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Community Assessment for Mental and Physical Health Effects After Hurricane Irma — Florida Keys, May 2019

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Disasters can adversely affect population health, resulting in increased need for health services. Hurricane Irma made landfall in the Florida Keys (Monroe County) as a Category 4 hurricane on September 10, 2017. The hurricane caused substantial damage to 65% of homes and resulted in 40 persons injured and 17 deaths from hurricane-related causes.* During 2018, the county suicide rate increased to 34.9 per 100,000 population from the 5-year (2013–2017) average of 25.2 per 100,000 population (*1*). In May 2019, 20 months after the hurricane, the Florida Department of Health (FDOH) conducted a modified Community Assessment for Public Health Emergency Response (CASPER) to assess the community's mental, physical, and economic health and develop public health interventions to decrease the suicide rate. A consenting adult member from 231 households was interviewed, and a weighted cluster analysis was conducted to estimate the number and percentage of households throughout the Florida Keys with a particular response, as well as the number and percentage of persons at risk for suicide. During the 20 months since Hurricane Irma, 17% of households reported a need for a mental health care provider; 37.9% of these did not receive those services. A modified CASPER was used to calculate population estimates of suicide risk in an area of high landfall for hurricanes; estimated population suicide risk was 7.3%. Respondents reported worsening of respiratory conditions (17.7%), anxiety (17.0%), and depression (11.3%). Emergency preparedness plans should consider strengthening mental health service delivery after a hurricane, particularly during the long-term recovery phase.

During May 21–23, 2019, FDOH conducted a modified CASPER in the Florida Keys (*2*). The sampling frame included all households in the Florida Keys according to the 2010 U.S. Census data. Census blocks were used as clusters to select nonoverlapping sections of the Florida Keys. To increase statistical power, FDOH selected 35 clusters rather than the traditional 30 (*2*). Interview teams comprising one FDOH staff member and one community member selected seven households from each cluster using systematic random sampling. Within households, teams randomly selected an adult aged ≥18 years.† All participating households received brochures with information on health services provided locally and contact information for the suicide lifeline. If there was no answer after the first visit, teams left a written notification asking for a household member to call FDOH and provide

* https://www.monroecounty-fl.gov/726/Hurricane-Irma-Recovery

† An adult within a household was randomly chosen according to criteria determined by the interview team, such as the adult with the next birthday or the adult who correctly guessed a predetermined number.

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their availability for completing the survey interview. Teams substituted households following the same systematic selection process after a home was found vacant, three visits were made with no answer, or a household member refused to participate. The goal was to complete 245 interviews in 3 days.

FDOH, along with state and local stakeholders, developed a questionnaire to assess mental, physical, and economic health. Suicide risk was assessed using the four-item Suicide Behaviors Questionnaire-Revised (SBQ-R) (*2*,*3*). Item one of the SBQ-R evaluates lifetime suicidal ideation and suicide attempt, item two assesses frequency of suicidal ideation during the past 12 months, item three evaluates lifetime threats of suicidal behavior, and item four assesses likelihood of suicidal behavior someday (*3*). The range of scores for each item are as follows: item one, 1–4; item two, 1–5; item three, 1–3; and item four, 0–6. A combined score of ≥7 indicates a lifetime risk for some suicide behavior with sensitivity of 93% and a specificity of 95% (*3*,*4*).

Respondents were asked about health conditions that had worsened, need for physical and mental health care, and barriers to receiving care among any household member since Hurricane Irma. Household-level weighted estimates, percentages, and 95% confidence intervals (CIs) were calculated based on the household's selection probability. Individual-level weight was calculated to account for the probability of an adult being selected within the household for individual-level questions (e.g., SBQ-R). All weighted frequencies, percentages, and CIs were calculated in SAS software (version 1.7.0_76; SAS Institute).

This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.[§] The FDOH Ethics and Human Research Protection Program deemed the modified CASPER to be nonresearch with a primary intent of a public health response. All participants provided oral consent.

Field teams visited 458 households for potential survey inclusion. After accounting for replacements and refusals, field teams were able to enroll 231 households in the allotted time for a contact rate of 50.4% (the number of completed interviews divided by the total number of households for which contact was attempted). Eleven questionnaires were excluded from individual-level question estimates because of incomplete data that did not allow for individual weights. As a result, 220 questionnaires were available to evaluate individual-level responses. Median respondent age was 58 years (mean = 56 years; interquartile range = 44–67), 29% were aged ≥65 years, the median number of persons per household was two, and the median reported household income was $65,000. Seventeen percent of respondents reported that someone in the household needed mental health services. Among those, 37.9% did not receive needed services, with 56.2% reporting cost as a barrier (Table 1). Respondents were asked if "a person

[§] 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.

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TABLE 1. Estimated household mental health needs, barriers to care, and suicide risk 20 months after Hurricane Irma — Community Assessment for Public Health Emergency Response, Florida Keys, 2019

Characteristic	Household	
	Estimated no.	% (95% CI)
Needed mental health services (n = 231)		
Yes	7,657	17.0 11.1–22.8)
No	35,104	77.7 (71.7–83.6)
Don't know or refused	—*	—
Missing	1,639	3.6 (0.7–6.5)
Received needed services (n = 38)†		
Yes	4,651	60.7 (48.5–73.0)
No	2,899	37.9 (25.8–50.0)
Don't know, refused, or missing	—	—
Cost as a barrier to access care (n = 12)§,¶		
Yes	1,629	56.2 (21.3–91.1)
No	1,270	43.8 (8.9–78.8)
Suicide risk, persons, SBQ-R Scale (n = 207)††		
Risk§§	6,037	7.3 (3.3–11.2)
No risk	77,021	92.7 (88.8–96.7)

Abbreviations: CI = confidence interval; SBQ-R = Suicide Behaviors Questionnaire-Revised.

* Dashes indicate number of the responses was too few to be weighted for each option.
† Only among those households responding that they needed mental health services.
§ Only among those households responding that they did not receive needed services.
¶ Multiple responses were permitted.
** Estimate based on the individual-level SBQ-R questions.
†† An adult is defined as being at risk if the SBQ-R score is ≥7.
§§ https://www.aetnabetterhealth.com/louisiana/assets/pdf/providers/communications/SDQ-Color.pdf

TABLE 2. Estimated number and percentage of households reporting worsened health conditions, provider needs, and barriers to care 20 months after Hurricane Irma — Community Assessment for Public Health Emergency Response, Florida Keys, 2019

Characteristic	Household	
	Estimated no.	% (95% CI)
Worsened health conditions (n = 231)*		
Respiratory conditions	7,991	17.7 (13.0–22.4)
Anxiety	7,702	17.0 (10.1–23.9)
Depression	5,103	11.3 (5.7–16.9)
Fatigue	3,904	8.6 (3.7–13.6)
Insomnia	3,451	7.6 (4.0–11.3)
Hypertension	2,777	6.1 (2.0–10.3)
Other†	4,229	9.4 (4.5–14.2)
Needed a primary care doctor or pediatrician (n = 231)		
Yes	28,984	64.1 (55.9–72.4)
No	15,328	33.9 (26.1–41.8)
Don't know, refused, or missing	—§	—
Received needed services (n = 146)¶		
Yes	26,328	90.8 (85.1–96.6)
No	2,433	8.4 (2.9–13.9)
Don't know, refused, or missing	—	—
Barriers to access care (n = 12)**		
No doctor nearby	1,464	60.2 (25.5–94.8)
Cost	1,378	56.6 (23.3–90.0)

Abbreviation: CI = confidence interval.

* Multiple responses were permitted.
† Includes diabetes, poor appetite, fibromyalgia, and other medical conditions.
§ Dashes indicate number of the responses was too few to be weighted for each option.
¶ Only among those households responding that they needed a primary doctor or pediatrician.
** Only among those households responding that they did not receive needed services.

should generally sort out their own mental health problems"; 17.7% responded affirmatively. Thirteen questionnaires were excluded from the suicide risk estimate because at least one of the SBQ-R items was missing, for a final sample size of 207. The SBQ-R risk scores identified an estimated weighted suicide risk in the Florida Keys adult population of 7.3% (i.e., 7.3% are at some risk for suicide) (Table 1).

The three health conditions most commonly reported as worsening since the hurricane were respiratory problems (17.7%), anxiety (17.0%), and depression (11.3%) (Table 2). Sixty-four percent of households had at least one member who needed a primary care doctor or pediatrician for any health care need after the hurricane; 90.8% of those households received the needed care. Lack of doctors nearby and cost were the two barriers most frequently reported by persons who did not receive care.

Discussion

The survey took place 20 months after Hurricane Irma in response to an increased suicide rate in the year after hurricane landfall. The modified CASPER aimed to assess the potential long-term effects of Hurricane Irma on the population.

This study describes the use of a modified CASPER to establish a population estimate of suicide risk after a disaster. This assessment established a reference point for suicide risk in the Florida Keys after a hurricane using SBQ-R scores. The identified suicide risk will be compared with future suicide risk estimates for the evaluation of future mental health intervention strategies.

Although 17% of respondents reported a need for mental health services for at least one household member, approximately 40% of those needing such services did not receive them. The most commonly reported barrier to receiving mental health services was limited financial resources. Other reports have documented the increased need for mental health services after a disaster (*5*–*7*). The current findings highlight the importance of increasing access to mental health services after the initial phase of disaster relief, when assistance is readily available, specifically when communities realize the limitations of disaster assistance during the long-term recovery phase of a disaster (*6*).

Building mental health service delivery into emergency preparedness plans could help emergency management and public health programs address the mental health needs during short- and long-term disaster recovery, particularly among persons with limited financial resources. Stakeholders, including nonprofit organizations and mental health care providers, might

consider increasing the visibility of mental health services when emotional lows are expected, such as during the next hurricane season and hurricane anniversaries (*6*). Primary care providers who are trained to recognize signs of depression and suicide risk can connect persons with needed services earlier. Suicide prevention needs can be addressed by incorporating prevention strategies from CDC's Preventing Suicide: A Technical Package of Policy, Programs, and Practices (*8*).

In 64.1% of interviewed households, at least one resident needed a primary care doctor at some point during the 20 months after Hurricane Irma. Cost and unavailability of doctors were identified as barriers to accessing care. Providing transportation to health care services as part of disaster response, incentivizing providers to serve in person, and offering telemedicine services could increase access to care for underserved residents and those experiencing financial limitations (*9*,*10*). Access to health care services during a disaster response might also be improved by establishing connections with primary care and mental health service providers during the preparedness step of emergency management.

The findings in this report are subject to at least three limitations. First, persons who were severely affected by the hurricane and relocated outside the Florida Keys were not captured in this assessment. Second, interview teams encountered many empty households, possibly because the Florida Keys is popular for seasonal residents and tourists, and the CASPER took place before seasonal residents were expected to return to their homes, which contributed to a low contact rate. Finally, because FDOH did not collect data on sex, race, and ethnicity, more detailed demographic information on respondents could not be reported.

This modified CASPER was an important tool for evaluating the effects of Hurricane Irma by providing a point prevalence of the population's suicide risk after a hurricane, identifying information gaps regarding community health needs, and providing information that will improve local disaster plans, response, and recovery activities. If resources allow, serial CASPERs could be conducted every 6 months throughout the duration of a hurricane or other environmental disaster recovery phases (immediate to long-term recovery) to address community needs in a timely manner. Emergency preparedness plans should consider strengthening mental health service delivery after a hurricane, particularly during the long-term recovery phase.

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Summary

What is already known about this topic?

Community Assessment for Public Health Emergency Response (CASPER) is a useful tool to assess community needs after a disaster.

What is added by this report?

A modified CASPER was used to calculate population estimates of suicide risk in an area of high landfall for hurricanes; estimated suicide risk was 7.3%. During the 20 months after Hurricane Irma, residents of the Florida Keys reported worsening of anxiety (17.0%) and depression (11.3%) and a need for mental health services (17.0%).

What are the implications for public health practice?

Emergency preparedness plans should consider strengthening mental health service delivery after a hurricane or other disaster, particularly during the long-term recovery phase.

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Prevalence of Voluntary Medical Male Circumcision for HIV Infection Prevention — Chókwè District, Mozambique, 2014–2019

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Male circumcision is an important preventive strategy that confers lifelong partial protection (approximately 60% reduced risk) against heterosexually acquired HIV infection among males (*1*). In Mozambique, the prevalence of male circumcision was 51% when the voluntary medical male circumcision (VMMC) program began in 2009. The Mozambique Ministry of Health set a goal of 80% circumcision prevalence among males aged 10–49 years by 2019 (*2*). CDC analyzed data from five cross-sectional surveys of the Chókwè Health and Demographic Surveillance System (CHDSS) to evaluate progress toward the goal and guide ongoing needs for VMMC in Mozambique. During 2014–2019, circumcision prevalence among males aged 15–59 years increased 42%, from 50.1% to 73.5% (adjusted prevalence ratio [aPR] = 1.42). By 2019, circumcision prevalence among males aged 15–24 years was 90.2%, exceeding the national goal (*2*). However, circumcision prevalence among males in older age groups remained below 80%; prevalence was 62.7%, 54.5%, and 55.7% among males aged 25–34, 35–44, and 45–59 years, respectively. A multifaceted strategy addressing concerns about the safety of the procedure, cultural norms, and competing priorities that lead to lack of time could help overcome barriers to circumcision among males aged ≥25 years.

CHDSS catchment areas located in Gaza Province included all households in Chókwè town and seven rural villages, representing approximately 100,000 of 183,000 total Chókwè District residents of all ages and approximately 58,000 residents aged 15–59 years. HIV is hyperendemic in this area; in 2015, HIV prevalence among males aged 15–49 years was higher in Gaza Province (17.6%) than in all other provinces in Mozambique (3.3%–15.8%) (*3*). During the analysis period, circumcision by certified providers was routinely offered at Hospital Rural de Chókwè and via a mobile operating unit at four temporary (outreach) sites in Chókwè District. Services were regularly advertised through local radio stations and promoted by community leaders during public engagements. In addition, lay counselors encouraged circumcision during household-based HIV-testing services, and campaigns that included free transportation to circumcision sites were periodically conducted in public spaces (e.g., markets, workplaces, and schools) to create demand. During 2014–2019, a total of 19,201 males aged ≥10 years in Chókwè District underwent voluntary medical circumcision.[†]

Prevalences of male circumcision and HIV infection among males were assessed with five independent, annual cross-sectional surveys of approximately 13% (survey rounds R1 and R2) or 23% (survey rounds R3–R5) of randomly selected CHDSS catchment area households.[§] All members of selected households aged 15–59 years were eligible to participate in an interview, which included each male's self-reported circumcision status, reasons for not being circumcised, and intention to undergo circumcision in the next 12 months (if applicable). Females were asked about their beliefs about male circumcision and whether they had ever discussed circumcision with a male sex partner, friend, or family member. All participants provided written consent. After the interview, consenting participants received a rapid HIV test in accordance with the national testing algorithm and provided 1–2 mL of whole blood. During R1–R3, stored blood specimens from males with HIV infection were used to evaluate recency of HIV infection.[¶]

Male circumcision aPRs (adjusted for age group, residence of Chókwè town [urban] or a CHDSS village [rural], and marital status [single versus nonsingle[**]]) and differences in HIV prevalence and incidence between circumcised and uncircumcised males were analyzed using SAS (version 9.3; SAS Institute). Annualized HIV incidence and 95% confidence intervals (CIs) were calculated using R (version 3.5.2; R Foundation).[††, §§] All estimates were

* Deceased.

† Program performance data were obtained from Jhpiego (a nonprofit affiliate of Johns Hopkins University), which is a VMMC service provider.

§ Survey dates were as follows: R1 = April 2014–April 2015, R2 = May 2015–January 2016, R3 = March–December 2016, R4 = March–November 2017, and R5 = April 2018–March 2019.

¶ Assessed recency of HIV infection with a limiting-antigen (LAg) avidity enzyme immunoassay using dried blood spots. LAg-avidity tests were not performed on specimens during R4 and R5. https://www.maximbio.com/Products/92003/Maxim-HIV-1-Limiting-Antigen-Avidity-%28LAg-Avidity%29-DBS-EIA-Kit%2C-192-Tests

** Nonsingle was a composite variable of married, union, divorced, separated, and widowed.

†† Recency test results were used to calculate annualized HIV incidence. Participants who reported using antiretroviral therapy or who had HIV viral load suppression (<1000 copies/mL) were defined as having long-term infection. Participants with recent infection were assumed to have a mean duration of recent infection of 161 days. Analysis was conducted using R Incidence Estimation Tools package. https://github.com/SACEMA/inctools

§§ Data across R1–R3 were pooled because of eight recent infections that occurred after repeat participants were excluded.

census-weighted by sex, age group, and geographic area (urban or rural). Because all selected household members aged 15–59 years were eligible for the surveys, confidence intervals were adjusted for household clustering. The protocol was approved by the local institutional review board and the National Committee for Bioethics in Health of Mozambique. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.¶¶

The number of participants during R1–R5 ranged from 3,034 to 5,089 (response rate of contacted residents was 64.2%–84.3%). Overall, males accounted for 30% of all participants. Among 5,904 male survey participants during R1–R5, 5,837 (98.9%) reported their circumcision status. During 2014–2019, prevalence of male circumcision increased 42%, from 50.1% during R1 to 73.5% during R5 (aPR = 1.42) (Table 1). The largest increases occurred among males who resided in rural areas (37.0% to 62.5%; aPR = 1.77) and males aged 15–24 years (58.4% to 90.2%; aPR = 1.47). The increase in circumcision prevalence from R1 to R5 was less pronounced among older age groups studied: 25–34 years (44.7% to 62.7%), 35–44 years (39.6% to 54.5%), and 45–59 years (42.1% to 55.7%). Single males and those residing in urban areas were more likely to be circumcised than were nonsingle males or those living in rural areas; differences in circumcision prevalence between males living in urban and rural areas decreased from R1 (aPR = 1.55) to R5 (aPR = 1.17) (Table 1).

Among males aged 25–59 years who participated in R5 (April 2018–March 2019), few (3.0%) who were circumcised had undergone the procedure during the previous year. A considerable proportion (44.7%) of uncircumcised males in this age group reported that they intended to undergo circumcision during the next year (Table 2); these males were less aware (70.5%) than were their circumcised counterparts (85.4%) that male circumcision provides partial protection against HIV infection (aPR = 1.21; 95% CI = 1.07–1.37). Common reasons for not undergoing circumcision included fear of complications (26.6%),*** not perceiving male circumcision as part of one's culture (17.2%), and lack of time (17.0%). Nearly all females who participated during R5 (96.0%) agreed that males should be circumcised.†††

HIV prevalence was lower among circumcised males than among uncircumcised males across all survey rounds (Figure). The age-adjusted difference in HIV prevalence between circumcised and uncircumcised males was significantly lower

¶¶ 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 composite variable for fear of complications included risk for injury to penis, risk for infection, and pain caused by the procedure.

††† R1–R4 with a similar proportion.

TABLE 1. Male circumcision prevalence by sociodemographic characteristics and survey round — Chókwè Health Demographic Surveillance System, Chókwè District, Mozambique, 2014–2019

Characteristic	Round 1 (Apr 2014–Apr 2015) N = 1,109		Round 2 (May 2015–Jan 2016) N = 872		Round 3 (Mar–Dec 2016) N = 1,362		Round 4 (Mar–Nov 2017) N = 1,318		Round 5 (Apr 2018–Mar 2019) N = 1,176		Round 5 versus Round 1
	% (95% CI)	aPR* (95% CI)	% (95% CI)	aPR* (95% CI)	% (95% CI)	aPR* (95% CI)	% (95% CI)	aPR* (95% CI)	% (95% CI)	aPR* (95% CI)	aPR* (95% CI)
All males	**50.1 (46.8–53.6)**	**N/A**	**57.1 (53.4–61.1)**	**N/A**	**65.5 (62.4–68.7)**	**N/A**	**66.5 (63.4–69.8)**	**N/A**	**73.5 (70.6–76.6)**	**N/A**	**1.42 (1.33–1.52)**
Age group, yrs											
15–24	58.4 (54.0–63.2)	Ref	72.0 (67.5–76.8)	Ref	82.7 (79.8–85.7)	Ref	84.7 (81.9–87.6)	Ref	90.2 (88.0–92.4)	Ref	1.47 (1.36–1.60)
25–34	44.7 (38.3–52.2)	0.81 (0.68–0.97)	42.0 (34.5–51.2)	0.62 (0.51–0.77)	53.9 (46.8–62.2)	0.69 (0.59–0.81)	53.1 (45.0–62.6)	0.68 (0.57–0.82)	62.7 (55.6–70.6)	0.77 (0.69–0.87)	1.40 (1.16–1.70)
35–44	39.6 (32.0–49.1)	0.73 (0.58–0.93)	46.1 (36.9–57.5)	0.70 (0.55–0.88)	48.6 (40.3–58.5)	0.64 (0.52–0.78)	45.6 (37.2–55.8)	0.60 (0.48–0.75)	54.5 (45.8–64.7)	0.68 (0.57–0.82)	1.37 (1.04–1.80)
45–59	42.1 (34.2–51.7)	0.78 (0.62–0.99)	42.7 (33.8–53.9)	0.66 (0.51–0.84)	43.2 (35.6–52.4)	0.59 (0.47–0.72)	49.5 (41.2–59.3)	0.67 (0.55–0.81)	55.7 (47.1–66.0)	0.71 (0.59–0.85)	1.33 (1.02–1.73)
Marital status											
Nonsingle†	41.6 (37.3–46.4)	Ref	44.0 (38.9–49.8)	Ref	51.0 (46.2–56.4)	Ref	52.4 (47.5–57.9)	Ref	57.6 (52.6–63.0)	Ref	1.42 (1.31–1.53)
Single	59.8 (55.3–64.6)	1.12 (0.97–1.29)	70.1 (65.4–75.1)	1.18 (1.03–1.36)	76.7 (73.2–80.3)	1.14 (1.01–1.28)	80.1 (76.7–83.7)	1.12 (1.01–1.26)	87.5 (84.8–90.2)	1.08 (0.99–1.17)	1.48 (1.29–1.69)
Residence§											
Rural	37.0 (33.1–41.3)	Ref	46.5 (42.2–51.2)	Ref	57.9 (54.4–61.6)	Ref	59.2 (55.7–63.0)	Ref	62.5 (58.6–66.7)	Ref	1.77 (1.58–1.99)
Urban	56.7 (52.4–61.5)	1.55 (1.36–1.76)	62.6 (57.5–68.0)	1.36 (1.21–1.52)	69.4 (65.2–73.9)	1.18 (1.10–1.26)	70.3 (65.9–74.9)	1.15 (1.08–1.23)	79.1 (75.3–83.2)	1.17 (1.11–1.23)	1.34 (1.24–1.45)

Abbreviations: aPR = adjusted prevalence ratio; CI = confidence interval; N/A = not applicable; Ref = referent group.

* Adjusted for age group, marital status, and urban or rural residence.

† Nonsingle was a composite variable of married, union, divorced, separated, and widowed.

§ Rural indicates residence in one of seven district villages; urban indicates residence in Chókwè town.

TABLE 2. Knowledge, attitudes, and beliefs related to circumcision among males aged 25–59 years and females aged 15–59 years – Chókwè Health Demographic Surveillance System (Round 5), Chókwè District, Mozambique, April 2018–March 2019

Sex, circumcision status, and beliefs	% (95% CI)
Males	
Circumcised	
Underwent MC in the past year	3.0 (1.4–6.3)
Know that MC is partially protective against HIV infection	85.4 (80.5–90.5)
Uncircumcised	
Intend to undergo MC in the next year	44.7 (37.6–53.0)
Know that MC is partially protective against HIV infection	70.5 (63.4–78.5)
Reason for not undergoing circumcision*	
Any reason	>99.5% (NC)
Other†	55.5 (48.4–63.7)
Fear of complications§	26.6 (20.5–34.4)
Not part of my culture	17.2 (12.3–24.1)
Lack of time	17.0 (12.1–23.9)
Risk for injury to penis	13.3 (9.1–19.4)
Pain caused by procedure	9.3 (5.7–15.2)
Risk for infection	6.4 (3.5–11.4)
Does not prevent STI	1.9 (0.6–6.3)
Does not prevent HIV	1.9 (0.6–6.3)
Risk for impotence	0.6 (0.1–2.4)
Costs too much money	0.6 (0.1–2.4)
Sex is worse/less pleasurable	<0.5 (NC)
Partner does not want me to be circumcised	<0.5 (NC)
Looks unnatural	<0.5 (NC)
Risk for infertility	<0.5 (NC)
Contrary to my religious beliefs	<0.5 (NC)
Females	
Believe males should be circumcised	96.0 (95.1–96.9)
Ever discussed circumcision with a male sex partner or male friend or family member	29.2 (27.2–31.4)

Abbreviations: CI = confidence interval; MC = medical circumcision; NC = not calculated; R5 = round five; STI = sexually transmitted infection.

* Participants could indicate multiple reasons. All participants in survey round R5 (April 2018–March 2019) indicated at least one reason why they did not undergo circumcision.

† "Other" reason for not undergoing circumcision was a free text field. No data existed for 50.5% of responses (unweighted). Of responses with data, lack of time was the most common reason for not undergoing circumcision (32.0% of unweighted data).

§ Composite variable combining risk for injury to penis, risk for infection, or pain caused by procedure.

during R1–R4 (R1: HIV prevalence 12.7% versus 25.7% [aPR = 0.67; p = 0.005]; R2: HIV prevalence 10.5% versus 30.9% [aPR = 0.55; p = <0.001]; R3: HIV prevalence 9.6% versus 28.9% [aPR = 0.62; p = 0.002]; R4: HIV prevalence 11.2% versus 32.1% [aPR = 0.65; p = 0.005]). The pattern was similar during R5, but the difference was not statistically significant (R5: HIV prevalence 11.8% versus 27.3% [aPR = 0.81; p = 0.188]). During R1–R3, annual HIV incidence was 0.2% among circumcised males and 3.2% among uncircumcised males (incidence difference p = 0.02).

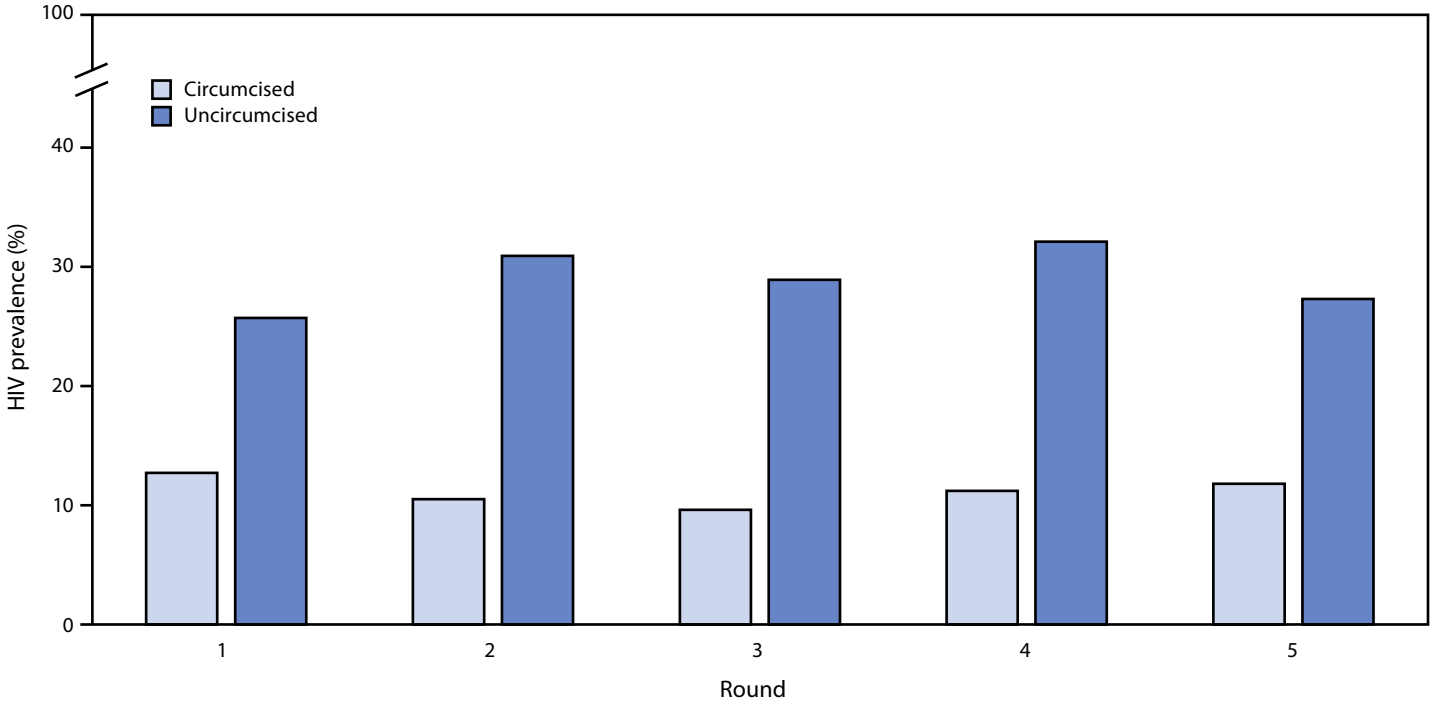
Discussion

During 2014–2019, the prevalence of circumcision increased 42% among males aged 15–59 years in the Chókwè District of Mozambique, which has a high HIV prevalence, after implementation of a program to promote circumcision for HIV prevention. The prevalence of circumcision in 2019 was lower among males aged 25–59 years than among younger males and remains a critical gap because peak incidence of HIV in Mozambique occurs among males aged 35–39 years (*4*). For the VMMC program to exert its most immediate public health impact, males in the age group or groups with the highest HIV incidence need to become circumcised.

Circumcision prevalence did not reach the target of 80% among males aged 25–59 years despite a high proportion who stated an intent to become circumcised, indicating unaddressed barriers among these males. This analysis identified various barriers (e.g., fear of complications, not perceiving male circumcision as part of one's culture, or lack of time), indicating that a multifaceted approach is needed to increase circumcision among these males. The VMMC program could address commonly reported barriers by expanding the availability of services through extended hours and additional community-based services, and by conducting campaigns specifically targeting males aged 25–59 years. The program should also address competing priorities that lead to lack of time (*5*), promote and ensure the safety of circumcision (*6*), and engage community leaders and other important influencers to promote circumcision (*5*). In addition, females, who nearly universally supported circumcision in the CHDSS, could be encouraged to promote circumcision with male sex partners, family members, and friends (*7*). Lastly, a knowledge gap among uncircumcised males of the partially protective benefit of male circumcision illustrates the continued need for education regarding the benefits of male circumcision in Chókwè District. However, the remaining gap in circumcision among males aged 25–59 years could result from a higher proportion being in monogamous sexual relationships compared with those aged 15–24 years and, consequently, a lower perceived need for the procedure.

As expected, HIV prevalence and incidence were lower among circumcised males than among uncircumcised males during R1–R5, even after adjusting for age. Although HIV prevalence was lower for circumcised males than uncircumcised males during R5, the difference was not statistically significant after adjusting for age. The lack of statistical significance might be attributed to an increasing proportion of older males, many of whom had HIV infections, undergoing circumcision, or higher mortality among HIV-positive males, more of whom were uncircumcised compared with HIV-negative males. Also,

FIGURE. HIV prevalence among males aged 15–59 years, by circumcision status and survey round*,† — Chókwè Health Demographic Surveillance System, Chókwè District, Mozambique, 2014–2019



Abbreviations: aPR = age-adjusted prevalence ratio; CI = confidence interval; R = round.
* R1: April 2014–April 2015; R2: May 2015–January 2016; R3: March–December 2016; R4: March–November 2017; R5: April 2018–March 2019.
† aPRs (95% CIs) were calculated by survey round: R1 = 0.67 (0.51–0.89); R2 = 0.55 (0.40–0.76); R3 = 0.62 (0.46–0.83); R4 = 0.65 (0.49–0.88); and R5 = 0.81 (0.60–1.11).

lower power to detect differences because of a smaller sample size of older males in R5 or self-misclassification of circumcision status by uncircumcised males related to a desire to align with perceived preference of CHDSS survey staff, especially as increasing proportion of males in Chókwè were circumcised, could contribute to this finding.

The findings in this report are subject to at least six limitations. First, these findings do not reflect trends among males aged 10–14 years, a group that accounted for approximately 50% of VMMC clients in Mozambique (*8*). Second, although annual surveys were based on a random sample of households and results were weighted to the census, the generalizability of these findings outside of the CHDSS in Chókwè District (or Mozambique) is unknown. Third, self-reported circumcision status can be unreliable (*9*), but it might be more accurate in areas where male circumcision is not a local cultural practice (*10*). Fourth, although a large proportion of uncircumcised males stated an intent to become circumcised, this could reflect a social desirability bias among some who had no intention of being circumcised. Fifth, because the study included few incident HIV infections, recency results needed to be pooled across R1–R3. Finally, differences in other HIV risk behaviors (e.g., number of sex partners) could account for the association of lower HIV prevalence with male circumcision.

This analysis demonstrates increasing prevalence of male circumcision in the context of VMMC program implementation. Reaching 90% circumcision prevalence among males aged 15–24 years in CHDSS is a notable achievement, which was attained with a circumcision program that involved routine and campaign VMMC service delivery, public engagement for demand creation, circumcision promotion by community health workers, and free transportation. Given the proven benefit of circumcision to reduce the risk for HIV infection, the lower prevalence among males aged 25–59 years in Chókwè District justifies continued promotion of VMMC services as a critical component of the HIV response in this hyperendemic area. Fear of complications, cultural reasons, and lack of time were among the most commonly reported reasons for not undergoing circumcision by males aged 25–59 years. A multifaceted strategy could address barriers to circumcision. These include reassuring the population that services are safe, engaging key influencers, providing convenient service delivery, addressing the competing priorities of males eligible for VMMC, and shifting social norms.

Summary

What is already known about this topic?

Circumcision reduces the risk for heterosexually acquired HIV infection among males and is an important HIV-preventive strategy in Mozambique. Voluntary medical male circumcision programs have been supported by the Mozambique Ministry of Health since 2009.

What is added by this report?

During 2014–2019, the prevalence of male circumcision increased 42% in Chókwè District in southern Mozambique. The largest increase occurred among males aged 15–24 years; the prevalence among those 25–59 years remained below the national objective of 80%. Fear of complications, cultural reasons, and lack of time were among the most common reasons reported for not undergoing circumcision by males aged 25–59 years.

What are the implications for public health practice?

A multifaceted strategy addressing concerns about the safety of the procedure, cultural norms, and competing priorities could help overcome barriers to circumcision among males aged ≥25 years.

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Morbidity and Mortality Weekly Report

Symptoms of Depression, Anxiety, Post-Traumatic Stress Disorder, and Suicidal Ideation Among State, Tribal, Local, and Territorial Public Health Workers During the COVID-19 Pandemic — United States, March–April 2021

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Increases in mental health conditions have been documented among the general population and health care workers since the start of the COVID-19 pandemic (*1–3*). Public health workers might be at similar risk for negative mental health consequences because of the prolonged demand for responding to the pandemic and for implementing an unprecedented vaccination campaign. The extent of mental health conditions among public health workers during the COVID-19 pandemic, however, is uncertain. A 2014 survey estimated that there were nearly 250,000 state and local public health workers in the United States (*4*). To evaluate mental health conditions among these workers, a nonprobability–based online survey was conducted during March 29–April 16, 2021, to assess symptoms of depression, anxiety, post-traumatic stress disorder (PTSD), and suicidal ideation among public health workers in state, tribal, local, and territorial public health departments. Among 26,174 respondents, 53.0% reported symptoms of at least one mental health condition in the preceding 2 weeks, including depression (32.0%), anxiety (30.3%), PTSD (36.8%), or suicidal ideation (8.4%). The highest prevalence of symptoms of a mental health condition was among respondents aged ≤29 years (range = 13.6%–47.4%) and transgender or nonbinary persons (i.e., those who identified as neither male nor female) of all ages (range = 30.4%–65.5%). Public health workers who reported being unable to take time off from work were more likely to report adverse mental health symptoms. Severity of symptoms increased with increasing weekly work hours and percentage of work time dedicated to COVID-19 response activities. Implementing prevention and control practices that eliminate, reduce, and manage factors that cause or contribute to public health workers' poor mental health might improve mental health outcomes during emergencies.

A nonprobability–based convenience sample of public health workers was invited to complete a self-administered, online, anonymous survey during March 29–April 16, 2021. All persons who worked at a state, tribal, local, or territorial health department for any length of time in 2020 were eligible to participate.* National public health membership associations† emailed a link to the survey to all members (approximately 24,000), and supervisors were asked to cascade the survey to all workers within their organization; 26,174 public health workers responded to the survey. The survey included questions on traumatic events or stressors experienced since March 2020,§ demographics, workplace factors, and self-reported mental health symptoms, including depression, anxiety, PTSD, or suicidal ideation, in the past 2 weeks. Mental health symptoms were evaluated using the 9-item Patient Health Questionnaire (PHQ-9) for depression (*5*), the 2-item General Anxiety Disorder (GAD-2) for anxiety (*6*), the 6-item Impact of Event Scale (IES-6) for PTSD (*7*),¶ and one item of the PHQ-9 for suicidal ideation.** Prevalence of symptoms of mental health conditions and suicidal ideation were assessed by demographic characteristics and workplace factors.†† Univariate prevalence ratios were calculated using Poisson regression with 95% confidence intervals estimated using a robust standard error. Analyses were completed using RStudio software (version 1.2.1335; RStudio). This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.§§

Overall, 53.0% of respondents reported symptoms of at least one adverse mental health condition in the preceding 2 weeks. Prevalences of symptoms of depression,

* Respondents who did not report working at a state, tribal, local, or territorial public health agency or department in 2020 were excluded from the analysis.

† Membership associations that participated were the Association of Public Health Laboratories (APHL), the Association of State and Territorial Health Officials (ASTHO), the Council of State and Territorial Epidemiologists (CSTE), and the National Association of County and City Health Officials (NACCHO).

§ Respondents were asked if they had experienced specific traumatic events or stressors since March 2020, when COVID-19 was declared a pandemic; choices were yes/no/skip question.

¶ Symptoms of depression, anxiety, and post-traumatic stress disorder were scored and categorized by severity according to thresholds established by these validated tools. Those who scored ≥10.0 out of 27 on the PHQ-9 for depression, ≥3.0 out of 6 on the GAD-2 for anxiety, or ≥1.75 out of 4 on the IES-6 for PTSD were considered symptomatic for the respective conditions.

** Respondents who indicated that they would be better off dead or thought of hurting themselves at any time in the past 2 weeks were categorized as experiencing suicidal ideation.

†† Mental health outcome counts might not sum to total number of respondents because of missing data; counts for each category are those who answered all validated survey questions for that outcome.

§§ 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.

Summary

What is already known about this topic?

Increases in mental health conditions have been documented among the general population and health care workers during the COVID-19 pandemic; however, data on public health workers are limited.

What is added by this report?

Among 26,174 surveyed state, tribal, local, and territorial public health workers, 53.0% reported symptoms of at least one mental health condition in the past 2 weeks. Symptoms were more prevalent among those who were unable to take time off or worked ≥41 hours per week.

What are the implications for public health practice?

Implementing prevention and control practices that eliminate, reduce, and manage factors that cause or contribute to public health workers' poor mental health might improve mental health outcomes during emergencies.

anxiety, PTSD, and suicidal ideation were 32.0%, 30.3%, 36.8%, and 8.4%, respectively (Table 1). The highest prevalences of symptoms of a mental health condition or suicidal ideation were among respondents aged ≤29 years (range = 13.6%–47.4%), transgender or nonbinary persons of all ages (range = 30.4%–65.5%), and those who identified as multiple races (range = 12.1%–43.4%); prevalence of symptoms of PTSD was higher among respondents who had a postbaccalaureate graduate education (40.7%).

Most (92.6%) respondents reported working directly on COVID-19 response activities; the majority (59.2%) worked ≥41 hours in a typical week since March 2020. The prevalences of all four mental health outcomes and the severity of symptoms of depression or PTSD increased as the percentage of work time spent directly on COVID-19 response activities and number of work hours in a typical week increased (Table 1) (Figure). Public health workers who were unable to take time off from work when they needed were nearly twice as likely to report symptoms of an adverse mental health condition (prevalence ratio range = 1.84–1.93) as were those who could take time off. Among those not able to take time off from work (8,586), the most common reasons were concern about falling behind on work (64.4%), no work coverage (60.6%), and feeling guilty (59.0%); 18.2% reported that their employer did not allow time off from work. Needing mental health counseling/services in the last 4 weeks, but not receiving these services, was reported by nearly one in five (19.6%) respondents. Employee assistance programs were available to nearly two thirds (66.1%) of respondents but were accessed by only 11.7% of those respondents; 27.3% of all respondents did not know whether their employer offered an employee assistance program.

Respondents reported experiencing traumatic events or stressors since March 2020, including feeling overwhelmed by workload or family/work balance (72.0%), receiving job-related threats because of work (11.8%), and feeling bullied, threatened or harassed because of work (23.4%); 12.6% of respondents reported having received a diagnosis of COVID-19 (Table 2). Respondents who reported traumatic events or stressors, either personal or work-related, were more likely to report symptoms of PTSD than respondents who did not experience these events or stressors.

Discussion

Among a convenience sample of 26,174 state, tribal, local, and territorial public health workers, approximately one half experienced symptoms of a mental health condition in the 2 weeks preceding the survey, with highest prevalences reported among younger respondents, and transgender or nonbinary respondents. Public health workers who reported certain workplace practices, such as long work hours and the inability to take time off, were more likely to have experienced symptoms of a mental health condition. Implementing prevention and control practices that eliminate, reduce, and manage workplace factors[¶¶] that cause or contribute to public health workers' adverse mental health status[***] might improve mental health outcomes during this and other public health emergencies.

The overall prevalence of symptoms of mental health conditions among public health workers was higher than previously reported in the general population (approximately 40.9%) (*1*). Prevalences of symptoms of depression and anxiety among public health workers were similar to those in previous reports among health care workers (*3*); however, prevalence of PTSD symptoms among public health workers was 10%–20% higher than that previously reported among health care workers (*2*), frontline personnel (*3*), and the general public (*1*). Symptoms of PTSD disproportionately affected public health workers who experienced work-related traumatic stressors (e.g., felt inadequately compensated or felt unappreciated at work), particularly those factors that affect workers' personal lives (e.g., felt disconnected from family and friends because of workload). Traumatic and stressful work experiences related to the COVID-19 pandemic might have played a role in elevating the risk for experiencing symptoms of PTSD among public health workers.

Increases in adverse mental health symptoms among workers have been linked to increased absenteeism, high turnover, lower productivity, and lower morale, which could influence the effectiveness of public health organizations during emergencies (*8*,*9*). Among public health worker respondents, nearly 20% reported that their employer did not allow them to take

¶¶ https://www.cdc.gov/niosh/twh/guidelines.html
*** https://unhealthywork.org/category/mental-health-outcomes/

TABLE 1. Mental health symptoms among 26,174 state, tribal, local, and territorial public health workers during the past 2 weeks, by demographic characteristics and work factors — United States, March–April 2021

Characteristic	No.	Depression* (n = 23,112†) Prevalence, %	Depression* (n = 23,112†) PR (95% CI)	Anxiety* (n = 23,610†) Prevalence, %	Anxiety* (n = 23,610†) PR (95% CI)	PTSD* (n = 22,248†) Prevalence, %	PTSD* (n = 22,248†) PR (95% CI)	Suicidal ideation (n = 23,317†) Prevalence, %	Suicidal ideation (n = 23,317†) PR (95% CI)
Overall	**26,174***	**32.0**	—	**30.3**	—	**36.8**	—	**8.4**	—
Age group, yrs									
≤29	3,525	41.4	2.09 (1.92–2.28)	44.7	2.81 (2.56–3.09)	47.4	2.03 (1.88–2.19)	13.6	2.98 (2.46–3.60)
30–39	5,461	35.2	1.78 (1.63–1.93)	37.1	2.33 (2.12–2.56)	42.3	1.81 (1.68–1.95)	10.3	2.26 (1.87–2.73)
40–49	5,102	32.3	1.63 (1.50–1.78)	29.1	1.83 (1.66–2.01)	37.3	1.60 (1.48–1.73)	7.5	1.65 (1.36–2.01)
50–59	4,925	28.8	1.45 (1.33–1.59)	23.5	1.47 (1.33–1.63)	32.0	1.37 (1.26–1.48)	6.0	1.32 (1.08–1.62)
≥60	2,830	19.8	Ref	15.9	Ref	23.4	Ref	4.6	Ref
Sex									
Male	3,904	28.2	Ref	24.4	Ref	33.2	Ref	9.9	Ref
Female	19,873	32.3	1.15 (1.09–1.21)	31.2	1.28 (1.20–1.36)	37.2	1.12 (1.07–1.18)	7.9	0.81 (0.72–0.90)
Transgender or nonbinary	147	62.4	2.21 (1.93–2.54)	61.1	2.21 (1.88–2.59)	65.5	1.97 (1.74–2.24)	30.4	3.10 (2.37–4.06)
Race/Ethnicity									
Hispanic	1,974	31.4	0.97 (0.90–1.04)	29.9	0.95 (0.89–1.02)	37.5	1.01 (0.95–1.07)	9.9	1.20 (1.03–1.39)
AI/AN, NH	156	36.8	1.14 (0.92–1.40)	32.7	1.04 (0.83–1.31)	41.6	1.12 (0.92–1.35)	7.3	0.89 (0.50–1.57)
Asian, NH	1,009	29.8	0.92 (0.83–1.02)	27.6	0.88 (0.79–0.98)	38.3	1.03 (0.94–1.12)	10.1	1.22 (1.00–1.49)
Black, NH	2,177	25.5	0.79 (0.73–0.85)	21.7	0.69 (0.64–0.75)	29.8	0.80 (0.75–0.86)	6.5	0.79 (0.67–0.94)
NH/PI, NH	96	28.2	0.87 (0.62–1.22)	22.2	0.71 (0.48–1.04)	25.3	0.68 (0.47–0.98)	11.1	1.34 (0.75–2.42)
White, NH	17,218	32.4	Ref	31.4	Ref	37.2	Ref	8.3	Ref
Multiple races, NH	614	40.7	1.26 (1.14–1.39)	37.2	1.19 (1.07–1.32)	43.4	1.17 (1.06–1.28)	12.1	1.46 (1.17–1.83)
Highest educational degree attained									
Less than bachelor's	5,386	32.3	Ref	27.1	Ref	30.1	Ref	6.5	Ref
Bachelor's	9,180	32.6	1.01 (0.96–1.06)	30.6	1.13 (1.07–1.20)	36.8	1.22 (1.16–1.29)	9.1	1.40 (1.24–1.59)
Graduate	9,375	31.2	0.97 (0.92–1.02)	32.0	1.18 (1.12–1.25)	40.7	1.35 (1.29–1.42)	8.9	1.37 (1.22–1.56)
Hrs worked per wk									
≤40	9,993	24.8	Ref	24.4	Ref	27.3	Ref	7.6	Ref
41–60	11,466	34.3	1.38 (1.33–1.45)	32.3	1.32 (1.26–1.38)	40.4	1.48 (1.42–1.54)	8.4	1.10 (1.00–1.21)
>60	3,018	46.6	1.88 (1.79–1.98)	41.6	1.70 (1.61–1.80)	54.2	1.99 (1.89–2.08)	11.0	1.44 (1.27–1.63)
% of time spent on COVID–19 response activities									
None	1,787	23.6	Ref	23.0	Ref	22.3	Ref	7.6	Ref
1–25	5,151	24.9	1.06 (0.96–1.17)	23.5	1.02 (0.92–1.13)	24.3	1.09 (0.98–1.21)	7.5	0.99 (0.82–1.21)
26–50	3,432	28.9	1.23 (1.11–1.36)	26.7	1.16 (1.05–1.29)	31.6	1.42 (1.28–1.57)	8.4	1.12 (0.91–1.37)
51–75	3,283	31.6	1.34 (1.21–1.48)	30.6	1.33 (1.20–1.47)	37.0	1.66 (1.50–1.84)	8.6	1.14 (0.93–1.40)
≥76	10,620	37.9	1.61 (1.47–1.76)	35.9	1.56 (1.42–1.71)	47.0	2.11 (1.92–2.32)	8.9	1.18 (0.99–1.41)
Can take time off from work									
Yes	13,507	23.5	Ref	23.0	Ref	27.9	Ref	6.2	Ref
No	8,586	45.3	1.93 (1.85–2.00)	42.4	1.85 (1.77–1.92)	51.5	1.84 (1.78–1.91)	12.0	1.92 (1.76–2.10)

Abbreviations: AI/AN = American Indian or Alaska Native; CI = confidence interval; IES-6 = 6-item Impact of Event Scale; GAD-2 = General Anxiety Disorder; NH = non-Hispanic; NH/PI = Native Hawaiian or Pacific Islander; PHQ-9 = 9-item Patient Health Questionnaire; PR = prevalence ratio; PTSD = post-traumatic stress disorder; Ref = referent group.

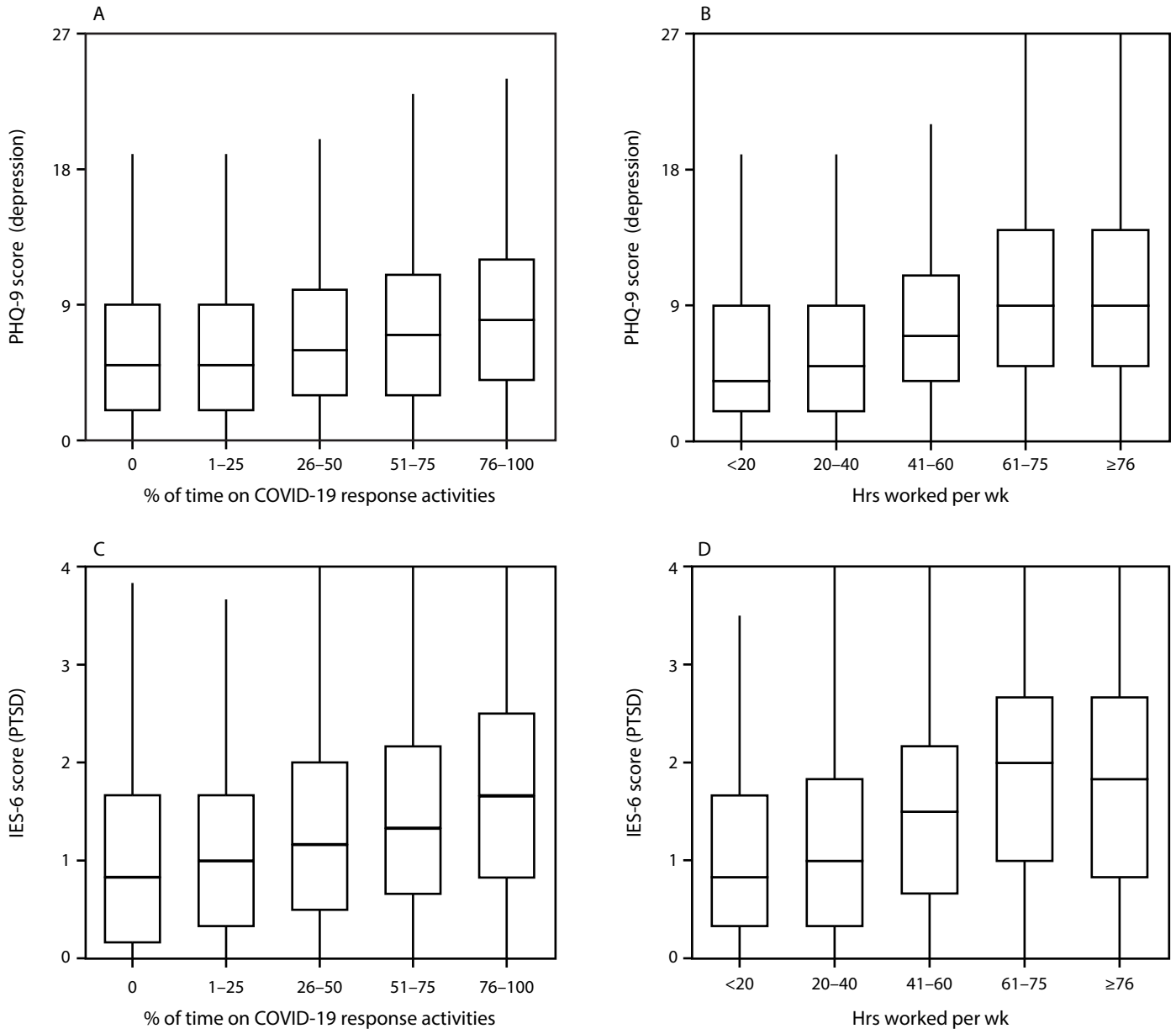
* Symptoms of mental health conditions were scored and categorized by severity. Respondents who scored ≥10.0 out of 27 on the PHQ-9 for depression, ≥3.0 out of 6 on the GAD-2 for anxiety, or ≥1.75 out of 4 on the IES-6 for PTSD were considered symptomatic for the respective conditions. Respondents who indicated that they would be better off dead or thought of hurting themselves at any time in the past 2 weeks were categorized as experiencing suicidal ideation.

† Some categories might not sum to 26,174 because of missing data. Denominators for categories are respondents who answered the questions to be scored.

time off; the inability to take time off had the largest impact on reporting symptoms of mental health. Approximately one quarter of public health workers did not know whether their workplace offered an employee assistance program. Even where available, employee assistance programs were not commonly accessed. Several strategies could reduce adverse mental health symptoms among public health workers during public health emergencies. For example, expanding staffing size (e.g., recruiting surge personnel to backfill positions) and implementing flexible schedules might reduce the need for long work hours; encouraging workers to take regular breaks and time off could help avoid overwork and reduce the risk for adverse mental health outcomes. In addition, implementing, evaluating, and promoting use of employee assistance programs could improve employee resiliency and coping.

The findings in this report are subject to at least four limitations. First, the study used a nonprobability–based convenience sample of public health worker respondents, and a completion rate could not be determined. Although the participating national public health membership associations reach many public health workers, the findings might not be representative of all state, tribal, local, and territorial public health workers in the United States.

FIGURE. Distribution* of 9-item Patient Health Questionnaire scores for depression and 6-item Impact of Event Scale scores for post-traumatic stress disorder† among state, tribal, local, and territorial public health worker respondents,§ by percentage of work time spent directly on COVID-19 response activities for the majority of 2020 (panels A, C), and hours worked in a typical week since March 2020 (panels B, D) — United States, March–April 2021



Abbreviations: IES-6 = 6-item Impact of Event Scale; PHQ-9 = 9-item Patient Health Questionnaire; PTSD = post-traumatic stress disorder.

* Upper and lower levels of boxes indicate 75th and 25th percentiles, respectively; horizontal line indicates median; whiskers indicate observation nearest to 1.5 x interquartile range.

† Self-reported symptoms of depression or PTSD were evaluated; respondents who scored ≥10.0 out of 27 on the PHQ-9 for depression or ≥1.75 out of 4 on the IES-6 for PTSD were considered symptomatic for the respective conditions.

§ Only public health worker respondents who completed all PHQ-9 items (n = 23,112) or all IES-6 items (n = 22,248) are included.

Second, self-reported mental health symptoms were assessed using screening instruments, which does not constitute clinical diagnosis of a mental health disorder; however, the screening instruments have been clinically validated (*5*–*7*). Third, participants were surveyed about symptoms experienced in the 2 weeks preceding the survey, which might not reflect all symptoms experienced during the pandemic. Finally, not all traumatic stressors or events experienced by public health workers were assessed by the survey, such as non–COVID-19 illnesses or financial insecurity.

TABLE 2. Traumatic events or stressors reported by 26,174 state, tribal, local, and territorial public health workers and comparisons* of symptoms of post-traumatic stress disorder† — United States, March–April 2021

Traumatic event or stressor/Response	No.§	PTSD prevalence, %	PTSD PR (95% CI)
Personal-related			
Had COVID-19			
Yes¶	2,834	36.7	1.03 (0.98–1.09)
Maybe**	3,310	42.4	1.19 (1.14–1.25)
No	16,266	35.6	Ref
Got divorced or separated			
Yes	747	49.6	1.36 (1.27–1.47)
No	22,084	36.3	Ref
Experienced death of a loved one			
Yes	7,580	42.3	1.24 (1.20–1.29)
No	15,403	34.0	Ref
Worried about the health of family and loved ones			
Yes	20,857	39.4	3.11 (2.77–3.48)
No	2,203	12.7	Ref
Felt isolated and alone			
Yes	12,944	49.8	2.49 (2.38–2.60)
No	10,080	20.0	Ref
Work-related			
Felt overwhelmed by workload or family/work balance			
Yes	16,563	45.4	3.10 (2.91–3.30)
No	6,451	14.7	Ref
Felt disconnected from family and friends because of workload			
Yes	14,051	49.0	2.77 (2.64–2.91)
No	8,964	17.7	Ref
Felt inadequately compensated for work			
Yes	13,703	45.2	1.85 (1.78–1.93)
No	9,101	24.4	Ref
Felt unappreciated at work			
Yes	12,362	46.5	1.82 (1.76–1.90)
No	10,551	25.5	Ref
Experienced stigma or discrimination because of work			
Yes	5,962	56.2	1.88 (1.82–1.94)
No	16,944	29.9	Ref
Received job-related threats because of work			
Yes	2,699	61.8	1.85 (1.78–1.92)
No	20,262	33.4	Ref
Felt bullied, threatened, or harassed because of work			
Yes	5,376	59.0	1.97 (1.91–2.03)
No	17,594	30.0	Ref
Interacted often with the public			
Yes	11,143	41.1	1.23 (1.19–1.28)
No	13,318	33.3	Ref
Worried about workplace exposure to COVID-19			
Yes	11,197	42.6	1.36 (1.31–1.41)
No	11,805	31.3	Ref

Abbreviations: IES-6 = 6-item Impact of Event Scale; PR = prevalence ratio; PTSD = post-traumatic stress disorder; Ref = referent group.
* Referent group for all prevalence ratio calculations was not experiencing the traumatic event/stressor (i.e., "No" category).
† Experienced symptoms of post-traumatic stress disorder in the 2 weeks preceding survey, defined as having an IES-6 score ≥1.75 out of 4.
§ Some categories might not sum to 26,174; only those respondents who completed IES-6 questions (N = 22,248) are included in analysis.
¶ Positive COVID-19 test or diagnosis by medical professional.
** Had symptoms compatible with COVID-19 but not tested or test inconclusive.

During the COVID-19 pandemic, public health workers have experienced symptoms of depression, anxiety, PTSD, and suicidal ideation. Addressing work practices that contribute to stress and trauma is critical to managing workers' adverse mental health status during emergency responses. Furthermore, strengthening work systems to encourage behavior changes that promote mental health, such as building awareness of symptoms of mental health conditions and developing sustainable coping strategies, might improve mental health conditions, particularly for public health workers who are at increased

risk, including those who are younger (*10*) or transgender or nonbinary persons. In addition, employee assistance programs could be evaluated and adjusted to be more accessible and acceptable to workers and focus more on building workplace cultures that promote wellness and destigmatize requests for mental health assistance.

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Disparities in Learning Mode Access Among K–12 Students During the COVID-19 Pandemic, by Race/Ethnicity, Geography, and Grade Level — United States, September 2020–April 2021

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On June 29, 2021, this report was posted as an MMWR *Early Release on the* MMWR *website (https://www.cdc.gov/mmwr).*

In response to the COVID-19 pandemic, schools across the United States began transitioning to virtual learning during spring 2020. However, schools' learning modes varied during the 2020–21 school year across states as schools transitioned at differing times back to in-person learning, in part reflecting updated CDC guidance. Reduced access to in-person learning is associated with poorer learning outcomes and adverse mental health and behavioral effects in children (*1*–*3*). Data on the learning modes available in 1,200 U.S. public school districts (representing 46% of kindergarten through grade 12 [K–12] public school enrollment) from all 50 states and the District of Columbia during September 2020–April 2021 were matched with National Center for Education Statistics (NCES) demographic data. Learning mode access was assessed for K–12 students during the COVID-19 pandemic, over time and by student race/ethnicity, geography, and grade level group. Across all assessed racial/ethnic groups, prevalence of virtual-only learning showed more variability during September–December 2020 but declined steadily from January to April 2021. During January–April 2021, access to full-time in-person learning for non-Hispanic White students increased by 36.6 percentage points (from 38.0% to 74.6%), compared with 31.1 percentage points for non-Hispanic Black students (from 32.3% to 63.4%), 23.0 percentage points for Hispanic students (from 35.9% to 58.9%) and 30.6 percentage points for students of other races/ethnicities (from 26.3% to 56.9%). In January 2021, 39% of students in grades K–5 had access to full-time in-person learning compared with 33% of students in grades 6–8 and 30% of students in grades 9–12. Disparities in full-time in-person learning by race/ethnicity existed across school levels and by geographic region and state. These disparities underscore the importance of prioritizing equitable access to this learning mode for the 2021–22 school year. To increase equitable access to full-time in-person learning for the 2021–22 school year, school leaders should focus on providing safety-optimized in-person learning options across grade levels. CDC's K–12 operational strategy presents a pathway for schools to safely provide in-person learning through implementing recommended prevention strategies, increasing vaccination rates for teachers and older students with a focus on vaccine equity, and reducing community transmission (*4*).

All data for the analyses were publicly available. Data were collected on learning modes used across 1,200 school districts from all 50 states and the District of Columbia, representing 46% of U.S. K–12 public school enrollment and 90% of students in the 232 most populous U.S. counties.* Information on learning mode was collected through weekly Internet searches of school district webpages, Facebook, and other public sources for each school district, by grade level group (K–5, 6–8, 9–12) or individual grade level, as available, and were classified using the most in-person mode available.† Learning modes were categorized as "full-time in-person" (i.e., access to in-person learning 5 days a week), "virtual-only" (i.e., no access to in-person learning; entirely online, synchronous and asynchronous), or "hybrid" (i.e., access to part-time in-person learning). Data were collected weekly during January–April 2021 and less frequently during September–December 2020 because data collection was not systematized until December 2020.

District enrollment data from the 2019–20 NCES Common Core of Data collected by the U.S. Department of Education (*5*) were used to estimate enrollment in each of the 1,200 assessed school districts. District and grade-level enrollment data by race/ethnicity from the NCES data were matched to learning mode data to estimate weekly numbers of students with access to each learning mode, by race/ethnicity, geography (state and region), and grade level group. The analytic time frame was September 8, 2020–April 23, 2021. Weekly variation in school learning mode was examined over the 2020–21 school year by race/ethnicity for non-Hispanic White students, non-Hispanic Black students, Hispanic students (of any race), and students of other races/ethnicities§; weekly variation was also assessed by grade level for non-Hispanic White students and students of color.¶ To analyze differences in access to virtual-only, hybrid, and full-time in-person learning modes between non-Hispanic White students and students of color by region** and state, CDC

* https://about.burbio.com/methodology/

† For example, districts that offered both full-time in-person and hybrid options to K–5 students are categorized as "full-time in-person for K–5." Grade levels categorized as virtual do not have access to hybrid or full-time in-person learning modes.

§ Other race/ethnicities includes students who identify as American Indian or Alaska Native, Asian or Pacific Islander, or two or more races.

¶ "Students of color" includes all students who identify with a race/ethnicity group other than non-Hispanic White.

** Regions of the United States are defined by NCES. https://nces.ed.gov/nationsreportcard/hsts/tabulations/regions.asp

calculated the mean share of access[††] to learning modes over the entire study period. Trends over time for each race/ethnicity group were analyzed using linear regressions of percentage of students with access on number of weeks from the start of the study period with total district enrollment for the race/ethnicity group as analytic weights. To compare regions and states, the mean percentage of students with access and 95% confidence intervals for the entire study period were calculated using total district enrollment as analytic weights. Stata software (version 16.0; StataCorp) was used to conduct all analyses. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.[§§]

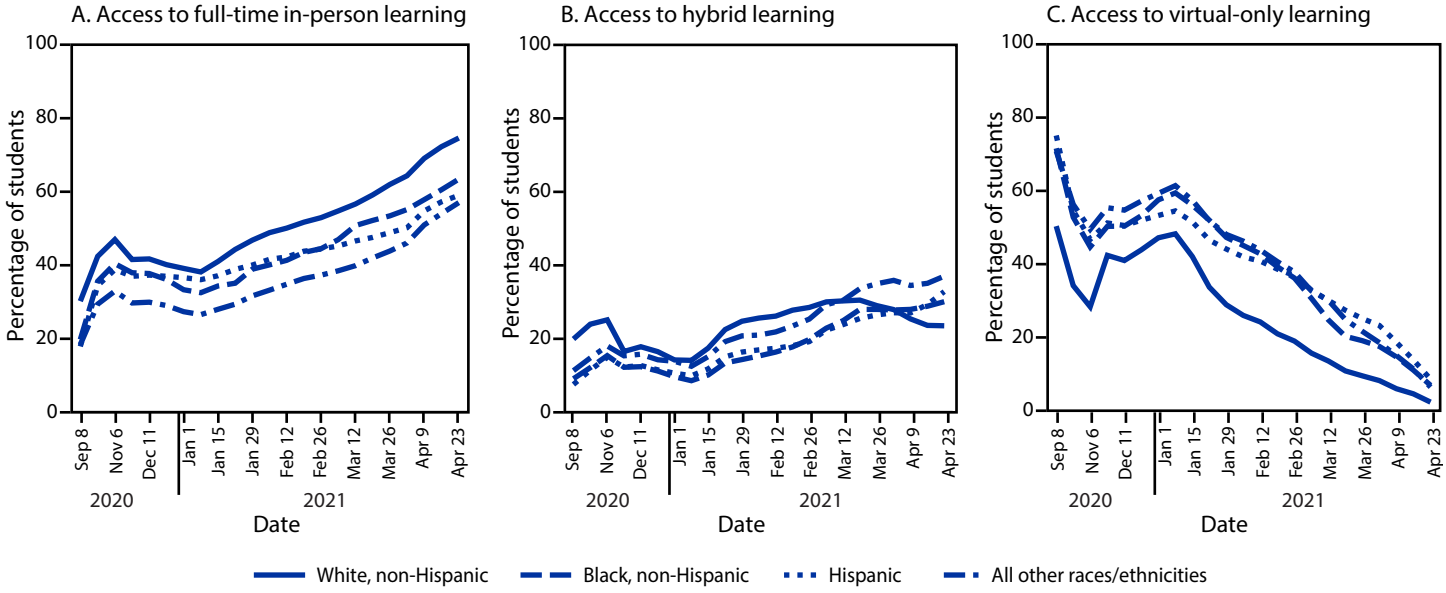
Full-time in-person learning access steadily increased starting January 2021 among all assessed racial/ethnic groups ($p< 0.01$) (Figure 1). During January–April 2021, access to full-time in-person learning for non-Hispanic White students increased by 36.6 percentage points (from 38.0% to 74.6%) compared with 31.1 percentage points for non-Hispanic Black students (from 32.3% to 63.4%), 23.0 percentage points for Hispanic students (from 35.9% to 58.9%), and 30.6 percentage points for students of other races/ethnicities (from 26.3% to 56.9%) (Figure 1). Access to hybrid learning increased by 9.5 percentage points for non-Hispanic White students (from 13.9% to 23.4%) compared with 21.7 percentage points for non-Hispanic Black students (from 8.3% to 30.0%), 23 percentage points for Hispanic students (from 9.7% to 32.7%), and 24.6 percentage points for students of other races/ethnicities (from 12.3% to 36.9%) (Figure 1). Across all assessed racial/ethnic groups, prevalence of virtual-only learning decreased significantly during September 2020–April 2021 (Figure 1).

During January–April 2021, the percentage of students with access to virtual-only learning decreased by 46.0 percentage points for non-Hispanic White students (48.1% to 2.1%), 52.6 percentage points for non-Hispanic Black students (59.3% to 6.7%), 46.1 percentage points for Hispanic students (54.4% to 8.3%), and 55.2 percentage points for students of other races/ethnicities (61.3% to 6.1%). During September 2020-April 2021, students in the South had greater

[††] To calculate mean difference, the percentage of students with access to virtual-only and full-time in-person learning modes was first calculated for each time point during September 2020–April 2021. The average of these percentages was then calculated over the study period for each learning mode. The percentage point difference of these two means is presented. A positive value indicates a higher percentage of students of color in the learning mode compared with non-Hispanic White students. A negative value indicates a higher percentage of non-Hispanic White students in the learning mode compared with students of color.

[§§] 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.

FIGURE 1. Changes in access to full-time in-person (A), hybrid (B), and virtual-only (C) learning,* by race/ethnicity[†] — United States, September 2020–April 2021[§,¶]



* Learning modes are defined as "full-time in-person" (access to in-person learning 5 days a week), "hybrid" (access to part-time in-person learning), and "virtual-only" (no access to in-person learning; entirely online).

† Race/ethnicity data are based on district-level National Center for Education Statistics 2019–20 demographic data (http://nces.ed.gov/ccd/elsi). Hispanic students could be of any race. Students included in "All other races/ethnicities" include non-Hispanic students who are American Indian or Alaska Native, Asian or Pacific Islander, or two or more races.

§ Data before January 1, 2021, were collected less frequently and are not presented at weekly intervals. Data during January 1–April 23, 2021, are presented on a weekly basis. Date labels are condensed for readability.

¶ Access to full-time in-person learning increased significantly for all races/ethnicities ($p<0.01$ for all four regressions), access to hybrid learning increased significantly for all races/ethnicities ($p<0.01$ for all four regressions), and access to virtual learning decreased significantly for all races/ethnicities ($p<0.01$ for all four regressions).

access to full-time in-person learning (62.5%), on average, compared with other regions (Midwest, 37.1%; Northeast, 16.2%; and West, 21.8%). Access to in-person learning varied by state with the lowest mean percent of all students with access in Hawaii (1.3%) and highest in Wyoming and Montana (100%) (Table). In 43 states, access to full-time in-person learning was higher for non-Hispanic White students compared with students of color. The District of Columbia, Delaware, Hawaii, Wyoming, and Montana had the lowest disparity; Ohio and Pennsylvania had the highest.

As of January 8, 39% of K–5 students had access to full-time in-person learning compared with 33% of students in grades 6–8 and 30% of students in grades 9–12; however, differences in full-time in-person learning by race/ethnicity were noted across elementary, middle, and high school levels. During January–April 2021, the difference in access to full-time in-person learning between non-Hispanic White students and students of color in grades K–5 increased by 6.9 percentage points (8.2 percentage points to 15.1 percentage points) compared with increases of 11.4 percentage points at the middle school level (from 2.4 to 13.8) and 12.7 percentage points at the high school level (from 2.1 to 14.8) (Figure 2).

Discussion

During January–April 2021, overall access to full-time in-person learning increased for all K–12 students. However, disparities in access to full-time in-person learning were apparent by race/ethnicity, geography, and school level. The populations with the most access to full-time in-person learning were non-Hispanic White students, students living in the South, and those in grades K–5. These disparities in learning mode during the COVID-19 pandemic underscore the importance of decreasing community transmission and of increasing equitable access to full-time in-person learning for the 2021–22 school year.

Growing evidence suggests virtual learning can be a challenge for many students, leading to learning losses for children and worsening mental health for children and parents (*1*–*3*). Therefore, disparities in access to full-time in-person learning across demographic groups might translate into short-term increases in educational disparities; however, such disparities might be driven by a number of factors (*1*). For example, urban districts might be less likely to open for full-time in-person learning, in part because of higher COVID-19 community rates, and these districts generally include more students of color (*6*). Further, rates of COVID-19 hospitalization and mortality have been higher in communities of color, and districts serving a larger share of these students might have faced more significant public health challenges as they made decisions about reopening schools (*7*,*8*).

The findings in this report are subject to at least five limitations. First, the study assessed access to different learning modes and not how students actually received instruction. Some evidence suggests that families of color are less likely to opt in to full-time in-person school, even when it is an option, because they are more likely to be concerned about their child contracting COVID-19 and about students not complying with COVID-19 mitigation practices in schools (*9*). Second, data included in this report cover only 1,200 school districts out of the 13,057 in the nation (*5*), representing only 46% of public K–12 enrollment in the United States; therefore, although the sampling frame is more representative of larger districts in more populated areas, it is not representative of the entire United States. Third, data were collected from public sources that could reflect inaccuracies if not updated frequently. Fourth, data were collected less frequently during September–December 2020 because data collection was not systematized until December 2020. Finally, these data do not directly measure changes in learning outcomes; such outcomes might be affected by types of learning modes (*1*).

This study documents disparate access to full-time in-person learning across racial/ethnic groups among U.S. K–12 students over the 2020–21 school year, by geography and school level. These results highlight the importance of continued efforts to address inequities in access to the full-time in-person learning mode, including increasing vaccination coverage to reduce community transmission in all populations. Evidence suggests that many K–12 schools that have optimized prevention strategies have safely opened for full-time in-person learning and remained open (*10*). To increase equitable access to full-time in-person learning for the 2021–22 school year, school leaders should focus on providing safety-optimized in-person learning options across grade levels. CDC's K–12 operational strategy presents a pathway for schools to safely provide in-person learning through implementation of recommended prevention strategies, increasing vaccination rates, and reducing community transmission (*4*).

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TABLE. Mean difference in access* to full-time in-person compared with virtual-only learning modes† between non-Hispanic White students and students of color,§ by region and jurisdiction¶ — United States, September 2020–April 2021

Area	Total enrollment included in sample	Full-time in-person access		Virtual-only access	
		Mean percentage of students with access (95% CI)	Mean difference in access for students of color (95% CI)	Mean percentage of students with access (95% CI)	Mean difference in access for students of color (95% CI)
Region					
South	11,733,585	62.5 (61.4 to 63.5)	−3.5 (−4.5 to −2.5)	21.6 (20.7 to 22.5)	3.8 (2.2 to 5.5)
Midwest	3,280,369	37.1 (36.1 to 38.1)	−20.1 (−21.7 to −18.4)	36.7 (35.7 to 37.8)	22.6 (19.3 to 25.9)
West	5,451,104	21.8 (20.8 to 22.7)	−22.6 (−24.3 to −20.9)	58.4 (57.2 to 59.6)	26.7 (24.3 to 29.2)
Northeast	1,974,998	16.2 (15.5 to 17.0)	−12.3 (−14.8 to −9.9)	41.7 (40.6 to 42.8)	31.0 (28.8 to 33.2)
Jurisdiction					
Wyoming	27,751	100.0 (100.0)	0 (—)	0 (—)	0 (—)
Montana	12,488	100.0 (100.0)	0 (—)	0 (—)	0 (—)
Florida	2,679,579	98.4 (97.6 to 99.2)	−1.1 (−3.2 to 1.1)	1.3 (0.5 to 2.1)	1.1 (−1.1 to 3.3)
Arkansas	102,025	81.5 (75.5 to 87.5)	21.3 (20.6 to 22.0)	1.0 (−0.5 to 2.5)	0.4 (−0.4 to 1.1)
Utah	435,494	79.5 (74.7 to 84.3)	−18.9 (−21.0 to −16.9)	2.7 (0.7 to 4.6)	3.6 (2.1 to 5.0)
South Dakota	43,311	76.8 (66.7 to 86.8)	−0.8 (−1.0 to −0.6)	0.0 (—)	0 (—)
Texas	3,054,742	74.8 (73.1 to 76.5)	−13.5 (−15.1 to −11.9)	5.8 (4.9 to 6.8)	4.3 (2.1 to 6.4)
Louisiana	257,164	74.6 (71.0 to 78.1)	−11.0 (−12.5 to −9.5)	1.2 (−0.3 to 2.6)	1.3 (−0.4 to 2.9)
Nebraska	146,720	73.6 (68.8 to 78.5)	−10.6 (−17.9 to −3.3)	3.8 (1.6 to 5.9)	3.8 (0.0 to 7.7)
Alabama	293,702	69.5 (64.3 to 74.6)	−8.8 (−13.2 to −4.5)	17.3 (13.1 to 21.5)	14.8 (10.4 to 19.1)
Mississippi	120,489	69.2 (63.4 to 75.0)	−16.3 (−22.0 to −10.7)	11.2 (6.9 to 15.4)	15.8 (9.1 to 22.5)
Georgia	1,012,693	68.5 (64.5 to 72.6)	−17.3 (−18.0 to −16.6)	23.9 (20.1 to 27.6)	15.1 (12.7 to 17.5)
South Carolina	497,693	67.7 (64.3 to 71.1)	−2.2 (−3.1 to −1.4)	8.9 (6.4 to 11.3)	2.8 (0.9 to 4.8)
North Dakota	44,341	65.8 (57.5 to 74.2)	0.1 (−1.1 to 1.3)	0.6 (−0.6 to 1.8)	0.1 (−0.1 to 0.3)
Arizona	348,120	64.7 (60.4 to 69.1)	−14.2 (−17.2 to −11.2)	25.6 (21.5 to 29.8)	15.6 (11.6 to 19.6)
Iowa	124,369	60.0 (53.8 to 66.2)	−7.1 (−10.3 to −3.8)	10.7 (6.9 to 14.6)	3.7 (0.7 to 6.7)
Tennessee	494,768	58.8 (53.2 to 64.3)	−16.9 (−24.7 to −9.1)	36.6 (30.9 to 42.2)	21.7 (13.2 to 30.1)
Missouri	271,026	55.8 (52.3 to 59.3)	−14.1 (−15.8 to −12.4)	21.5 (18.1 to 24.9)	22.8 (18.6 to 27.0)
Indiana	328,466	55.1 (52.4 to 57.8)	−14.7 (−16.1 to −13.4)	16.1 (13.7 to 18.6)	10.9 (7.1 to 14.8)
Oklahoma	153,078	53.7 (48.1 to 59.3)	−20.5 (−25.8 to −15.1)	26.7 (21.3 to 32.1)	18.1 (11.4 to 24.8)
Kansas	184,604	52.9 (48.1 to 57.7)	−7.4 (−10.9 to −4.0)	29.3 (23.9 to 34.7)	15.0 (11.6 to 18.3)
Idaho	126,946	44.8 (39.4 to 50.2)	−8.4 (−10.3 to −6.5)	13.2 (8.3 to 18.0)	5.0 (1.7 to 8.3)
Colorado	651,020	44.3 (41.5 to 47.2)	−4.6 (−6.2 to −3.0)	28.7 (25.0 to 32.4)	2.4 (0.0 to 4.9)
Vermont	11,215	44.1 (38.1 to 50.2)	−1.5 (−4.1 to 1.0)	8.5 (4.8 to 12.3)	4.4 (2.1 to 6.7)
Michigan	345,524	40.9 (38.5 to 43.2)	−20.7 (−26.8 to −14.7)	44.7 (42.2 to 47.2)	21.6 (15.8 to 27.4)
Alaska	70,370	40.1 (31.9 to 48.3)	−1.4 (−4.9 to 2.1)	41.6 (31.2 to 52.0)	12.5 (8.9 to 16.1)
West Virginia	56,868	39.9 (28.4 to 51.4)	−0.7 (−2.4 to 0.9)	28.4 (18.0 to 38.8)	1.2 (−0.7 to 3.0)
Ohio	499,577	36.8 (34.5 to 39.2)	−23.2 (−25.4 to −21.0)	32.1 (29.9 to 34.4)	21.8 (16.2 to 27.4)
Connecticut	143,101	35.4 (31.9 to 38.9)	−9.8 (−13.4 to −6.3)	19.1 (15.8 to 22.4)	9.9 (7.0 to 12.9)
Rhode Island	43,015	35.1 (30.9 to 39.3)	3.6 (0.8 to 6.4)	26.7 (19.6 to 33.8)	−3.3 (−8.4 to 1.8)
Minnesota	227,000	30.4 (26.5 to 34.3)	−2.1 (−3.6 to −0.5)	50.2 (45.4 to 55.0)	11.9 (8.6 to 15.1)
North Carolina	942,072	25.5 (23.0 to 28.0)	−4.6 (−5.4 to −3.7)	38.5 (34.7 to 42.2)	10.9 (7.9 to 13.8)
Wisconsin	268,237	25.5 (22.3 to 28.8)	−12.9 (−15.7 to −10.2)	59.6 (55.5 to 63.7)	27.3 (22.7 to 31.9)
Pennsylvania	633,775	22.4 (20.8 to 24.0)	−21.5 (−25.6 to −17.5)	44.1 (42.1 to 46.2)	38.6 (35.7 to 41.6)
Kentucky	199,713	17.8 (12.3 to 23.3)	−9.0 (−11.3 to −6.8)	63.4 (56.3 to 70.4)	12.6 (8.4 to 16.7)
Delaware	90,500	15.1 (11.7 to 18.6)	0.0 (−1.1 to 1.0)	27.1 (21.4 to 32.7)	4.1 (1.9 to 6.3)
New Mexico	170,693	14.9 (9.5 to 20.2)	−1.2 (−1.6 to −0.7)	77.2 (71.2 to 83.2)	3.2 (2.0 to 4.3)
New Hampshire	52,543	14.8 (10.7 to 18.9)	−8.5 (−11.4 to −5.5)	25.8 (20.7 to 30.8)	10.7 (6.3 to 15.1)
Nevada	408,723	13.6 (8.6 to 18.5)	−6.4 (−7.3 to −5.4)	65.7 (56.4 to 75.1)	10.8 (8.6 to 12.9)
New York	377,921	13.5 (12.3 to 14.8)	−5.7 (−7.0 to −4.4)	25.1 (23.1 to 27.1)	14.3 (10.9 to 17.7)
Virginia	873,746	12.2 (9.9 to 14.5)	−7.1 (−8.3 to −5.9)	59.2 (55.5 to 62.9)	8.0 (6.8 to 9.1)
Illinois	797,194	10.1 (8.7 to 11.6)	−9.7 (−13.2 to −6.3)	54.0 (51.5 to 56.5)	21.4 (16.7 to 26.1)
Maine	27,647	7.9 (4.6 to 11.3)	−3.1 (−4.8 to −1.5)	3.4 (1.0 to 5.8)	−1.7 (−4.0 to 0.5)
District of Columbia	50,971	7.0 (2.9 to 11.2)	0 (—)	89.6 (85.2 to 94.0)	0 (—)
Massachusetts	239,342	6.8 (5.2 to 8.3)	−4.6 (−8.0 to −1.1)	54.9 (51.2 to 58.5)	32.8 (28.2 to 37.3)
New Jersey	446,439	6.7 (5.5 to 7.9)	−8.5 (−12.5 to −4.4)	59.2 (56.7 to 61.7)	41.4 (37.4 to 45.4)
Oregon	302,998	4.4 (3.1 to 5.7)	−2.5 (−3.5 to −1.5)	80.5 (77.5 to 83.5)	5.5 (3.6 to 7.4)
California	2,327,278	4.0 (3.3 to 4.6)	−5.8 (−6.8 to −4.8)	79.1 (77.6 to 80.6)	17.4 (15.0 to 19.8)
Washington	388,135	2.8 (2.2 to 3.5)	−1.1 (−1.4 to −0.8)	69.0 (66.2 to 71.8)	5.6 (4.1 to 7.1)
Maryland	853,781	2.3 (0.9 to 3.8)	−3.5 (−6.1 to −0.9)	76.9 (73.0 to 80.8)	11.3 (6.4 to 16.1)
Hawaii	181,088	1.3 (−0.3 to 3.0)	0 (—)	52.3 (42.1 to 62.4)	0 (—)

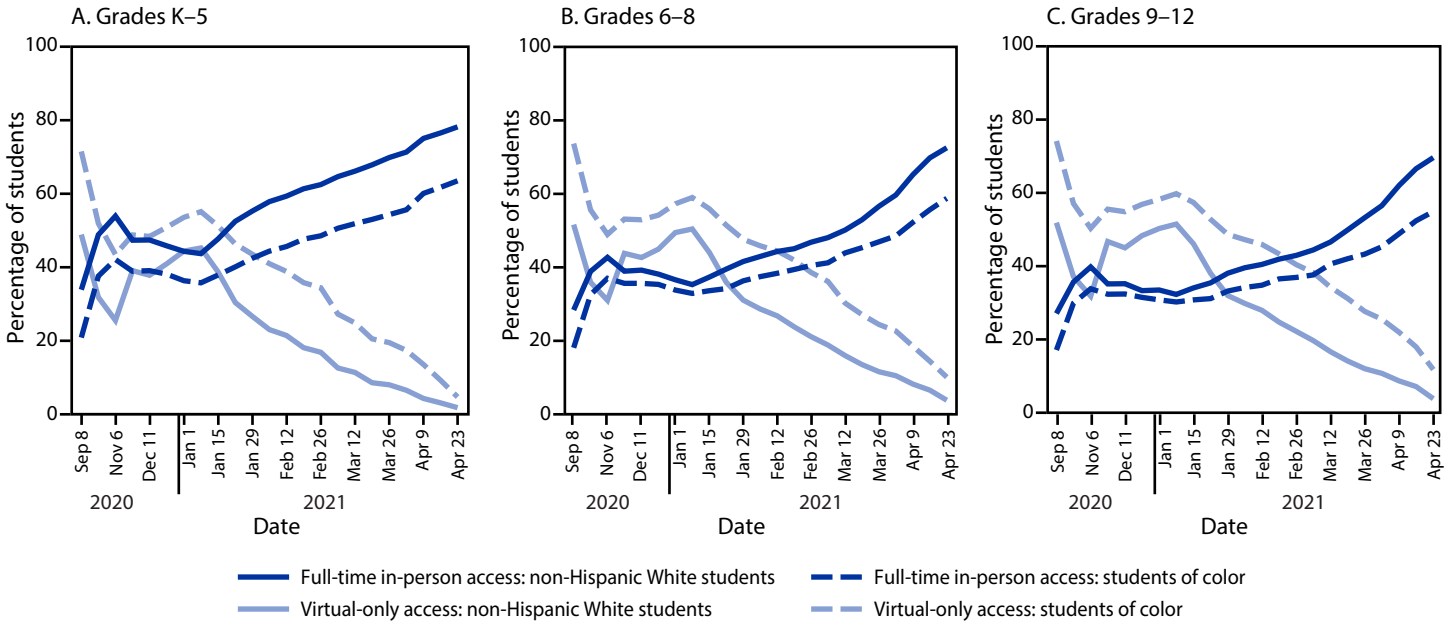
* To calculate mean difference, the percentage of students with access to virtual-only and full-time in-person learning modes was first calculated for each time point during September 2020–April 2021. The average of these percentages was then calculated over the study period for each learning mode. The percentage point difference of these two means is presented. A positive value indicates a higher percentage of students of color in the learning mode compared with non-Hispanic White students. A negative value indicates a higher percentage of non-Hispanic White students in the learning mode compared with students of color.

† The "virtual-only" learning mode is defined as no access to in-person instruction; entirely online, including synchronous and asynchronous instruction. The "full-time in-person" learning mode is defined as access to in-person instruction 5 days a week.

§ Race/ethnicity data are based on district-level National Center for Education Statistics 2019–20 demographic data (https://nces.ed.gov/ccd/elsi). Students of color include all students who identify with a race/ethnicity other than non-Hispanic White, including students who are American Indian or Alaska Native, Asian or Pacific Islander, Black or African American, Hispanic, or two or more races.

¶ Sample includes students who had access to all learning modes, including virtual-only instruction, full-time in-person instruction, and hybrid (access to part-time in-person learning) instruction and mean percent of students with access and 95% confidence intervals are calculated using total district enrollment as analytic weights. Note that the percent of students with access to hybrid instruction is not presented in this table to highlight a focus on virtual access and full-time in-person access. Thus, the columns presenting access to virtual-only and full-time in-person instruction might not sum to 100%.

FIGURE 2. Student access to learning modes,* by grade level and race/ethnicity† — United States, September 2020–April 2021§,¶



* Learning modes are defined as "full-time in-person" (access to in-person learning 5 days a week) and "virtual-only" (no access to in-person learning; entirely online).

† Race/ethnicity data are based on district-level National Center for Education Statistics 2019–20 demographic data (http://nces.ed.gov/ccd/elsi). The "Students of color" category includes all students not identified as non-Hispanic White, including students who are American Indian or Alaska Native, Asian or Pacific Islander, Black or African American, Hispanic, or two or more races.

§ Data before January 1, 2021, were collected less frequently and are not presented at weekly intervals. Data during January 1–April 23, 2021, are presented on a weekly basis. Date labels are condensed for readability.

¶ Trends over time for non-Hispanic White students and students of color by grade level were analyzed using linear regressions of percentage of students with access on number of weeks from the start of the study period with the grade level group's total district enrollment for the race/ethnicity group as analytic weights. Access to full-time in-person learning increased significantly for all three grade level groups for both non-Hispanic White students and students of color ($p<0.01$ for all four regressions), and access to virtual learning decreased significantly for all three grade level groups for both non-Hispanic White students and students of color ($p<0.01$ for all four regressions).

Summary

What is already known about this topic?

Reduced access to in-person learning is associated with poorer learning outcomes and adverse mental health and behavioral effects in children.

What is added by the report?

Although access to in-person, hybrid, and virtual learning modes varied throughout the school year, during January–April 2021, access to full-time in-person learning for non-Hispanic White students increased by 36.6 percentage points, 31.1 percentage points for non-Hispanic Black students, 22.0 percentage points for Hispanic students, and 26.6 percentage points for students of other race/ethnicities.

What are the implications for public health practice?

To increase equitable access to full-time in-person learning for the 2021–22 school year, school leaders should focus on providing safety-optimized in-person learning options across grade levels in all geographic areas. Vaccination and other efforts to reduce levels of community transmission should be intensified.

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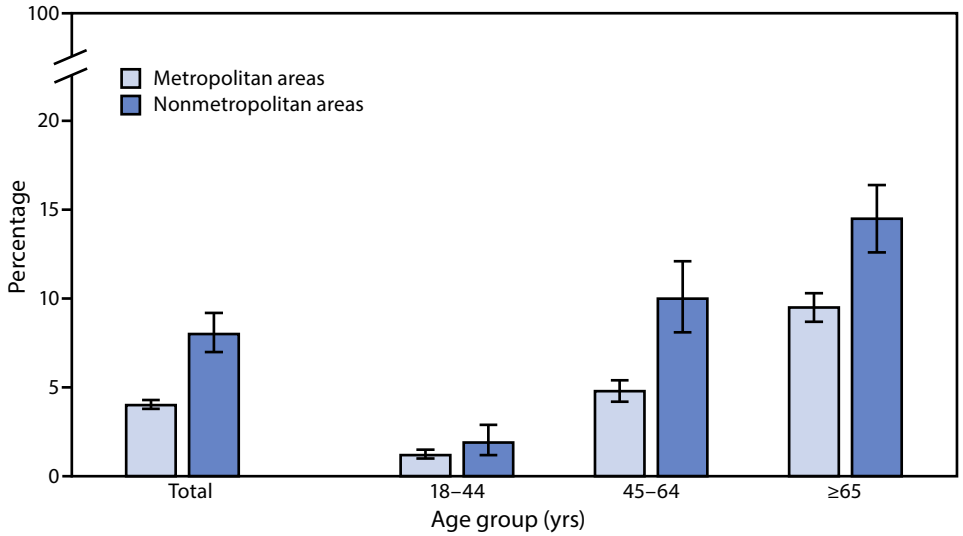
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Adults Aged ≥18 Years with Diagnosed Chronic Obstructive Pulmonary Disease,† by Urbanization Level§ and Age Group — National Health Interview Survey, United States, 2019¶



* With 95% confidence intervals indicated with error bars.
† Based on a positive response to the survey question, "Have you ever been told by a doctor or other health professional that you had chronic obstructive pulmonary disease, COPD, emphysema, or chronic bronchitis?"
§ Urbanization level is based on the Office of Management and Budget's February 2013 delineation of metropolitan statistical areas (MSAs), in which each MSA must have at least one urbanized area of ≥50,000 inhabitants. Areas with <50,000 inhabitants are grouped into the nonmetropolitan category.
¶ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

In 2019, the percentage of adults aged ≥18 years with diagnosed chronic obstructive pulmonary disease (COPD) was higher among those living in nonmetropolitan areas (8.0%) than among those living in metropolitan areas (4.0%). Percentages were higher in nonmetropolitan areas for adults aged 45–64 years (10.0% versus 4.8%) and aged ≥65 years (14.5% versus 9.5%), but the difference by urbanization level was not statistically significant for adults aged 18–44 years (1.9% versus 1.2%). The prevalence of diagnosed COPD increased with age in both nonmetropolitan and metropolitan areas.

Source: National Center for Health Statistics, National Health Interview Survey, 2019. https://www.cdc.gov/nchs/nhis.htm

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