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Persistent Racial/Ethnic Disparities in Fatal Unintentional Drowning Rates Among Persons Aged ≤29 Years — United States, 1999–2019

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During 1999–2019, a total of 81,947 unintentional drowning deaths occurred in the United States (*1*). Drowning is one of the three leading causes of unintentional injury death among persons aged ≤29 years and results in more deaths among children aged 1–4 years than any other cause except birth defects (*2*). Drowning death rates have decreased since 1990 (declining by 57% worldwide and by 32% in the United States) (*3*). However, because of racial/ethnic disparities in drowning risk, rates remain high among certain racial/ethnic groups, particularly American Indian or Alaska Native (AI/AN) persons and Black or African-American (Black) persons (*4*). To assess whether decreasing drowning death rates have been accompanied by reductions in racial/ethnic disparities, and to further describe these disparities by age group and setting, CDC analyzed U.S. mortality data during 1999–2019. The drowning death rate among persons aged ≤29 years was 1.3 per 100,000 population. The rate per 100,000 among AI/AN persons (2.5) and Black persons (1.8) was higher than among all other racial/ethnic groups and was 2.0 and 1.5 times higher than among White persons (1.2). Racial/ethnic disparities in drowning death rates did not significantly decline for most groups, and the disparity in rates among Black persons compared with White persons increased significantly from 2005–2019. Drowning death rates are associated with persistent and concerning racial/ethnic disparities. A better understanding of the factors that contribute to drowning disparities is needed. Implementing and evaluating community-based interventions, including those promoting basic swimming and water safety skills, among disproportionately affected racial/ethnic groups could help reduce drowning disparities.

National Vital Statistics System death certificate data from 1999–2019 were used to calculate unintentional drowning death rates and disparity rate ratios (RRs) for persons aged ≤29 years. Crude death rates (per 100,000 population) were calculated using 1999–2019 U.S. Census bridged-race population estimates. Disparity RRs and their corresponding 95% confidence intervals (CIs) were calculated using White persons as the reference population (chosen because they represented the largest racial/ethnic group during the study period). RRs >1.0 indicate a higher drowning death rate in the specified group compared with White persons. Because of high interannual variability in drowning death rates, 5-year moving averages in rates and RRs were calculated to visualize temporal trends.

Unintentional drowning deaths were identified using the *International Classification of Diseases, Tenth Revision* underlying cause of death codes W65–W74, V90, and V92. Death rates and RRs were examined by setting (bathtub, swimming pool,

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natural water, watercraft, and other or unspecified), age, and race/ethnicity. Race/ethnicity was categorized as non-Hispanic AI/AN, non-Hispanic Asian or Pacific Islander (A/PI), non-Hispanic Black, non-Hispanic White, and Hispanic or Latino (referred to as Hispanic in this report). Age was categorized in 5-year age groups except for infants aged <1 year. Joinpoint regression (version 4.7.0.0; National Cancer Institute) was used to describe trends and changes in trends in annual drowning death rates and RRs. Up to three changes in trend could be detected. P-values <0.05 were considered significant. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.*

During 1999–2019, a total of 34,315 persons aged ≤29 years died from unintentional drowning in the United States (Table 1). The 5-year moving average in crude drowning death rates decreased from 1.5 to 1.2 per 100,000 population during the study period (Figure). From 1999 to 2019, annual rates significantly decreased for each racial/ethnic group except AI/AN (p = 0.16) and Hispanic persons (p = 0.29). The highest annual drowning death rates occurred among AI/AN (range: 1.8–3.6) and Black (range: 1.6–2.5) persons. Using White persons as the reference, the 5-year moving average in drowning RRs ranged from 1.8 to 2.2 for AI/AN persons and from 1.3 to 1.6 for Black persons (Figure). The Black:White RR decreased significantly from 1999 to 2005 (p = 0.04) and then increased significantly from 2005 to 2019 (p = 0.003). There was no significant change in the AI/AN:White (p = 0.16) or A/PI:White (p = 0.15) RRs during 1999–2019. The Hispanic:White RR decreased significantly from 1999 to 2015 (p<0.001) and did not change significantly from 2015 to 2019 (p = 0.19).

Compared with the drowning death rate overall (all settings, ages, and years combined) among White persons, the rate was 2.0 times higher among AI/AN persons and 1.5 times higher among Black persons (Table 2); rates were lower among Hispanic (RR = 0.9) and A/PI persons (RR = 0.9). Drowning death rates and RRs varied by age and setting. For all settings combined, disparities in AI/AN rates were present across all age groups: the highest RRs were among persons aged 25–29 years (3.5), followed by children aged <1 year (2.5). Disparities in drowning death rates between Black persons and White persons were present across all age groups except persons aged 1–4 years, the largest being among children aged 10–14 years (RR = 3.6) and 5–9 years (RR = 2.6).

Racial/ethnic disparities were present in all settings and were most pronounced in swimming pool deaths; compared with White persons, the highest RRs occurred among Black youth aged 10–14 years (7.6), 15–19 years (5.6), and 5–9 years (4.4) (Table 2). Disparities in swimming pool drowning death rates were also present in most age groups for A/PI and Hispanic persons, with the highest RRs observed among those aged 25–29 years (3.2), 15–19 years (2.5), and 10–14 years (2.1) for A/PI persons and among those aged 20–24 years (1.8),

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

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TABLE 1. Numbers and rates* of fatal unintentional drowning† among persons aged ≤29 years, by age group, setting, and race/ethnicity — United States, 1999–2019

	Age group, yrs															
	<1		1–4		5–9		10–14		15–19		20–24		25–29		Total	
Setting	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
All settings																
AI/AN	24	2.8	136	4.1	52	1.2	44	1.0	108	2.3	136	3.1	154	3.9	654	2.5
A/PI	23	0.5	236	1.4	164	0.8	117	0.6	326	1.5	325	1.3	322	1.1	1,513	1.1
Black	224	1.8	1,205	2.4	976	1.5	1,041	1.6	1,615	2.4	1,198	1.8	919	1.5	7,178	1.8
Hispanic§	236	1.2	1,707	2.2	428	0.5	384	0.4	1,126	1.3	1,424	1.6	1,066	1.2	6,371	1.2
White	516	1.2	5,964	3.3	1,392	0.6	1,083	0.4	3,103	1.2	3,485	1.3	2,943	1.1	18,486	1.2
Total**	**1,028**	**1.2**	**9,269**	**2.8**	**3,025**	**0.7**	**2,679**	**0.6**	**6,295**	**1.4**	**6,590**	**1.5**	**5,429**	**1.2**	**34,315**	**1.3**
Pool																
AI/AN	—¶	—	36	1.1	13	—	—	—	—	—	—	—	—	—	62	0.2
A/PI	—	—	132	0.8	67	0.3	26	0.1	37	0.2	37	0.2	66	0.2	369	0.3
Black	—	—	697	1.4	490	0.8	302	0.5	261	0.4	171	0.3	106	0.2	2,035	0.5
Hispanic§	12	—	952	1.2	157	0.2	74	<0.1	101	0.1	116	0.1	94	0.1	1,506	0.3
White	61	0.1	3,165	1.7	414	0.2	149	<0.1	180	<0.1	189	<0.1	185	<0.1	4,343	0.3
Total**	**86**	**0.1**	**4,996**	**1.5**	**1,148**	**0.3**	**560**	**0.1**	**581**	**0.1**	**532**	**0.1**	**453**	**0.1**	**8,347**	**0.3**
Natural water																
AI/AN	—	—	50	1.5	24	0.6	27	0.6	62	1.3	75	1.7	81	2.1	319	1.2
A/PI	—	—	48	0.3	61	0.3	70	0.3	214	1.0	203	0.8	188	0.7	785	0.6
Black	—	—	162	0.3	241	0.4	420	0.6	879	1.3	649	1.0	464	0.8	2,817	0.7
Hispanic§	—	—	224	0.3	148	0.2	208	0.2	696	0.8	865	1.0	629	0.7	2,775	0.5
White	14	—	1,055	0.6	495	0.2	470	0.2	1,684	0.6	1,796	0.7	1,354	0.5	6,868	0.5
Total**	**23**	**<0.1**	**1,540**	**0.5**	**973**	**0.2**	**1,199**	**0.3**	**3,542**	**0.8**	**3,600**	**0.8**	**2,727**	**0.6**	**13,604**	**0.5**
Watercraft																
AI/AN	—	—	—	—	—	—	—	—	13	—	19	—	26	0.7	66	0.3
A/PI	—	—	—	—	—	—	—	—	17	—	24	<0.1	16	—	62	<0.1
Black	—	—	—	—	13	—	19	—	61	<0.1	70	0.1	72	0.1	239	<0.1
Hispanic§	—	—	—	—	—	—	15	—	37	<0.0	85	<0.1	73	<0.1	228	<0.1
White	—	—	41	<0.1	73	<0.1	102	<0.1	307	0.1	484	0.2	426	0.2	1,438	<0.1
Total**	**—**	**—**	**56**	**<0.1**	**98**	**<0.1**	**143**	**<0.1**	**436**	**<0.1**	**682**	**0.2**	**617**	**0.1**	**2,038**	**<0.1**
Bathtub																
AI/AN	17	—	10	—	—	—	—	—	—	—	—	—	—	—	39	0.2
A/PI	13	—	15	—	—	—	—	—	—	—	—	—	—	–	51	<0.1
Black	151	1.2	129	0.3	29	<0.1	34	<0.1	23	<0.1	43	<0.1	55	<0.1	464	0.1
Hispanic§	157	0.8	182	0.2	21	<0.1	22	<0.1	30	<0.1	30	<0.1	38	<0.1	480	<0.1
White	319	0.7	471	0.3	85	<0.1	111	<0.1	151	<0.1	256	<0.1	324	0.1	1,717	0.1
Total**	**658**	**0.8**	**811**	**0.2**	**139**	**<0.1**	**169**	**<0.1**	**207**	**<0.1**	**339**	**<0.1**	**434**	**<0.1**	**2,757**	**0.1**
Other or unspecified																
AI/AN	—	—	39	1.2	13	—	—	—	31	0.7	34	0.8	36	0.9	168	0.7
A/PI	—	—	39	0.2	31	0.2	17	—	56	0.3	53	0.2	45	0.2	246	0.2
Black	62	0.5	214	0.4	203	0.3	266	0.4	391	0.6	265	0.4	222	0.4	1,623	0.4
Hispanic§	62	0.3	340	0.4	93	<0.1	65	<0.1	262	0.3	328	0.4	232	0.3	1,382	0.3
White	117	0.3	1,232	0.7	325	0.1	251	<0.1	781	0.3	760	0.3	654	0.3	4,120	0.3
Total**	**255**	**0.3**	**1,866**	**0.6**	**667**	**0.2**	**608**	**0.1**	**1,529**	**0.3**	**1,446**	**0.3**	**1,198**	**0.3**	**7,569**	**0.3**

Abbreviations: AI/AN = American Indian or Alaska Native; A/PI = Asian or Pacific Islander; ICD-10 = *International Classification of Diseases, Tenth Revision*.
* Per 100,000 population.
† ICD-10 underlying cause of death codes W65–W74, V90, and V92.
§ Persons identified as Hispanic might be of any race. Persons identified as AI/AN, A/PI, Black, or White are all non-Hispanic.
¶ Dashes indicate death counts based on <10 deaths suppressed for confidentiality; death rates based on <20 deaths suppressed for unreliability.
** Total rates for each setting include race/ethnicity "not stated."

15–19 years (1.7), and 25–29 years (1.5) for Hispanic persons. Drowning death rates in natural water were highest among AI/AN persons (RR = 2.7), with high RRs across all age groups (range: 2.1–4.0). The drowning death rate in natural water among Black persons was 1.6 times higher than among White persons, with the highest RR found among children aged 10–14 years (3.4).

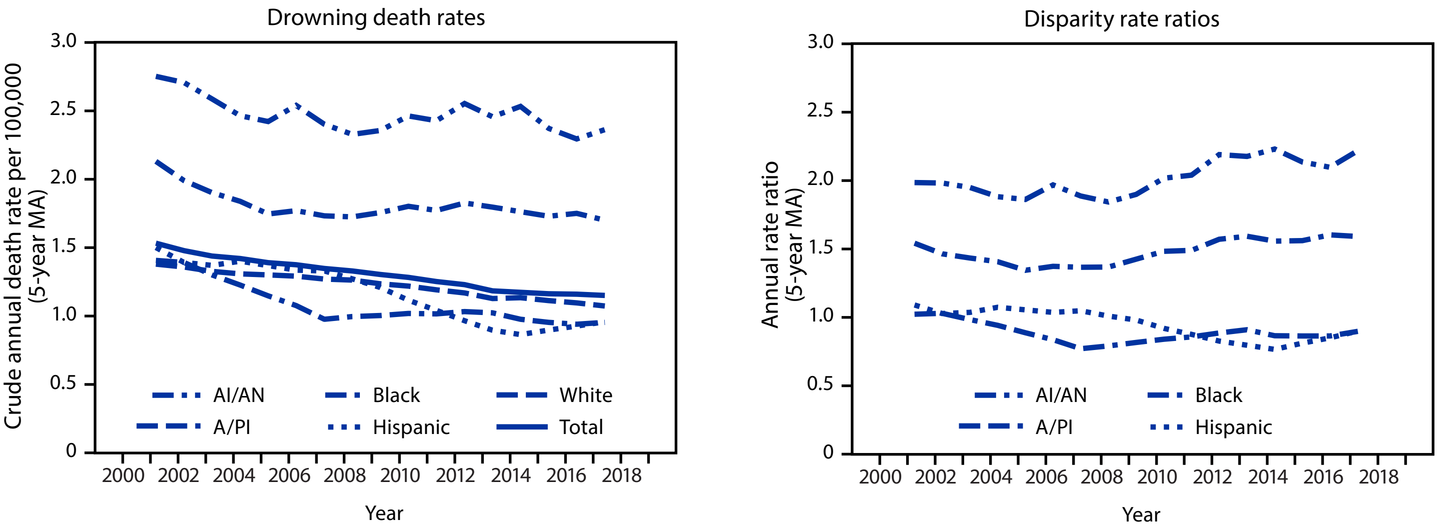
Discussion

Racial/ethnic disparities in unintentional drowning death rates among persons aged ≤29 years were evident in 1999 and persisted through 2019, with significantly higher rates among AI/AN and Black persons compared with White, A/PI, and Hispanic persons. Although drowning death rates decreased overall, racial/ethnic disparities persisted during the 21-year period, and the disparity between Black and White persons increased in recent years.

Multiple factors contribute to increased risk of drowning for all persons, including behavior, skill (e.g., low water competency†), environment, and underlying medical conditions (*5*). Racial/ethnic differences in drowning death rates might reflect variation in these or other social or cultural

† https://www.watersafetyusa.org/water-competency.html

FIGURE. Five-year moving average* fatal unintentional drowning† rates and rate ratios§ among persons aged ≤29 years, by race/ethnicity¶ — United States, 1999–2019



Abbreviations: AI/AN = American Indian or Alaska Native; A/PI = Asian or Pacific Islander; ICD-10 = *International Classification of Diseases, Tenth Revision*; MA = moving average.

* Because of high interannual variability in drowning rates, 5-year MAs in rates and rate ratios were calculated to visualize temporal trends; annual rates and rate ratios are reported in text. For the study period (1999–2019), the first year for which a 5-year average can be calculated is 2001, and the last year for which a 5-year average can be calculated is 2017.

† ICD-10 underlying cause of death codes W65–W74, V90, and V92.

§ Rate ratios use White persons as the comparison group.

¶ Persons identified as Hispanic might be of any race. Persons identified in the other categories (AI/AN, A/PI, Black, or White) are all non-Hispanic.

factors among groups. Relying on death certificates to describe drowning disparities limits the ability to explore these factors, because death certificates do not include details on known risk or protective factors (*4*) or other sociocultural influences. Further research is needed on the determinants that contribute to racial/ethnic disparities in drowning, including the barriers to implementing effective drowning prevention programs in communities at highest risk.

Proven drowning prevention strategies include installing barriers that prevent unintended access to water, teaching basic swimming and water safety skills, using life jackets properly, active supervision, and knowing and performing cardiopulmonary resuscitation (CPR) (*4*). Racial/ethnic disparities in drowning deaths differed by setting, and the most applicable drowning prevention strategies might also differ by setting; however, having basic swimming and water safety skills can be beneficial in all settings (*4*). Research suggests that Black persons report more limited swimming ability than members of other groups (*6*,*7*). This disparity in swimming ability has persisted over time (*8*). Racial differences in fear of drowning have been identified as one factor contributing to limited swimming ability in some Black youths (*9*). A reduction in Black:White drowning disparities occurred in Florida from 1970 to 2015 (*10*). This progress might be the result of community-level initiatives to promote swimming skills among Black children (*10*).

Summary

What is already known about this topic?

Drowning is preventable; however, it is one of three leading causes of unintentional injury death among persons aged ≤29 years.

What is added by this report?

During 1999–2019, 34,315 persons aged ≤29 years died from drowning in the United States, and drowning death rates decreased from 1.5 to 1.2 per 100,000 population overall. Compared with non-Hispanic White persons, the rate was 2.0 times higher among American Indian or Alaska Native persons and 1.5 times higher among non-Hispanic Black persons. Disparities in drowning death rates between non-Hispanic Black and White persons increased from 2005 to 2019.

What are the implications for public health practice?

Although drowning death rates have decreased overall, racial/ethnic disparities persist. Implementing and evaluating community-based interventions, including those promoting basic swimming and water safety skills among disproportionately affected racial/ethnic groups, could help reduce these disparities.

Swimming skill and other factors contributing to increased drowning risk in AI/AN persons have not been thoroughly explored. Engagement of the populations and communities at highest risk of drowning is critical to developing effective programs and reducing disparities.

TABLE 2. Fatal unintentional drowning* disparity rate ratio among persons aged ≤29 years, by age group, setting, and race/ethnicity — United States, 1999–2019

	Age group, yrs							
	<1	1–4	5–9	10–14	15–19	20–24	25–29	Total
Setting	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
All settings								
AI/AN	2.5 (1.6–3.7)	1.2 (1.1–1.5)	2.1 (1.6–2.7)	2.3 (1.7–3.0)	2.0 (1.6–2.4)	2.4 (2.0–2.8)	3.5 (2.9–4.1)	2.0 (1.9–2.2)
A/PI	0.5 (0.3–0.7)	0.4 (0.4–0.5)	1.3 (1.1–1.6)	1.3 (1.1–1.6)	1.3 (1.1–1.4)	1.0 (0.9–1.1)	1.0 (0.9–1.1)	0.9 (0.8–0.9)
Black	1.6 (1.3–1.8)	0.7 (0.7–0.8)	2.6 (2.4–2.8)	3.6 (3.3–3.9)	2.0 (1.9–2.1)	1.4 (1.3–1.5)	1.3 (1.2–1.4)	1.5 (1.5–1.5)
Hispanic†	1.0 (0.9–1.2)	0.7 (0.6–0.7)	0.8 (0.7–0.9)	1.0 (0.9–1.1)	1.1 (1.0–1.2)	1.2 (1.1–1.3)	1.1 (1.0–1.2)	0.9 (0.9–1.0)
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Pool								
AI/AN	—§	0.6 (0.5–0.9)	—	—	—	—	—	0.8 (0.6–1.1)
A/PI	—	0.4 (0.4–0.5)	1.8 (1.4–2.4)	2.1 (1.4–3.2)	2.5 (1.7–3.5)	2.0 (1.4–2.9)	3.2 (2.4–4.2)	0.9 (0.8–1.0)
Black	—	0.8 (0.7–0.9)	4.4 (3.8–5.0)	7.6 (6.3–9.3)	5.6 (4.6–6.7)	3.6 (2.9–4.4)	2.4 (1.9–3.1)	1.8 (1.7–1.9)
Hispanic†	—	0.7 (0.6–0.7)	1.0 (0.8–1.1)	1.4 (1.0–1.8)	1.7 (1.3–2.1)	1.8 (1.4–2.3)	1.5 (1.2–1.9)	1.0 (0.9–1.0)
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Natural water								
AI/AN	—	2.6 (1.9–3.4)	2.7 (1.8–4.0)	3.2 (2.2–4.7)	2.1 (1.6–2.7)	2.5 (2.0–3.2)	4.0 (3.2–5.0)	2.7 (2.4–3.0)
A/PI	—	0.5 (0.4–0.7)	1.4 (1.1–1.8)	1.8 (1.4–2.3)	1.5 (1.3–1.8)	1.2 (1.0–1.4)	1.2 (1.1–1.4)	1.2 (1.1–1.3)
Black	—	0.6 (0.5–0.7)	1.8 (1.5–2.1)	3.4 (2.9–3.8)	2.0 (1.9–2.2)	1.4 (1.3–1.6)	1.5 (1.3–1.6)	1.6 (1.5–1.7)
Hispanic†	—	0.5 (0.4–0.6)	0.8 (0.6–0.9)	1.2 (1.0–1.5)	1.2 (1.1–1.4)	1.4 (1.3–1.6)	1.4 (1.3–1.5)	1.1 (1.1–1.2)
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Watercraft								
AI/AN	—	—	—	—	—	—	4.1 (2.7–6.0)	2.7 (2.1–3.4)
A/PI	—	—	—	—	—	0.5 (0.3–0.8)	—	0.5 (0.4–0.6)
Black	—	—	—	—	0.8 (0.6–1.0)	0.6 (0.5–0.7)	0.7 (0.6–0.9)	0.6 (0.6–0.7)
Hispanic†	—	—	—	—	0.4 (0.3–0.5)	0.5 (0.4–0.7)	0.5 (0.4–0.7)	0.4 (0.4–0.5)
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Bathtub								
AI/AN	—	—	—	—	—	—	—	1.3 (1.0–1.8)
A/PI	—	—	—	—	—	—	—	0.3 (0.2–0.4)
Black	1.7 (1.4–2.1)	1.0 (0.8–1.2)	1.3 (0.8–1.9)	1.2 (0.8–1.7)	0.6 (0.4–0.9)	0.7 (0.5–0.9)	0.7 (0.5–1.0)	1.0 (0.9–1.2)
Hispanic†	1.1 (0.9–1.3)	0.9 (0.8–1.0)	0.6 (0.4–1.0)	0.6 (0.4–0.9)	0.6 (0.4–0.9)	0.4 (0.2–0.5)	0.4 (0.3–0.5)	0.8 (0.7–0.9)
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Other or unspecified								
AI/AN	—	1.7 (1.3–2.4)	—	—	2.2 (1.6–3.2)	2.7 (1.9–3.8)	3.6 (2.6–5.1)	2.4 (2.0–2.8)
A/PI	—	0.3 (0.2–0.5)	1.1 (0.7–1.6)	—	0.9 (0.7–1.1)	0.7 (0.6–1.0)	0.6 (0.5–0.8)	0.6 (0.6–0.7)
Black	1.9 (1.4–2.6)	0.6 (0.5–0.7)	2.3 (1.9–2.7)	3.9 (3.4–4.7)	1.9 (1.7–2.2)	1.4 (1.2–1.6)	1.5 (1.2–1.7)	1.5 (1.4–1.6)
Hispanic†	1.2 (0.9–1.6)	0.6 (0.6–0.7)	0.7 (0.6–0.9)	0.7 (0.6–1.0)	1.0 (0.9–1.2)	1.3 (1.1–1.5)	1.1 (0.9–1.2)	0.9 (0.9–1.0)
White	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

Abbreviations: AI/AN = American Indian or Alaska Native; A/PI = Asian or Pacific Islander; CI = confidence interval; ICD-10 = *International Classification of Diseases, Tenth Revision*; Ref = reference; RR = rate ratio.
* ICD-10 underlying cause of death codes W65–W74, V90, and V92.
† Persons identified as Hispanic might be of any race. Persons identified as AI/AN, A/PI, Black, or White are all non-Hispanic.
§ Dashes indicate RRs based on <20 deaths suppressed for unreliability.

The findings in this report are subject to at least three limitations. First, information about race/ethnicity on death certificates is reported by next of kin or by observation. Persons who self-report their race/ethnicity as AI/AN, Asian, or Hispanic are sometimes reported as White or non-Hispanic on death certificates, leading to possible underestimations of deaths among these groups; proxy reporting of race/ethnicity is especially inaccurate for AI/AN persons (*1*). Second, approximately 17% of drowning deaths were coded as "unspecified drowning," meaning the setting could not be determined, and the drowning might have occurred in one of the other settings. Finally, because of a lack of exposure data, how the drowning disparities reported by setting are affected by a group's exposure to that setting could not be determined.

Drowning is preventable, and more prevention efforts are needed to reduce the racial/ethnic disparities in drowning death rates that persist in the United States. Identification and evaluation of factors contributing to racial/ethnic disparities are crucial to inform the development and implementation of interventions that could effectively reduce disparities. Developing, implementing, and evaluating community-based interventions to promote drowning prevention strategies (installing barriers, basic swimming and water safety skills, using life jackets properly, active supervision, and knowing/performing CPR) among disproportionately affected racial/ethnic groups could help reduce disparities. Although the practicality of prevention strategies varies by setting, having basic swimming and water safety skills is applicable in all settings. Engaging populations at the highest risk of drowning to understand and address the barriers to accessing basic swimming and water safety skills training is needed.

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References

1. CDC. CDC WONDER. Underlying cause of death, 1999–2019. Atlanta, GA: US Department of Health and Human Services, CDC; 2021. https://wonder.cdc.gov/ucd-icd10.html
2. CDC. Web-based Injury Statistics Query and Reporting System (WISQARS). WISQARS fatal injury data visualization. Atlanta, GA: US Department of Health and Human Services, CDC; 2021. https://wisqars-viz.cdc.gov:8006/lcd/home
3. Franklin RC, Peden AE, Hamilton EB, et al. The burden of unintentional drowning: global, regional and national estimates of mortality from the Global Burden of Disease 2017 Study. Inj Prev 2020;26(Supp 1):i83–95. PMID:32079663 https://doi.org/10.1136/injuryprev-2019-043484
4. Gilchrist J, Parker EM. Racial/ethnic disparities in fatal unintentional drowning among persons aged ≤29 years—United States, 1999–2010. MMWR Morb Mortal Wkly Rep 2014;63:421–6. PMID:24827409
5. Denny SA, Quan L, Gilchrist J, et al.; Council on Injury, Violence, and Poison Prevention. Prevention of drowning. Pediatrics 2019;143:e20190850. PMID:30877146 https://doi.org/10.1542/peds.2019-0850
6. Irwin CC, Irwin RL, Ryan TD, Drayer J. Urban minority youth swimming (in)ability in the United States and associated demographic characteristics: toward a drowning prevention plan. Inj Prev 2009;15:234–9. PMID:19651995 https://doi.org/10.1136/ip.2008.020461
7. Pharr J, Irwin C, Layne T, Irwin R. Predictors of swimming ability among children and adolescents in the United States. Sports (Basel) 2018;6:17. PMID:29910321 https://doi.org/10.3390/sports6010017
8. Irwin CC, Pharr JR, Irwin RL, Layne TE. Youth swimming ability and associated factors in the United States, 2010–17. Am J Health Behav 2018;42:32–42. PMID:30688639 https://doi.org/10.5993/AJHB.42.5.3
9. Irwin CC, Irwin RL, Ryan TD, Drayer J. The legacy of fear: is fear impacting fatal and non-fatal drowning of African American children? J Black Stud 2011;42:561–76. PMID:21910272 https://doi.org/10.1177/0021934710385549
10. Gorsuch MM, Myers SL Jr, Lai Y, Steward D, Motachwa R. Vanishing racial disparities in drowning in Florida. Inj Prev 2019;25:487–93. PMID:30352797 https://doi.org/10.1136/injuryprev-2018-042872

Hepatitis A Virus Infections Among Men Who Have Sex with Men — Eight U.S. States, 2017–2018

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During 1995–2011, the overall incidence of hepatitis A decreased by 95% in the United States from 12 cases per 100,000 population during 1995 to 0.4 cases per 100,000 population during 2011, and then plateaued during 2012–2015. The incidence increased by 294% during 2016–2018 compared with the incidence during 2013–2015, with most cases occurring among populations at high risk for hepatitis A infection, including persons who use illicit drugs (injection and noninjection), persons who experience homelessness, and men who have sex with men (MSM) (*1–3*). Previous outbreaks among persons who use illicit drugs and MSM led to recommendations issued in 1996 by the Advisory Committee on Immunization Practices (ACIP) for routine hepatitis A vaccination of persons in these populations (*4*). Despite these long-standing recommendations, vaccination coverage rates among MSM remain low (*5*). In 2017, the New York City Department of Health and Mental Hygiene contacted CDC after public health officials noted an increase in hepatitis A infections among MSM. Laboratory testing* of clinical specimens identified strains of the hepatitis A virus (HAV) that subsequently matched strains recovered from MSM in other states. During January 1, 2017–October 31, 2018, CDC received reports of 260 cases of hepatitis A among MSM from health departments in eight states, a substantial increase from the 16 cases reported from all 50 states during 2013–2015. Forty-eight percent (124 of 258) of MSM patients were hospitalized for a median of 3 days. No deaths were reported. In response to these cases, CDC supported state and local health departments with public health intervention efforts to decrease HAV transmission among MSM populations. These efforts included organizing multistate calls among health departments to share information, providing guidance on developing targeted outreach and managing supplies for vaccine campaigns, and conducting laboratory testing of clinical specimens. Targeted outreach for MSM to increase awareness about hepatitis A infection and improve access to vaccination services, such as providing convenient locations for vaccination, are needed to prevent outbreaks among MSM.

This analysis included confirmed cases of hepatitis A among MSM whose symptoms began during January 1, 2017–October 31, 2018. During this period, community outbreaks of hepatitis A among persons reporting drug use or homelessness or both were identified in California, Kentucky, Michigan, and Utah (*1*,*6*). These persons were not included in this analysis because they were found to be infected with a different strain of hepatitis A virus and therefore deemed a separate outbreak. Confirmed cases were defined as those in which a patient had an illness consistent with acute viral hepatitis and jaundice (or elevated serum alanine aminotransferase [ALT] levels [>200 IU/L]) and a positive immunoglobulin M (IgM) antibody to HAV, or positive nucleic acid amplification test result in the absence of a more likely diagnosis. Local and state health department personnel interviewed patients using standard questionnaires and reviewed medical records to supplement demographic, clinical, and risk factor information. Analysis was conducted using SAS (version 9.4; SAS Institute). Data collection was directly related to disease control and was deemed not to be human subject research. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.†

Available serum specimens from patients who received a positive test result for HAV IgM antibodies were submitted for additional testing at CDC or the Viral and Rickettsial Disease Laboratory at the California Department of Public Health. These specimens were tested for HAV RNA by polymerase chain reaction, and amplicons were sequenced to characterize a 315-base pair fragment of the VP1/P2B region, which defines the genotype of the virus.

During January 1, 2017–October 31, 2018, a total of 260 cases of hepatitis A among MSM were reported across the following eight states: California, Colorado, Georgia, Maryland, New York, North Carolina, Pennsylvania, and Virginia. During the analysis period, these states reported 1,229 cases of hepatitis A with "no" or "unknown" MSM status to the National Notifiable Diseases Surveillance System. Among these states, the highest number of cases among MSM occurred in New York (39%), specifically New York City (31%), and California (24%) (Table). Illness onset dates were available for 258 of 260 cases (Figure). The median age of MSM patients was 32 years (range = 19–75 years). Among patients for whom

* CDC or the Viral and Rickettsial Disease Laboratory at the California Department of Public Health.

† 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. Characteristics and risk factors for hepatitis A, by reported cases (n = 260) among men who have sex with men — eight U.S. States,* January 1, 2017–October 31, 2018

Characteristic	No. (%)
Median age (range), yrs	32 (19–75)
Reporting state	
New York	101 (39)
California	63 (24)
Colorado	20 (8)
North Carolina	20 (8)
Pennsylvania	20 (8)
Maryland	14 (5)
Virginia	12 (5)
Georgia	10 (4)
Risk exposures, no. (row %)	
MSM	260/260 (100)
International travel during incubation period	54/253 (21)
Injection or noninjection drug use during incubation period	59/244 (24)
≥1 dose hepatitis A vaccine†	15/187 (8)
Hepatitis B infection§	5/212 (2)
Hepatitis C infection§	2/212 (1)
HIV infection¶	26/72 (36)
Clinical symptoms and disease outcome, no. (row %)	
Fatigue/Malaise	171/193 (89)
Dark urine	205/240 (85)
Jaundice	205/254 (81)
Anorexia	171/251 (68)
Nausea	175/257 (68)
Abdominal pain	162/256 (63)
Vomiting	124/257 (48)
Fever	120/254 (47)
Light or clay-colored stools	96/222 (43)
Diarrhea	73/243 (30)
Hospitalized	124/258 (48)
Duration of hospitalization, median (range), days**	3 (0–10)
Died	0/260 (—)
Laboratory data, no. of patients with available data, median (range)	
ALT (n = 251)	2,285 (181–7,575)
AST (n = 240)	1,015 (78–9,154)
Total bilirubin (n = 232)	6.8 (0.5–21.7)
Hepatitis A virus genotype IA strain	
Total no. of patients with genotype IA strains	126 (100)
U.S. MSM cluster 1	43 (34)
RIVM-HAV16–090	30 (24)
VRD_521_2016	20 (16)
U.S. MSM cluster 2	13 (10)
V16–25801	4 (3)
Other	16 (13)

Abbreviation: ALT = alanine aminotransferase; AST = aspartate aminotransferase; MSM = men who have sex with men.

* States that reported cases analyzed in this report were California, Colorado, Georgia, Maryland, New York, North Carolina, Pennsylvania, and Virginia.

† California only considered documented hepatitis A vaccine doses as evidence of prior vaccination, whereas other states included hepatitis A vaccination self-reported by patients.

§ Colorado did not report hepatitis B and C infections.

¶ California, Colorado, and New York did not report HIV infections.

** Information on duration of hospitalization was available for 108 of 260 cases among MSM.

detailed clinical information was available, the most frequently reported signs and symptoms were fatigue or malaise (171 of 193 [89%]), dark urine (205 of 240 [85%]), and jaundice (205 of 254 [81%]) (Table). Median laboratory values for ALT, aspartate aminotransferase, and total bilirubin were 2,285 IU/L, 1,015 IU/L, and 6.8 mg/dL, respectively (Table). Among 212 patients with available viral hepatitis coinfection data, five of 212 (2%) had evidence of past or current hepatitis B virus infection, and two of 212 (1%) had evidence of past or current hepatitis C virus infection. Among 72 patients whose HIV infection status was known, coinfection with HIV was reported in 26 (36%) patients. Forty-eight percent (124 of 258) were hospitalized for a median of 3 days. No deaths were reported. Twenty-one percent (54 of 253) of patients reported international travel during the incubation period, 24% (59 of 244) of patients reported injection or noninjection drug use during the incubation period, and 8% (15 of 187) of patients reported receiving ≥1 dose of hepatitis A vaccine (Table).

Anti-HAV IgM-positive specimens from 133 patients were submitted to the laboratories for HAV RNA isolation and additional strain characterization; all were positive for the presence of HAV RNA. Among these specimens, 95% (126 of 133) were HAV genotype IA, and 5% (six of 133) were HAV genotype IB; one specimen was determined to have an insufficient quantity for genotyping. Among the 126 specimens with HAV genotype IA sequences, 54 (43%) were from patients infected with a genotype IA strain that was genetically identical to one of three strains identified during recent HAV outbreaks among MSM in the European Union (30 [24%] RIVM-HAV16–090; 20 [16%] VRD_521_2016; and four [3%] V16–25801) (*7*). Two additional HAV genotype IA strains were circulating among MSM infected with HAV in the United States during the analysis period: MSM cluster 1 (43 [34%]) and MSM cluster 2 (13 [10%]) of the total 126 specimens (Table).

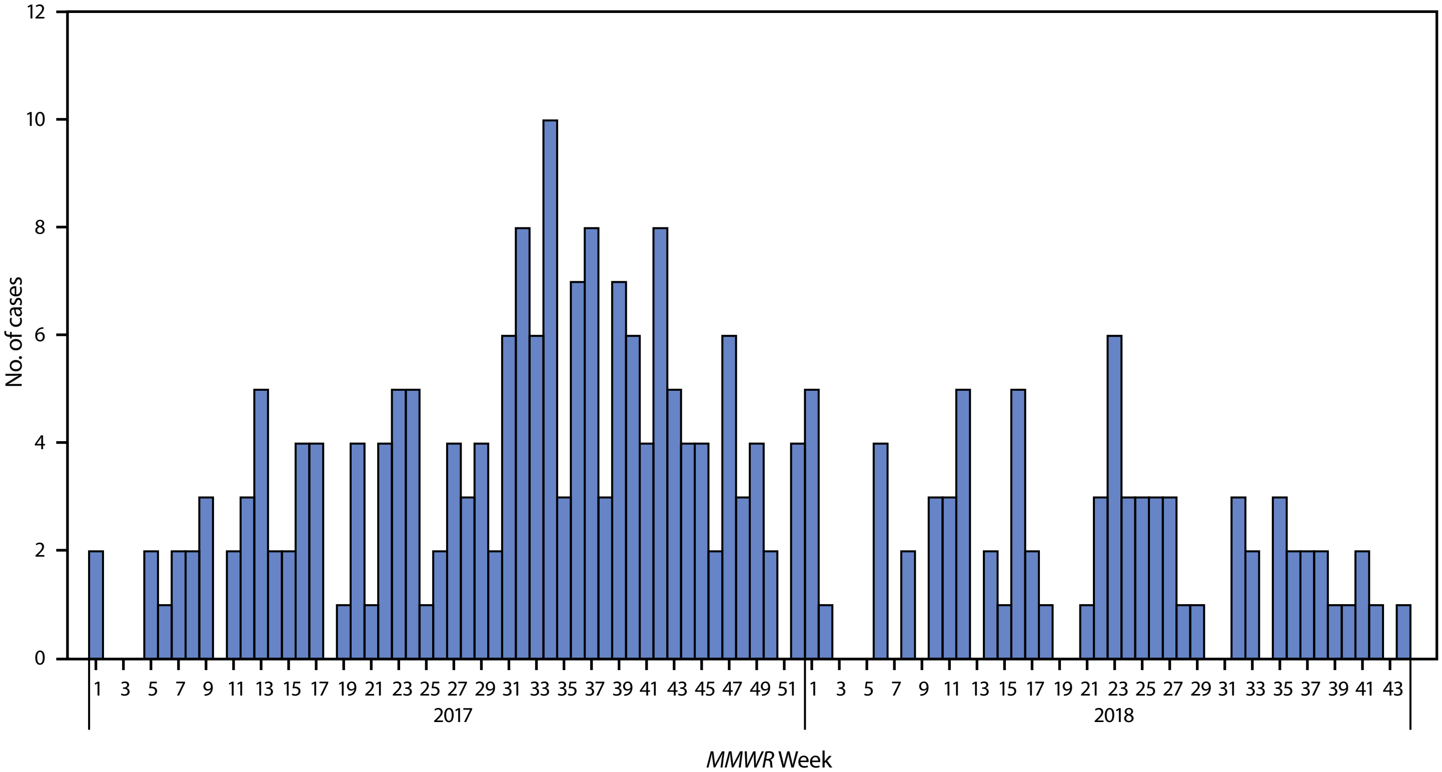
State and local health departments in affected areas provided outreach to the MSM community through websites and webinars, resources designed to reach the MSM community, targeted communication campaigns, and vaccination events in specialized venues.§ Letters and health alerts were sent to physicians to inform them of increases in HAV infections among MSM and remind them of the ACIP recommendation to vaccinate this population against hepatitis A. Many jurisdictions used social media outreach to target hepatitis A educational messaging and vaccination opportunities to MSM through such social platforms as Grindr, Scruff, and Facebook.¶,**

§ https://www1.nyc.gov/site/doh/about/press/pr2017/pr078-17.page

¶ https://epi.publichealth.nc.gov/cd/hepatitis/HepatitisAandHIV.pdf

** https://nychealth.tumblr.com/post/165278208281/health-alert-hepatitis-a-hepatitis-a-is-on-the

FIGURE. Hepatitis A virus infections (n = 258)* among men who have sex with men, by *MMWR* week† — eight U.S. states,§ January 1, 2017–October 31, 2018



Abbreviation: MSM = men who have sex with men.
* Dates of illness onset were available for 258 of 260 cases among MSM.
† *MMWR* week numbering is sequential beginning with 1 and incrementing with each week to a maximum of 52 or 53 and is based on the epidemiologic week for disease reporting, which lasts Sundays through Saturdays. https://wwwn.cdc.gov/nndss/document/MMWR_week_overview.pdf
§ Cases were reported from the following eight states: California, Colorado, Georgia, Maryland, New York, North Carolina, Pennsylvania, and Virginia. Information obtained from case investigations did not allow for the definitive determination of where the outbreak started or how it progressed (e.g., via spread from one state to others or via simultaneous introduction of the involved hepatitis A virus strains in multiple states).

Discussion

Hepatitis A outbreaks among MSM have been previously reported (*8*); evidence of increased risk of hepatitis A virus infection led the ACIP in 1996 to include MSM as a risk group that should receive hepatitis A vaccination (*4*). Despite this longstanding recommendation, vaccination coverage rates among MSM remain low. On the basis of 2013–2015 data from the National Health Interview Survey, the percentage of adult MSM in the noninstitutionalized U.S. population who reported ever having received a hepatitis A vaccination was 40% (*5*). Previous studies have determined that population immunity levels >70% are needed to prevent outbreaks among MSM (*9*).

HAV infections among MSM reported from eight states during January 1, 2017–October 31, 2018 contributed to the overall increase in hepatitis A incidence in the United States during 2016–2018 (*3*). During this period, coinfections with hepatitis B or hepatitis C viruses, hospitalization, and death were reported less frequently among MSM patients than among hepatitis A patients who reported drug use or homelessness (*1*). Among clinical specimens available for testing, 87% were infected with one of five HAV genotype IA strains: three of these five strains were observed in outbreaks associated with MSM that occurred during the same period (January 1, 2017–October 31, 2018) but in different parts of the world; to date the other two genotype IA strains were detected only in the United States (*7*).

Behaviors that facilitate HAV transmission among MSM vary and can involve sexual practices that enable fecal-oral transmission (e.g., digital-anal and oral-anal sex) (*7*). Case investigations of hepatitis A among MSM in the United States do not always reveal distinct sexual networks; anonymous involvement with sexual contacts makes partner notification and control of outbreak clusters difficult (*8*).

Hepatitis A vaccination is highly protective against HAV infection (*4*). Studies among African American MSM in the southern United States reported the strongest predictor for hepatitis A vaccination to be health care provider communication

Summary

What is already known about this topic?

Hepatitis A vaccination is recommended for men who have sex with men (MSM).

What is added by this report?

During January 1, 2017–October 31, 2018, a total of 260 cases of hepatitis A occurred among MSM from eight states compared with 16 cases reported from 50 states during 2013–2015. Forty-eight percent (124 of 258) of MSM patients were hospitalized for a median of 3 days. No deaths were reported.

What are the implications for public health practice?

Targeted outreach to increase awareness about hepatitis A infection and improve access to vaccination services are needed to prevent outbreaks among MSM.

about patient sexual orientation and behaviors and low perceived barriers to vaccination. Perceived benefits of vaccination were not associated with increased vaccination (*10*).

The findings in this report are subject to at least four limitations. First, questions about sexual orientation and sexual practices on HAV case report forms are not standardized across jurisdictions. Second, the ability to draw conclusions from incomplete race and ethnicity data was limited, and therefore, not analyzed. Third, data regarding coinfections with other viruses, particularly HIV, were limited. Finally, distinguishing the cause of infection when persons reported multiple behaviors that increase risk of HAV infection was difficult and might have resulted in cases being misclassified

Despite these limitations, this report highlights a gap in vaccination among MSM in the United States. Targeted outreach to MSM, including efforts that increase knowledge about hepatitis A infection and improve access to vaccination services, such as providing convenient locations for vaccination, are needed to improve hepatitis A immunity among MSM and to help prevent outbreaks.

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All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflicts of interest were disclosed.

References

1. Foster M, Ramachandran S, Myatt K, et al. Hepatitis A virus outbreaks associated with drug use and homelessness—California, Kentucky, Michigan, and Utah, 2017. MMWR Morb Mortal Wkly Rep 2018;67:1208–10. PMID:30383739 https://doi.org/10.15585/mmwr.mm6743a3
2. Ly KN, Klevens RM. Trends in disease and complications of hepatitis A virus infection in the United States, 1999–2011: a new concern for adults. J Infect Dis 2015;212:176–82. Epub January 29, 2015. PMID:25637352 https://doi.org/10.1093/infdis/jiu834
3. Foster MA, Hofmeister MG, Kupronis BA, et al. Increase in hepatitis A virus infections—United States, 2013–2018. MMWR Morb Mortal Wkly Rep 2019;68:413–5 10. PMID:31071072 https://doi.org/10.15585/mmwr.mm6818a2
4. Advisory Committee on Immunization Practices. Prevention of hepatitis A through active or passive immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). Atlanta, GA: US Department of Health and Human Services, CDC. MMWR Recomm Rep 1996;45(No. RR-15). PMID:9005304
5. Srivastav A, O'Halloran A, Lu PJ, Williams WW, Hutchins SS. Vaccination differences among US adults by their self-identified sexual orientation, National Health Interview Survey, 2013–2015. PLoS One 2019;14:e0213431. PMID:30845220 https://doi.org/10.1371/journal.pone.0213431
6. CDC. Widespread outbreaks of hepatitis A across the United States. Atlanta, GA: US Department of Health and Human Services, CDC; 2019. Accessed June 25, 2019. https://www.cdc.gov/hepatitis/outbreaks/2017March-HepatitisA.htm.
7. European Centre for Disease Prevention and Control. Epidemiological update: hepatitis A outbreak in the EU/EEA mostly affecting men who have sex with men. Solna, Sweden: European Union, ECDC; 2018. Accessed June 25, 2019. https://www.ecdc.europa.eu/en/news-events/epidemiological-update-hepatitis-outbreak-eueea-mostly-affecting-men-who-have-sex-men-2
8. Cotter SM, Sansom S, Long T, et al. Outbreak of hepatitis A among men who have sex with men: implications for hepatitis A vaccination strategies. J Infect Dis 2003;187:1235–40. PMID:12696002 https://doi.org/10.1086/374057
9. Regan DG, Wood JG, Benevent C, et al. Estimating the critical immunity threshold for preventing hepatitis A outbreaks in men who have sex with men. Epidemiol Infect 2016;144:1528–37. Epub November 13, 2015. PMID:26566273 https://doi.org/10.1017/S0950268815002605
10. Rhodes SD, Yee LJ, Hergenrather KC. Hepatitis A vaccination among young African American men who have sex with men in the deep south: psychosocial predictors. J Natl Med Assoc 2003;95(4 Suppl):S31–6.

Mental Health Among Parents of Children Aged <18 Years and Unpaid Caregivers of Adults During the COVID-19 Pandemic — United States, December 2020 and February–March 2021

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Early during the COVID-19 pandemic, nearly two thirds of unpaid caregivers of adults reported adverse mental or behavioral health symptoms, compared with approximately one third of noncaregivers[†] (*1*). In addition, 27% of parents of children aged <18 years reported that their mental health had worsened during the pandemic (*2*). To examine mental health during the COVID-19 pandemic among U.S. adults on the basis of their classification as having a parenting role (i.e., unpaid persons caring for children and adolescents aged <18 years, referred to as children in this report) or being an unpaid caregiver of adults (i.e., persons caring for adults aged ≥18 years),[§] CDC analyzed data from cross-sectional surveys that were administered during December 2020 and February–March 2021 for The COVID-19 Outbreak Public Evaluation (COPE) Initiative.[¶] Respondents were categorized as parents only, caregivers of adults only, parents-caregivers (persons in both roles), or nonparents/noncaregivers (persons in neither role). Adjusted odds ratios (aORs) for any adverse mental health symptoms, particularly suicidal ideation, were higher among all respondents who were parents, caregivers of adults, or both compared with respondents who were nonparents/noncaregivers and were highest among persons in both roles (parents-caregivers) (any adverse mental health symptoms: aOR = 5.1, 95% confidence interval [CI] = 4.1–6.2; serious suicidal ideation: aOR = 8.2, 95% CI = 6.5–10.4). These findings highlight that parents and caregivers, especially those balancing roles both as parents and caregivers, experienced higher levels of adverse mental health symptoms during the COVID-19 pandemic than adults without these responsibilities. Caregivers who had someone to rely on for support had lower odds of experiencing any adverse mental health symptoms. Additional measures are needed to improve mental health among parents, caregivers, and parents-caregivers.

Among 16,384 eligible and invited unique respondents,[**] 10,469 (63.9%) completed English-language, Internet-based surveys administered to Qualtrics panels for The COPE Initiative during distinct intervals (December 6–27, 2020, and February 16–March 8, 2021). The nonprobability demographic quota sample was weighted to closely align with the distribution of the U.S. population by sex, age, and race/ethnicity.[††] Data for explanatory and outcome variables were obtained from 10,444 (99.8%) respondents. Respondents described their parenting and caregiving roles, completed screening instruments for symptoms of anxiety and depression[§§] and COVID-19 trauma- and stressor-related disorders

* These authors contributed equally to this report.

† https://www.medrxiv.org/content/10.1101/2021.02.02.21251042v1

§ Parents and unpaid caregivers of adults were self-identified. Parents were defined as persons who had provided unpaid care to relatives or friends aged <18 years to help them take care of themselves at any time during the last 3 months. Unpaid caregivers of adults were defined as persons who had provided unpaid care to relatives or friends aged ≥18 years to help them take care of themselves at any time during the last 3 months. Respondents answered questions about these two roles separately. Respondents were categorized as parents only, caregivers of adults only, parents-caregivers (persons in both roles), or nonparents/noncaregivers. Whether adults who reported they were in parenting roles were biologic or legal parents or guardians of the children for whom they were providing care is not known, nor is it known whether adults were legal dependents of their caregivers.

¶ The COPE Initiative (https://www.thecopeinitiative.org/) is designed to assess public attitudes, behaviors, and beliefs related to the COVID-19 pandemic and to evaluate the mental and physical health consequences of the pandemic. The COPE Initiative surveys included in this analysis were administered by Qualtrics, LLC (https://www.qualtrics.com), a commercial survey company with a network of participant pools comprising hundreds of suppliers and with varying recruitment methodologies that include digital advertisements and promotions, word-of-mouth and membership referrals, social networks, television and radio advertisements, and offline mail-based approaches.

** Eligibility to complete surveys was determined after electronic contact with potential participants who met criteria of age ≥18 years and U.S. residence. Age and residence were assessed using screening questions without indication of eligibility criteria before survey commencement. Country-specific geolocation verification via IP address mapping was used to ensure respondents were in the United States. Qualtrics, LLC, conducted data quality screening including algorithmic and keystroke analysis for attention patterns, click-through behavior, duplicate responses, machine responses, and inattentiveness.

†† Additional information on quota sampling, a nonprobabilistic sampling method, is available at https://www.qualtrics.com/experience-management/research/sampling-methods/. Demographic quotas were set for sex, age, race, and ethnicity using questions and national U.S. adult population estimates from the 2019 American Community Survey. After the surveys were conducted, iterative proportional fitting and weight trimming were applied to the overall sample to match 2019 American Community Survey estimates for sex, age, and combined race/ethnicity. Survey weighting was performed using the R survey package (version 3.29; R Foundation).

§§ Symptoms of anxiety and depression were assessed via the four-item Patient Health Questionnaire (PHQ-4), which refer to anxiety and depression symptoms experienced over the past 2 weeks. Those who scored ≥3 out of 6 on the Generalized Anxiety Disorder (GAD-2) or Patient Health Questionnaire (PHQ-2) subscales were considered symptomatic for these respective conditions.

(TSRDs),¶¶ and reported whether during the past 30 days they had wished they were dead or could go to sleep and not wake up (passive suicidal ideation) or had seriously considered trying to kill themselves (serious suicidal ideation).***

Respondents were grouped based on their roles as 1) only parents of children aged <18 years (parents only), 2) only caregivers of adults aged ≥18 years (caregivers only), 3) having both roles (parents-caregivers), or 4) having neither role (nonparents/noncaregivers). Multivariable weighted logistic regression was used to estimate aORs by group for symptoms of anxiety or depression or COVID-19 TSRDs, passive suicidal ideation, serious suicidal ideation, or any of these symptoms. Covariates included gender, age, race/ethnicity, sexual orientation, disability status,††† education, U.S. Census region§§§ and urbanicity¶¶¶ of residence, employment characteristics,**** and survey wave. Models also estimated aORs for adverse mental health symptoms by the following reasons for providing care for adults: 1) age-related health decline, 2) cognitive impairments (e.g., Alzheimer disease), 3) chronic medical conditions (e.g., cancer), 4) acute medical conditions (e.g., recovery after surgery), 5) mental health or substance use conditions, 6) active COVID-19 illness, 7) risk for severe COVID-19–associated illness, or 8) other. Additional models among all caregivers of adults, which also adjusted for parenting, duration of caregiving, hours of caregiving per week, and person receiving care, were used to estimate aORs by level of agreement with statements about caregiving-related financial strain, family strife, preparedness, support, confidence, personal freedom, positive feelings, and resentment.†††† Variance inflation factors for all variables with aOR estimates were less than six, indicating acceptable multicollinearity.§§§§

Participants provided informed electronic consent. Two-sided p values <0.05 were considered statistically significant. Rounded, weighted values are reported. Analyses were conducted using Python (version 3.7.8; Python Software Foundation) and R (version 4.0.2; R Foundation) using the R survey package (version 3.29; R Foundation). The Monash University Human Research Ethics Committee reviewed and approved the study. This activity was also reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.¶¶¶¶

Overall, 42.5% of the 10,444 U.S. adult respondents identified as parents of children, caregivers of adults, or both, including 8.4% as parents only, 11.2% as caregivers only, and 22.9% as parents-caregivers (Table 1). Among all respondents who were parents, caregivers, or parents-caregivers, 45.0% were women and 50.2% were aged 25–44 years. The distribution by race/ethnicity was similar to those of the overall sample and the U.S. adult population. A total of 71.4% of parents or caregivers reported paid employment in addition to their parenting or unpaid caregiving roles.

Approximately 70% of all caregivers (parents only, caregivers of adults only, or those with both roles) reported adverse mental health symptoms, including symptoms of anxiety or depression (55.3%), COVID-19 TSRDs (53.8%), or passive (39.3%) or serious (32.2%) suicidal ideation (Table 2). Among 2,391 parents-caregivers, approximately 85% experienced one or more adverse mental health symptoms, and approximately 50% reported past-month serious suicidal ideation. Parenting and caregiving were significantly positively associated with

¶¶ Disorders classified as TSRDs in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition,* include posttraumatic stress disorder (PTSD), acute stress disorder (ASD), and adjustment disorders, among others. Symptoms of a TSRD attributed to the COVID-19 pandemic were assessed via the six-item Impact of Event scale (IES-6) to screen for overlapping symptoms of PTSD, ASD, and adjustment disorders. The COVID-19 pandemic was specified as the traumatic exposure to record peritraumatic and posttraumatic symptoms associated with the range of stressors introduced by the COVID-19 pandemic. Those who scored ≥1.75 out of 4 were considered symptomatic.

*** For questions related to suicidal ideation, participants were informed that responses were deidentified and that direct support could not be provided to those who reported substance use behavior or suicidal ideation. Regarding suicidal ideation, all respondents were provided the following: "This survey is anonymous, so we cannot provide direct support. If you would like crisis support, please contact the National Suicide Prevention Lifeline, 1-800-273-TALK (8255, or chat line) for help for yourself or for others." Passive suicidal ideation was assessed using an item from the Columbia-Suicide Severity Rating Scale adapted to refer to the past 30 days: "At any time in the past 30 days, have you wished you were dead or wished you could go to sleep and not wake up?" Serious suicidal ideation was assessed using an item from the National Survey on Drug Use and Health adapted to refer to the past 30 days: "At any time in the past 30 days, did you seriously think about trying to kill yourself?"

††† Persons who had a disability were defined as such based on a qualifying response to either one of the two following questions: "Are you limited in any way in any activities because of physical, mental, or emotional condition?" and "Do you have any health conditions that require you to use special equipment, such as a cane, wheelchair, special bed, or special telephone?" https://www.cdc.gov/brfss/questionnaires/pdf-ques/2015-brfss-questionnaire-12-29-14.pdf

§§§ https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf

¶¶¶ https://www.hrsa.gov/rural-health/about-us/definition/datafiles.html

**** Employment characteristics included employment status (employed, unemployed, retired, or student only), weekly paid work hours, and percentage of work hours completed remotely versus on-site.

†††† Respondents rated their level of agreement to statements using a five-item Likert scale (1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree) taken from the ARCHANGELS short-form Caregiver Intensity Index (CII), a copyrighted instrument available for use only with permission. Responses were trichotomized to disagree (1 and 2), neutral (3), or agree (4 and 5). CII was administered to all unpaid caregivers of adults.

§§§§ The maximum acceptable level of variance inflation factor cutoff was set at 10, which signals high multicollinearity (i.e., when two or more explanatory variables in a multivariable model are highly correlated). https://www.itl.nist.gov/div898/software/dataplot/refman2/auxillar/vif.htm

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

TABLE 1. Demographic characteristics of respondents, by parent/caregiver role — The COVID-19 Outbreak Public Evaluation Initiative, United States, December 2020 and February–March 2021

Characteristic	Weighted no. (%)*					
	Total	Nonparents/ Noncaregivers	Parents only, caregivers of adults only, and parents-caregivers†	Parents only	Caregivers of adults only	Parents-caregivers
Total	**10,444 (100)**	**6,008 (57.5)**	**4,436 (42.5)**	**875 (8.4)**	**1,170 (11.2)**	**2,391 (22.9)**
Gender§						
Female	5,138 (49.2)	3,144 (52.3)	1,995 (45.0)	510 (58.2)	611 (52.2)	874 (36.6)
Male	5,227 (50.1)	2,827 (47.1)	2,400 (54.1)	360 (41.2)	552 (47.2)	1,487 (62.2)
Transgender	58 (0.6)	26 (0.4)	32 (0.7)	—	—	26 (1.1)
Age group, yrs						
18–24	1,248 (11.9)	549 (9.1)	699 (15.7)	91 (10.5)	145 (12.4)	462 (19.3)
25–44	3,605 (34.5)	1,377 (22.9)	2,227 (50.2)	426 (48.6)	393 (33.6)	1,409 (58.9)
45–64	3,419 (32.7)	2,293 (38.2)	1,126 (25.4)	266 (30.4)	427 (36.5)	433 (18.1)
≥65	2,172 (20.8)	1,789 (29.8)	384 (8.6)	92 (10.5)	205 (17.5)	87 (3.7)
Race/Ethnicity						
White, non-Hispanic	6,297 (60.3)	3,660 (60.9)	2,637 (59.5)	550 (62.9)	711 (60.7)	1,376 (57.6)
Black, non-Hispanic	1,297 (12.4)	766 (12.7)	531 (12.0)	103 (11.8)	135 (11.5)	293 (12.2)
Asian, non-Hispanic	589 (5.6)	408 (6.8)	181 (4.1)	43 (4.9)	67 (5.7)	71 (3.0)
Other, multiple races, non-Hispanic¶	382 (3.7)	220 (3.7)	162 (3.6)	36 (4.2)	61 (5.2)	64 (2.7)
Hispanic, any race	1,880 (18.0)	955 (15.9)	925 (20.9)	142 (16.3)	196 (16.8)	587 (24.5)
Employment status						
Employed	5813 (55.7)	2,645 (44.0)	3,167 (71.4)	518 (59.2)	654 (55.9)	1,995 (83.4)
≤40 hrs, <20% remote	1,500 (14.4)	970 (16.1)	531 (12.0)	153 (17.5)	179 (15.3)	199 (8.3)
≤40 hrs, 20%–80% remote	1,209 (11.6)	448 (7.5)	761 (17.2)	102 (11.7)	144 (12.3)	515 (21.5)
≤40 hrs, >80% remote	877 (8.4)	490 (8.2)	387 (8.7)	76 (8.7)	82 (7.0)	228 (9.5)
>40 hrs, <20% remote	568 (5.4)	341 (5.7)	227 (5.1)	66 (7.6)	79 (6.8)	81 (3.4)
>40 hrs, 20%–80% remote	1,120 (10.7)	224 (3.7)	896 (20.2)	80 (9.1)	117 (10.0)	699 (29.2)
>40 hrs, >80% remote	539 (5.2)	172 (2.9)	366 (8.3)	41 (4.7)	53 (4.6)	272 (11.4)
Unemployed	1,791 (17.2)	1,160 (19.3)	632 (14.2)	208 (23.8)	215 (18.4)	208 (8.7)
Retired	2,517 (24.1)	2,010 (33.5)	508 (11.4)	124 (14.2)	265 (22.7)	119 (5.0)
Student	322 (3.1)	193 (3.2)	129 (2.9)	24 (2.8)	36 (3.0)	69 (2.9)
Duration in parenting/caregiving role						
<3 mos	—	—	993 (22.4)	183 (20.9)	357 (30.5)	454 (19.0)
4–12 mos	—	—	1,368 (30.8)	180 (20.5)	264 (22.6)	924 (38.6)
>1 yr	—	—	2,075 (46.8)	513 (58.6)	549 (46.9)	1,013 (42.4)
Parenting, hrs/wk						
<10	—	—	—	145 (16.5)	—	261 (10.9)
10–20	—	—	—	207 (23.7)	—	377 (15.8)
21–40	—	—	—	211 (24.1)	—	570 (23.8)
41–60	—	—	—	92 (10.5)	—	374 (15.7)
>60	—	—	—	220 (25.2)	—	808 (33.8)
Adult caregiving, hrs/wk						
<10	—	—	—	—	317 (27.1)	239 (10.0)
10–20	—	—	—	—	363 (31.0)	457 (19.1)
21–40	—	—	—	—	229 (19.6)	606 (25.4)
41–60	—	—	—	—	80 (6.8)	352 (14.7)
>60	—	—	—	—	182 (15.6)	737 (30.8)
Reason for providing care for adults**						
Age-related health decline	—	—	—	—	477 (40.8)	587 (24.5)
Cognitive impairments	—	—	—	—	188 (16.1)	339 (14.2)
Chronic health condition	—	—	—	—	303 (25.9)	662 (27.7)
Acute health condition	—	—	—	—	118 (10.1)	405 (16.9)
Mental health or substance use condition	—	—	—	—	162 (13.9)	573 (24.0)
Active case of COVID-19	—	—	—	—	96 (8.2)	659 (27.5)
Risk for severe COVID-19	—	—	—	—	190 (16.3)	637 (26.6)
Other	—	—	—	—	165 (14.1)	155 (6.5)

See table footnotes on the next page.

TABLE 1. (*Continued*) Demographic characteristics of respondents, by parent/caregiver role — The COVID-19 Outbreak Public Evaluation Initiative, United States, December 2020 and February–March 2021

* Weighted numbers and percentages might not sum to expected values because of rounding.

† Parents and unpaid caregivers of adults were self-identified. Parents were defined as persons who had provided unpaid care to relatives or friends aged <18 years to help them take care of themselves at any time in the last 3 months. Unpaid caregivers of adults were defined as persons who had provided unpaid care to relatives or friends aged ≥18 years to help them take care of themselves at any time in the last 3 months. Respondents answered questions about parenting and caregiving separately. Respondents were categorized as parents only, caregivers (of adults) only, parents-caregivers (persons in both roles), or nonparents/noncaregivers. Whether adults in parenting roles were biologic or legal parents or guardians of the children for whom they were providing care is not known, nor is it known whether adults were legal dependents of their caregivers. This column includes all parents, caregivers of adults, and parents-caregivers listed in the next three columns. Weighted numbers and percentages might not sum to expected values because of rounding. Unweighted numbers and percentages for key demographic variables were as follows: survey wave (December 2020: 5,188 [49.7%]; February–March 2021: 5,256 [50.3%]), gender (female: 5,429 [52.0%]; male: 4,958 [47.5%]; transgender: 35 [0.3%]; none of these: 22 [0.2%]), age group (18–24 years: 867 [8.3%]; 25–44 years: 3,681 [35.2%]; 45–64 years: 2,994 [28.7%]; ≥65 years: 2,902 [27.8%]), and race/ethnicity (non-Hispanic White: 7,737 [74.1%]; non-Hispanic Black: 1,058 [10.1%]; non-Hispanic Asian: 529 [5.1%]; non-Hispanic other or multiple races: 353 [3.4%]; Hispanic or Latino: any race or races, 767 [7.3%]).

§ Respondents who chose "none of these" are not shown because of small numbers (total respondents: weighted n = 20, caregivers: weighted n = 10). Cells with counts <10 are not shown for privacy reasons.

¶ Includes respondents who identified as non-Hispanic and as more than one race or as American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or all other races.

** Caregivers of adults could select multiple answers.

each adverse mental health symptom compared with being a nonparent/noncaregiver (for one or more symptoms, parents only: aOR = 1.5; caregivers only: aOR = 1.8; parents-caregivers: aOR = 5.1) and was particularly high for serious suicidal ideation among parents-caregivers compared with nonparents/noncaregivers (aOR = 8.2). Among respondents providing care for an adult for a given health condition compared with those not providing care for that condition, the highest aORs for adverse mental health symptoms were observed for caregivers of adults with mental health or substance use conditions (e.g., one or more symptoms: aOR = 5.0), adults with an active case of COVID-19 (aOR = 4.4), or adults at risk for severe COVID-19 (aOR = 3.9) (Table 2). Higher aORs for all adverse mental health symptoms were also observed for caregivers who were caring for adults with acute health conditions, chronic health conditions, cognitive impairments, and age-related health decline.

Among all caregivers of adults (adult caregivers only and parents-caregivers), those who agreed with the statements that they had experienced caregiving-related family disagreements or resented their caregiving responsibilities had approximately three times the odds for any adverse mental health symptoms (Figure) compared with those who disagreed with these statements. Similarly, aORs for any adverse mental health symptoms were approximately twice as high for caregivers who agreed that they felt underprepared as a caregiver, did not have the personal freedom they desired, or had to decrease living expenses to help pay for things, compared with caregivers who did not agree with these statements. Conversely, persons who had someone to rely on for support had lower odds of experiencing any adverse mental health symptoms.

Discussion

Approximately 40% of U.S. adults surveyed in late 2020 or early 2021 reported having parenting responsibilities, adult caregiving responsibilities, or both. Overall, 70% of all caregivers (parents only, caregivers of adults only, or those with both roles) reported recent adverse mental health symptoms, including symptoms of anxiety or depression, COVID-19 TSRDs, or suicidal ideation. Of particular concern, 85% of respondents with both parenting responsibilities and adult caregiving responsibilities experienced adverse mental health symptoms, and approximately 50% reported past-month serious suicidal ideation, with eight times the odds of serious suicidal ideation compared with nonparents/noncaregivers.

Caregivers of adults with mental health or substance use conditions, adults currently ill with COVID-19, or adults at risk for severe COVID-19 reported more adverse mental health symptoms than did caregivers of adults with other conditions, highlighting the need for education and support for caregivers in these roles. Social factors, such as financial strain, feeling a lack of preparedness for or resentment of caregiving, a lack of freedom, and family conflict were also associated with adverse mental health. The lower odds of having any adverse mental health symptoms based on the perception of having a person to rely on for support is encouraging. Because employment and caregiving responsibilities might limit the time available to seek help, telehealth and Internet-based interventions (*3*) might improve caregiver mental health; however, Internet access might be limited for some populations, particularly those with lower incomes. In addition, adult day services centers might benefit the mental health of caregivers and of those for whom they are providing care (*4*).***** Finally,

***** https://www.cdc.gov/coronavirus/2019-ncov/community/adult-day-care-service-centers.html

TABLE 2. Prevalence of and adjusted odds ratios for adverse mental health symptoms, by parent/caregiver role and reason for providing care for adults — The COVID-19 Outbreak Public Evaluation Initiative, United States, December 2020 and February–March 2021

Caregiver role and reason for providing care	Symptoms											
	Total		Anxiety or depression*		COVID-19 TSRD†		Past-month passive suicidal ideation§		Past-month serious suicidal ideation§		Any of these symptoms	
Total, no. (%) (95% CI)¶	**10,444 (100)**	**—**	**3,780 (36.2)**	**(35.1–37.3)**	**3,596 (34.4)**	**(33.3–35.5)**	**2,321 (22.2)**	**(21.2–23.2)**	**1,697 (16.2)**	**(15.4–17.1)**	**5,001 (47.9)**	**(46.8–49.0)**
Parent role/caregiver role, no. (%) (95% CI)¶**												
Nonparent/ Noncaregiver	6,008 (57.5)	(56.4–58.7)	1,327 (22.1)	(20.8–23.4)	1,209 (20.1)	(18.8–21.4)	580 (9.6)	(8.7–10.7)	269 (4.5)	(3.8–5.3)	1,925 (32.0)	(30.6–33.5)
Parent only, caregiver of adults only, or parent-caregiver	4,436 (42.5)	(41.3–43.6)	2,453 (55.3)	(53.4–57.2)	2,387 (53.8)	(51.9–55.7)	1,741 (39.3)	(37.4–41.1)	1,428 (32.2)	(30.4–34.0)	3,076 (69.3)	(67.6–71.0)
Parent only	875 (8.4)	(7.8–9.0)	315 (35.9)	(32.2–39.8)	304 (34.8)	(31.0–38.7)	162 (18.5)	(15.2–22.2)	79 (9.0)	(6.9–11.4)	443 (50.6)	(46.6–54.6)
Caregiver of adults only	1,170 (11.2)	(10.4–12.0)	454 (38.8)	(35.2–42.5)	425 (36.3)	(32.8–40.0)	187 (16.0)	(13.5–18.7)	118 (10.1)	(8.1–12.4)	591 (50.5)	(46.8–54.2)
Parent-caregiver	2,391 (22.9)	(21.9–23.9)	1,685 (70.5)	(67.9–72.9)	1,658 (69.3)	(66.8–71.8)	1,392 (58.2)	(55.6–60.9)	1,232 (51.5)	(48.8–54.2)	2,043 (85.4)	(83.5–87.2)
Parent role/caregiver role, aOR (95% CI)††**												
Parent only	—	—		1.4 (1.1–1.7)		1.5 (1.2–1.9)		1.5 (1.2–2.0)		1.6 (1.1–2.2)		1.5 (1.2–1.8)
Adult caregiver only	—	—		1.9 (1.6–2.3)		1.8 (1.5–2.2)		1.3 (1.0–1.7)		1.7 (1.2–2.3)		1.8 (1.5–2.1)
Parent-caregiver	—	—		3.7 (3.1–4.5)		3.6 (3.1–4.3)		5.8 (4.8–7.1)		8.2 (6.5–10.4)		5.1 (4.1–6.2)
Reason for care for adults, aOR (95% CI)§§												
Age-related health decline	—	—		1.8 (1.4–2.3)		1.8 (1.5–2.3)		1.4 (1.1–1.8)		1.8 (1.3–2.3)		1.9 (1.5–2.4)
Cognitive challenges	—	—		2.0 (1.5–2.7)		2.0 (1.5–2.6)		2.3 (1.7–3.0)		3.1 (2.2–4.4)		2.2 (1.7–2.8)
Chronic health condition	—	—		2.8 (2.2–3.5)		1.9 (1.6–2.4)		2.8 (2.2–3.5)		3.3 (2.5–4.3)		2.3 (1.8–2.9)
Acute health condition	—	—		2.7 (1.9–3.7)		2.8 (2.1–3.7)		2.4 (1.8–3.2)		3.6 (2.6–4.9)		3.0 (2.1–4.3)
Mental health or substance use condition	—	—		3.7 (2.8–5.0)		3.7 (2.8–4.8)		3.0 (2.3–3.9)		3.8 (2.9–5.0)		5.0 (3.7–6.9)
Active case of COVID-19	—	—		3.8 (2.7–5.1)		3.1 (2.3–4.1)		4.2 (3.2–5.6)		5.5 (4.1–7.5)		4.4 (3.0–6.4)
Risk for severe COVID-19	—	—		3.4 (2.6–4.4)		2.8 (2.2–3.6)		3.5 (2.8–4.5)		4.7 (3.6–6.1)		3.9 (3.0–5.2)
Other	—	—		1.6 (1.1–2.5)		1.4 (1.0–1.9)		1.2 (0.8–1.9)		2.4 (1.6–3.6)		1.5 (1.0–2.2)

Abbreviations: aOR = adjusted odds ratio; ASD = acute stress disorder; CI = confidence interval; CII = Caregiving Intensity Index; GAD-2 = two-item Generalized Anxiety Disorder scale; IES-6 = six-item Impact of Event scale; PHQ-2 = two-item Patient Health Questionnaire; PHQ-4 = four-item Patient Health Questionnaire; PTSD = posttraumatic stress disorder; TSRD = trauma- and stressor-related disorder.

* Symptoms of anxiety and depression were assessed via PHQ-4. Those who scored ≥3 out of 6 on the GAD-2 or PHQ-2 subscales were considered symptomatic for anxiety or depression symptoms.

† Disorders classified as TSRDs in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition,* include PTSD, ASD, and adjustment disorders, among others. Symptoms of a TSRD attributed to the COVID-19 pandemic were assessed via IES-6 to screen for overlapping symptoms of PTSD, ASD, and adjustment disorders. The COVID-19 pandemic was specified as the traumatic exposure to record peritraumatic and posttraumatic symptoms associated with the range of stressors introduced by the COVID-19 pandemic. Those who scored ≥1.75 out of 4 were considered symptomatic.

§ Passive suicidal ideation was assessed using an item from the Columbia-Suicide Severity Rating Scale adapted to refer to the past 30 days: "At any time in the past 30 days, have you wished you were dead or wished you could go to sleep and not wake up?" Serious suicidal ideation was assessed using an item from the National Survey on Drug Use and Health adapted to refer to the past 30 days: "At any time in the past 30 days, did you seriously think about trying to kill yourself?"

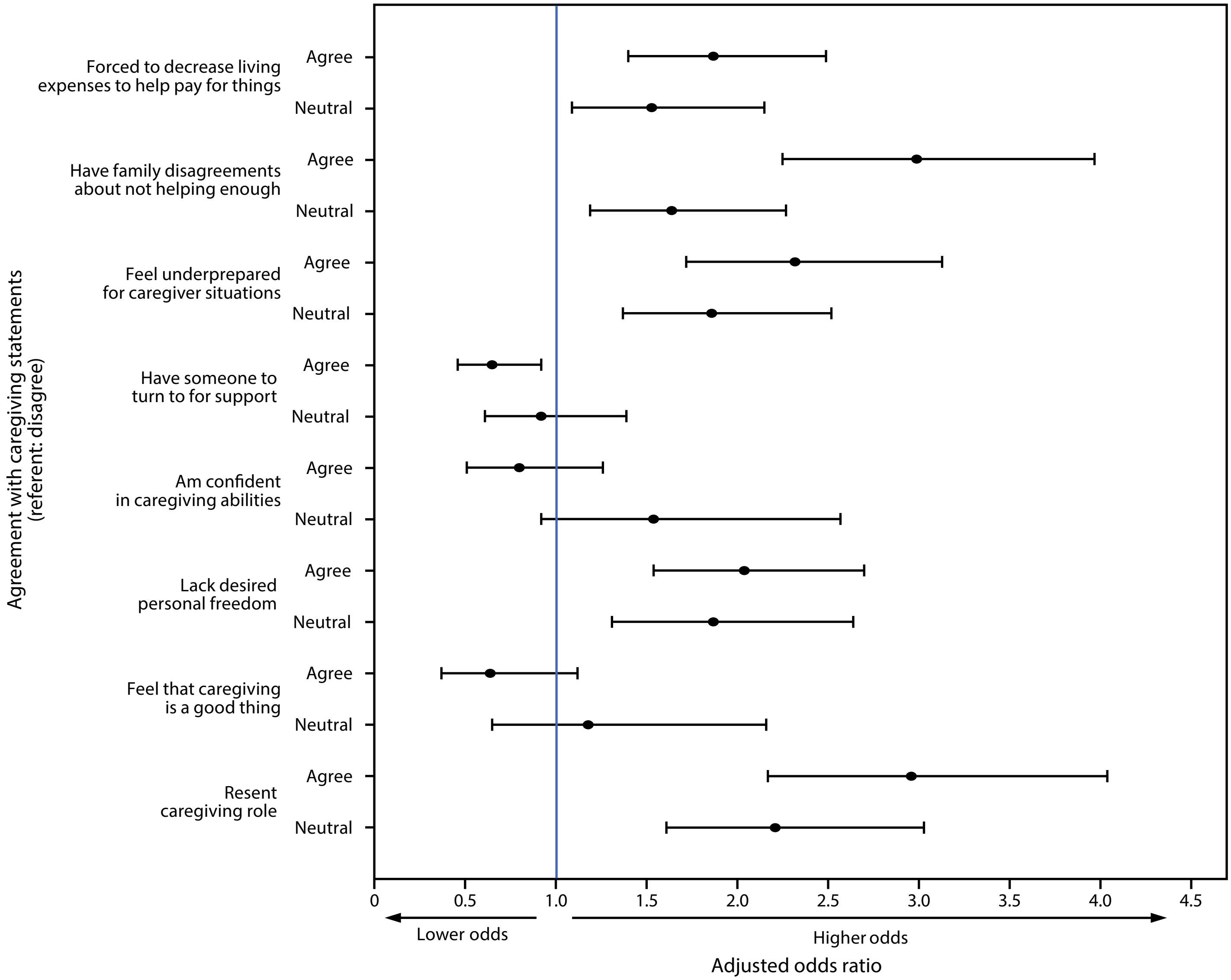
¶ Weighted numbers and percentages might not sum to expected values because of rounding.

** Parents and unpaid caregivers of adults were self-identified. For this analysis, parents were defined as persons who had provided unpaid care to relatives or friends aged <18 years to help them take care of themselves at any time in the last 3 months. Unpaid caregivers of adults were defined as persons who had provided unpaid care to relatives or friends aged ≥18 years to help them take care of themselves at any time in the last 3 months. Respondents answered questions about these two roles separately. Respondents were categorized as parents only, caregivers of adults only, parents-caregivers (persons in both roles), or nonparents/noncaregivers. Whether adults in parenting roles were biologic or legal parents or guardians of the children for whom they were providing care is not known, nor is it known whether adults were legal dependents of their caregivers.

†† Referent: nonparent/noncaregiver. Weighted multivariable logistic regression models were used to estimate aORs for each adverse mental health symptom, with survey wave, gender, age group, race/ethnicity, sexual orientation, disability status, education attainment, region, urbanicity, and employment (work hours per week and remote work percentage) as covariates. P values <0.05 were considered statistically significant. Models with all unpaid caregiver statuses included 10,017 respondents because persons who answered "prefer not to say" for sexual orientation or disability status and those who reported invalid zip codes were excluded. Models with unpaid caregivers of adults included 3,155 respondents; respondents were excluded for the same reasons.

§§ Referent: not providing care to an adult for this reason. This referent group includes all adults not providing care for the listed reason, including those who were nonparents/noncaregivers, parents only, and caregivers of adults who were providing care for different reasons.

FIGURE. Factors* associated† with adverse mental health symptoms§ among unpaid caregivers of adults and parents-caregivers¶ — The COVID-19 Outbreak Public Evaluation Initiative, United States, December 2020 and February–March 2021



Abbreviations: ASD = acute stress disorder; CII = Caregiving Intensity Index; GAD-2 = two-item Generalized Anxiety Disorder scale; IES-6 = six-item Impact of Event scale; PHQ-2 = two-item Patient Health Questionnaire; PHQ-4 = four-item Patient Health Questionnaire; PTSD = posttraumatic stress disorder; TSRD = trauma- and stressor-related disorder.

* Caregiving statements were taken from the ARCHANGELS short-form CII, a copyrighted instrument available for use only with permission.

† Adjusted odds ratios, with 95% confidence intervals indicated by error bars, were estimated using weighted multivariable logistic regression models. The primary model is adjusted for survey wave, gender, age group, race/ethnicity, sexual orientation, disability status, education attainment, region, urbanicity, and employment (including work hours per week and remote work percentage), parental status (i.e., whether caregivers were parents-caregivers), duration of caregiving, hours of caregiving per week, and person receiving care. Additional separate models were analyzed for each CII item that was based on perceived levels of agreement with statements regarding caregiving-related financial strain, family strife, preparedness, support, confidence, personal freedom, positive feelings, and resentment.

§ The presence of one or more of the following was considered an adverse mental health symptom: anxiety symptoms, depression symptoms, COVID-19 TSRD symptoms, passive suicidal ideation, or having seriously considered suicide in the past 30 days. Symptoms of anxiety and depression were assessed via PHQ-4. Those who scored ≥3 out of 6 on the GAD-2 and PHQ-2 subscales were considered symptomatic for these respective conditions. Disorders classified as TSRDs in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*, include PTSD, ASD, and adjustment disorders, among others. Symptoms of a TSRD attributed to the COVID-19 pandemic were assessed via IES-6 to screen for overlapping symptoms of PTSD, ASD, and adjustment disorders. The COVID-19 pandemic was specified as the traumatic exposure to record peritraumatic and posttraumatic symptoms associated with the range of stressors introduced by the COVID-19 pandemic. Those who scored ≥1.75 out of 4 were considered symptomatic. Passive suicidal ideation was assessed using an item from the Columbia-Suicide Severity Rating Scale adapted to refer to the past 30 days: "At any time in the past 30 days: have you wished you were dead or wished you could go to sleep and not wake up?" Serious suicidal ideation was assessed using an item from the National Survey on Drug Use and Health, adapted to refer to the past 30 days: "At any time in the past 30 days, did you seriously think about trying to kill yourself?"

¶ Parents and unpaid caregivers of adults were self-identified. Unpaid caregivers of adults were defined as persons who had provided unpaid care to relatives or friends aged ≥18 years to help them take care of themselves at any time in the last 3 months. Parents were defined as persons who had provided unpaid care to relatives or friends aged <18 years to help them take care of themselves at any time in the last 3 months. Parents-caregivers had both roles. All unpaid caregivers of adults were included in this analysis, including caregivers of adults only (i.e., not parents) and parents-caregivers.

suicide prevention[†††††] and mental health disaster support services[§§§§§,¶¶¶¶¶,******] are needed for parents and caregivers.

During the pandemic, parents and caregivers have had worse mental health than adults without parenting and caregiving responsibilities (*5*). Managing mental health might be especially challenging for parents balancing employment and remote education; virtual instruction during the COVID-19 pandemic has presented risks for mental health both among children and parents (*6*). For caregivers of adults, these findings reinforce prepandemic data on poor mental health among caregivers (*7*). The results also support AmeriSpeak Omnibus survey findings that during the COVID-19 pandemic, caregivers had substantial concerns about their own mental health and the health and well-being of their care recipients, were worried about their finances, and needed respite from caregiving (*8*). Adverse mental health consequences for persons in both roles (i.e., parents-caregivers) support an urgent need to tailor public health efforts to this population. Together, these results suggest that parents and caregivers might benefit from tailored mental health services. For caregivers, and especially persons with dual responsibilities of parenting while also caring for adults, increasing access to, awareness of, and use of support groups and respite services[††††††] might help to alleviate the caregiving workload[§§§§§§] (*9*).

The findings in this report are subject to at least six limitations. First, this study did not fully characterize parenting roles (e.g., age and number of children, whether children had chronic health conditions, and whether children were in virtual rather than in-person school). Whether the mental health of adults differs based on these factors could be explored. Second, diagnostic evaluations for anxiety and depression were not conducted; however, clinically validated instruments were used to measure symptoms of anxiety and depression. Third, responses might be subject to social desirability bias, particularly regarding negative feelings about caregiving roles, which might be underreported. Fourth, without prepandemic mental health data in this sample, whether adverse mental health symptoms were caused by or worsened by the pandemic is unknown. However, caregivers of adults had higher odds of new adverse mental or behavioral health symptoms during the pandemic than did noncaregivers (*1*). Fifth, the survey did not assess support systems for parents or caregivers (e.g., child care or support from family members), which could have affected the intensity of their caregiving roles. Finally, because the surveys were English-language only and quota sampling and survey weighting might not have eliminated inherent biases in Internet-based survey samples,[¶¶¶¶¶¶] this sample might not fully represent the U.S. population, particularly regarding English-language fluency and Internet access. This might partially account for the finding that more parents, caregivers, or parents-caregivers were male. However, previous studies have estimated that up to 47% of caregivers are male. Furthermore, the infrequency of assessments of both parental and caregiving roles makes comparing these estimates difficult.[*******] The prevalence and trajectories of anxiety and depression symptoms were consistent with results from the Household Pulse Survey[†††††††] (*10*), and robust associations between parenting and caregiving roles and adverse mental health symptoms in the large, demographically diverse COPE Initiative sample merit additional research.

Caregivers, particularly persons with both parenting and adult caregiving responsibilities, will continue to face mental health challenges, and the need for caregivers is projected to increase as the U.S. population ages.[§§§§§§§] Additional research can assess differences in coping and help-seeking behaviors among parents and caregivers to further guide tailored support and services to meet their needs during and after the COVID-19 pandemic.

Summary

What is already known about this topic?

Parents of children aged <18 years and unpaid caregivers of adults have had mental health challenges before and during the COVID-19 pandemic.

What is added by this report?

Among 10,444 U.S. adults surveyed during December 6–27, 2020, and February 16–March 8, 2021, parents, unpaid caregivers of adults, and parents-caregivers (persons in both roles) had significantly worse mental health than adults not in these roles, including five times the odds of any adverse mental health symptoms (parents-caregivers). Persons who had someone to rely on for support had lower odds of experiencing any adverse mental health symptoms.

What are the implications for public health practice?

Parents and unpaid caregivers of adults, and particularly those in both roles, might benefit from mental health support and services tailored to their roles.

††††† National Suicide Prevention Lifeline (https://suicidepreventionlifeline.org/) or Lifeline Crisis Chat (https://suicidepreventionlifeline.org/chat/).

§§§§§ Substance Abuse and Mental Health Services Administration National Helpline (also known as the Treatment Referral Routing Service) for persons and families facing mental disorders, substance use disorders, or both (https://www.samhsa.gov/find-help/national-helpline).

¶¶¶¶¶ Disaster Distress Helpline (https://www.samhsa.gov/disaster-preparedness).

****** Crisis Text Line (https://www.crisistextline.org/).

†††††† https://www.cdc.gov/aging/publications/features/caring-for-yourself.html; https://www.norc.org/PDFs/Maintaining%20Physical%20and%20Mental%20Well/OACCaregiverOnePager.pdf

§§§§§§ https://www.caregiving.org/resources/

¶¶¶¶¶¶ https://www.pewresearch.org/politics/methodology/collecting-survey-data/internet-surveys/

******* https://www.apa.org/pi/about/publications/caregivers/faq/statistics

††††††† https://www.cdc.gov/nchs/covid19/pulse/mental-health.htm

§§§§§§§ https://www.cdc.gov/aging/caregiving/index.htm

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References

1. Czeisler MÉ, Lane RI, Petrosky E, et al. Mental health, substance use, and suicidal ideation during the COVID-19 pandemic—United States, June 24–30, 2020. MMWR Morb Mortal Wkly Rep 2020;69:1049–57. PMID:32790653 https://doi.org/10.15585/mmwr.mm6932a1
2. Patrick SW, Henkhaus LE, Zickafoose JS, et al. Well-being of parents and children during the COVID-19 pandemic: a national survey. Pediatrics 2020;146:e2020016824. PMID:32709738 https://doi.org/10.1542/peds.2020-016824
3. Sherifali D, Ali MU, Ploeg J, et al. Impact of Internet-based interventions on caregiver mental health: systematic review and meta-analysis. J Med Internet Res 2018;20:e10668. PMID:29970358 https://doi.org/10.2196/10668
4. Parker LJ, Gaugler JE, Samus Q, Gitlin LN. Adult day service use decreases likelihood of a missed physician's appointment among dementia caregivers. J Am Geriatr Soc 2019;67:1467–71. PMID:31219175 https://doi.org/10.1111/jgs.15995
5. Czeisler MÉ, Lane RI, Wiley JF, Czeisler CA, Howard ME, Rajaratnam SMW. Follow-up survey of US adult reports of mental health, substance use, and suicidal ideation during the COVID-19 pandemic, September 2020. JAMA Netw Open 2021;4:e2037665. PMID:33606030 https://doi.org/10.1001/jamanetworkopen.2020.37665
6. Verlenden JV, Pampati S, Rasberry CN, et al. Association of children's mode of school instruction with child and parent experiences and well-being during the COVID-19 pandemic—COVID Experiences Survey, United States, October 8–November 13, 2020. MMWR Morb Mortal Wkly Rep 2021;70:369–76. PMID:33735164 https://doi.org/10.15585/mmwr.mm7011a1
7. Schulz R, Sherwood PR. Physical and mental health effects of family caregiving. Am J Nurs 2008;108(Suppl):23–7. PMID:18797217 https://doi.org/10.1097/01.NAJ.0000336406.45248.4c
8. NORC at the University of Chicago. Needs assessment and environmental scan report: maintaining physical and mental well-being of older adults and their caregivers during public health emergencies. Bethesda, MD: NORC at the University of Chicago; 2021. https://www.norc.org/PDFs/Maintaining%20Physical%20and%20Mental%20Well/ESandNAReportNarrative.pdf
9. Worrall H, Schweizer R, Marks E, Yuan L, Lloyd C, Ramjan R. The effectiveness of support groups: a literature review. Mental Health and Social Inclusion 2018;22:85–93. https://doi.org/10.1108/MHSI-12-2017-0055
10. Vahratian A, Blumberg SJ, Terlizzi EP, Schiller JS. Symptoms of anxiety or depressive disorder and use of mental health care among adults during the COVID-19 pandemic—United States, August 2020–February 2021. MMWR Morb Mortal Wkly Rep 2021;70:490–4. PMID:33793459 https://doi.org/10.15585/mmwr.mm7013e2

Emergency Department Visits for Suspected Suicide Attempts Among Persons Aged 12–25 Years Before and During the COVID-19 Pandemic — United States, January 2019–May 2021

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Beginning in March 2020, the COVID-19 pandemic and response, which included physical distancing and stay-at-home orders, disrupted daily life in the United States. Compared with the rate in 2019, a 31% increase in the proportion of mental health–related emergency department (ED) visits occurred among adolescents aged 12–17 years in 2020 (*1*). In June 2020, 25% of surveyed adults aged 18–24 years reported experiencing suicidal ideation related to the pandemic in the past 30 days (*2*). More recent patterns of ED visits for suspected suicide attempts among these age groups are unclear. Using data from the National Syndromic Surveillance Program (NSSP),* CDC examined trends in ED visits for suspected suicide attempts† during January 1, 2019–May 15, 2021, among persons aged 12–25 years, by sex, and at three distinct phases of the COVID-19 pandemic. Compared with the corresponding period in 2019, persons aged 12–25 years made fewer ED visits for suspected suicide attempts during March 29–April 25, 2020. However, by early May 2020, ED visit counts for suspected suicide attempts began increasing among adolescents aged 12–17 years, especially among girls. During July 26–August 22, 2020, the mean weekly number of ED visits for suspected suicide attempts among girls aged 12–17 years was 26.2% higher than during the same period a year earlier; during February 21–March 20, 2021, mean weekly ED visit counts for suspected suicide attempts were 50.6% higher among girls aged 12–17 years compared with the same period in 2019. Suicide prevention measures focused on young persons call for a comprehensive approach, that is adapted during times of infrastructure disruption, involving multisectoral partnerships (e.g., public health, mental health, schools, and families) and implementation of evidence-based strategies (*3*) that address the range of factors influencing suicide risk.

CDC examined NSSP ED visit data, which include approximately 71% of the nation's EDs in 49 states (all except Hawaii) and the District of Columbia. ED visits for suspected suicide attempts were identified by using a combination of chief complaint terms and administrative discharge diagnosis codes. ED visits for suspected suicide attempts include visits for suicide attempts, as well as some nonsuicidal self-harm visits (*4*). Suspected suicide attempts were identified by querying an NSSP syndrome definition developed by CDC in partnership with state and local health departments (Supplementary Table, https://stacks.cdc.gov/view/cdc/106694). All analyses were restricted to EDs that reported consistently throughout the study period (January 1, 2019–May 15, 2021) and had at least one visit for suspected suicide attempts; 41% of those that reported consistently had one or more visits for suspected suicide attempts.§ Weekly counts and rates (mean number of ED visits for suspected suicide attempts/mean total number of ED visits) x 100,000) analyzed by age group (12–17 and 18–25 years) and sex were plotted across the entire study period, and analyzed for three distinct periods: spring 2020 (March 29–April 25, 2020; calendar year weeks 14–17); summer 2020 (July 26–August 22, 2020; weeks 31–34); and winter 2021 (February 21–March 20, 2021; weeks 8–11) and compared with their corresponding reference periods in 2019.¶ These time frames were selected as representative of distinct periods throughout the pandemic. Percent change and visit ratios (rate of ED visits for suspected suicide attempts during surveillance period/rate of ED visits for suspected suicide attempts during reference period) with 95% confidence intervals (CIs) were calculated to compare suspected suicide attempt

* NSSP is a collaborative program among CDC, federal partners, local and state health departments, and academic and private sector partners to support the collection and analysis of electronic health data from EDs, urgent and ambulatory care centers, inpatient health care facilities, and laboratories.

† Analysis was limited to ED encounters. As of March 31, 2021, a total of 3,722 EDs covering 49 states (all except Hawaii) and the District of Columbia contributed data to the platform daily, including data from 71% of all nonfederal EDs in the United States.

§ To limit the impact of data quality on trends, all analyses were restricted to facilities with a coefficient of variation <30 throughout the analysis period January 2019–May 2021 so that only consistently reporting facilities were included. Of all the EDs that met the data quality criteria, 41% had visits and thus were included in the analysis.

¶ Percent change in visits per week during each surveillance period was calculated as the difference in total visits between the surveillance period and the reference period, divided by the total visits during the reference period, times 100%. ([ED visits for suspected suicide attempts during surveillance period–ED visits for suspected suicide attempts during reference period]/ED visits for suspected suicide attempts during reference period*100%).

ED visit rates by pandemic period and sex; CIs that excluded 1.0 were considered statistically significant. NSSP race and ethnicity data were not available at the national level for this analysis at the time it was conducted. All analyses were conducted using R software (version 4.0.5; R Foundation). This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.**

Among adolescents aged 12–17 years, the number of weekly ED visits for suspected suicide attempts decreased during spring 2020 compared with that during 2019 (Figure 1) (Table). ED visits for suspected suicide attempts subsequently increased for both sexes. Among adolescents aged 12–17 years, mean weekly number of ED visits for suspected suicide attempts were 22.3% higher during summer 2020 and 39.1% higher during winter 2021 than during the corresponding periods in 2019, with a more pronounced increase among females. During winter 2021, ED visits for suspected suicide attempts were 50.6% higher among females compared with the same period in 2019; among males, such ED visits increased 3.7%. Among adolescents aged 12–17 years, the rate of ED visits for suspected suicide attempts also increased as the pandemic progressed (Supplementary Figure 1, https://stacks.cdc.gov/view/cdc/106695). Compared with the rate during the corresponding period in 2019, the rate of ED visits for suspected suicide attempts was 2.4 times as high during spring 2020, 1.7 times as high during summer 2020, and 2.1 times as high during winter 2021 (Table). This increase was driven largely by suspected suicide attempt visits among females.

Among men and women aged 18–25 years, a 16.8% drop in the number of ED visits for suspected suicide attempts occurred during spring 2020 compared with the 2019 reference period (Figure 2) (Table). Although ED visits for suspected suicide attempts subsequently increased, they remained consistent with 2019 counts (Figure 2). However, the ED visit rate for suspected suicide attempts among adults aged 18–25 years was higher throughout the pandemic compared with that during 2019 (Supplementary Figure 2, https://stacks.cdc.gov/view/cdc/106696). Compared with the rate in 2019, the rate was 1.6 times as high during spring 2020, 1.1 times as high during summer 2020, and 1.3 times as high during winter 2021 (Table).

Discussion

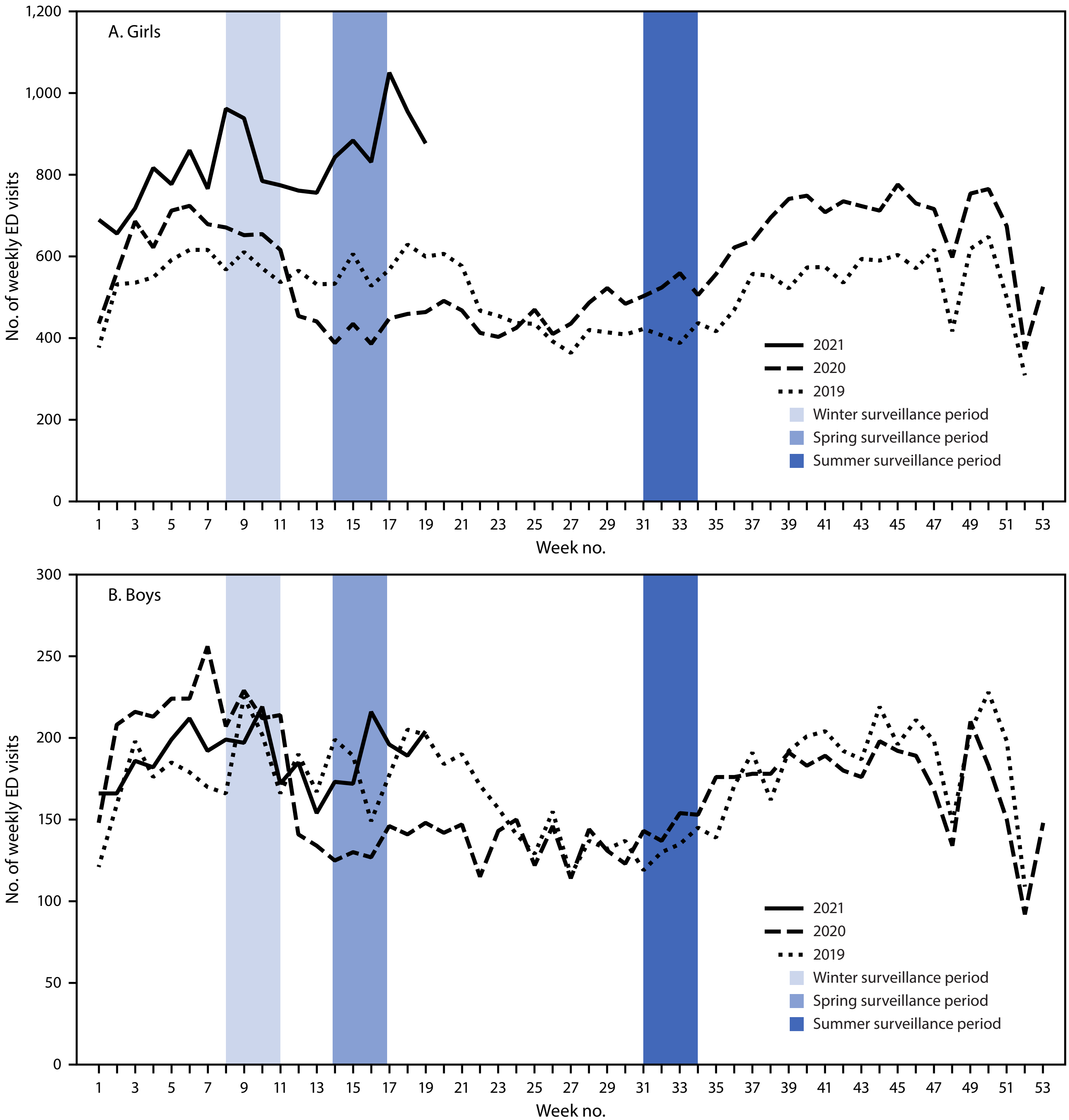
This report expands upon previous work highlighting increases in ED visits for suspected suicide attempts earlier in the pandemic among all persons (*5*) and suggests that these trends persisted among young persons as the pandemic progressed. Compared with the corresponding period in 2019, persons aged 12–25 years made fewer ED visits for suspected suicide attempts during March 29–April 25, 2020, the period that followed the declaration of the COVID-19 pandemic as a national emergency and a concurrent 42% decrease in the total number of U.S. ED visits (*6*). However, ED visits for suspected suicide attempts increased among adolescent girls aged 12–17 years during summer 2020 and remained elevated throughout the remaining study period; the mean weekly number of these visits was 26.2% higher during summer 2020 and 50.6% higher during winter 2021 compared with the corresponding periods in 2019. The number of ED visits for suspected suicide attempts remained stable among adolescent boys aged 12–17 years and among all adults aged 18–25 years compared with the corresponding periods in 2019, although rates of ED visits for suspected suicide attempts increased.

The difference in suspected suicide attempts by sex and the increase in suspected suicide attempts among young persons, especially adolescent females, is consistent with past research: self-reported suicide attempts are consistently higher among adolescent females than among males (*7*), and research before the COVID-19 pandemic indicated that young females had both higher and increasing rates of ED visits for suicide attempts compared with males (*8*). However, the findings from this study suggest more severe distress among young females than has been identified in previous reports during the pandemic (*1,2*), reinforcing the need for increased attention to, and prevention for, this population. Importantly, although this report found increases in ED visits for suspected suicide attempts among adolescent females during 2020 and early 2021, this does not mean that suicide deaths have increased. Provisional mortality data found an overall decrease in the age-adjusted suicide rate from quarter 3 (July–September) of 2019 to quarter 3 of 2020. The suicide rate among young persons aged 15–24 years during this same period saw no significant change (*9*). Future analyses should further examine these provisional rates by age, sex, race, ethnicity, and geographic setting.

Some researchers have cautioned about a potential increase in suicides during the COVID-19 pandemic on account of increases in suicide risk factors; however, this study was not designed to identify the risk factors leading to increases in suspected suicide attempts, (*10*). Young persons might represent a group at high risk because they might have been particularly affected by mitigation measures, such as physical distancing (including a lack of connectedness to schools, teachers, and peers); barriers to mental health treatment; increases in substance use; and anxiety about family health and economic problems, which are all risk factors for suicide. In addition, average ED visit rates for mental health concerns and suspected child abuse and neglect, risk factors for suicide attempts, also increased in 2020 compared with 2019 (*5*), potentially contributing to increases in

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

FIGURE 1. Numbers of weekly emergency department visits* for suspected suicide attempts† among adolescents aged 12–17 years, by sex — National Syndromic Surveillance Program, United States, January 1, 2019–May 15, 2021



Abbreviations: ED = emergency department; NSSP = National Syndromic Surveillance Program.

* ED visits for suspected suicide attempts were identified by querying an NSSP syndrome definition developed by CDC in partnership with state and local health departments (https://stacks.cdc.gov/view/cdc/106694). NSSP ED visit data include approximately 71% of the nation's EDs in 49 states (all except Hawaii) and the District of Columbia.

† Visits for suspected suicide attempts include visits for suicide attempts, as well as nonsuicidal self-harm.

TABLE. Mean weekly counts, percentage change,* visit rates,† and visit ratios§ of emergency department visits for suspected suicide attempts¶ among persons aged 12–25 years — National Syndromic Surveillance Program — United States, March 29, 2020–March 20, 2021**

Surveillance period and indicators	Adolescents aged 12–17 yrs				Adults aged 18–25 yrs			
	All	Girls	Boys	Ratio†† for girls to boys	All	Women	Men	Ratio†† for women to men
Spring 2020§§ weeks 14–17 (March 29–April 25)								
Mean no. of weekly ED visits for suspected suicide attempts	540.25	408.25	131.75	N/A	646.50	385.50	257.50	N/A
% Change in mean no. of weekly ED visits for suspected suicide attempts	−26.45	−26.57	−25.56	N/A	−16.80	−20.68	−10.75	N/A
ED visit rates† for suspected suicide attempts	2,750.03	3,766.75	1,499.25	N/A	815.31	827.30	789.99	N/A
Visit ratio (95% CI)	2.36 (2.23 to 2.49)	2.32 (2.17 to 2.47)	2.43 (2.17 to 2.72)	2.51 (2.28 to 2.77)	1.58 (1.50 to 1.67)	1.62 (1.51 to 1.73)	1.53 (1.41 to 1.66)	1.05 (0.97 to 1.13)
Summer 2020: weeks 31–34 (July 26–August 22)								
Mean no. of weekly ED visits for suspected suicide attempts	665.50	518.50	145.75	N/A	754.75	456.25	297.50	N/A
% Change in mean no. of weekly ED visits for suspected suicide attempts	22.33	26.16	10.84	N/A	−5.60	−2.82	−9.37	N/A
ED visit rates† for suspected suicide attempts	1,665.09	2,360.65	812.36	N/A	588.63	589.39	587.70	N/A
Visit ratio (95% CI)	1.65 (1.56 to 1.74)	1.64 (1.54 to 1.75)	1.55 (1.38 to 1.75)	2.91 (2.65 to 3.18)	1.12 (1.06 to 1.17)	1.18 (1.10 to 1.25)	1.03 (0.95 to 1.12)	1.00 (0.93 to 1.08)
Winter 2021: weeks 8–11 (February 21–March 20)								
Mean no. of weekly ED visits for suspected suicide attempts	1,054.25	855.50	195.50	N/A	786.50	489.75	294.75	N/A
% Change in mean no. of weekly ED visits for suspected suicide attempts	39.13	50.55	3.71	N/A	1.68	5.83	−4.22	N/A
ED visit rates† for suspected suicide attempts	2,482.32	3,600.89	1,048.00	N/A	652.98	657.15	644.35	N/A
Visit ratio (95% CI)	2.12 (2.02 to 2.22)	2.26 (2.15 to 2.39)	1.61 (1.45 to 1.77)	3.44 (3.18 to 3.71)	1.26 (1.20 to 1.33)	1.35 (1.27 to 1.44)	1.15 (1.06 to 1.24)	1.02 (0.95 to 1.10)

Abbreviations: CI = confidence interval; ED = emergency department; N/A = not applicable.

* Percent change in visits per week during each surveillance period was calculated as the difference in total visits between the surveillance period and the reference period, divided by the total visits during the reference period, times 100%. ([ED visits for suspected suicide attempts during surveillance period–ED visits for suspected suicide attempts during reference period]/ED visits for suspected suicide attempts during reference period*100%).

† Rate of ED visits for suspected suicide attempts = (mean number of ED visits for suspected suicide attempts/mean total number of ED visits) x 100,000.

§ Visit ratios for suspected suicide attempt visits = (rate of ED visits for suspected suicide attempts during the surveillance period/rate of ED visits for suspected suicide attempts during reference period). Ratios >1 indicate a higher rate of ED visits for suspected suicide attempts during the surveillance period than during the reference period. Reference periods are as follows: for weeks 14–17, 2020 (March 29–April 25, 2020, Spring 2020): weeks 14–17, 2019 (March 21–April 27, 2019); for weeks 31–34, 2020 (July 26–August 22, 2020, Summer 2020): weeks 31–34, 2019 (July 28–August 24, 2019); for weeks 8–11, 2021 (February 21–March 20, 2021, Winter 2021): weeks 8–11, 2019 (February 17–March 16, 2019).

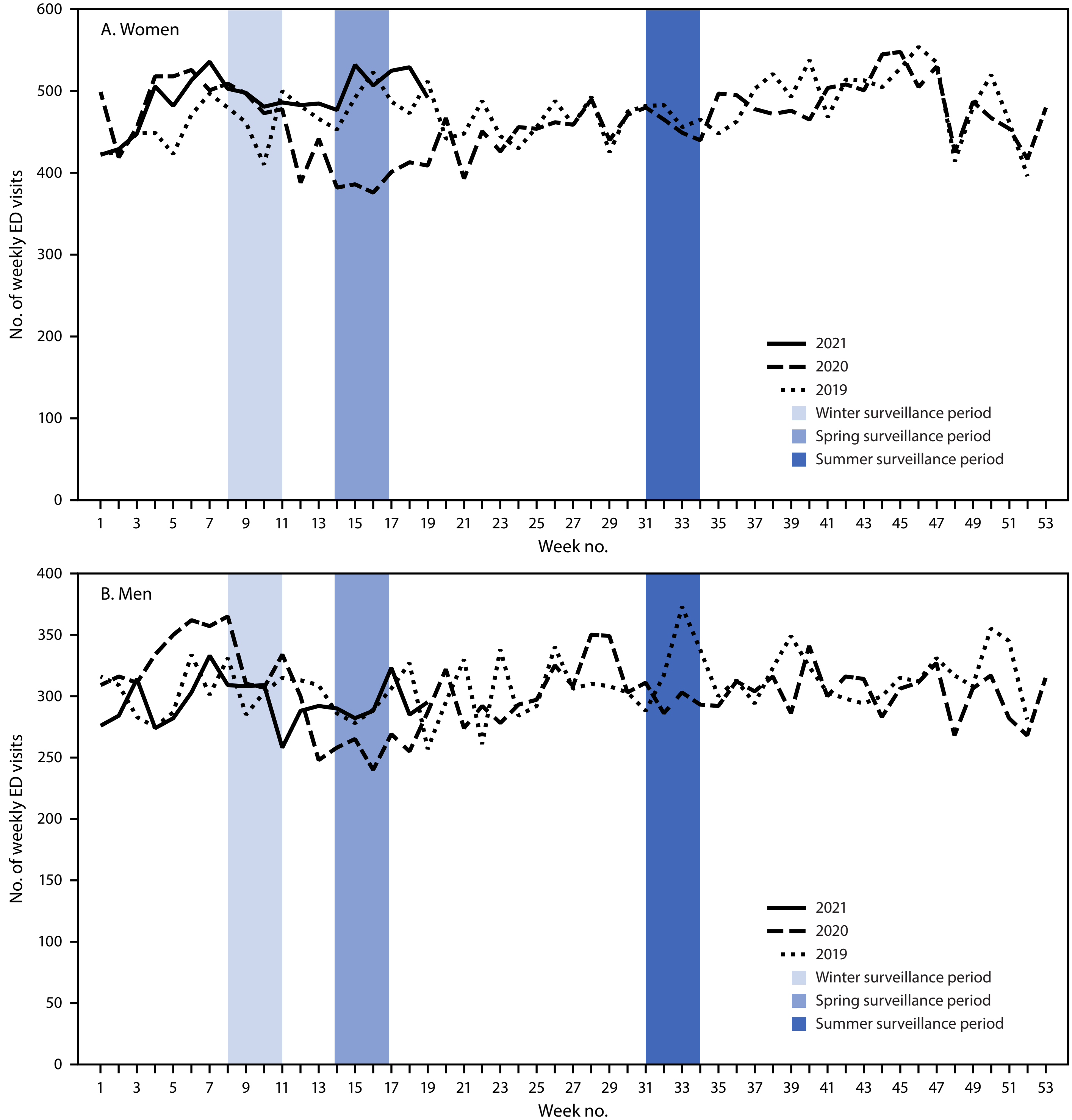
¶ ED visits for suspected suicide attempts were defined using NSSP's syndrome definition based on a combination of chief complaint terms and administrative discharge diagnosis codes.

** NSSP is a collaborative program among CDC, local and state health departments, and academic and private sector partners supporting the collection and analysis of electronic health data. Results in this analysis are limited to only ED encounters. As of March 31, 2021, 71% of all nonfederal EDs in the United States. (3,722) covering 49 states (all except Hawaii) and the District of Columbia contribute data to the platform daily. Of all the EDs that met the data quality criteria, 41% observed visits for suspected suicide attempts and thus were included in the analysis.

†† Female to male visit ratios = (proportion of ED visits for suspected suicide attempts during surveillance period for females/proportion of ED visits for suspected suicide attempts during surveillance period for males). Ratios >1 indicate a higher proportion of suspected suicide attempt–related ED visits during the surveillance period for females compared with males.

§§ Data are shown only for the surveillance periods (spring 2020: March 29–April 25, 2020; summer 2020: July 26–August 22, 2020; and winter 2021: February 21–March 20, 2021). Thus, the date range is different from that in the figures, which depict the entire study period (January 1, 2019–May 15, 2021).

FIGURE 2. Numbers of weekly emergency department visits* for suspected suicide attempts† among adults aged 18–25 years, by sex — National Syndromic Surveillance Program, United States, January 1, 2019–May 15, 2021



Abbreviations: ED = emergency department; NSSP = National Syndromic Surveillance Program.

* ED visits for suspected suicide attempts were identified by querying an NSSP syndrome definition developed by CDC in partnership with state and local health departments (https://stacks.cdc.gov/view/cdc/106694). NSSP ED visit data include approximately 71% of the nation's EDs in 49 states (all except Hawaii) and the District of Columbia.

† Visits for suspected suicide attempts include visits for suicide attempts, as well as nonsuicidal self-harm.

suspected suicide attempts. Conversely, by spending more time at home together with young persons, adults might have become more aware of suicidal thoughts and behaviors, and thus been more likely to take their children to the ED.

The findings in this report are subject to at least nine limitations. First, these data are not nationally representative. Second, facility participation varies within and across states; however, data were only analyzed from facilities that reported consistently over the study period, thus minimizing the impact of reporting fluctuations on resultant trends. Third, differences in availability, coding practices, and reporting of chief complaints and discharge diagnoses from facilities might influence results returned by the syndrome definition. Fourth, distinguishing initial visits from follow-up visits for the same event was not possible, so the number of ED visits for suspected suicide attempts might be lower than presented. Fifth, NSSP race and ethnicity data were not available at the national level for this analysis at the time it was conducted, so analyses of differences among racial/ethnic groups was not possible. Sixth, these data likely underrepresent the true prevalence of suspected suicide attempts because persons with less severe injuries might be less likely to seek emergency care during the pandemic when many persons avoided medical settings to reduce the risk for contracting COVID-19. Seventh, the suspected suicide attempt syndrome definition excludes some, but not all, visits for nonsuicidal self-harm. Eighth, the sharp decline in all ED visits during the pandemic likely affected the number and proportion of visits for suspected suicide attempts (*6*). Finally, this analysis was not designed to determine whether a causal link existed between these trends and the COVID-19 pandemic.

Suicide can be prevented through a comprehensive approach that supports persons from becoming suicidal as well as persons who are at increased risk for suicide.[††] Such an approach involves multisectoral partnerships (e.g., public health, mental health, schools, and families) and implementation of evidence-based strategies to address the range of factors influencing suicide attempts, which is a leading risk factor for suicide (*3*). Strategies specific to young persons include preventing and mitigating adverse childhood experiences, strengthening economic supports for families, limiting access to lethal means (e.g., safe storage of medications and firearms), training community and school staff members and others to learn the signs of suicide risk and how to respond, improving access and delivery of evidence-based care, increasing young persons' social connectedness and coping skills, and following safe messaging by the media and in schools after a suicide (*3*). Widely implementing these comprehensive prevention strategies across the United States, including adapting these strategies during times of infrastructure disruption, such as during the pandemic, can contribute to healthy development and prevent suicide among young persons.

[††] https://www.cdc.gov/suicide/programs/csp/index.html

Summary

What is already known about this topic?

During 2020, the proportion of mental health–related emergency department (ED) visits among adolescents aged 12–17 years increased 31% compared with that during 2019.

What is added by this report?

In May 2020, during the COVID-19 pandemic, ED visits for suspected suicide attempts began to increase among adolescents aged 12–17 years, especially girls. During February 21–March 20, 2021, suspected suicide attempt ED visits were 50.6% higher among girls aged 12–17 years than during the same period in 2019; among boys aged 12–17 years, suspected suicide attempt ED visits increased 3.7%.

What are the implications for public health practice?

Suicide prevention requires a comprehensive approach that is adapted during times of infrastructure disruption, involves multisectoral partnerships and implements evidence-based strategies to address the range of factors influencing suicide risk.

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References

1. Leeb RT, Bitsko RH, Radhakrishnan L, Martinez P, Njai R, Holland KM. Mental health-related emergency department visits among children aged <18 years during the COVID-19 pandemic—United States, January 1–October 17, 2020. MMWR Morb Mortal Wkly Rep 2020;69:1675–80. PMID:33180751 https://doi.org/10.15585/mmwr.mm6945a3
2. Czeisler MÉ, Lane RI, Petrosky E, et al. Mental health, substance use, and suicidal ideation during the COVID-19 pandemic—United States, June 24–30, 2020. MMWR Morb Mortal Wkly Rep 2020;69:1049–57. PMID:32790653 https://doi.org/10.15585/mmwr.mm6932a1
3. Stone DM, Holland KM, Bartholow B, Crosby AE, Davis S, Wilkins N. Preventing suicide: a technical package of policies, programs, and practices. Atlanta, GA: US Department of Health and Human Services, CDC, National Center for Injury Prevention and Control; 2017. https://www.cdc.gov/suicide/pdf/suicideTechnicalPackage.pdf
4. Crosby AE, Ortega L, Melanson C. Self-directed violence surveillance: uniform definitions and recommended data elements, version 1.0. Atlanta, GA: US Department of Health and Human Services, CDC, National Center for Injury Prevention and Control; 2011. https://www.cdc.gov/suicide/pdf/Self-Directed-Violence-a.pdf
5. Holland KM, Jones C, Vivolo-Kantor AM, et al. Trends in US emergency department visits for mental health, overdose, and violence outcomes before and during the COVID-19 pandemic. JAMA Psychiatry 2021;78:372–9. PMID:33533876 https://doi.org/10.1001/jamapsychiatry.2020.4402

6. Hartnett KP, Kite-Powell A, DeVies J, et al.; National Syndromic Surveillance Program Community of Practice. Impact of the COVID-19 pandemic on emergency department visits—United States, January 1, 2019–May 30, 2020. MMWR Morb Mortal Wkly Rep 2020;69:699–704. PMID:32525856 https://doi.org/10.15585/mmwr.mm6923e1
7. Ivey-Stephenson AZ, Demissie Z, Crosby AE, et al. Suicidal ideation and behaviors among high school students—youth risk behavior survey, United States, 2019. MMWR Suppl 2020;69(No. Suppl 1). http://dx.doi.org/10.15585/mmwr.su6901a6
8. Mercado MC, Holland K, Leemis RW, Stone DM, Wang J. Trends in emergency department visits for nonfatal self-inflicted injuries among youth aged 10 to 24 years in the United States, 2001–2015. JAMA 2017;318:1931–3. PMID:29164246 https://doi.org/10.1001/jama.2017.13317
9. Ahmad FB, Cisewski JA. Quarterly provisional estimates for selected indicators of mortality, 2018–quarter 3, 2020. Atlanta, GA: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2021. https://www.cdc.gov/nchs/nvss/vsrr/mortality.htm
10. Reger MA, Stanley IH, Joiner TE. Suicide mortality and coronavirus disease 2019–a perfect storm? JAMA Psychiatry 2020;77:1093–4. PMID:32275300 https://doi.org/10.1001/jamapsychiatry.2020.1060

COVID-19 Vaccination Coverage Among Pregnant Women During Pregnancy — Eight Integrated Health Care Organizations, United States, December 14, 2020–May 8, 2021

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On June 15, 2021, this report was posted as an MMWR *Early Release on the* MMWR *website (https://www.cdc.gov/mmwr).*

COVID-19 vaccines are critical for ending the COVID-19 pandemic; however, current data about vaccination coverage and safety in pregnant women are limited. Pregnant women are at increased risk for severe illness and death from COVID-19 compared with nonpregnant women of reproductive age, and are at risk for adverse pregnancy outcomes, such as preterm birth (*1*–*4*). Pregnant women are eligible for and can receive any of the three COVID-19 vaccines available in the United States via Emergency Use Authorization.* Data from Vaccine Safety Datalink (VSD), a collaboration between CDC and multiple integrated health systems, were analyzed to assess receipt of ≥1 dose (first or second dose of the Pfizer-BioNTech or Moderna vaccines or a single dose of the Janssen [Johnson & Johnson] vaccine) of any COVID-19 vaccine during pregnancy, receipt of first dose of a 2-dose COVID-19 vaccine (initiation), or completion of a 1- or 2-dose COVID-19 vaccination series. During December 14, 2020–May 8, 2021, a total of 135,968 pregnant women were identified, 22,197 (16.3%) of whom had received ≥1 dose of a vaccine during pregnancy. Among these 135,968 women, 7,154 (5.3%) had initiated and 15,043 (11.1%) had completed vaccination during pregnancy. Receipt of ≥1 dose of COVID-19 vaccine during pregnancy was highest among women aged 35–49 years (22.7%) and lowest among those aged 18–24 years (5.5%), and higher among non-Hispanic Asian (Asian) (24.7%) and non-Hispanic White (White) women (19.7%) than among Hispanic (11.9%) and non-Hispanic Black (Black) women (6.0%). Vaccination coverage increased among all racial and ethnic groups over the analytic period, likely because of increased eligibility for vaccination† and increased availability of vaccine over time. These findings indicate the need for improved outreach to and engagement with pregnant women, especially those from racial and ethnic minority groups who might be at higher risk for severe health outcomes because of COVID-19 (*4*). In addition, providing accurate and timely information about COVID-19 vaccination to health care providers, pregnant women, and women of reproductive age can improve vaccine confidence and coverage by ensuring optimal shared clinical decision-making.

VSD is a collaboration between CDC's Immunization Safety Office and nine integrated health care organizations in seven U.S. states; eight sites provide data and one additional site provides subject matter expertise.§ Among the eight sites providing data, the integrated health care organizations serve 11.6 million insured persons, including approximately 2.7 million women aged 18–49 years. To monitor vaccination coverage and safety, CDC obtains COVID-19 vaccination data from the VSD sites' electronic health records, health insurance claims, and state immunization information systems. A dynamic pregnancy algorithm, based on *International Classification of Diseases, Tenth Edition* (ICD-10) diagnosis codes, procedure codes, estimated dates of delivery, and last menstrual period dates from electronic health records was used to identify pregnancies weekly (*5*). Because the algorithm identifies pregnancies based on coded health care utilization data, pregnancies are generally identified at approximately 8–10 weeks' gestational age. COVID-19 vaccination status was captured for all pregnant women identified from December 14, 2020, when the first COVID-19 vaccine received Emergency Use Authorization, through May 8, 2021. This analysis focused on COVID-19 vaccination during pregnancy. Pregnant women who completed vaccination before pregnancy (1,073) were excluded from this study to ascertain willingness of women to receive the COVID-19 vaccine while pregnant. Receipt of ≥1 dose of a COVID-19 vaccine was defined as receipt of either first or second dose of the Moderna or Pfizer-BioNTech vaccines or receipt of a single dose of the Janssen vaccine during pregnancy. Vaccination initiation was defined as receipt of the first dose of the Moderna or Pfizer-BioNTech vaccines during pregnancy. Vaccination completion was defined as receipt of the second dose (for women who received the first dose before pregnancy) or both doses of Moderna or Pfizer-BioNTech vaccines or 1 dose of Janssen vaccine during pregnancy. COVID-19

* https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html
† https://www.cdc.gov/mmwr/volumes/69/wr/mm695152e2.htm
§ https://www.cdc.gov/vaccinesafety/ensuringsafety/monitoring/vsd/

Summary

What is already known about this topic?

Pregnant women are at increased risk for severe illness and death from COVID-19.

What is added by this report?

As of May 8, 2021, 16.3% of pregnant women identified in CDC's Vaccine Safety Datalink had received ≥1 dose of a COVID-19 vaccine during pregnancy in the United States. Vaccination was lowest among Hispanic (11.9%) and non-Hispanic Black women (6.0%) and women aged 18–24 years (5.5%) and highest among non-Hispanic Asian women (24.7%) and women aged 35–49 years (22.7%).

What are the implications for public health practice?

Improving outreach to and engagement with health care providers and pregnant women, especially those who are younger and from racial and ethnic minority groups, could increase vaccine confidence and thus coverage of COVID-19 vaccination in this population.

vaccination initiation and completion during pregnancy were estimated by age, race and ethnicity, and vaccine type. All analyses were performed using SAS software (version 9.4; SAS Institute). This activity was reviewed by CDC and VSD sites and was conducted consistent with applicable federal law and CDC policy.¶

A total of 135,968 pregnant women were identified in VSD during December 14, 2020–May 8, 2021 (Table). Among pregnant women, race and ethnicity data were complete for 93.8% and age data were complete for 100%. White women accounted for 34.0% of pregnancies, and Hispanic women for 32.9%. A larger proportion of pregnant Hispanic women were aged 18–24 years (47.4%) compared with pregnant White (25.4%) and Asian (3.9%) women. Among pregnant women, 16.3% received ≥1 dose of a COVID-19 vaccine; 5.3% initiated, and 11.1% completed vaccination during pregnancy. Vaccination increased with age, with highest rates of ≥1 dose observed among women aged 35–49 years (22.7%) and lowest rates among those aged 18–24 years (5.5%). Receipt of ≥1 dose was highest among Asian women (24.7%), followed by White women (19.7%), and lowest among Black women (6.0%) and Hispanic women (11.9%). The highest rates of receipt of ≥1 dose during pregnancy were reported for Pfizer-BioNTech (8.7%), followed by Moderna (7.0%), and Janssen (0.6%) vaccines. Cumulative receipt of ≥1 dose of a COVID-19 vaccine during pregnancy has increased weekly since March 13, 2021, (when these data were first reported to CDC) among all pregnant women and across all racial and ethnic groups (Figure).

Discussion

In this analysis, receipt of COVID-19 vaccination during pregnancy was lowest among Black and Hispanic women and women aged 18–24 years; a larger proportion of pregnant Hispanic women were aged 18–24 years compared with pregnant White and Asian women. Similar increasing trends in COVID-19 vaccination coverage have been observed among the general U.S. population as seen among pregnant women (*6*). Even though COVID-19 vaccination coverage has been increasing, Black and Hispanic women still have the lowest vaccination coverage among all racial and ethnic groups. Further, similar results have been reported for receipt of other vaccinations during pregnancy, including influenza and tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccines, in which the lowest vaccination coverage was noted among pregnant Black and Hispanic women** (*7*). These findings highlight racial and ethnic disparities in COVID-19 vaccination coverage to date among pregnant women, who are at increased risk for infection and severe COVID-19–associated illness, indicating a need to prioritize vaccine equity by addressing potential barriers and access issues.

COVID-19 vaccination completion is lower in pregnant women (11.1%) compared with nonpregnant females aged 18–49 years reported in VSD for the same period (24.9%) (CDC, unpublished data, 2021). Low coverage among pregnant women might be attributable to various factors including limited available safety data on COVID-19 vaccines during pregnancy; need for increased vaccine confidence among health care providers and pregnant women; vaccine prioritization, access, and availability; and cultural and language barriers. Coverage differences by vaccine type might be influenced by the date the vaccines were authorized for use, the shorter interval between receipt of first and second doses of Pfizer-BioNTech COVID-19 vaccine than for Moderna vaccine, and vaccine availability at vaccination sites. Pregnant women were excluded from preauthorization clinical trials, and only very limited human data on safety and efficacy during pregnancy were available at the time that the vaccines were authorized for use. Survey data before COVID-19 vaccine authorization showed low acceptance of COVID-19 vaccination among pregnant women, and the most frequently reported reasons for lack of intent to get vaccinated during pregnancy were limited safety data in pregnancy and concerns about possibility of harm to the fetus†† (*8*,*9*).

Through early May 2021, COVID-19 vaccination coverage among pregnant women within VSD was low; however, coverage increased over the analytic period across all age and

¶ 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.

** https://www.cdc.gov/flu/fluvaxview/dashboard/vaccination-coverage-pregnant.html

†† https://www.medrxiv.org/content/10.1101/2021.03.26.21254402v1

TABLE. Receipt of ≥1 dose,* initiation,† and completion§ of COVID-19 vaccination during pregnancy among pregnant women, by selected characteristics and by vaccine type — Vaccine Safety Datalink, United States, December 14, 2020–May 8, 2021

Characteristic	No. (%¶)								
					Vaccine**				
	Total population	Receipt of ≥1 dose*	Total		Pfizer-BioNTech		Moderna		
			Initiation†	Completion§	Initiation†	Completion§	Initiation†	Completion§	Janssen
Total	**135,968 (100)**	**22,197 (16.3)**	**7,154 (5.3)**	**15,043 (11.1)**	**3,658 (2.7)**	**8,226 (6.0)**	**3,496 (2.6)**	**5,992 (4.4)**	**825 (0.6)**
Age group, yrs									
18–24	**18,882 (13.9)**	1,044 (5.5)	**458 (2.4)**	**586 (3.1)**	195 (1.0)	307 (1.6)	263 (1.4)	240 (1.3)	39 (0.2)
25–34	**83,335 (61.3)**	13,478 (16.2)	**4,368 (5.2)**	**9,110 (10.9)**	2,203 (2.6)	4,986 (6.0)	2,165 (2.6)	3,638 (4.4)	486 (0.6)
35–49	**33,751 (24.8)**	7,675 (22.7)	**2,328 (6.9)**	**5,347 (15.8)**	1,260 (3.7)	2,933 (8.7)	1,068 (3.2)	2,114 (6.3)	300 (0.9)
Race and Ethnicity									
White, NH	**46,245 (34.0)**	9,105 (19.7)	**2,653 (5.7)**	**6,452 (14.0)**	1,456 (3.1)	3,645 (7.9)	1,197 (2.6)	2,491 (5.4)	316 (0.7)
Black, NH	**10,729 (7.9)**	644 (6.0)	**242 (2.3)**	**402 (3.7)**	124 (1.2)	215 (2.0)	118 (1.1)	161 (1.5)	26 (0.2)
Hispanic/Latino	**44,673 (32.9)**	5,312 (11.9)	**1,893 (4.2)**	**3,419 (7.7)**	804 (1.8)	1,689 (3.8)	1,089 (2.4)	1,529 (3.4)	201 (0.4)
Asian, NH	**19,597 (14.4)**	4,834 (24.7)	**1,512 (7.7)**	**3,322 (17.0)**	834 (4.3)	1,880 (9.6)	678 (3.5)	1,252 (6.4)	190 (1.0)
Other, NH††	**6,292 (4.6)**	990 (15.7)	**350 (5.6)**	**640 (10.2)**	174 (2.8)	352 (5.6)	176 (2.8)	243 (3.9)	45 (0.7)
Unknown	**8,432 (6.2)**	1,312 (15.6)	**504 (6.0)**	**808 (9.6)**	266 (3.1)	445 (5.3)	238 (2.8)	316 (3.7)	47 (0.6)

Abbreviation: NH = non-Hispanic.
* Receipt of first or second dose of the Pfizer-BioNTech or Moderna vaccines or a single dose of the Janssen (Johnson & Johnson) vaccine during pregnancy during December 14, 2020–May 8, 2021.
† Receipt of first dose of Pfizer-BioNTech or Moderna vaccines only during pregnancy during December 14, 2020–May 8, 2021.
§ Receipt of both first and second dose, or second dose for women who received the first dose before pregnancy, of Pfizer-BioNTech or Moderna vaccines or receipt of 1 dose of Janssen vaccine during pregnancy during December 14, 2020–May 8, 2021.
¶ Percentages might not sum to expected values because of rounding.
** The Food and Drug Administration issued Emergency Use Authorizations for use of COVID-19 vaccines on the following dates: Pfizer-BioNTech, December 11, 2020; Moderna, December 18, 2020; and Janssen, February 27, 2021.
†† Includes American Indian or Alaska Native, Native Hawaiian or Pacific Islander, and Multiple or Other races.

racial and ethnic groups. The increase might be attributable to inclusion of pregnancy among the conditions that increase risk for severe COVID-19 and thus for prioritization for early allocation of COVID-19 vaccines,§§ as well as the rollout of vaccines to the entire U.S. population in mid-April. In addition, analyses of emerging data regarding safety of COVID-19 vaccines, specifically mRNA vaccines, have detected no safety signals for pregnant women (*10*). In early data from three of CDC's vaccine safety monitoring systems, no safety concerns were identified for vaccinated pregnant women or their infants; additional follow-up is needed, particularly among women vaccinated in the first and second trimesters of pregnancy (*10*). There are also emerging data suggesting that COVID-19 vaccination during pregnancy can lead to transfer of antibodies through placenta and breast milk, which might confer some immunity to newborns.¶¶

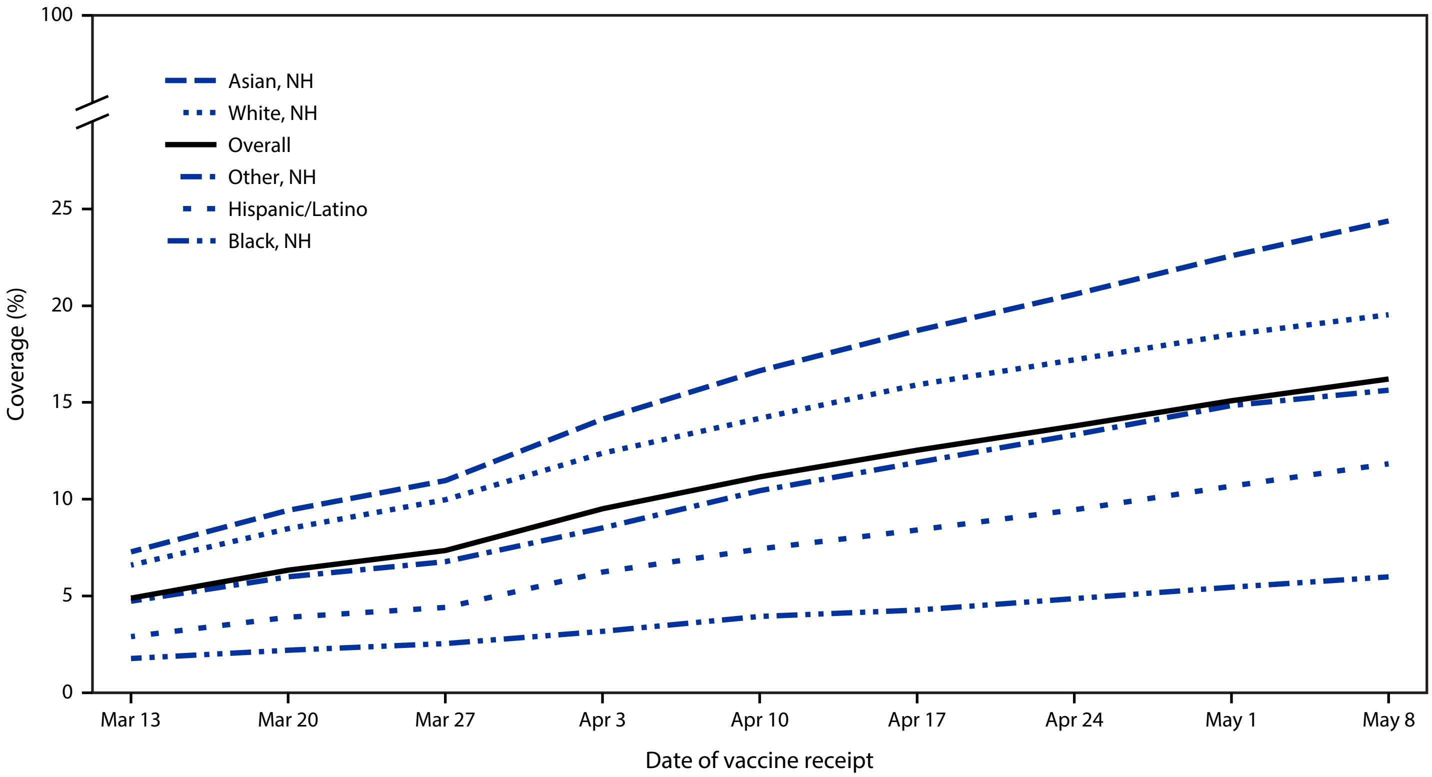
This analysis is the first in the United States to assess COVID-19 vaccination coverage among pregnant women. In addition, this study identifies vaccinations recorded in medical records, health insurance claims, and linked state immunization registries, which minimizes recall or social desirability biases inherent in studies relying on self-reported vaccination. VSD will continue to monitor and assess COVID-19 vaccination among pregnant women weekly.

The findings in this report are subject to at least four limitations. First, the findings might not be generalizable to all pregnant women in the United States because VSD collects data within eight integrated health care organizations. Second, vaccination status could be misclassified in VSD if some pregnant women received vaccinations outside of participating vaccine delivery systems or state registry catchment areas. Third, data on some covariates of interest (especially race and ethnicity) are incomplete in VSD data, although more complete than the national vaccination data reported by CDC (*6*). Finally, the dynamic pregnancy algorithm might result in some misclassification of pregnancy status and dates, especially in weekly reports when data from ongoing pregnancies might be incomplete.

Although low, COVID-19 vaccination coverage among pregnant women is expected to increase as vaccine availability and access improve, and as more safety data become available. Addressing barriers to access as well as augmenting the scientific evidence regarding safety and effectiveness of COVID-19 vaccines in pregnancy are critical. In addition, vaccine misinformation and hesitancy should be addressed. Strategies and approaches to expanding vaccination coverage in ways to ensure and prioritize equity also should be implemented.*** Finally, making accurate and timely information available to health care providers and pregnant women could increase confidence and thus acceptance of COVID-19 vaccines in this population.

§§ https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html
¶¶ https://www.ajog.org/article/S0002-9378(21)00187-3/fulltext
*** https://aspe.hhs.gov/system/files/pdf/265511/vaccination-disparities-brief.pdf

FIGURE. Cumulative COVID-19 vaccination coverage (receipt of ≥1 dose*) among pregnant women,† overall and by race and ethnicity§ — Vaccine Safety Datalink, United States, March 13–May 8, 2021¶



Abbreviation: NH = non-Hispanic.

* Receipt of first or second dose of the Pfizer-BioNTech or Moderna vaccines or a single dose of the Janssen (Johnson & Johnson) vaccine.

† All pregnant women identified in the Vaccine Safety Datalink during December 14, 2020–May 8, 2021. These estimates do not exclude pregnant women who completed COVID-19 vaccination before pregnancy.

§ "Other, NH" includes American Indian or Alaska Native, Native Hawaiian or Pacific Islander, and Multiple or Other races.

¶ Cumulative vaccination data from the Vaccine Safety Datalink were first reported to CDC on March 13, 2021, and included vaccines administered since December 14, 2020; thus, data reported during December 14, 2020–March 12, 2021, could not be displayed by week.

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References

1. Woodworth KR, Olsen EO, Neelam V, et al.; CDC COVID-19 Response Pregnancy and Infant Linked Outcomes Team. Birth and infant outcomes following laboratory-confirmed SARS-CoV-2 infection in pregnancy—SET-NET, 16 jurisdictions, March 29–October 14, 2020. MMWR Morb Mortal Wkly Rep 2020;69:1635–40. PMID:33151917 https://doi.org/10.15585/mmwr.mm6944e2
2. Wei SQ, Bilodeau-Bertrand M, Liu S, Auger N. The impact of COVID-19 on pregnancy outcomes: a systematic review and meta-analysis. CMAJ 2021;193:E540–8. PMID:33741725 https://doi.org/10.1503/cmaj.202604
3. Allotey J, Stallings E, Bonet M, et al.; for PregCOV-19 Living Systematic Review Consortium. Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. BMJ 2020;370:m3320. PMID:32873575 https://doi.org/10.1136/bmj.m3320
4. Zambrano LD, Ellington S, Strid P, et al.; CDC COVID-19 Response Pregnancy and Infant Linked Outcomes Team. Update: characteristics of symptomatic women of reproductive age with laboratory–confirmed SARS-CoV-2 infection by pregnancy status—United States, January 22–October 3, 2020. MMWR Morb Mortal Wkly Rep 2020;69:1641–7. PMID:33151921 https://doi.org/10.15585/mmwr.mm6944e3

5. Naleway AL, Crance B, Irving SA, et al. Vaccine Safety Datalink infrastructure enhancements for evaluating the safety of maternal vaccination. Ther Adv Drug Saf 2021. Epub June 14, 2021. https://doi.org/10.1177%2F20420986211021233
6. CDC. CDC data tracker: demographics trends of people receiving COVID-19 vaccination in the United States. Atlanta, GA: US Department of Health and Human Services; CDC; 2021. https://covid.cdc.gov/covid-data-tracker/#vaccination-demographics-trends
7. Razzaghi H, Kahn KE, Black CL, et al. Influenza and Tdap vaccination coverage among pregnant women—United States, April 2020. MMWR Morb Mortal Wkly Rep 2020;69:1391–7. PMID:33001873 https://doi.org/10.15585/mmwr.mm6939a2
8. Goncu AS, Oluklu D, Atalay A, et al. COVID-19 vaccine acceptance in pregnant women. Int J Gynaecol Obstet 2021. E-pub April 19, 2021. PMID:33872386 https://doi.org/10.1002/ijgo.13713
9. Skjefte M, Ngirbabul M, Akeju O, et al. COVID-19 vaccine acceptance among pregnant women and mothers of young children: results of a survey in 16 countries. Eur J Epidemiol 2021;36:197–211. PMID:33649879 https://doi.org/10.1007/s10654-021-00728-6
10. Shimabukuro TT, Kim SY, Myers TR, et al. Preliminary findings of mRNA Covid-19 vaccine safety in pregnant persons. N Engl J Med 2021. E-pub April 21, 2021. https://doi.org/10.1056/NEJMoa2104983

Erratum

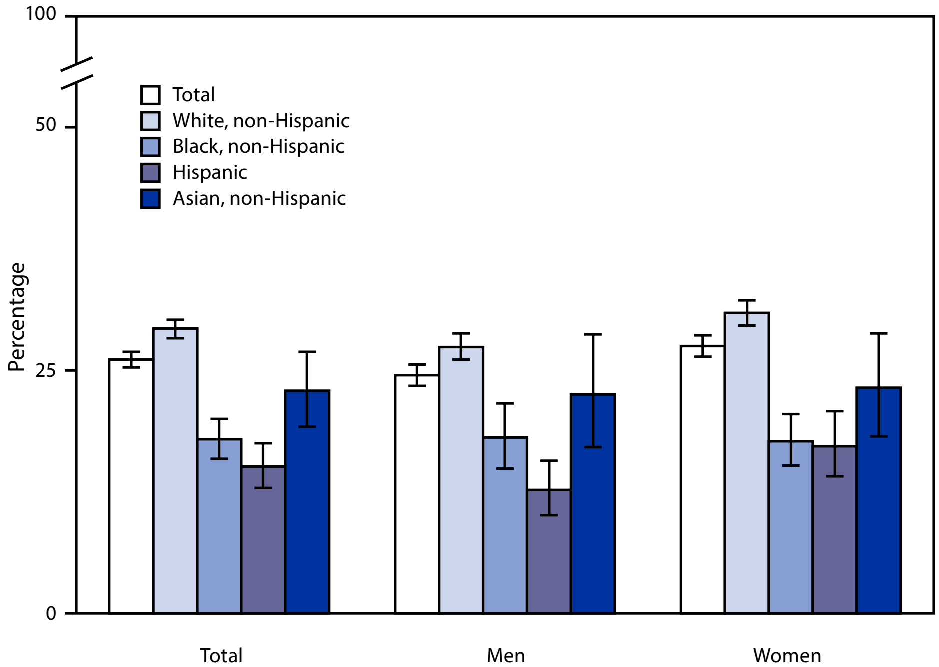
Vol. 70, No. 14

In the report "Provisional Mortality Data — United States, 2020," on page 520, the last sentence in the "What is added by this report?" paragraph of the Summary box should have read, "COVID-19 was the third leading cause of death, and the COVID-19 death rate was highest among **non-Hispanic American Indian or Alaska Native persons**."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Adults Aged ≥50 Years Who Ever Received a Shingles Vaccination,† by Race and Hispanic Origin§ and Sex — National Health Interview Survey, United States, 2019¶



* With 95% confidence intervals indicated with error bars.
† Based on a response to the question, "Have you had a vaccine for shingles?"
§ Adults categorized as non-Hispanic White, non-Hispanic Black, and non-Hispanic Asian indicated one race only; respondents had the option to select more than one racial group. Hispanic respondents might be of any race or combination of races. Non-Hispanic adults of multiple or other races are not shown separately but are included in the total groups.
¶ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population.

In 2019, 26.1% of adults aged ≥50 years had ever received a shingles vaccination. Non-Hispanic White adults (29.3%) were more likely than non-Hispanic Asian (22.9%), non-Hispanic Black (17.9%), and Hispanic (15.1%) adults to have ever received a shingles vaccination. Overall, women (27.5%) were more likely than men (24.5%) to be vaccinated, and this pattern was consistent for non-Hispanic White women and men (30.9% versus 27.4%) and for Hispanic women and men (17.2% versus 12.7%). No statistically significant difference by sex was observed for non-Hispanic Asian women and men (23.2% versus 22.5%) or non-Hispanic Black women and men (17.7% versus 18.1%).

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

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