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Racial and Ethnic Differences in Subjective Cognitive Decline — United States, 2015–2020

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Subjective cognitive decline (SCD), the self-reported experience of worsening or more frequent memory loss or confusion, might be a symptom of early-stage dementia or future serious cognitive decline such as Alzheimer disease* or a related dementia (ADRD) (*1*). Established modifiable risk factors for ADRD include high blood pressure, inadequate physical activity, obesity, diabetes, depression, current cigarette smoking, and hearing loss (*2*). An estimated 6.5 million persons aged ≥65 years in the United States live with Alzheimer disease, the most common dementia (*1*). This number is projected to double by 2060, with the largest increase among non-Hispanic Black or African American (Black), and Hispanic or Latino (Hispanic) adults (*1*,*3*). Using data from the Behavioral Risk Factor Surveillance System (BRFSS), CDC assessed racial and ethnic, select demographic, and geographical differences in SCD prevalence, and prevalence of health care professional conversations among those reporting SCD. The age-adjusted prevalence of SCD during 2015–2020 was 9.6% among adults aged ≥45 years (5.0% of Asian or Pacific Islander [A/PI] adults, 9.3% of non-Hispanic White [White] adults, 10.1% of Black adults, 11.4% of Hispanic adults, and 16.7% of non-Hispanic American Indian or Alaska Native [AI/AN] adults). College education was associated with a lower prevalence of SCD among all racial and ethnic groups. Only 47.3% of adults with SCD reported that they had discussed confusion or memory loss with a health care professional. Discussing changes in cognition with a physician can allow for the identification of potentially treatable conditions, early detection of dementia, promotion of dementia risk reduction behaviors, and establishing a treatment or care plan to help adults remain healthy and independent for as long as possible.

* Although the term “Alzheimer’s disease” is frequently used, this report uses “Alzheimer disease” in accordance with the American Medical Association Manual of Style, 11th Edition, and *MMWR* style.

BRFSS is a random-digit–dialed annual landline and cellular telephone cross-sectional survey of noninstitutionalized U.S. adults aged ≥18 years.† The BRFSS six-question cognitive decline optional module (*4*) was administered to adults aged ≥45 years by all 50 states, Puerto Rico, and the District of Columbia at least once from 2015 to 2020; for states that implemented the module in multiple years, the most recent year of data was used.§ To maximize sample sizes for each

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

§ Most recent data collection year for each jurisdiction: 2020 (Alaska, Arizona, Arkansas, California, Delaware, District of Columbia, Hawaii, Idaho, Illinois, Kentucky, Maine, Michigan, Nevada, New Hampshire, New York, North Carolina, Ohio, Oregon, Utah, Vermont, Washington, Wyoming, and Puerto Rico); 2019 (Alabama, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin); 2018 (New Jersey); 2016 (Massachusetts and Montana); and 2015 (Colorado).

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racial and ethnic group,[¶] data were aggregated for survey years 2015–2020. Overall telephone response rates** across survey years ranged from 45.9% (2017) to 49.4% (2019).

Respondents were classified as experiencing SCD if they responded "yes" when asked if they had experienced worsening or more frequent confusion or memory loss in the past 12 months; those who responded "yes" were asked if they had discussed SCD symptoms with a health care professional. Analyses were conducted using SAS-callable SUDAAN (version 11.0.3; RTI International) to account for complex sample survey design and weighting. Unadjusted and age-adjusted prevalence of SCD by race and ethnicity were estimated among 215,406 study participants aged ≥45 years overall, and for groups defined by jurisdiction, sex, age, education, marital status, health insurance status, and access to a personal doctor. Estimates that did not meet reliability standards (relative SE <30%) were suppressed. T-tests with p-values <0.05 were used to denote significant differences between racial and ethnic groups and differences between groups by selected characteristics. This study was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.[††]

Nearly 10% of adults aged ≥45 years (9.6%) reported experiencing SCD in the past 12 months (Table 1). SCD prevalence increased among successive age groups and was lower among adults with health insurance (9.5%) than among those without health insurance (11.6%) and decreased with increasing formal educational attainment. The highest overall percentages of SCD occurred among adults who did not have a high school diploma (16.4%), those who had been married, but were not currently married (13.6%), and those aged ≥75 years (13.3%). Age-adjusted SCD was higher among AI/AN (16.7%) and Hispanic adults (11.4%) than among White adults (9.3%) and was lower among A/PI adults (5.0%); prevalence among Black adults (10.1%) was similar to that among White adults (9.3%). This pattern of racial and ethnic differences was observed across most demographic subcategories examined. Unadjusted overall prevalence of SCD was highest in Alabama (14.3%), Oklahoma (14.1%), Florida (13.6%), Louisiana (13.6%), West Virginia (13.6%), Tennessee (12.9%), and New Mexico (12.8%), and lowest in Illinois 6.1% (Table 2). Because of small sample sizes, estimates for A/PI and AI/AN adults were unstable in most states.

¶ Racial and ethnic categories were classified as American Indian or Alaska Native, non-Hispanic; Asian or Pacific Islander, non-Hispanic; Black or African American, non-Hispanic; White, non-Hispanic; Hispanic or Latino (any race). In addition to these categories, non-Hispanic persons who self-identified as another race or multiracial were classified as other and included in the total.

** https://www.cdc.gov/brfss/annual_data/2020/pdf/2020-response-rates-table-508.pdf; https://www.cdc.gov/brfss/annual_data/2019/pdf/2019-response-rates-table-508.pdf; https://www.cdc.gov/brfss/annual_data/2018/pdf/2018-response-rates-table-508.pdf; https://www.cdc.gov/brfss/annual_data/2017/pdf/2017-response-rates-table-508.pdf; https://www.cdc.gov/brfss/annual_data/2016/pdf/2016moduleanalysis.pdf; https://www.cdc.gov/brfss/annual_data/2015/pdf/2015moduleanalysis.pdf

†† 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

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TABLE 1. Prevalence* of subjective cognitive decline† among adults aged ≥45 years, by race and ethnicity and selected characteristics — Behavioral Risk Factor Surveillance System, United States,§ 2015–2020.

Characteristic	Total (N = 215,406)**	American Indian or Alaska Native (n = 3,500)	Asian or Pacific Islander (n = 3,427)	Black or African American (n = 14,700)	White (n = 172,437)	Hispanic or Latino (n = 11,961)
	Race and ethnicity¶ — Adults reporting subjective cognitive decline, % (95% CI)					
Overall						
Unadjusted	**9.7 (9.3–10.0)**	16.4 (13.0–20.4)††	4.1 (3.0–5.7)††	10.0 (9.1–10.9)	9.5 (9.1–9.8)	11.2 (9.8–12.8)
Age-adjusted	**9.6 (9.3–10.0)**	16.7 (13.0–21.2)††	5.0 (3.7–6.6)††	10.1 (9.2–11.1)	9.3 (8.9–9.7)	11.4 (10.0–13.1)††
Sex						
Men	**9.3 (8.9–9.8)**	16.2 (11.8–21.8)††	5.9 (4.0–8.6)††	9.4 (8.1–10.9)	9.3 (8.8–9.9)	9.1 (7.5–11.0)
Women§§	**9.9 (9.4–10.4)**	17.5 (12.1–24.6)††	4.3 (2.8–6.6)††	10.7 (9.5–12.0)	9.3 (8.8–9.8)	13.4 (11.2–16.0)††,¶¶
Age group, yrs						
45–64§§	**8.8 (8.5–9.2)**	18.6 (14.0–24.1)††	3.7 (2.5–5.5)††	9.5 (8.4–10.7)	8.4 (8.0–8.8)	10.5 (9.0–12.3)††
65–74	**9.5 (8.8–10.2)**	11.9 (8.3–16.9)	—***	11.4 (9.5–13.7)	9.0 (8.4–9.6)	12.4 (8.5–17.6)
≥75	**13.3 (12.3–14.4)¶¶**	—	8.9 (5.2–14.7)	11.5 (9.5–13.8)	13.4 (12.2–14.6)¶¶	14.1 (10.0–19.5)
Education level						
Not high school graduate	**16.4 (15.0–17.9)¶¶**	26.1 (16.9–37.9)¶¶	—	19.1 (15.4–23.4)¶¶	19.2 (17.3–21.1)¶¶	13.0 (10.4–16.0)††,¶¶
High school graduate	**10.6 (10.0–11.3)¶¶**	13.9 (9.0–20.8)††,¶¶	—	10.8 (9.3–12.5)¶¶	10.3 (9.6–11.0)¶¶	12.6 (9.7–16.3)¶¶
Some college	**9.4 (8.8–10.1)¶¶**	17.4 (13.1–22.8)††,¶¶	4.1 (2.5–6.7)††	7.9 (6.6–9.3)	9.6 (8.8–10.4)¶¶	10.6 (7.6–14.6)
College graduate§§	**6.3 (5.9–6.7)**	6.6 (4.2–10.3)	3.9 (2.5–6.0)	6.8 (5.3–8.7)	6.2 (5.8–6.6)	7.2 (5.5–9.4)
Marital status						
Currently married§§	**7.7 (7.3–8.1)**	15.8 (11.6–21.1)††	4.4 (3.0–6.4)††	8.0 (6.7–9.5)	7.5 (7.1–7.9)	9.2 (7.3–11.6)
Once married, but not currently married	**13.6 (12.9–14.3)¶¶**	19.5 (12.6–28.9)	8.0 (4.7–13.4)	12.2 (10.6–14.0)¶¶	13.6 (12.8–14.5)¶¶	14.5 (12.2–17.2)¶¶
Never married	**11.6 (10.4–13.0)¶¶**	13.5 (7.7–22.6)	—	10.4 (8.2–13.0)	11.3 (9.9–12.9)¶¶	16.3 (11.0–23.6)
Health insurance status						
Has insurance§§	**9.5 (9.1–9.8)**	16.8 (12.8–21.7)††	4.4 (3.2–6.0)††	9.8 (8.9–10.8)	9.1 (8.7–9.5)	11.8 (10.2–13.7)††
Does not have insurance	**11.6 (10.1–13.3)¶¶**	15.2 (9.1–24.3)	23.3 (15.2–34.0)††,¶¶	11.7 (8.5–15.9)	11.7 (10.2–13.4)¶¶	11.5 (7.2–18.0)
Has personal doctor						
Yes§§	**9.6 (9.3–10.0)**	17.8 (13.3–23.3)	5.1 (3.8–6.9)	9.7 (8.8–10.7)	9.3 (8.9–9.7)	12.0 (10.3–13.8)
No	**9.8 (8.8–11.0)**	15.6 (10.7–22.2)	—	13.4 (10.1–17.7)	9.3 (8.3–10.5)	9.7 (6.5–14.2)
Visited doctor in preceding year						
Yes§§	**10.0 (9.6–10.3)**	18.8 (14.4–24.3)††	5.7 (4.2–7.7)††	10.1 (9.1–11.1)	9.6 (9.2–10.0)	12.0 (10.3–13.9)††
No	**8.2 (7.1–9.5)¶¶**	9.2 (5.6–14.5)	—	10.3 (7.5–13.9)	8.2 (6.9–9.6)	10.3 (6.1–16.9)

* Except for age-specific and overall unadjusted estimates, estimates were age-standardized to the 2000 projected U.S. Census Bureau population aged ≥45 years using three age groups: 45–64, 65–74, and ≥75 years. https://www.cdc.gov/nchs/data/statnt/statnt20.pdf

† Defined as the self-reported experience of worsening confusion or memory loss in the preceding year.

§ Estimates are aggregated to include the most recent survey year for each jurisdiction. These estimates include data collected from jurisdictions in 2020 (Alaska, Arizona, Arkansas, California, Delaware, District of Columbia, Hawaii, Idaho, Illinois, Kentucky, Maine, Michigan, Nevada, New Hampshire, New York, North Carolina, Ohio, Oregon, Utah, Vermont, Washington, Wyoming, and Puerto Rico); 2019 (Alabama, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin); 2018 (New Jersey); 2016 (Massachusetts and Montana); and 2015 (Colorado).

¶ Persons of Hispanic or Latino (Hispanic) origin might be of any race but are categorized as Hispanic; all racial groups are non-Hispanic.

** Total study population includes respondents in the five racial and ethnic groups (206,025) and an additional 9,381 adults reporting multiple races and other race categories.

†† The estimate for this racial and ethnic group differs statistically from that of White adults (p<0.05).

§§ Reference group for comparisons for groups defined by a characteristic within the overall population and within each racial and ethnic group.

¶¶ The estimate for this group differs statistically from the reference group defined by this characteristic (p<0.05).

*** Dashes indicate estimate is not reported because relative SE >30% or sample size <50.

Among 21,299 respondents with SCD, 47.3% reported talking with a health care professional about confusion or memory loss; women (50.7%) were more likely than men (43.3%) to do so (Table 3). Overall and within racial and ethnic groups, adults with SCD symptoms who were less likely to talk to a health care professional about their symptoms were aged ≥75 years, had less education, did not have health insurance, did not have a personal doctor, and had not visited a doctor in the past year.

Discussion

Prevalence of SCD varied across adults by demographic characteristics and race and ethnicity. Among racial and ethnic groups, SCD was lowest among A/PI adults and highest among AI/AN adults. Prevalence of SCD was higher among persons with less formal education than among college graduates across all racial and ethnic groups. This finding is consistent

TABLE 2. Unadjusted prevalence of subjective cognitive decline* among adults aged ≥45 years, by race and ethnicity and jurisdiction† — Behavioral Risk Factor Surveillance System, United States, 2015–2020

	Race and ethnicity§					
	Adults reporting subjective cognitive decline, % (95% CI)					
Jurisdiction	Total 2015–2020	American Indian or Alaska Native	Asian or Pacific Islander	Black or African American	White	Hispanic or Latino
Alabama	**14.3 (12.9–15.7)**	29.9 (16.8–47.3)¶	—**	13.8 (11.4–16.8)	14.2 (12.6–15.9)	—
Alaska	**8.6 (6.8–10.7)**	6.2 (3.6–10.6)	—	—	7.7 (6.0–9.8)	—
Arizona	**8.8 (7.9–9.9)**	10.6 (6.7–16.4)	—	—	8.6 (7.5–9.8)	9.3 (7.1–12.2)
Arkansas	**11.5 (10.1–13.0)**	—	—	10.9 (7.5–15.4)	11.8 (10.3–13.5)	—
California	**7.3 (5.5–9.6)**	—	—	—	7.8 (5.3–11.2)	10.8 (7.0–16.4)
Colorado	**10.7 (9.5–12.1)**	—	—	—	9.7 (8.4–11.1)	16.6 (12.0–22.4)¶
Connecticut	**7.3 (6.5–8.2)**	—	—	9.1 (6.0–13.6)	6.9 (6.1–7.8)	8.9 (5.6–14.0)
Delaware	**8.2 (6.8–9.9)**	—	—	8.2 (5.3–12.4)	8.0 (6.4–10.0)	—
District of Columbia	**8.8 (7.1–10.8)**	—	—	10.2 (7.9–13.0)¶	5.6 (4.1–7.5)	—
Florida	**13.6 (12.2–15.1)**	—	—	9.7 (6.6–14.0)	14.1 (12.7–15.6)	14.3 (9.8–20.4)
Georgia	**10.9 (9.6–12.4)**	—	—	8.9 (6.5–12.0)	11.6 (10.0–13.3)	—
Hawaii	**6.7 (5.8–7.7)**	—	6.1 (4.8–7.8)	—	7.3 (5.8–9.2)	8.8 (5.7–13.2)
Idaho	**9.2 (7.9–10.8)**	—	—	—	8.8 (7.5–10.4)	—
Illinois	**6.1 (4.8–7.7)**	—	—	—	5.8 (4.4–7.6)	—
Indiana	**11.2 (10.2–12.2)**	—	—	11.8 (8.3–16.5)	10.8 (9.8–11.8)	13.3 (7.3–23.1)
Iowa	**10.0 (9.1–10.9)**	—	—	—	9.8 (9.0–10.7)	11.4 (6.5–19.1)
Kansas	**11.5 (10.2–12.8)**	—	—	—	11.2 (9.9–12.5)	—
Kentucky	**11.2 (9.6–13.0)**	—	—	—	11.6 (10.0–13.5)	—
Louisiana	**13.6 (12.1–15.3)**	—	—	16.4 (13.0–20.5)	12.3 (10.6–14.2)	—
Maine	**7.9 (7.0–8.8)**	—	—	—	7.9 (7.0–8.8)	—
Maryland	**10.1 (8.9–11.4)**	—	—	9.2 (7.0–11.9)	10.9 (9.5–12.6)	—
Massachusetts	**9.3 (8.2–10.5)**	—	—	—	8.2 (7.0–9.4)	16.5 (11.4–23.2)¶
Michigan	**9.5 (7.6–11.7)**	—	—	11.0 (6.1–18.9)	8.2 (6.5–10.3)	—
Minnesota	**8.9 (8.1–9.7)**	—	—	9.5 (6.0–14.8)	8.7 (8.0–9.5)	5.8 (3.2–10.2)
Mississippi	**11.8 (10.4–13.4)**	—	—	13.2 (10.7–16.1)	10.1 (8.6–11.9)	—
Missouri	**11.2 (10.0–12.5)**	—	—	8.3 (5.5–12.4)	11.2 (10.0–12.6)	—
Montana	**9.8 (8.6–11.2)**	16.4 (10.7–24.3)¶	—	—	9.0 (7.8–10.3)	—
Nebraska	**9.6 (8.5–10.7)**	—	—	—	9.2 (8.2–10.3)	5.9 (3.4–10.1)
Nevada	**10.3 (8.0–13.2)**	—	—	—	9.8 (7.5–12.8)	—
New Hampshire	**6.9 (6.1–8.0)**	—	—	—	6.3 (5.5–7.3)	—
New Jersey	**8.8 (6.9–11.2)**	—	—	—	8.9 (6.6–11.9)	—
New Mexico	**12.8 (11.4–14.4)**	13.1 (8.7–19.3)	—	—	11.2 (9.6–13.2)	15.0 (12.4–18.1)
New York	**7.1 (5.8–8.7)**	—	—	5.4 (3.1–9.2)	5.8 (4.5–7.4)	13.8 (8.2–22.2)
North Carolina	**6.9 (5.9–8.2)**	24.9 (15.0–38.4)	—	5.7 (4.0–8.3)	7.1 (5.8–8.7)	—
North Dakota	**8.1 (7.0–9.3)**	—	—	—	7.5 (6.6–8.6)	—
Ohio	**9.1 (8.1–10.1)**	—	—	12.4 (8.3–18.1)	8.2 (7.3–9.3)	—
Oklahoma	**14.1 (12.2–16.2)**	13.9 (7.8–23.5)	—	—	14.2 (12.1–16.5)	—
Oregon	**9.5 (8.2–11.1)**	—	—	—	8.9 (7.8–10.2)	9.1 (5.0–16.0)
Pennsylvania	**9.6 (8.4–10.9)**	—	—	14.7 (10.3–20.6)	8.8 (7.7–10.1)	—
Puerto Rico	**6.2 (4.7–8.3)**	—	—	—	—	6.3 (4.7–8.4)
Rhode Island	**10.2 (9.0–11.6)**	—	—	—	9.5 (8.3–10.9)	21.4 (14.0–31.3)¶
South Carolina	**11.5 (10.3–12.8)**	—	—	12.3 (9.4–15.8)	11.0 (9.7–12.5)	—
South Dakota	**9.5 (7.8–11.6)**	—	—	—	8.5 (7.0–10.4)	—
Tennessee	**12.9 (11.6–14.5)**	—	—	16.5 (11.7–22.6)	12.1 (10.7–13.6)	—
Texas	**11.6 (10.3–13.2)**	—	—	15.9 (10.4–23.5)	10.9 (9.3–12.7)	12.4 (9.7–15.8)
Utah	**9.8 (8.6–11.2)**	—	—	—	10.6 (9.2–12.1)	—
Vermont	**7.5 (6.5–8.6)**	—	—	—	7.4 (6.4–8.6)	—
Virginia	**9.5 (8.6–10.5)**	—	—	11.0 (8.6–13.8)	9.3 (8.3–10.4)	—
Washington	**9.3 (8.5–10.3)**	—	7.3 (4.3–12.2)	11.4 (6.3–19.7)	9.2 (8.3–10.1)	9.4 (5.7–15.0)
West Virginia	**13.6 (12.3–15.0)**	—	—	—	13.5 (12.2–15.0)	—
Wisconsin	**9.6 (8.4–11.0)**	—	—	—	9.8 (8.5–11.2)	—
Wyoming	**8.0 (6.8–9.4)**	—	—	—	7.8 (6.6–9.2)	—

* Subjective cognitive decline was defined as the self-reported experience of worsening confusion or memory loss in the preceding year.

† Estimates are aggregated to include the most recent survey year for each jurisdiction. These estimates include data collected from jurisdictions in 2020 (Alaska, Arizona, Arkansas, California, Delaware, District of Columbia, Hawaii, Idaho, Illinois, Kentucky, Maine, Michigan, Nevada, New Hampshire, New York, North Carolina, Ohio, Oregon, Utah, Vermont, Washington, Wyoming, and Puerto Rico); 2019 (Alabama, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin); 2018 (New Jersey); 2016 (Massachusetts and Montana); and 2015 (Colorado).

§ Persons of Hispanic or Latino (Hispanic) origin might be of any race but are categorized as Hispanic; all racial groups are non-Hispanic.

¶ The estimate for the selected racial and ethnic group differs statistically from that of White adults (p<0.05) within each jurisdiction.

** Dashes indicate estimate is not reported because relative SE >30% or sample size <50.

TABLE 3. Percentage* of adults aged ≥45 years with subjective cognitive decline† who talked about confusion or memory loss with a health care professional, by race and ethnicity and other selected characteristics — Behavioral Risk Factor Surveillance System, United States,§ 2015–2020.

	Race and ethnicity¶					
	Adults reporting subjective cognitive decline who spoke with health care professional, % (95% CI)					
Characteristic	**Total (N = 21,299)****	**American Indian or Alaska Native (n = 493)**	**Asian or Pacific Islander (n = 212)**	**Black or African American (n = 1,588)**	**White (n = 16,700)**	**Hispanic or Latino (n = 1,224)**
Overall						
Unadjusted	**46.0 (44.2–47.8)**	51.7 (39.8–63.4)	35.3 (22.9–50.1)	49.4 (44.8–54.1)	45.9 (44.0–47.8)	41.8 (34.8–49.3)
Age-adjusted	**47.3 (45.5–49.1)**	50.5 (39.0–61.9)	34.5 (22.6–48.9)	49.5 (44.7–54.4)	48.5 (46.6–50.4)	40.5 (33.9–47.4)
Sex						
Men	**43.3 (40.7–46.0)††**	51.8 (36.8–66.5)	35.6 (21.0–53.5)	43.4 (35.6–51.5)	44.0 (41.0–47.0)††	40.9 (31.9–50.6)
Women§§	**50.7 (48.2–53.1)**	49.9 (38.1–61.8)	32.2 (18.6–49.7)¶¶	54.2 (48.4–59.8)	52.4 (49.8–54.9)	40.4 (32.1–49.4)¶¶
Age group, yrs						
45–64§§	**50.6 (48.3-52.8)**	55.9 (41.4–69.4)	33.3 (19.1–51.4)	54.8 (48.6–60.8)	51.8 (49.4–54.1)	41.6 (33.9–49.7)
65–74	**48.6 (44.8-52.5)**	44.6 (30.1–60.0)	—***	46.0 (36.2–56.2)	48.7 (45.1–52.2)	49.3 (30.1–68.7)
≥75	**34.0 (30.7-37.5)††**	—	—	32.7 (24.8-41.7)††	34.1 (30.3-38.1)††	32.2 (18.8-49.3)
Education level						
Not high school graduate	**41.4 (36.8–46.2)††**	49.6 (31.5–67.8)	—	42.8 (33.1–53.0)	44.0 (39.3–48.8)	34.4 (24.3–46.1)
High school graduate	**43.4 (40.4–46.4)††**	37.0 (25.7–49.9)††	—	46.1 (39.1–53.3)	43.9 (40.6–47.3)††	44.1 (34.4–54.3)
Some college	**54.1 (51.0–57.2)**	63.2 (49.8–74.8)	56.4 (39.1–72.2)††	54.2 (46.1–62.1)	53.5 (49.9–57.1)	53.9 (41.6–65.8)
College graduate§§	**50.2 (46.9–53.4)**	66.7 (51.6–79.0)	23.0 (13.7–36.0)¶¶	62.3 (51.5–72.0)	50.9 (47.4–54.3)	45.8 (32.9–59.2)
Marital status						
Currently married§§	**46.1 (43.4–48.7)**	53.5 (39.9–66.6)	32.6 (18.6–50.6)	50.3 (40.6–60.1)	47.8 (45.1–50.5)	36.5 (27.1–47.1)
Divorced or widowed	**48.8 (46.0–51.5)**	52.2 (41.0–63.2)	42.8 (26.7–60.6)	50.1 (43.5–56.7)	49.1 (45.9–52.4)	43.2 (34.4–52.4)
Never married	**51.4 (45.7–57.1)**	34.6 (19.7–53.3)	—	57.6 (47.5–67.2)	50.5 (44.1–56.9)	63.7 (47.9–77.1)††
Health insurance status						
Has insurance§§	**48.7 (46.8–50.7)**	51.8 (39.6–63.7)	36.5 (23.8–51.4)	53.1 (47.7–58.3)	49.2 (47.2–51.3)	42.5 (35.2–50.2)
Does not have insurance	**32.5 (27.8–37.7)††**	—	—	23.4 (14.5–35.6)††	39.7 (33.2–46.6)††	23.5 (15.5–34.0)††
Has personal doctor						
Yes§§	**49.9 (48.0–51.9)**	52.6 (40.2–64.7)	36.5 (23.8–51.5)	52.2 (46.8–57.6)	50.6 (48.5–52.7)	44.8 (37.7–52.2)
No	**30.4 (25.6–35.5)††**	40.2 (25.0–57.5)	—	38.4 (26.6–51.6)	31.2 (26.0–36.9)††	27.5 (19.3–37.6)††
Doctor visit in preceding year						
Yes§§	**50.7 (48.7–52.7)**	51.6 (39.3–63.7)	42.8 (29.9–56.8)	51.8 (46.5–57.1)	52.3 (50.1–54.4)	44.7 (37.3–52.3)
No	**27.2 (23.7–31.1)††**	35.0 (20.3–53.2)	—	34.0 (23.9–45.8)††	27.9 (24.3–31.9)††	16.7 (9.2–28.3)††

* Except for age-specific and overall unadjusted estimates, estimates were age-standardized to the 2000 projected U.S. Census Bureau population aged ≥45 years using three age groups: 45–64, 65–74, and ≥75 years. https://www.cdc.gov/nchs/data/statnt/statnt20.pdf

† Defined as the self-reported experience of worsening confusion or memory loss in the preceding year.

§ Estimates are aggregated to include the most recent survey year for each jurisdiction. These estimates include data collected from jurisdictions in 2020 (Alaska, Arizona, Arkansas, California, Delaware, District of Columbia, Hawaii, Idaho, Illinois, Kentucky, Maine, Michigan, Nevada, New Hampshire, New York, North Carolina, Ohio, Oregon, Utah, Vermont, Washington, Wyoming, and Puerto Rico); 2019 (Alabama, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Nebraska, New Mexico, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin); 2018 (New Jersey); 2016 (Massachusetts and Montana); and 2015 (Colorado).

¶ Persons of Hispanic or Latino (Hispanic) origin might be of any race but are categorized as Hispanic; all racial groups are non-Hispanic.

** Total study population includes those in the five racial and ethnic groups (N = 20,217) and 1,082 adults reporting multiple races and other race categories.

†† Estimate for this group differs statistically from the reference group for this characteristic (p<0.05).

§§ Reference group.

¶¶ Estimate for the selected racial and ethnic group differs statistically from that of White adults (p<0.05).

*** Dashes indicate estimate suppressed (relative SE >30% or sample size <50).

with other studies that suggest that persons with more years of formal education have a lower risk for dementia than do those with fewer years of formal education (*5*,*6*). Low prevalence of SCD among adults with higher education suggests that education might be protective against SCD. More research is needed to better understand the roles that education and related systemic factors play in sustaining cognitive health, particularly across diverse racial and ethnic populations. For example, modifiable risk factors for ADRD are less prevalent among adults with higher education, differ among racial and ethnic groups, and are associated with high prevalence of SCD (*2*).

The findings of this study can help health care providers identify groups of patients who would benefit from risk reduction behaviors and further cognitive assessment. Persons who talked with a health care professional about SCD were more likely to be women, had at least some college education, were aged <75 years, had a personal doctor, had a doctor visit within the past year, and had health insurance. Public health strategies

Summary

What is already known about this topic?

Subjective cognitive decline (SCD), self-reported memory loss or confusion that is occurring more frequently, might be a symptom of early-stage dementia.

What is added by this report?

During 2015–2020, approximately 10% of adults aged ≥45 years reported SCD, with the highest prevalence among American Indian or Alaska Native adults (16.7%); prevalence declined with increasing formal educational attainment. Fewer than one half of persons with SCD had discussed their concerns about SCD with a health care professional.

What are the implications for public health?

Discussing changes in cognition with a physician is important to identifying potentially treatable conditions, obtaining early diagnosis and detection, developing support systems for caregivers, and establishing a treatment or care plan to help adults remain healthy and independent for as long as possible.

are needed to support access to health care for persons who lack access to routine health care or to have a designated preventive health care professional. For example, programs such as Welcome to Medicare[§§] and Medicare Annual Wellness Visit for adults[¶¶] aged ≥65 provide coverage for preventive care screenings including cognitive assessments. Health care providers could consider asking patients as young as age 45 years about experiences of worsening memory loss or confusion during visits to initiate discussions about early signs of dementia and strategies to reduce risk and sustain cognitive health.

The findings in this report are subject to at least three limitations. First, sample sizes for some racial and ethnic groups were too small to detect statistical differences, particularly at the state level. Second, BRFSS represents the noninstitutionalized adult population only and therefore cannot be generalized to institutionalized adults. Finally, BRFSS data rely on self-report rather than medical examination records; survey questions about cognitive decline may be subject to recall and social desirability biases and responses may reflect cultural differences. However, the self-perception of cognitive decline has been shown to discriminate preclinical ADRD from normal aging (*7*).

Early detection and diagnosis are important to rule out conditions other than ADRD that might be treatable, and to establish a care plan to manage co-morbid conditions and avoid unnecessary hospitalizations. These potentially avoidable hospitalizations can be both costly and detrimental to quality of life, especially given that some persons with SCD are caregivers for others, which might affect the quality of care provided (*8*). Public health professionals can continue working to improve social determinants of health, conditions in places where people are born, live, learn, work, play, worship, and age that affect risk for developing ADRD (*9*). Although dementia might not be preventable for some, the risk for developing dementia for others can be delayed or reduced through early interventions and public health education including heart-healthy lifestyles, protecting the head from traumatic brain injury, and engaging in social activities (*1*,*2*,*10*). The Building Our Largest Dementia Infrastructure Act (BOLD), charges CDC with strengthening the dementia and dementia caregiving public health infrastructure.[***] BOLD Public Health Centers of Excellence on Risk Reduction, Early Detection, and Caregiving are national resources to public health departments in reaching populations at greatest risk for ADRD and their caregivers. States and organizations participating in the National Healthy Brain Initiative and BOLD Public Health Programs[†††] are strengthening the public health infrastructure utilizing the Healthy Brain Initiative Road Map Series[§§§] and implementing strategies for reducing dementia in populations with known and widening disparities through programs such as the Chronic Disease Self-Management Program.[¶¶¶] Public health professionals can use these strategies to reduce risks for dementia in at-risk populations within their jurisdictions.

§§ https://www.medicare.gov/coverage/welcome-to-medicare-preventive-visit
¶¶ https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/bp102c15.pdf#page=268

*** https://www.cdc.gov/aging/bold/index.html
††† https://www.cdc.gov/aging/awardees/index.html
§§§ https://www.cdc.gov/aging/healthybrain/roadmap.htm
¶¶¶ https://www.cdc.gov/arthritis/interventions/programs/cdsmp.htm

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Voluntary Medical Male Circumcisions for HIV Prevention — 13 Countries in Eastern and Southern Africa, 2017–2021

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In 2007, voluntary medical male circumcision (VMMC) was endorsed by the World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS after it was found to be associated with approximately a 60% reduction in the risk for female-to-male transmission of HIV (*1*). As a result of this endorsement, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), through partnerships with U.S. government agencies, including CDC, the U.S. Department of Defense, and the U.S. Agency for International Development, started supporting VMMCs performed in prioritized countries in southern and eastern Africa. During 2010–2016, CDC supported 5,880,372 VMMCs in 12 countries (*2*,*3*). During 2017–2021, CDC supported 8,497,297 VMMCs performed in 13 countries. In 2020, the number of VMMCs performed declined 31.8% compared with the number in 2019, primarily because of COVID-19–related disruptions to VMMC service delivery. PEPFAR 2017–2021 Monitoring, Evaluation, and Reporting data were used to provide an update and describe CDC's contribution to the scale-up of the VMMC program, which is important to meeting the 2025 Joint United Nations Programme on HIV/AIDS (UNAIDS) target of 90% of males aged 15–59 years having access to VMMC services in prioritized countries to help end the AIDS epidemic by 2030 (*4*).

VMMC programs are incorporated into national HIV prevention portfolios. Services include voluntary HIV testing, HIV risk reduction education, screening and treatment of sexually transmitted infections, and linkage to care and treatment for clients who receive a positive HIV test result. During 2017–2021, CDC supported VMMC programs in 13 countries: Botswana, Eswatini, Ethiopia, Kenya, Malawi, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. Not all of these countries were supported by CDC during the entire 5-year period.*

VMMC programs report indicators to the PEPFAR Monitoring, Evaluation, and Reporting database every quarter in accordance with the U.S. government fiscal year† (*5*). This analysis includes the annual number of CDC-supported VMMCs performed, as well as the following indicators: client age group, HIV test results among males who underwent testing at VMMC sites, attendance at postoperative follow-up visits within 14 days, and type of circumcision method (use of a WHO pre-qualified circumcision device as method of circumcision or traditional surgical technique). Age was categorized as <15 years, 15–29 years, and ≥30 years. The prevalence of HIV-positivity was calculated by dividing the number of males who received a positive test result for HIV by the number of males who underwent HIV testing at VMMC sites. All statistical analyses were performed using Stata software (version 16; StataCorp). This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.§

During 2017–2021, CDC supported 8,497,297 VMMCs in 13 countries (Table) (Figure). During 2017–2019, the number of CDC-supported VMMCs increased annually, with a mean annual increase of 13.5%. During 2020, at the start of the COVID-19 pandemic, the number of VMMCs declined 31.8%, from 2,120,797 in 2019 to 1,447,147, with further reductions during 2021. During 2017–2019, 43.8% of all VMMCs were performed in clients aged 10–14 years and 45.7% in clients aged 15–29 years; the proportion performed in clients aged 15–29 years increased to 61.0% during 2020 and to 86.6% during 2021. Most (74.2%) VMMC clients participated in HIV testing services at VMMC sites; this proportion declined from 86.4% in 2017 to 48.7% in 2021.¶ Among the 5,595,239 males who underwent testing for HIV at VMMC sites, 44,745 (0.8%) received a positive result. HIV-positivity ranged from 0.4% in 2020 to 1.2% in 2021.

Among all VMMC clients during 2017–2021, 90.8% returned for a follow-up visit within 14 days. Postoperative follow-up visits increased among all countries from, 86.2% in 2017 to 96.7% in 2021. Two percent (166,475) of all

* Eswatini started receiving CDC support in 2019, and in 2020 Namibia shifted PEFPAR support from CDC to another U.S. government agency.

† Years in VMMC program data refer to U.S. government fiscal years (October 1–September 30).

§ 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

¶ Rwanda and Tanzania stopped reporting HIV testing rates in fiscal year 2020 because of a change in funding and testing practices at VMMC sites.

TABLE. CDC-supported voluntary medical male circumcisions — 13 countries in eastern and southern Africa, 2017–2021

Country	Fiscal year*	No. of VMMCs performed	Annual target achieved, %	Client age group, yrs, no. (%) <15	Client age group, yrs, no. (%) 15–29	Client age group, yrs, no. (%) ≥30	No. (%) VMMCs performed using a device†	No. (%) Clients who received HIV testing at a VMMC site	No. (%) Clients with a positive HIV test result§	No. (%) Clients with postoperative follow-up within 14 days of VMMC
Botswana	2017	17,870	117.0	11,205 (62.7)	4,814 (26.9)	1,851 (10.4)	287 (1.6)	9,311 (52.1)	14 (0.2)	10,968 (61.4)
	2018	15,874	76.0	9,386 (59.1)	4,701 (29.6)	1,787 (11.3)	0 (—)	7,730 (48.7)	29 (0.4)	14,674 (92.4)
	2019	16,461	78.4	7,710 (46.8)	6,127 (37.2)	2,624 (15.9)	0 (—)	9,436 (57.3)	11 (0.1)	16,155 (98.1)
	2020¶	5,845	28.0	2,313 (39.7)	2,252 (38.6)	1,265 (21.7)	0 (—)	3,913 (66.9)	20 (0.5)	5,514 (94.3)
	2021	2,748	31.0	0 (—)**	1,539 (35.9)	2,748 (64.1)	0 (—)	1,437 (52.3)	25 (1.7)	2,720 (99.0)
	Total	**58,798**	**67.4**	**30,614 (50.8)**	**19,433 (32.2)**	**10,275 (17.0)**	**287 (0.5)**	**31,827 (54.1)**	**99 (0.3)**	**50,031 (85.1)**
Eswatini	2017††	0	0	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)
	2018††	0	0	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)
	2019	761	20.0	298 (39.2)	410 (53.9)	53 (7.0)	0 (—)	707 (92.9)	7 (1.0)	761 (100.0)
	2020¶	4,626	24.0	1,923 (41.6)	2,197 (47.5)	506 (10.9)	0 (—)	4,245 (91.8)	56 (1.3)	4,322 (93.4)
	2021	3,269	79.2	3 (0.1)**	2,561 (78.3)	705 (21.6)	0 (—)	2,984 (91.3)	6 (0.2)	3,259 (99.7)
	Total	**8,656**	**31.5**	**2,224 (25.7)**	**5,168 (59.7)**	**1,264 (14.6)**	**0 (—)**	**7,936 (91.7)**	**69 (0.9)**	**8,342 (96.4)**
Ethiopia	2017	10,910	96.2	5,290 (48.5)	4,610 (42.3)	1,010 (9.3)	0 (—)	8,149 (74.7)	3 (0.0)	10,905 (99.9)
	2018	20,302	112.0	9,023 (44.4)	9,312 (45.9)	1,967 (9.7)	0 (—)	13,941 (68.7)	43 (0.3)	19,874 (97.9)
	2019	23,776	98.3	10,024 (42.2)	11,768 (49.5)	1,984 (8.3)	0 (—)	21,907 (92.1)	7 (0.0)	23,169 (97.4)
	2020¶	33,483	82.1	3,198 (9.6)	25,681 (76.7)	4,604 (13.8)	0 (—)	31,189 (93.1)	30 (0.1)	32,540 (97.2)
	2021	45,499	101.1	0 (—)**	39,148 (86.0)	6,351 (14.0)	0 (—)	23,417 (51.5)	14 (0.1)	44,636 (98.1)
	Total	**133,970**	**96.1**	**27,535 (20.6)**	**90,519 (67.6)**	**15,916 (11.9)**	**0 (—)**	**98,603 (73.6)**	**97 (0.1)**	**131,124 (97.9)**
Kenya	2017	149,286	90.7	106,754 (71.5)	38,858 (26.0)	3,674 (2.5)	1,446 (1.0)	146,157 (97.9)	285 (0.2)	121,855 (81.6)
	2018	191,111	96.5	158,642 (83.0)	29,540 (15.5)	2,929 (1.5)	2,140 (1.1)	82,772 (43.3)	281 (0.3)	159,537 (83.5)
	2019	185,145	93.9	161,990 (87.5)	20,405 (11.0)	2,750 (1.5)	2,820 (1.5)	24,346 (13.1)	64 (0.3)	170,353 (92.0)
	2020¶	68,173	48.8	45,030 (66.1)	21,366 (31.4)	1,708 (2.5)	1,750 (2.6)	14,823 (21.7)	25 (0.2)	60,432 (88.6)
	2021	25,351	115.6	1 (0)**	22,803 (89.9)	2,547 (10.0)	2,789 (11.0)	7,671 (30.3)	16 (0.2)	24,683 (97.4)
	Total	**619,066**	**85.8**	**472,417 (79.2)**	**110,169 (18.5)**	**13,608 (2.3)**	**10,945 (1.8)**	**275,769 (44.5)**	**671 (0.2)**	**536,860 (86.7)**
Malawi	2017	30,136	86.1	5,612 (18.6)	21,455 (71.2)	3,069 (10.2)	0 (—)	30,063 (99.8)	104 (0.3)	24,219 (80.4)
	2018	46,004	92.0	4,199 (9.1)	37,562 (81.6)	4,243 (9.2)	109 (0.2)	45,780 (99.5)	520 (1.1)	37,216 (80.9)
	2019	52,062	104.1	3,205 (6.2)	45,015 (86.5)	3,842 (7.4)	824 (1.6)	51,791 (99.5)	434 (0.8)	52,041 (99.9)
	2020¶	34,239	38.9	4,423 (12.9)	27,677 (80.8)	2,139 (6.2)	371 (1.1)	28,482 (83.2)	14 (0.0)	34,239 (99.9)
	2021	70,178	97.5	0 (—)**	65,226 (92.9)	4,952 (7.1)	5,667 (8.1)	23,429 (33.4)	25 (0.1)	69,961 (99.7)
	Total	**232,619**	**78.8**	**17,439 (8.1)**	**196,935 (91.9)**	**18,245 (8.5)**	**6,971 (3.0)**	**179,545 (77.2)**	**1,097 (0.6)**	**217,676 (93.6)**
Mozambique	2017	189,225	62.5	96,218 (50.8)	83,211 (44.0)	9,796 (5.2)	0 (—)	178,615 (94.4)	4,350 (2.4)	144,708 (76.5)
	2018	233,069	90.9	131,881 (56.6)	90,365 (38.8)	10,823 (4.6)	0 (—)	219,906 (94.4)	4,530 (2.1)	200,060 (85.8)
	2019	222,887	83.1	130,731 (58.7)	82,253 (36.9)	9,903 (4.4)	0 (—)	206,983 (92.9)	4,736 (2.3)	193,267 (86.7)
	2020¶	120,464	42.9	59,232 (49.2)	54,596 (45.3)	6,636 (5.5)	0 (—)	57,490 (47.7)	1,109 (1.9)	98,738 (82.0)
	2021	46,292	84.3	0 (—)**	37,873 (81.8)	8,419 (18.2)	0 (—)	31,419 (67.9)	3,183 (10.1)	39,549 (85.4)
	Total	**811,937**	**69.8**	**418,062 (51.5)**	**348,298 (42.9)**	**45,577 (5.6)**	**0 (—)**	**694,413 (85.5)**	**17,908 (2.6)**	**676,322 (83.3)**
Namibia	2017	15,579	70.1	5,037 (33.0)	7,937 (51.9)	2,305 (15.0)	0 (—)	9,377 (60.2)	63 (0.7)	15,106 (97.0))
	2018	19,384	82.7	8,807 (46.0)	8,393 (43.8)	1,957 (10.2)	0 (—)	9,752 (50.3)	36 (0.4)	18,857 (97.3)
	2019	17,059	73.3	7,480 (45.5)	7,235 (44.0)	1,711 (10.4)	546 (3.2)	8,829 (51.8)	44 (0.5)	15,614 (91.5)
	2020¶,††	0	0	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)
	2021††	0	0	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)	0 (—)
	Total	**52,022**	**75.4**	**21,324 (41.9)**	**23,565 (46.3)**	**5,973 (11.7)**	**546 (1.0)**	**27,958 (53.7)**	**143 (0.5)**	**49,577 (95.3)**
Rwanda	2017	91,689	191.2	25,123 (27.4)	63,301 (69.1)	3,245 (3.5)	53,351 (58.2)	90,564 (98.8)	281 (0.3)	91,662 (99.9)
	2018	75,338	222.2	28,866 (38.3)	43,323 (57.5)	3,149 (4.2)	30,178 (40.1)	68,384 (90.8)	22 (0.0)	75,201 (99.8)
	2019	79,622	152.6	23,933 (30.1)	52,202 (65.6)	3,487 (4.4)	15,167 (19.0)	44,729 (56.2)	14 (0.0)	79,420 (99.7)
	2020¶	140,984	143.2	35,383 (25.1)	100,287 (71.1)	5,314 (3.8)	7,615 (5.4)	0 (—)§§	0 (—)§§	140,784 (99.9)
	2021	181,539	156.4	14 (0)**	163,800 (90.2)	17,725 (9.8)	2,016 (1.1)	0 (—)§§	0 (—)§§	179,435 (98.9)
	Total	**569,172**	**163.3**	**113,319 (19.9)**	**422,916 (74.3)**	**32,920 (5.8)**	**108,327 (19.0)**	**203,677 (35.8)**	**317 (0.2)**	**566,502 (99.5)**
South Africa	2017	232,198	94.3	91,312 (39.3)	114,436 (49.3)	26,450 (11.4)	886 (0.4)	140,960 (60.7)	4,390 (3.1)	169,955 (73.2)
	2018	284,202	81.7	144,208 (50.8)	107,826 (38.0)	32,037 (11.3)	0 (—)	260,025 (91.5)	4,524 (1.7)	189,787 (66.8)
	2019	332,096	109.1	125,598 (38.0)	175,228 (53.0)	30,055 (9.1)	0 (—)	285,267 (85.9)	1,795 (0.6)	247,819 (74.6)
	2020¶	144,622	46.4	34,347 (23.7)	89,195 (61.7)	21,080 (14.6)	0 (—)	134,101 (92.7)	412 (0.3)	131,951 (91.2)
	2021	164,995	52.4	0 (—)**	113,625 (68.9)	51,369 (31.1)	0 (—)	142,756 (86.5)	1,068 (0.7)	152,267 (92.3)
	Total	**1,158,113**	**75.9**	**395,465 (34.2)**	**600,310 (51.9)**	**160,991 (13.9)**	**886 (0.1)**	**1,022,493 (88.3)**	**14,189 (1.4)**	**891,779 (77.0)**

See table footnotes on the next page.

TABLE. (*Continued*) CDC-supported voluntary medical male circumcisions — 13 countries in eastern and southern Africa, 2017–2021

Country	Fiscal year*	No. of VMMCs performed	Annual target achieved, %	Client age group, yrs, no. (%)			No. (%)			
				<15	15–29	≥30	VMMCs performed using a device†	Clients who received HIV testing at a VMMC site	Clients with a positive HIV test result§	Clients with postoperative follow-up within 14 days of VMMC
Tanzania	2017	290,041	91.7	131,039 (45.2)	136,000 (46.9)	23,002 (7.9)	0 (—)	222,693 (76.8)	547 (0.2)	258,342 (89.1)
	2018	451,073	92.8	206,288 (45.7)	209,371 (46.4)	35,414 (7.9)	0 (—)	450,318 (99.8)	674 (0.1)	390,295 (86.5)
	2019	453,764	110.4	193,883 (42.7)	223,742 (49.3)	36,139 (8.0)	1,517 (0.3)	59,909 (13.2)	105 (0.2)	438,954 (96.7)
	2020¶	299,967	104.4	140,485 (46.8)	140,580 (46.9)	18,902 (6.3)	817 (0.3)	0 (—)§§	0 (—)§§	296,017 (98.7)
	2021	337,989	95.9	0 (—)**	304,264 (90.0)	33,725 (10.0)	0 (—)	0 (—)§§	0 (—)§§	334,933 (99.1)
	Total	**1,832,834**	**98.9**	**671,695 (39.3)**	**891,557 (52.1)**	**147,182 (8.6)**	**2,334 (0.1)**	**732,920 (40.0)**	**1,326 (0.2)**	**1,718,541 (93.8)**
Uganda	2017	334,515	71.5	68,104 (33.2)	119,705 (58.4)	17,175 (8.4)	1,590 (0.5)	310,211 (92.7)	1,324 (0.4)	296,092 (88.5)
	2018	340,168	100.1	144,585 (49.4)	128,088 (43.8)	20,029 (6.8)	134 (0.0)	319,255 (93.9)	5,422 (1.7)	321,776 (94.6)
	2019	336,947	98.1	140,769 (41.8)	168,459 (50.0)	27,603 (8.2)	399 (0.1)	283,062 (84.0)	612 (0.2)	321,085 (95.3)
	2020¶	291,955	73.2	65,981 (22.6)	193,944 (66.4)	32,030 (11.0)	925 (0.3)	227,315 (77.9)	497 (0.2)	284,636 (97.5)
	2021	153,534	103.0	544 (0.4)	132,983 (86.6)	20,007 (13.0)	7,627 (5.0)	89,554 (58.3)	284 (0.3)	143,644 (93.6)
	Total	**1,457,119**	**85.8**	**419,983 (31.0)**	**743,179 (54.9)**	**116,844 (8.6)**	**10,675 (0.7)**	**1,229,397 (84.4)**	**8,139 (0.7)**	**1,367,233 (93.8)**
Zambia	2017	181,767	171.4	68,397 (37.6)	97,113 (53.4)	16,237 (8.9)	477 (0.3)	173,555 (95.5)	824 (0.5)	175,361 (96.5)
	2018	173,425	128.2	48,704 (28.1)	109,385 (63.1)	15,328 (8.8)	391 (0.2)	170,722 (98.4)	482 (0.3)	162,355 (94.0)
	2019	271,099	167.7	67,514 (24.9)	176,690 (65.2)	26,852 (9.9)	2,371 (0.9)	226,737 (83.6)	570 (0.3)	259,892 (95.9)
	2020¶	240,857	126.9	31,032 (12.9)	188,853 (78.4)	20,972 (8.7)	4,738 (2.0)	66,969 (27.8)	91 (0.1)	233,739 (97.0)
	2021	282,259	139.0	0 (—)**	258,048 (91.4)	24,211 (8.6)	12,217 (4.3)	39,859 (14.1)	71 (0.2)	276,061 (97.8)
	Total	**1,149,407**	**144.4**	**215,647 (18.8)**	**830,089 (72.2)**	**103,600 (9.0)**	**20,194 (1.8)**	**677,842 (59.0)**	**2,038 (0.3)**	**1,107,408 (96.3)**
Zimbabwe	2017	103,677	103.7	43,383 (41.9)	51,357 (49.5)	8,914 (8.6)	5,037 (4.9)	103,546 (99.9)	270 (0.3)	99,821 (96.3)
	2018	70,494	66.7	24,026 (34.1)	39,383 (55.9)	7,083 (10.0)	0 (—)	70,454 (99.9)	111 (0.2)	64,721 (91.8)
	2019	129,118	102.7	42,994 (33.3)	72,084 (55.9)	13,966 (10.8)	52 (0.0)	129,044 (99.9)	119 (0.1)	124,692 (96.6)
	2020¶	61,932	48.0	20,059 (32.4)	35,674 (57.6)	6,199 (10.0)	0 (—)	61,880 (99.9)	86 (0.1)	59,796 (96.6)
	2021	48,363	37.1	0 (—)**	39,042 (80.7)	9,321 (19.3)	221 (0.5)	47,935 (99.1)	73 (0.2)	45,513 (94.1)
	Total	**413,584**	**70.0**	**130,462 (31.6)**	**237,540 (57.4)**	**45,483 (11.0)**	**5,310 (1.3)**	**412,859 (99.8)**	**659 (0.2)**	**394,543 (95.4)**
All countries	2017	1,646,893	89.7	657,474 (43.3)	742,797 (49.0)	116,728 (7.7)	63,074 (3.8)	1,423,201 (86.4)	12,455 (0.9)	1,418,994 (86.2)
	2018	1,920,444	95.3	918,615 (49.1)	817,249 (43.6)	136,746 (7.3)	32,952 (1.7)	1,719,039 (89.5)	16,674 (1.0)	1,654,353 (86.1)
	2019	2,120,797	106.8	916,129 (43.2)	1,041,618 (49.2)	160,969 (7.6)	23,696 (1.1)	1,352,040 (63.8)	8,511 (0.6)	1,942,461 (91.6)
	2020¶	1,447,147	72.2	443,406 (30.6)	882,302 (61.0)	121,355 (8.4)	16,216 (1.1)	630,407 (62.7)§§	2,340 (0.4)	1,382,708 (95.5)
	2021	1,362,016	92.5	562 (0)	1,180,912 (86.6)	182,080 (13.4)	30,537 (2.2)	410,461 (48.7)§§	4,765 (1.2)	1,316,661 (96.7)
	Total	**8,497,297**	**91.2**	**2,936,186 (35.3)**	**4,664,878 (56.1)**	**717,082 (8.6)**	**166,475 (2.0)**	**5,595,239 (74.2)§§**	**44,745 (0.8)**	**7,715,177 (90.8)**

Abbreviations: PEPFAR = U.S. President's Emergency Plan for AIDS Relief; VMMC = voluntary medical male circumcision.

* October 1–September 30.

† VMMCs performed using a device refers to use of World Health Organization–prequalified circumcision device as method of circumcision instead of traditional surgical technique.

§ HIV prevalence was calculated by dividing the number of males who received positive HIV test results by the number undergoing HIV testing services at VMMC sites.

¶ COVID-19 was declared a pandemic in 2020.

** In 2021 most countries reported zero or a small number of VMMCs conducted in clients aged <15 years because of a change in VMMC age eligibility to 15 years with the exception of the ShangRing device (Wuhu Snnda Medical Treatment Appliance Technology).

†† Eswatini in 2017 and 2018 and Namibia in 2020 and 2021 did not have a CDC-supported VMMC program.

§§ Rwanda and Tanzania stopped conducting PEPFAR-supported HIV testing at VMMC sites in 2020 and 2021. These countries were excluded from the combined country estimates.

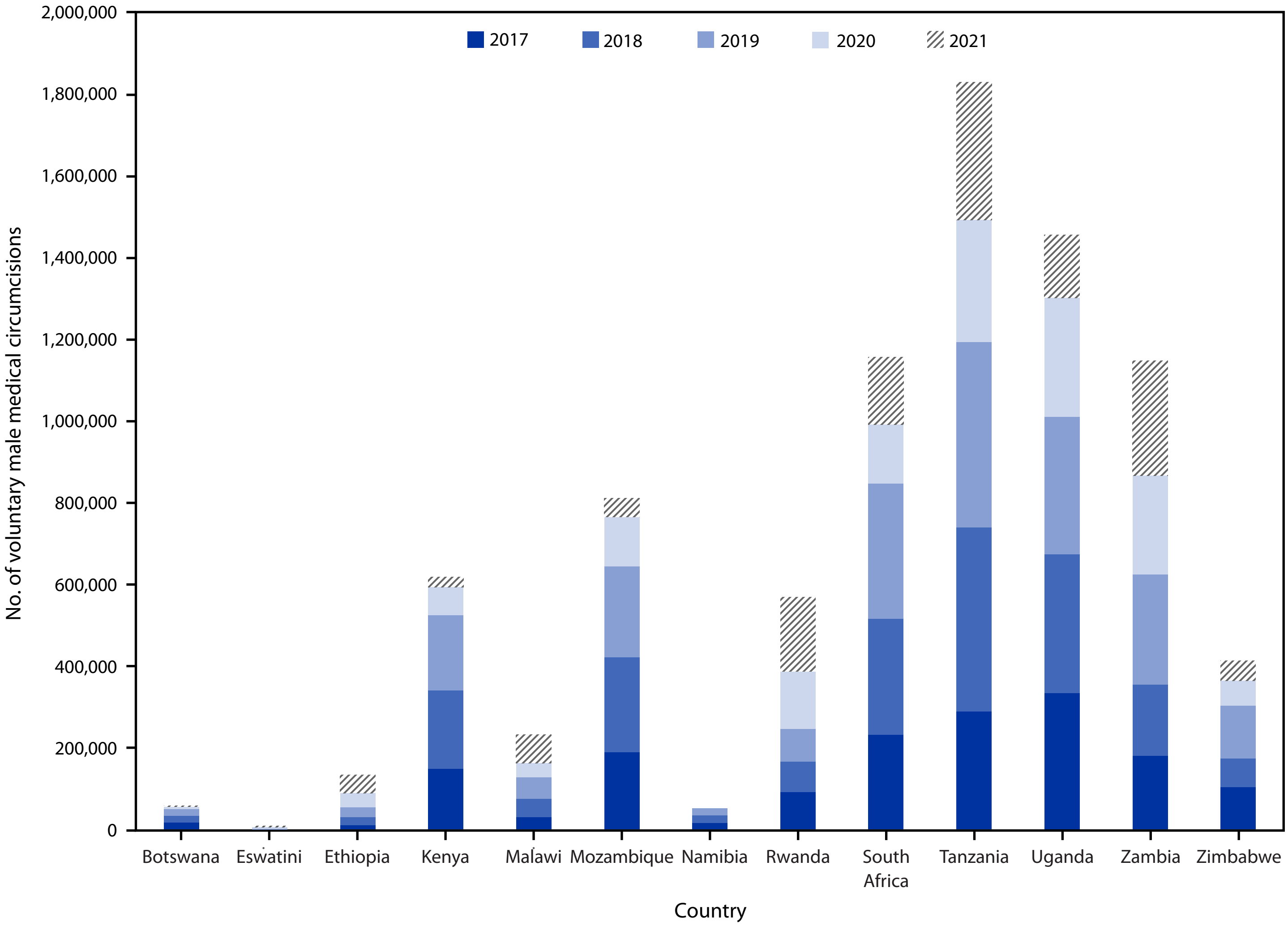
circumcisions were performed using a device; this proportion was highest (3.8%) in 2017, declined annually until 2020, then increased from 1.1% in 2020 to 2.2% in 2021.

Discussion

Overall, substantial progress has been made in scaling up CDC-supported VMMC programs, with 8,497,297 VMMCs performed during 2017–2021. Increased programmatic experience in VMMC scale-up and the continued prioritization of VMMC by ministries of health and global stakeholders have contributed to this progress. The decreased number of VMMCs performed during 2020 was largely related to mitigation measures implemented to prevent the spread of COVID-19. In addition, in 2020, based on 2015–2018 data showing that certain severe adverse events associated with VMMC, while very rare, were higher among clients aged 10–14 years (2.9 per 100,000 procedures) than among clients aged ≥15 years (1.6 per 100,000 procedures), PEPFAR increased the age eligibility for VMMC to ≥15 years (*6*). This change in age eligibility likely contributed to the increase in the proportion of VMMCs performed in persons aged 15–29 years during 2020 and 2021.

During 2017–2021, a total of 44,745 males who underwent testing at a VMMC site received a positive HIV test result. VMMC sites serve as an important entry point for HIV testing; without this opportunity, many cases of HIV infection among males might go undiagnosed. The decrease in HIV testing at VMMC sites in

FIGURE. CDC-supported voluntary medical male circumcisions, by year — 13 eastern and southern African countries, 2017–2021*



* COVID-19 was declared a pandemic in 2020.

2020 and 2021 was likely due to changes in testing approaches after the 2019 PEPFAR recommendations to provide targeted testing including screening for clients at higher risk for HIV (*7*). VMMC postoperative follow-up visits increased in all countries during 2017–2021. The percentage of males who returned for a postoperative follow-up visit within 14 days exceeded the recommended 80%, which helped to facilitate timely detection of an adverse event. To reduce the transmission of COVID-19, many countries conducted virtual follow-up visits during 2020. In 2021, PEPFAR supported this approach based on evidence from the scientific literature and programmatic success (*8*).

VMMC programs can use WHO-prequalified male circumcision devices which typically includes application of a device for removal of the foreskin, as an alternative to traditional surgical circumcision techniques. The overwhelming majority of VMMCs are still performed through conventional surgical methods; the decision to introduce a circumcision device is country-specific, with many programs still piloting use of the devices. Device-based circumcisions declined from 3.8% during 2017 to 1.1% during 2019 and 2020; one factor contributing to the decline might be the lack of programmatic experience to scale up use of the ShangRing device (Wuhu Snnda Medical Treatment Appliance Technology) when practitioners started to phase out the PrePex device (Circ MedTech, Ltd.) during 2016–2018 after reports of tetanus in patients who received VMMC with this device (*9*). During 2021, more programs scaled up device-based circumcisions, and their use increased to 2.2% from 1.1% during 2020.

The findings in this report are subject to at least three limitations. First, only CDC-supported VMMC results are reported, so the actual number of VMMCs performed might be higher than that reported here. Second, Monitoring, Evaluation, and Reporting data are subject to reporting and data entry errors. Finally, the data used for this analysis cannot be used to directly

Summary

What is already known about this topic?

Voluntary medical male circumcision (VMMC) is associated with an approximately 60% reduction in the risk for female-to-male transmission of HIV. The U.S. President's Emergency Plan for AIDS Relief, through CDC and other organizations, has supported VMMC for HIV prevention in eastern and southern Africa. During 2010–2016, CDC supported 5,880,372 VMMCs performed in 12 countries.

What is added by this report?

During 2017–2021, CDC supported an additional 8,497,297 VMMCs performed in 13 countries in eastern and southern Africa. Compliance with postoperative follow-up visits within 14 days of VMMC was high, and use of device-based circumcisions remains low.

What are the implications for public health practice?

CDC's continued support of the VMMC program is a critical component to ending the AIDS epidemic and reaching the Joint United Nations Programme on HIV/AIDS 2025 target of 90% of eligible males having access to VMMC in prioritized countries.

assess progress towards reaching the goal of 90% of eligible males having access to VMMC services.

Modeling analyses have estimated that the 26.8 million PEPFAR-supported VMMCs performed during 2008–2019 in prioritized countries have helped prevent 340,000 new HIV infections; this estimate is projected to increase to 1.8 million by 2030, given that VMMC provides a lifelong reduction in HIV risk (*10*). CDC's continued support of the VMMC program is a critical component of ending the AIDS epidemic and reaching the UNAIDS 2025 target of 90% of eligible males having access to VMMC in prioritized countries (*4*). Prioritization of uncircumcised males living in areas of high HIV incidence and those at highest risk for HIV can maximize VMMC's contribution to HIV epidemic control.

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Public Health Response to Clusters of Rapid HIV Transmission Among Hispanic or Latino Gay, Bisexual, and Other Men Who Have Sex with Men — Metropolitan Atlanta, Georgia, 2021–2022

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During February 2021–June 2022, the Georgia Department of Public Health (GDPH) detected five clusters of rapid HIV transmission concentrated among Hispanic or Latino (Hispanic) gay, bisexual, and other men who have sex with men (MSM) in metropolitan Atlanta. The clusters were detected through routine analysis of HIV-1 nucleotide sequence data obtained through public health surveillance (*1*,*2*). Beginning in spring 2021, GDPH partnered with health districts with jurisdiction in four metropolitan Atlanta counties (Cobb, DeKalb, Fulton, and Gwinnett) and CDC to investigate factors contributing to HIV spread, epidemiologic characteristics, and transmission patterns. Activities included review of surveillance and partner services interview data,[†] medical chart reviews, and qualitative interviews with service providers and Hispanic MSM community members. By June 2022, these clusters included 75 persons, including 56% who identified as Hispanic, 96% who reported male sex at birth, 81% who reported male-to-male sexual contact, and 84% of whom resided in the four metropolitan Atlanta counties. Qualitative interviews identified barriers to accessing HIV prevention and care services, including language barriers, immigration- and deportation-related concerns, and cultural norms regarding sexuality-related stigma. GDPH and the health districts expanded coordination, initiated culturally concordant HIV prevention marketing and educational activities, developed partnerships with organizations serving Hispanic communities to enhance outreach and services, and obtained funding for a bilingual patient navigation program with academic partners to provide staff members to help persons overcome barriers and understand the health care system. HIV molecular cluster detection can identify rapid HIV transmission among sexual networks involving ethnic and sexual minority groups, draw attention to the needs of affected populations, and advance health equity through tailored responses that address those needs.

* These authors contributed equally to this report.

† Partner services interviews are completed by health departments for eligible persons with a newly diagnosed HIV infection and, potentially, after a person with known HIV infection is identified as part of a cluster. Interviews are completed to ensure that persons with HIV infection are linked to care and to obtain information about their sexual partners, who can receive notification of their potential exposure and services, including testing and HIV preexposure prophylaxis.

Investigation and Results

In February 2021, GDPH identified three HIV clusters among Hispanic MSM using molecular analysis of HIV-1 nucleotide sequence data collected through routine surveillance (*1*). In Georgia, clusters are inferred using a genetic distance threshold of 0.005 nucleotide substitutions per site among persons with HIV infection diagnosed during the most recent 3 years, with priority clusters defined as those that include four or more diagnoses during the most recent 12 months. This definition is consistent with evidence of rapid HIV transmission (*1*,*3*). These were the first priority clusters in Georgia comprising ≥40% Hispanic persons. GDPH analysis of HIV surveillance data demonstrated that during 2014–2019, HIV diagnoses among Hispanic adolescents and adults in four metropolitan Atlanta counties increased from 38.9 to 47.1 per 100,000 persons.

After demonstration of persistent growth of the clusters through early 2021, GDPH reviewed partner services interview data and attempted direct outreach to all persons in clusters, including those previously interviewed. However, response was limited, partly attributed to immigration- and deportation-related concerns and limited numbers of bilingual staff members.

In October 2021, CDC began providing remote assistance in analyzing epidemiologic data for investigation activities, and GDPH initiated review of medical charts of persons in clusters. Among 38 persons with available charts, 10 (26%) were primarily Spanish-speaking, and 12 (32%) were from Latin American countries; five (13%) had mental health diagnoses, including depression, anxiety, or bipolar disorder.

In February 2022, GDPH requested CDC assistance in conducting a qualitative assessment with Hispanic MSM community members and service providers to identify barriers to accessing medical and social services and HIV care, as well as simplifying cluster data synthesis and visualization. CDC provided support during March–July 2022. This activity was reviewed by CDC and conducted consistent with applicable federal law and CDC policy.[§]

§ 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

By June 30, 2022, GDPH detected two additional clusters that included ≥40% Hispanic persons, with additional persons identified among all clusters throughout the investigation period (Figure). The five clusters included 75 persons with HIV, with clusters ranging in size from four to 45 persons. The median age of persons in clusters was 29 years (range = 16–54 years), 56% identified as Hispanic, 96% were assigned male sex at birth, and 81% reported male-to-male sexual contact (Table). Overall, 84% of persons lived in one of the four metropolitan Atlanta counties. Forty percent of diagnoses were from facilities with infectious disease providers who specialize in HIV care, 27% in primary or urgent care settings, 13% in inpatient or emergency department settings, and 11% at health departments. Eighty-five percent of persons in these clusters were virally suppressed[¶]; however, new diagnoses continued to be identified throughout the investigation (Figure).

By June 30, 2022, among 52 persons in clusters eligible for partner services interviews,[**] 34 (65%) were interviewed, 16 (31%) could not be reached, and two (4%) declined. Among those interviewed, 20 (59%) reported meeting partners online, and four (12%) reported ever having taken HIV preexposure prophylaxis (PrEP).

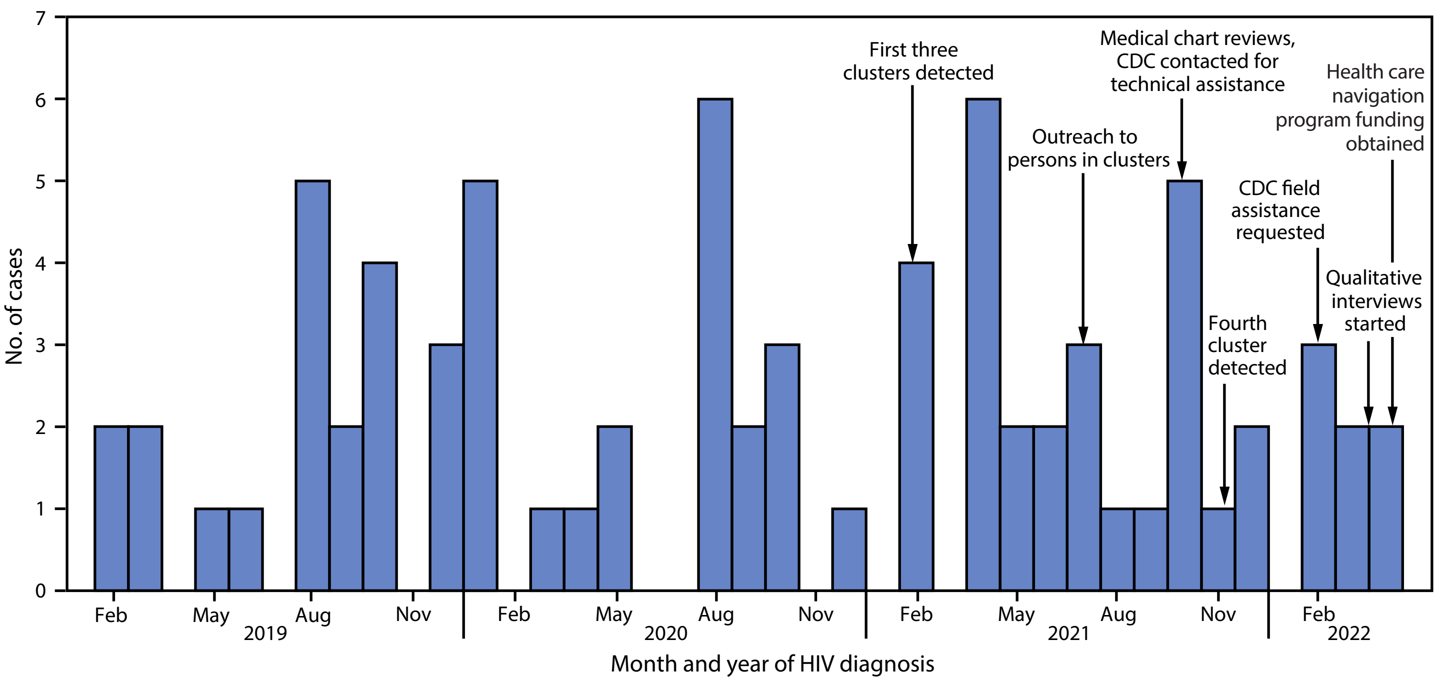
CDC and health department staff members conducted qualitative interviews with 28 Hispanic MSM and one transgender woman in the four counties and 28 individual or group interviews with 65 medical and social service providers who treated persons in clusters or served Hispanic MSM. Community members were recruited by provider referral, social media, and at bars and clubs. Because multiple attempts had already been made to reach persons in clusters for partner services interviews, further attempts to conduct qualitative interviews were not made for persons in clusters.

Interviewed participants identified barriers to accessing medical and social services, including few Spanish-speaking staff members, limited Spanish language materials, and fear of deportation and other immigration-related concerns. Participants also reported barriers to accessing HIV prevention and care, including stigma toward MSM and persons with HIV because of sexuality-related cultural norms, low levels of awareness about HIV and other sexually transmitted infections because of limited primary care access, limited provision of HIV services in primary and urgent care settings, and limited Hispanic MSM-focused community outreach and marketing.

¶ HIV suppression is defined as HIV viral load <200 copies of HIV RNA per mL of blood in the preceding year in Georgia Department of Public Health HIV surveillance data.

** Persons who received an HIV diagnosis from a health department or entity funded by a health department are eligible for partner services interviews in Georgia.

FIGURE. HIV diagnoses by month of diagnosis, and major events during the public health response to five HIV molecular clusters primarily among Hispanic or Latino gay, bisexual, and other men who have sex with men — Metropolitan Atlanta, Georgia, February 2019–April 2022*



* Persons in clusters were identified through June 30, 2022, with all identified persons having a diagnosis date of April 30, 2022, or earlier. Persons with more recently diagnosed HIV infection might not yet have been identified as part of a cluster for reasons including time needed to enter HIV care, time for HIV nucleotide sequence to be reported to health department, and molecular analysis schedule.

Summary

What is already known about this topic?

Molecular HIV clusters provide evidence of rapid transmission.

What is added by this report?

In 2021, molecular HIV analysis in Georgia identified clusters of rapid HIV transmission among Hispanic or Latino (Hispanic) gay, bisexual, and other men who have sex with men (MSM) in metropolitan Atlanta. A multicomponent investigation identified factors that might limit access to HIV services, including language barriers, immigration- and deportation-related concerns, and sexuality-related cultural norms. Health departments, providers, and community-based organizations collaborated to address these barriers.

What are the implications for public health practice?

Hispanic MSM can face important barriers to accessing HIV services. Detecting and responding to HIV clusters among MSM can mobilize resources to strengthen services and improve health equity.

TABLE. Characteristics of persons in five HIV molecular clusters primarily among Hispanic or Latino gay, bisexual, and other men who have sex with men (N = 75) — Metropolitan Atlanta, Georgia, June 2022

Characteristic	No. (%)
Age, yrs, median (range)	29 (16–54)
Received HIV diagnosis during preceding 12 mos	22 (29)
Sex at birth	
Male	72 (96)
Female	3 (4)
Race and ethnicity	
Black or African American, non-Hispanic	7 (9)
White, non-Hispanic	15 (20)
Hispanic or Latino	42 (56)
Other, non-Hispanic	11 (15)
County of residence at diagnosis	
Cobb	7 (9)
DeKalb	11 (15)
Fulton	10 (13)
Gwinnett	35 (47)
Other	12 (16)
Born outside the United States	25 (33)
HIV transmission category	
Male-to-male sexual contact	55 (73)
Male-to-male sexual contact and injection drug use	6 (8)
Heterosexual contact	5 (7)
Unknown	9 (12)
Diagnosis setting	
Facility with infectious diseases or HIV specialty	30 (40)
Primary or urgent care	20 (27)
Inpatient or emergency facility	10 (13)
Health department	8 (11)
Other*	7 (9)
Most recent viral load test <200 HIV RNA copies/mL	64 (85)
Achieved viral suppression ≤365 days after diagnosis	69 (92)
History of HIV PrEP use†	4 (5)
STI diagnosed within 2 mos of HIV diagnosis	23 (31)
STI identified during the 12 mos before HIV diagnosis	4 (5)

Abbreviations: PrEP = preexposure prophylaxis; STI = sexually transmitted infection.
* Includes unknown (six) and out of state (one).
† HIV PrEP use ever recorded in partner services interview data.

Public Health Response

Response activities have included establishing routine coordination meetings between GDPH and metropolitan Atlanta health districts and presenting reports on the investigation to HIV community advisory boards and planning councils. Health districts disseminated Spanish-language HIV prevention materials emphasizing service availability irrespective of immigration status via social media and at venues in zip codes where persons in clusters reside. GDPH established new partnerships with community-based organizations (CBOs) serving Hispanic communities and developed strategies to increase the number of bilingual staff members, including modifying job postings to prioritize hiring bilingual personnel. Health departments and CBOs partnered with academic institutions to engage in implementation science research and obtained federal funding for a culturally concordant outreach and patient navigation program for status-neutral sexual health services. A status-neutral approach provides persons with and without HIV access to comprehensive medical services, including HIV prevention and treatment, and social services depending on their needs.[††] In addition, in June 2022, the local health districts launched an at-home HIV and sexually transmitted infection self-testing program.[§§] GDPH is continuing to partner with CDC to implement informatics tools to simplify cluster investigations.

Discussion

The detection of multiple HIV clusters among Hispanic MSM in metropolitan Atlanta provided evidence of rapid, ongoing HIV transmission and resulted in a multifaceted response involving health departments, CDC, health care providers, and CBOs. The response identified barriers to accessing HIV services among Hispanic MSM in metropolitan Atlanta. Although most persons in clusters had evidence of viral suppression, which prevents sexual HIV transmission, as of June 30, 2022, the clusters were still expanding. This finding indicates potential ongoing transmission among a larger network, which could include persons with undiagnosed HIV infection.

This investigation highlighted the value of molecular HIV cluster detection and response for identifying gaps in services among networks of MSM. Although most large HIV outbreak responses in the United States have focused on persons who inject drugs, male-to-male sexual contact is the primary mode of HIV transmission in most molecular clusters (*4*,*5*). This investigation demonstrated that cluster detection and response can detect rapid HIV transmission and identify population-level gaps in systems involving MSM.

[††] https://www.cdc.gov/hiv/policies/data/status-neutral-issue-brief.html
[§§] https://stophivatl.org/free-hiv-sti-home-test/

Barriers to accessing HIV services among Hispanic MSM in this investigation included language barriers and immigration- and deportation-related concerns; stigma toward MSM and persons with HIV, often tied to sexuality-related cultural norms; and lack of HIV prevention services in primary and urgent care settings. These findings align with studies identifying access to HIV prevention and care services, language, traditional notions of masculinity, and medical mistrust as barriers to HIV prevention among Hispanic MSM (*6*,*7*). When HIV clusters are detected, it is important to gather data to identify gaps in HIV services so that response efforts can strengthen services for affected populations. Although gaps might already be known, collaborative response efforts can clarify the most important gaps and catalyze new efforts to overcome them such as those described in this response.

The findings in this report are subject to at least three limitations. First, qualitative interviews were conducted among Hispanic MSM community members; thus, findings might not directly reflect the experience of persons in the clusters. Second, because HIV testing and diagnoses substantially declined during the COVID-19 pandemic, cluster size might be underestimated (*8*). Finally, because surveillance and chart review data were incomplete, the proportion of persons in clusters born outside the United States or who were Spanish-speaking might also be underestimated.

This investigation highlights important barriers to and inequalities in HIV prevention services experienced by Hispanic MSM in Georgia because of issues related to language, immigration- and deportation-concerns, and sexuality-related cultural norms. HIV molecular cluster detection has the capability to identify rapid HIV transmission in a new demographic group and advance health equity through expanded and tailored resources for HIV prevention and care.

Acknowledgments

All community members and service providers who participated in qualitative interviews; Humberto Orozco, Latino LinQ; Sergio Mendez, Gigi Pedraza, Latino Community Fund; Kayleigh McClary, Cobb and Douglas Public Health; Moja Ashanti, DeKalb County Board of Health; Terry Bolden, Sabrina Clark, Cleonecia Forbes, Darshon Herbert, Tina John, Joshua O'Neal, Fulton County Board of Health; Karem Echeverria, Sameka Orekyeh, Yazmin Silva, Gwinnett, Newton, and Rockdale County Health Department; Christine Agnew Brune, Elana Morris, Jeffery Todd, CDC; Laila Woc-Colburn, Division of Infectious Diseases, Department of Medicine, Emory University School of Medicine.

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All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. Valeria D. Cantos reported grant support from the National Institute for Allergy and Infectious Diseases, National Institutes of Health (NIH), Gilead Sciences, and Janssen Research. Jane Yoon Scott reported grant support from the NIH's Centers for AIDS Research. No other potential conflicts of interest were disclosed.

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Notes from the Field

Increase in Pediatric Invasive Group A *Streptococcus* Infections — Colorado and Minnesota, October–December 2022

Meghan Barnes, MSPH[1]; Erin Youngkin, MPH[1]; Jennifer Zipprich, PhD[2]; Kayla Bilski, MPH[2]; Christopher J. Gregory, MD[3]; Samuel R. Dominguez, MD, PhD[4]; Erica Mumm, MPH[2]; Melissa McMahon, MPH[2]; Kathryn Como-Sabetti, MPH[2]; Ruth Lynfield, MD[2]; Sopio Chochua, MD, PhD[3]; Jennifer Onukwube, MPH[3]; Melissa Arvay, PhD[3]; Rachel Herlihy, MD[1]

During fall 2022, a resurgence of invasive group A *Streptococcus* (iGAS) infection in children and adolescents was observed in two of CDC's Emerging Infections Program (EIP)* surveillance sites: Colorado (Denver metropolitan area) and Minnesota (entire state). This increase followed historic declines in invasive bacterial diseases during 2020, concurrent with mitigation strategies implemented during the COVID-19 pandemic† (*1*). Whereas reports of iGAS increased among all age groups, including adults, the increase among children and adolescents was notable, occurred earlier than seasonal increases during previous years, and accompanied a resurgence in hospitalizations for respiratory viral illnesses such as respiratory syncytial virus (RSV) and influenza. Viral infections, such as influenza and varicella, have been identified as risk factors for iGAS infection in children, adolescents, and adults (*2*) and can be reduced by vaccination.

Surveillance for iGAS is conducted by 10 U.S. sites as part of EIP's Active Bacterial Core surveillance (ABCs).§ An analysis of cases among Colorado and Minnesota EIP site residents aged <18 years who met criteria for iGAS¶ was conducted using ABCs data from the Colorado and Minnesota surveillance sites. Case counts, age distribution, and clinical characteristics of patients with iGAS infection were compared over three periods: baseline (January 1, 2016–December 31, 2019), pandemic (January 1, 2020–December 31, 2021), and recent increase (October 1–December 31, 2022). This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.**

During October 1–December 31, 2022, a combined total of 34 cases was reported in the Colorado and Minnesota ABCs sites. In comparison, a 3-month average of 11 cases and four cases were observed during the same period in 2016–2019 and 2020–2021, respectively. Colorado patients identified during the recent increase were younger (median age = 3.1 years) than were those during the baseline period (5.6 years) and the pandemic period (6.2 years); this was not observed in Minnesota (median age = 4.0, 6.0, and 6.5 years in the baseline, pandemic, and recent increase periods, respectively). Two deaths (one each in Colorado and Minnesota) were noted during the recent increase period; overall, during 2016–2021, five deaths occurred (one in Colorado and four in Minnesota). Frequency of intensive care unit admission and length of hospital stay were similar during the recent increase (35.3% [12 of 34 patients]; 4.5 days) and baseline periods (34.4% [62 of 180], 5.0 days).†† Most cases (73.5% [25 of 34]) that occurred during the recent increase were in children and adolescents without underlying medical conditions.

Among the 34 cases that occurred during the recent increase, 21 (61.8%) patients had an upper respiratory tract infection noted within the 2 weeks preceding their iGAS infection, six (17.6%) reported sore throat, and seven (20.6%) reported no preceding illness. Fifteen (44.1%) patients received positive test results for one or more respiratory viral pathogen during the 2 weeks before, or concurrent with, their iGAS infection. Viral respiratory pathogens identified included RSV (six, 17.6%), influenza A or B (six, 17.6%), and SARS-CoV-2 (three, 8.8%).§§ Comparison of pediatric iGAS case counts, and influenza and RSV hospitalization rates during 2016–2022 showed an increase in iGAS infections coinciding with seasonal peaks in RSV and influenza hospitalization rates during most years except in 2021, when influenza and RSV hospitalizations were lower than those in previous or subsequent years (Figure).

Among the 26 (76%) iGAS cases from the recent increase period with M protein gene¶¶ (*emm*) typing results available, 22 (85.0%) were type 1 (nine, 34.6%) or type 12 (13, 50.0%);

* The Emerging Infections Program is a network of 10 state health departments (program sites) funded by CDC's Division of Preparedness and Emerging Infections that collaborates with academic institutions and other public health stakeholders to address emerging infections. https://www.cdc.gov/ncezid/dpei/eip/index.html

† https://www.cdc.gov/abcs/reports-findings/data-2020.html (Accessed February 7, 2023).

§ https://www.cdc.gov/abcs/methodology/case-def-ascertain.html (Accessed January 30, 2023).

¶ Group A *Streptococcus* isolated or pathogen-specific nucleic acid detected using a validated molecular test in a specimen obtained from a normally sterile body site, or group A *Streptococcus* isolated from a wound culture and accompanied by necrotizing fasciitis or streptococcal toxic shock syndrome.

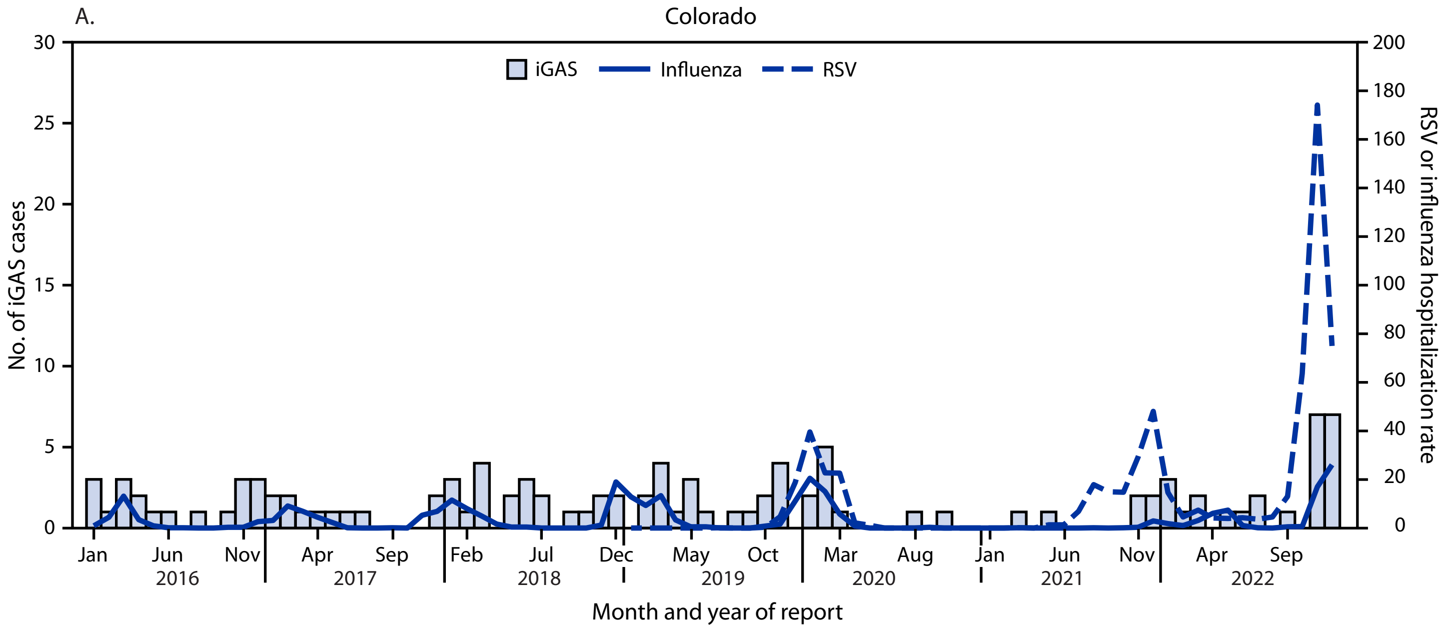
** 45 C.F.R. part 46.102(l)(2), 21 C.F.R. part 56; 42 U.S.C. Sect. 241(d); 5 U.S.C. Sect. 552a; 44 U.S.C. Sect. 3501 et seq.

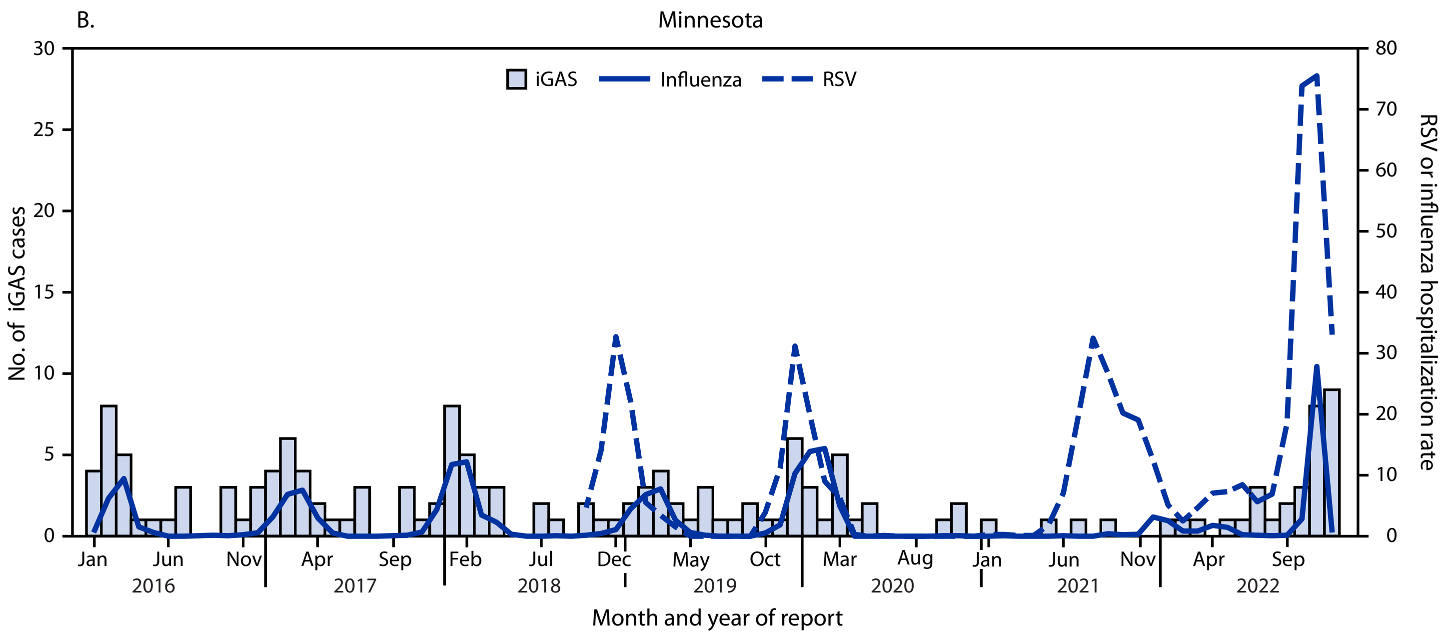
†† A comparison with pandemic numbers is not provided because of the small number of cases during 2020–2021.

§§ Other respiratory pathogens detected included parainfluenza (two) and coronavirus other than SARS-CoV-2 (one).

¶¶ The M protein gene (*emm*) encodes the cell surface M virulence protein and forms the basis for the most widely used iGAS strain subtyping method.

FIGURE. Cases of invasive group A *Streptococcus* infections* and hospitalization rates† for influenza§ and respiratory syncytial virus¶ among children and adolescents aged <18 years — Colorado and Minnesota, January 2016–December 2022**





Abbreviations: iGAS = invasive group A *Streptococcus* infection; RSV = respiratory syncytial virus.

* iGAS infections were identified through each state's Emerging Infections Program Active Bacterial Core surveillance systems. Cases in Colorado are from the Denver metropolitan area; cases in Minnesota throughout the state are reportable to the Minnesota Department of Health.

† Hospitalizations per 100,000 population.

§ Colorado influenza hospitalizations are reported from the Denver metropolitan area, and rates in children and adolescents aged <18 years were calculated using age-specific and geographically defined population data obtained from the Colorado Department of Local Affairs, Demography Office. Influenza hospitalizations in Minnesota throughout the state are reportable to the Minnesota Department of Health; Minnesota influenza hospitalization rates in children and adolescents aged <18 years were calculated using age-specific and statewide population data obtained from CDC WONDER.

¶ RSV hospitalizations in Colorado were from the Denver metropolitan area; RSV hospitalization rates in children and adolescents aged <18 years were calculated using age-specific and Denver metropolitan population data obtained from the Colorado Department of Local Affairs, Demography Office. Colorado RSV hospitalization data are available during July 2019–December 2022. Minnesota RSV hospitalization rates are from the seven-county Twin Cities metropolitan area; rates in children and adolescents aged <18 years were calculated using age-specific and seven-county metropolitan population data obtained from CDC WONDER. Minnesota RSV hospitalization data were available during October 2018–December 2022.

** COVID-19 cases were not included because of the short period for which data were available and the variations in testing practices and surveillance catchment areas that limit the comparability of data.

these were also the two most common types detected during the baseline period (55.1% type 1; 17.9% type 12). Whole genome sequencing results did not indicate changes in predicted antibiotic susceptibility (*3*) compared with earlier years or expansion of a single clone. Twenty-three isolates were predicted to be susceptible to all antimicrobials; one type 12 isolate was resistant to erythromycin, and two type 77 isolates were resistant to erythromycin, clindamycin, and tetracycline.

The increase in pediatric iGAS cases reported during fall 2022 is important for understanding the impact of the COVID-19 pandemic on the epidemiology of iGAS (*1*). Increased activity of respiratory viruses, in combination with reduced exposure to GAS and associated development of protective immunity to common *emm* types during the COVID-19 pandemic (*4*), might have predisposed children to iGAS infection when pandemic restrictions were lifted. The proportion of patients with preceding or concurrent influenza infections suggests that influenza vaccination might reduce the risk for iGAS, as has been demonstrated for varicella vaccination (*5*). Clinicians should consider iGAS as a possible cause of severe illness in children, adolescents, and adults, particularly among patients at increased risk,*** and offer influenza and varicella vaccination to eligible persons who are not up to date.

*** Persons at increased risk of iGAS include those aged ≥65 years; American Indian or Alaska Native persons; residents of long-term care facilities; those with medical conditions such as diabetes, malignancy, immunosuppression, chronic kidney, cardiac, or respiratory disease; those with wounds or skin disease; and those who inject drugs or are experiencing homelessness.

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All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. Ruth Lynfield reports participation on the Council of State and Territorial Epidemiologists (CSTE) Executive Board, the National Foundation of Infectious Diseases (NFID) Executive Board, the Program Committee for ID Week, and serving as associate editor of the American Academy of Pediatrics Red Book (the fee for which was donated to the Minnesota Department of Health), and receipt of support from these groups to attend CSTE, American Academy of Pediatrics Committee on Infectious Diseases, NFID, and ID Week meetings. Samuel R. Dominguez reports institutional support from Pfizer and Biofire Diagnostics, unrelated to the current work, and consulting fees (paid to his institution) from Biofire Diagnostics and Karius. Jennifer Zipprich reports that her spouse is employed by Pfizer. No other potential conflicts of interest were disclosed.

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Errata

Vol. 72, No. 2

In the report "Vaccination Coverage with Selected Vaccines and Exemption Rates Among Children in Kindergarten — United States, 2021–22 School Year," multiple errors occurred. On page 26, in the eighth line of the first paragraph, the sentences should have read, "Nationwide, vaccination coverage with 2 doses of measles, mumps and rubella vaccine (MMR) was **93.0**%[¶]; with the state-required number of diphtheria, tetanus, and acellular pertussis vaccine (DTaP) doses was **92.7**%[**]; with poliovirus vaccine (polio) was **93.1%**[††]; and with the state-required number of varicella vaccine doses was 92.8%.[§§] Compared with the 2020–21 school year, vaccination coverage decreased **0.8–0.9** percentage points for all vaccines. Although 2.6% of kindergartners had an exemption for at least one vaccine,[¶¶] an additional **4.4**% who did not have an exemption were not up to date with MMR."

On page 27, in the fifth line of the first paragraph, the sentences should have read, "During the 2021–22 school year, immunization programs reported **3,835,130** children enrolled in kindergarten in 49 states and the District of Columbia.[¶¶¶] Reported estimates are based on **3,536,546** (92.2%) children who were surveyed for vaccination coverage, **3,686,775 (96.1%)** surveyed for exemptions, and **2,527,578 (65.9%)** surveyed for grace period and provisional enrollment status." Also on page 27, in the first line of the second column, the sentences should have read, "Nationally, 2-dose MMR coverage was **93.0**% (range = 78.0% [Alaska] to **≥98.6% [Mississippi]**), with coverage of ≥95% reported by **14** states and <90% by nine states and the District of Columbia (Table). DTaP coverage was **92.7**% (range = 78.0% [Alaska] to **≥98.6% [Mississippi]**); coverage of ≥95% was reported by **15** states and of <90% by 12 states and the District of Columbia. Polio vaccination coverage was **93.1**% (range = 77.1% [Alaska] to **≥98.6% [Mississippi]**), with coverage of ≥95% reported by **14** states and <90% by 10 states and the District of Columbia. Varicella vaccination coverage nationally was 92.8% (range = 76.1% [Alaska] to **≥98.6% [Mississippi]**), with **13** states reporting coverage ≥95% and nine states and the District of Columbia reporting <90% coverage." Also on page 27, in the third line of the third paragraph in the second column, the sentences should have read, "Nationwide, **4.4**% of kindergarten students were not fully vaccinated and not exempt. Among the **35** states and the District of Columbia with MMR coverage <95%, all but four could potentially achieve ≥95% MMR coverage if all nonexempt kindergartners who were within a grace period, provisionally enrolled, or otherwise enrolled in school without documentation of vaccination were vaccinated (Figure 2)."

On page 28, the Table contained multiple errors. In the first row, labeled "National estimate," the value under the column heading "Kindergarten population" should have been **3,835,130**, the value under the heading "2 Doses MMR" should have been **93.0**, the value under the heading "5 Doses DTaP" should have been **92.7**, and the value under the heading "4 Doses polio" should have been **93.1**. In the 28th row, labeled "Mississippi," the value under the column heading "Kindergarten population" should have been **36,524**; the value under the heading "2 Doses MMR" should have been **≥98.6**; the value under the heading "5 Doses DTaP" should have been **≥98.6**; the value under the heading "4 Doses polio" should have been **≥98.6**; the value under the heading "2 Doses VAR" should have been **≥98.6**; and the value under the heading "Grace period or provisional enrollment, %" should have been **1.0**.

On page 29, the last two sentences in the 13th footnote should have read, "****Data reported from **3,536,546** kindergartners were assessed for coverage, **3,686,775** for exemptions, and **2,527,578** for grace period or provisional enrollment. Estimates represent rates for populations of coverage (**3,835,130**), exemptions (**3,835,130**), and grace period or provisional enrollment (**2,604,872**)."

On page 30, in the 13th line of the first paragraph, the sentences should have read, "MMR coverage of **93.0**% translates to **approximately** 250,000 kindergartners who are potentially not protected against measles; clusters of unvaccinated and undervaccinated children can lead to outbreaks of vaccine-preventable diseases." Also on page 30, in the fourth line of the second paragraph, the sentence should have read, "Nationwide, **4.4**% of kindergarten students were not fully vaccinated with MMR and not exempt, and this percentage increased in most states compared with 2020–21."

On page 30, in Figure 1, the line for "MMR, 2 doses" for 2021–2022, should have indicated a value of **93.0%**.

On page 31, in Figure 2, the bar for "MMR coverage" among kindergartners for Mississippi should have indicated a value of **98.6**%. The bar for "MMR not up to date and no exemption" for kindergartners in Delaware should have indicated a value of **2.4**%, and for South Carolina, should have indicated a value of **4.6%**.

On page 32, in the Summary box, the second line in the second paragraph should have read, "An additional **4.4**% without an exemption were not up to date with measles, mumps and rubella vaccine."

Supplementary materials have also been corrected.

Errata

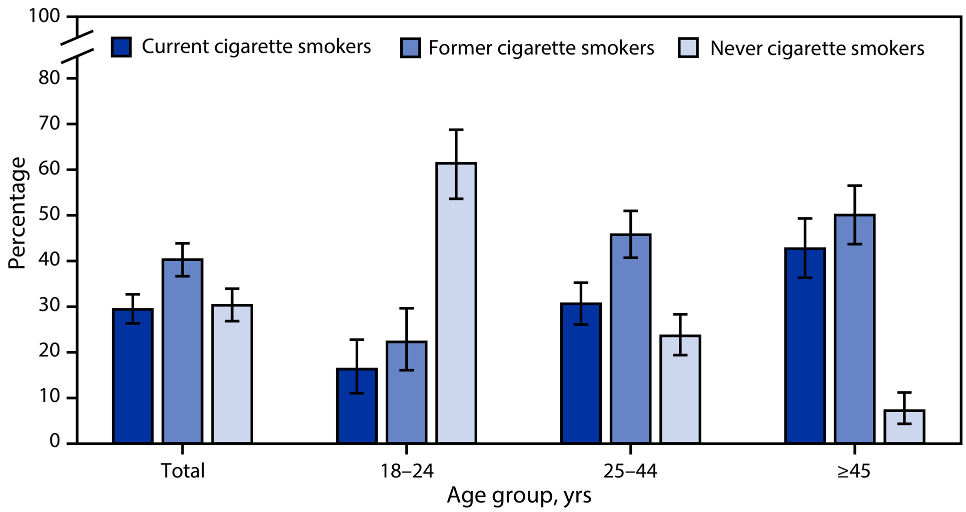
Vol. 72, No. 7

In the report "Preliminary Estimates of Effectiveness of Monovalent mRNA Vaccines in Preventing Symptomatic SARS-CoV-2 Infection Among Children Aged 3–5 Years — Increasing Community Access to Testing Program, United States, July 2022–February 2023," on page 181, the fifth sentence should have read, "By November–December 2022, **87%** of U.S. children aged 6 months–4 years had evidence of infection-induced SARS-CoV-2 immunity[¶¶¶¶¶]; however, caregivers reported previous SARS-CoV-2 infection >3 months earlier for only approximately 20% of children in this analysis, and, therefore, the analysis was not adjusted for previous infection."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage Distribution* of Cigarette Smoking Status† Among Current Adult E-Cigarette Users,§ by Age Group — National Health Interview Survey, United States, 2021¶



* With 95% CIs indicated by error bars.

† Current smokers are persons who have smoked at least 100 cigarettes in their lifetime and currently smoke cigarettes every day or some days. Never smokers are persons who have not smoked 100 cigarettes in their lifetime. Former smokers are persons who have smoked at least 100 cigarettes in their lifetime but do not currently smoke cigarettes.

§ Current e-cigarette users are persons who have ever tried an e-cigarette or other electronic vaping product even once and are now using every day or some days. The percentage of adults aged ≥18 years currently using e-cigarettes was 4.5%.

¶ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

In 2021, 4.5% of U.S. adults were current e-cigarette users. Among adult e-cigarette users overall, 29.4% also were current cigarette smokers, 40.3% were former cigarette smokers, and 30.3% had never been cigarette smokers. Among e-cigarette users aged 18–24 years, 16.3% were current smokers, 22.3% were former smokers, and 61.4% had never been cigarette smokers. Among those aged 25–44 years, 30.6% were current smokers, 45.8% were former smokers, and 23.6% had never smoked cigarettes. Among those aged ≥45 years, 42.7% were current smokers, 50.1% were former smokers, and 7.2% had never smoked cigarettes. Younger e-cigarette users were more likely to have never smoked cigarettes, and older e-cigarette users were more likely to be current or former cigarette smokers.

Source: National Center for Health Statistics, National Health Interview Survey, 2021. https://www.cdc.gov/nchs/nhis/index.htm

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For more information on this topic, CDC recommends the following link: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm

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