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Great American Smokeout — November 15, 2018

The American Cancer Society's 43rd annual Great American Smokeout will be held on November 15, 2018. The Great American Smokeout is an annual event that encourages smokers to make a plan to quit smoking (https://www.cancer.org/healthy/stay-away-from-tobacco/great-american-smokeout.html).

A report in this issue of MMWR (*1*) indicates that in 2017, 14.0% of U.S. adults were current cigarette smokers, the lowest prevalence recorded since monitoring began in 1965. Nonetheless, smoking remains the leading preventable cause of disease, disability, and death in the United States (*2*). Each year, an estimated 480,000 U.S. adults die from cigarette smoking and secondhand smoke exposure (*2*).

Smokers can and do quit smoking: former smokers now outnumber current smokers (*2*). Among current U.S. adult smokers, nearly two out of three want to quit smoking, and approximately half made a quit attempt in the preceding year (*2*). Getting effective help through counseling and use of medications can increase the chances of quitting by as much as threefold (*3*).

Information and support for quitting smoking is available at 800-QUIT-NOW (800–784–8669). CDC's Tips From Former Smokers campaign offers additional resources (https://www.cdc.gov/tips).

References

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Tobacco Product Use Among Adults — United States, 2017

Teresa W. Wang, PhD[1]; Kat Asman, MSPH[1]; Andrea S. Gentzke, PhD[1]; Karen A. Cullen, PhD[2]; Enver Holder-Hayes, MPH[2]; Carolyn Reyes-Guzman, PhD[3]; Ahmed Jamal, MBBS[1]; Linda Neff, PhD[1]; Brian A. King, PhD[1]

Cigarette smoking harms nearly every organ of the body and causes adverse health consequences, including heart disease, stroke, and multiple types of cancer (*1*). Although cigarette smoking among U.S. adults has declined considerably, tobacco products have evolved in recent years to include various combustible, noncombustible, and electronic products (*1*,*2*). To assess recent national estimates of tobacco product use among U.S. adults aged ≥18 years, CDC, the Food and Drug Administration (FDA), and the National Institutes of Health's National Cancer Institute analyzed data from the 2017 National Health Interview Survey (NHIS). In 2017, an

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estimated 47.4 million U.S. adults (19.3%) currently used any tobacco product, including cigarettes (14.0%; 34.3 million); cigars, cigarillos, or filtered little cigars (3.8%; 9.3 million); electronic cigarettes (e-cigarettes) (2.8%; 6.9 million); smokeless tobacco (2.1%; 5.1 million); and pipes, water pipes, or hookahs (1.0%; 2.6 million). Among current tobacco product users, 86.7% (41.1 million) smoked combustible tobacco products, and 19.0% (9.0 million) used ≥2 tobacco products. By univariate analyses, the prevalence of current use of any tobacco product was higher among males than among females; adults aged <65 years than among those aged ≥65 years; non-Hispanic American Indian/Alaska Natives, whites, blacks, or multiracial adults than among Hispanics or non-Hispanic Asians; adults who lived in the South or Midwest than among those in the West or Northeast; adults who had a general educational development certificate (GED) than among those with other levels of education; adults who earned an annual household income of <$35,000 than among those with those with higher income; lesbian, gay, or bisexual adults than among heterosexual/straight adults; and adults who were divorced/separated/widowed or single/never married/not living with a partner than among those who were married/living with a partner. Prevalence was also higher among those who were uninsured, insured by Medicaid, or had some other public insurance than among those with private insurance or Medicare only; those who had a disability/limitation than among those who did not; and those who had serious psychological distress than among those who did not. Full implementation of evidence-based tobacco control interventions that address the diversity of tobacco products used by U.S. adults, in coordination with regulation of tobacco product manufacturing, marketing, and sales, can reduce tobacco-related disease and death in the United States (*1–3*).

NHIS is an annual, nationally representative, in-person survey of the noninstitutionalized U.S. civilian population (*4*). The 2017 Sample Adult component included 26,742 adults aged ≥18 years; the response rate was 53.0%. Data were weighted to adjust for differences in selection probability and nonresponse and to provide nationally representative estimates. Five tobacco products were assessed: cigarettes; cigars (cigars, cigarillos, or filtered little cigars); pipes (regular pipes, water pipes, or hookahs)*; e-cigarettes; and smokeless tobacco (chewing tobacco, snuff, dip, snus, or dissolvable tobacco). Current cigarette smokers were those who reported having smoked ≥100 cigarettes during their lifetime and smoked every day or some days at the time of survey. Current users of all other tobacco products were those who reported their use every day or some days at the time of survey. Prevalence estimates for current use of any tobacco product, any combustible tobacco product (cigarettes, cigars, or pipes), and use of ≥2 tobacco

* The use of regular pipe, water pipe, or hookah was assessed together using a single question. Interviewers could read the following sentences if necessary: "A hookah is a type of water pipe. It is sometimes called a 'narghile' (NAR-ge-lee) pipe. Do not include electronic hookahs or e-hookahs"; "Do not include electronic pipes or e-pipes."

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products[†] were calculated. Estimates were calculated overall and separately by sex, age, race/ethnicity, U.S. region,[§] education, marital status, annual household income, sexual orientation,[¶] health insurance coverage,[**] disability,[††] and presence of serious psychological distress.[§§] T-tests were performed to assess overall differences in tobacco use between 2016 and 2017, with statistical significance defined as p<0.05.[¶¶]

Among U.S. adults in 2017, 19.3% (estimated 47.4 million) currently used any tobacco product and 16.7% (41.1 million; 86.7% of current tobacco users) used any combustible tobacco product (Table). Cigarettes were the most commonly used tobacco product (14.0%; 34.3 million), with the prevalence of cigarette smoking in 2017 being the lowest measured among U.S. adults since NHIS data collection for this measure began in 1965 (Figure 1). Prevalence estimates of other tobacco products in 2017 were as follows: cigars (3.8%; 9.3 million); e-cigarettes (2.8%; 6.9 million); smokeless tobacco (2.1%; 5.1 million); and pipes (1.0%; 2.6 million). During 2016–2017, declines occurred in current use of any tobacco product; any combustible tobacco product; ≥2 tobacco products; cigarettes; and smokeless tobacco (all p<0.05). Among current tobacco product users, the proportion who were daily users was 75.0% for cigarettes, 58.2% for smokeless tobacco, 40.5% for e-cigarettes, 12.4% for cigars, and 10.6% for pipes.

Overall, 3.7% of U.S. adults (9.0 million; 19.0% of current tobacco product users) used ≥2 tobacco products. Among multiple tobacco product users, 84.1% used two products, 13.4% used three products, and 2.5% used four or more products. The most prevalent tobacco product combinations were cigarettes and e-cigarettes (30.1%), followed by cigarettes and cigars (29.2%) (Figure 2).

By univariate analyses, the prevalence of any current tobacco product use was higher among males (24.8%) than among females (14.2%); those aged 25–44 years (22.5%), 45–64 years (21.3%), or 18–24 years (18.3%) than among those aged ≥65 years (11.0%); non-Hispanic American Indian/Alaska Natives (29.8%), multiracial adults (27.4%), whites (21.4%), or blacks (20.1%) than among Hispanics (12.7%) or non-Hispanic Asians (8.9%); those who lived in the Midwest (23.5%) or the South (20.8%) than among those who lived in the West (15.9%) or Northeast (15.6%); those who had a GED (42.6%) than among those with other levels of education; those who were divorced/separated/widowed (23.1%) or single/never married/not living with a partner (21.0%) than among those married/living with a partner (17.6%); those who had annual household income of <$35,000 (26.0%) than among those with higher income; and lesbian, gay, or bisexual adults (27.3%) than among heterosexual/straight adults (19.0%). Prevalence was also higher among those who were uninsured (31.0%), insured by Medicaid (28.2%) or had some other public insurance (26.8%) than among those with private insurance (16.2%) or Medicare only (11.0%); those who had a disability/limitation (25.0%) than among those who did not (18.8%); and those who had serious psychological distress (40.8%) than among those who did not (18.5%).

Discussion

Considerable progress has been made in reducing cigarette smoking among U.S. adults over the past half century: an

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† Current use of ≥2 tobacco products was defined as use either every day or some days of at least two or more of the following tobacco products: cigarettes (≥100 cigarettes during lifetime); cigars, cigarillos, or filtered little cigars; pipes, water pipes, or hookahs; electronic cigarettes; or smokeless tobacco products.

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

¶ Sexual orientation was determined using the question "Which of the following best represents how you think of yourself?" Response options included "gay," "straight, that is, not gay," "bisexual," "something else," and "I don't know the answer" among male respondents, and "lesbian or gay," "straight, that is, not lesbian or gay," "bisexual, "something else," and "I don't know the answer" among female respondents. Respondents were considered to be lesbian, gay, or bisexual if they responded "gay," "lesbian or gay," or "bisexual."

** *Private coverage:* includes adults who had any comprehensive private insurance plan (including health maintenance organizations and preferred provider organizations). *Medicaid:* for adults aged <65 years, includes those who did not have private coverage, but who had Medicaid or other state-sponsored health plans, including Children's Health Insurance Program (CHIP). For adults aged ≥65 years, includes adults aged ≥65 years who did not have any private coverage but had Medicare and Medicaid or other state-sponsored health plans including CHIP; *Medicare only:* includes adults aged ≥65 years who only had Medicare coverage; *Other coverage:* includes adults who did not have private insurance, Medicaid, or other public coverage, but who had any type of military coverage, coverage from other government programs, or Medicare. *Uninsured:* includes adults who did not indicate that they were covered at the time of the interview under private health insurance, Medicare, Medicaid, CHIP, a state-sponsored health plan, other government programs, or military coverage.

†† Disability status was defined on the basis of self-reported presence of selected limitations, including vision, hearing, cognition, and movement. Limitations in performing activities of daily living were defined using the question "Does [person] have difficulty dressing or bathing?" Limitations in performing instrumental activities of daily living were defined on the basis of responses to the question "Because of a physical, mental, or emotional condition, does [person] have difficulty doing errands alone such as visiting a doctor's office or shopping?" Any disability was defined as a "yes" response pertaining to at least one of the limitations listed (vision, hearing, cognition, movement, activities of daily living, or instrumental activities of daily living). A random sample of half of the respondents from the 2017 Person File was asked about limitations, and weights from the Family Disability Questions File were applied.

§§ The Kessler psychological distress scale is a series of six questions that ask about feelings of hopelessness, sadness, nervousness, restlessness, worthlessness, and feeling like everything is an effort in the past 30 days. Participants were asked to respond on a Likert Scale ranging from "None of the time" (score = 0) to "All of the time" (score = 4). Responses were summed over the six questions; persons with a score of ≥13 were coded as having serious psychological distress, and respondents with a score <13 were coded as not having serious psychological distress.

¶¶ NHIS 2016 data were incorporated to inform statistically significant differences during 2016–2017 for the use of any tobacco product, any combustible tobacco product, ≥2 tobacco products, cigarettes, cigars, pipes, e-cigarettes, and smokeless tobacco. The 2016 Sample Adult component included 26,742 adults aged ≥18 years; the response rate was 54.3%.

TABLE. Percentage of adults aged ≥18 years who reported tobacco product use "every day" or "some days," by tobacco product and selected characteristics — National Health Interview Survey, United States, 2017

	Tobacco product use % (95% CI)							
Characteristic	Any tobacco product*	Any combustible tobacco product[†]	Cigarettes[§]	Cigars/Cigarillos/ Filtered little cigars[¶]	Regular pipe/ Water pipe/ Hookah**	E-cigarettes[††]	Smokeless tobacco[§§]	≥2 tobacco products[¶¶]
Overall	**19.3 (18.6–20.0)**	**16.7 (16.1–17.3)**	**14.0 (13.4–14.6)**	**3.8 (3.5–4.1)**	**1.0 (0.9–1.2)**	**2.8 (2.5–3.1)**	**2.1 (1.9–2.3)**	**3.7 (3.4–4.0)**
Sex								
Male	24.8 (23.8–25.8)	20.8 (19.9–21.7)	15.8 (15.0–16.7)	6.8 (6.2–7.4)	1.8 (1.5–2.1)	3.3 (2.8–3.7)	4.0 (3.6–4.5)	5.7 (5.1–6.2)
Female	14.2 (13.4–15.0)	12.9 (12.1–13.7)	12.2 (11.4–13.0)	1.0 (0.8–1.2)	0.4 (0.2–0.5)	2.4 (2.0–2.7)	0.2 (0.1–0.3)	1.8 (1.5–2.0)
Age group (yrs)								
18–24	18.3 (16.2–20.3)	14.0 (12.2–15.8)	10.4 (8.8–12.0)	4.3 (3.4–5.3)	2.5 (1.7–3.2)	5.2 (3.9–6.5)	2.9 (2.1–3.7)	5.2 (4.1–6.2)
25–44	22.5 (21.4–23.7)	19.5 (18.4–20.6)	16.1 (15.1–17.1)	4.7 (4.1–5.3)	1.2 (0.9–1.5)	3.6 (3.1–4.2)	2.5 (2.2–2.9)	4.7 (4.2–5.3)
45–64	21.3 (20.1–22.5)	18.9 (17.8–20.0)	16.5 (15.4–17.5)	3.9 (3.4–4.4)	0.6 (0.4–0.8)	2.4 (2.0–2.7)	2.0 (1.7–2.3)	3.5 (3.1–4.0)
≥65	11.0 (10.1–11.8)	9.8 (9.0–10.7)	8.2 (7.4–9.0)	1.8 (1.4–2.1)	0.7 (0.5–0.9)	0.7 (0.5–0.9)	0.9 (0.6–1.2)	1.1 (0.8–1.4)
Race/Ethnicity***								
White, non-Hispanic	21.4 (20.6–22.2)	18.3 (17.5–19.0)	15.2 (14.4–15.9)	4.0 (3.6–4.4)	1.1 (0.9–1.3)	3.3 (2.9–3.6)	2.8 (2.5–3.1)	4.2 (3.8–4.5)
Black, non-Hispanic	20.1 (18.3–21.9)	18.8 (17.0–20.5)	14.9 (13.1–16.6)	6.0 (4.8–7.2)	1.4 (0.7–2.0)	2.2 (1.5–2.9)	0.6 (0.3–1.0)	4.1 (3.0–5.1)
Asian, non-Hispanic	8.9 (7.1–10.8)	8.0 (6.2–9.8)	7.1 (5.5–8.8)	—[†††]	—	0.9 (0.4–1.4)	—	1.2 (0.5–1.8)
American Indian/ Alaska Native, non-Hispanic	29.8 (18.9–40.7)	26.3 (16.5–36.0)	24.0 (14.4–33.5)	5.8 (3.2–8.3)	—	—	—	4.9 (2.3–7.5)
Hispanic	12.7 (11.4–14.0)	11.2 (9.9–12.4)	9.9 (8.6–11.1)	2.2 (1.5–2.8)	0.6 (0.3–0.8)	1.8 (1.1–2.5)	0.7 (0.4–1.0)	1.9 (1.3–2.6)
Multirace, non-Hispanic	27.4 (22.4–32.3)	23.8 (19.0–28.6)	20.6 (16.0–25.2)	4.3 (2.2–6.4)	—	5.6 (2.7–8.5)	—	6.4 (3.3–9.4)
U.S. Census region[§§§]								
Northeast	15.6 (13.8–17.4)	13.9 (12.3–15.6)	11.2 (9.8–12.6)	3.2 (2.5–3.8)	0.6 (0.3–0.9)	2.0 (1.5–2.6)	1.3 (0.9–1.8)	2.5 (1.8–3.1)
Midwest	23.5 (22.1–24.8)	20.5 (19.2–21.7)	16.9 (15.5–18.2)	4.9 (4.2–5.6)	1.4 (1.0–1.7)	2.9 (2.4–3.4)	2.9 (2.5–3.4)	4.7 (4.0–5.3)
South	20.8 (19.6–22.0)	18.0 (16.9–19.2)	15.5 (14.4–16.7)	4.1 (3.6–4.7)	0.9 (0.7–1.2)	3.1 (2.6–3.6)	2.2 (1.8–2.5)	4.1 (3.5–4.6)
West	15.9 (14.6–17.1)	13.4 (12.4–14.3)	11.0 (10.1–11.8)	2.8 (2.3–3.3)	1.2 (0.9–1.6)	2.8 (2.2–3.3)	1.7 (1.2–2.1)	3.0 (2.5–3.5)
Education (adults aged ≥25 yrs)								
0–12 yrs (no diploma)	26.1 (24.0–28.3)	24.1 (22.0–26.2)	23.1 (21.0– 25.2)	3.6 (2.5–4.7)	—	2.1 (1.5–2.8)	1.8 (1.2–2.4)	4.3 (3.1–5.4)
GED	42.6 (38.2–46.9)	38.5 (34.3–42.8)	36.8 (32.7–41.0)	6.4 (4.1–8.7)	—	7.2 (4.8–9.6)	3.4 (1.8–4.9)	9.9 (7.1–12.7)
High school diploma	24.3 (22.8–25.8)	21.2 (19.7–22.6)	18.7 (17.4–20.1)	4.1 (3.3–4.8)	0.7 (0.4–1.0)	3.1 (2.5–3.7)	2.8 (2.3–3.4)	4.4 (3.7–5.2)
Some college, no degree	23.1 (21.6–24.6)	19.6 (18.1–21.0)	17.4 (16.0–18.7)	3.4 (2.6–4.1)	1.0 (0.6–1.3)	3.4 (2.7–4.0)	2.3 (1.8–2.8)	3.8 (3.1–4.6)
Associate degree (academic or technical/vocational)	20.4 (18.6–22.2)	18.2 (16.5–19.9)	15.5 (13.9–17.1)	3.6 (2.9–4.4)	0.8 (0.4–1.2)	2.7 (2.0–3.4)	1.9 (1.4–2.5)	3.6 (2.8–4.4)
Undergraduate degree (bachelor's)	12.5 (11.3–13.6)	10.7 (9.6–11.7)	7.1 (6.2– 7.9)	3.8 (3.2–4.5)	1.0 (0.6–1.3)	1.7 (1.2–2.2)	1.5 (1.1–1.8)	2.3 (1.8–2.8)
Graduate degree (Master's, doctoral or professional	8.3 (7.0–9.5)	7.5 (6.3–8.7)	4.1 (3.3–5.0)	3.2 (2.4–4.0)	0.9 (0.6–1.3)	0.9 (0.5–1.2)	0.8 (0.5–1.1)	1.4 (0.9–1.9)
Marital status								
Married/Living with partner	17.6 (16.7–18.4)	15.0 (14.3–15.8)	12.4 (11.6–13.1)	3.6 (3.2–4.0)	0.7 (0.6–0.9)	2.3 (2.0–2.6)	2.1 (1.8–2.4)	3.1 (2.7–3.5)
Divorced/Separated/ Widowed	23.1 (21.8–24.4)	21.1 (19.8–22.3)	19.1 (17.8–20.3)	3.4 (2.8–4.0)	0.7 (0.5–0.9)	2.9 (2.4–3.3)	1.7 (1.3–2.0)	4.0 (3.4–4.5)
Single/Never married/ Not living with partner	21.0 (19.7–22.4)	17.9 (16.7–19.2)	14.4 (13.2–15.6)	4.6 (3.9–5.2)	2.1 (1.6–2.6)	4.1 (3.3–4.9)	2.2 (1.8–2.7)	5.0 (4.3–5.7)
Annual household income ($)[¶¶¶]								
<35,000	26.0 (24.6–27.3)	23.7 (22.4–25.1)	21.4 (20.1–22.7)	4.4 (3.7–5.1)	1.4 (1.1–1.7)	3.6 (3.1–4.1)	1.6 (1.3–1.9)	5.2 (4.5–5.9)
35,000–74,999	20.5 (19.4–21.6)	17.7 (16.7–18.8)	15.3 (14.3–16.3)	3.6 (3.1–4.2)	1.0 (0.7–1.3)	3.1 (2.6–3.6)	2.6 (2.1–3.0)	4.3 (3.7–4.9)
75,000–99,999	18.4 (16.6–20.1)	14.9 (13.3–16.6)	11.8 (10.3–13.4)	3.7 (2.7–4.7)	0.8 (0.4–1.1)	2.5 (1.7–3.2)	2.8 (2.1–3.4)	2.9 (2.1–3.7)
≥100,000	13.5 (12.3–14.7)	11.2 (10.1–12.2)	7.6 (6.7–8.4)	4.0 (3.4–4.6)	0.8 (0.5–1.1)	1.8 (1.3–2.2)	2.0 (1.6–2.4)	2.3 (1.9–2.8)
Sexual orientation								
Heterosexual/Straight	19.0 (18.3–19.8)	16.5 (15.9–17.1)	13.7 (13.1–14.4)	3.8 (3.5–4.1)	1.0 (0.8–1.2)	2.6 (2.4–2.9)	2.1 (1.9–2.3)	3.6 (3.2–3.9)
Lesbian/Gay/Bisexual	27.3 (23.0–31.6)	23.4 (19.4–27.4)	20.3 (16.7–24.0)	3.8 (2.2–5.5)	2.1 (0.9–3.2)	7.5 (5.3–9.8)	—	6.6 (4.8–8.5)

See table footnotes on next page

TABLE. (*Continued*) Percentage of adults aged ≥18 years who reported tobacco product use "every day" or "some days," by tobacco product and selected characteristics — National Health Interview Survey, United States, 2017

Characteristic	Tobacco product use % (95% CI)							
	Any tobacco product*	Any combustible tobacco product†	Cigarettes§	Cigars/Cigarillos/ Filtered little cigars¶	Regular pipe/ Water pipe/ Hookah**	E-cigarettes††	Smokeless tobacco§§	≥2 tobacco products¶¶
Health insurance coverage******								
Private insurance	16.2 (15.5–16.9)	13.6 (12.9–14.3)	10.5 (9.9–11.1)	3.6 (3.2–3.9)	0.9 (0.7–1.1)	2.3 (2.0–2.6)	2.2 (2.0–2.5)	2.9 (2.5–3.2)
Medicaid	28.2 (26.0–30.4)	25.9 (23.7–28.0)	24.5 (22.4–26.6)	3.6 (2.7–4.5)	1.0 (0.6–1.4)	4.8 (3.7–5.9)	1.0 (0.7–1.4)	5.7 (4.6–6.8)
Medicare only (aged ≥65 yrs)	11.0 (9.5–12.5)	9.9 (8.5–11.3)	8.7 (7.3–10.1)	1.8 (1.1–2.4)	—	0.7 (0.4–1.1)	0.8 (0.4–1.1)	1.3 (0.8–1.9)
Other public insurance	26.8 (24.2–29.5)	23.2 (20.6–25.7)	20.4 (18.0–22.9)	5.7 (4.3–7.0)	1.4 (0.7–2.1)	3.1 (2.1–4.1)	3.4 (2.3–4.5)	5.1 (3.8–6.3)
Uninsured	31.0 (28.7–33.4)	27.8 (25.6–30.1)	24.7 (22.5–26.9)	6.0 (4.6–7.5)	1.9 (1.2–2.7)	4.6 (3.6–5.6)	2.6 (1.9–3.2)	7.3 (5.8–8.7)
Disability/Limitation††††								
Yes	25.0 (23.3–26.7)	22.4 (20.8–24.1)	20.7 (19.1–22.3)	3.4 (2.6–4.1)	1.1 (0.7–1.5)	3.3 (2.6–4.1)	2.1 (1.5–2.6)	4.5 (3.7–5.3)
No	18.8 (17.9–19.8)	16.1 (15.2–16.9)	13.3 (12.5–14.0)	3.7 (3.3–4.1)	1.1 (0.9–1.3)	2.7 (2.4–3.1)	2.1 (1.8–2.5)	3.4 (3.0–3.8)
Serious psychological distress§§§§								
Yes	40.8 (36.9–44.7)	36.4 (32.6–40.3)	35.2 (31.4–39.0)	4.4 (2.9–6.0)	—	7.9 (5.8–10.1)	—	7.3 (5.4–9.3)
No	18.5 (17.8–19.2)	16.0 (15.4–16.6)	13.2 (12.5–13.8)	3.8 (3.5–4.1)	1.1 (0.9–1.2)	2.6 (2.3–2.9)	2.1 (1.9–2.3)	3.5 (3.2–3.8)

Abbreviations: CI = confidence interval; E-cigarettes = electronic cigarettes; GED = general educational development certificate; HS = high school.

* Any tobacco product use was defined as use either every day or some days of at least one tobacco product. For cigarettes only, users were defined as persons who had smoked ≥100 cigarettes during their lifetime and now smoked cigarettes either every day or some days.

† Any combustible tobacco product use was defined as use either every day or some days of at least one combustible tobacco product: cigarettes; cigars, cigarillos, or filtered little cigars; pipes, water pipes, or hookahs. For cigarettes only, users were defined as persons who had smoked ≥100 cigarettes during their lifetime and now smoked cigarettes every day or some days.

§ Current cigarette smokers were defined as persons who reported smoking ≥100 cigarettes during their lifetime and now smoked cigarettes every day or some days.

¶ Reported smoking cigars, cigarillos, or little filtered cigars at least once during their lifetime and now smoked at least one of these products every day or some days.

** Reported smoking tobacco in a regular pipe, water pipe, or hookah at least once during their lifetime and now smoked at least one of these products every day or some days.

†† Reported using electronic cigarettes at least once during their lifetime and now used e-cigarettes every day or some days.

§§ Reported using chewing tobacco, snuff, dip, snus, or dissolvable tobacco at least once during their lifetime and now used at least one of these products every day or some days.

¶¶ Use was defined as use either every day or some days of at least two or more of the following tobacco products: cigarettes (≥100 cigarettes during lifetime); cigars, cigarillos, or filtered little cigars; pipes, water pipes, or hookahs ; electronic cigarettes; or smokeless tobacco products. Among multiple tobacco product users, 84.1% used two products, 13.4% used three products, and 2.5% used four or more tobacco products

*** Hispanic persons could be of any race.

††† Dashes indicate that prevalence estimates with a relative standard error ≥30% are not presented.

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

¶¶¶ Based on observed income as obtained from combined family income bracketing questions.

**** Private coverage: includes adults who had any comprehensive private insurance plan (including health maintenance organizations and preferred provider organizations). Medicaid: for adults aged <65 years, includes adults who do not have private coverage, but who have Medicaid or other state-sponsored health plans including Children's Health Insurance Program (CHIP); also includes adults aged ≥65 years who do not have any private coverage but have Medicare and Medicaid or other state-sponsored health plans including CHIP. Medicare only: includes adults aged ≥65 years who only have Medicare coverage. Other coverage: includes adults who do not have private insurance, Medicaid, or other public coverage, but who have any type of military coverage, coverage from other government programs, or Medicare. Uninsured: includes adults who have not indicated that they are covered at the time of the interview under private health insurance, Medicare, Medicaid, CHIP, a state-sponsored health plan, other government programs, or military coverage. Insurance coverage is 'as of time of survey'.

†††† Disability status was defined on the basis of self-reported presence of selected limitations including vision, hearing, cognition, and movement. Limitations in performing activities of daily living were defined using the question "Does [person] have difficulty dressing or bathing?" Limitations in performing instrumental activities of daily living were defined on the basis of responses to the question "Because of a physical, mental, or emotional condition, does [person] have difficulty doing errands alone such as visiting a doctor's office or shopping?" Any disability was defined as a "yes" response pertaining to at least one of the limitations listed (vision, hearing, cognition, movement, activities of daily living, or instrumental activities of daily living). A random sample of half of the respondents from the 2017 Person File was asked about limitations and weights from the Family Disability Questions File were applied.

§§§§ Based on the Kessler psychological distress scale, a series of six questions that ask about feelings of hopelessness, sadness, nervousness, restlessness, worthlessness, and feeling like everything is an effort in the past 30 days. Participants were asked to respond on a Likert Scale ranging from "None of the time" (score = 0) to "All of the time" (score = 4). Responses were summed over the six questions; persons with a score of ≥13 were coded as having serious psychological distress, and respondents with a score <13 were coded as not having serious psychological distress.

estimated 14.0% of U.S. adults (34.3 million) were current cigarette smokers in 2017, representing a 67% decline since 1965. However, in 2017, nearly nine in 10 (41.1 million) adult tobacco product users reported using a combustible tobacco product, with cigarettes being the product most commonly used. The burden of death and disease from tobacco use in the United States is caused overwhelmingly by cigarettes and other combustible products, and an estimated 480,000 U.S. adults die from cigarette smoking and secondhand smoke exposure each year (*1*). Therefore, continued efforts to reduce all forms of combustible tobacco smoking, including cigarettes, among U.S. adults are especially important (*1*).

U.S. adults also report using various noncigarette tobacco products. In 2017, approximately one in five adults (47.4 million) currently used any tobacco product, and 19.0% of these adults reported multiple tobacco product use. Multiple tobacco product users are at increased risk for nicotine addiction and dependence (*1*,*5*). E-cigarettes were commonly used among multiple tobacco product users. Primary reasons for e-cigarette use among adults include curiosity, flavoring, cost, consideration of others, convenience, and simulation of cigarettes, as well as to attempt to quit smoking (*6*). However, although e-cigarettes could benefit adult smokers if used as a complete substitute for combustible tobacco smoking, evidence of the effectiveness of e-cigarettes as a cessation aid is inconclusive (*7*).

Demographic variations in tobacco product use were observed. For example, young adults reported the highest use of emerging products such as e-cigarettes and pipes; the higher prevalence of overall pipe use among young adults is likely primarily driven by water pipe or hookah use (*1*). Differences in tobacco product use across population groups might be related to multiple factors, including targeted advertising, differing perceptions regarding the relative harm or social acceptability of tobacco use, and differences in tobacco product prices and levels of access to cessation resources (*1*,*2*).

Summary

What is already known about this topic?

Although cigarette smoking among U.S. adults has declined considerably, tobacco products have evolved in recent years to include various combustible, non-combustible, and electronic products.

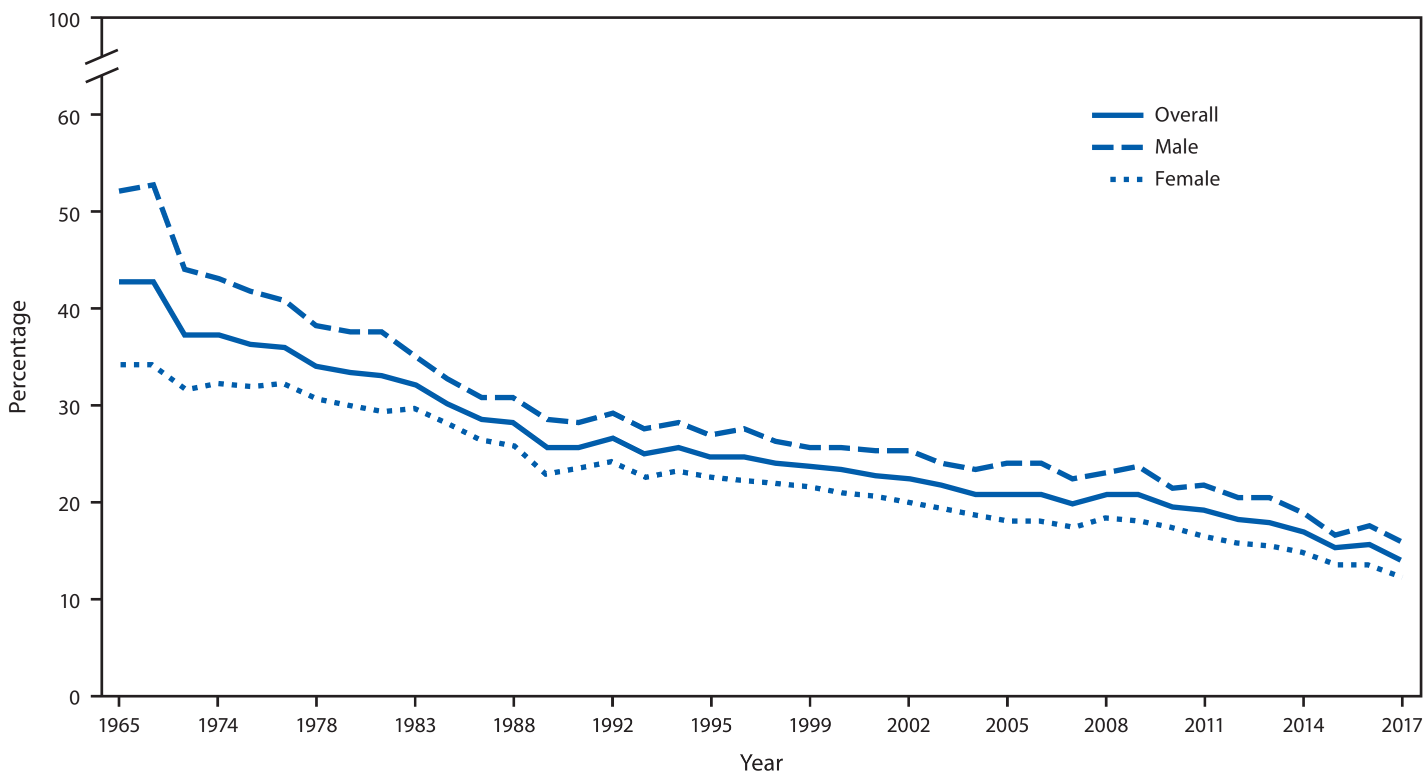
What is added by this report?

In 2017, an estimated 47.4 million U.S. adults (19.3%) currently used any tobacco product. Among current tobacco product users, 86.7% (41.1 million) smoked combustible tobacco products, and 19.0% (9.0 million) used two or more tobacco products.

What are the implications for public health practice?

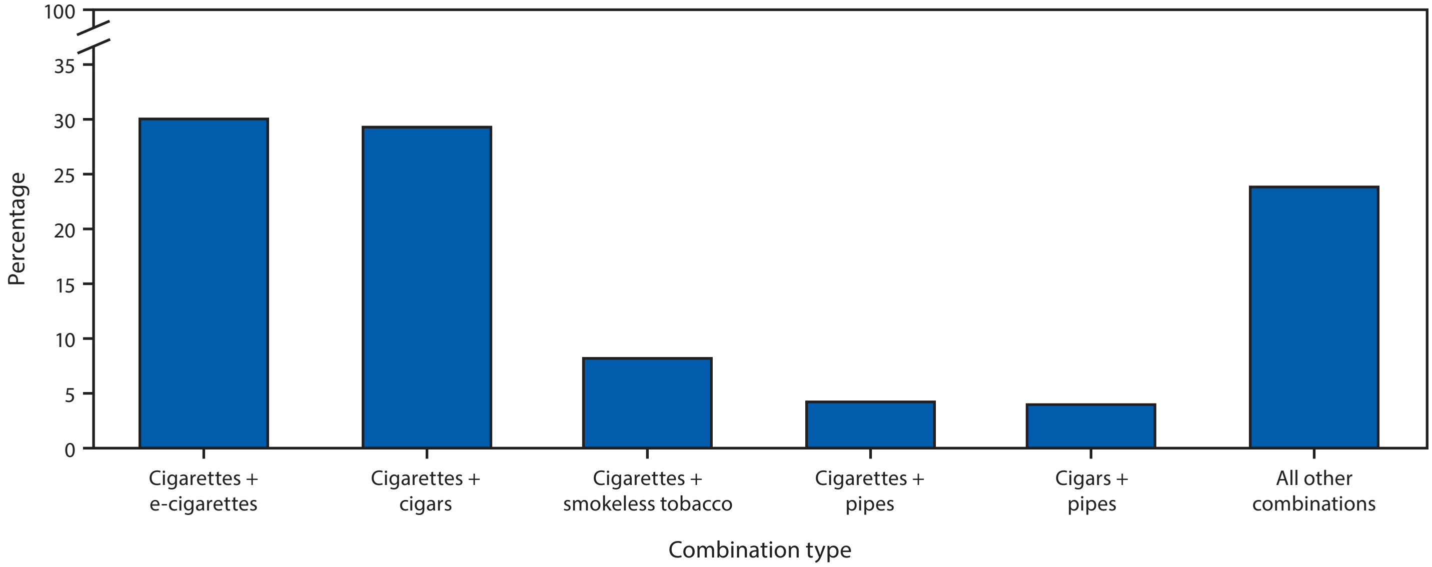
Implementation of evidence-based tobacco control interventions that address the diversity of tobacco products used by U.S. adults, in coordination with regulation of tobacco product manufacturing, marketing, and sales, can reduce tobacco-related disease and death in the United States.

FIGURE 1. Percentage of adults aged ≥18 years who were current cigarette smokers,* overall and by sex — National Health Interview Survey (NHIS), United States, 1965–2017



* For NHIS years 1965–1991, current smokers included adults who reported that they had smoked ≥100 cigarettes in their lifetime and currently smoked. Since 1992, current smokers included adults who reported smoking ≥100 cigarettes during their lifetime and specified that they currently smoked every day or on some days. Data are not available for 1967–1969, 1971–1973, 1975, 1981, 1982, 1984, 1986, 1989, and 1996 because questions regarding smoking were not included in the NHIS conducted in those years. Related data and documentation can be found at https://www.cdc.gov/nchs/nhis/data-questionnaires-documentation.htm.

FIGURE 2. Top tobacco product use* combinations among adults aged ≥18 years who currently used ≥2 tobacco products†,§ — National Health Interview Survey, United States, 2017



* For cigarettes, current smokers were defined as persons who had smoked ≥100 cigarettes during their lifetime and now smoked either every day or some days. Current users of all other assessed tobacco products were defined as persons who reported use of each respective product every day or some days at the time of survey.
† Percentages were calculated among adults who currently used ≥2 of the following five tobacco product types: cigarettes; cigars, cigarillos, or filtered little cigars (cigars); regular pipes, water pipes, or hookahs (pipes); chewing tobacco, snuff, dip, snus, or dissolvable tobacco (smokeless tobacco); and electronic cigarettes (e-cigarettes).
§ A total of 26 distinct combinations were assessed (10 two-product type combinations; 10 three-product type combinations; 5 four-product type combinations, and 1 five-product type combination).

The findings in this report are subject to at least four limitations. First, the potential for recall bias exists because responses were self-reported and not biochemically validated. However, self-reported smoking status correlates highly with serum cotinine levels (*8*). Second, the questionnaire did not assess gender identity; including transgender persons could affect overall tobacco use estimates among the sexual and gender minorities considered in this report. Third, NHIS estimates are not generalizable to persons in the military or institutionalized populations. Finally, the NHIS Sample Adult component's response rate of 53.0% might have resulted in nonresponse bias.

Full implementation of comprehensive tobacco control programs at the national, state, and local levels, including tobacco price increases, high-impact anti-tobacco mass media campaigns, comprehensive smoke-free laws,*** and barrier-free access to tobacco cessation counseling and approved medications, along with FDA regulation of tobacco products, can accelerate progress toward reducing tobacco-related death and disease in the United States (*3*). Given the increasing diversity of available tobacco products, coordinated efforts are key to implementing proven strategies while also exploring promising new strategies. For example, CDC supports the National Tobacco Control Program (*3*), and the Tips From Former Smokers campaign, which led to approximately half a million sustained quits among U.S. adult smokers during 2012–2015 (*9*). FDA launched the Every Try Counts campaign in 2018, which targets adults aged 25–54 years who have attempted to quit smoking in the last year but were unsuccessful. The campaign also complements FDA's recently announced plan to explore reducing nicotine content in cigarettes to minimally or nonaddictive levels (*10*). The National Cancer Institute supports research to improve tobacco dependence treatment and provides resources to help smokers quit, including Smokefree.gov; the toll-free national quitline network (1-800-QUIT-NOW); and LiveHelp online. These coordinated strategies, in combination with state and local level tobacco prevention and control strategies that address the diversity of tobacco products, can reduce tobacco related disease and death in the United States (*1*).

*** Includes policies that completely prohibit smoking in all indoor areas of private-sector worksites, restaurants, and bars. https://www.cdc.gov/mmwr/volumes/65/wr/mm6524a4.htm.

Corresponding author: Teresa W. Wang, TWWang@cdc.gov; 770-488-5493.

[1]Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC; [2]Center for Tobacco Products, Food and Drug Administration, Silver Spring, Maryland; [3]Tobacco Control Research Branch, National Cancer Institute, National Institutes of Health, Bethesda, Maryland.

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Firearm Homicides and Suicides in Major Metropolitan Areas — United States, 2012–2013 and 2015–2016

Scott R. Kegler, PhD[1]; Linda L. Dahlberg, PhD[2]; James A. Mercy, PhD[2]

Firearm homicides and suicides represent a continuing public health concern in the United States. During 2015–2016, a total of 27,394 firearm homicides (including 3,224 [12%] among persons aged 10–19 years) and 44,955 firearm suicides (including 2,118 [5%] among persons aged 10–19 years) occurred among U.S. residents (*1*). This report updates an earlier report (*2*) that provided statistics on firearm homicides and suicides in major metropolitan areas during 2006–2007 and 2009–2010, and places continued emphasis on youths, in recognition of the importance of early prevention efforts. Firearm homicide and suicide rates were determined for the 50 most populous U.S. metropolitan statistical areas (MSAs)* during 2012–2013 and 2015–2016 using mortality data from the National Vital Statistics System (NVSS) and population data from the U.S. Census Bureau. In contrast to the earlier report, which indicated that firearm homicide rates among persons of all ages had been declining both nationally and in large MSAs overall, current findings show that rates have returned to levels comparable to those observed during 2006–2007. Consistent with the earlier report, these findings show that firearm suicide rates among persons aged ≥10 years have continued to increase, both nationally and in large MSAs overall. Although firearm suicide rates among youths remain notably lower than those among persons of all ages, youth rates have also increased both nationally and in large MSAs collectively. These findings can inform ongoing development and monitoring of strategies directed at reducing firearm-related violence.

NVSS mortality data for 2012–2013 and 2015–2016 were used to identify firearm homicides (*International Classification of Diseases, 10th Revision* [ICD-10] underlying cause codes X93–X95 and U01.4 [U.S. extension to ICD-10]) and firearm suicides (codes X72–X74) among U.S. residents. Firearm homicide and suicide counts were tabulated for county groupings forming the 50 largest MSAs (by population rank mid-year 2016).† Tabulated counts were integrated with U.S. Census Bureau population estimates for the counties forming these MSAs to calculate annual firearm homicide rates for persons of all ages and annual firearm suicide rates for persons aged ≥10 years (persons aged <10 years were excluded because intent for self-harm often is not attributed to young children). Rates were similarly calculated for youths aged 10–19 years. Rates among persons of all ages were age-adjusted to the year 2000 U.S. standard population. MSA-level data involving firearm homicide or suicide counts <20 are not reported separately because of concerns related to statistical reliability (stability) and data privacy. However, such data were included in the calculations for all large MSAs combined.

The rates of firearm homicide among persons of all ages during 2015–2016 varied widely among the 50 largest MSAs, ranging from 1.1 (Providence-Warwick) to 16.6 (New Orleans-Metairie) per 100,000 residents per year (Table). The rate for all large MSAs combined was 4.9, compared with a national rate of 4.4. This represents an increase from 2012–2013, when the rate for large MSAs combined was 4.1 and the national rate was 3.7. Between 2012–2013 and 2015–2016, firearm homicide rates increased for 43 (86%) of the 50 large MSAs considered individually. Among youths, the firearm homicide rate for large MSAs combined was 4.7 during 2015–2016, compared with a national rate of 3.9. Similar to rates among persons of all ages, this represents an increase from 2012–2013, when the rate for large MSAs combined was 4.3 and the national rate was 3.4. Males accounted for approximately 85% of firearm homicide victims (all ages) during both reporting periods, for the 50 largest MSAs combined as well as nationally.

Firearm suicide rates among persons of all ages during 2015–2016 also varied widely by large MSA, ranging from 1.5 (New York-Newark-Jersey City) to 13.5 (Oklahoma City) per 100,000 residents per year (Table). The rate for large MSAs combined was 5.8, compared with a national rate of 7.7, representing an increase from 2012–2013, when the rate for large MSAs combined was 5.6 and the national rate was 7.4. Firearm suicide rates among youths remained much lower than those among all persons aged ≥10 years. The rate for this age group for large MSAs combined was 1.9 during 2015–2016, compared with a national rate of 2.5. This also represents an increase from 2012–2013, when the rate for large MSAs combined was 1.5 and the national rate was 2.1. Similar to firearm homicides, males accounted for approximately 85%

* An MSA is defined by the U.S. Office of Management and Budget (OMB) as consisting of "at least one urbanized area of 50,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties." This report is based on the revised geographic delineations for MSAs issued by OMB in August 2017.

† The same MSAs were the 50 most populous during both reporting periods; rankings by total population changed slightly. This group of MSAs includes most metropolitan areas with a resident population of at least one million, and currently represents approximately 55% of the U.S. resident population.

TABLE. Numbers and annual rates (per 100,000 population) of firearm homicides and suicides for the 50 most populous metropolitan statistical areas (MSAs) — United States, 2012–2013 and 2015–2016*

MSA (ordered alphabetically)	Years	Firearm homicides		Firearm suicides	
		All ages	Aged 10–19 years	Aged ≥10 years	Aged 10–19 years
		No.† (rate§)	No. (rate)	No.† (rate§)	No. (rate)
U.S. total	**2012–2013**	**22,822 (3.7)**	**2,858 (3.4)**	**41,833 (7.4)**	**1,736 (2.1)**
	2015–2016	**27,392 (4.4)**	**3,224 (3.9)**	**44,950 (7.7)**	**2,118 (2.5)**
MSA total (50 MSAs)¶	2012–2013	14,086 (4.1)	1,951 (4.3)	17,339 (5.6)	671 (1.5)
	2015–2016	17,128 (4.9)	2,153 (4.7)	18,513 (5.8)	851 (1.9)
Atlanta, Sandy Springs, Roswell (Georgia)	2012–2013	536 (4.9)	69 (4.4)	726 (7.7)	35 (2.2)
	2015–2016	717 (6.3)	106 (6.5)	764 (7.6)	48 (2.9)
Austin, Round Rock (Texas)	2012–2013	39 (1.0)	—** (—)	254 (8.2)	— (—)
	2015–2016	99 (2.3)	— (—)	283 (8.2)	— (—)
Baltimore, Columbia, Towson (Maryland)	2012–2013	422 (7.7)	46 (6.5)	262 (5.2)	— (—)
	2015–2016	656 (12.2)	63 (9.1)	239 (4.6)	— (—)
Birmingham, Hoover (Alabama)	2012–2013	187 (8.6)	23 (7.8)	230 (11.2)	— (—)
	2015–2016	275 (12.6)	23 (7.9)	245 (11.9)	— (—)
Boston, Cambridge, Newton (Massachusetts, New Hampshire)	2012–2013	112 (1.1)	— (—)	177 (2.1)	— (—)
	2015–2016	113 (1.2)	— (—)	179 (2.1)	— (—)
Buffalo, Cheektowaga, Niagara Falls (New York)	2012–2013	86 (4.0)	— (—)	85 (4.0)	— (—)
	2015–2016	81 (3.6)	— (—)	76 (3.3)	— (—)
Charlotte, Concord, Gastonia (North Carolina, South Carolina)	2012–2013	197 (4.3)	26 (4.1)	285 (6.9)	— (—)
	2015–2016	231 (4.8)	23 (3.4)	348 (8.1)	22 (3.3)
Chicago, Naperville, Elgin (Illinois, Indiana, Wisconsin)	2012–2013	1,137 (6.0)	244 (9.3)	610 (3.6)	27 (1.0)
	2015–2016	1,527 (8.1)	272 (10.7)	620 (3.6)	29 (1.1)
Cincinnati (Ohio, Kentucky, Indiana)	2012–2013	160 (4.0)	29 (4.9)	264 (6.9)	— (—)
	2015–2016	174 (4.2)	31 (5.3)	307 (8.1)	22 (3.8)
Cleveland, Elyria (Ohio)	2012–2013	193 (5.1)	38 (7.0)	256 (6.8)	— (—)
	2015–2016	298 (7.8)	33 (6.4)	277 (7.2)	— (—)
Columbus (Ohio)	2012–2013	180 (4.5)	22 (4.2)	259 (7.6)	— (—)
	2015–2016	206 (5.0)	33 (6.2)	256 (7.0)	— (—)
Dallas, Fort Worth, Arlington (Texas)	2012–2013	486 (3.5)	49 (2.5)	857 (7.6)	40 (2.0)
	2015–2016	541 (3.8)	62 (3.0)	949 (7.9)	54 (2.6)
Denver, Aurora, Lakewood (Colorado)	2012–2013	125 (2.3)	— (—)	411 (8.7)	— (—)
	2015–2016	173 (3.0)	— (—)	469 (9.6)	24 (3.3)
Detroit, Warren, Dearborn (Michigan)	2012–2013	764 (9.5)	93 (8.0)	511 (6.6)	28 (2.4)
	2015–2016	652 (8.2)	50 (4.5)	554 (7.0)	28 (2.5)
Hartford, West Hartford, East Hartford (Connecticut)	2012–2013	52 (2.2)	— (—)	68 (3.1)	— (—)
	2015–2016	55 (2.5)	— (—)	59 (2.5)	— (—)
Houston, The Woodlands, Sugar Land (Texas)	2012–2013	626 (4.9)	76 (4.2)	739 (7.2)	43 (2.4)
	2015–2016	828 (6.1)	109 (5.7)	921 (8.2)	45 (2.3)
Indianapolis, Carmel, Anderson (Indiana)	2012–2013	235 (6.2)	27 (5.0)	295 (8.8)	— (—)
	2015–2016	298 (7.7)	45 (8.3)	308 (8.9)	— (—)
Jacksonville (Florida)	2012–2013	186 (6.8)	— (—)	282 (11.6)	— (—)
	2015–2016	208 (7.4)	32 (8.8)	299 (11.0)	— (—)

See table footnotes on page 1236.

of firearm suicides (all ages) in both reporting periods, for the 50 largest MSAs combined and nationally.

Discussion

During 2015–2016, homicide was the 16th leading cause of death among persons of all ages in the United States and the third leading cause among youths aged 10–19 years; a firearm injury was the underlying cause of death in 74% of all homicides and in 87% of youth homicides (*1*). Previously observed decreases in firearm homicide rates have not continued, with more recent rates showing an increase both nationally and in large MSAs considered collectively. Firearm homicide rates among persons of all ages and among youths in the large MSAs overall have both remained higher than corresponding national rates.

During the same period, suicide was the 10th leading cause of death nationally among all persons aged ≥10 years and the second leading cause among youths; a firearm injury was the underlying cause of death in 50% of all suicides and in 42%

TABLE. (*Continued*) Numbers and annual rates (per 100,000 population) of firearm homicides and suicides for the 50 most populous metropolitan statistical areas (MSAs) — United States, 2012–2013 and 2015–2016*

MSA (ordered alphabetically)	Years	Firearm homicides		Firearm suicides	
		All ages	Aged 10–19 years	Aged ≥10 years	Aged 10–19 years
		No.† (rate§)	No. (rate)	No.† (rate§)	No. (rate)
Kansas City (Missouri, Kansas)	2012–2013	262 (6.6)	27 (4.9)	348 (9.7)	— (—)
	2015–2016	327 (8.2)	38 (6.8)	375 (10.4)	22 (4.0)
Las Vegas, Henderson, Paradise (Nevada)	2012–2013	124 (3.1)	— (—)	371 (10.4)	— (—)
	2015–2016	234 (5.6)	26 (4.8)	391 (10.3)	— (—)
Los Angeles, Long Beach, Anaheim (California)	2012–2013	916 (3.4)	141 (4.0)	769 (3.4)	— (—)
	2015–2016	1,003 (3.7)	123 (3.6)	781 (3.2)	25 (0.7)
Louisville/Jefferson County (Kentucky, Indiana)	2012–2013	113 (4.7)	— (—)	230 (10.3)	— (—)
	2015–2016	204 (8.4)	25 (7.8)	259 (11.0)	— (—)
Memphis (Tennessee, Mississippi, Arkansas)	2012–2013	300 (11.2)	48 (12.3)	188 (8.0)	— (—)
	2015–2016	398 (15.0)	52 (14.0)	183 (7.9)	— (—)
Miami, Fort Lauderdale, West Palm Beach (Florida)	2012–2013	641 (5.7)	94 (6.8)	613 (5.4)	— (—)
	2015–2016	669 (5.9)	98 (7.1)	613 (5.3)	— (—)
Milwaukee, Waukesha, West Allis (Wisconsin)	2012–2013	182 (6.0)	29 (6.8)	176 (6.2)	— (—)
	2015–2016	267 (8.9)	30 (7.2)	182 (6.5)	— (—)
Minneapolis, St. Paul, Bloomington (Minnesota, Wisconsin)	2012–2013	117 (1.7)	— (—)	354 (5.8)	20 (2.2)
	2015–2016	136 (2.0)	26 (2.8)	316 (5.1)	20 (2.2)
Nashville-Davidson, Murfreesboro, Franklin (Tennessee)	2012–2013	129 (3.6)	— (—)	298 (9.6)	— (—)
	2015–2016	178 (4.8)	29 (6.1)	334 (10.2)	23 (4.8)
New Orleans, Metairie (Louisiana)	2012–2013	442 (18.2)	75 (24.4)	151 (7.0)	— (—)
	2015–2016	404 (16.6)	54 (17.6)	186 (8.1)	— (—)
New York, Newark, Jersey City (New York, New Jersey, Pennsylvania)	2012–2013	920 (2.3)	105 (2.1)	602 (1.6)	21 (0.4)
	2015–2016	937 (2.4)	97 (2.0)	564 (1.5)	— (—)
Oklahoma City (Oklahoma)	2012–2013	150 (5.7)	— (—)	253 (11.1)	— (—)
	2015–2016	163 (6.0)	21 (5.7)	317 (13.5)	20 (5.5)
Orlando, Kissimmee, Sanford (Florida)	2012–2013	171 (3.7)	20 (3.4)	262 (6.5)	— (—)
	2015–2016	251 (5.1)	23 (3.7)	275 (6.2)	— (—)
Philadelphia, Camden, Wilmington (Pennsylvania, New Jersey, Delaware, Maryland)	2012–2013	762 (6.5)	107 (6.7)	497 (4.5)	— (—)
	2015–2016	800 (6.8)	94 (6.1)	513 (4.5)	— (—)
Phoenix, Mesa, Scottsdale (Arizona)	2012–2013	344 (4.0)	36 (3.0)	756 (10.0)	28 (2.3)
	2015–2016	397 (4.4)	42 (3.3)	865 (10.6)	34 (2.7)
Pittsburgh (Pennsylvania)	2012–2013	201 (4.7)	39 (7.0)	341 (7.4)	— (—)
	2015–2016	233 (5.4)	38 (7.2)	381 (8.7)	— (—)
Portland, Vancouver, Hillsboro (Oregon, Washington)	2012–2013	60 (1.3)	— (—)	355 (8.5)	— (—)
	2015–2016	80 (1.7)	— (—)	356 (8.2)	— (—)
Providence, Warwick (Rhode Island, Massachusetts)	2012–2013	41 (1.3)	— (—)	79 (2.8)	— (—)
	2015–2016	38 (1.1)	— (—)	103 (3.3)	— (—)

See table footnotes on page 1236.

of youth suicides (*1*). Previously observed increases in firearm suicide rates among persons of all ages continued in recent years, both nationally and in large MSAs collectively; youth firearm suicide rates also increased both nationally and in large MSAs overall. In contrast to firearm homicide rates, firearm suicide rates among persons of all ages and among youths in the large MSAs overall have both remained lower than corresponding national rates. This is consistent with previous research showing that rates of suicide, considering all causes, have been persistently lower in more urban areas than in less urban areas (*3*).

It is too soon to know whether recent increases in firearm homicide rates represent a short-term fluctuation or the beginning of a longer-term trend. From 2015 to 2016, violent crime increased 3.8% for the nation overall, 6.1% in cities with populations ≥250,000, 2.2% in suburban areas and 1.6% in nonmetropolitan counties,[§] suggesting a short-term increase concentrated particularly in the core cities of

[§] U.S. Department of Justice, Federal Bureau of Investigation. Crime in the United States, Annual Reports for Years 1995–2016, Table 10. https://ucr.fbi.gov/ucr-publications.

TABLE. (*Continued*) Numbers and annual rates (per 100,000 population) of firearm homicides and suicides for the 50 most populous metropolitan statistical areas (MSAs) — United States, 2012–2013 and 2015–2016*

MSA (ordered alphabetically)	Years	Firearm homicides: All ages No.† (rate§)	Firearm homicides: Aged 10–19 years No. (rate)	Firearm suicides: Aged ≥10 years No.† (rate§)	Firearm suicides: Aged 10–19 years No. (rate)
Raleigh (North Carolina)	2012–2013	51 (2.1)	— (—)	117 (6.0)	— (—)
	2015–2016	64 (2.5)	— (—)	121 (5.4)	— (—)
Richmond (Virginia)	2012–2013	129 (5.2)	— (—)	202 (9.2)	— (—)
	2015–2016	180 (7.3)	— (—)	218 (9.2)	— (—)
Riverside, San Bernardino, Ontario (California)	2012–2013	292 (3.3)	32 (2.3)	400 (5.5)	— (—)
	2015–2016	303 (3.3)	41 (3.0)	408 (5.4)	20 (1.5)
Sacramento, Roseville, Arden-Arcade (California)	2012–2013	135 (3.1)	24 (4.0)	252 (6.4)	— (—)
	2015–2016	162 (3.7)	21 (3.5)	259 (6.1)	— (—)
St. Louis (Missouri, Illinois)	2012–2013	355 (6.7)	58 (7.9)	413 (8.2)	20 (2.7)
	2015–2016	596 (11.4)	61 (8.6)	442 (8.7)	— (—)
Salt Lake City (Utah)	2012–2013	29 (1.3)	— (—)	216 (11.8)	— (—)
	2015–2016	46 (1.9)	— (—)	237 (12.4)	20 (5.7)
San Antonio, New Braunfels (Texas)	2012–2013	175 (3.9)	— (—)	299 (7.6)	— (—)
	2015–2016	266 (5.6)	27 (3.9)	305 (7.3)	20 (2.9)
San Diego, Carlsbad (California)	2012–2013	96 (1.4)	— (—)	315 (5.6)	— (—)
	2015–2016	103 (1.6)	— (—)	282 (4.8)	— (—)
San Francisco, Oakland, Hayward (California)	2012–2013	386 (4.5)	72 (7.1)	260 (3.1)	— (—)
	2015–2016	414 (4.5)	60 (5.8)	263 (3.0)	— (—)
San Jose, Sunnyvale, Santa Clara (California)	2012–2013	71 (1.9)	21 (4.4)	85 (2.5)	— (—)
	2015–2016	58 (1.5)	— (—)	97 (2.7)	— (—)
Seattle, Tacoma, Bellevue (Washington)	2012–2013	125 (1.7)	— (—)	425 (6.6)	— (—)
	2015–2016	165 (2.2)	32 (3.7)	452 (6.7)	29 (3.3)
Tampa, St. Petersburg, Clearwater (Florida)	2012–2013	170 (3.1)	— (—)	478 (8.7)	— (—)
	2015–2016	204 (3.7)	21 (3.1)	568 (9.5)	— (—)
Virginia Beach, Norfolk, Newport News (Virginia, North Carolina)	2012–2013	174 (4.8)	20 (4.5)	223 (7.4)	— (—)
	2015–2016	247 (6.8)	38 (8.8)	263 (8.3)	— (—)
Washington, DC, Arlington, Alexandria (District of Columbia, Virginia, Maryland, West Virginia)	2012–2013	300 (2.5)	48 (3.2)	440 (4.3)	— (—)
	2015–2016	469 (3.8)	42 (2.7)	451 (4.2)	28 (1.8)

* Numbers and rates reflect victim place of residence, not place of occurrence.
† These national and MSA-specific numbers exclude a small fraction of records with undocumented decedent age (10 firearm homicides; 11 firearm suicides) and might therefore differ slightly from numbers in the text.
§ All-ages rates are age-adjusted to the year 2000 United States standard population.
¶ This table includes only the 50 most populous MSAs among the 383 U.S. MSAs currently delineated and therefore cannot be used to establish comprehensive national rankings.
** Dash indicates suppressed entry because of statistical instability or data confidentiality concerns (both associated with small numbers).

metropolitan areas. Preventing firearm homicides can be a challenge for cities across the country; however, previous research has demonstrated that efforts to modify the physical and social environments in cities through abandoned building and vacant lot remediation, greening activities, street outreach and community norm change, low-income housing tax credits, and business improvement districts are significantly associated with reductions in gun assaults, youth homicide, and other violent crime (*4*).

In contrast to homicide rates, which began increasing only recently, rates of suicide in the United States have been gradually increasing over the past decade and a half, across states, population groups, and in rural and urban settings (*3*,*5*,*6*). Rates of firearm suicide, in particular, began increasing coincident with the economic downturn of 2007–2008 and have continued to increase, despite subsequent economic recovery. After declining 7% from 1999 to 2006, annual rates of firearm suicide increased 21% from 2006 to 2016 (from 6.5 to 7.8 per 100,000 residents aged ≥10 years) (*1*). Urban areas recovered more quickly from the economic downturn than did rural areas, but the continued increase in rates of firearm suicide in large MSAs suggests that multiple factors are involved, and that a combination of prevention approaches might be necessary to reduce risks. Efforts to strengthen household financial security; stabilize housing; teach youths coping and problem-solving skills; identify and support persons at risk; and implement proactive prevention policies in schools, workplaces, and other organizational settings are associated with reductions in

Summary

What is already known about this topic?

Firearm homicide rates in large metro areas are generally higher than for the nation overall, but rates for both had been declining. In contrast, firearm suicide rates in large metro areas are generally lower than those for the nation overall, but rates for both had been increasing.

What is added by this report?

Recently, firearm homicide rates in large metro areas and the nation overall began increasing, reaching levels comparable to those a decade ago. Firearm suicide rates have continued to increase in large metro areas and the nation overall.

What are the implications for public health practice?

Ongoing tracking of rates at all geographic levels can help support initiatives directed at reducing firearm-related violence..

suicide, suicide attempts, and/or co-occurring risks such as substance abuse, depression, and social isolation (*7*).

Another factor likely affecting both firearm homicide and suicide is access to firearms by persons at risk for harming themselves or others. Previous studies have shown that the interval between deciding to act and attempting suicide can be as brief as 10 minutes or less, and that persons tend not to substitute a different method when a highly lethal method is unavailable or difficult to access (*8*,*9*). Reducing access to lethal means during an acute suicidal crisis by safely storing firearms or temporarily removing them from the home can help reduce suicide risk, particularly among youths (*7*). Preventing persons convicted of or under a restraining order for domestic violence from possessing a firearm has been associated with reductions in intimate partner-related homicide, including firearm homicide (*10*). Efforts to strengthen the background check system to better identify persons convicted of violent crimes or at risk for harming themselves or others might also prevent lethal firearm violence, although these policies need further study (*10*).

The findings in this report are subject to at least two limitations. First, although statistics on nonfatal injuries associated with firearm assault or self-harm might have strengthened the report, population-based nonfatal injury data are not available for MSAs. Second, and notwithstanding the intended focus on youth firearm violence, a more expansive analysis might have addressed firearm homicide and suicide rates for other age groups not separately considered in this report.

Understanding the patterns, characteristics, and impact of firearm violence is an important factor in preventing injuries and deaths. Ongoing tracking of firearm homicide and suicide rates at all geographic levels can provide important input for initiatives directed at reducing firearm-related violence.

Corresponding author: Scott R. Kegler, skegler@cdc.gov, 770-488-3830.

[1]Division of Analysis, Research, and Practice Integration, National Center for Injury Prevention and Control, CDC; [2]Division of Violence Prevention, National Center for Injury Prevention and Control, CDC.

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Prevalence of Arthritis Among Adults with Prediabetes and Arthritis-Specific Barriers to Important Interventions for Prediabetes — United States, 2009–2016

Michelle Sandoval-Rosario, MPH[1,2]; Babak Michael Nayeri, NMD[2]; Addey Rascon[2]; Michael Boring, MS[1,4]; Teresa Aseret-Manygoats, MPA[2]; Charles G. Helmick, MD[1]; Louise B. Murphy, PhD[1]; Jennifer M. Hootman, PhD[1]; Giuseppina Imperatore MD, PhD[3]; Kamil E. Barbour, PhD[1]

An estimated 54.4 million U.S. adults have doctor-diagnosed arthritis (arthritis), and this number is projected to rise to 78.4 million by 2040 (*1*,*2*). Physical inactivity and obesity are two factors associated with an increased risk for developing type 2 diabetes,* and arthritis has been determined to be a barrier to physical activity among adults with obesity (*3*). The prevalence of arthritis among the 33.9% (estimated 84 million)† of U.S. adults with prediabetes and how these conditions are related to physical inactivity and obesity are unknown. To examine the relationships among arthritis, prediabetes, physical inactivity, and obesity, CDC analyzed combined data from the 2009–2016 National Health and Nutrition Examination Surveys (NHANES). Overall, the unadjusted prevalence of arthritis among adults with prediabetes was 32.0% (26 million). Among adults with both arthritis and prediabetes, the unadjusted prevalences of leisure-time physical inactivity and obesity were 56.5% (95% confidence intervals [CIs] = 51.3–61.5) and 50.1% (CI = 46.5–53.6), respectively. Approximately half of adults with both prediabetes and arthritis are either physically inactive or have obesity, further increasing their risk for type 2 diabetes. Health care and public health professionals can address arthritis-specific barriers§ to physical activity by promoting evidence-based physical activity interventions.¶ Furthermore, weight loss and physical activity promoted though the National Diabetes Prevention Program can reduce the risk for type 2 diabetes and reduce pain from arthritis.

NHANES** examines a sample of the U.S. noninstitutionalized adult population through both interview and examination components. Analysis of data from 2009–2016 included 10,179 adults aged ≥20 years with a fasting plasma glucose measurement and complete arthritis data. Backward regression equations for adjusted fasting plasma glucose were applied.†† Prediabetes was defined as a glycated hemoglobin A1c (HbA1c) level of 5.7%–6.4% or a fasting plasma glucose level of 100–125 mg/dL. Diabetes was defined as an HbA1c level of ≥6.5%, fasting plasma glucose level of ≥126 mg/dL, or a "yes" response to the question "Other than during pregnancy, has a doctor or other health professional ever told you that you have diabetes or sugar diabetes?" Arthritis was defined as a "yes" response to the question "Has a doctor or other health professional ever told you that you have arthritis?" Arthritis prevalence estimates were calculated by sociodemographic characteristics (age group, sex, race/ethnicity, and highest attained education level). The measure of physical activity for this study was determined by reported leisure-time physical activity. Respondents were classified as inactive if they reported both zero minutes per week of moderate intensity leisure-time activity and zero minutes per week of vigorous intensity leisure-time activity in response to aerobic physical activity questions. Measured obesity was defined as a body mass index of ≥30 kg/m^2. To compare group differences, estimates were age-standardized to the 2000 U.S. standard population aged ≥20 years (*4*). Pairwise t-tests were used to evaluate group differences, and a Bonferroni correction was applied to address multiple comparisons. For analyses examining the prevalence of leisure-time physical inactivity or obesity among adults with or without arthritis and prediabetes, adults with diabetes were excluded to make fair comparisons between groups. All analyses accounted for the complex sampling design including poststratification weighting and the use of Taylor series linearization for variance estimation with statistical significance set at $p<0.05$.

During 2009–2016, the overall unadjusted prevalences of adults with diabetes and prediabetes were 13.1% and 35.8%, respectively. The annualized unadjusted prevalence of arthritis among adults with prediabetes was 32.0% (CI = 29.7–34.5), or an estimated 26 million persons (Table). The annualized unadjusted prevalence of arthritis among adults with diabetes was 42.0% (CI = 38.1–45.9) (approximately 13 million persons). The age-standardized prevalence of arthritis among adults with prediabetes was 25.9% (CI = 24.0%–27.9%) (Table). The prevalence of arthritis was not significantly different from that among adults with diabetes (30.2%; CI = 26.5–34.2, p = 0.09), but was significantly higher than that for adults without prediabetes or arthritis (21.9%; CI = 20.1%–23.9%; p = 0.03). Although data were combined, the age-standardized prevalence of arthritis for adults with prediabetes for each year was relatively consistent across all 8 years.

Among adults with prediabetes, arthritis prevalence was highest among those aged ≥65 years (55.7%); arthritis prevalence was significantly lower among adults aged 20–44 years

* https://www.cdc.gov/diabetes/prevention/index.html.
† https://www.cdc.gov/diabetes/data/statistics/statistics-report.html.
§ https://www.cdc.gov/arthritis/.
¶ https://www.cdc.gov/arthritis/interventions/physical-activity.html.
** https://www.cdc.gov/nchs/nhanes/index.htm.
†† https://wwwn.cdc.gov/Nchs/Nhanes/2015-2016/GLU_I.htm.

TABLE. Unadjusted and age-standardized estimates of arthritis* prevalence among adults with prediabetes† — National Health and Nutrition Examination Surveys, United States, 2009–2016

Characteristic	Sample with arthritis and prediabetes	Population with arthritis and prediabetes (x 1,000)§	Unadjusted prevalence % (95% CI)	Age-standardized¶ prevalence % (95% CI)
Overall	**1,076**	**25,696**	**32.0 (29.7–34.5)**	**25.9 (24.0–27.9)**
Age group (yrs)				
20–44	102	2,643	10.1 (8.1–12.6)	—
45–64	452	11,796	34.8 (30.8–39.0)	—
≥65	522	11,257	55.7 (51.4–60.0)	—
Sex				
Men	440	10,402	24.5 (21.6–27.6)	21.5 (19.2–23.9)
Women	636	15,293	40.5 (37.0–44.1)	31.0 (28.2–34.0)
Race/Ethnicity				
White, non-Hispanic	592	20,106	38.1 (35.0–41.3)	29.0 (26.2–32.1)
Black, non-Hispanic	221	2,566	26.1 (23.2–29.3)	25.0 (22.1–28.1)
Hispanic**	200	1,793	15.3 (13.0–18.0)	17.3 (15.2–19.7)
Other, non-Hispanic	63	1,231	20.7 (15.5–27.0)	18.3 (14.1–23.5)
Highest education level				
Less than high school	280	4,994	31.8 (27.6–36.3)	27.5 (23.9–31.5)
High school or equivalent	251	5,871	31.0 (27.0–35.3)	24.8 (21.6–28.4)
Some college or AA degree	320	7,805	33.1 (30.5–35.8)	27.1 (25.1–29.2)
College and above	225	7,026	32.0 (27.2–37.3)	24.1 (20.3–28.4)

Abbreviations: AA = Associate of Arts; CI = confidence interval.
* Arthritis was defined as a "yes" response to the question "Has a doctor or other health professional ever told you that have arthritis?"
† Prediabetes was defined as glycated hemoglobin A1c level of 5.7%–6.4% or a fasting plasma glucose level of 100–125 mg/dL.
§ Weighted number of U.S. adults with prediabetes who have arthritis.
¶ Prevalence estimates were age-standardized to projected U.S. 2000 population.
** Hispanic persons might be of any race.

(10.1%) and 45–64 years (34.8%). Age-standardized arthritis prevalence was significantly higher among women (31.0%) and non-Hispanic whites (29.0%) than among men and other racial/ethnic groups (Table).

The unadjusted prevalences of leisure-time physical inactivity and obesity among adults with both prediabetes and arthritis were 56.5% (CI = 51.3–61.5) and 50.1% (CI = 46.5–53.6), respectively. The age-standardized prevalence of leisure-time physical inactivity among adults with both prediabetes and arthritis (54.0%; CI = 46.1–61.6) was significantly higher than that among adults with neither prediabetes nor arthritis (39.5%; CI = 36.5–42.6), but not for adults with one condition (either prediabetes or arthritis only) (Figure 1). In addition, the age-standardized prevalence of obesity among adults with arthritis and prediabetes (57.8%; CI = 51.5–64.0) was significantly higher than that among adults with prediabetes only (41.6%; CI = 38.9–44.4), arthritis only (36.1%; CI = 32.0–40.4), and neither prediabetes nor arthritis (25.2%; CI = 22.7–27.8) (Figure 2).

Discussion

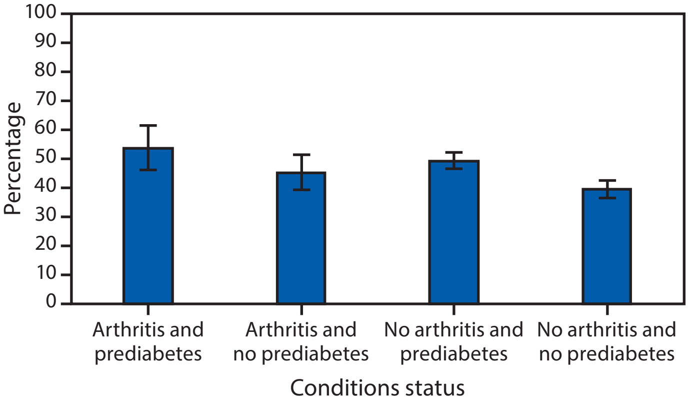
During 2009–2016, approximately one in three adults in the United States with prediabetes (26 million) had arthritis. The comorbid burden of arthritis and prediabetes is substantial, particularly among persons aged ≥65 years, women, and non-Hispanic whites. Moreover, approximately half of adults with both prediabetes and arthritis reported being physically inactive or had obesity, which might further increase their risk for type 2 diabetes. Health care and public health professionals can use this information to better understand and target appropriate evidence-based interventions for persons with arthritis and prediabetes.

Arthritis can hinder the ability of adults with prediabetes to engage in physical activity to prevent type 2 diabetes. The combination of arthritis and other chronic conditions, such as obesity, has been determined to be associated with higher levels of physical inactivity (*5*). Physical activity can improve physical function and mobility, reduce blood glucose levels and weight, which in turn can lower both the risk for developing type 2 diabetes, and alleviate pain related to arthritis.[§§]

Physical inactivity can increase the risk for progression of prediabetes to type 2 diabetes (*6*). Increasing physical activity and weight loss are recommended as parts of self-management strategies for type 2 diabetes prevention (*7*). Lifestyle change programs, such as the CDC's National Diabetes Prevention Program, encourage moderate intensity physical activity to reduce the risk for developing type 2 diabetes by promoting long-term behavioral changes that affect physical activity (e.g., time management and mood cues). Although studies specifically linking the National Diabetes Prevention Program to reduced arthritis-specific barriers to physical activity (e.g., joint pain) are limited, there is evidence that the National Diabetes

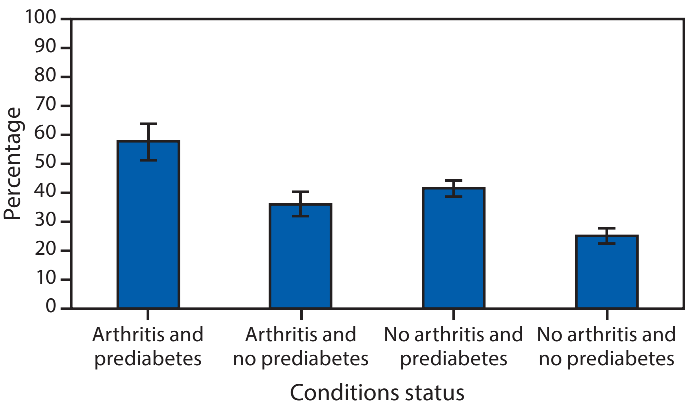
§§ https://www.arthritis.org/living-with-arthritis/comorbidities/diabetes-and-arthritis/rheumatoid-arthritis-diabetes-risk.php.

FIGURE 1. Age-standardized* prevalence of leisure-time physical inactivity, by arthritis and prediabetes† status, excluding adults with diabetes — National Health and Nutrition Examination Survey, United States, 2009–2016



* Estimates were age-standardized to the 2000 U.S. standard population aged ≥20 years.
† Prediabetes was defined as glycated hemoglobin A1c level of 5.7%–6.4% or a fasting plasma glucose level of 100–125 mg/dL.

FIGURE 2. Age-standardized* prevalence of obesity, by arthritis and prediabetes† status, excluding adults with diabetes — National Health and Nutrition Examination Survey, United States, 2009–2016



* Estimates were age-standardized to the 2000 U.S. standard population aged ≥20 years.
† Prediabetes was defined as glycated hemoglobin A1c level of 5.7%–6.4% or a fasting plasma glucose level of 100–125 mg/dL.

Prevention Program can promote weight loss and that weight loss can in turn help reduce joint pain and improve function. A meta-analysis of four randomized controlled trials indicated that a 5.1% reduction in weight over 20 weeks can reduce pain and functional disability in patients with knee osteoarthritis and obesity (*8*). Thus, weight loss has benefits for both managing arthritis and preventing progression to type 2 diabetes.

Providers can reduce arthritis-specific barriers to physical activity by referring patients to the National Diabetes Prevention

Summary

What is already known about this topic?

Physical activity and weight loss are recommended for adults with prediabetes to prevent progression to type 2 diabetes. Arthritis is a barrier to physical activity among adults with chronic conditions.

What is added by this report?

The unadjusted prevalence of arthritis among adults with prediabetes was 32.0%. The unadjusted prevalences of physical inactivity and obesity among adults with these conditions were 56.5% and 50.1%, respectively.

What are the implications for public health practice?

Increasing physical activity and promoting weight loss can reduce risk for type 2 diabetes and improve pain management among adults with prediabetes and arthritis. Health care and public health professionals can address arthritis-specific barriers to physical activity among adults with prediabetes by promoting evidence-based arthritis interventions.

Program and other evidence-based, community programs. Several community groups and self-directed physical activity programs are available for adults with arthritis (e.g., EnhanceFitness, Walk with Ease, Active Living Every Day, and tai chi [*9*]) and can address arthritis-specific barriers to being physically active among adults by reducing joint pain, which in turn might increase physical activity. Community-based organizations, including the National Recreation and Parks Association¶¶ and the YMCA,*** disseminate these and other evidence-based physical activity programs throughout the United States. A meta-analysis of chronic disease self-management programs indicated short-term and sustained increases in aerobic physical activity and reduced joint pain (*10*).

The findings in this report are subject to at least four limitations. First, NHANES is a cross-sectional study, and, therefore, temporal relationships cannot be established between prediabetes and arthritis. Second, most characteristics examined were self-reported, and diagnosis for arthritis was not confirmed by a health care professional. In addition, self-reported variables, such as leisure-time physical activity, might be subject to social desirability bias. Third, the measure of physical inactivity excludes occupational physical activity, which for some persons might be their only form of physical activity. Finally, these findings cannot distinguish among the types of arthritis.

Approximately 26 million adults with prediabetes (about one in three) have arthritis, and approximately half of those with

¶¶ https://www.nrpa.org/our-work/partnerships/initiatives/healthy-aging-in-parks/.
*** http://www.ymca.net/enhancefitness/.

both conditions are physically inactive or have obesity. Health care and public health professionals can address arthritis-specific barriers to being physically active among adults with prediabetes by promoting evidence-based arthritis interventions, including programs such as EnhanceFitness, Walk with Ease, Active Living Every Day, and tai chi. Furthermore, increased dissemination of the National Diabetes Prevention Program can potentially reduce the risk for developing type 2 diabetes among adults with arthritis and assist them with managing their pain from arthritis.

Corresponding author: Michelle Sandoval-Rosario, ftv2@cdc.gov, 602-364-4810.

[1]Division of Population Health, CDC; [2]Arizona Department of Health Services; [3]Division of Diabetes Translation, CDC; [4]Cetechs, Mesa, Arizona.

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Progress Toward Poliomyelitis Eradication — Pakistan, January 2017–September 2018

Christopher Hsu, MD, PhD[1]; Abdirahman Mahamud, MD[2]; Muhammad Safdar, MD[3]; Joanna Nikulin, MD[4]; Jaume Jorba, PhD[5]; Kelley Bullard, MS[6]; John Agbor, MD[7]; Milhia Kader, MD[1]; Salmaan Sharif, PhD[8]; Jamal Ahmed, MD[9]; Derek Ehrhardt, MPH, MSN[1]

Among the three wild poliovirus (WPV) serotypes, only WPV type 1 (WPV1) has been reported in polio cases or detected from environmental surveillance globally since 2012. Pakistan remains one of only three countries worldwide (the others are Afghanistan and Nigeria) that has never had interrupted WPV1 transmission. This report documents Pakistan's activities and progress toward polio eradication during January 2017–September 2018 and updates previous reports (*1*,*2*). In 2017, Pakistan reported eight WPV1 cases, a 60% decrease from 20 cases in 2016. As of September 18, 2018, four cases had been reported, compared with five cases at that time in 2017. Nonetheless, in 2018, WPV1 continues to be isolated regularly from environmental surveillance sites, primarily in the core reservoir areas of Karachi, Quetta, and Peshawar, signifying persistent transmission. Strategies to increase childhood immunity have included an intense schedule of supplemental immunization activities (SIAs), expanding and refining deployment of community-based vaccination implemented by community health workers recruited from the local community in reservoir areas, and strategic placement of permanent transit points where vaccination is provided to mobile populations. Interruption of WPV1 transmission will require further programmatic improvements throughout the country with a focus on specific underperforming subdistricts in reservoir areas.

Oral Poliovirus Vaccine (OPV) Coverage and Immunization Activities

OPV coverage. Based on World Health Organization (WHO) and United Nations Children's Fund (UNICEF) estimates for 2017, routine vaccination coverage of infants in Pakistan with 3 doses of oral poliovirus vaccine (OPV3) by age 1 year was 75%, the same as for 2016 (*3*). Variation in OPV3 coverage among provinces is high; the highest reported administrative OPV3 coverage rates in 2017 (based on records from vaccination sites) were in Azad Jammu and Kashmir (95%) and Islamabad (91%), and the lowest were in Balochistan (35%) and the Khyber Pakhtunkhwa Tribal Districts (KP-TD) (50%).

Vaccination history (based on vaccination cards or parental recall) of children aged 6–23 months with acute flaccid paralysis (AFP) who tested negative for poliovirus (nonpolio AFP) is used as a surrogate estimate of OPV coverage in the target populations; the focus is on children who never received OPV through SIAs or routine immunization services (i.e., zero-dose children). Provinces with the highest percentage of zero-dose children were Balochistan in 2016 (2%), Gilgit-Baltistan in 2017 (15%), and Balochistan, Azad Jammu and Kashmir, Islamabad, and Gilgit-Baltistan in 2018 (each 1%).

Supplementary immunization activities. During January 2017–September 2018, nine nationwide SIAs and eight subnational SIAs were conducted using bivalent OPV (bOPV [types 1 and 3]) in addition to 35 small-scale SIAs in response to isolation of WPV1 from environmental surveillance and persons with AFP. Two SIA rounds using injectable inactivated poliovirus vaccine (IPV) combined with bOPV were implemented in the high-risk districts and core reservoirs, targeting 3,081,900 children in 2017 and 1,287,835 children in 2018 in Balochistan, KP-TD, and Karachi. The quality of SIAs is assessed in subdistricts (Union Councils) by post-campaign monitoring surveys, which are not random, and lot quality assurance surveys that are implemented using a random selection of clusters. Both methods have indicated high overall SIA quality, but there are some Union Councils noted to underperform frequently.

Community-based vaccination and permanent transit points. Locally recruited community health workers in selected districts of core reservoir areas are responsible for vaccinating children within their communities during and between SIAs through engagement with local leaders and community members. As of August 2018, a total of 18,153 community health workers have been deployed in 16 districts in KP-TD, Balochistan, and Sindh; 85% of these community health workers are women, who can more easily enter homes in these culturally and religiously conservative areas than can men. Establishment of permanent transit points is an intervention aimed at identifying and vaccinating children in mobile populations at high risk. There are currently 1,106 permanent transit points strategically placed along major domestic migration routes and at transport hubs in all provinces and at the Afghanistan official border crossings.

Surveillance Activities

AFP surveillance. During January–December 2017, all provinces exceeded the target nonpolio AFP rate of two cases per 100,000 population aged <15 years and the 80% target proportion of AFP cases with collection of adequate specimens (Table). During January 2017−September 2018, the national

TABLE. Acute flaccid paralysis (AFP) surveillance indicators and reported cases of wild poliovirus (WPV), by province and period — Pakistan, January 2017–September 2018

Province	AFP surveillance indicators (January–December 2017)			Reported WPV cases			
	No. of AFP cases	Nonpolio AFP rate*	% with adequate specimens†	Jan–Jun 2017	Jul–Dec 2017	Jan–Sep 2018	Total
Pakistan total	**10,318**	**12.4**	**86**	**3**	**5**	**4**	**12**
Azad Jammu Kashmir	179	10.0	83	0	0	0	**0**
Gilgit-Baltistan	531	12.1	93	1	0	0	**1**
Islamabad	107	18.4	87	0	0	0	**0**
KP-TD	2,103	17.7	82	0	1	1	**2**
Punjab	4,549	10.3	87	1	0	0	**1**
Balochistan	531	13.6	84	1	2	3	**6**
Sindh	2,184	11.5	87	0	2	0	**2**
FATA	606	30.0	88	0	0	0	**0**

Abbreviations: FATA = Federally Administered Tribal Areas; KP-TD = Khyber Pakhtunkhwa Tribal Districts.
* Per 100,000 children aged <15 years.
† Two stool specimens collected at an interval of at least 24 hours within 14 days of paralysis onset and properly shipped to the laboratory.

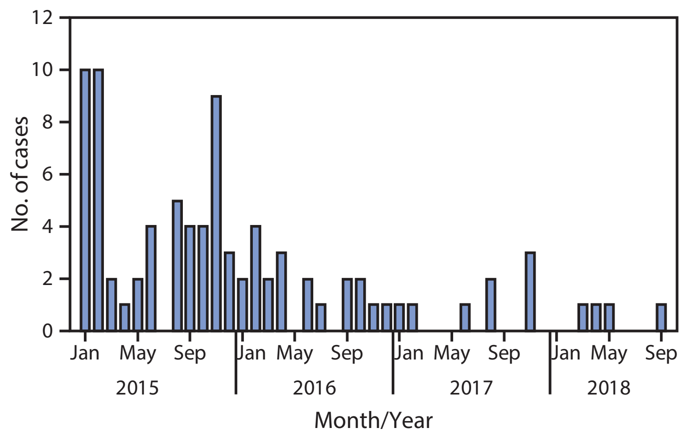
NPAFP rate was 12.9, ranging from 11.5 to 24.1 among provinces; the percentage of AFP cases with adequate stool specimens was 89% nationally, ranging from 87% to 95% among provinces.

Environmental surveillance. Environmental surveillance supplements AFP surveillance through systematic, strategic sewage sampling tested for poliovirus, currently at 59 sites. Thirty-nine (66%) of these sites have been sampled monthly during 2016–2018. Although the number of WPV1 cases in Pakistan decreased during January 2016–September 2018, the number and proportion of samples from these 39 environmental surveillance sites that tested positive for WPV1 have not substantially changed: 60 (13%) in 2016, 89 (19%) in 2017, and 53 (17%) from January–August 2018, primarily in Karachi, the Quetta block (Pishin, Killa Abdullah, and Quetta districts), and Peshawar.

Epidemiology of WPV1 Cases

During 2017, eight WPV1 cases were reported in Pakistan, a 60% decrease from the 20 cases reported in 2016 (Figure 1). Four WPV1 cases have been reported during January–September 2018 in two districts (Dukki in Balochistan and Charsada in KP-TD), compared with five WPV1 cases during the same period in 2017 in five districts. Of the eight WPV1 cases reported in 2017, one was reported from each of three provinces (KP-TD, Gilgit Baltistan, and Punjab), two from Sindh, and three from Balochistan (Figure 2). Of the 20 WPV1 cases reported in 2016, eight (40%) were from KP-TD, eight (40%) from Sindh, two (10%) from Federally Administered Tribal Areas, and two (10%) from Balochistan. The ages of the 12 children with WPV1 cases reported during January 2017–September 2018 ranged from 4 to 38 months. Based on parental recall, none of the 2018 cases occurred in zero-dose children; all had received OPV during SIAs (from 3 to >7 doses), and one had received three OPV doses and one IPV dose through routine immunization services. During the same period in 2017, one child with WPV1 (20%) had received zero doses, one (20%) child had received only SIA doses, and three children (60%) received doses from routine immunization services and during SIAs.

FIGURE 1. Number of cases of wild poliovirus type 1, by month — Pakistan, January 2015–September 2018

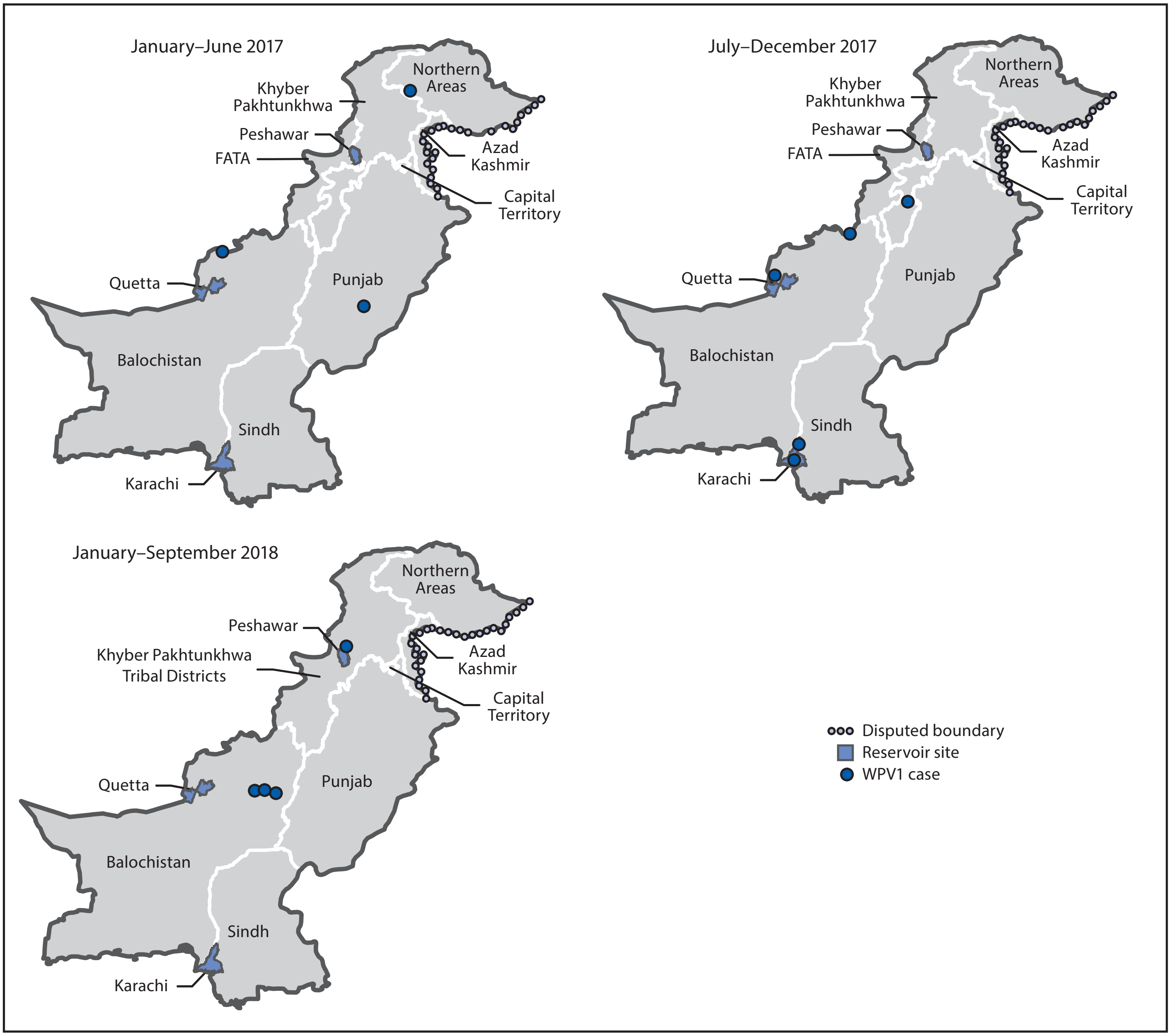


Discussion

Maintaining intensively scheduled SIAs with high overall quality indicators has been associated with the trend of decreasing WPV1 cases in Pakistan. At the same time, AFP surveillance and environmental surveillance sampling indicate the persistence of WPV1 transmission in 2018 in three key reservoirs. WPV1 transmission in those reservoirs will not be interrupted without fully addressing low SIA quality and weak routine immunization services in specific Union Councils.

Despite advances over previous years, parental refusals of OPV vaccination have increased and pose a substantial challenge to reaching all children in core WPV reservoir areas (*4*).

FIGURE 2. Location of cases of wild poliovirus type 1 (WPV1), by province and period — Pakistan, January 2017–September 2018



Abbreviation: FATA = Federally Administered Tribal Areas.

To address this growing trend, an aggressive communication strategy has been implemented through traditional and social media as well as targeted engagement with communities and their opinion leaders. The main factors contributing to mounting refusals have been the recent rapid spread of misconceptions about overall vaccine safety and efficacy and demand for basic services other than polio vaccination (e.g., clean water, maternal health services, and adult health needs) in marginalized urban communities. Frontline vaccinators are the key to reaching caregivers in households, and with enhanced communications messages, they can better counter these increasing vaccine refusals. Polio eradication partners are working with development agencies to address the demand for basic services in critical areas within the reservoirs.

Mass cross-border population movements from Afghanistan and internal migrant populations within Pakistan pose a challenge to vaccinating children. Although progress has been made in identifying and tracking mobile populations at high risk

Summary

What is already known about this topic?

Pakistan remains one of three countries (along with Afghanistan and Nigeria) where wild poliovirus type 1 (WPV1) transmission has never been interrupted.

What is added by this report?

During January 2017-September 2018, WPV1 cases in Pakistan continued to decrease compared with previous periods. However, environmental surveillance continues to detect polioviruses, an indication of children who were missed for immunization, as well as poor vaccination program performance.

What are the implications for public health practice?

Stopping WPV1 transmission will require further enhancing the quality of vaccination and surveillance, augmenting cross-border coordination with Afghanistan, strengthening efforts to reach mobile populations at high risk, and focusing on poor-performing areas.

and vaccinating children at permanent transit points on major routes, these strategies can be further enhanced to overcome current challenges (e.g., refusals and failure to address travel in all directions by some teams).

In 2018, as of September 18, a total of 13 WPV1 cases have been reported in neighboring Afghanistan. The geographic locations of these cases are in two major cross-border migration areas between Afghanistan and Pakistan, forming corridors into each country: the Northern Corridor includes KP-TD Province in Pakistan, and the Southern Corridor includes Balochistan (*5*). Genetic sequencing data from environmental isolates indicate that the WPV1 found in Pakistan has also been detected in neighboring provinces in Afghanistan. Genomic sequence analysis of WPV1 isolated from patients with AFP has also shown linked cross-border transmission. For several years, the two countries have been fully synchronizing SIAs and conducting regular bilateral meetings through respective national and provincial Emergency Operation Centers to share data on migrant movements; however, efforts to improve bilateral coordination must be further pursued to ensure optimal vaccination of migrant populations.

Ending WPV1 transmission in Pakistan will require continuing overall high-quality SIAs and improving routine immunization services. It will also require assessing and augmenting supplemental and routine vaccination activities in poor-performing Union Councils in each reservoir.

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Corresponding author: Christopher Hsu, chsu@cdc.gov, 404-639-4526.

[1]Global Immunization Division, Center for Global Health, CDC; [2]World Health Organization, Islamabad, Pakistan; [3]National Emergency Operation Center, Islamabad, Pakistan; [4]World Health Organization, Amman, Jordan; [5]Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, CDC; [6]IHRC, Inc, Atlanta, Georgia; [7]United Nations Children's Fund, Islamabad, Pakistan; [8]Department of Virology, National Institute of Health, Islamabad, Pakistan; [9]World Health Organization, Geneva, Switzerland.

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Notes from the Field

Increase in Coccidioidomycosis — Arizona, October 2017–March 2018

Carla P. Bezold, ScD[1,2,3]; Mohammed A. Khan, MSPH[2,4]; Guillermo Adame, MPH[2]; Shane Brady, MPH[2]; Rebecca Sunenshine, MD[3,5]; Ken Komatsu, MPH[2]

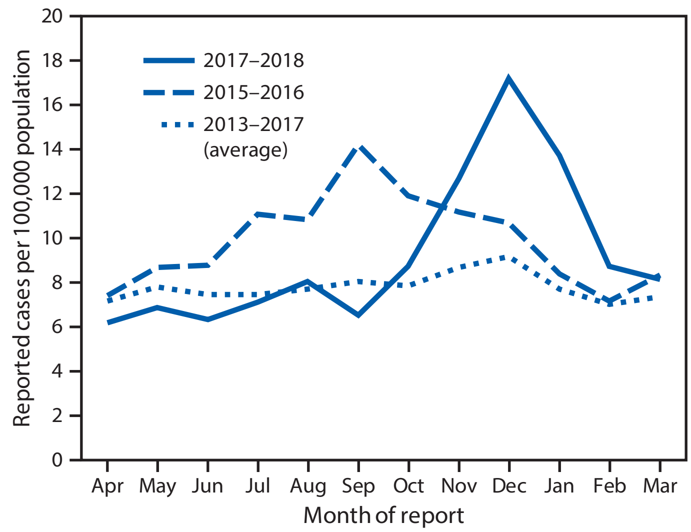
Beginning in October 2017, the Arizona Department of Health Services (ADHS) noted an increase in the number of reported cases of coccidioidomycosis (Figure). According to provisional data (not finalized), the incidence in December 2017 (17.2 per 100,000 population) represented the highest monthly rate in the last 5 years, surpassing the previous peak of 14.2 cases per 100,000 population in September 2015. In total, 4,827 cases of coccidioidomycosis were reported to ADHS during October 2017–March 2018. Whereas case counts typically increase during these months, this particular period represented a 58.3% increase over the 3,050 cases reported during the same months the previous year and a 50.3% increase over the 6-month average of 3,211 cases reported during October–March for the years 2013–2017.

Coccidioidomycosis (Valley fever) is an infectious disease caused by inhalation of *Coccidioides* spores; approximately 40% of infected persons experience signs and symptoms including fever, cough, fatigue, chest pain, shortness of breath, and rash. *Coccidioides* is endemic in soil in the southwestern United States (*1*). The majority of reported U.S. coccidioidomycosis cases occur in Arizona (*2*), and incidence is seasonal: the highest number of reported cases in Arizona typically occurs during the fall and winter months.* Because of the high number of cases in Arizona and the high predictive value of a positive laboratory result, Arizona's coccidioidomycosis case definition requires only laboratory evidence to confirm a case (*3*). Laboratory evidence can include detection of anticoccidioidal immunoglobulin M (IgM) or immunoglobulin G (IgG) antibodies; culture, histopathologic, or molecular evidence of *Coccidioides* spp.; or coccidioidal skin test conversion after illness onset.

During October 2017–March 2018, the median age of persons with reported coccidioidomycosis was 56 years (interquartile range [IQR] = 39–69 years); approximately half (50.5%) of patients were male. Age and sex distributions were similar to those observed during October 2016–March 2017, with a median age of 57 years, (IQR = 40–69); 51.2% of patients were male. Approximately 90% of persons with reported coccidioidomycosis in Arizona reside in the three most populous counties (Maricopa, Pima, and Pinal). During

* https://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/valley-fever/reports/valley-fever-2016.pdf.

FIGURE. Monthly incidence of coccidioidomycosis — Arizona, April 2013–March 2018



October 2017–March 2018, 3,674 cases were reported in Maricopa County (87.0 cases per 100,000 population), a 70.5% increase over the 2,157 cases (52.0 per 100,000 population) reported during the same period the preceding year. The number of reported cases and incidence also increased, but less sharply, in Pima County (31.5% increase, 601 cases, 58.6 per 100,000 population versus 457 cases, 45.1 per 100,000 population the preceding year) and Pinal County (29.5% increase, 329 cases, 76.9 per 100,000 population versus 254 cases, 61.5 per 100,000 population).

To evaluate the possibility of laboratory or reporting artifact, data were reviewed to assess the proportion of cases that were coccidioidomycosis-positive by enzyme immunoassay (EIA) for IgM antibodies alone. EIA IgM alone has been reported to have lower specificity in some circumstances compared with other testing methods (*4*). There were 4,638 cases reported during October 2017–March 2018 where the type of laboratory test used could be classified; 602 (13.0%) tested positive by EIA IgM alone, compared with 316 of 2973 (10.6%) during the same months 1 year before. This slightly higher proportion of cases testing positive by EIA IgM alone is insufficient to explain the magnitude of the increase in cases during October 2017–March 2018. No known changes in provider or laboratory reporting occurred during this time.

Reasons for the current increase in reported coccidioidomycosis are unknown but might include weather and environmental factors, including precipitation, which can facilitate growth of *Coccidioides*, followed by high temperatures and drought, which can facilitate distribution (*5*). Preliminary data suggest that 2017 was uncharacteristically warm and dry in central Arizona.[†] In addition, during 2016–2017, Maricopa County experienced the largest population gain of any county in the United States.[§] An increase in the number of susceptible persons and dust disturbance, resulting from increased residential construction, might have contributed to the increased incidence of coccidioidomycosis. Further investigation of the causes of increased coccidioidomycosis in areas with endemic transmission is crucial to informing strategies to prevent disease and educate providers and the public regarding the importance of appropriate diagnosis and management of coccidioidomycosis.

[†] https://www.weather.gov/psr/Year_in_Review_2017.
[§] https://www.census.gov/newsroom/press-releases/2018/popest-metro-county.html.

Corresponding author: Carla P. Bezold, Carla.Bezold@azdhs.gov, 602-290-3514.

[1]Epidemic Intelligence Service, CDC; [2]Arizona Department of Health Services, Phoenix, Arizona; [3]Maricopa County Department of Public Health, Phoenix, Arizona; [4]Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, Georgia; [5]Career Epidemiology Field Officer Program, CDC.

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Notes from the Field

Cronobacter sakazakii Meningitis in a Full-Term Neonate Fed Exclusively with Breast Milk — Indiana, 2018

Madhura Sundararajan, MPH[1]; Leslie A. Enane, MD[2]; Laurie A. Kidwell[1]; Ryan Gentry, MPH[1]; Stanley Danao[1]; Samina Bhumbra, MD[2]; Christopher Lehmann, MD[3]; Megan Teachout[1]; Jamie Yeadon-Fagbohun[1]; Peter Krombach, MPH[1]; Betsy Schroeder, DVM[4]; Haley Martin[5]; Jonathan Winkjer[5]; Thomas Waltz[5]; Jonathan Strysko, MD[4,5]; Jennifer R. Cope, MD[5]

In January 2018, the Indiana State Department of Health (ISDH) was notified of a case of *Cronobacter sakazakii* meningitis in a female neonate who had been fed exclusively maternal breast milk. The infant was born by induced vaginal delivery at 37 weeks' gestational age. She was discharged from the newborn nursery after 2 days and was clinically well until age 8 days, when she was admitted with poor feeding, fever of 100.4°F (38°C), and abnormal movements. Electroencephalography demonstrated multifocal seizures; MRI demonstrated multifocal restricted diffusion, leptomeningeal enhancement, and patchy hemorrhagic areas. Cultures from blood and cerebrospinal fluid yielded *C. sakazakii*, a gram-negative pathogenic bacillus. She was initially treated with meropenem, gentamicin, and antiepileptics to control seizures; when antibiotic sensitivity results were available, the antimicrobial regimen was narrowed to cefepime to complete a 21-day course. She was discharged home at age 33 days with early intervention therapies for global hypotonia and close monitoring of her development.

From birth until illness onset, the infant was fed exclusively maternal breast milk, both at the breast and expressed. Breast milk was expressed using a personal electric breast pump and was not combined with any additives such as fortifier or infant formula. The breast pump and flanges were wiped with a baby wipe after each use and occasionally cleaned with soap and water. When the bottles and pump parts were cleaned, they were disassembled, hand-scrubbed, and air-dried on a towel next to the sink; they were periodically sanitized either by boiling or in a microwave steam bag.

ISDH, in partnership with clinicians from the hospital and CDC, conducted an investigation to identify the source of infection. Items and materials tested included the cerebrospinal fluid isolate, four samples of expressed breast milk, and the breast pump kit and parts from the patient's home. In addition, kitchen environmental surfaces were sampled using sponges that were submitted for testing. *C. sakazakii* was isolated from expressed breast milk samples, the breast pump kit, and samples obtained from the sink, drain, and drying area next to the sink. Pulsed field gel electrophoresis (PFGE) was performed on all *C. sakazakii* isolates using the PulseNet *Cronobacter* protocol (https://www.cdc.gov/pulsenet/pdf/cronbacter-pfge-protocol-508c.pdf). Environmental isolates were indistinguishable or differed by one band by PFGE from the clinical isolate.

C. sakazakii infection is rare and can cause sepsis and severe meningitis, associated with high morbidity and mortality, in infants fed powdered infant formula (*1*). Infection in breast-fed infants is rare but has recently been reported in two preterm neonates in association with contaminated breast pump parts (*2*,*3*). This case demonstrates the potential for invasive infection with this emerging pathogen in healthy full-term neonates fed exclusively maternal breast milk. This organism can grow rapidly in expressed breast milk without added formula (*4*). This case provides additional evidence that, although rare, expressed breast milk contaminated with *C. sakazakii* can cause life-threatening invasive infection in neonates (*2*,*3*). Although the source of contamination in this case is unknown, as was reported in the other cases, the breast pump kit became contaminated with *C. sakazakii* (*2*,*3*). Because human milk is the optimal nutrition for neonates, clinicians should proactively support and educate new parents about the importance of breast pump hygiene. Breast pump kits should be taken apart and cleaned either by hand with soap and water or in the dishwasher after every use. Parents should consider sanitizing breast pump kits daily by boiling or steaming, especially if their infant is aged <3 months, was born prematurely, or has a compromised immune system (*5*).

Corresponding author: Madhura Sundararajan, MSundararajan@isdh.IN.gov, 317-234-6312.

[1]Indiana State Department of Health; [2]The Ryan White Center for Pediatric Infectious Disease and Global Health, Indianapolis, Indiana; [3]Departments of Medicine and Pediatrics, Indiana University School of Medicine, Indianapolis, Indiana; [4]Epidemic Intelligence Service, CDC; [5]Division of Foodborne, Waterborne, and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC.

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Erratum

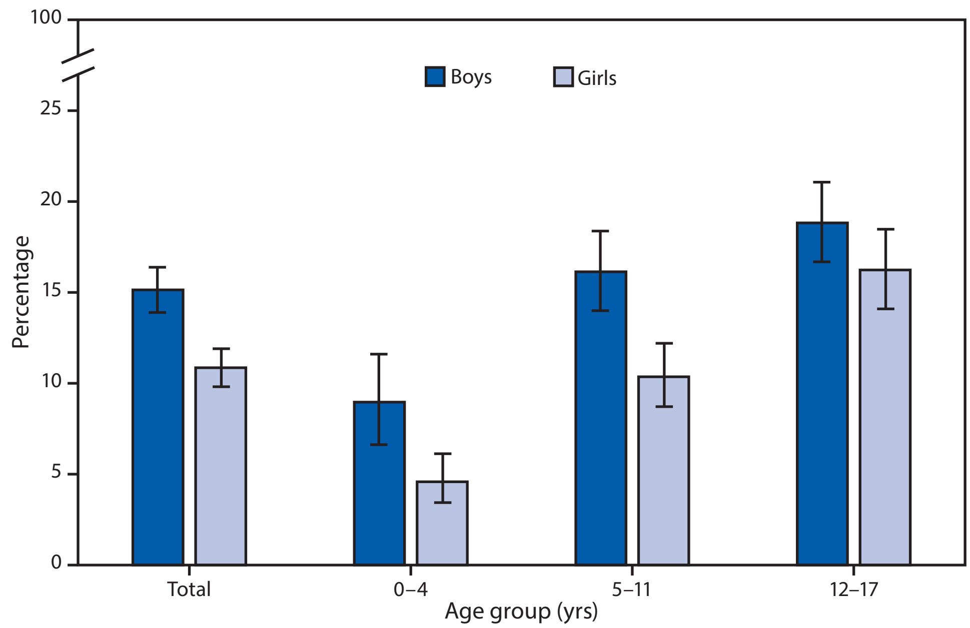
Vol. 67, No. 42

In the report "Translocation of a Stray Cat Infected with Rabies from North Carolina to a Terrestrial Rabies-Free County in Ohio, 2017," on page 1176, the first complete sentence on that page (second sentence of the discussion) should have read "The raccoon RVV is found in 19 states in the eastern United States, but in only several counties in northeast Ohio that border Pennsylvania; Summit County is not considered enzootic for **raccoon** RVV."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage* of Children Having a Problem for Which Prescription Medication Has Been Taken Regularly for ≥3 Months,† by Age Group and Sex — National Health Interview Survey, United States, 2017§



* Percentages shown with 95% confidence intervals.
† Based on the response of "yes" to the survey question, "Does [child's name] now have a problem for which [he/she] has regularly taken prescription medication for at least three months?"
§ Estimates are based on household interviews of a sample of the civilian, noninstitutionalized U.S. population and are derived from the National Health Interview Survey sample child component.

In 2017, the percentage of children who had a problem for which prescription medication had been taken regularly for ≥3 months increased with increasing age. Among boys the percentage ranged from approximately 8% of those aged 0–4 years to nearly 19% of those aged 12–17. Among girls the percentage ranged from approximately 5% of those aged 0–4 years to 16% of those aged 12–17. Overall, boys were more likely than girls to have had a problem for which prescription medication had been taken regularly for ≥3 months.

Source: National Health Interview Survey, 2017 data. https://www.cdc.gov/nchs/nhis.htm.

Reported by: Lindsey I. Black, MPH, LBlack1@cdc.gov, 301-458-4548; Patricia Barnes, MA.

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