveler on September 30, 2018; this outbreak lasted 9.5 months and included 702 cases. The second outbreak, which began in NYS with an internationally imported case in a foreign visitor on October 1, 2018, lasted 10.5 months and included 412 cases. The NYC outbreak included 53 cases reported by four other jurisdictions, and the NYS outbreak included four cases reported by two other jurisdictions. Among the 1,487 cases reported to CDC during September 30, 2018–October 1, 2019, 1,397 (94%) cases were associated with 26 outbreaks, and 1,114 (75%) were related to outbreaks in NYC and NYS (Figure). Compared with the NYC and NYS outbreaks, the 24 other U.S. outbreaks reported during the same period were of smaller sizes (median = six cases; range = 3–79 cases), and shorter durations (median = 27 days; range = 5–82 days). Median age was similar between the NYC (median = 4 years; IQR = 1–14 years) and NYS (median = 5 years; IQR = 2–14 years) outbreaks, but lower than that in the other U.S. outbreaks (median = 19 years; IQR = 8–25 years). The proportion of unvaccinated patients and patients with unknown vaccination status was similar in NYC (89%), NYS (91%), and other U.S. (87%) outbreaks. The NYC and NYS outbreaks were associated with multiple internationally imported cases (eight in NYC and 10 in NYS), whereas the other U.S. outbreaks were associated with a median of one internationally imported case.

Discussion

A total of 1,249 measles cases have been reported in the United States in 2019, with most cases associated with large and closely related outbreaks in New York City and the rest of New York State. Consistent with previous outbreaks that have occurred since measles was declared eliminated in the United States in 2000, most of the other U.S. outbreaks reported in 2019 were of limited size and duration because of high population immunity and rapid implementation of outbreak control measures by local and state public health authorities. In contrast, the two sustained outbreaks in NYC and NYS were larger and lasted longer because of a combination of three important risk factors for measles transmission: 1) pockets of low vaccination coverage and variable vaccine acceptance; 2) relatively high population density and closed social nature of the affected community; and 3) repeated importations of measles cases among unvaccinated persons traveling internationally and returning to or visiting the affected communities. These two almost year-long outbreaks placed the United States at risk for losing measles elimination status. Robust responses in NYC and NYS with multiple partners involved vaccination efforts, including administration of approximately 60,000 MMR vaccine doses in the affected communities; tailored communication campaigns; partnerships with religious leaders, local physicians, health centers, and advocacy groups; and use of local public health statutory authorities. These efforts ended transmission before the 12-month elimination deadline, with the most recent cases reported with rash onset on July 15, 2019, in NYC and August 19, 2019, in the rest of NYS. Both jurisdictions have since passed two incubation periods for measles with no additional reported cases associated with these outbreaks as of October 1, 2019; however, continued vigilance is important to ensure that elimination is sustained.

Increased global measles activity and existence of undervaccinated communities place the United States at continual risk for measles cases and outbreaks (*6*). Control measures for measles outbreaks have been in place for decades in the United States to limit transmission and prevent reestablishment of endemic transmission (*7*,*8*). Core elements include a highly sensitive surveillance system with multiple feedback loops between providers, laboratories, local and state public health authorities, and CDC. These measures are coupled with rapid activation of local and state public health departments in response to every measles case to determine the source of infection, identify susceptible contacts, and implement control measures, including postexposure prophylaxis, exclusion and quarantine, and community-wide vaccination. High national MMR vaccination coverage remains the foundation for preventing more widespread measles transmission (*9*). The limited size and duration of 24 of the 26 outbreaks reported during

FIGURE. Number of reported measles cases (N = 1,487), by week of rash onset — United States, September 30, 2018–October 1, 2019



Abbreviations: NYC = New York City; NYS = New York State.

September 2018–September 2019 indicate that high baseline vaccination coverage and standard measles control measures effectively controlled most outbreaks in the United States.

Measles outbreaks in undervaccinated, close-knit communities pose challenges that require considerations beyond standard control measures. To identify and protect communities, routine assessments, including school audits and use of electronic immunization information systems to ascertain local vaccination coverage and vaccine access, could help identify critical gaps and resource needs. Because health-seeking behaviors in members of close-knit communities are routinely informed by discussions with like-minded community members, establishing strong community partnerships before outbreaks occur can foster overarching goals to protect the community against public health threats. Public health authorities might also benefit from identifying trusted community liaisons who can assist with case and contact investigations so that standard control measures can be rapidly implemented.

Undervaccinated, close-knit communities are not unique to the United States and exist around the world. These communities are at high risk for outbreaks of vaccine-preventable diseases, which threaten the health and safety of vulnerable persons within, as well as outside of, these communities. Therefore, public health authorities need to identify pockets of undervaccinated persons to prevent these outbreaks, which require substantial resources to control. A preventive strategy to build vaccine confidence is important, especially one that uses culturally appropriate communication strategies to offset misinformation and disseminate accurate information about the safety and importance of vaccination in advance of outbreaks.

Summary

What is already known about this topic?

Measles was eliminated in the United States in 2000. High national coverage with measles, mumps, and rubella vaccine and rapid implementation of measles control measures prevent widespread measles transmission.

What is added by this report?

During January–September 2019, 1,249 U.S. measles cases were reported, the highest annual number since 1992. Eighty-nine percent of measles patients were unvaccinated or had an unknown vaccination status, and 10% were hospitalized. Eighty-six percent of cases were associated with outbreaks in underimmunized, close-knit communities, including two outbreaks in New York Orthodox Jewish communities that threatened measles elimination status in the United States.

What are the implications for public health practice?

Ensuring high rates of measles immunization in all communities is critical to sustaining measles elimination.

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Notes from the Field

Environmental Contamination from E-cigarette, Cigarette, Cigar, and Cannabis Products at 12 High Schools — San Francisco Bay Area, 2018–2019

Jeremiah Mock, PhD[1,2]; Yogi H. Hendlin, PhD[3,4]

The United States is experiencing an epidemic of lung injury associated with youth electronic cigarette (e-cigarette) use, or vaping (*1*); in 2018, 20.8% of U.S. high school students reported currently using e-cigarettes (*1*). E-cigarette products such as Juul, a popular device that delivers nicotine and flavors,* are used by students at schools, including in classrooms and bathrooms.† Use of flavored e-cigarettes by youths has become an increasing concern (*2*). A recent analysis of the National Youth Tobacco Survey showed that among high school students who currently used e-cigarettes, the percentage who used flavored e-cigarettes increased from 65.1% in 2014 to 67.8% in 2018 (*3*). In 2018, 8.1% of high school students currently smoked cigarettes, and 45.7% of those students smoked menthol cigarettes. In addition, 7.6% of high school students currently smoked cigarillos, little cigars, or cigars, 43.6% of whom used flavored varieties of these products (*1*,*3*). Many youths also use cigars to make marijuana blunts (i.e., cigarillos with the tobacco removed and replaced with marijuana) (*4*), and some use manufactured disposable cannabis products (e.g., vape pens, vaporizer cartridges, oils, and concentrates) (*5*). Waste from e-cigarette products can contain plastics, nicotine, heavy metals, other chemical toxins, and hazardous lithium-ion batteries (*6*,*7*). The toxicity of combustible tobacco product waste from cigarettes (e.g., plastic cellulose acetate, nicotine, formaldehyde, lead, and cadmium) is well established (*8*). Cannabis product waste can include plastics, metals, electronic components, and batteries.

A garbology§ study of environmental contamination from e-cigarette product waste, combustible tobacco product waste, and cannabis product waste was conducted using a purposively selected, nonrandom sample of 12 public high schools with a total enrollment of 18,831 students in Alameda, Contra Costa, Marin, and San Francisco counties in California. Using 2016 data from the National Center for Education Statistics, researchers stratified schools by the percentages of students from low-income families (i.e., those with students eligible for free or reduced-price lunch).¶ At each school, researchers systematically scanned the student parking lots and exterior school perimeter areas once during July 2018–April 2019 to collect all e-cigarette product waste, combustible tobacco product waste, and cannabis product waste found on the ground.

Overall, 893 waste items were collected, including 172 (19%) e-cigarette product waste items (nearly all were Juul or Juul-compatible pods and pod caps) (Table). Almost all Juul or Juul-compatible pods and caps were found at schools with predominantly middle- and upper-income student populations. Among 74 (43%) Juul or Juul-compatible color-coded flavor caps, 73 (99%) were from flavored pods other than tobacco flavor. Overall, 47 (64%) pod caps were from mint-flavored (e.g., Cool Mint) and other menthol-flavored (e.g., Cool Cucumber and Classic Menthol) pods. Additional scans were conducted at one upper-income area school beginning 3 months after Juul Laboratories announced it was removing flavors (except Cool Mint and Classic Menthol) from retail distribution. These additional scans yielded 127 mint, 20 mango, four fruit Juul or Juul-compatible pod caps, and three yellow (banana or mango) Juul-compatible caps.

At four high schools with populations composed predominantly of lower-income African-American and Latino students, eight e-cigarette product waste items were collected, in addition to 71 little cigar or cigarillo plastic wrappers and mouthpieces, 94% of which were from flavored products. No little cigar or cigarillo items were found at schools in upper-income communities.

Across all schools, 620 cigarette butts were collected, including 403 (65%) from recently smoked cigarettes that were identifiable. Among these, 168 (42%) were menthol. At low-, middle-, and upper-income schools, identifiable menthol butts accounted for 60%, 38%, and 28%, respectively, of all identifiable cigarette butts. Fourteen cannabis product waste items were found, including vaporizer pens, cartridges, and packaging from high-potency pineapple- and lemon-flavored cannabis oil concentrate vaporizer cartridges.

E-cigarette waste and combustible tobacco product waste contaminate the Bay Area high schools studied and confirm use of these products by high school students. Cannabis product waste represents an emerging issue. The large proportions of flavored products identified in this study are consistent with findings from other studies showing high prevalence rates of flavored e-cigarette and combustible tobacco product use

* Menthol is one of the types of tobacco-product flavoring. https://www.tobaccofreekids.org/assets/factsheets/0394.pdf.

† https://truthinitiative.org/research-resources/emerging-tobacco-products/nearly-1-5-youth-say-they-have-seen-juul-used-school.

§ The ethno-archeological study of a community or cultural group by analyzing its waste.

¶ https://nces.ed.gov/ccd/schoolsearch/.

TABLE. Electronic cigarette, combustible tobacco product, and cannabis product waste collected at 12 high schools, by percentage of students from low-income families*,† and other demographic characteristics — San Francisco Bay Area, 2018–2019

Characteristic	Low income*					Middle income*					Upper income*					Total
Public high school no.	1	2	3	4	Subtotals and averages for schools 1–4	5	6	7	8	Subtotals and averages for schools 5–8	9	10	11	12	Subtotals and averages for schools 9–12	1–12
Student population*,†	1,528	1,583	865	1,210	5,186	2,685	1,117	1,296	3,205	8,303	1,076	1,077	1,419	1,770	5,342	**18,831**
Students from low-income families (%)	92	88	81	56	79.3	40	32	32	28	33.0	20	7	9	4	10.0	**40.8**
Students learning English as a second language (%)	43	22	37	22	31.0	2	11	11	6	7.5	7	1	2	1	2.8	**13.8**
Female students (%)	51	47	42	50	47.5	59	46	53	51	52.3	46	50	49	49	48.5	**49.4**
Percentage of students, by race/ethnicity†,§																
Latino or Hispanic	86	27	64	64	60.3	10	40	36	21	26.8	26	11	9	11	14.3	**33.8**
African American or black	5	35	25	1	16.5	2	2	3	19	6.5	3	2	5	1	2.8	**8.6**
White	1	2	2	29	8.5	15	45	50	40	37.5	60	77	69	74	70.0	**38.7**
Asian	6	33	7	5	12.8	65	8	5	9	21.8	5	3	9	7	6.0	**13.5**
American Indian or Alaska Native	<1	<1	<1	<1	<1	<1	1	1	<1	<1	1	<1	<1	<1	<1	**<1**
Hawaiian Native or Pacific Islander	<1	1	1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**<1**
Multiracial	<1	2	1	<1	1.0	7	2	5	11	6.3	4	6	8	7	6.3	**4.3**
Total no. of waste items	**18**	**71**	**232**	**38**	**359**	**67**	**39**	**12**	**30**	**148**	**15**	**33**	**118**	**220**	**386**	**893**
Total no. of Juul and Juul-compatible items	**0**	**0**	**2**	**6**	**8**	**0**	**6**	**3**	**3**	**12**	**3**	**6**	**15**	**128**	**152**	**172**
Juul or Juul-compatible pods	0	0	1	3	4	0	1	0	1	2	0	1	7	33	41	**47**
Juul or Juul-compatible pod black end-caps	0	0	1	3	4	0	0	0	0	0	1	1	4	39	45	**49**
Juul or Juul-compatible Classic Tobacco cap	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	**1**
Juul or Juul-compatible Virginia Tobacco cap	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**1**
Juul or Juul-compatible Cool Mint cap	0	0	0	0	0	0	0	0	2	2	2	4	0	31	37	**39**
Juul or Juul-compatible Mango cap	0	0	0	0	0	0	4	1	**0**	5	0	0	4	10	14	**19**
Juul or Juul-compatible Cool Cucumber cap	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	**7**
Juul or Juul-compatible Classic Menthol cap	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**1**
Juul or Juul-compatible Crème Brulee cap	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	**3**
Juul or Juul-compatible Fruit Medley cap	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	**2**
Juul-compatible yellow cap	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**1**
Juul Cool Mint 5% 4-pack	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**1**
Juul Mango 5% 4-pack	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	**1**
Juul unknown 4-pack	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	**1**
Total no. of little cigar or cigarillo items	**8**	**26**	**37**	**0**	**71**	**4**	**0**	**3**	**9**	**16**	**0**	**0**	**0**	**0**	**0**	**87**
Little cigar or cigarillo wrappers	7	17	26	0	50	3	0	0	7	10	0	0	0	0	0	**60**
Little cigar or cigarillo mouth pieces or butts	1	9	11	0	21	1	0	3	2	6	0	0	0	0	0	**27**
Total no. of cigarette butts¶	**8**	**42**	**193**	**32**	**275**	**59**	**33**	**6**	**15**	**113**	**12**	**27**	**103**	**90**	**232**	**620**
Identifiable cigarette butts	8	40	65	29	142	51	25	1	15	92	4	23	83	59	169	**403**
Marlboro menthols	1	6	10	1	18	5	2	0	2	9	0	4	2	5	11	**38**
Newport menthols	1	15	22	1	39	4	0	0	6	10	0	0	1	0	1	**50**
Camel menthols	2	4	9	0	15	0	6	1	2	9	0	3	8	12	23	**47**
All other menthols	0	6	7	0	13	2	3	0	2	7	0	0	11	2	13	**33**
% of menthol among all identifiable butts	50	78	74	7	**60**	22	44	100	80	**38**	0	30	27	32	**28**	**45**
Total no. of cannabis items	**2**	**3**	**0**	**0**	**5**	**4**	**0**	**0**	**3**	**7**	**0**	**0**	**0**	**2**	**2**	**14**
Butts (roaches)	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	**2**
Cartridges/Mouthpieces	1	0	0	0	1	1	0	0	1	2	0	0	0	2	2	**5**
High-potency oil concentrate packaging	0	3	0	0	3	2	0	0	2	4	0	0	0	0	0	**7**

* Low-income families are defined as those with students eligible for free or reduced-price lunch. Stratification of schools is as follows: low income = >50% of students from low-income families; middle income = 25%–50% of students from low-income families; upper income = <25% of students from low-income families.

† National Center for Education Statistics, 2016. https://nces.ed.gov/ccd/schoolsearch/.

§ National Center for Education Statistics data are reported as mutually exclusive categories of white, African American or black, Asian, American Indian or Alaska Native, Hawaiian Native or other Pacific Islander, Hispanic or Latino, or multiracial.

¶ Total cigarette butts do not equal sum of items because categories overlap.

among U.S. youths. Further research and actions at national, state, and community levels are needed to inform policymaking to reduce youth access to and use of tobacco products, including e-cigarettes, and cannabis products. Youth use of flavored tobacco products, including mint and all other mentholated flavors, is of particular concern. Likewise, measures are needed to eliminate environmental contamination from e-cigarette, combustible tobacco product, and cannabis product waste in and around schools. Schools can engage students in garbology projects to identify existing and new use of these products and to raise awareness about their hazardous health and environmental impacts.

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Errata

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In the report "Characteristics of a Multistate Outbreak of Lung Injury Associated with E-cigarette Use, or Vaping — United States, 2019," on page 860, in the first paragraph, the ninth sentence should have read "Among 514 patients with information on substances used in e-cigarettes, or vaping products, in the **3 months** preceding symptom onset, 76.9% reported using THC-containing products, and 56.8% reported using nicotine-containing products; 36.0% reported exclusive use of THC-containing products, and 16.0% reported exclusive use of nicotine-containing products."

Also on page 860, in the last paragraph, the third sentence should have read "Among a subset of 514 patients (63.8%) for whom information on substances used in e-cigarettes, or vaping, products was available, 395 (76.9%) reported using THC-containing products, and 292 (56.8%) reported using nicotine-containing products in the **3 months** preceding symptom onset; 210 patients (40.9%) reported using both THC-containing and nicotine-containing products, 185 (36.0%) reported exclusive use of THC-containing products, and 82 (16.0%) reported exclusive use of nicotine-containing products."

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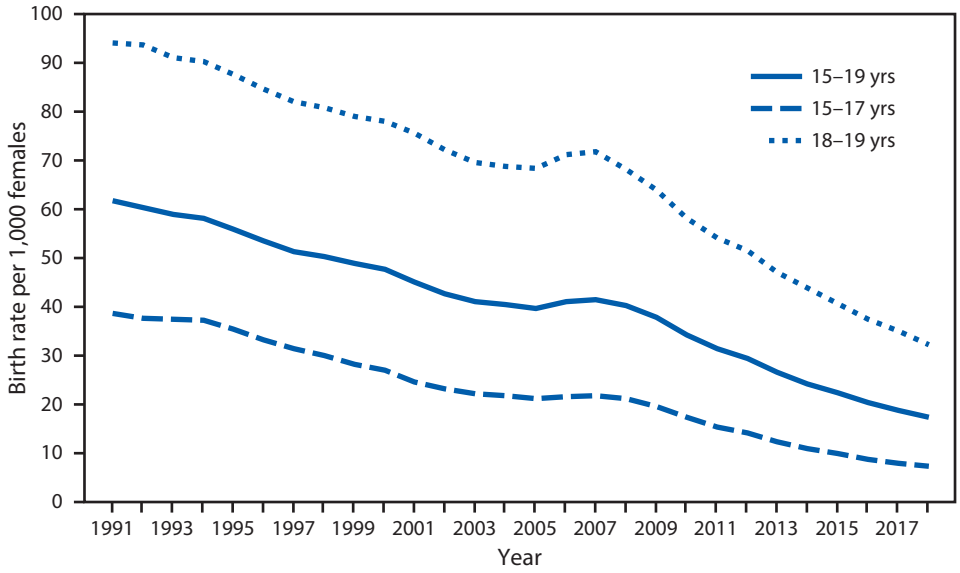
In the report "Outbreak of *Salmonella* Newport Infections with Decreased Susceptibility to Azithromycin Linked to Beef Obtained in the United States and Soft Cheese Obtained in Mexico — United States, 2018–2019," on page 716, in the first full paragraph, the second sentence should read "Because use of antibiotics in livestock can cause selection of resistant strains (*7*), the reported 41% rise in macrolide **sales for use** in U.S. cattle from 2016 to 2017 (*8*) might have accelerated carriage of the outbreak strain among U.S. cattle."

In addition, reference 8 should have read as follows: "8. Food and Drug Administration. 2017 summary report on antimicrobials sold or distributed for use in food-producing animals. (**Page 24, 5b**). Silver Spring, MD: US Department of Health and Human Services, Food and Drug Administration; 2018. https://www.fda.gov/media/119332/download"

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Birth Rates* for Teens Aged 15–19 Years, by Age Group — National Vital Statistics System, United States, 1991–2018



* Births per 1,000 females aged 15–19 years.

The birth rate for teens aged 15–19 years declined from a peak of 61.8 per 1,000 females in 1991 to a record low of 17.4 in 2018. The rate has declined more rapidly since 2007. From 2007 to 2018, the rate declined from 21.7 to 7.2 for teens aged 15–17 years and from 71.7 to 32.3 for teens aged 18–19 years.

Source: NCHS, National Vital Statistics System. Birth Data, 1991–2018. https://www.cdc.gov/nchs/nvss/births.htm.

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