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Association of Mental Health Conditions, Recent Stressful Life Events, and Adverse Childhood Experiences with Postpartum Substance Use — Seven States, 2019–2020

Andrea Stewart, PhD[1,2]; Jean Ko, PhD[1]; Beatriz Salvesen von Essen, MPH[1]; Madison Levecke, MPH[1,3]; Denise V. D'Angelo, MPH[4]; Lisa Romero, DrPH[1]; Shanna Cox, MSPH[1]; Lee Warner, PhD[1]; Wanda Barfield, MD[1]

Most pregnancy-related deaths due to mental health conditions, which include overdose and poisoning related to substance use disorder, occur during the late (43–365-day) postpartum period (*1*). Adverse childhood experiences and stressful life events are associated with increased substance use during pregnancy (*2*,*3*). Pregnancy Risk Assessment Monitoring System (PRAMS) respondents in seven states with high opioid overdose mortality rates were recontacted 9–10 months after giving birth in 2019 and asked about postpartum prescription opioid misuse,* tobacco use, unhealthy alcohol use,† and use of other substances.§ Substance and polysubstance use prevalence estimates were calculated, stratified by mental health and social adversity indicators. Overall, 25.6% of respondents reported postpartum substance use, and 5.9% reported polysubstance use. The following conditions were associated with higher substance and polysubstance use prevalence in postpartum women: depressive symptoms, depression, anxiety, adverse childhood experiences, and stressful life events. Substance use prevalence was higher among women who experienced six or more stressful life events during the year preceding the birth (67.1%) or four adverse childhood experiences related to household dysfunction (57.9%). One in five respondents who experienced six or more stressful life events in the year before giving birth and 26.3% of women with four adverse childhood experiences reported postpartum polysubstance use. Clinical and community- and systems-level interventions to improve postpartum health can include screening and treatment for depression, anxiety, and substance use disorders during the postpartum period. Evidence-based strategies can prevent adverse childhood experiences and mitigate the immediate and long-term harms.¶

PRAMS is a collaboration between CDC and participating jurisdictions to conduct population-based surveillance for maternal experiences before, during, and after pregnancy among women with a recent live birth (*4*). To better understand opioid

* Opioid misuse was defined as taking prescription opioid medication for a reason other than pain or obtained from a source other than a health care provider. https://www.cdc.gov/mmwr/volumes/69/wr/mm6928a1.htm

† Meeting the CDC definition of binge drinking (more than four drinks during a single 2-hour episode) or excessive alcohol use (eight or more drinks per week) since giving birth.

§ Including heroin, marijuana products, cocaine, amphetamines, hallucinogens, tranquilizers, or inhalants.

¶ https://www.cdc.gov/violenceprevention/pdf/preventingACES.pdf

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use and risks for opioid use among postpartum women, PRAMS recontacted respondents from 2019 in seven states with high rates of opioid-involved overdose deaths** 9–10 months after they gave birth. They were asked about use of opioid pain relievers since giving birth, including source and reasons for use, as well as use of tobacco, alcohol, and other substances††; current depression or anxiety§§; and depressive symptoms during the previous 30 days.¶¶ Respondents were also asked whether they had experienced any of four household-dysfunction adverse childhood experiences before age 18 years.*** During the core PRAMS survey, respondents in six of the seven states were asked whether they had experienced any of 14 stressful life events during the year preceding the birth.†††

Postpartum substance use was defined as the misuse of opioid pain relievers, unhealthy alcohol use, or any use of tobacco or other substances since giving birth. Polysubstance use was defined as using two or more of these substances. Data were weighted to account for the PRAMS sample, nonresponse, and noncoverage. Estimates are representative of women with a live birth in each participating state during a 5-month period in 2019.§§§

Weighted prevalence and 95% CIs of postpartum substance and polysubstance use were estimated overall and by age, combined race and ethnicity, education level, health insurance status at the time of recontact, state of residence, previous 30-day depressive symptoms, current depression, current anxiety, number of adverse childhood experiences, and number of stressful life events. Chi-square tests with adjusted Wald F statistics were used to determine statistical significance of

** Kentucky, Louisiana, Massachusetts, Missouri, Pennsylvania, Utah, and West Virginia.

†† Respondents were asked "Since your baby was born, have you taken or used __________?" with the following options: "Cannabidiol or CBD products"; "Marijuana or hash"; "Synthetic marijuana, or K2 or Spice"; "Heroin, also known as smack, junk, Black Tar, or Chiva"; "Amphetamines, also known as uppers, speed, crystal meth, crank, ice, or agua"; "Cocaine, also known as crack, rock, coke, blow, snow, or nieve"; "Tranquilizers, also known as downers or ludes"; "Hallucinogens, such as LSD/acid, PCP/angel dust, Ecstasy, Molly, mushrooms, or bath salts"; and "Sniffing gasoline, glue, aerosol spray cans, or paint to get high, also known as huffing."

§§ Part of a series of questions that started, "I'm going to read a list of health conditions. For each one, please tell me if you currently have it. Do you have ____?"

¶¶ Answering "always" or "often" to either of the Patient Health Questionnaire-2 questions: "How often have you felt down, depressed, or hopeless?" and "How often have you had little interest or little pleasure in doing things you usually enjoyed?"

*** Parental separation/divorce, living with someone who was a problem drinker/alcoholic or using drugs, living with someone with mental illness, or living with someone who was incarcerated.

††† Sick and hospitalized family member, separation/divorce, moved, experiencing lack of housing, lost job, partner lost job, partner or self had hours or pay cut, extended time apart from partner due to military deployment or work-related travel, argued with partner more than usual, partner said they didn't want them to be pregnant, difficulty paying bills, partner or self went to jail, someone very close had problem with substances, or someone very close died. Data was collected during the core PRAMS survey 2–6 months after a live birth. West Virginia data were not available.

§§§ Five months of data were weighted to represent women having a live birth during approximately 5 months in 2019.

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differences across characteristics. Multivariable logistic regression models adjusted for age, race and ethnicity, education level, health insurance status, and state of residence were used to calculate adjusted prevalence ratios (aPRs) of postpartum substance and polysubstance use for each mental health and social adversity indicator. Analyses were conducted using SAS-callable SUDAAN (version 11.0; RTI International). This study was reviewed and approved by the Institutional Review Boards at CDC and each participating PRAMS site.¶¶¶

Among 1,990 respondents in seven states, 1,920 (96%) provided data on postpartum substance use. The weighted prevalences of postpartum substance use and polysubstance use were 25.6% and 5.9%, respectively. Substance use prevalence varied significantly across categories of education level, health insurance status, and state of residence. Significant differences in polysubstance use rates were observed by race and ethnicity and health insurance status (Table 1).

The prevalence of substance use was approximately twice as high among respondents who reported the following conditions than among those who didn't: depressive symptoms (48.5% versus 24.0%), current depression (42.8% versus 21.9%), and anxiety (40.9% versus 18.9%) (Table 1). The prevalence of polysubstance use was also higher among respondents who reported those conditions than among those who did not: 17.5% versus 7.0%, 17.3% versus 3.5%, and 13.0% versus 2.8%, respectively.

¶¶¶ 45 C.F.R. part 46; 21 C.F.R. part 56.

TABLE 1. Prevalence of postpartum substance use, by maternal characteristics, depressive symptoms, self-reported depression and anxiety, and number of adverse childhood experiences — Pregnancy Risk Assessment Monitoring System, seven states, 2019

Characteristic	No., unweighted	Any postpartum substance use* % (95% CI)	Postpartum polysubstance use* % (95% CI)
Total	**1,920**	**25.6 (22.8–28.7)**	**5.9 (4.6–7.6)**
Age group, yrs			
≤19	63	31.2 (16.5–51.0)	3.6 (1–11.6)
20–24	299	34.3 (26.9–42.5)	10.6 (6.3–17.4)
25–34	1,162	24.4 (20.9–28.4)	5.2 (3.9–7.0)
≥35	396	21.4 (15.9–28.3)	4.9 (2.2–10.3)
Race and ethnicity†			
Black, non-Hispanic	352	23.0 (16.8–30.6)	4.6 (2.4–8.8)
Hispanic or Latino	244	20.4 (13.3–29.9)	3.1 (1.4–6.7)
White, non-Hispanic	1,157	27.6 (24.0–31.6)	7.0 (5.2–9.3)
Other, non-Hispanic	143	16.4 (10.0–25.7)	2.1 (0.9–4.6)
Education level, yrs§			
<12	179	30.1 (20.5–41.8)	3.7 (1.2–10.6)
12	429	35.4 (29.0–42.5)	10.0 (6.5–15.1)
>12	1,281	21.8 (18.5–25.5)	4.9 (3.5–6.8)
Health insurance status 9–10 mos after giving birth†,§			
Private¶	1,085	21.1 (17.6–25)	4.4 (2.8–6.7)
Medicaid	616	37.6 (31.8–43.7)	8.6 (6.1–12.1)
None	173	16.7 (10.5–25.6)	9.0 (4.7–16.5)
Other	40	21.2 (9.7–40.5)	2.8 (0.5–13.5)**
State of residence§			
Kentucky	316	30.7 (23.9–38.5)	8.9 (5.3–14.3)
Louisiana	273	25.2 (18.6–33.2)	3.9 (1.8–8.1)
Massachusetts	364	24.8 (19.5–30.9)	6.5 (3.8–10.8)
Missouri	272	31.8 (25.0–39.5)	7.1 (4.0–12.4)
Pennsylvania	219	22.9 (16.7–30.7)	4.5 (2.2–9.1)
Utah	297	17.8 (13.0–24.0)	6.4 (3.5–11.5)
West Virginia	179	31.2 (22.9–40.8)	5.1 (3.9–6.7)
Depressive symptoms during previous 30 days†,§,††			
Yes	152	48.5 (36.7–60.6)	17.5 (9.4–30.3)
No	1,753	24.0 (21.2–27.1)	7.0 (3.4–13.7)
Current depression†,§			
Yes	347	42.8 (35.0–51.1)	17.3 (11.8–24.6)
No	1,572	21.9 (19.0–25.1)	3.5 (2.5–4.7)
Current anxiety†,§			
Yes	580	40.9 (35.0–47.1)	13.0 (9.6–17.2)
No	1,338	18.9 (15.9–22.3)	2.8 (1.8–4.6)
No. of adverse childhood experiences†,§,§§			
0	835	16.6 (13.1–20.8)	2.0 (1.1–3.7)
1	564	24.8 (19.7–30.8)	5.0 (2.8–8.9)
2–3	401	39.5 (32.6–46.9)	11.9 (8.2–17.1)
4	76	57.9 (42.1–72.3)	26.3 (14.5–43)
No. of stressful life events in yr before giving birth†,§,¶¶			
0	496	17.0 (12.5–22.7)	1.9 (0.9–4.0)
1–2	722	20.3 (16.1–25.1)	5.0 (3.0–8.4)
3–5	401	37.4 (30.9–44.4)	9.6 (6.6–13.8)
≥6	109	67.1 (54.2–77.8)	20.8 (12.2–33.3)

Abbreviation: PRAMS = Pregnancy Risk Assessment Monitoring System.
* Defined as self-reported excessive alcohol use (eight or more drinks per week) or any binge drinking (more than four drinks in a single 2-hour episode); opioid misuse (taking prescription opioid medication for reason other than pain or obtained from a source other than a health care provider); or any use of tobacco, marijuana products (including cannabidiol and synthetic marijuana such as K2 or Spice), heroin, cocaine, amphetamines, hallucinogens, tranquilizers, or inhalants since giving birth. Polysubstance use indicates use of two or more of these substances.
† $p<0.05$ for an adjusted Wald F chi-square test of differences across categories for "polysubstance use."
§ $p<0.05$ for an adjusted Wald F chi-square test of differences across categories for "any substance use."
¶ Includes Tricare or other military health care.
** Indicates unweighted denominator count <60; estimate might be unstable.
†† Answering "always" or "often" to either of the Patient Health Questionnaire-2 questions: "How often have you felt down, depressed, or hopeless?" and "How often have you had little interest or little pleasure in doing things you usually enjoyed?".
§§ Parental separation/divorce, living with someone who was a problem drinker/alcoholic or using drugs, living with someone with mental illness, or living with someone who was incarcerated.
¶¶ Collected during the core PRAMS survey 2–6 months after a live birth. West Virginia data were not available. Unweighted n = 1,728. The full list of events is available in the PRAMS Standard Question list. https://www.cdc.gov/prams/questionnaire.htm

Among respondents who reported all four household-dysfunction adverse childhood experiences, the prevalence of postpartum substance use was 57.9% and of polysubstance use was 26.3%. Among respondents reporting six or more stressful life events during the year before giving birth, the prevalence of postpartum substance use was 67.1% and of polysubstance use was 20.8%.

Adjusted prevalences of postpartum substance use and polysubstance use among respondents with depressive symptoms were 1.8 and 3.0 times as high, respectively, as among those without these symptoms. aPRs for the association of any postpartum substance and polysubstance use with current depression and anxiety were similar (Table 2). Prevalences of postpartum substance and polysubstance use among those reporting two to four adverse childhood experiences were 2.1 and 5.5 times as high, respectively, as among those reporting none. Compared with the prevalence of substance use among those who reported no stressful life events in the year before giving birth, prevalence of substance use was 3.6 times as high and of polysubstance use was 9.1 times as high among those who reported six or more stressful life events (Table 2).

TABLE 2. Association of mental health conditions, recent stressful events, and adverse childhood experiences with postpartum substance use — Pregnancy Risk Assessment Monitoring System, seven states,* 2019

Characteristic	Any postpartum substance use, aPR† (95% CI)	Postpartum polysubstance use, aPR† (95% CI)
Depressive symptoms during previous 30 days		
No	Ref	Ref
Yes	1.8 (1.3–2.5)	3.0 (1.4–6.2)
Current depression		
No	Ref	Ref
Yes	1.7 (1.3–2.2)	4.5 (2.7–7.5)
Current anxiety		
No	Ref	Ref
Yes	1.9 (1.5–2.4)	3.9 (2.1–7.1)
No. of adverse childhood experiences		
0	Ref	Ref
1	1.3 (0.9–1.7)	2.1 (0.9–5.3)
2–4§	2.1 (1.5–2.7)	5.5 (2.6–11.4)
No. of stressful life events¶ in yr before giving birth		
0	Ref	Ref
1–2	1.2 (0.8–1.7)	2.8 (1.1–7.2)
3–5	1.9 (1.4–2.7)	4.3 (1.8–10.6)
≥6	3.6 (2.5–5.1)	9.1 (3.4–24.7)

Abbreviations: aPR = adjusted prevalence ratio; Ref = referent group.
* Kentucky, Louisiana, Massachusetts, Missouri, Pennsylvania, Utah, and West Virginia.
† Models were adjusted for age, race and ethnicity, education level, health insurance status, and state of residence. aPRs were estimated using separate models for each mental health and psychosocial indicator.
§ Categories were combined because of small numbers of observations preventing estimation of aPRs.
¶ Data on stressful life events were not available for West Virginia.

Discussion

In a population-based sample of women from seven states with high rates of opioid overdose deaths who had participated in a PRAMS survey and were recontacted 9–10 months after a live birth in 2019, approximately one in four reported substance use, and more than one in 17 reported polysubstance use since giving birth. These results update postpartum polysubstance use estimates for the United States and demonstrate that polysubstance use commonly co-occurs during the postpartum period with mental health conditions and a history of predelivery life stressors and adverse childhood experiences. In the 2006–2014 National Survey of Drug Use and Health (NSDUH), 5.1% of pregnant women and 24.3% of nonpregnant women reported using more than one substance during the previous month (*5*). In the 2009–2019 NSDUH, previous-month polysubstance use during pregnancy ranged from 31.3% in the first trimester to 7.8% in the third trimester (*6*). NSDUH and PRAMS use different sampling and administration methods as well as different definitions of alcohol use; therefore, direct comparisons between the two surveillance systems is difficult.

A history of stressful life events in the year before giving birth and adverse childhood experiences related to household dysfunction were both associated with a higher prevalence of postpartum substance use. This finding is consistent with studies of perinatal alcohol (*2*) and marijuana use (*3*). The American College of Obstetrics and Gynecologists (ACOG) recommends a comprehensive postpartum visit within 12 weeks of giving birth that includes 1) screening for depression, anxiety, and substance use disorder; 2) assessment of material needs such as housing, utilities, and food; and 3) referrals for follow-up care and resources (*7*,*8*). ACOG also emphasizes that postpartum care should be a process tailored to individual needs, coordinated between obstetric and primary care providers (*7*). The United States Preventive Services Task Force provides screening guidance for unhealthy substance use and depression, including for pregnant and postpartum women (*9*,*10*). Approaches to reduce postpartum harms of adverse childhood experiences include family-centered treatment approaches for substance-use disorders and victim-centered services.

Recommendations from Maternal Mortality Review Committee (MMRC) investigations of pregnancy-related mental health and substance use–associated deaths highlight potential community- and systems-level interventions (*1*). To prevent maternal deaths, MMRC recommends improving social, family, and peer support and education for patients, providers, and communities (*1*). Other strategies to prevent, identify, and improve access to treatment of opioid use disorder among pregnant and postpartum women include sharing best practices through collaborative learning communities, and perinatal quality collaboratives supporting multidisciplinary teams to build capacity for screening, treating, and coordinating care

Summary

What is already known about this topic?

Most pregnancy-related deaths due to mental health conditions, including substance use disorder–related overdose and poisoning, occur during the late (43–365-day) postpartum period.

What is added by this report?

In seven states with high opioid-involved overdose mortality rates, depressive symptoms, depression, anxiety, adverse childhood experiences, and stressful life events were associated with higher substance and polysubstance use prevalences among postpartum women. Postpartum substance use prevalence was most common among women experiencing six or more stressful life events in the year before giving birth (67.1%) or four household-dysfunction adverse childhood experiences (57.9%).

What are the implications for public health?

Clinical and community- and systems-level interventions can address postpartum substance use and mental health conditions and lessen harms associated with adverse childhood experiences.

for pregnant and postpartum women with opioid use disorder and their infants.****

The findings in this report are subject to at least five limitations. First, these data are only generalizable to the seven states that administered the callback survey, where overdose mortality rates were high. Second, substance use was self-reported and is subject to social desirability bias and therefore might be underestimated. Third, misuse of prescription medications other than opioid pain relievers was not included in the definition of substance misuse. Fourth, information on adverse childhood experiences such as physical, emotional, or sexual abuse, or stressful life events after giving birth, was not collected. Finally, the definition of polysubstance use in this report represents use of two or more substances any time since giving birth and not necessarily that respondents used multiple substances at the same time.

Substance use was common in the postpartum period, particularly among those women who reported experiencing social adversity. Comprehensive prenatal and postpartum care, including screening and treatment for mental health and substance use disorders and community support and education, might help address postpartum substance use–related morbidity and mortality.

**** https://www.cdc.gov/reproductivehealth/maternalinfanthealth/substance-abuse/opioid-use-disorder-pregnancy/working-with-states-partners-organizations.htm

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Corresponding author: Andrea Stewart, ouo8@cdc.gov.

[1]Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, CDC; [2]Epidemic Intelligence Service, CDC; [3]Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee; [4]Division of Violence Prevention, National Center for Injury Prevention and Control, CDC.

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Cancer Distribution Among Asian, Native Hawaiian, and Pacific Islander Subgroups — United States, 2015–2019

Suzanne Bock, MPH[1]; S. Jane Henley, MSPH[1]; Mary Elizabeth O'Neil, MPH[1]; Simple D. Singh, MD[1]; Trevor D. Thompson[1]; Manxia Wu, MD[1]

Non-Hispanic Asian (Asian) and non-Hispanic Native Hawaiian and Pacific Islander (NHPI) persons represent growing segments of the U.S. population (*1*). Epidemiologic cancer studies often aggregate Asian and NHPI persons (*2*,*3*); however, because Asian and NHPI persons are culturally, geographically, and linguistically diverse (*2*,*4*), subgroup analyses might provide insights into the distribution of health outcomes. To examine the frequency and percentage of new cancer cases among 25 Asian and NHPI subgroups, CDC analyzed the most current 2015–2019 U.S. Cancer Statistics data.* The distribution of new cancer cases among Asian and NHPI subgroups differed by sex, age, cancer type, and stage at diagnosis (for screening-detected cancers). The percentage of cases diagnosed among females ranged from 47.1% to 68.2% and among persons aged <40 years, ranged from 3.1% to 20.2%. Among the 25 subgroups, the most common cancer type varied. For example, although breast cancer was the most common in 18 subgroups, lung cancer was the most common cancer among Chamoru, Micronesian race not otherwise specified (NOS), and Vietnamese persons; colorectal cancer was the most common cancer among Cambodian, Hmong, Laotian, and Papua New Guinean persons. The frequency of late-stage cancer diagnoses among all subgroups ranged from 25.7% to 40.3% (breast), 38.1% to 61.1% (cervical), 52.4% to 64.7% (colorectal), and 70.0% to 78.5% (lung). Subgroup data illustrate health disparities among Asian and NHPI persons, which might be reduced through the design and implementation of culturally and linguistically responsive cancer prevention and control programs, including programs that address social determinants of health.

Invasive cancer cases were defined according to the World Health Organization *International Classification of Diseases for Oncology, Third Edition*† diagnosed during 2015–2019 using the most current U.S. Cancer Statistics data. This source of high-quality incidence data from population-based cancer registries, supported by CDC's National Program of Cancer Registries and the National Cancer Institute's Surveillance, Epidemiology, and End Results Program, covers approximately 99% of the U.S. population during the 5-year period.

Central cancer registries collect race and ethnicity information from different sources, including self-reported intake questionnaires, abstracted patient records, electronic health records, linkages to administrative databases, and algorithms to impute missing data (*5*). The current analysis is restricted to Asian and NHPI persons who reported non-Hispanic ethnicity. Race was recorded by standardized coding methods using 30 race groups, including 25 Asian and NHPI subgroups.§ Some subgroups were defined by region rather than race (e.g., Micronesian race NOS). Because of low case counts, in some analyses, Cambodian, Hmong, Laotian, and Thai persons were aggregated into an Other Southeast Asian group.¶ Data for other racial groups are available in the Data Visualizations Tool** (Supplementary Table, https://stacks.cdc.gov/view/cdc/126010). Cases were stratified by race, sex, and age for all cancers combined and then categorized into the 10 most common cancer types among all Asian and NHPI persons. A subset of cancer types detectable by screening†† (i.e., female breast, colon and rectum, lung and bronchus, and cervix uteri) were further categorized by stage at diagnosis as early-stage, late-stage, or unknown.§§ Because current national population denominators are not available for all subgroups, results are presented as frequencies and percentages rather than rates. In all analyses, cells containing fewer than six cases were suppressed to protect confidentiality and reduce misinterpretation or misuse of unstable counts. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.¶¶

* https://www.cdc.gov/cancer/uscs

† https://apps.who.int/iris/bitstream/handle/10665/96612/9789241548496_eng.pdf

§ Cancer registries use uniform data items and codes as documented by the North American Association of Central Cancer Registries (NAACCR). This analysis used Race 1 variable, which is defined in the NAACCR Data Standards and Data Dictionary, Volume II, Version 21, Chapter X. https://www.naaccr.org/data-standards-data-dictionary

¶ The Asian group includes East Asian (Chinese, Japanese, and Korean), Southeast Asian (Cambodian, Filipino, Hmong, Laotian, Thai, and Vietnamese), South Asian (Asian Indian, Pakistani, and Asian Indian or Pakistani NOS), and Other Asian. The NHPI group includes NHPI (Chamoru, Fiji Islander, Guamanian NOS, Melanesian NOS, Micronesian NOS, Native Hawaiian, Pacific Islander NOS, Papua New Guinean, Polynesian NOS, Samoan, Tahitian, and Tongan). Persons who were members of racial subgroups not included in the 24 subgroups or whose race was not specified further than "Asian subgroup" were combined into the Other Asian group. Because of low case counts, in some analyses, Cambodian, Laotian, Hmong, and Thai persons were combined into the Other Southeast Asian group.

** https://www.cdc.gov/cancer/uscs/dataviz/index.htm

†† https://www.cdc.gov/cancer/dcpc/prevention/screening.htm

§§ Early-stage was defined as a tumor being confined to the organ of origin without extension beyond the primary organ. Late-stage was defined as a direct extension of the tumor to adjacent organs, structures, or spread to regional lymph nodes or to parts of the body remote from the primary tumor.

¶¶ 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.

During 2015–2019, a total of 273,656 new invasive cancer cases were reported among Asian persons and 18,491 among NHPI persons in the United States (Table 1); these included 92,562 in East Asian persons (31.7% of all cases among Asian and NHPI persons), 71,721 in Southeast Asian persons (24.5%), 44,890 in South Asian persons (15.4%), and 64,483 in Other Asian persons (22.1%). Approximately one half of cases among Asian (56.2%) and NHPI (56.5%) persons were diagnosed in females, and approximately one tenth were diagnosed in persons aged <40 years (including 8.5% in Asian and 9.6% in NHPI persons). Across subgroups, the highest percentages of new cancer cases among females occurred among Tahitian (68.2%), Thai (65.5%), and Fiji Islander (65.1%) subgroups. The percentage of new cancer cases in persons aged <40 years was highest among Hmong (20.2%), Micronesian race NOS (18.1%), and Melanesian race NOS persons (15.7%), and lowest among Japanese persons (3.1%).

Breast cancer accounted for the highest proportion of new cancer diagnoses among 18 (72.0%) of the 25 Asian and NHPI subgroups. Lung cancer was the most common cancer among Chamoru, Micronesian race NOS, and Vietnamese persons; colorectal cancer was the most common cancer among Cambodian, Hmong, Laotian, and Papua New Guinean persons (Table 2) (Supplementary Table, https://stacks.cdc.gov/view/cdc/126010).

Among Asian and NHPI subgroups, the frequency of late-stage diagnoses for screening-detected cancers ranged from 25.7% (Japanese) to 40.2% (Other Southeast Asian) and 40.3% (Pacific Islander) for breast cancer; from 38.1% (Other Asian) to 61.1% (Korean) for cervical cancer; from 52.4% (Other Asian) to 64.7% (Other Southeast Asian) for colorectal cancer; and from 70.0% (Other Asian) to 78.5% (Other Southeast Asian) for lung cancer (Table 3).

TABLE 1. Cancer diagnosis stratified by sex and age groups, by race and ethnicity — United States, 2015–2019*

	No. (%)§,¶						
		Sex		Age group at diagnosis, yrs			
Race and ethnicity†	**Total****	**Male**	**Female**	**<40**	**40–64**	**65–74**	**≥75**
Asian American, Native Hawaiian, or Pacific Islander	**292,147 (100.0)**	**127,857 (43.8)**	**164,290 (56.2)**	**25,054 (8.6)**	**127,096 (43.5)**	**74,837 (25.6)**	**65,148 (22.3)**
Asian American	**273,656 (93.7)**	119,822 (43.8)	153,834 (56.2)	23,272 (8.5)	118,380 (43.3)	69,925 (25.6)	62,079 (22.7)
East Asian	**92,562 (31.7)**	40,862 (44.1)	51,700 (55.9)	5,007 (5.4)	35,946 (38.8)	23,358 (25.2)	28,251 (30.5)
Chinese	**55,181 (18.9)**	25,181 (45.6)	30,000 (54.4)	3,537 (6.4)	22,831 (41.4)	13,581 (24.6)	15,232 (27.6)
Japanese	**18,467 (6.3)**	7,565 (41.0)	10,902 (59.0)	564 (3.1)	5,505 (29.8)	4,804 (26.0)	7,594 (41.1)
Korean	**18,914 (6.5)**	8,116 (42.9)	10,798 (57.1)	906 (4.8)	7,610 (40.2)	4,973 (26.3)	5,425 (28.7)
Southeast Asian	**71,721 (24.5)**	30,689 (42.8)	41,032 (57.2)	4,445 (6.2)	31,759 (44.3)	19,934 (27.8)	15,583 (21.7)
Cambodian	**2,198 (0.8)**	1,021 (46.5)	1,177 (53.5)	184 (8.4)	1,008 (45.9)	595 (27.1)	411 (18.7)
Filipino	**42,330 (14.5)**	16,208 (38.3)	26,122 (61.7)	2,446 (5.8)	17,970 (42.5)	12,296 (29.0)	9,618 (22.7)
Hmong	**877 (0.3)**	365 (41.6)	512 (58.4)	177 (20.2)	346 (39.5)	161 (18.4)	193 (22.0)
Laotian	**1,918 (0.7)**	1,015 (52.9)	903 (47.1)	124 (6.5)	980 (51.1)	480 (25.0)	334 (17.4)
Thai	**2,287 (0.8)**	789 (34.5)	1,498 (65.5)	227 (9.9)	1,023 (44.7)	747 (32.7)	290 (12.7)
Vietnamese	**22,111 (7.6)**	11,291 (51.1)	10,820 (48.9)	1,287 (5.8)	10,432 (47.2)	5,655 (25.6)	4,737 (21.4)
South Asian	**44,890 (15.4)**	21,016 (46.8)	23,874 (53.2)	5,826 (13.0)	20,286 (45.2)	11,226 (25.0)	7,552 (16.8)
Asian Indian	**22,863 (7.8)**	10,781 (47.2)	12,082 (52.8)	3,020 (13.2)	9,917 (43.4)	5,794 (25.3)	4,132 (18.1)
Pakistani	**3,025 (1.0)**	1,450 (47.9)	1,575 (52.1)	329 (10.9)	1,496 (49.5)	796 (26.3)	404 (13.4)
Asian Indian or Pakistani, race NOS	**19,002 (6.5)**	8,785 (46.2)	10,217 (53.8)	2,477 (13.0)	8,873 (46.7)	4,636 (24.4)	3,016 (15.9)
Other Asian	**64,483 (22.1)**	27,255 (42.3)	37,228 (57.7)	7,994 (12.4)	30,389 (47.1)	15,407 (23.9)	10,693 (16.6)
Native Hawaiian or Pacific Islander	**18,491 (6.3)**	8,035 (43.5)	10,456 (56.5)	1,782 (9.6)	8,716 (47.2)	4,912 (26.6)	3,069 (16.6)
Chamoru	**132 (0)**	69 (52.3)	63 (47.7)	13 (9.8)	61 (46.2)	37 (28.0)	21 (15.9)
Fiji Islander	**364 (0.1)**	127 (34.9)	237 (65.1)	30 (8.2)	200 (54.9)	85 (23.4)	49 (13.5)
Guamanian, race NOS	**301 (0.1)**	132 (43.9)	169 (56.1)	27 (9.0)	134 (44.5)	90 (29.9)	50 (16.6)
Melanesian, race NOS	**51 (0)**	25 (49.0)	26 (51.0)	8 (15.7)	24 (47.1)	12 (23.5)	7 (13.7)
Micronesian, race NOS	**731 (0.3)**	319 (43.6)	412 (56.4)	132 (18.1)	393 (53.8)	153 (20.9)	53 (7.3)
Native Hawaiian	**10,668 (3.7)**	4,643 (43.5)	6,025 (56.5)	898 (8.4)	4,761 (44.6)	3,014 (28.3)	1,995 (18.7)
Pacific Islander, race NOS	**4,040 (1.4)**	1,757 (43.5)	2,283 (56.5)	471 (11.7)	2,027 (50.2)	952 (23.6)	590 (14.6)
Papua New Guinean	**48 (0)**	24 (50.0)	24 (50.0)	—††	21 (43.8)	—	—
Polynesian, race NOS	**123 (0)**	45 (36.6)	78 (63.4)	12 (9.8)	60 (48.8)	33 (26.8)	18 (14.6)
Samoan	**1,512 (0.5)**	665 (44.0)	847 (56.0)	159 (10.5)	767 (50.7)	378 (25.0)	208 (13.8)
Tahitian	**22 (0)**	7 (31.8)	15 (68.2)	—	14 (63.6)	—	—
Tongan	**499 (0.2)**	222 (44.5)	277 (55.5)	32 (6.4)	254 (50.9)	146 (29.3)	67 (13.4)

Abbreviation: NOS = not otherwise specified.
* Cancer incidence data were compiled from registries that meet the data quality criteria for all invasive cancer sites combined, representing 99% of the U.S. population.
† The current analysis is restricted to persons who reported non-Hispanic ethnicity.
§ The denominator used to calculate percentages of new cancer cases among Asian American, Native Hawaiian, and Pacific Islander population is 292,147.
¶ Percentage calculated using each racial group's total number of cases as a denominator.
** Counts from suppressed cells are included in the aggregate totals.
†† Dashes indicate that counts were suppressed because fewer than six cases were reported or for complementary cell suppression.

TABLE 2. Percentage* of new invasive cancer diagnoses, by 10 common cancer types and race and ethnicity — United States, 2015–2019†

Race and ethnicity§	Cancer site, % Female breast	Lung and bronchus	Colon and rectum	Prostate	Thyroid	Non-Hodgkin lymphoma	Liver and intrahepatic bile duct	Corpus uteri and uterus NOS	Stomach	Pancreas
Asian American, Native Hawaiian, or Pacific Islander	19.3	11.2	9.9	8.6	5.4	4.4	4.1	4.1	3.1	3.1
Asian American	19.3	11.2	10.0	8.6	5.5	4.4	4.2	3.9	3.1	3.1
East Asian	17.8	13.9	10.9	7.6	4.2	4.1	4.4	3.1	4.8	3.9
Chinese	16.9	15.3	10.2	7.3	4.9	4.1	4.7	3.2	4.2	3.5
Japanese	20.5	11.4	11.8	10.3	1.9	4.7	3.1	3.3	3.6	4.9
Korean	17.9	12.1	12.1	5.7	4.5	3.5	4.9	2.3	7.7	4.2
Southeast Asian	19.7	13.3	10.1	7.4	4.9	4.3	5.8	4.4	2.3	3.1
Cambodian	14.8	12.3	15.9	3.7	4.9	5.0	11.0	2.0	2.2	3.3
Filipino	23.4	11.7	9.0	8.8	5.4	4.3	3.1	5.5	1.6	3.3
Hmong	9.0	9.7	13.1	1.4	3.1	4.6	7.9	4.6	6.2	4.4
Laotian	11.7	14.1	14.8	4.1	2.0	4.5	11.7	2.6	3.0	3.7
Thai	22.5	13.1	9.7	6.1	4.5	4.2	4.7	4.3	2.6	2.5
Vietnamese	13.9	16.4	11.2	5.8	4.3	4.4	9.9	2.7	3.4	2.8
South Asian	20.7	6.9	8.0	9.7	6.3	4.7	2.8	4.1	2.2	2.5
Asian Indian	20.7	6.5	7.5	9.5	5.9	4.8	2.5	4.3	2.2	2.4
Pakistani	20.6	6.9	7.5	7.7	4.7	5.1	5.6	4.2	1.9	3.1
Asian Indian or Pakistani, race NOS	20.6	7.3	8.8	10.3	7.0	4.6	2.7	3.9	2.3	2.5
Other Asian	20.2	7.9	9.8	10.6	7.5	4.7	3.1	4.4	2.3	2.3
Native Hawaiian or Pacific Islander	18.6	10.9	8.9	9.3	4.1	3.8	3.2	7.4	2.5	3.1
Chamoru	13.6	18.9	13.6	4.5	—¶	—	—	—	5.3	—
Fiji Islander	27.5	6.1	8.8	5.8	2.5	4.1	1.9	7.7	3.9	4.1
Guamanian, race NOS	17.3	14.0	9.7	7.0	3.0	4.0	6.3	6.7	—	4.7
Melanesian, race NOS	25.5	—	—	13.7	—	—	—	—	—	—
Micronesian, race NOS	11.5	11.7	3.7	9.6	4.9	5.1	5.2	8.2	3.7	2.2
Native Hawaiian	19.4	11.5	9.2	9.2	4.1	3.7	3.1	6.5	2.0	3.3
Pacific Islander, race NOS	19.0	8.7	8.9	10.8	5.2	4.3	2.6	7.1	2.2	2.3
Papua New Guinean	14.9	12.8	14.9	—	—	—	—	—	—	—
Polynesian, race NOS	13.8	10.6	7.3	—	—	—	—	17.9	—	—
Samoan	13.9	12.8	9.0	8.1	2.3	3.3	3.2	12.8	4.7	3.8
Tahitian	27.3	—	—	—	—	—	—	—	—	—
Tongan	18.1	10.0	6.6	8.4	2.0	4.0	6.6	12.7	3.6	3.2

Abbreviation: NOS = not otherwise specified.

* Percentage was calculated by dividing the number of new cancer cases for 10 common cancer types by the total number of cancer cases in each racial group. The cancer types are based on the 10 most common cancer types diagnosed among all Asian American, Native Hawaiian, and Pacific Islander persons combined.

† Cancer incidence data were compiled from registries that meet the data quality criteria for all invasive cancer sites combined, representing 99% of the U.S. population.

§ The current analysis is restricted to persons who reported non-Hispanic ethnicity.

¶ Dashes indicate that counts were suppressed because fewer than six cases were reported.

Discussion

Persons of Asian and NHPI origin are often aggregated into one racial group (*2*,*3*); however, the findings in this report show differences in cancer distribution and late-stage cancer diagnoses among Asian and NHPI subgroups. These results are generally consistent with a study that found a higher percentage of distant-stage colorectal cancers among men with an origin in Cambodia, Laos, or Vietnam (*6*). Late-stage cancer cases can be attributed in part to disparities in cancer screening (*7*). National Health Interview Survey data from 2018 show that Asian American persons were less likely than non-Hispanic White or non-Hispanic Black or African American persons to be up to date with colorectal cancer testing, pap smear, or mammogram (*7*,*8*). One way CDC addresses cancer disparities is with the development of resources such as the Breast Cancer Disparities Tool Kit.*** Although this online tool is not tailored to specific populations, it encourages coordinated partner engagement, sustainable implementation from trusted messengers, and evaluation to address social determinants of health and reduce mortality among groups that experience breast cancer disparities.

Ongoing surveillance is important in addressing and evaluating cancer disparities among different populations. An evaluation of the impact of COVID-19 on the number of breast and cervical cancer screening tests provided through CDC's National Breast and Cervical Cancer Early Detection Program found that in April 2020, breast cancer screening among Asian

*** https://www.cdc.gov/cancer/breast/what_cdc_is_doing/

TABLE 3. Percentage of four invasive cancers detectable by screening, by race and ethnicity and stage* at diagnosis — United States,† 2015–2019

Race and ethnicity§ and stage	Female breast, %	Colon and rectum,%	Lung and bronchus, %	Cervix uteri, %
Asian American, Native Hawaiian, or Pacific Islander				
Early-stage	65.3	34.3	22.5	45.7
Late-stage	32.5	59.0	72.9	48.6
Unknown	2.2	6.7	4.6	5.7
Asian American				
Early-stage	65.6	34.2	22.6	45.9
Late-stage	32.3	59.0	72.8	48.3
Unknown	2.2	6.8	4.6	5.8
East Asian				
Chinese				
Early-stage	68.2	34.4	25.0	48.3
Late-stage	30.0	58.6	70.5	46.2
Unknown	1.7	7.0	4.4	5.5
Japanese				
Early-stage	72.9	33.8	20.4	42.4
Late-stage	25.7	60.5	73.3	51.4
Unknown	1.4	5.7	6.4	6.3
Korean				
Early-stage	64.1	30.3	21.2	35.4
Late-stage	33.8	63.1	73.8	61.1
Unknown	2.1	6.7	5.0	3.5
Southeast Asian				
Filipino				
Early-stage	64.8	32.3	22.0	41.1
Late-stage	33.5	61.8	73.9	55.1
Unknown	1.8	5.9	4.2	3.8
Vietnamese				
Early-stage	64.9	30.9	18.9	43.4
Late-stage	32.9	62.9	77.3	51.3
Unknown	2.2	6.1	3.8	5.3
Other Southeast Asian¶				
Early-stage	57.5	28.9	16.6	42.2
Late-stage	40.2	64.7	78.5	50.0
Unknown	2.4	6.4	4.9	7.8
South Asian¶				
Early-stage	61.9	33.7	21.7	42.2
Late-stage	35.9	60.6	73.8	51.0
Unknown	2.1	5.7	4.4	6.7
Other Asian¶				
Early-stage	66.0	39.1	25.0	54.6
Late-stage	31.0	52.4	70.0	38.1
Unknown	3.0	8.5	5.0	7.2
Native Hawaiian or Pacific Islander				
Early-stage	61.4	35.2	20.3	43.2
Late-stage	35.7	59.1	75.3	52.3
Unknown	2.9	5.7	4.4	4.6
Native Hawaiian¶				
Early-stage	65.2	34.3	21.2	48.4
Late-stage	32.6	60.8	74.2	48.4
Unknown	2.2	5.0	4.5	—**
Pacific Islander¶				
Early-stage	55.7	36.5	18.9	40.0
Late-stage	40.3	56.7	76.9	54.7
Unknown	4.0	6.7	4.3	5.3

Abbreviation: NOS = not otherwise specified.

* Early-stage (localized) cancer is confined to the primary site, and late-stage (regional or distant stage) cancer has spread to lymph nodes or other parts of the body. Cases identified only through autopsies or death certificates were excluded from the stage analyses.

† Cancer incidence data were compiled from cancer registries that meet the data quality criteria for all invasive cancer sites combined, representing 99% of the U.S. population.

§ The current analysis is restricted to persons who reported non-Hispanic ethnicity.

¶ Groups were combined as follows: Other Southeast Asian includes Cambodian, Hmong, Laotian, and Thai persons; South Asian includes Asian Indian, Pakistani, and Asian Indian or Pakistani race NOS persons; Pacific Islander includes Chamoru, Fiji Islander, Guamanian race NOS, Melanesian race NOS, Micronesian race NOS, Papua New Guinean, Polynesian race NOS, Samoan, Tahitian, Tongan, and Pacific Islander race NOS persons; Other Asian includes data for persons whose race was not further specified or who are members of racial groups that did not include the other 24 Asian American, Native Hawaiian, or other Pacific Islander subgroups.

** Counts were suppressed because fewer than six cases were reported.

and NHPI women declined 97% compared with the previous 5-year average; cervical cancer screening decreased by 92% (*8*). To help address the decline in screening among certain populations, CDC has partnered with health care providers to resume timely use of preventive tests such as cancer screening (*8*). Cancer screening tests can aid in the early detection of breast, cervical, colorectal, and lung cancers, when treatment is likely to be most effective (*8*).

A better understanding of cancer distribution among Asian and NHPI persons can support the development of tailored cancer prevention and control initiatives. For example, in response to studies that found high rates of liver cancer among Asian and NHPI persons combined (*9*), the Hawaii Comprehensive Cancer Coalition developed a culturally and linguistically appropriate statewide hepatitis B vaccination media campaign††† for non–U.S.-born Asian and NHPI persons. The Massachusetts Comprehensive Cancer Steering Committee is working to increase breast cancer screening rates among Asian women by collaborating with advocacy and state outreach partners.§§§ Culturally and linguistically competent programs might help address disparities in cancer incidence and outcomes; such programs are particularly well-positioned to succeed when they consider social determinants of health (i.e., social and environmental circumstances in which persons live, learn, work, and play¶¶¶) (*10*).

The findings in this report are subject to at least four limitations. First, current national population denominators were not available for all subgroups; therefore, comparing rates was

††† https://ftp.cdc.gov/pub/Publications/Cancer/ccc/hawaii_ccc_plan-508.pdf
§§§ https://ftp.cdc.gov/pub/Publications/Cancer/ccc/massachusetts_ccc_plan-508.pdf
¶¶¶ https://health.gov/healthypeople/priority-areas/social-determinants-health

Summary

What is already known about this topic?

Non-Hispanic Asian and non-Hispanic Native Hawaiian and Pacific Islander (NHPI) persons represent a growing segment of the U.S. population, and are often aggregated in analyses.

What is added by this report?

Cancer incidence among 25 Asian and NHPI subgroups differed by sex, age, cancer type, and stage at diagnosis. For example, lung cancer was the most common cancer among Chamoru, Micronesian, and Vietnamese persons; colorectal cancer was the most common cancer among Cambodian, Hmong, Laotian, and Papua New Guinean persons.

What are the implications for public health practice?

Understanding cancer distribution among Asian and NHPI subgroups might help guide development and implementation of culturally and linguistically relevant programs addressing health disparities and social determinants of health.

not possible. Second, because of small case counts among certain subgroups, comparisons between certain subgroups were limited. Third, multiracial identification was not included in this analysis. Finally, other risk factors not routinely collected by cancer registries could not be assessed.

Differences in cancer distribution among Asian and NHPI subgroups exist. Using population-based cancer registries to identify groups with disproportionate cancer outcomes might help guide the design and implementation of cancer prevention and control programs that consider social determinants of health. CDC funds several national cancer programs that are required to include activities to identify and address drivers of cancer health disparities.****

**** https://www.cdc.gov/media/releases/2022/p0608-cancer-award.html; https://www.cdc.gov/cancer/health-equity/

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Corresponding author: Suzanne Bock, sbock2@cdc.gov.

[1]Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC.

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Suspected Suicide Attempts by Self-Poisoning Among Persons Aged 10–19 Years During the COVID-19 Pandemic — United States, 2020–2022

Rita Farah, PhD[1]; Saumitra V. Rege, PhD[1]; Ryan J. Cole, MD[1]; Christopher P. Holstege, MD[1]

The World Health Organization declared COVID-19 a global pandemic on March 11, 2020 (*1*). As strategies to mitigate the pandemic were implemented, concerns were raised that the containment efforts through quarantine and social distancing practices were negatively affecting the mental and physical health of children and adolescents (*2*). Suicide is a growing public health problem in the United States. In 2020, suicide was the second leading cause of death among persons aged 10–14 years and the third leading cause among those aged 15–24 years (*3*). The National Poison Data System (NPDS) database was used to examine trends in suspected suicide attempts by self-poisoning among persons aged 10–19 years before and during the COVID-19 pandemic. Compared with 2019 (prepandemic), during 2021, the overall rate of suspected suicide attempts by self-poisoning increased by 30.0% (95% CI = 28.6%–30.9%), rates among children aged 10–12 years, adolescents aged 13–15 years, and females increased 73.0% (67.4%–80.0%), 48.8% (46.7%–50.9%), and 36.8% (35.4%–38.2%), respectively, and these trends continued into the third quarter of 2022. Substances most frequently involved in overdoses were acetaminophen, ibuprofen, sertraline, fluoxetine, and diphenhydramine. Acetaminophen-involved overdoses increased 71% (67.4%–74.9%) in 2021 and 58.0% (54.5%–61.6%) in 2022. Diphenhydramine-involved overdoses increased 24.2% (19.9%–28.7%) in 2021 and 35.8% (31.2%–40.5%) in 2022. A comprehensive public health approach to suicide prevention, focused on children and adolescents and involving a partnership between families, school teachers, mental health professionals, and public health leadership is needed. The 9-8-8 Suicide and Crisis Lifeline provides crisis support for persons experiencing mental health–related distress and assists community members who are concerned about persons experiencing a mental health crisis.*

A retrospective review of the NPDS database, the data warehouse for all 55 U.S. poison control centers (PCCs), during January 1, 2016–September 30, 2022, was conducted. Each PCC submits, in near real-time, deidentified case data to NPDS after providing necessary poison exposure management and information services to callers from the general public and health care providers. Closed cases coded by specialists in poison information as intentional suspected suicide involving persons aged 10–19 years were included. The NPDS coding manual specifies that cases coded as intentional suspected suicide include suspected suicide attempts as well as intentional self-harm cases. Multiple substances (multiple exposures) can be reported for each call. Cases classified as a confirmed nonexposure (reliable and objective evidence that exposure to a pharmaceutical or nonpharmaceutical agent never occurred) and those involving persons of unknown age were excluded. Reported numeric age was used to manually compute three age group categories (10–12, 13–15, and 16–19 years). Trends in the frequency and rates of suspected suicide attempts by self-poisoning (suspected suicide attempts per 100,000 persons aged 10–19 years) (*4*) were analyzed using Poisson regression methods and stratified by age group, sex, source of calls made to PCCs, level of care, substance involved, and clinical outcome. To assess the potential impact of the pandemic, yearly changes in suspected suicide attempt rates were compared between 2016 and 2022. The year 2019, the last calendar year before the pandemic, was considered the reference year. Monthly trends in suspected suicide attempt calls were plotted for January 2019–September 2022. Monthly counts of suspected suicide attempts and overall human exposure calls† during the pandemic were compared with their corresponding 2019 reference months. Interpretation of trends in suspected suicide attempts considered the potential impact of changes in the monthly overall human exposure calls to PCCs. Data were analyzed using SAS statistical software (version 9.4; SAS Institute). Percent changes are reported with the corresponding 95% CIs. The study was conducted on deidentified NPDS data and was exempt from comprehensive Institutional Review Board review.

The yearly trend of suspected suicide attempt rates showed a sharp increase in 2021 compared with previous years. From 2019 to 2021, the overall number of human exposure calls to PCCs decreased 3.1%, from 2,148,141 to 2,080,917 ($p<0.001$); however, suspected suicide attempt calls increased (29.5%) in 2021 compared with prepandemic rates (2019). Calls to PCCs regarding suspected suicide attempts increased for both males and females (except between 2018 and 2019) and across all age groups (Table). In 2021, a statistically significant increase in the rate of suspected suicide attempts occurred among children aged 10–12 years (73.0%), adolescents aged 13–15 years (48.8%), and females (36.8%); this increase continued into September

* https://www.cdc.gov/suicide/prevention/index.html

† Total number of calls made to PCCs regarding actual or suspected human contact with any substance that was ingested, inhaled, absorbed, applied to, or injected into the body, regardless of toxicity or clinical manifestation. PCCs receive calls related to human and animal exposures.

TABLE. Frequency and rates* of suspected suicide attempts by self-poisoning among persons aged 10–19 years reported to U.S. Poison Control Centers, by selected characteristics — National Poison Data System, United States, January 1, 2016–September 30, 2022

Characteristic	No.[†] (rate)							% Rate change (95% CI)[†]					
Year	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2016**	**2017**	**2018**	**2020**	**2021**	**2022[†]**
Overall	**79,984[§] (189.3)**	**87,553[§] (206.7)**	**88,227[§] (208.1)**	**88,535 (209.2)**	**93,265[§] (220.7)**	**114,664 (272.0)**	**104,888[§] (248.6)**	**−10.1 (−10.5 to −8.8)[§]**	**−1.2 (−3.0 to −0.2)[§]**	**−0.5 (−1.4 to 0.5)**	**5.4 (4.4 to 6.4)[§]**	**30.0 (28.6 to 30.9)[§]**	**18.6 (17.7 to 19.7)[§]**
Age group, yrs													
10–12	3,450[§] (27.5)	4,286[§] (33.9)	4,951[§] (39.0)	5,473 (43.4)	6,423[§] (51.5)	9,396[§] (76.1)	8,171[§] (66.1)	−37.0 (−39.6 to −34.2)[§]	−21.9 (−24.9 to −18.7)[§]	−10.0 (−13.3 to 6.4)[§]	17.8 (13.6 to 22.1)[§]	73.0 (67.4 to 80.0)[§]	50.4 (45.4 to 55.7)[§]
13–15	30,572[§] (243.5)	33,207[§] (265.0)	33,278[§] (264.2)	34,007 (268.8)	38,614[§] (303.4)	50,844[§] (397.6)	45,944[§] (361.6)	−9.8 (−11.2 to −8.4)[§]	−2.0 (−3.4 to −0.5)[§]	−2.0 (−3.5 to −0.5)[§]	13.2 (11.6 to 14.9)[§]	48.8 (46.7 to 50.9)[§]	34.9 (33.0 to 36.8)[§]
16–19	45,810[§] (267.2)	49,914[§] (290.3)	49,848[§] (291.0)	48,902 (286.4)	48,075[§] (282.1)	54,249[§] (318.7)	50,617[§] (295.7)	−6.5 (−7.3 to −5.3)[§]	1.8 (0.5 to 3.0)[§]	1.8 (0.5 to 3.1)[§]	−1.7 (−2.9 to −0.4)[§]	11.1 (9.7 to 12.4)[§]	3.4 (2.1 to 4.7)[§]
Sex													
Female	62,915[§] (303.3)	68,995[§] (332.9)	67,944 (327.4)	68,045 (328.5)	73,270[§] (354.2)	92,962[§] (450.1)	83,131[§] (402.6)	−7.6 (−8.4 to −6.6)[§]	1.4 (0.3 to 0.8)[§]	−0.3 (−1.3 to 0.8)	7.7 (6.6 to 8.9)[§]	36.8 (35.4 to 38.2)[§]	22.3 (21.1 to 23.6)[§]
Male	16,969[§] (78.9)	18,452[§] (85.3)	20,174 (93.2)	20,362 (94.3)	19,848[§] (92.0)	21,467[§] (99.7)	21,480[§] (99.7)	−16.6 (−8.2 to −14.8)[§]	−9.5 (−11.3 to −7.7)[§]	−1.1 (−3.0 to 0.9)	−2.5 (−4.4 to −0.6)[§]	5.6 (3.6 to 7.6)[§]	5.6 (3.6 to 9.4)[§]
Source of call													
Health care facilities	64,137[§] (151.7)	70,986 (167.6)	71,690[§] (169.0)	71,061 (167.9)	73,175[§] (173.2)	91,522[§] (216.9)	84,484[§] (200.3)	−9.7 (−10.7 to −8.2)[§]	−0.2 (−1.2 to 0.9)	0.8 (−0.3 to 1.8)	3.0 (2.0 to 4.1)[§]	29.0 (27.7 to 30.3)	19.0 (17.7 to 20.2)
General public	15,688[§] (37.1)	16,390[§] (38.7)	16,397[§] (38.7)	17,321 (40.9)	19,939[§] (47.2)	22,997[§] (54.5)	20,288[§] (48.1)	−9.4 (−11.4 to −7.5)[§]	−5.5 (−7.5 to −3.4)[§]	−5.5 (−7.5 to −3.4)[§]	15.2 (12.7 to 17.6)[§]	33.0 (30.4 to 35.6)[§]	17.3 (14.9 to 19.7)[§]
Level of care													
Admission to critical care unit	13,632[§] (32.3)	14,389[§] (34.0)	13,655[§] (32.2)	13,095 (30.9)	13,105 (31.0)	14,114[§] (33.4)	11,879[§] (28.0)	4.2 (1.6 to 6.7)[§]	9.8 (7.3 to 12.5)[§]	4.2 (1.7 to 6.7)[§]	0.1 (−0.3 to 2.6)	8.0 (5.4 to 10.6)[§]	−9.2 (−11.4 to −6.9)[§]
Admission to psychiatric facility	25,186[§] (59.6)	28,515[§] (67.3)	29,771[§] (70.2)	30,485 (72.0)	31,636[§] (74.9)	39,354[§] (93.3)	35,924[§] (85.2)	−17.4 (−18.8 to −16.0)[§]	−6.6 (−8.1 to −5.0)[§]	−2.5 (−4.0 to −0.9)[§]	3.8 (2.2 to 5.5)[§]	29.3 (27.3 to 31.2)[§]	18.0 (16.2 to 19.9)[§]
Clinical outcome													
Major effect[¶]	1,919[§] (4.5)	2,269[§] (5.3)	2,545[§] (6.0)	2,980[§] (7.4)	3,139[§] (7.4)	3,757[§] (8.9)	3,501[§] (8.3)	−35.7 (−39.3 to −31.9)[§]	−14.0 (−28.0 to −19.7)[§]	−14.8 (−19.2 to −10.2)[§]	5.3 (0.2 to 10.7)[§]	26.1 (20.2 to 32.4)[§]	17.6 (12.0 to 23.4)[§]
Death**	37[§] (0.9)	33[§] (0.8)	51 (0.12)	59 (0.14)	55 (0.13)	65 (0.15)	59 (0.14)	−37.3 (−59.4 to −42.4)[§]	−44.1 (−63.5 to −14.4)[§]	13.7 (−40.7 to 25.6)	−6.8 (−35.6 to 34.7)	10.3 (−22.4 to 57.0)	0.1 (−30.2 to 43.6)
Substance[††]													
Acetaminophen	10,178[§] (24.1)	11,397[§] (26.9)	11,709[§] (27.6)	12,552 (29.6)	15,141[§] (35.8)	21,443[§] (50.9)	19,805[§] (46.8)	−18.9 (−21.0 to −16.8)[§]	−9.3 (−11.6 to −7.0)[§]	−6.9 (−9.3 to −4.5)[§]	20.7 (17.9 to 23.6)[§]	71.0 (67.4 to 74.9)[§]	58.0 (54.5 to 61.6)[§]
Ibuprofen	11,851[§] (28.0)	13,015[§] (30.7)	13,162[§] (31.0)	13,353 (31.5)	13,756[§] (32.5)	18,017[§] (42.7)	15,513[§] (36.7)	−11.3 (−13.4 to −9.0)[§]	−2.6 (−4.9 to −0.2)[§]	−1.6 (−3.9 to −0.9)[§]	3.1 (0.7 to 5.6)[§]	35.1 (32.1 to 38.2)[§]	16.3 (13.6 to 19.0)[§]
Sertraline	4,366[§] (10.3)	5,079[§] (12.0)	5,488[§] (12.9)	5,791 (13.7)	6,394[§] (15.1)	7,651[§] (18.1)	6,896[§] (16.3)	−24.6 (−27.5 to −21.6)[§]	−12.4 (−15.4 to −9.0)[§]	−5.4 (−8.8 to −1.8)[§]	10.5 (6.6 to 14.5)[§]	32.3 (27.9 to 36.9)[§]	19.2 (15.1 to 23.5)[§]
Fluoxetine	3,935[§] (9.3)	4,518[§] (10.7)	4,943[§] (11.7)	592[§] (12.5)	5,698[§] (13.5)	7,620[§] (18.1)	6,812[§] (16.1)	−25.7 (−28.7 to −22.5)[§]	−14.7 (−18.0 to −11.3)[§]	−6.7 (−10.3 to −3.0)[§]	7.7 (3.8 to 11.9)[§]	44.2 (39.2 to 49.4)[§]	28.9 (24.3 to 33.6)[§]
Diphenhydramine	5,191[§] (12.3)	5,771[§] (13.6)	5,551[§] (13.1)	5,596 (13.2)	5,864[§] (13.8)	6,940[§] (16.5)	7,587[§] (18.0)	−7.2 (−10.7 to −3.7)[§]	3.1 (−0.7 to 6.9)	−0.1 (−4.6 to 2.8)	4.8 (1.1 to 8.8)[§]	24.2 (19.9 to 28.7)[§]	35.8 (31.2 to 40.5)[§]

* Attempts per 100,000 population based on U.S. Census Bureau's midyear census.
† Annualized rates were used to present data during January 1, 2019–September 30, 2022 (reference year: 2019).
§ Statistically significant.
¶ Symptoms resulting from exposures that were life-threatening or resulted in significant residual disability or disfigurement.
** Direct and indirect death reports were included.
†† Generic codes: acetaminophen alone (0072705, 0072707, and 0072000), ibuprofen (0234003), sertraline (310014), fluoxetine (0310011), and diphenhydramine alone (0159900, 0159000, and 0159850).

2022. Call rates made to PCCs from health care facilities (29.0%) and the general public (33.0%) increased during 2021 as did admissions to psychiatric facilities (29.3%).

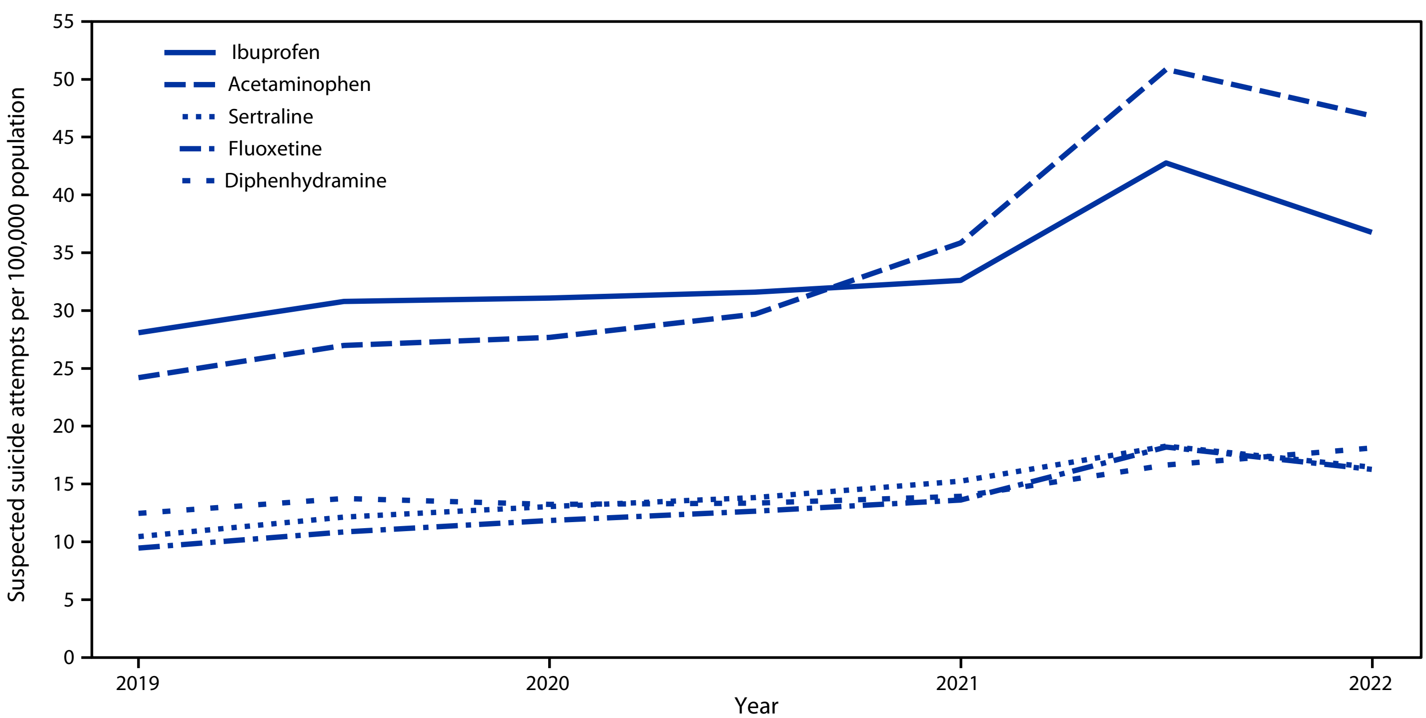
In 2021 and 2022, an analysis of substances involved in suspected suicide attempts found acetaminophen, ibuprofen, sertraline, fluoxetine, and diphenhydramine to be the substances most frequently involved, with a significant increase in acetaminophen- (71.0% and 58.0%, respectively) and diphenhydramine- (24.2% and 35.8%, respectively) involved overdoses compared with those in 2019. Overdoses involving ibuprofen (35.1%), fluoxetine (44.2%), and sertraline (32.3%) increased significantly in 2021 compared with prepandemic rates (2019) (Figure 1). Single-substance cases accounted for 430,051 (68%) suspected suicide attempt calls; acetaminophen (excluding combinations with other substances) was the most frequent single substance involved in suspected suicide attempts, accounting for 57,768 (13.4%) of single-substance cases.

The monthly variation in suspected suicide attempt–related calls among persons aged 10–19 years increased during school months, with a sharp increase in September, and a decline during summer months (June and July) and winter breaks (December) (Figure 2). During the period when the national lockdown was implemented (April–May 2020), suspected suicide attempt–related calls were lower compared with those during the same months in 2019, 2021, and 2022 (p<0.001); the overall human exposure calls did not decrease during this same period. However, during June 2020–February 2022, monthly suspected suicide attempt–related calls were significantly higher than they were during the corresponding months of 2019 (with the exception of March–June 2020, when suspected suicide attempt–related calls were similar to those in 2019). The monthly overall human exposure calls to PCCs significantly declined beginning in August 2020 compared with the corresponding months during 2019 (Supplementary Table, https://stacks.cdc.gov/view/cdc/126401).

Discussion

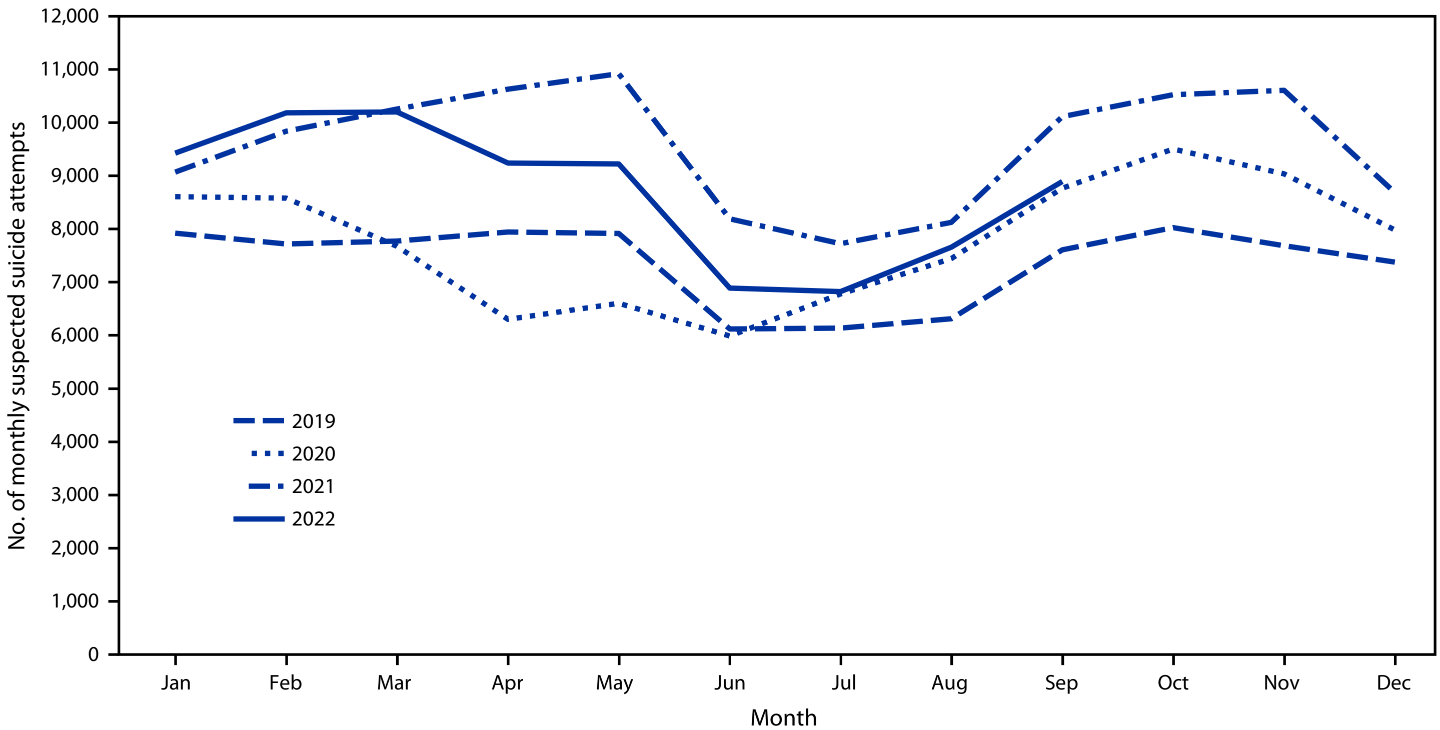
This study, examining the potential impact of the COVID-19 pandemic on suspected suicide attempts by self-poisoning among children and adolescents using a U.S. national database, found an increase during the pandemic, most notably among children aged 10–12 years, adolescents aged 13–15 years, and females, with the sharpest increase in attempts involving acetaminophen and diphenhydramine. Further, the study revealed

FIGURE 1. Rates of suspected suicide attempts by self-poisoning among persons aged 10–19 years reported to U.S. poison control centers, by substance*,†— United States, January 1, 2016–September 30, 2022§



* Trends in rates of suspected suicide attempts involving acetaminophen, ibuprofen, sertraline, and fluoxetine were statistically significant during 2016–2022 (reference year: 2019).
† Trends in rates of suspected suicide attempts involving diphenhydramine were statistically significant during 2020–2022 (reference year: 2019).
§ Annualized rates were used to present data during January 1, 2019–September 30, 2022.

FIGURE 2. Number of monthly suspected suicide attempts by self-poisoning among persons aged 10–19 years reported to U.S. poison control centers — United States, January 1, 2019–September 30, 2022



Summary

What is already known about this topic?

In 2020, suicide was the second leading cause of death among persons aged 10–14 years and the third leading cause among those aged 15–24 years.

What is added by this report?

Analysis of National Poison Data System data found that the rate of suspected suicide attempts by self-poisoning among persons aged 10–19 years increased 30.0% in 2021 as compared with prepandemic rates (2019), with a 73.0% increase among children aged 10–12 years, 48.8% among adolescents aged 13–15 years, and 36.8% among females.

What are the implications for public health practice?

A comprehensive public health approach to suicide prevention measures focusing on children and adolescents and involving partnerships among families, school teachers, mental health professionals, and public health leadership is needed.

an increase in admissions to psychiatric facilities. These findings suggest that the mental health of children and adolescents was affected by the pandemic, raising concerns about long-term consequences, especially given that previous attempted suicide has been found to be the strongest predictor of subsequent death by suicide (*5*). The results support findings of an increase in emergency department visits for suspected suicide attempts among persons aged 12–17 years, particularly among adolescent girls, beginning in mid-2020, reported in mid-2021, based on data from the National Syndromic Surveillance Program (*6*). An increase in the proportion of suspected suicide-related calls during 2015–2020, involving acetaminophen and ibuprofen, among children aged 10–12 years, was recently reported, in an analysis of calls to PCCs using NPDS data *(7)*. The current findings revealed an increase in rates of suspected suicide attempts involving acetaminophen and ibuprofen among U.S. population aged 10–12 years during 2016–2022; however, the increase during the pandemic was at an accelerated rate.

The period coinciding with the beginning of the pandemic and stay-at-home orders (March 2020) was characterized by an initial decrease in reported cases of suspected attempted suicide, followed by a subsequent increase (July 2020). A similar trend in suicides is commonly seen among persons affected by crises such as natural disasters and wars. This phenomenon is frequently termed the "honeymoon effect" *(8)*. The seasonality of suicide among children and adolescents is reported in the literature and is characterized by a significant decline during the months of June, July, and August, as well as December (*9*). The seasonality of suspected suicide attempts among youth during the pandemic can be observed starting in September 2020.

In the current study, rates of acetaminophen-involved suicide attempts in 2020 surpassed those of ibuprofen that had predominated in earlier years and continued to increase through September 2022. Three of the top five most frequently identified drugs involved in suspected suicide attempts in this analysis are over-the-counter medications, and two drugs are antidepressant medications. An urgent need exists to strengthen programs focused on identifying and supporting persons at risk for suicide, especially young persons. In addition, protective environments need to be created through the reduction of access to lethal means including promoting the safe storage of medications (e.g., over-the-counter drugs).

The findings in this report are subject to at least four limitations. First, NPDS data are not designed to assess potential risk factors leading to increases in suspected suicide attempts. However, visits to an emergency department for mental health consults and suspected child abuse, risk factor for potential suicide attempts, also increased in 2020 compared with 2019 (*10*). Further, call volume to PCCs decreased during the pandemic; therefore, the increase in calls for suspected suicide attempts cannot be explained by the change in call volume. In addition, although the U.S. population aged 10–19 years decreased 0.4% from 42,314,777 in 2019 to 42,190,515 in 2021 (*4*), this decrease cannot fully account for the increase in rates of suspected suicide attempts during the pandemic. Second, because NPDS data are affected by completeness of reporting from health care providers and the general public, as well as the accuracy of data entry and coding by PCC staff members, they are susceptible to reporting bias. Third, multiple substances can be reported for each call to PCCs, and it was not possible to determine which substance was most related to the clinical effects and medical outcome. Finally, because reporting to PCCs is voluntary, NPDS data do not represent all cases of suspected suicide attempts. However, the consistency of these findings with those in other published studies highlights the association of the COVID-19 pandemic with harmful effects on youth mental health and underscores the need for further research to confirm these findings and inform prevention strategies *(6,10)*.

Pediatric and adolescent suicide attempts by self-poisoning have increased during the COVID-19 pandemic. It is imperative to mitigate this increase with suicide prevention measures that focus on children and adolescents and involve partnerships between key partners in the communities, such as families, school teachers, mental health professionals, and public health leadership. Suicide prevention resources and tools are available to help communities prevent suicide. These strategies include identifying and supporting youth at risk for suicide, creating protective environments through reduction of access to lethal means, improving access to mental health care, and teaching coping and problem-solving skills. In addition, the 9-8-8 Suicide and Crisis Lifeline became available nationally in July 2022. The 9-8-8 Suicide and Crisis Lifeline is a national network of more than 200 crisis centers supported by local and state sources as well as the Department of Health and Human Services' Substance Abuse and Mental Health Services Administration.

Corresponding author: Christopher P. Holstege, ch2xf@uvahealth.org.

[1]Division of Medical Toxicology, Department of Emergency Medicine, University of Virginia School of Medicine, Charlottesville, Virginia.

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Stroke Mortality Among Black and White Adults Aged ≥35 Years Before and During the COVID-19 Pandemic — United States, 2015–2021

Quanhe Yang, PhD[1]; Xin Tong, MPH[1]; Linda Schieb, MSPH[1]; Fátima Coronado, MD[1]; Robert Merritt, MS[1]

Stroke is the fifth leading cause of death and a leading cause of long-term disability in the United States (*1*). Although stroke death rates have declined since the 1950s, age-adjusted rates remained higher among non-Hispanic Black or African American (Black) adults than among non-Hispanic White (White) adults (*1*,*2*). Despite intervention efforts to reduce racial disparities in stroke prevention and treatment through reducing stroke risk factors, increasing awareness of stroke symptoms, and improving access to treatment and care for stroke (*1*,*3*), Black adults were 45% more likely than were White adults to die from stroke in 2018.* In 2019, age-adjusted stroke death rates (AASDRs) (stroke deaths per 100,000 population) were 101.6 among Black adults and 69.1 among White adults aged ≥35 years. Stroke deaths increased during the early phase of the COVID-19 pandemic (March–August 2020), and minority populations experienced a disproportionate increase (*4*). The current study examined disparities in stroke mortality between Black and White adults before and during the COVID-19 pandemic. Analysts used National Vital Statistics System (NVSS) mortality data accessed via CDC WONDER† to calculate AASDRs among Black and White adults aged ≥35 years prepandemic (2015–2019) and during the pandemic (2020–2021). Compared with that during the prepandemic period, the absolute difference in AASDR between Black and White adults during the pandemic was 21.7% higher (31.3 per 100,000 versus 38.0). During the pandemic period, an estimated 3,835 excess stroke deaths occurred among Black adults (9.4% more than expected) and 15,125 among White adults (6.9% more than expected). These findings underscore the importance of identifying the major factors contributing to the widened disparities; implementing prevention efforts, including the management and control of hypertension, high blood cholesterol, and diabetes; and developing tailored interventions to reduce disparities and advance health equity in stroke mortality between Black and White adults. Stroke is a serious medical condition that requires emergency care. Warning signs of a stroke include sudden face drooping, arm weakness, and speech difficulty. Immediate notification of Emergency Medical Services by calling 9-1-1 is critical upon recognition of stroke signs and symptoms.

Annual AASDRs (calculated using 2000 U.S. Census Bureau standard population) and 95% CIs for Black and White adults aged ≥35 years were calculated for 2015–2020 (using final underlying cause of death data stratified by bridged-race categories) and 2021 (using underlying cause of death data stratified by single-race categories as of March 20, 2023) using CDC WONDER mortality data based on place of residence data from death certificates filed in the 50 U.S. states and the District of Columbia. AASDRs and 95% CIs were then calculated for the prepandemic and pandemic periods. *International Classification of Diseases, Tenth Revision* cause of death codes I60–I69 (cerebrovascular disease) were used to classify stroke as the underlying cause of death. This study included persons listed as having one race (Black or White) and non-Hispanic or Latino ethnicity.§ Disparities between Black and White adults were measured using absolute and relative differences. The absolute difference in AASDR among adults aged ≥35 years (rate among Black adults minus rate among White adults) was calculated for the prepandemic and pandemic periods and compared. The relative difference was measured by rate ratios calculated as AASDR among Black adults divided by AASDR among White adults. The 95% CIs for the absolute and relative differences were estimated. Nonoverlapping 95% CIs for rates, absolute differences, or relative differences between two periods or two groups (e.g., women versus men) were considered statistically significant. Analyses were stratified by sex and age group (35–64, 65–84, and ≥85 years).

Excess stroke deaths for Black and White adults during the pandemic were estimated as follows: 1) annual percent changes (APC) in the sex-, age-, and race and ethnicity–specific stroke death rates during 2015–2019 were estimated; 2) expected rates for 2020 and 2021 were calculated, assuming the APC during 2015–2019 would continue during 2020–2021; 3) the expected number of stroke deaths was obtained by multiplying the sex-, age-, and race and ethnicity–specific population

* https://www.heart.org/en/about-us/2024-health-equity-impact-goal/age-adjusted-total-stroke-mortality-rates-by-raceethnicity

† Data were accessed from the National Center for Health Statistics' mortality data from 2018–2021 on the CDC WONDER online database, released in 2023. This study also selected 2015–2020 data from "1999–2020 Underlying Cause of Death by Bridged-race Categories" and 2021 data from "2018–2021 Underlying Cause of Death by Single-race Categories" and combined 2015–2020 and 2021 data for analyses. Mortailty data were compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. https://wonder.cdc.gov/Deaths-by-Underlying-Cause.html

§ Persons listed as Black or White (not including those listed as "more than one race") and listed as non-Hispanic or Latino (not including those with Hispanic ethnicity listed as "not stated") were included in this study.

by the expected stroke death rates; and 4) excess stroke deaths were calculated as the number of stroke deaths observed minus the number expected¶ (*5*). Analyses were conducted using SAS software (version 9.4; SAS Institute) and Joinpoint (version 4.8.1.0; National Cancer Institute). This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.**

During 2015–2019, AASDR remained consistent for both Black (range = 100.5–102.0 [with a slight trend of increased rates]) and White adults (range = 69.1–70.6 [with a slight trend of decreased rates]); the average absolute difference was 31.3 per 100,000, and the average relative difference was 1.4. The relative differences in stroke mortality between Black and White adults were higher among men than women, and decreased with increasing age (Table 1) (Figure). During the COVID-19 pandemic, AASDR increased among both populations, but the increase was larger among Black adults; the average AASDR among Black adults increased 11.2% (from 101.3 to 112.6), compared with 6.6% (from 70.0 to 74.6) among White adults. The absolute difference in AASDR between Black and White

¶ Using different years of baseline data or different methods to predict 2020–2021 stroke death rates can result in different expected stroke death rates, and, therefore, the different estimated excess number of stroke deaths. https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm

** 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.

TABLE 1. Age-adjusted stroke death rates among Black and White adults* aged ≥35 years before (2015–2019) and during (2020–2021) the COVID-19 pandemic, by age group and sex — United States, 2015–2021

	Age-adjusted stroke death rates per 100,000† (95% CI)§									% Change in absolute differences between Black and White adults
	Pre–COVID-19						During COVID-19			
Characteristic	2015	2016	2017	2018	2019	Average 2015–2019	2020	2021	Average 2020–2021	2020–2021 vs. 2015–2019¶
Total										
BNH	**100.9 (99.4 to 102.5)**	**100.5 (99.0 to 102.0)**	**102.0 (100.5 to 103.5)**	**101.3 (99.8 to 102.7)**	**101.6 (100.1 to 103.0)**	**101.3 (100.6 to 101.9)**	**110.0 (108.5 to 111.4)**	**115.4 (113.9 to 117.0)**	**112.6 (111.6 to 113.7)**	—
WNH	**70.6 (70.2 to 71.1)**	**70.1 (69.7 to 70.5)**	**70.6 (70.2 to 71.1)**	**69.7 (69.3 to 70.1)**	**69.1 (68.7 to 69.5)**	**70.0 (69.8 to 70.2)**	**72.0 (71.6 to 72.5)**	**77.4 (76.9 to 77.8)**	**74.6 (74.3 to 74.9)**	—
Absolute difference, BNH vs. WNH	**30.3 (28.7 to 31.9)**	**30.4 (28.9 to 32.0)**	**31.3 (29.8 to 32.9)**	**31.6 (30.1 to 33.1)**	**32.4 (30.9 to 33.9)**	**31.3 (31.0 to 31.5)**	**37.9 (36.3 to 39.5)**	**38.0 (36.4 to 39.7)**	**38.0 (37.0 to 39.1)**	**21.7 (18.0 to 25.3)**
Relative difference, BNH vs. WNH**	**1.4 (1.4 to 1.5)**	**1.4 (1.4 to 1.5)**	**1.4 (1.4 to 1.5)**	**1.5 (1.4 to 1.5)**	**1.5 (1.4 to 1.5)**	**1.4 (1.4 to 1.5)**	**1.5 (1.5 to 1.5)**	**1.5 (1.5 to 1.5)**	**1.5 (1.5 to 1.5)**	—
Sex										
Men										
BNH	**110.3 (107.7 to 112.9)**	109.8 (107.2 to 112.4)	112.1 (109.5 to 114.6)	112.7 (110.2 to 115.2)	110.8 (108.3 to 113.2)	**111.2 (110.0 to 112.3)**	122.6 (120.0 to 125.1)	125.7 (123.1 to 128.3)	**124.1 (122.3 to 125.9)**	—
WNH	69.6 (68.9 to 70.3)	69.2 (68.5 to 69.8)	69.9 (69.2 to 70.5)	69.1 (68.5 to 69.8)	69.0 (68.4 to 69.6)	**69.3 (69.0 to 69.6)**	72.4 (71.7 to 73.0)	76.7 (76.0 to 77.4)	**74.4 (74.0 to 74.9)**	—
Absolute difference, BNH vs. WNH	40.7 (38.0 to 43.4)	40.6 (38.0 to 43.3)	42.2 (39.5 to 44.8)	43.6 (41.0 to 46.2)	41.8 (39.2 to 44.3)	**41.8 (40.7 to 43.0)**	50.2 (47.6 to 52.8)	49.0 (46.3 to 51.6)	**49.7 (47.9 to 51.5)**	18.7 (13.2 to 24.4)
Relative difference, BNH vs. WNH**	1.6 (1.5 to 1.6)	1.6 (1.5 to 1.6)	1.6 (1.6 to 1.6)	1.6 (1.6 to 1.7)	1.6 (1.6 to 1.6)	**1.6 (1.6 to 1.6)**	1.7 (1.7 to 1.7)	1.6 (1.6 to 1.7)	**1.7 (1.6 to 1.7)**	—
Women										
BNH	92.7 (90.8 to 94.5)	92.6 (90.7 to 94.4)	93.5 (91.7 to 95.4)	91.9 (90.2 to 93.7)	93.5 (91.7 to 95.3)	**92.9 (92.0 to 93.7)**	99.5 (97.7 to 101.3)	106.3 (104.4 to 108.2)	**102.8 (101.5 to 104.2)**	—
WNH	70.3 (69.7 to 70.9)	69.5 (68.9 to 70.1)	70.0 (69.5 to 70.6)	69.0 (68.5 to 69.5)	68.1 (67.6 to 68.6)	**69.4 (69.1 to 69.6)**	70.6 (70.1 to 71.2)	76.7 (76.1 to 77.3)	**73.5 (73.1 to 73.9)**	—
Absolute difference, BNH vs. WNH	22.4 (20.4 to 24.3)	23.1 (21.2 to 25.0)	23.5 (21.6 to 25.4)	22.9 (21.1 to 24.8)	25.4 (23.5 to 27.2)	**23.5 (22.6 to 24.3)**	28.9 (27.0 to 30.8)	29.6 (27.6 to 31.6)	**29.3 (27.9 to 30.7)**	24.8 (17.5 to 32.3)
Relative difference, BNH vs. WNH**	1.3 (1.3 to 1.3)	1.3 (1.3 to 1.4)	1.3 (1.3 to 1.4)	1.3 (1.3 to 1.4)	1.4 (1.3 to 1.4)	**1.3 (1.3 to 1.4)**	1.4 (1.4 to 1.4)	1.4 (1.4 to 1.4)	**1.4 (1.4 to 1.4)**	—

See table footnotes on the next page.

TABLE 1. (*Continued*) **Age-adjusted stroke death rates among Black and White adults* aged ≥35 years before (2015–2019) and during (2020–2021) the COVID-19 pandemic, by age group and sex — United States, 2015–2021**

	Age-adjusted stroke death rates per 100,000† (95% CI)§									% Change in absolute differences between Black and White adults
	Pre–COVID-19						During COVID-19			
Characteristic	2015	2016	2017	2018	2019	Average 2015–2019	2020	2021	Average 2020–2021	2020–2021 vs. 2015–2019¶
Age group, yrs										
35–64										
BNH	28.0 (27.2 to 28.8)	27.4 (26.6 to 28.2)	27.6 (26.8 to 28.3)	27.0 (26.3 to 27.8)	27.0 (26.3 to 27.8)	**27.4 (27.1 to 27.8)**	30.4 (29.5 to 31.2)	30.9 (30.1 to 31.7)	**30.6 (30.0 to 31.2)**	—
WNH	10.6 (10.4 to 10.8)	10.8 (10.6 to 11.1)	10.8 (10.6 to 11.0)	10.8 (10.6 to 11.0)	10.9 (10.7 to 11.2)	**10.8 (10.7 to 10.9)**	12.0 (11.7 to 12.2)	12.4 (12.2 to 12.7)	**12.2 (12.0 to 12.4)**	—
Absolute difference, BNH vs. WNH	17.4 (16.6 to 18.2)	16.6 (15.8 to 17.4)	16.8 (16.0 to 17.6)	16.2 (15.4 to 17.0)	16.1 (15.3 to 16.9)	**16.6 (16.3 to 17.0)**	18.4 (17.8 to 19.0)	18.5 (17.6 to 19.3)	**18.4 (18.0 to 18.8)**	10.9 (6.6 to 15.4)
Relative difference, BNH vs. WNH**	2.6 (2.5 to 2.7)	2.5 (2.4 to 2.6)	2.6 (2.5 to 2.6)	2.5 (2.4 to 2.6)	2.5 (2.4 to 2.6)	**2.5 (2.5 to 2.6)**	2.5 (2.5 to 2.6)	2.5 (2.4 to 2.6)	**2.5 (2.5 to 2.6)**	—
65–84										
BNH	236.1 (230.9 to 241.3)	232.1 (227.0 to 237.2)	235.1 (230.1 to 240.1)	233.6 (228.7 to 238.5)	233.7 (228.9 to 238.4)	**234.1 (231.9 to 236.3)**	249.0 (244.2 to 253.8)	264.3 (259.2 to 269.3)	**256.6 (253.1 to 260.1)**	—
WNH	148.4 (147.0 to 149.8)	146.0 (144.6 to 147.4)	145.2 (143.8 to 146.5)	141.8 (140.4 to 143.1)	140.8 (139.5 to 142.1)	**144.3 (143.7 to 144.9)**	145.8 (144.5 to 147.1)	153.1 (151.7 to 154.4)	**149.4 (148.5 to 150.3)**	—
Absolute difference, BNH vs. WNH	87.7 (82.2 to 93.1)	86.1 (80.9 to 91.3)	90.0 (84.8 to 95.2)	91.8 (86.7 to 96.9)	92.9 (87.9 to 97.9)	**89.8 (87.5 to 92.1)**	103.2 (98.2 to 108.2)	111.2 (105.9 to 116.4)	**107.2 (103.5 to 110.7)**	19.4 (14.5 to 24.5)
Relative difference, BNH vs. WNH**	1.6 (1.6 to 1.6)	1.6 (1.6 to 1.6)	1.6 (1.6 to 1.7)	1.6 (1.6 to 1.7)	1.7 (1.6 to 1.7)	**1.6 (1.6 to 1.6)**	1.7 (1.7 to 1.7)	1.7 (1.7 to 1.8)	**1.7 (1.7 to 1.7)**	—
≥85										
BNH	944.3 (916.3 to 972.2)	973.4 (945.4 to 1,001.4)	995.6 (967.8 to 1,023.5)	997.2 (969.8 to 1,024.7	1,005.7 (978.5 to 1,033.0)	**984.1 (971.7 to 996.5)**	1,090.3 (1,062.3 to 1,118.4)	1,148.0 (1,117.7 to 1,178.2)	**1,117.7 (1,097.2 to 1,138.3)**	—
WNH	1,003.8 (995.1 to 1,012.4)	997.5 (988.9 to 1,006.1)	1,022.8 (1,014.1 to 1,031.4)	1,014.9 (1,006.2 to 1,023.5)	1,000.0 (991.4 to 1,008.6)	**1,007.8 (1,003.9 to 1,011.7)**	1,035.0 (1,026.3 to 1,043.8)	1,147.0 (1,137.2 to 1,156.7)	**1,087.5 (1,080.9 to 1,094.0)**	—
Absolute difference, BNH vs. WNH	−59.5 (−89.0 to 30.5)	−24.1 (−53.4 to 5.2)	−27.1 (−56.3 to 2.3)	−17.7 (−46.4 to 11.4)	5.7 (−22.8 to 34.4)	**−23.7 (−36.7 to 10.5)**	55.3 (25.9 to 84.2)	1.0 (30.6 to 32.4)	**30.3 (8.3 to 51.4)**	227.5 (133.8 to 426.9)
Relative difference, BNH vs. WNH**	0.9 (0.9 to 1.0)	1.0 (0.9 to 1.0)	1.0 (0.9 to 1.0)	1.0 (1.0 to 1.0)	1.0 (1.0 to 1.0)	**1.0 (1.0 to 1.0)**	1.1 (1.0 to 1.1)	1.0 (1.0 to 1.0)	**1.0 (1.0 to 1.1)**	—

Abbreviations: AASDR = age-adjusted stroke death rate; BNH = Black or African American, non-Hispanic; WNH = White, non-Hispanic.

* Persons listed as BNH or WNH (not including those with race listed as "more than one race" or Hispanic ethnicity listed as "not stated") were included in this study.

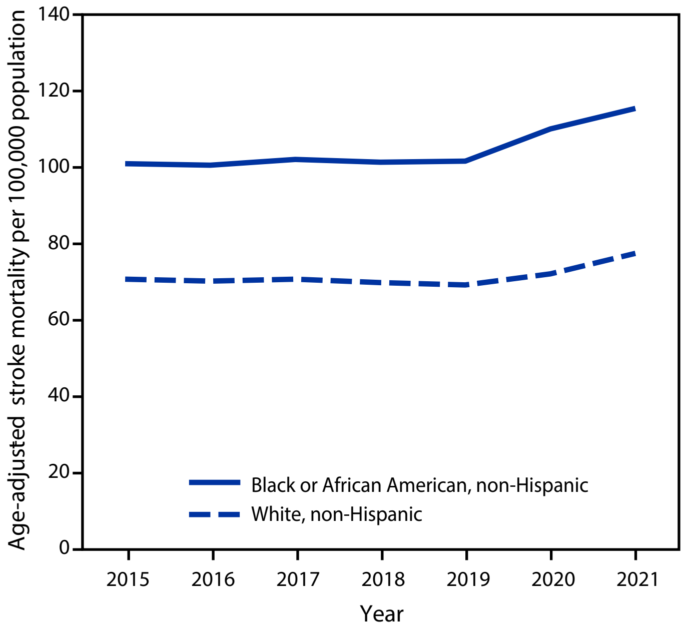
† Per 100,000 persons, standardized to the 2000 U.S. Census Bureau population by age group (35–54, 55–64, 65–74, 75–84, and ≥85 years).

§ For AASDRs, 95% CIs are calculated using Anderson-Rosenberg methods with the normal approximations of the 95% CIs (https://www.cdc.gov/nchs/data/nvsr/nvsr47/nvs47_03.pdf). For absolute and relative differences in rates, and percent change of absolute difference in rates between BNH and WNH adults (2020–2021 versus 2015–2019), 95% CIs are estimated by the Monte Carlo simulation–based approach by sampling 5,000 normal distributions based on the AASDRs and SEs and defining the CIs as the 2.5 and 97.5 percentiles of the simulation results using @Risk software (version 8.3.2; Palisade). https://help.palisade.com/v8/en/Guides/@RISK-Getting-Started-Guide.pdf

¶ Percent change of absolute difference in rates in 2015–2019 versus 2020–2021 between BNH and WNH adults is calculated by 1) calculating the difference of the average absolute difference in rates between BNH and WNH adults in 2020–2021 and the average absolute difference in rates between BNH and WNH adults in 2015–2019, and 2) dividing the above difference by the average absolute difference in rates between BNH and WNH adults in 2015–2019 and multiplying by 100.

** Relative difference in rates are AASDRs among BNH divided by AASDRs among WNH adults. The percent change in absolute differences between BNH and WNH adults in 2015–2019 compared with 2020–2021 might be different based on the results presented in the table because of rounding the results to one-decimal point.

FIGURE. Age-adjusted stroke death rates* per 100,000 Black and White adults† aged ≥35 years, before and during§ the COVID-19 pandemic — United States, 2015–2021



* Per 100,000 persons, standardized to the 2000 U.S. Census Bureau population by age group (35–54, 55–64, 65–74, 75–84, and ≥85 years).
† Persons listed as Black or African American or White (not including those listed as "more than one race") and listed as non-Hispanic or Latino (not including those with Hispanic ethnicity listed as "not stated") were included in this study.
§ The period before the pandemic was defined as 2015–2019 and the period during the pandemic as 2020–2021.

adults increased 21.7% (from 31.3 to 38.0), and the average relative difference increased to 1.5. The patterns of increased disparities in stroke mortality, as measured by percent change in absolute differences, during the pandemic were similar among men and women and increased with increasing age. The absolute difference in AASDR between Black and White adults increased 10.9% (from 16.6 to 18.4) among persons aged 35–64 years and 19.4% (from 89.8 to 107.2) among persons aged 65–84 years. During the prepandemic period, annual stroke mortality rates among persons aged ≥85 years were lower among Black than among White adults (*2*). The absolute difference in this age group changed from −23.7 during 2015–2019 to 30.3 per 100,000 during 2020–2021 (Table 1). During 2020–2021, an estimated 3,835 excess stroke deaths occurred among Black adults (9.4% more than expected), and 15,125 excess stroke deaths occurred among White adults (6.9% more than expected). The estimated percentage of excess stroke deaths among both Black and White adults was higher among women and decreased with increasing age (Table 2).

Discussion

This analysis found that in the United States, disparities among Black and White adults in stroke mortality widened from the prepandemic period to the pandemic period.

TABLE 2. Observed, expected, and estimated number and percentage of excess stroke deaths among Black and White adults* aged ≥35 years during the COVID-19 pandemic, by age group and sex — United States, 2020–2021

	Stroke deaths, 2020–2021					
	Black or African American, non-Hispanic			White, non-Hispanic		
Characteristic	Observed, no.	Expected,† no.	Excess,§ no. (%)	Observed, no.	Expected,† no.	Excess,§ no. (%)
Total	**44,686**	**40,851**	**3,835 (9.4)**	**233,639**	**218,514**	**15,125 (6.9)**
Sex						
Men	20,407	18,705	1,702 (9.1)	99,207	93,653	5,554 (5.9)
Women	24,279	22,146	2,133 (9.6)	134,432	124,861	9,571 (7.7)
Age group, yrs						
35–64	11,279	10,181	1,098 (10.8)	24,463	22,775	1,688 (7.4)
65–84	22,063	20,161	1,902 (9.4)	102,120	94,848	7,272 (7.7)
≥85	11,344	10,508	836 (8.0)	107,056	100,891	6,165 (6.1)

Abbreviation: AASDR = age-adjusted stroke death rate.
* Persons listed as Black or African American or White (not including those listed as "more than one race") and non-Hispanic or Latino (not including those with Hispanic ethnicity listed as "not stated") were included in this study.
† The expected number of stroke deaths were obtained by 1) assuming that the sex-, age-, and race and ethnicity–specific stroke death rates would continue through 2021 at the annual rate of 2015–2019 as identified by joinpoint analysis and 2) multiplying the sex-, age-, and race and ethnicity–specific population with the expected sex-, age-, and race and ethnicity–specific stroke death rates for 2020 and 2021. The expected number of stroke deaths by sex and age group might not sum to the total number of expected stroke deaths because of rounding.
§ Excess stroke deaths were calculated based on the difference between the observed versus expected stroke deaths by sex, age, and race and ethnicity during 2020–2021. The percentages of excess stroke deaths were calculated by number of excess stroke deaths divided by number of expected stroke deaths multiplied by 100. The estimated excess number of stroke deaths by sex and age group might not sum to the total number of estimated excess stroke deaths because of rounding. The percentages of estimated excess stroke deaths among non-Hispanic Black or African American persons (9.4%) were lower than the changes in AASDR from prepandemic to during the pandemic periods (11.2%) because of the slight trend of increased AASDR during 2015–2019. The percentages of estimated excess stroke deaths among non-Hispanic White persons (6.9%) were slightly higher than the changes in AASDR from prepandemic to during the pandemic periods (6.6%) because of the slight trend of decreased AASDR during 2015–2019.

Summary

What is already known about this topic?

Stroke is the fifth leading cause of death and a leading cause of long-term disability in the United States. During 1999–2019, non-Hispanic Black or African American (Black) adults experienced consistently higher stroke death rates than did non-Hispanic White (White) adults.

What is added by this report?

During the COVID-19 pandemic, age-adjusted stroke mortality rates increased among both Black and White adults; however, the absolute difference between Black and White adults was 21.7% higher than during the prepandemic period. The percentage of excess stroke deaths during the pandemic was higher among Black (9.4%) than among White (6.9%) adults.

What are the implications for public health practice?

Identifying the health care, behavioral, and contextual factors associated with these widened disparities and providing tailored interventions are necessary to reduce disparities in stroke mortality among Black and White adults.

Although stroke mortality increased among both Black and White adults, the absolute difference in AASDRs between the groups increased an estimated 21.7%; this pattern was similar in men and women. The estimated percentage of excess stroke deaths during the pandemic period among Black adults (9.4%) was higher than that among White adults (6.9%). The disparity, measured by absolute difference in AASDR, among adults aged 35–54 years increased approximately 11%, and among adults aged 65–84 years, increased 19%; the lower stroke mortality among Black adults aged ≥85 years during the prepandemic period reversed during the pandemic period.

Disparities in stroke mortality among Black and White adults are largely driven by differences in stroke incidence, with higher prevalences of high blood pressure and diabetes being the major risk factors for stroke among Black adults (*1*,*2*,*6*); racial differences in case-fatality played a minor role (*2*,*6*). The COVID-19 pandemic caused a substantial shift in health care for patients with high blood pressure and might have exacerbated existing inequities in high blood pressure treatment and control among persons of color (*7*). Reduced emergency department visits and hospitalizations for stroke, partly because of fear of SARS-CoV-2 infections (especially during the early phase of the pandemic) (*8*), suggest that delayed stroke treatment and care might have resulted in worse stroke outcomes and increased risk for death. Further, health and lifestyle behaviors, such as mental health, physical activity, and diet and sleep quality were adversely affected by the pandemic and might have disproportionately affected persons of color, resulting in increased risk for stroke (*4*). COVID-19 is associated with increased risk for stroke (*9*); disproportionately higher rates of COVID-19 experienced by Black persons[††] (*10*) might have contributed to the widened disparity among Black and White adults in stroke mortality.

A main goal of the Healthy People 2030 initiative is to improve the health and well-being of all U.S. persons by eliminating health disparities, achieving health equity, and increasing health literacy.[§§] Further studies are needed to identify and evaluate the underlying risk factors, including stress-related factors such as economic strain, poor mental health, and social determinants of health that might have contributed to the widened disparity between Black and White adults in stroke mortality during the COVID-19 pandemic. Tailored interventions to improve the prevention, control and management of risk factors, system-based stroke care, and structural changes addressing racial disparities in health care might be required to effect lasting change.

The findings in this report are subject to at least two limitations. First, the NVSS mortality data lacks information to determine how much of an increase in stroke mortality was directly attributable to the COVID-19 pandemic. Second, this study focused on disparity in stroke mortality among Black and White adults before and during the pandemic, and did not include other races.

Substantial disparities in stroke mortality between Black and White adults in the United States exist and have widened during the COVID-19 pandemic. The COVID-19 pandemic imposed setbacks to progress made in reducing disparities in stroke mortality between Black and White adults. Identifying factors associated with these widened disparities, implementing prevention efforts, including the management and control of stroke risk factors, preventing disparities in treatment and services for long term sequelae of stroke, and tailoring interventions to advance health equity are needed to reduce disparities in stroke mortality.

[††] https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html

[§§] https://health.gov/healthypeople/priority-areas/health-equity-healthy-people-2030

Corresponding author: Quanhe Yang, qay0@cdc.gov.

[1]Division for Heart Disease and Stroke Prevention, National Center for Chronic Disease Prevention and Health Promotion, CDC.

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The Association of Reported Experiences of Racial and Ethnic Discrimination in Health Care with COVID-19 Vaccination Status and Intent — United States, April 22, 2021–November 26, 2022

Laurie D. Elam-Evans, PhD[1]; Camara Phyllis Jones, MD, PhD[2]; Kushagra Vashist, MPH[1,3]; David Yankey, PhD[1]; Chalanda S. Smith, PhD[1]; Jennifer L. Kriss, PhD[1]; Peng-Jun Lu, MD[1]; Michael E. St. Louis, MD[4]; Noel T. Brewer, PhD[5]; James A. Singleton, PhD[1]

In 2021, the CDC Director declared that racism is a serious threat to public health,* reflecting a growing awareness of racism as a cause of health inequities, health disparities, and disease. Racial and ethnic disparities in COVID-19–related hospitalization and death (*1*,*2*) illustrate the need to examine root causes, including experiences of discrimination. This report describes the association between reported experiences of discrimination in U.S. health care settings and COVID-19 vaccination status and intent to be vaccinated by race and ethnicity during April 22, 2021–November 26, 2022, based on the analysis of interview data collected from 1,154,347 respondents to the National Immunization Survey–Adult COVID Module (NIS–ACM). Overall, 3.5% of adults aged ≥18 years reported having worse health care experiences compared with persons of other races and ethnicities (i.e., they experienced discrimination), with significantly higher percentages reported by persons who identified as non-Hispanic Black or African American (Black) (10.7%), non-Hispanic American Indian or Alaska Native (AI/AN) (7.2%), non-Hispanic multiple or other race (multiple or other race) (6.7%), Hispanic or Latino (Hispanic) (4.5%), non-Hispanic Native Hawaiian or other Pacific Islander (NHOPI) (3.9%), and non-Hispanic Asian (Asian) (2.8%) than by non-Hispanic White (White) persons (1.6%). Unadjusted differences in prevalence of being unvaccinated against COVID-19 among respondents reporting worse health care experiences than persons of other races and ethnicities compared with those who reported that their health care experiences were the same as those of persons of other races and ethnicities were statistically significant overall (5.3) and for NHOPI (19.2), White (10.5), multiple or other race (5.7), Black (4.6), Asian (4.3), and Hispanic (2.6) adults. Findings were similar for vaccination intent. Eliminating inequitable experiences in health care settings might help reduce some disparities in receipt of a COVID-19 vaccine.

NIS–ACM is a random-digit–dialed mobile telephone survey of adults aged ≥18 years in the 50 states, the District of Columbia, selected local areas, and selected U.S. territories.† During the data collection period for this report, monthly survey response rates ranged from 17% to 23%. Reported experiences of racial and ethnic discrimination were assessed by the question, "When seeking health care in the last 2 years, do you feel your experiences were worse than, the same as, or better than (those of) persons of other races or ethnicities?" (hereafter worse, same, and better). "Don't know" was also a valid response option. This question was adapted from CDC's Behavioral Risk Factor Surveillance System (BRFSS) Reactions to Race module.§ The question was field tested, cognitively tested, and approved by the Office of Management and Budget, then slightly modified for NIS-ACM by adding ethnicities and expanding the time frame to 2 years because of COVID-19. Because of the interest in examining reported inequitable experiences in health care and the association of these experiences with COVID-19 vaccination behaviors, the focus for the analysis of discrimination was a comparison of worse experiences with same experiences. COVID-19 vaccination status¶ was assessed by three questions: "Have you received at least one dose of a COVID-19 vaccine?," "Which brand of COVID-19 vaccine did you receive for your first dose?," and "How many doses of a COVID-19 vaccine have you received?" The last two questions assessed completion of the primary series or partial vaccination. Among persons who had not received any COVID-19 vaccine doses, vaccination intent** was assessed by the question, "How likely are you to get a COVID-19 vaccine?" The outcomes of interest in this study were 1) being unvaccinated against COVID-19 and 2) among unvaccinated persons, definitely not intending to get vaccinated. Unadjusted and adjusted prevalence differences

* https://www.cdc.gov/media/releases/2021/s0408-racism-health.html

† Local areas that received federal immunization funds under Section 317 of the Public Health Service Act are sampled separately in the National Immunization Survey. Local areas include Bexar County, Texas; Chicago, Illinois; Houston, Texas; New York, New York; and Philadelphia County, Pennsylvania. Three U.S. territories were sampled separately: Guam (April–July 2021 and April–July 2022), Puerto Rico, and U.S. Virgin Islands (January 2021–December 2021).

§ The question was one of six included in the Reactions to Race module that was piloted in 2002 and included as an optional module during 2002–2014. https://www.cdc.gov/brfss/questionnaires/index.htm

¶ Vaccination status was categorized as follows: not vaccinated/unvaccinated (zero doses), partially vaccinated (1 dose Pfizer-BioNTech or 1 dose Moderna), and fully vaccinated/completed a vaccine primary series (2 doses of the Pfizer-BioNTech vaccine, 2 doses of the Moderna vaccine, 2 doses of the Novavax vaccine [starting with August 2022 data], or 1 dose of the Janssen [Johnson & Johnson] vaccine). Immunocompromise status was also used to determine completion of the primary series.

** Vaccination intent was asked of respondents reporting they had not received any COVID-19 vaccinations and was categorized as follows: unvaccinated but definitely intend to get vaccinated, unvaccinated but probably will get vaccinated, unvaccinated and unsure about getting vaccinated, unvaccinated and probably will not get vaccinated, and unvaccinated and definitely will not get vaccinated.

compared those reporting experiences that were worse than and the same as those of persons of other races and ethnicities. T-tests were used to assess statistical significance of unadjusted prevalence differences. Adjusted prevalence differences were based on multivariable logistic regression and predictive marginals assessing the association of reported discrimination with vaccination status and vaccination intent, overall and by race and ethnicity, controlling for age, sex, education, poverty status, metropolitan statistical area (urban, suburban, or rural residence), U.S. Census Bureau region, and health insurance status. Adjusted and unadjusted prevalence differences were considered statistically significant at $p<0.05$. Analyses were conducted for respondents overall and separately for AI/AN, Asian, Black, Hispanic, NHOPI, White, and multiple or other race respondents. Data were weighted to represent the noninstitutionalized U.S. adult population and to adjust for nonresponse and households without a telephone. Data were calibrated to state vaccine administration data reported to CDC.[††] SAS (version 9.4; SAS Institute) and SUDAAN (version 11; RTI International) were used for statistical analyses. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.[§§]

Overall, 3.5% of respondents reported that their experiences in health care were worse than those of persons of other races and ethnicities (Supplementary Table; https://stacks.cdc.gov/view/cdc/127243) (Supplementary Figure 1; https://stacks.cdc.gov/view/cdc/127237). Significantly higher percentages of having worse experiences were reported by Black (10.7%), AI/AN (7.2%), multiple or other race (6.7%), Hispanic (4.5%), NHOPI (3.9%) and Asian (2.8%) adults than by White (1.6%) adults. The prevalence of being unvaccinated against COVID-19 was significantly higher among respondents reporting worse experiences in health care than among those reporting the same experiences, with unadjusted prevalence differences of 5.3 overall, and 19.2 among NHOPI, 10.5 among White, 5.7 among multiple and other race, 4.6 among Black, 4.3 among Asian, and 2.6 among Hispanic adults (Table 1) (Figure). After adjustment, the prevalence

†† Survey weights were calibrated to the COVID-19 vaccine administration data by jurisdiction, age group, and sex. https://covid.cdc.gov/covid-data-tracker/ (Accessed September 23, 2022).

§§ 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.

TABLE 1. Association between experience with racial and ethnic discrimination* when seeking health care and COVID-19 vaccination status, overall and by race and ethnicity — National Immunization Survey–Adult COVID Module, April 22, 2021–November 26, 2022

	COVID–19 vaccination status								
	Not vaccinated			Partially vaccinated†			Completed primary vaccination series§		
	Unadjusted		Adjusted¶	Unadjusted		Adjusted¶	Unadjusted		Adjusted¶
Race and ethnicity/ Experience	%, by row (95% CI)	PD (95% CI)	PD (95% CI)	%, by row (95% CI)	PD (95% CI)	PD (95% CI)	%, by row (95% CI)	PD (95% CI)	PD (95% CI)
Overall									
Worse	28.0 (27.0 to 29.0)	5.3 (4.3 to 6.3)**	3.2 (2.4 to 4.0)**	3.0 (2.7 to 3.4)	0.6 (0.2 to 0.9)**	0.3 (0 to 0.6)	68.6 (67.6 to 69.6)	−5.9 (−7.0 to −4.9)**	−3.5 (−4.4 to −2.6)**
Same	22.7 (22.5 to 22.9)	Ref	Ref	2.5 (2.4 to 2.5)	Ref	Ref	74.5 (74.3 to 74.8)	Ref	Ref
Better	8.6 (8.3 to 8.8)	−14.1 (−14.5 to −13.8)**	−10.4 (−10.8 to −10.1)**	1.6 (1.5 to 1.7)	−0.8 (−1.0 to −0.7)**	−0.5 (−0.6 to −0.3)**	89.5 (89.2 to 89.8)	15.0 (14.6 to 15.3)**	10.8 (10.4 to 11.2)**
Don't know	19.2 (18.9 to 19.6)	−3.4 (−3.9 to −3.0)**	−0.5 (−0.9 to −0.1)**	2.2 (2.0 to 2.3)	−0.3 (−0.5 to −0.2)**	−0.1 (−0.2 to 0.1)	78.1 (77.8 to 78.5)	3.6 (3.1 to 4.0)**	0.5 (0.1 to 0.9)**
American Indian or Alaska Native, non-Hispanic									
Worse	39.0 (32.5 to 45.6)	4.0 (−3.0 to 10.9)	3.0 (−3.1 to 9.2)	2.4 (1.0 to 3.8)	−0.6 (−2.2 to 1.0)	−0.8 (−2.5 to 0.8)	57.5 (51.1 to 63.9)	−4.0 (−10.9 to 2.8)	−2.8 (−8.8 to 3.2)
Same	35.1 (32.6 to 37.5)	Ref	Ref	3.1 (2.2 to 3.9)	Ref	Ref	61.5 (59.1 to 64.0)	Ref	Ref
Better	23.8 (19.9 to 27.7)	−11.2 (−15.8 to −6.7)**	−7.0 (−11.6 to −2.4)**	1.7 (0.8 to 2.6)	−1.3 (−2.5 to −0.1)**	−1.4 (−2.7 to −0.2)**	72.5 (68.2 to 76.9)	11.0 (6.0 to 16.0)**	6.8 (2.0 to 11.5)**
Don't know	36.6 (31.6 to 41.7)	1.6 (−4.0 to 7.2)	4.4 (−0.7 to 9.5)	2.3 (1.2 to 3.4)	−0.8 (−2.1 to 0.6)	−1.0 (−2.5 to 0.4)	59.7 (54.6 to 64.7)	−1.9 (−7.5 to 3.8)	−3.9 (−9.0 to 1.3)
Asian, non-Hispanic									
Worse	9.4 (5.3 to 13.4)	4.3 (0.2 to 8.4)**	3.8 (0 to 7.5)**	1.9 (0.6 to 3.2)	0.1 (−1.3 to 1.4)	−0.2 (−1.5 to 1.0)	88.7 (84.5 to 92.9)	−4.2 (−8.5 to 0)	−3.5 (−7.3 to 0.4)
Same	5.1 (4.6 to 5.7)	Ref	Ref	1.9 (1.6 to 2.1)	Ref	Ref	92.9 (92.3 to 93.5)	Ref	Ref
Better	4.9 (3.8 to 6.0)	−0.2 (−1.4 to 1.0)	0 (−1.3 to 1.2)	1.4 (1.0 to 1.9)	−0.4 (−1.0 to 0.1)	−0.4 (−1.0 to 0.1)	93.5 (92.4 to 94.7)	0.6 (−0.7 to 1.9)	0.4 (−0.9 to 1.8)
Don't know	5.4 (4.4 to 6.4)	0.3 (−0.9 to 1.5)	0.1 (−1.0 to 1.3)	1.9 (1.4 to 2.3)	0 (−0.5 to 0.5)	0.1 (−0.5 to 0.6)	92.2 (91.0 to 93.5)	−0.7 (−2.1 to 0.7)	−0.6 (−2.0 to 0.7)

See table footnotes on the next page.

TABLE 1. (*Continued*) **Association between experience with racial and ethnic discrimination* when seeking health care and COVID-19 vaccination status, overall and by race and ethnicity — National Immunization Survey–Adult COVID Module, April 22, 2021–November 26, 2022**

Race and ethnicity/Experience	COVID–19 vaccination status: Not vaccinated, Unadjusted %, by row (95% CI)	Not vaccinated, Unadjusted PD (95% CI)	Not vaccinated, Adjusted¶ PD (95% CI)	Partially vaccinated†, Unadjusted %, by row (95% CI)	Partially vaccinated†, Unadjusted PD (95% CI)	Partially vaccinated†, Adjusted¶ PD (95% CI)	Completed primary vaccination series§, Unadjusted %, by row (95% CI)	Completed primary vaccination series§, Unadjusted PD (95% CI)	Completed primary vaccination series§, Adjusted¶ PD (95% CI)
Black, non-Hispanic									
Worse	25.3 (23.7 to 26.8)	4.6 (2.9 to 6.2)**	2.7 (1.3 to 4.1)**	3.2 (2.7 to 3.8)	0.3 (−0.3 to 0.9)	0.1 (−0.4 to 0.7)	71.3 (69.7 to 72.9)	−4.6 (−6.3 to −2.9)**	−2.7 (−4.2 to −1.3)**
Same	20.7 (20.1 to 21.3)	Ref	Ref	3.0 (2.7 to 3.2)	Ref	Ref	75.9 (75.3 to 76.5)	Ref	Ref
Better	19.4 (18.1 to 20.8)	−1.2 (−2.7 to 0.2)	1.3 (−0.2 to 2.7)	2.8 (2.3 to 3.2)	−0.2 (−0.7 to 0.3)	0.1 (−0.5 to 0.6)	77.2 (75.8 to 78.6)	1.3 (−0.3 to 2.8)	−1.2 (−2.7 to 0.3)
Don't know	22.6 (21.4 to 23.8)	1.9 (0.6 to 3.3)**	3.3 (2.0 to 4.6)**	3.1 (2.6 to 3.6)	0.1 (−0.5 to 0.6)	0.2 (−0.4 to 0.7)	73.5 (72.2 to 74.8)	−2.4 (−3.8 to −1.0)**	−3.7 (−5.0 to −2.4)**
Hispanic									
Worse	22.6 (20.5 to 24.7)	2.6 (0.4 to 4.8)**	3.0 (0.9 to 5.2)**	3.3 (2.4 to 4.2)	0.3 (−0.7 to 1.2)	0.3 (−0.7 to 1.2)	73.7 (71.5 to 75.9)	−2.9 (−5.2 to −0.6)**	−3.2 (−5.4 to −1.0)**
Same	20.0 (19.4 to 20.5)	Ref	Ref	3.1 (2.9 to 3.3)	Ref	Ref	76.6 (76.0 to 77.1)	Ref	Ref
Better	15.0 (14.0 to 16.0)	−5.0 (−6.1 to −3.9)**	−2.7 (−3.9 to −1.5)**	2.8 (2.4 to 3.2)	−0.3 (−0.7 to 0.2)	−0.2 (−0.7 to 0.3)	81.5 (80.5 to 82.5)	4.9 (3.8 to 6.1)**	2.6 (1.3 to 3.9)**
Don't know	21.8 (20.6 to 23.1)	1.8 (0.5 to 3.2)**	3.1 (1.7 to 4.5)**	3.5 (3.0 to 4.0)	0.4 (−0.2 to 1.0)	0.4 (−0.2 to 1.0)	74.1 (72.8 to 75.4)	−2.5 (−3.9 to −1.0)**	−3.6 (−5.1 to −2.2)**
Native Hawaiian or other Pacific Islander, non-Hispanic									
Worse	42.1 (29.1 to 55.1)††	19.2 (5.9 to 32.6)**,††	14.6 (2.0 to 27.1)**,††	2.0 (0.1 to 4.0)	−0.3 (−2.4 to 1.8)	−0.7 (−2.8 to 1.3)	55.3 (42.5 to 68.2)††	−19.1 (−32.3 to −5.8)††	−14.2 (−26.9 to −1.5)**,††
Same	22.9 (19.7 to 26.1)	Ref	Ref	2.3 (1.6 to 3.1)	Ref	Ref	74.4 (71.1 to 77.7)	Ref	Ref
Better	16.4 (11.0 to 21.8)	−6.5 (−12.8 to −0.2)**	−3.0 (−9.2 to 3.1)	2.1 (1.1 to 3.0)	−0.2 (−1.5 to 1.0)	0.1 (−1.3 to 1.5)	81.2 (75.7 to 86.7)	6.8 (0.4 to 13.2)**	3.0 (−3.1 to 9.2)
Don't know	19.9 (13.3 to 26.5)	−3.0 (−10.4 to 4.4)	0.6 (−6.1 to 7.4)	3.0 (1.0 to 5.1)	0.7 (−1.5 to 2.9)	0.9 (−1.4 to 3.1)	76.7 (69.9 to 83.5)	2.3 (−5.3 to 9.9)	−1.4 (−7.9 to 5.1)
White, non-Hispanic									
Worse	35.4 (33.5 to 37.3)	10.5 (8.7 to 12.4)**	6.1 (4.6 to 7.7)**	2.7 (2.1 to 3.3)	0.5 (−0.1 to 1.1)	0.1 (−0.4 to 0.6)	61.5 (59.6 to 63.4)	−11.2 (−13.1 to −9.3)**	−6.5 (−8.1 to −4.9)**
Same	24.9 (24.6 to 25.1)	Ref	Ref	2.2 (2.1 to 2.3)	Ref	Ref	72.7 (72.4 to 73.0)	Ref	Ref
Better	5.9 (5.6 to 6.2)	−19.0 (−19.3 to −18.6)**	−14.6 (−15.0 to −14.2)**	1.3 (1.2 to 1.4)	−0.9 (−1.1 to −0.8)**	−0.5 (−0.7 to −0.4)**	92.7 (92.4 to 92.9)	20.0 (19.6 to 20.4)**	15.1 (14.7 to 15.5)**
Don't know	18.4 (18.0 to 18.8)	−6.5 (−7.0 to −6.0)**	−2.9 (−3.4 to −2.5)**	1.8 (1.7 to 1.9)	−0.4 (−0.5 to −0.3)**	−0.2 (−0.3 to 0)**	79.4 (79.0 to 79.8)	6.8 (6.2 to 7.3)**	3.0 (2.6 to 3.5)**
Multiple or other, non-Hispanic									
Worse	36.3 (31.9 to 40.7)	5.7 (1.1 to 10.3)**	3.4 (−0.7 to 7.5)	3.5 (2.1 to 5.0)	0.9 (−0.5 to 2.4)	0.9 (−0.6 to 2.5)	59.8 (55.4 to 64.2)	−6.8 (−11.4 to −2.2)**	−4.4 (−8.6 to −0.3)**
Same	30.6 (29.3 to 31.9)	Ref	Ref	2.6 (2.2 to 3.1)	Ref	Ref	66.6 (65.2 to 67.9)	Ref	Ref
Better	14.6 (12.6 to 16.6)	−16.0 (−18.4 to −13.6)**	−11.1 (−13.6 to −8.6)**	2.1 (1.4 to 2.7)	−0.6 (−1.4 to 0.2)	−0.5 (−1.3 to 0.3)	83.0 (80.9 to 85.1)	16.4 (13.9 to 18.9)**	11.4 (8.8 to 14.0)**
Don't know	30.6 (28.2 to 33.0)	0 (−2.7 to 2.8)	2.6 (0 to 5.1)	2.5 (1.6 to 3.4)	−0.1 (−1.1 to 0.9)	0 (−1.0 to 1.1)	66.4 (64.0 to 68.8)	−0.2 (−3.0 to 2.6)	−2.7 (−5.3 to −0.1)**

Abbreviations: MSA = metropolitan statistical area; PD = prevalence difference; Ref = referent group.

* Reported experiences of racial and ethnic discrimination were assessed by the question, "When seeking health care in the last 2 years, do you feel your experiences were worse than, the same as, or better than (those of) persons of other races or ethnicities?" Persons who reported "worse" experiences were considered to have experienced discrimination.

† Received 1 dose of the Pfizer-BioNTech vaccine or 1 dose of the Moderna vaccine.

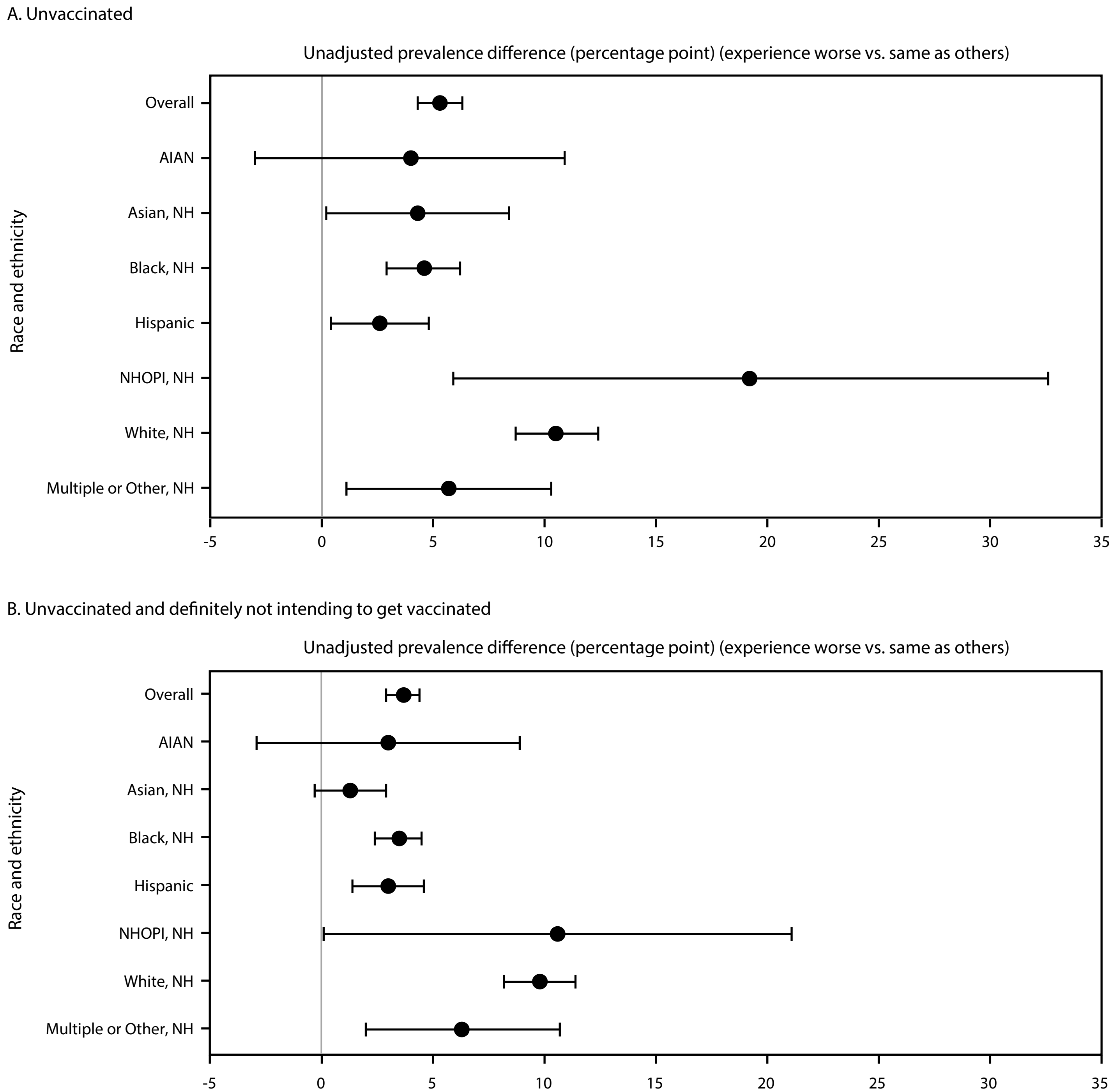
§ Received 2 doses of the Pfizer-BioNTech vaccine, 2 doses of the Moderna vaccine, 1 dose of the Janssen (Johnson & Johnson) vaccine, or 2 doses of the Novavax vaccine (starting with August 2022 data).

¶ Adjusted prevalence differences were those adjusted for age (18–29, 30–39, 40–49, 50–64, 65–74, or ≥75 years), sex (female or male), education (high school diploma or less, some college, college graduate, or advanced degree), poverty status (below poverty, at or above poverty and <$75,000 annually, or at or above poverty and ≥$75,000 annually), MSA status (MSA principal city, MSA nonprincipal city, or non-MSA), U. S. Census Bureau region (Northeast, Midwest, South, or West), and health insurance status (insured or not insured).

** Statistically significant difference compared with Ref ("same as") (p<0.05).

†† 95% CI >20 might not be reliable.

FIGURE. Unadjusted association* between experience with racial and ethnic discrimination† while seeking health care and being (A) unvaccinated and (B) unvaccinated and definitely not intending to get vaccinated, overall and by race and ethnicity§ — National Immunization Survey – Adult COVID Module, April 22, 2021–November 26, 2022



Abbreviations: AI/AN = American Indian or Alaska Native; NH = non-Hispanic; NHOPI = Native Hawaiian or other Pacific Islander.
* 95% CIs indicated by error bars; 95% CIs that exclude zero are statistically significant.
† Reported experiences of racial and ethnic discrimination were assessed by the question, "When seeking health care in the last 2 years, do you feel your experiences were worse than, the same as, or better than (those of) persons of other races or ethnicities?" Persons who reported "worse" experiences were considered to have experienced discrimination.
§ Hispanic persons could be of any race.

differences associated with being unvaccinated were attenuated but remained statistically significant overall (3.2) as well as for NHOPI (14.6), White (6.1), Black (2.7), Asian, (3.8), and Hispanic (3.0) adults (Table 1) (Supplementary Figure 2; https://stacks.cdc.gov/view/cdc/127242).

Among unvaccinated respondents, the prevalence of those who stated that they were definitely not intending to get vaccinated was significantly higher among those who reported worse experiences in health care than among those who reported that their experiences were the same as those of persons of other races and ethnicities, with unadjusted prevalence differences of 3.7 overall, and 10.6 among NHOPI, 9.8 among White persons, 6.3 among multiple and other race, 3.5 among Black, and 3.0 among Hispanic (Table 2) (Figure). After adjustment, the prevalence differences were attenuated but remained statistically significant overall (2.9) and for White (6.4), multiple and other race (4.9), Black (2.6), and Hispanic (3.3) adults (Table 2) (Supplementary Figure 2; https://stacks.cdc.gov/view/cdc/127242).

Discussion

Reported experiences of racial and ethnic discrimination in health care settings were associated with a difference in prevalence of nonvaccination against COVID-19 ranging from 2.6 (Hispanic adults) to 19.2 (NHOPI adults). Among unvaccinated adults, experiencing discrimination in health care settings was associated with a prevalence difference ranging from 3.0 (Hispanic adults) to 10.6 (NHOPI adults) for respondents who were definitely not intending to get vaccinated. Other studies have attributed disparities in COVID-19 vaccination to lower confidence in vaccination and more barriers to access (*3*,*4*). Few studies, however, have examined the association between reported experiences of discrimination in health care with COVID-19 vaccination status and intent to be vaccinated. One national survey[¶¶] found that U.S. adults who reported experiences of discrimination in health care had lower COVID-19 vaccination coverage. A study on influenza vaccination identified similar findings. Specifically, seasonal influenza vaccination coverage among chronically ill U.S. adults who reported experiencing discrimination in health care was one half that of those who did not report these experiences (32% versus 60%; p = 0.009) (*5*). Addressing experiences of discrimination in health care settings might facilitate preventive care use, including COVID-19 vaccination.

The findings in this report are subject to at least eight limitations. First, response rates for the NIS–ACM were approximately 20%; therefore, bias might occur from household nonresponse and phoneless households. Data weighting might have partially mitigated this bias. Second, COVID-19 vaccination status was self-reported and subject to misclassification because of errors in recall or social desirability; however, given the recency of COVID-19 vaccine authorization and high awareness of the pandemic, errors in vaccination recall were likely minimal. Third, this report focuses on reported discrimination in health care settings during the previous 2 years. If respondents refrained from seeking health care because of the pandemic, true rates of discrimination could be higher or lower; CDC was unaware of any data to evaluate this potential limitation. Fourth, this survey did not sample institutionalized adults, including those experiencing incarceration or living in nursing homes, which might underestimate the impact of discrimination. Fifth, the adjusted prevalence differences might be biased because of misspecification of the multivariable models. Specifically, some adjustment variables, such as socioeconomic status and health insurance status, might not truly be independent of discrimination, but instead be linked in complex ways with race and ethnicity in these experiences. Sixth, there might be some uncontrolled covariates contributing to the observed association between reported racial and ethnic discrimination and COVID-19 vaccination status or intent. Seventh, the sample size for NHOPI was small, which might have yielded unreliable estimates. However, including NHOPI permitted analysis of as many racial and ethnic groups as possible. Finally, this is a cross-sectional study; therefore, causal inferences about the impact of reported discrimination on COVID-19 vaccination status and intent cannot be made.

Reported racial and ethnic discrimination appears to be associated with at least some disparities in COVID-19 vaccine receipt; thus, eliminating inequities in health care experiences might reduce some of this disparity and potentially increase vaccination coverage among adults. Some progress was made to address disparities early in the pandemic (*6*). To advance vaccine equity, CDC has funded national, state, local, and community-level partners[***] who work with their communities to increase vaccine access, confidence, demand, and equity by training trusted messengers, setting up vaccination clinics, and conducting community outreach in local languages and dialects.[†††,§§§]

Additional studies and action are needed to understand and eliminate discrimination. CDC supported the examination of discrimination in 27 states to administer the Reactions to Race module on the 2022 and 2023 BRFSS, and analysis of experiences with racism is a part of the current research

¶¶ https://www.brookings.edu/blog/how-we-rise/2021/10/20/discrimination-in-the-healthcare-system-is-leading-to-vaccination-hesitancy/

*** https://www.cdc.gov/media/releases/2021/p0317-COVID-19-Health-Disparities.html

††† https://www.cdc.gov/media/releases/2021/p0325-community-healthworkers-support.html

§§§ https://www.cdc.gov/vaccines/health-equity/index.html

TABLE 2. Association between experience with racial and ethnic discrimination* when seeking health care and COVID-19 vaccination intent, overall and by race and ethnicity — National Immunization Survey–Adult COVID Module, April 22, 2021–November 26, 2022

Race and ethnicity/ Experience	COVID–19 vaccination intent of unvaccinated respondents														
	Definitely will get vaccinated			Probably will get vaccinated			Unsure about getting vaccinated			Probably will not get vaccinated			Definitely will not get vaccinated		
	Unadjusted[†]		Adjusted[§]	Unadjusted[†]		Adjusted[§]	Unadjusted[†]		Adjusted[§]	Unadjusted[†]		Adjusted[§]	Unadjusted[†]		Adjusted[§]
	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)
Overall															
Worse	2.5 (2.1 to 2.8)	0.6 (0.3 to 1.0)[¶]	0.3 (0 to 0.6)[¶]	2.7 (2.3 to 3.0)	0.1 (−0.2 to 0.5)	−0.1 (−0.4 to 0.2)	4.8 (4.3 to 5.3)	1.1 (0.6 to 1.5)[¶]	0.5 (0.1 to 0.9)[¶]	3.9 (3.5 to 4.4)	−0.2 (−0.7 to 0.2)	−0.3 (−0.7 to 0.1)	14.1 (13.4 to 14.9)	3.7 (2.9 to 4.4)[¶]	2.9 (2.2 to 3.5)[¶]
Same	1.8 (1.8 to 1.9)	Ref	Ref	2.5 (2.5 to 2.6)	Ref	Ref	3.7 (3.6 to 3.8)	Ref	Ref	4.2 (4.1 to 4.3)	Ref	Ref	10.4 (10.3 to 10.6)	Ref	Ref
Better	1.4 (1.3 to 1.5)	−0.4 (−0.6 to −0.3)[¶]	0 (−0.2 to 0.1)	1.4 (1.3 to 1.5)	−1.2 (−1.3 to −1.0)[¶]	−0.7 (−0.9 to −0.5)[¶]	1.7 (1.6 to 1.9)	−2.0 (−2.2 to −1.8)[¶]	−1.3 (−1.5 to −1.2)[¶]	1.3 (1.2 to 1.4)	−2.9 (−3.1 to −2.7)[¶]	−2.3 (−2.5 to −2.2)[¶]	2.8 (2.6 to 2.9)	−7.7 (−7.9 to −7.5)[¶]	−6.3 (−6.5 to −6.0)[¶]
Don't know	1.7 (1.5 to 1.8)	−0.2 (−0.3 to 0)[¶]	0.1 (−0.1 to 0.2)	1.9 (1.8 to 2.0)	−0.7 (−0.8 to −0.5)[¶]	−0.3 (−0.5 to −0.1)[¶]	3.5 (3.3 to 3.7)	−0.2 (−0.4 to −0)[¶]	0.3 (0.1 to 0.5)[¶]	3.1 (3.0 to 3.3)	−1.0 (−1.2 to −0.9)[¶]	−0.4 (−0.6 to −0.2)[¶]	9.1 (8.8 to 9.3)	−1.4 (−1.7 to −1.1)[¶]	−0.2 (−0.5 to 0.1)
American Indian or Alaska Native, non-Hispanic															
Worse	1.7 (0.4 to 2.9)	−1.0 (−2.5 to 0.6)	−1.1 (−2.5 to 0.4)	2.3 (0.8 to 3.8)	−0.4 (−2.2 to 1.4)	−0.2 (−2.0 to 1.6)	11.0 (5.1 to 16.9)	5.0 (−1.1 to 11.0)	4.7 (−0.4 to 9.8)	2.8 (1.2 to 4.4)	−2.9 (−4.9 to −0.9)[¶]	−2.8 (−4.7 to −1.0)[¶]	21.2 (15.6 to 26.7)	3.0 (−2.9 to 8.9)	2.2 (−3.4 to 7.9)
Same	2.6 (1.7 to 3.6)	Ref	Ref	2.7 (1.8 to 3.7)	Ref	Ref	6.0 (4.8 to 7.3)	Ref	Ref	5.7 (4.5 to 6.8)	Ref	Ref	18.2 (16.1 to 20.2)	Ref	Ref
Better	2.6 (1.2 to 3.9)	−0.1 (−1.7 to 1.5)	0.1 (−1.6 to 1.8)	1.6 (0.7 to 2.5)	−1.1 (−2.5 to 0.2)	−0.8 (−2.2 to 0.6)	4.6 (2.7 to 6.6)	−1.4 (−3.7 to 0.9)	−0.6 (−3.0 to 1.8)	2.8 (1.6 to 3.9)	−2.9 (−4.5 to −1.2)[¶]	−2.0 (−3.8 to −0.3)[¶]	12.3 (9.1 to 15.6)	−5.8 (−9.7 to− 2.0)[¶]	−4.1 (−8.1 to 0)[¶]
Don't know	1.7 (0.9 to 2.5)	−0.9 (−2.1 to 0.3)	−0.8 (−2.0 to 0.5)	3.8 (1.4 to 6.1)	1.0 (−1.5 to 3.6)	1.5 (−1.1 to 4.0)	7.7 (5.4 to 10.1)	1.7 (−0.9 to 4.3)	2.3 (−0.4 to 5.1)	6.9 (3.0 to 10.7)	1.2 (−2.8 to 5.2)	2.0 (−1.8 to 5.8)	16.9 (13.3 to 20.4)	−1.3 (−5.4 to 2.8)	−0.5 (−4.7 to 3.7)
Asian, non-Hispanic															
Worse	1.9 (−0.1 to 3.9)	0.5 (−1.5 to 2.5)	0.4 (−1.4 to 2.2)	0.8 (0.2 to 1.3)	−0.2 (−0.9 to 0.4)	−0.2 (−0.9 to 0.4)	3.4 (0.2 to 6.5)	2.4 (−0.8 to 5.5)	2.1 (−0.7 to 4.9)	1.2 (0.1 to 2.2)	0.4 (−0.7 to 1.5)	0.4 (−0.7 to 1.6)	2.2 (0.6 to 3.8)	1.3 (−0.3 to 2.9)	1.1 (−0.4 to 2.6)
Same	1.4 (1.1 to 1.7)	Ref	Ref	1.0 (0.8 to 1.2)	Ref	Ref	1.0 (0.8 to 1.3)	Ref	Ref	0.8 (0.5 to 1.1)	Ref	Ref	1.0 (0.7 to 1.2)	Ref	Ref
Better	1.6 (1.0 to 2.2)	0.2 (−0.5 to 0.9)	0.2 (−0.5 to 1.0)	1.1 (0.6 to 1.6)	0.1 (−0.5 to 0.7)	0.1 (−0.5 to 0.7)	0.8 (0.4 to 1.1)	−0.3 (−0.6 to 0.1)	−0.2 (−0.6 to 0.2)	1.0 (0.3 to 1.6)	0.2 (−0.5 to 0.9)	0.3 (−0.5 to 1.1)	0.5 (0.2 to 0.7)	−0.5 (−0.8 to −0.2)[¶]	−0.5 (−0.8 to −0.1)[¶]
Don't know	1.8 (1.1 to 2.6)	0.5 (−0.3 to 1.2)	0.4 (−0.4 to 1.2)	0.7 (0.3 to 1.0)	−0.4 (−0.7 to 0)	−0.4 (−0.8 to 0)	1.3 (0.8 to 1.8)	0.3 (−0.2 to 0.9)	0.4 (−0.2 to 0.9)	0.4 (0.2 to 0.6)	−0.4 (−0.7 to −0.1)[¶]	−0.4 (−0.7 to −0.1)[¶]	1.1 (0.6 to 1.6)	0.2 (−0.4 to 0.7)	0.1 (−0.4 to 0.6)
Black, non-Hispanic															
Worse	2.2 (1.8 to 2.6)	−0.4 (−0.8 to 0.1)	−0.4 (−0.9 to 0)	3.2 (2.6 to 3.9)	−0.5 (−1.2 to 0.2)	−0.8 (−1.4 to −0.2)[¶]	5.5 (4.7 to 6.4)	0.7 (−0.1 to 1.6)	0.4 (−0.4 to 1.2)	4.7 (3.7 to 5.6)	1.3 (0.3 to 2.3)[¶]	0.9 (0.1 to 1.8)[¶]	9.7 (8.7 to 10.7)	3.5 (2.4 to 4.5)[¶]	2.6 (1.6 to 3.6)[¶]
Same	2.6 (2.3 to 2.8)	Ref	Ref	3.8 (3.5 to 4.1)	Ref	Ref	4.8 (4.5 to 5.1)	Ref	Ref	3.3 (3.1 to 3.6)	Ref	Ref	6.2 (5.9 to 6.6)	Ref	Ref
Better	2.7 (2.2 to 3.3)	0.2 (−0.4 to 0.8)	0.3 (−0.3 to 0.9)	3.2 (2.6 to 3.9)	−0.5 (−1.2 to 0.2)	0 (−0.8 to 0.8)	4.7 (4.0 to 5.5)	−0.1 (−0.9 to 0.7)	0.4 (−0.4 to 1.3)	2.5 (1.9 to 3.0)	−0.9 (−1.5 to −0.3)[¶]	−0.4 (−1.1 to 0.3)	6.3 (5.5 to 7.1)	0.1 (−0.8 to 1.0)	1.0 (0 to 2.0)[¶]
Don't know	2.6 (2.1 to 3.0)	0 (−0.5 to 0.5)	0.2 (−0.4 to 0.7)	3.1 (2.6 to 3.6)	−0.7 (−1.2 to −0.1)[¶]	−0.5 (−1.0 to 0.1)	6.1 (5.4 to 6.8)	1.3 (0.6 to 2.1)[¶]	1.5 (0.7 to 2.3)[¶]	3.2 (2.7 to 3.7)	−0.1 (−0.7 to 0.4)	0.2 (−0.4 to 0.8)	7.6 (6.8 to 8.4)	1.4 (0.5 to 2.3)[¶]	1.9 (1.0 to 2.8)[¶]
Hispanic															
Worse	3.0 (2.2 to 3.8)	0.5 (−0.3 to 1.4)	0.5 (−0.3 to 1.4)	3.0 (2.2 to 3.9)	−0.4 (−1.3 to 0.5)	−0.4 (−1.3 to 0.5)	4.5 (3.5 to 5.5)	0.4 (−0.6 to 1.4)	0.5 (−0.6 to 1.6)	2.6 (1.8 to 3.3)	−0.9 (−1.7 to −0.1)[¶]	−0.7 (−1.6 to 0.1)	9.5 (8.0 to 11.1)	3.0 (1.4 to 4.6)[¶]	3.3 (1.6 to 5.0)[¶]
Same	2.4 (2.2 to 2.7)	Ref	Ref	3.5 (3.2 to 3.7)	Ref	Ref	4.1 (3.8 to 4.4)	Ref	Ref	3.4 (3.2 to 3.7)	Ref	Ref	6.5 (6.2 to 6.8)	Ref	Ref
Better	2.3 (1.9 to 2.7)	−0.1 (−0.6 to 0.3)	0.2 (−0.3 to 0.7)	2.9 (2.5 to 3.3)	−0.5 (−1.0 to 0)[¶]	−0.2 (−0.8 to 0.4)	3.7 (3.2 to 4.2)	−0.4 (−1.0 to 0.2)	0.1 (−0.6 to 0.8)	1.8 (1.4 to 2.2)	−1.6 (−2.1 to −1.2)[¶]	−1.3 (−1.8 to −0.7)[¶]	4.2 (3.6 to 4.8)	−2.3 (−3.0 to −1.7)[¶]	−1.6 (−2.3 to −0.8)[¶]
Don't know	2.4 (1.9 to 2.9)	0 (−0.6 to 0.5)	0.1 (−0.5 to 0.6)	3.3 (2.8 to 3.8)	−0.2 (−0.7 to 0.4)	0.1 (−0.6 to 0.8)	5.0 (4.3 to 5.6)	0.8 (0.1 to 1.5)[¶]	1.0 (0.2 to 1.7)[¶]	3.1 (2.6 to 3.5)	−0.4 (−0.9 to 0.2)	0 (−0.6 to 0.6)	7.9 (7.0 to 8.7)	1.4 (0.5 to 2.2)[¶]	1.8 (0.9 to 2.8)[¶]

See table footnotes on the next page.

TABLE 2. (*Continued*) Association between experience with racial and ethnic discrimination* when seeking health care and COVID-19 vaccination intent, overall and by race and ethnicity — National Immunization Survey–Adult COVID Module, April 22, 2021–November 26, 2022

	COVID–19 vaccination intent of unvaccinated respondents														
	Definitely will get vaccinated			Probably will get vaccinated			Unsure about getting vaccinated			Probably will not get vaccinated			Definitely will not get vaccinated		
	Unadjusted†		Adjusted§	Unadjusted†		Adjusted§	Unadjusted†		Adjusted§	Unadjusted†		Adjusted§	Unadjusted†		Adjusted§
Race and ethnicity/ Experience	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)	% (95% CI)	PD (95% CI)	PD (95% CI)
Native Hawaiian or other Pacific Islander, non-Hispanic															
Worse	4.1 (0 to 8.3)	1.2 (−3.1 to 5.6)	0.2 (−3.9 to 4.2)	0.6 (−0.1 to 1.3)	−2.4 (−3.9 to −1.0)¶	−2.0 (−4.4 to 0.5)	8.4 (2.9 to 13.9)	4.0 (−1.7 to 9.6)	2.9 (−2.9 to 8.7)	9.4 (−2.9 to 21.6)¶,**	5.5 (−6.9 to 17.9)**	6.5 (−8.8 to 21.8)**	19.6 (9.4 to 29.9)¶,**	10.6 (0.1 to 21.1)¶,**	5.4 (−3.2 to 14.0)
Same	2.9 (1.5 to 4.3)	Ref	Ref	3.0 (1.8 to 4.3)	Ref	Ref	4.4 (3.0 to 5.8)	Ref	Ref	3.9 (2.4 to 5.3)	Ref	Ref	9.0 (6.7 to 11.4)	Ref	Ref
Better	0.6 (0.1 to 1.1)	−2.3 (−3.8 to −0.8)¶	−2.4 (−3.9 to −0.8)¶	1.0 (0.3 to 1.7)	−2.1 (−3.5 to −0.6)¶	−1.1 (−3.2 to 0.9)	6.1 (1.9 to 10.4)	1.7 (−2.8 to 6.2)	2.5 (−1.9 to 6.8)	1.6 (0.7 to 2.4)	−2.3 (−3.9 to −0.7)¶	−2.1 (−3.7 to −0.5)¶	7.2 (3.9 to 10.6)	−1.8 (−5.9 to 2.3)	−0.6 (−5.1 to 3.9)
Don't know	4.7 (1.0 to 8.5)	1.9 (−2.2 to 5.9)	2.6 (−1.8 to 6.9)	0.7 (0.2 to 1.1)	−2.4 (−3.7 to −1.0)¶	−1.8 (−3.7 to 0.1)	2.9 (1.7 to 4.1)	−1.5 (−3.4 to 0.3)	−1.1 (−3.3 to 1.0)	6.0 (0.7 to 11.4)	2.2 (−3.3 to 7.7)	3.3 (−2.1 to 8.7)	5.8 (3.2 to 8.3)	−3.3 (−6.8 to 0.2)	−2.8 (−6.1 to 0.6)
White, non-Hispanic															
Worse	2.3 (1.6 to 3.1)	0.9 (0.1 to 1.7)¶	0.5 (−0.1 to 1.1)	2.1 (1.6 to 2.6)	0 (−0.5 to 0.6)	−0.1 (−0.5 to 0.4)	3.9 (3.1 to 4.7)	0.4 (−0.5 to 1.2)	−0.3 (−0.9 to 0.4)	4.1 (3.4 to 4.8)	−0.7 (−1.4 to 0)¶	−0.8 (−1.5 to −0.2)¶	22.9 (21.3 to 24.4)	9.8 (8.2 to 11.4)¶	6.4 (5.0 to 7.7)¶
Same	1.4 (1.4 to 1.5)	Ref	Ref	2.1 (2.0 to 2.2)	Ref	Ref	3.5 (3.4 to 3.7)	Ref	Ref	4.8 (4.7 to 5.0)	Ref	Ref	13.1 (12.9 to 13.3)	Ref	Ref
Better	1.0 (0.9 to 1.2)	−0.4 (−0.5 to −0.3)¶	0 (−0.2 to 0.1)	0.9 (0.8 to 1.0)	−1.2 (−1.3 to −1.0)¶	−0.8 (−1.0 to −0.6)¶	1.0 (0.9 to 1.1)	to 2.5 (−2.7 to −2.4)¶	−2.0 (−2.1 to −1.8)¶	1.0 (0.9 to 1.1)	−3.8 (−4.0 to −3.6)¶	−3.1 (−3.3 to −2.9)¶	2.0 (1.8 to 2.1)	−11.1 (−11.4 to −10.8)¶	−9.1 (−9.4 to −8.8)¶
Don't know	1.3 (1.2 to 1.4)	−0.1 (−0.3 to 0)	0.1 (0 to 0.3)	1.5 (1.4 to 1.6)	−0.6 (−0.7 to −0.4)¶	−0.3 (−0.4 to −0.1)¶	2.9 (2.7 to 3.1)	−0.7 (−0.9 to −0.4)¶	−0.1 (−0.4 to 0.1)	3.2 (3.0 to 3.4)	−1.6 (−1.9 to −1.4)¶	−0.9 (−1.1 to −0.7)¶	9.6 (9.2 to 9.9)	−3.5 (−3.9 to −3.1)¶	−1.8 (−2.2 to −1.5)¶
Multiple or other, non-Hispanic															
Worse	3.4 (1.7 to 5.1)	0.8 (−0.9 to 2.6)	0.7 (−1.0 to 2.4)	2.0 (1.1 to 2.8)	−1.6 (−2.6 to −0.6)¶	−1.7 (−2.6 to −0.7)¶	4.0 (2.7 to 5.4)	−0.4 (−1.9 to 1.1)	−0.7 (−2.1 to 0.7)	5.7 (3.9 to 7.4)	0.4 (−1.5 to 2.3)	0.3 (−1.5 to 2.2)	21.2 (17.0 to 25.5)	6.3 (2.0 to 10.7)¶	4.9 (1.0 to 8.7)¶
Same	2.6 (2.0 to 3.1)	Ref	Ref	3.5 (2.9 to 4.1)	Ref	Ref	4.4 (3.8 to 5.0)	Ref	Ref	5.3 (4.6 to 5.9)	Ref	Ref	14.9 (13.9 to 15.9)	Ref	Ref
Better	2.0 (1.0 to 3.0)	−0.6 (−1.7 to 0.6)	0 (−1.4 to 1.4)	1.7 (1.0 to 2.4)	−1.8 (−2.7 to −0.9)¶	−1.2 (−2.2 to −0.1)¶	2.4 (1.5 to 3.3)	−2.0 (−3.1 to −1.0)¶	−1.4 (−2.7 to −0.2)¶	2.2 (1.4 to 3.1)	−3.0 (−4.1 to −2.0)¶	−2.1 (−3.3 to −0.8)¶	6.2 (4.9 to 7.4)	−8.7 (−10.3 to −7.1)¶	−7.0 (−8.7 to −5.4)¶
Don't know	2.8 (1.8 to 3.8)	0.3 (−0.9 to 1.4)	0.6 (−0.7 to 1.9)	2.5 (1.6 to 3.3)	−1.1 (−2.1 to −0)¶	−0.6 (−1.7 to 0.5)	5.6 (4.3 to 6.9)	1.2 (−0.2 to 2.6)	1.8 (0.3 to 3.3)¶	4.4 (3.4 to 5.4)	−0.9 (−2.1 to 0.3)	−0.4 (−1.7 to 0.8)	15.3 (13.5 to 17.2)	0.5 (−1.6 to 2.5)	1.0 (−1.0 to 3.0)

Abbreviations: MSA = metropolitan statistical area; PD = prevalence difference; Ref = referent group.

* Reported experiences of racial and ethnic discrimination were assessed by the question, "When seeking health care in the last 2 years, do you feel your experiences were worse than, the same as, or better than (those of) persons of other races or ethnicities?" Persons who reported "worse" experiences were considered to have experienced discrimination.

† The unadjusted row percentages for the five categories of vaccination intent add to the unadjusted percentages of unvaccinated adults.

§ Adjusted prevalence differences were those adjusted for age (18–29, 30–39, 40–49, 50–64, 65–74, or ≥75 years), sex (female or male), education (high school diploma or less, some college, college graduate, or advanced degree), poverty status (below poverty, at or above poverty and <$75,000 annually, or at or above poverty and ≥$75,000 annually), MSA status (MSA principal city, MSA nonprincipal city, or non–MSA), U.S. Census Bureau region (Northeast, Midwest, South, or West), and health insurance status (insured or not insured).

¶ Statistically significant difference compared with Ref ("same as") (p<0.05).

** 95% CI >20 might not be reliable.

agenda (Personal communication, Machell Town, CDC, January 6, 2023), including assessment of structural racism (*7*). Prevention programs and prevention partners (i.e., community health workers and trusted messengers) could plan ways to address health care discrimination as a source of vaccine hesitancy when implementing health strategies (*8*). Health care providers might foster patient trust and improve adherence to recommended health interventions by becoming aware of patients' potential negative health care experiences and of known incidents of historical mistreatment, and incorporating this sensitivity into their patient interactions. Since the CDC Director's declaration that racism is a serious public health threat, CDC's scientific research to address health inequities rooted in racism has expanded across the agency with a renewed commitment to better understanding both the social determinants of health (including poverty) and the social determinants of equity (including racism) (*9*) and to addressing the racial and ethnic health inequities revealed throughout the COVID-19 pandemic.¶¶¶

¶¶¶ https://www.cdc.gov/minorityhealth/racism-disparities/cdc-efforts.html

Summary

What is already known about this topic?

There is a growing awareness of racism as a cause of health inequities, health disparities, and disease.

What is added by this report?

Adults reporting experiences of racial and ethnic discrimination in health care had a significantly higher prevalence of being unvaccinated against COVID-19 overall and among most racial and ethnic groups.

What are the implications for public health practice?

Strategies to address inequitable experiences (discrimination) include increasing awareness by health care providers of patients' potential negative health care experiences and known historical mistreatment and incorporating this sensitivity into their patient interactions. This action might foster patient trust, improve adherence to recommended health interventions, and reduce some COVID-19–related health disparities.

Acknowledgment

Madeleine R. Valier.

Corresponding author: Laurie D. Elam-Evans, lxe1@cdc.gov.

[1]Immunization Services Division, National Center for Immunization and Respiratory Diseases, CDC; [2]School of Global Affairs, King's College London, London, England; [3]Rollins School of Public Health, Emory University, Atlanta, Georgia; [4]Division of Global HIV and TB, Center for Global Health, CDC; [5]Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, North Carolina.

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Use of COVIDTests.gov At-Home Test Kits Among Adults in a National Household Probability Sample — United States, 2022

Nicole Luisi, MPH, MS[1]; Patrick S. Sullivan, PhD[1]; Travis Sanchez, PhD[1]; Heather Bradley, PhD[1]; Mansour Fahimi, PhD[2]; Kayoko Shioda, PhD[3]; Kristin N. Nelson, PhD[1]; Benjamin A. Lopman, PhD[1,3]; Aaron J. Siegler, PhD[1]

At-home rapid antigen COVID-19 tests were first authorized by the Food and Drug Administration in late 2020 (*1–3*). In January 2022, the White House launched COVIDTests.gov, which made all U.S. households eligible to receive free-to-the-user at-home test kits distributed by the U.S. Postal Service (*2*). By May 2022, more than 70 million test kit packages had been shipped to households across the United States (*2*); however, how these kits were used, and which groups were using them, has not been reported. Data from a national probability survey of U.S. households (COVIDVu), collected during April–May 2022, were used to evaluate awareness about and use of these test kits (*4*). Most respondent households (93.8%) were aware of the program, and more than one half (59.9%) had ordered kits. Among persons who received testing for COVID-19 during the preceding 6 months, 38.3% used a COVIDTests.gov kit. Among kit users, 95.5% rated the experience as acceptable, and 23.6% reported being unlikely to have tested without the COVIDTests.gov program. Use of COVIDTests.gov kits was similar among racial and ethnic groups (42.1% non-Hispanic Black or African American [Black]; 41.5% Hispanic or Latino [Hispanic]; 34.8% non-Hispanic White [White]; and 53.7% non-Hispanic other races [other races]). Use of other home COVID-19 tests differed by race and ethnicity (11.8% Black, 44.4% Hispanic, 45.8% White, 43.8% other races). Compared with White persons, Black persons were 72% less likely to use other home test kits (adjusted relative risk [aRR] = 0.28; 95% CI = 0.16–0.50). Provision of tests through this well-publicized program likely improved use of COVID-19 home testing and health equity in the United States, particularly among Black persons. National programs to address availability and accessibility of critical health services in a pandemic response have substantial health value.

Methods of the national COVIDVu survey have been previously reported (*4*). In brief, a national address-based household sample derived from the U.S. Postal Service Computerized Delivery Sequence File, which covers nearly all residential delivery points in all 50 U.S. states, was recruited. During August–December 2020, 39,500 addresses were selected in a probability sample, and one household member aged ≥18 years from each address was randomly selected to participate (*4,5*). Among 5,666 (15.3%) respondents who completed a baseline survey, 4,654 (12.6% of sampled households; 82.1% of those who completed a baseline survey) were eligible to participate in follow-up survey rounds, based on completion of study procedures (*5*). Weights were derived using raking* and trimming† procedures. Demographic and geographic data were used to develop person- and household-level weights, with additional adjustments for kit ordering using the publicly available figure of 70 million COVIDTests.gov orders shipped to households (*2*). Extreme weights were trimmed and readjusted to reach the total sum of households and noninstitutionalized adults aged ≥18 years in the United States. Among 4,654 participants enrolled at baseline (*5*), 3,400 (73%) completed an online follow-up survey during April 14–May 13, 2022. Data from the 3,400 responses were weighted to allow for national estimates of COVIDTests.gov use among U.S. households (128,674,487) and adults aged ≥18 years (252,117,111). Participants were asked to specify any COVID-19 tests they had received during the previous 6 months (e.g., laboratory, pharmacy, doctor's office, drive through site, government home test kit, or other home test kit). Awareness of the COVIDTests.gov program was assessed based on response to the question "Did you know that the government is offering free COVID-19 home test kits that can be ordered and mailed to your home?" Participants who answered "Yes" were asked if their household had ordered any of these government test kits, and whether these kits had been used by them or someone else. Those who used a government kit to self-administer a test during the previous 6 months were asked questions about the acceptability and use of the test kit. Sociodemographic variables were self-reported at baseline; weighted estimates and two-sided 95% CIs were prepared for the full sample and for the subset of respondents reporting use of a COVIDTests.gov kit. To evaluate the association between race and ethnicity and different testing modalities, aRRs and 95% CIs were estimated using weighted multivariable negative binomial regression; models were adjusted for age, sex, region, education, income, household size, and vaccination status.

* Raking is an iterative process that assigns a weight value to each survey respondent to ensure that the weighted distribution of the sample more closely approximates that of the sampled population. This procedure was used to align distributions with respect to gender, age, race, ethnicity, education, income, marital status, and U.S. Census Bureau region.

† Trimming is a process applied during raking to control the highest and lowest weight values. At both ends of the distribution, weights were trimmed at the 99th percentile.

All analyses were conducted using SAS statistical software (version 9.4; SAS Institute). The COVIDVu study was approved by the Emory University Institutional Review Board.

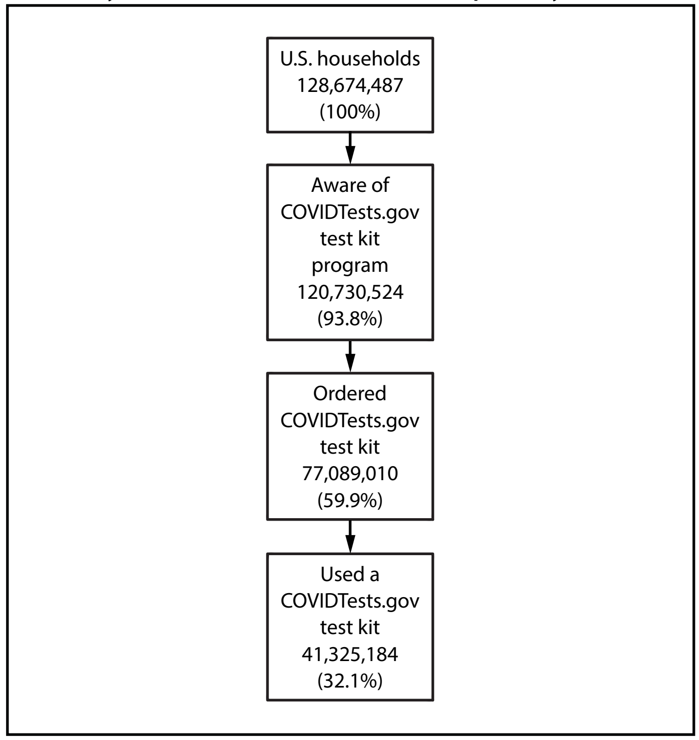
In May 2022, an estimated 93.8% (120,730,524) of U.S. households were aware of the COVIDTests.gov program, and 59.9% (77,089,010) of households had ordered government kits (Figure 1). In nearly one third (32.1%; 41,325,184) of households, at least one government test kit had been used by someone within or outside the home. An estimated 27.8% (35,763,825) of households had ordered COVIDTests.gov kits but had not yet used them.

Among an estimated 252,117,111 adults, 154,160,315 (61.1%) lived in a household that had ordered kits (Table), 41.3% (63,663,434) of whom had self-administered a test kit during the preceding 6 months. Approximately one half of persons aged 18–44 years had used kits (54.6% of those aged 18–34 and 50.9% of those aged 35–44 years), compared with 35.2%, 42.1%, and 26.8% of persons aged 45–54, 55–64, and ≥65 years, respectively. The lowest kit use prevalence was in the South U.S. Census Bureau Region (35.2%), and the highest was in the West U.S. Census Bureau Region (47.4%). Among households including three or more persons, approximately one half (46.0%) used kits, compared with 38.2% of households of fewer than three persons.

Nearly one quarter (23.6%) of persons using the government kits (more than 13 million persons) indicated that they would have been unlikely to test for COVID-19 if COVIDTests.gov kits were not available; 29.7% of kit users had not used any other type of test during the preceding 6 months. The survey did not collect information about test results from each test used, but 22.2% of COVIDTests.gov kit users reported at least one positive test result within this period. Among those who used a COVIDTests.gov kit, more than 95% rated the experience as very acceptable (64.1%) or acceptable (31.4%).

Among 166,128,467 (65.9%) adults who received testing for COVID-19 during the previous 6 months, 44.2% received a laboratory or clinic test, 25.7% received a drive-through test, 38.3% used a COVIDTests.gov kit, and 42.1% used another type of at-home self-test kit (e.g., pharmacy) (Figure 2). Prevalences of COVIDTests.gov kit use differed slightly among Black (42.1%), Hispanic (41.5%), White (34.8%), and other race persons (53.7%) ($p = 0.03$); compared with White persons, persons of other races were more likely to use government kits (aRR = 1.42; 95% CI = 1.12–1.80; $p = 0.004$), but Black and Hispanic persons were not. This differed from the use of other at-home self-test kits, with considerably lower use among Black (11.8%) than among Hispanic (44.4%), White (45.8%), and persons of other races (43.8%). Black persons were 72% less likely to use other home test kits compared with White persons (aRR = 0.28; 95% CI = 0.16–0.50; $p<0.001$), despite similar use of COVIDTests.gov kits.

FIGURE 1. Estimated COVIDTests.gov test kit awareness, ordering, and use by household[*,†,§] — United States, April–May 2022[¶]



* Based on a national probability sample (COVIDVu).
† Household-level weights were derived with raking and a trimming procedure. Demographic and geographic data were used to develop person-level weights, which were adjusted to create household-level weights based on the joint distribution of households within each geographic region of the United States, total number of adults and children in the home, household income, and home ownership. The publicly available benchmark of 70 million household COVIDTests.gov orders was used to adjust the individual and household-level weights. Extreme weights were trimmed and readjusted to sum to 128 million total U.S. households.
§ Test kit use includes any COVIDTests.gov kit use by resident or nonresident of household.
¶ Percentage of estimated total 128,674,487 U.S. households.

Discussion

In a probability sample of U.S. households, both awareness of the COVIDTests.gov program and use of kits were high, with more than 41 million households estimated to have used kits during January–May 2022. This number is likely a lower bound estimate because households might not have had sufficient time to use their ordered test kits at the time of the survey.

Prevalences of COVID-19 testing using the COVIDTests.gov kits were similar among racial and ethnic groups, a considerable difference from the highly inequitable use of other home self-tests for Black respondents observed both in this survey and in previous estimates (*3*). Racial and ethnic disparities in COVID-19 illness have been widely reported (*6*), as have concerns about the cost and accessibility of at-home tests (*7*). Long-term availability of government test kits appears to have significantly improved access to COVID-19 testing for racial and ethnic minorities, underscoring a critically important and successful element of the national COVID-19 response.

The findings in this report are subject to at least one limitation. Survey weights were used to establish estimates that represent the U.S. population; however, COVIDVu respondents might have been more likely to practice preventive measures such as vaccination and testing. To adjust for this potential bias, publicly available data on COVIDTests.gov kit orders were used as part of the weighting process, ensuring that the overall estimate of kit ordering is realistic; however, other sources of bias not addressed by weighting procedures might remain.

TABLE. Characteristics of adults* surveyed about SARS-CoV-2 testing and COVIDTests.gov kit use — United States, April–May 2022

Characteristic	All adults (N = 252,117,111)		Used a COVIDTests.gov test kit (n = 63,663,434)	
	Weighted, no.	Weighted, % (95% CI)†	Weighted, no.	Weighted, % (95% CI)§
COVIDTests.gov kits ordered within household	154,160,315	61.1 (58.0–64.2)	63,663,434	41.3 (38.0–44.7)
Race and ethnicity				
Black or African American, non-Hispanic	25,850,841	10.3 (8.4–12.5)	6,858,446	41.4 (30.2–53.6)
White, non-Hispanic	164,393,188	65.2 (62.2–68.1)	37,028,796	38.4 (34.6–42.3)
Hispanic or Latino	40,170,347	15.9 (13.8–18.4)	11,944,942	47.8 (38.9–56.8)
Other races, non-Hispanic	21,702,735	8.6 (7.0–10.5)	7,831,250	48.5 (37.4–59.8)
Sex				
Female	136,155,934	54.0 (51.0–57.0)	38,013,147	42.0 (37.8–46.3)
Male	115,961,177	46.0 (43.0–49.0)	25,650,287	40.3 (35.0–46.0)
Age group, yrs				
18–34	69,765,556	27.7 (25.0–30.6)	18,049,996	54.6 (47.1–61.9)
35–44	42,951,172	17.0 (14.9–19.4)	13,559,996	50.9 (43.0–58.7)
45–54	40,515,793	16.1 (14.1–18.3)	10,029,549	35.2 (27.9–43.3)
55–64	42,767,176	17.0 (15.0–19.2)	11,973,956	42.1 (34.7–49.9)
≥65	56,117,414	22.3 (19.9–24.8)	10,049,937	26.8 (21.3–33.0)
U.S. Census Bureau region¶				
Northeast	44,036,175	17.5 (15.2–19.9)	14,330,946	46.3 (38.3–54.5)
Midwest	53,575,092	21.3 (18.8–23.9)	11,451,840	40.0 (32.3–48.3)
South	92,920,639	36.9 (34.0–39.8)	20,006,130	35.2 (29.8–41.0)
West	61,585,205	24.4 (22.1–26.9)	17,874,519	47.4 (41.7–53.2)
Education				
High school diploma, GED, or less	84,356,738	33.5 (30.3–36.8)	18,849,902	39.5 (31.7–47.8)
Some college or associate degree	73,360,945	29.1 (26.6–31.7)	16,772,376	40.6 (35.0–46.4)
Bachelor's degree	59,827,173	23.7 (21.7–25.9)	17,166,926	42.9 (37.8–48.1)
Graduate degree	34,572,255	13.7 (12.3–15.3)	10,874,231	43.4 (37.9–49.1)
Income, US$				
0–24,999	30,092,036	11.9 (10.1–14.0)	5,463,583	41.0 (31.0–51.7)
25,000–49,999	42,687,868	16.9 (14.7–19.4)	9,413,207	39.3 (30.9–48.5)
50,000–99,999	73,698,765	29.2 (26.6–32.0)	20,287,832	44.0 (37.8–50.4)
100,000–199,999	72,574,972	28.8 (26.2–31.5)	20,189,928	42.5 (36.5–48.8)
≥200,000	33,063,470	13.1 (11.3–15.1)	8,308,883	35.6 (28.4–43.6)
Household size				
1–2 persons	151,075,517	59.9 (56.9–62.8)	35,303,476	38.2 (34.1–42.4)
≥3 persons	101,041,594	40.1 (37.2–43.1)	28,359,958	46.0 (40.5–51.7)
No. of COVID-19 vaccine doses received				
None	24,619,675	9.8 (7.9–12.0)	3,650,426	36.3 (22.5–52.6)
1	8,589,424	3.4 (2.4–4.7)	1,485,647	42.5 (26.3–60.4)
2	59,427,771	23.6 (21.0–26.4)	11,371,227	40.3 (32.1–49.0)
3	143,095,746	56.8 (53.7–59.7)	43,357,811	43.0 (39.0–47.2)
>3	16,384,496	6.5 (5.2–8.0)	3,798,322	32.7 (23.6–43.3)
COVID-19 testing, previous 6 mos				
Did not test	85,988,644	34.1 (31.3–37.1)	NA	NA
Tested, used at least one COVIDTests.gov test	63,663,434	25.3 (22.9–27.8)	NA	NA
Tested, did not use a COVIDTests.gov test	102,465,033	40.6 (37.7–43.6)	NA	NA
COVIDTests.gov test kit use in household **				
Used for self	63,663,434	41.3 (38.0–44.7)	NA	NA
Used by household member	42,511,539	27.6 (25.0–31.0)	NA	NA
Used by someone else	5,823,485	3.8 (2.7–5.3)	NA	NA
Test kits haven't arrived	3,420,382	2.2 (1.2–4.1)	NA	NA
No use of test kits	70,591,623	45.8(42.4–49.2)	NA	NA

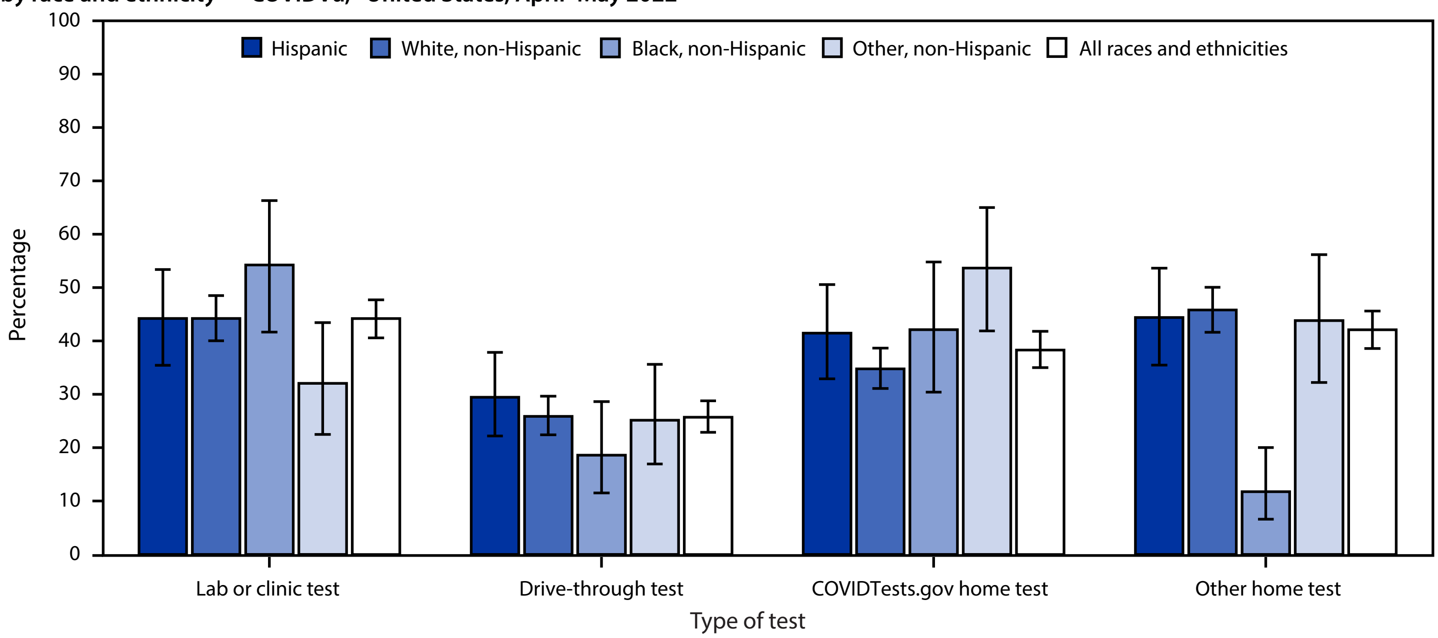
See table footnotes on the next page.

TABLE. (*Continued*) Characteristics of adults* surveyed about SARS-CoV-2 testing and COVIDTests.gov kit use — United States, April–May 2022

Characteristic	All adults (N = 252,117,111)		Used a COVIDTests.gov test kit (n = 63,663,434)	
	Weighted, no.	Weighted, % (95% CI)†	Weighted, no.	Weighted, % (95% CI)§
Other characteristics of COVIDTests.gov kit users, previous 6 mos††				
Used only COVIDTests.gov kit	18,534,473	29.7 (24.9–35.1)	NA	NA
Unlikely to test without COVIDTests.gov kit	13,884,660	23.6 (19.3–28.4)	NA	NA
Rating of COVIDTests.gov kit use experience				
Very acceptable	32,053,174	64.1 (57.9–69.9)	NA	NA
Acceptable	15,676,552	31.4 (25.9–37.4)	NA	NA
Neutral or unacceptable	2,248,190	4.5 (2.3–8.7)	NA	NA
Had any positive COVID-19 test result	14,133,748	22.2 (18.1–26.9)	NA	NA

Abbreviations: GED = general educational development certificate; NA = not applicable.
* From a national probability sample (COVIDVu).
† Percentages calculated as column percents, unless otherwise specified.
§ Percentages calculated as row percentages. Denominator includes only respondents living in households that ordered COVIDTests.gov test kits.
¶ https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf
** Categories are not mutually exclusive. Denominator includes only respondents living in households that ordered COVIDTests.gov test kits.
†† Denominator includes only respondents who used COVIDTests.gov test kits. Denominators in this section excluded the following missing values: used only COVIDTests.gov kit, n = 1,299,627; unlikely to test without COVIDTests.gov kit, n = 4,713,097; and rating of COVIDTests.gov kit use experience, n = 13,685,518.

FIGURE 2. Modalities of COVID-19 testing*,† among adults who received testing for COVID-19 during the previous 6 months (n = 166,128,467),§ by race and ethnicity — COVIDVu,¶ United States, April–May 2022



* Lab or clinic tests were used by 72,777,029 (44.2%); drive-through tests by 42,386,207 (25.7%); COVIDTests.gov tests by 63,663,434 (38.3%); and other home tests by 69,331,543 (42.1%) persons who received testing during the previous 6 months.
† With 95% CI indicated by error bars.
§ Data for use of lab or clinic, drive-through, and other home tests were missing for a small proportion (<1%) of respondents who received testing during the previous 6 months; the denominator for these tests is 164,828,840.
¶ A national probability sample.

These data indicate that provision of free COVID-19 tests through the COVIDTests.gov program was not only widely used, but also provided a mechanism for millions of persons to receive COVID-19 testing who otherwise might not have. Moreover, this program likely led to improvement in equity of COVID-19 testing. The COVIDTests.gov program was provided continuously until September 2, 2022, when it was paused; the site was reactivated on December 19, 2022 (*8*). These findings support the substantial health value of national programs that address critical health needs during a pandemic response.

Acknowledgments

The COVIDVu study team; Salesforce.

Summary

What is already known about this topic?

During January 2022, the White House launched COVIDTests.gov, a program through which all U.S. households could order free-to-the-user at-home test kits from the federal government, distributed by the U.S. Postal Service.

What is added by this report?

Awareness and acceptability of the COVIDTests.gov program is high. COVIDTests.gov test kits have improved access to COVID-19 testing, with more than 40 million households using at least one kit. The program helped to improve equity of COVID-19 home test use; non-Hispanic Black or African American (Black) and non-Hispanic White persons had similar use of COVIDTests.gov kits, and Black persons were 72% less likely to use other modalities for home-based testing.

What are the implications for public health practice?

National programs to address availability and accessibility of critical health services in a pandemic response have substantial health value.

Corresponding author: Nicole Luisi, nluisi@emory.edu.

[1]Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, Georgia; [2]Marketing Systems Group, Philadelphia, Pennsylvania; [3]Gangarosa Department of Environmental Health, Rollins School of Public Health, Emory University, Atlanta, Georgia.

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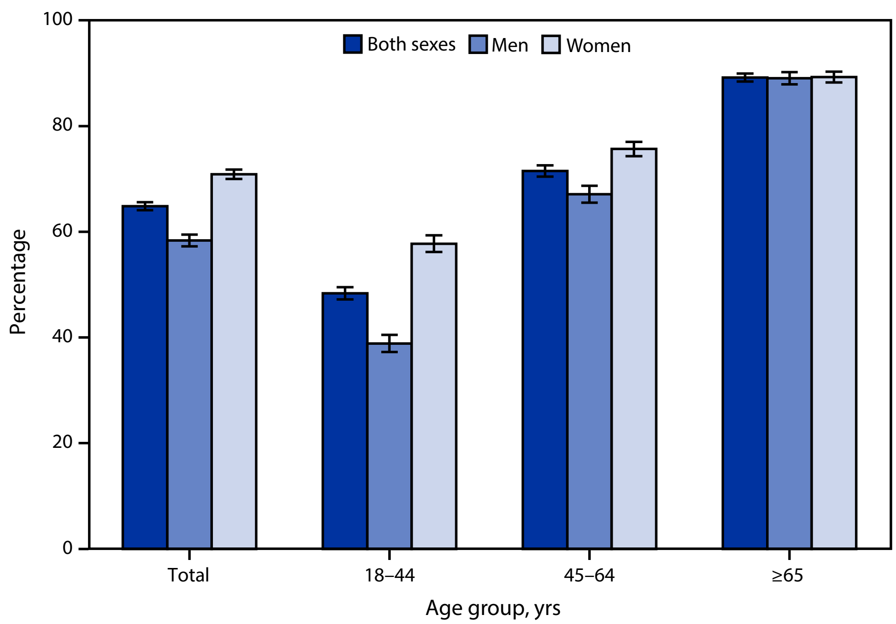
QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Adults Aged ≥18 Years Who Took Prescription Medication During the Past 12 Months,† by Sex and Age Group — National Health Interview Survey, United States, 2021§



* With 95% CIs indicated by error bars.
† Based on a positive response to the question, "At any time in the past 12 months, did you take prescription medication?"
§ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

In 2021, 64.8% of adults aged ≥18 years took prescription medication at any time during the past 12 months. The percentage of adults taking prescription medication was lower among men than women overall (58.4% versus 70.9%) and for those aged 18–44 years (38.9% versus 57.8%) and 45–64 years (67.1% versus 75.7%). Among adults aged ≥65 years, men (89.0%) and women (89.3%) were equally likely to take prescription medication. Prescription medication use increased with age, from 48.4% for those aged 18–44 years to 89.2% for those aged ≥65 years, and this pattern of increasing use with age was observed for both men and women.

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

Reported by: Robin A. Cohen, PhD, rzc6@cdc.gov; Laryssa Mykyta, PhD.

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