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Screening for Excessive Alcohol Use and Brief Counseling of Adults — 17 States and the District of Columbia, 2014

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Excessive and/or risky alcohol use* resulted in $249 billion in economic costs in 2010 (*1*) and >88,000 deaths in the United States every year from 2006 to 2010 (*2*). It is associated with birth defects and disabilities (e.g., fetal alcohol spectrum disorders [FASDs]), increases in chronic diseases (e.g., heart disease and breast cancer), and injuries and violence (e.g., motor vehicle crashes, suicide, and homicide).† Since 2004, the U.S. Preventive Services Task Force (USPSTF) has recommended alcohol misuse screening and brief counseling (also known as alcohol screening and brief intervention or ASBI) for adults aged ≥18 years (*3*).§ Among adults, ASBI reduces episodes of binge-level consumption, reduces weekly alcohol consumption, and increases compliance with recommended drinking limits in those who have an intervention in comparison to those who do not (*3*). A recent study suggested that health care providers rarely talk with patients about alcohol use (*4*). To estimate the prevalence of U.S. adults who reported receiving elements of ASBI, CDC analyzed 2014 Behavioral Risk Factor Surveillance System (BRFSS) data from 17 states¶ and the District of Columbia (DC). Weighted crude and age-standardized overall

* Excessive drinking is defined as binge drinking (≥4 drinks for women, ≥5 drinks for men on an occasion), high weekly consumption (≥8 drinks for women, ≥15 drinks for men in a week), and any drinking by pregnant women or persons aged <21 years. https://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm. Risky drinking includes exceeding daily and/or per occasion limits (≥4 drinks for women, ≥5 drinks for men on an occasion or in a day) and/or exceeding weekly drinking limits. Further, pregnant women and persons aged <21 years are recommended to not drink at all, and for them, any use is considered risky. Persons prescribed certain medications, or with some medical diagnoses, or engaging in some activities that might be negatively affected by alcohol use might need to drink less and communicate with their health professional about drinking in relation to their health. https://www.cdc.gov/ncbddd/fasd/documents/alcoholsbiimplementationguide.pdf.

† World Health Organization. Global Status Report on Alcohol and Health 2014. https://www.who.int/substance_abuse/publications/global_alcohol_report/en/.

§ Per the 2013 USPSTF recommendation for alcohol misuse screening and counseling. https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/alcohol-misuse-screening-and-behavioral-counseling-interventions-in-primary-care. The USPSTF considers three tools as instruments of choice for screening for alcohol misuse in the primary care setting: Alcohol Use Disorders Identification Test (AUDIT) (http://apps.who.int/iris/bitstream/10665/67205/1/WHO_MSD_MSB_01.6a.pdf), AUDIT-Consumption (AUDIT-C), and single-question screener (for example, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) recommends asking, "How many times in the past year have you had 5 [for men] or 4 [for women and all adults aged ≥65 years] or more drinks in a day?)" These measures include binge-level alcohol consumption occurring on an occasion or in a day.

¶ Connecticut, Florida, Hawaii, Indiana, Kansas, Kentucky, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Mexico, New York, Oregon, Texas, Washington, and Wisconsin.

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and state-level prevalence estimates were calculated by selected drinking patterns and demographic characteristics. Overall, 77.7% of adults (age-standardized estimate) reported being asked about alcohol use by a health professional in person or on a form during a checkup, but only 32.9% reported being asked about binge-level alcohol consumption (*3*). Among binge drinkers, only 37.2% reported being asked about alcohol use and advised about the harms of drinking too much, and only 18.1% reported being asked about alcohol use and advised to reduce or quit drinking. Widespread implementation of ASBI and other evidence-based interventions could help reduce excessive alcohol use in adults and related harms.

BRFSS is an ongoing state-based, random-digit–dialed telephone survey of the noninstitutionalized U.S. adult population aged ≥18 years. Information is collected on a variety of health conditions, health practices, and risk behaviors, including alcohol use. CDC analyzed 2014 data from 17 states and DC that administered an optional five-question ASBI module.** All respondents were asked three alcohol use screening–related questions: 1) "You told me earlier that your last routine checkup was [within the past year/within the past 2 years]. At that checkup, were you asked in person or on a form if you drink alcohol?"; 2) "Did the healthcare provider ask you in person or on a form how much you drink?"; 3) "Did the healthcare provider specifically ask whether you drank [5 for men/4 for women] or more alcoholic drinks on an occasion?" All respondents were also asked, "Were you offered advice about what level of drinking is harmful or risky for your health?" Finally, persons who responded affirmatively to any of the first three aforementioned questions were asked, "Healthcare providers may also advise patients to drink less for various reasons. At your last routine checkup, were you advised to reduce or quit your drinking?" Binge drinkers were identified by their response to the question, "Considering all types of alcoholic beverages, how many times during the past 30 days did you have [5 for men/4 for women] or more drinks on an occasion?" Analyses were conducted to account for the complex sampling design. Weighted crude and age-standardized overall and state-level prevalence estimates were calculated by selected drinking patterns and demographic characteristics. Only age-standardized estimates are reported in the results section of this report. Wald chi square tests were used to determine significant within-group differences. Only significant differences are reported. The median cooperation rate for the 18 sites was 65.8%†† and median response rate was 42.7%.§§

** The module lead-in question was "Healthcare providers may ask during routine checkups about behaviors like alcohol use, whether you drink or not. We want to know about their questions."

†† The American Association of Public Opinion Research Cooperation Rate is the number of complete and partial interviews divided by the number of contacted and eligible respondents. https://www.cdc.gov/brfss/annual_data/2014/pdf/2014_DQR.pdf.

§§ A Response Rate is an outcome rate with the number of complete and partial interviews in the numerator and an estimate of the number of eligible units in the sample in the denominator. https://www.cdc.gov/brfss/annual_data/2014/pdf/2014_DQR.pdf.

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Overall, 77.7% of persons reported being asked about alcohol use in person or by form, 68.8% reported being asked how much they drink, and 32.9% reported being asked about binge drinking (Table 1). The prevalence of being asked about binge drinking was higher among males (35.0%), persons with less than a high school diploma (40.1%), and binge drinkers (36.8%) in comparison to their counterparts. Non-Hispanic whites and Asian/Pacific Islanders were asked about binge drinking less than were non-Hispanic blacks, Hispanics, and American Indian/Alaskan Natives.

Among binge drinkers, 37.2% reported being asked at least one of the alcohol use screening–related questions and advised about levels of drinking harmful or risky to their health (Table 2); prevalence was higher among males (43.8%) than females (27.6%) and among binge drinkers with disabilities

TABLE 1. Weighted crude and age-standardized* prevalence of U.S. adults who reported being asked an alcohol use screening–related question by a health care provider at last routine checkup in the past 2 years — Behavioral Risk Factor Surveillance System, 17 states and the District of Columbia,† 2014

Characteristic	Asked about alcohol use (affirmative to question 1)			Asked how much alcohol (affirmative to question 2)			Asked about binge drinking (affirmative to question 3)		
	Sample size	Crude % (95% CI)	Age-standardized % (95% CI)	Sample size	Crude % (95% CI)	Age-standardized % (95% CI)	Sample size	Crude % (95% CI)	Age-standardized % (95% CI)
Total	**97,063**	**76.6 (75.9–77.3)**	**77.7 (76.9–78.5)**	**97,589**	**67.6 (66.8–68.4)**	**68.8 (67.9–69.6)**	**87,457**	**32.1 (31.2–32.9)**	**32.9 (31.9–33.9)**
Sex									
Male	39, 170	76.4 (75.3–77.6)	77.3 (76.1–78.5)	39,224	68.0 (66.8–69.3)	68.7 (67.3–70.1)	35,230	34.2 (32.8–35.6)	35.0 (33.5–36.6)
Female	57,893	76.8 (75.9–77.7)	78.1 (77.1–79.1)	58,365	67.2 (66.2–68.3)	68.9 (67.7–70.0)	52,227	30.3 (29.2–31.4)	31.2 (29.9–32.4)
Age group (yrs)									
18–24	4,350	76.1 (72.7–79.3)	—	4,307	58.9 (55.0–62.6)	—	4,013	24.8 (21.8–28.1)	—
25–34	7,385	84.2 (82.0–86.1)	—	7,265	76.0 (73.4–78.5)	—	6,236	37.5 (34.4–40.7)	—
35–44	10,326	82.3 (80.4–84.0)	—	10,184	75.4 (73.2–77.3)	—	8,536	37.4 (35.0–39.8)	—
45–64	38,930	78.9 (77.9–79.8)	—	38,859	72.0 (70.9–73.0)	—	34,016	34.6 (33.4–35.9)	—
≥65	36,072	64.0 (62.9–65.2)	—	36,974	54.3 (53.1–55.4)	—	34,656	25.2 (24.1–26.3)	—
Race/ethnicity									
White, non-Hispanic	74,533	77.0 (76.2–77.7)	79.2 (78.3–80.1)	75,099	68.8 (67.9–69.6)	71.3 (70.2–72.3)	66,377	29.4 (28.5–30.3)	31.2 (30.0–32.4)
Black, non-Hispanic	5,646	76.9 (74.3–79.3)	76.7 (74.1–79.1)	5,622	65.9 (62.7–68.9)	65.5 (62.2–68.6)	5,287	40.3 (37.1–43.6)	39.4 (36.2–42.7)
Hispanic	7,859	79.4 (77.1–81.5)	78.7 (76.5–80.8)	7,830	68.3 (65.7–70.8)	67.5 (65.1–69.9)	7,384	38.6 (35.8–41.4)	38.5 (35.9–41.3)
Asian/Pacific Islander	2,972	61.4 (56.5–66.1)	60.1 (55.6–64.4)	2,986	51.6 (46.6–56.6)	50.4 (46.1–54.7)	2,852	26.9 (22.3–32.0)	26.3 (22.0–31.2)
American Indian/Alaskan Native	1,788	79.0 (72.4–84.3)	79.3 (73.0–84.4)	1,799	70.2 (62.9–76.6)	68.6 (61.1–75.1)	1,695	39.8 (32.9–47.1)	39.4 (32.7–46.5)
Other non-Hispanic race or multiracial	2,873	76.7 (70.8–81.8)	76.0 (71.0–80.4)	2,862	67.7 (61.1–73.7)	68.9 (63.2–74.1)	2,607	34.6 (28.8–40.8)	37.2 (32.1–42.6)
Education level									
Less than high school diploma	6,793	72.7 (69.9–75.2)	74.0 (71.2–76.6)	6,790	62.5 (59.5–65.3)	64.0 (60.9–67.0)	6,569	39.6 (36.6–42.6)	40.1 (36.9–43.4)
High school diploma	25,748	72.9 (71.4–74.3)	74.9 (73.3–76.5)	26,048	61.9 (60.3–63.6)	64.6 (62.8–66.4)	24,250	31.7 (30.1–33.4)	33.4 (31.5–35.4)
College or tech school	64,200	79.3 (78.5–80.1)	80.0 (79.1–80.8)	64,425	71.5 (70.6–72.4)	72.1 (71.0–73.1)	56,334	30.4 (29.4–31.4)	31.0 (29.8–32.2)
Disability status§									
Yes	28,117	74.8 (73.4–76.2)	77.7 (75.5–79.7)	28,450	67.3 (65.8–68.7)	71.2 (69.0–73.4)	26,240	33.4 (31.8–35.0)	35.0 (32.3–37.7)
No	68,208	77.3 (76.4–78.1)	77.7 (76.9–78.6)	68,402	67.8 (66.8–68.7)	68.4 (67.4–69.4)	60,566	31.6 (30.6–32.7)	32.3 (31.2–33.4)
Insurance coverage									
Yes	91,808	76.6 (75.8–77.3)	78.0 (77.2–78.8)	92,362	67.8 (67.0–68.6)	69.3 (68.3–70.2)	82,623	31.7 (30.8–32.6)	32.7 (31.6–33.7)
No	5,004	77.7 (74.8–80.3)	74.7 (71.8–77.5)	4,973	66.4 (63.1–69.5)	64.2 (61.0–67.3)	4,588	35.6 (32.3–39.0)	35.9 (32.8–39.2)
Current drinker									
Yes	50,422	81.3 (80.4–82.2)	81.6 (80.6–82.6)	50,492	74.4 (73.3–75.4)	74.3 (73.2–75.5)	43,641	32.3 (31.1–33.5)	32.3 (31.1–33.6)
No	45,417	71.4 (70.3–72.5)	73.5 (72.3–74.7)	45,859	60.1 (58.9–61.4)	62.8 (61.4–64.2)	42,716	31.8 (30.5–33.1)	33.6 (32.1–35.1)
Binge drinker¶									
Yes	11,365	84.7 (83.0–86.3)	83.9 (82.3–85.4)	11,248	76.2 (74.0–78.2)	76.6 (74.7–78.4)	9,787	35.7 (33.4–38.1)	36.8 (34.6–39.0)
No	83,866	75.4 (74.6–76.2)	76.9 (76.0–77.7)	84,496	66.3 (65.4–67.1)	67.8 (66.8–68.8)	76,034	31.5 (30.5–32.4)	32.7 (31.6–33.8)

Abbreviation: CI = confidence interval.

* Estimates are age-standardized to the 2000 projected population for the United States.

† Respondents were from 17 states (Connecticut, Florida, Hawaii, Indiana, Kansas, Kentucky, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Mexico, New York, Oregon, Texas, Washington, and Wisconsin) and the District of Columbia.

§ Respondents were asked, "Are you limited in any way in any activities because of physical, mental, or emotional problems?" and "Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed, or a special telephone?" Persons who responded yes to either question were classified as having a disability.

¶ Binge drinkers were defined as respondents who consumed ≥4 drinks per occasion during the preceding 30 days for women and ≥5 drinks for men. An occasion is generally defined as 2–3 hours.

TABLE 2. Weighted crude and age-standardized* prevalence estimates of adult binge drinkers† who reported being asked an alcohol use screening–related question and advised about what level of drinking is harmful or risky for their health/advised to reduce their level of drinking by a health care provider at last routine checkup in the past 2 years — Behavioral Risk Factor Surveillance System, 17 states and District of Columbia,§ 2014

	Binge drinkers asked an alcohol use screening–related question					
	Advised on level of drinking harmful or risky to health			Advised to reduce drinking		
Characteristic	Sample size	Crude % (95% CI)	Age-standardized % (95% CI)	Sample size	Crude % (95% CI)	Age-standardized % (95% CI)
Total	9,620	36.4 (33.8–39.0)	37.2 (34.9–39.6)	9,855	17.3 (15.2–19.7)	18.1 (16.1–20.2)
Sex						
Male	5,436	43.5 (39.8–47.2)	43.8 (40.5–47.1)	5,572	22.6 (19.4–26.1)	22.6 (19.8–25.7)
Female	4,184	25.8 (22.9–29.0)	27.6 (24.6–30.7)	4,283	9.6 (7.8–11.7)	11.4 (9.1–14.2)
Age group (yrs)						
18–24	963	38.7 (30.8–47.3)	—	988	15.3 (8.9–25.0)¶	—
25–34	1,624	32.7 (27.4–38.5)	—	1,657	13.1 (9.5–17.8)	—
35–44	1,640	31.6 (27.0–36.5)	—	1,700	16.6 (12.8–21.3)	—
45–64	4,041	38.0 (34.5–41.7)	—	4,130	20.9 (17.7–24.5)	—
≥65	1,352	46.8 (41.2–52.5)	—	1,380	22.4 (17.8–27.9)	—
Race/ethnicity						
White, non-Hispanic	7,497	36.2 (33.3–39.2)	36.6 (34.0–39.3)	7,701	15.6 (13.1–18.5)	15.9 (13.7–18.5)
Black, non-Hispanic	421	37.8 (28.4–48.2)	39.6 (30.5–49.4)	424	23.0 (16.1–31.8)	25.2 (17.7–34.6)
Hispanic	838	35.0 (28.2–42.5)	37.8 (30.8–45.4)	855	20.8 (15.4–27.4)	23.2 (17.6–29.9)
Asian/Pacific Islander	204	33.8 (19.4–52.1)¶	33.8 (21.3–49.0)¶	207	N/A††	19.4 (11.2–31.4)¶
American Indian/Alaskan Native	190	51.2 (36.3–65.8)	51.2 (38.5–63.8)	187	26.2 (16.2–39.4)¶	33.0 (22.7–45.2)¶
Other non-Hispanic race or multiracial	368	33.8 (23.2–46.5)	41.2 (30.5–52.7)	379	17.9 (11.2–27.3)¶	24.1 (15.9–34.8)¶
Education level						
Less than high school diploma	443	43.1 (33.1–53.7)	44.1 (35.7–52.8)	444	33.6 (24.2–44.6)	31.3 (23.8–39.9)
High school diploma	2,404	37.0 (32.2–42.1)	37.7 (33.3–42.3)	2,443	21.2 (16.9–26.3)	21.4 (17.6–25.8)
College or tech school	6,765	35.1 (32.1–38.3)	35.9 (33.2–38.6)	6,960	13.5 (11.2–16.1)	14.1 (12.2–16.3)
Disability status**						
Yes	1,904	45.4 (39.1–51.9)	46.9 (40.2–53.7)	1,930	30.3 (24.1–37.4)	30.1 (23.8–37.2)
No	7,695	34.4 (31.8–37.2)	35.5 (33.0–38.1)	7,901	14.7 (12.6–17.1)	15.7 (13.6–18.0)

Abbreviations: CI = confidence interval; RSE = relative standard error.

* Estimates are age-standardized to the 2000 projected population for the United States.

† Binge drinkers were defined as respondents who consumed ≥4 drinks per occasion during the preceding 30 days for women and ≥5 drinks for men. An occasion is generally defined as 2–3 hours.

§ Respondents were from 17 states (Connecticut, Florida, Hawaii, Indiana, Kansas, Kentucky, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Mexico, New York, Oregon, Texas, Washington, and Wisconsin) and the District of Columbia. Florida and Massachusetts only obtained landline data.

¶ RSE = 0.20–0.30.

** Respondents were asked, "Are you limited in any way in any activities because of physical, mental, or emotional problems?" and "Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed, or a special telephone?" Persons who responded yes to either question were classified as having a disability.

†† Estimate not available (N/A) if the RSE >0.30.

(46.9%) than among those without disabilities (35.5%). Only 18.1% of binge drinkers who were asked at least one of the alcohol use screening–related questions were advised to reduce their drinking; in this group estimates were higher among males (22.6%) than females (11.4%), among American Indian/Alaska Natives (33.0%) than non-Hispanic whites (15.9%), among persons with a disability (30.1%) than among those without a disability (15.7%), and among persons with less than a high school education (31.3%) than among persons with a college or technical school education (14.1%). By state, the prevalence of binge drinkers being asked at least one of the alcohol use screening–related questions and being advised to reduce drinking ranged from 12.0% in Minnesota to 31.0% in DC (Table 3).

Discussion

In 2014, only one in three binge drinkers was asked about alcohol use and advised about risky or harmful drinking levels. Further, only one in six binge drinkers was asked about alcohol use and advised by a health professional to reduce their drinking. A previous CDC report of 2011 BRFSS data found that only one in six U.S. adults reported ever talking with a health professional about alcohol. Because of differences in the methodologies between this prior study and the current study, including the specific ASBI questions asked, populations assessed, and timeframes of reference for the interaction with the health professional (lifetime or ever versus the last 2 years)

TABLE 3. Age-standardized* prevalence estimates of adult binge drinkers† who reported being asked an alcohol use screening–related question and advised to reduce their level of drinking by a health care provider at last routine checkup in the past 2 years, by state — Behavioral Risk Factor Surveillance System, 17 states and District of Columbia, 2014

State/District	Sample size	Prevalence % (95% CI)
District of Columbia	333	31.0 (24.8–38.0)
Hawaii	623	28.2 (23.5–33.4)
New Mexico	495	23.5 (18.9–28.8)
Florida§	167	22.8 (14.8–33.5)
Texas	904	22.0 (18.0–26.5)
Indiana	310	18.8 (14.0–24.9)
Washington	762	18.7 (15.4–22.7)
Connecticut	560	18.6 (14.6–23.4)
Kentucky	451	18.2 (13.8–23.6)
Massachusetts§	214	18.2 (11.5–27.7)
Montana	541	15.6 (12.0–20.0)
Oregon	334	15.4 (11.5–20.2)
Michigan§	266	14.9 (9.7–22.2)
New York	230	14.2 (9.6–20.4)
Nebraska	875	14.0 (10.6–18.3)
Wisconsin	775	13.3 (10.5–16.9)
Kansas	377	12.7 (9.2–17.3)
Minnesota	1,638	12.0 (10.2–14.1)

Abbreviation: CI = confidence interval.
* Estimates are age-standardized to the 2000 projected population for the United States.
† Binge drinkers were defined as respondents who consumed ≥4 drinks per occasion during the preceding 30 days for women and ≥5 drinks for men. An occasion is generally defined as 2–3 hours.
§ Estimate is unreliable because relative standard error = 0.20–0.30.

(*4*), the findings are not directly comparable; however, both reports indicate that critical aspects of ASBI are not occurring routinely. Further, it might be that health professionals are asking about alcohol use on a form and not actually talking with their patients about their consumption. A conversation between patient and provider is traditionally a component of ASBI. While most adults reported being asked about alcohol use during a checkup, only one in three reported being asked about binge-level consumption, even though screening for binge-level consumption is recommended. Without proper screening[¶¶] and assessment, health professionals will not know which patients could benefit from a brief intervention, treatment (which might include pharmacotherapy), or a referral to treatment for alcohol dependence. A recent estimate of the prevalence of past-year alcohol dependence was 3.5% of the total U.S. adult population. Only 10.2% of all excessive drinkers were considered to have past-year alcohol dependence (*5*).

Among binge drinkers who were asked about their alcohol use, males and persons with disabilities were more often advised about harmful levels of alcohol use and advised to reduce intake than were females and persons without disabilities. Persons with disabilities might have frequent interactions with the health care system, be older, in poorer physical and mental health, or have co-morbidities that increase their chances of being counseled on alcohol use (*6*). State variations in ASBI provision could be related to differences in levels of consumption and alcohol-related health problems, insurance coverage, or other factors influencing the behavior of health care providers, such as the socioeconomic status of their patients.

Despite current policies that support the provision of ASBI, including recommendations for its use by the USPSTF and the related Affordable Care Act requirement that many health plans cover it,[***] and availability of evidenced-based clinical and implementation guidelines, these data indicate that all elements of ASBI are not routinely implemented in clinical settings, especially screening as recommended and brief intervention for persons who are screened and found to drink excessively. Federal agencies have supported initiatives to increase delivery of ASBI. For example, since 2014, CDC has funded FASD Practice and Implementation Centers[†††] and national partners[§§§] to focus on systems-level practice change to make ASBI standard in primary care, and published an implementation guide in 2014 for primary care medical practice settings.[¶¶¶] The Substance Abuse and Mental Health Services Administration (SAMHSA) has funded state and medical education cooperative agreements and grants for ASBI since 2003. SAMHSA also has a national hotline that provides referrals to local treatment facilities, support groups, and community-based organizations (1–800–662-HELP [4357];

¶¶ CDC recommends the use of the AUDIT (US) version for screening/assessment and the Alcohol Use Disorders Identification Test 1-3 (US) for screening as well as the NIAAA single-question screener as per https://www.cdc.gov/ncbddd/fasd/documents/alcoholsbiimplementationguide.pdf.

*** The Patient Protection and Affordable Care Act of 2010 requires that nongrandfathered private health plans provide coverage without cost-sharing for services that have in effect an "A" or "B" recommendation from the USPSTF. Because the USPSTF issued a "B" recommendation for alcohol misuse screening and behavioral counseling interventions in adults aged ≥18 years, this must be covered by such plans, Section 1001 of the Patient Protection and Affordable Care Act, Public Law 111-148, 2010. https://www.gpo.gov/fdsys/pkg/PLAW-111publ148/html/PLAW-111publ148.htm. https://www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations.

††† CDC Fetal Alcohol Spectrum Disorders (FASD) Practice and Implementation Centers or PICS are Baylor College of Medicine in collaboration with the American Academy of Family Physicians, the University of Alaska Anchorage in collaboration with the American College of Nurse-Midwives and the National Association of Nurse Practitioners in Women's Health, the University of California, San Diego in collaboration with the Association of Women's Health, Obstetric and Neonatal Nurses, the University of Missouri, the University of Nevada, Reno in collaboration with the American Association of Medical Assistants, and the University of Wisconsin. https://www.cdc.gov/ncbddd/fasd/training.html.

§§§ CDC FASD National Partners are American Academy of Pediatrics, American College of Obstetricians and Gynecologists, University of Pittsburgh School of Nursing, University of Texas at Austin School of Social Work, National Organization on Fetal Alcohol Syndrome. https://www.cdc.gov/ncbddd/fasd/training.html.

¶¶¶ https://www.cdc.gov/ncbddd/fasd/documents/alcoholsbiimplementationguide.pdf.

Summary

What is already known about this topic?

Although excessive or risky alcohol use is a major preventable cause of morbidity and mortality, according to 2011 CDC data, only one in six U.S. adults reports ever having a conversation with a health professional about alcohol use. It has been recommended by the U.S. Preventive Services Task Force (USPSTF) that all U.S. adults aged ≥18 years be screened for alcohol misuse and receive brief counseling if needed.

What is added by this report?

Findings from a 5-question module on alcohol screening and brief intervention (ASBI) using Behavioral Risk Factor Surveillance System survey data from 17 states and the District of Columbia in 2014 indicate that only one in three binge drinkers was asked about alcohol use (in person or on a form) and advised about risky drinking levels. Further, only one in six binge drinkers was asked about alcohol use (in person or on a form) and advised to reduce their drinking by a health professional.

What are the implications for public health practice?

Continued work at the health systems and individual practice levels is needed to implement ASBI per the USPSTF recommendation. If ASBI was provided as recommended in all appropriate medical settings, and coupled with recommended, evidence-based community interventions, preventable morbidity and mortality associated with excessive alcohol use might be reduced.

online treatment locators) and provides information about billing codes for ASBI reimbursement. The National Institute on Alcohol Abuse and Alcoholism has published clinical guidelines for conducting ASBI.**** In addition, The Community Guide evaluated the effectiveness of electronic screening and brief intervention for excessive alcohol use (which involves the use of computers, telephones, and social media) and recommended it in 2012.††††

The findings in this study are subject to at least four limitations. First, the data are self-reported, which can lead to social desirability and reporting biases. Second, because the data were obtained from 17 states and DC, prevalence estimates might not be nationally representative. Third, BRFSS does not collect information from persons living in some institutional settings (e.g., prison), and the prevalence of ASBI might differ in these groups. Finally, the survey median response rate was 42.7%, raising the possibility of response bias.

ASBI is effective in reducing excessive alcohol use, and if used routinely in primary care, could have a significant population-level benefit, particularly if other effective community-level strategies (e.g., increasing alcohol taxes and regulating alcohol outlet density) (*2*) are also implemented. Systems-level changes, such as including ASBI in electronic health records with appropriate prompts and screening tools, might facilitate implementation (*7*). Including ASBI measures in performance measurement programs, such as the Healthcare Effectiveness Data and Information Set, might also promote implementation (*8*). Further, the provision of ASBI by physicians and nonphysicians, including nurses, health educators, or other health professionals, has been shown to increase implementation and decrease consumption if multiple implementation strategies are used (i.e. patient, professional, and organizational approaches) (*9*). Kaiser Permanente of Northern California serves 3.8 million members in 15 counties and implemented ASBI in 54 adult primary care clinics in 11 medical centers as a part of the Alcohol Drinking As a Vital Sign (ADVISe) study (*10*). Additional systems-level implementation of ASBI, consistent with recommendations and with the provision of evidence-based community-level strategies, holds promise for broad level reduction of excessive alcohol use.

**** https://pubs.niaaa.nih.gov/publications/Practitioner/CliniciansGuide2005/guide.pdf.

†††† https://www.thecommunityguide.org/topic/excessive-alcohol-consumption.

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Methadone Prescribing and Overdose and the Association with Medicaid Preferred Drug List Policies — United States, 2007–2014

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Drug overdose is a leading cause of injury death in the United States; 47,055 fatal drug overdoses were reported in 2014, a 6.5% increase from the previous year (*1*), driven by opioid use disorder (*2*,*3*). Methadone is an opioid prescribed for pain management and is also provided through opioid treatment programs to treat opioid use disorders. Because methadone might remain in a person's system long after the pain-relieving benefits have been exhausted, it can cause slow or shallow breathing and dangerous changes in heartbeat that might not be perceived by the patient (*4*,*5*). In December 2006, the Food and Drug Administration issued a Public Health Advisory that alerted health care professionals to reports of death and life-threatening adverse events, such as respiratory depression and cardiac arrhythmias, in patients receiving methadone (*4*); in January 2008, a voluntary manufacturer restriction limited distribution of the 40 mg formulation of methadone.* CDC analyzed state mortality and health care data and preferred drug list (PDL) policies to 1) compare the percentage of deaths involving methadone with the rate of prescribing methadone for pain, 2) characterize variation in methadone prescribing among payers and states, and 3) assess whether an association existed between state Medicaid reimbursement PDL policies and methadone overdose rates. The analyses found that, from 2007 to 2014, large declines in methadone-related overdose deaths occurred. Prescriptions for methadone accounted for 0.85 % of all opioid prescriptions for pain in the commercially insured population and 1.1% in the Medicaid population. In addition, an association was observed between Medicaid PDLs requiring prior authorization for methadone and lower rates of methadone overdose among Medicaid enrollees. PDL policies requiring prior authorization might help to reduce the number of methadone overdoses.

To calculate drug overdose deaths and corresponding mortality rates, National Vital Statistics System Multiple Cause of Death mortality files (*6*) and bridged U.S. Census data for the period 1999–2014 were analyzed. To assess whether methadone prescribing in particular is higher among Medicaid enrollees, Truven Health's MarketScan Commercial Claims and Encounters (CCE) and Medicaid multistate databases for 2014 were used to compare outpatient methadone prescribing rates for commercially insured populations with Medicaid populations.† The CCE database represents enrollees who are typically covered through large private employers and state governments, enabling creation of a regionally distributed convenience sample of privately insured persons.

To explore whether the observed decline in methadone overdose deaths from 2007 to 2014 was associated with Medicaid methadone reimbursement policies aimed at reducing methadone prescribing, methadone overdoses (including fatal and nonfatal overdoses) were examined. Some states use a PDL, a formal published list of specific prescription drug products by brand and generic name, listed as "preferred." Nonpreferred products are available for payment or reimbursement only after obtaining prior authorization for the particular patient and product. Prescribing drugs from the preferred list makes the approval process less cumbersome and facilitates faster reimbursement. To determine whether a state's policy was associated with higher methadone morbidity or mortality, 2012 and 2013 emergency department and inpatient data from the Health Care Utilization Project (HCUP) (*7*) from three states (Florida, North Carolina, and South Carolina) were analyzed. State selection was based on geographic proximity (to maximize population similarities), variation in state PDL policies, and data availability. For each state, it was determined whether the PDL included methadone for pain; usually a prescriber does not have to obtain prior approval for use of a PDL drug to obtain reimbursement.

The three selected states confirmed the status of methadone for pain on their PDLs with the Centers for Medicare & Medicaid Services. During 2012–2013, Florida listed methadone as a preferred drug on its PDL. North Carolina gave methadone a preferred status without listing it on its PDL (Centers for Medicare & Medicaid Services, unpublished data, 2017), and South Carolina did not include methadone as a preferred drug. HCUP data (*7*) were used to calculate rates of methadone overdose by state for Medicaid enrollees; administrative billing codes from the *International Classification of Diseases, Ninth Version, Clinical Modification* (ICD-9-CM) were used to identify methadone overdose cases (965.02 [poisoning by methadone] and external cause code E8501 [accidental poisoning by methadone]). Fatal and nonfatal overdose cases were identified in both state-specific emergency department and inpatient data. Medicaid enrollee eligibility population within each state was provided by HCUP and used for population denominators. Univariate analysis of variance (ANOVA) with F-test was used to analyze methadone rates

* https://www.deadiversion.usdoj.gov/drug_chem_info/methadone/methadone.pdf.
† https://marketscan.truvenhealth.com/marketscanportal/.

of overdose among Medicaid-reimbursed patients in the three selected states. Differences with p values <0.05 were considered statistically significant. All analyses were performed using statistical software.

Trends in Methadone Mortality

From 1999 to 2014, the overall prescription opioid overdose death rate (involving natural and semisynthetic opioids and methadone) increased 300%, from 1.2 persons per 100,000 population (3,442 persons) in 1999 to 4.6 (14,838) in 2014 (Figure 1). The rate of methadone overdose deaths increased 600%, from 0.3 persons per 100,000 in 1999 (784) to 1.8 in 2006 (5,406), was stable in 2007 (5,518), and then declined 39% to 1.1 (3,400) in 2014.

Methadone Prescriptions Among Medicaid Enrollees

Prescriptions for methadone accounted for 0.85% (weighted) of all opioid prescriptions for pain in the commercially insured population and 1.1% in the Medicaid population, indicating that methadone prescribing for pain constituted a small proportion of opioid analgesic use. However, although methadone accounted for approximately 1% of all opioid prescriptions, overall methadone-related deaths accounted for 22.9% of all opioid-related mortality in 2014 (Figure 2). Among 20.9 million CCE enrollees and 6.8 million continuously enrolled Medicaid enrollees, the 2014 methadone prescribing rate among Medicaid enrollees (9.33 per 1,000 enrollees) was nearly twice that of CCE enrollees (4.85 per 1,000 enrollees).

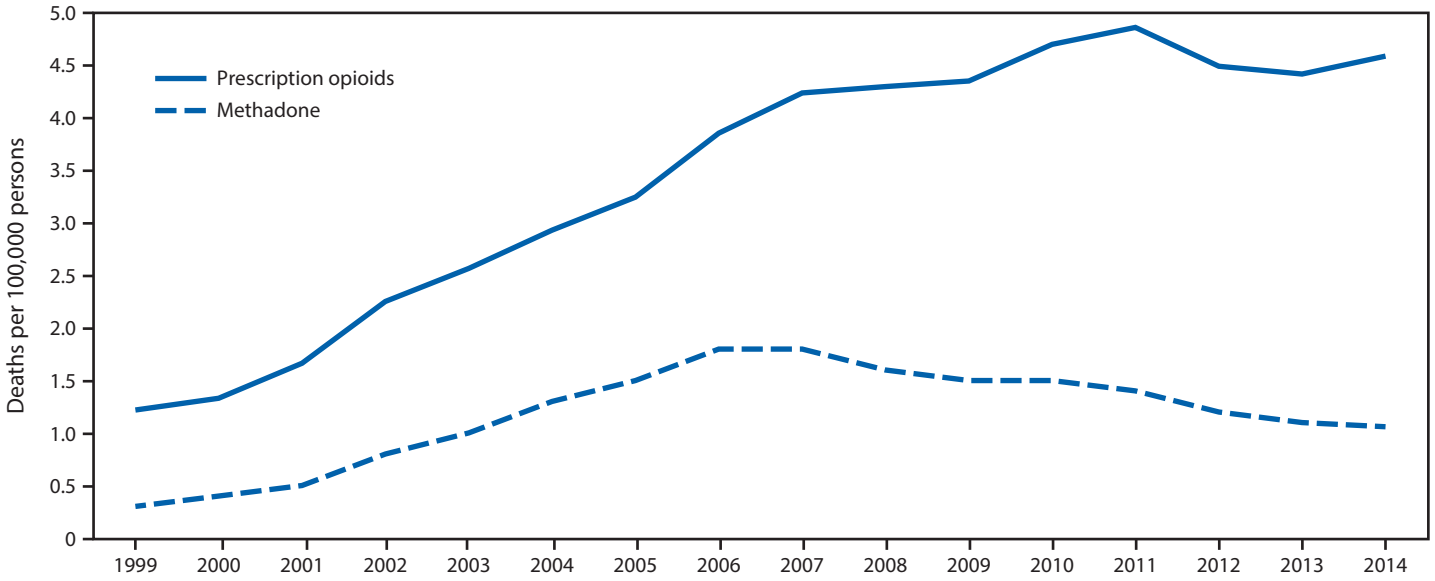
Association Between State Medicaid PDLs and Overdose Deaths

The rates of fatal and nonfatal methadone overdose among Medicaid enrollees in Florida (1.75 per 100,000 persons; 95% confidence interval [CI] = 1.57–1.94) and North Carolina (1.67, CI = 1.35–1.98), the two analyzed states that included methadone as a preferred drug, were significantly higher than those in South Carolina (0.81, CI = 0.65–0.96), which did not include methadone as preferred (Figure 3). The rate in South Carolina was significantly lower than the rates in North Carolina (F = 39.89, p<0.001) and Florida (F = 48.49, p<0.001). The rates of methadone overdose in North Carolina and Florida were similar (F = 0.42, p<0.525). Whereas there were large differences among the states in methadone overdose rates, the overall opioid overdose death rates in 2013 were similar for Florida (13.2 per 100,000 persons), North Carolina (12.9), and South Carolina (13.0) (*1*).

Discussion

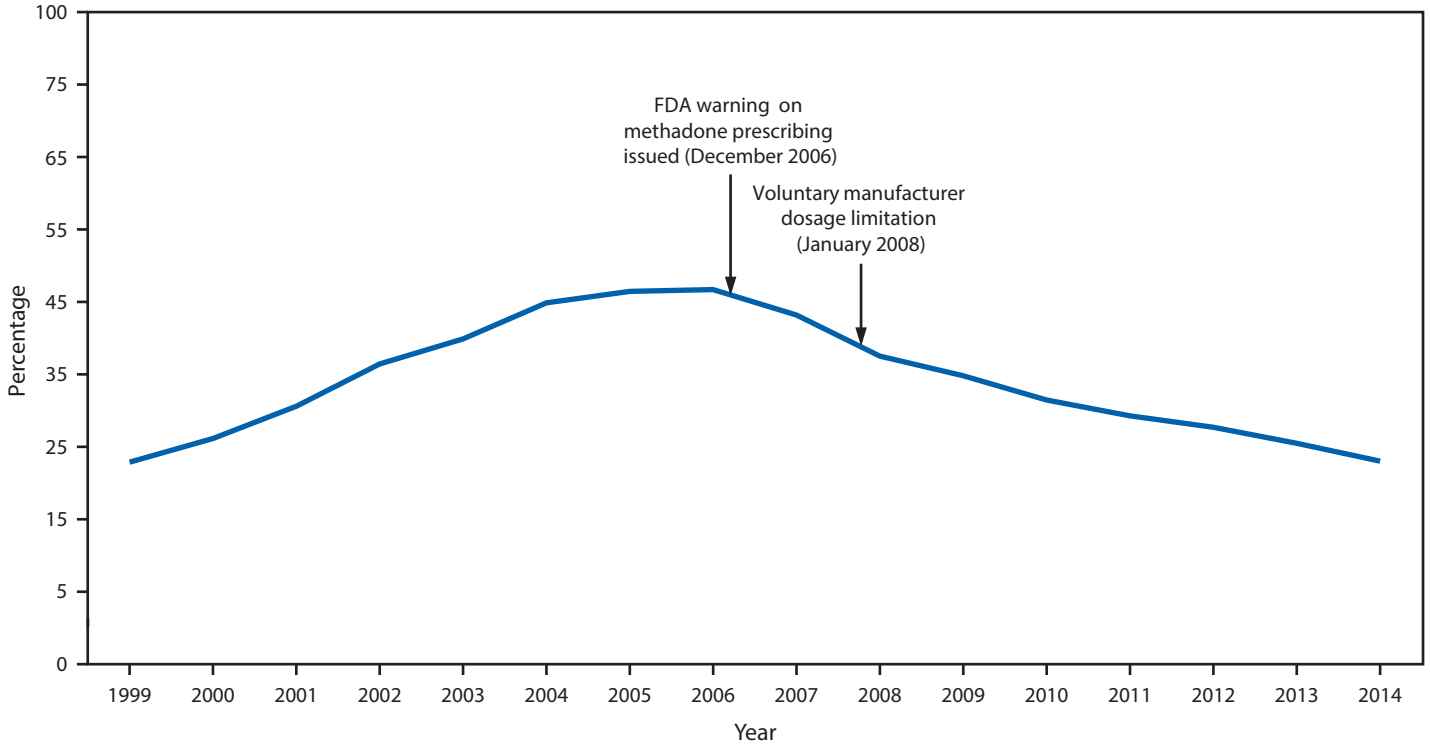
Drug overdose deaths involving methadone peaked in 2006 and 2007, then declined 39% by 2014. Despite this decline, however, methadone continues to account for nearly one in four prescription opioid-related deaths. Although this study was not designed to assess causal inference, the peak inflection point in 2007 occurred shortly after the December 2006 issuance of the Food and Drug Administration's Public Health Advisory on prescribing methadone that linked reports of respiratory depression and cardiac arrhythmias with the possibility of unintentional overdoses, drug interactions, or cardiac toxicity (*4*). The voluntary manufacturer restriction limiting

FIGURE 1. Rate of deaths from prescription opioid overdose overall* and from methadone overdose — United States, 1999–2014



* Prescription opioid deaths include those involving natural and semisynthetic opioids and methadone.

FIGURE 2. Percentage of prescription opioid overdose deaths involving methadone — United States, 1999–2014



Abbreviation: FDA = Food and Drug Administration.

the 40 mg formulation of methadone in 2008 likely also contributed to declines in methadone overdose death rates (*8*).

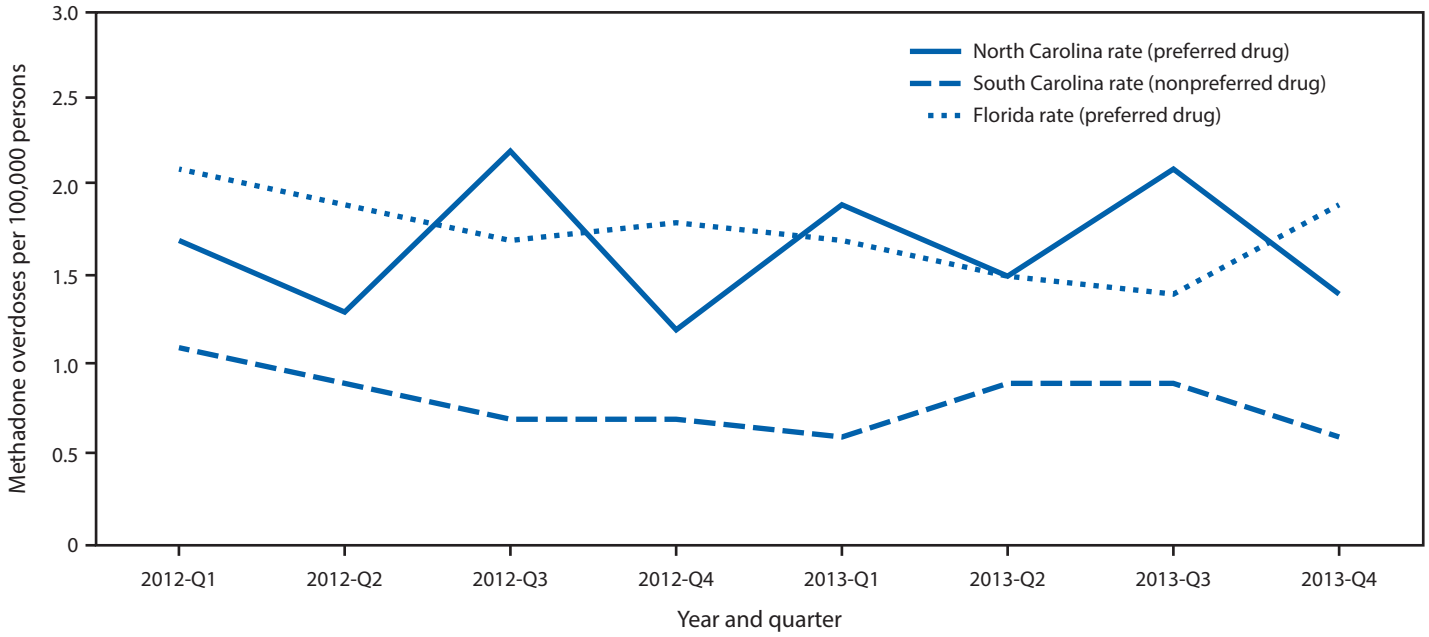
Given that methadone prescribing rates are higher among persons enrolled in Medicaid, strategies to reduce methadone prescribing among persons in this population might further reduce injuries and deaths from methadone. Focusing on the differences between state PDLs, a comparative exploratory analysis of states with different methadone drug utilization management policies found an association between a state's internal PDL policy and methadone overdose rates. If confirmed by additional studies, other states could consider Medicaid drug utilization management strategies such as PDL placement among other evidence-based strategies to reduce injuries and deaths associated with methadone.[§] Other pharmacy management strategies (e.g., prior authorization, quantity limits, and retrospective drug utilization review), as well as adherence to clinical prescribing guidelines and the increased deployment of prescription drug monitoring programs, might also help to optimize the benefit of methadone. Many of these approaches might also be applicable to private insurers.

The findings in this report are subject to at least two limitations. First, the analysis of mortality and morbidity data included all methadone overdoses. Because methadone is prescribed for pain and also to treat opioid use disorders in community-based opioid treatment programs, there is no definitive way to determine the source of methadone contributing to an injury or death. However, because methadone prescribed to treat opioid use disorders is tightly regulated (including an extra set of special standards) (*9*), the preponderance of methadone-associated morbidity and mortality likely arises from its use for pain. Second, findings from the policy analysis of PDL and overdose rates are exploratory in nature, and there are many potential determinants of methadone-related overdose rates beyond PDL policies. For example, South Carolina reported in its fiscal year 2013 Medicaid Drug Utilization Annual Report that it had implemented other drug utilization management strategies, such as requiring pain management providers to be certified and a process to identify prescribers not authorized to prescribe controlled drugs, whereas North Carolina and Florida did not have these policies at that time.

Amid a growing epidemic of deaths with widespread overuse of prescription opioids, understanding the successful strategies for the reduction in methadone overdose are important and might serve as a model for future positive outcomes involving other opioid drugs. Options for reducing future opioid morbidity and mortality include implementing multiple drug utilization management policies that are consistent with PDL practices and the CDC *Guideline for Prescribing Opioids for Chronic Pain* (*10*), which recommends that methadone should not be the first choice for an extended-release/long acting opioid.

[§] https://www.medicaid.gov/federal-policy-guidance/downloads/cib-02-02-16.pdf.

FIGURE 3. Methadone overdose rates among Medicaid enrollees, by year and quarter — Florida, North Carolina, and South Carolina, 2012–2013



Summary

What is already known about this topic?

It is important that prescribing methadone as a pain medication is done carefully. In 2006, the Food and Drug Administration issued a public health advisory regarding health risks associated with prescribing methadone.

What is added by this report?

Methadone accounted for approximately 1% of all opioids prescribed for pain but accounted for approximately 23% of all prescription opioid deaths in 2014. State drug management practices and reimbursement policies can affect methadone prescribing practices and, in turn, might reduce methadone overdose rates within a state.

What are the implications for public health practice?

Drug utilization management policies that reduce the use of risky opioids such as methadone might reduce opioid-related morbidity and mortality. This evidence of decreases in methadone overdoses and use of preferred drug list policies could serve as a model for future decreases in other specific opioid drug-related mortality.

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Sodium Intake Among Persons Aged ≥2 Years — United States, 2013–2014

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High sodium consumption can increase hypertension, a major risk factor for cardiovascular diseases (*1*). Reducing sodium intake can lower blood pressure, and sodium reduction in the U.S. population of 40% over 10 years might save at least 280,000 lives (*2*). Average sodium intake in the United States remains in excess of *Healthy People 2020* objectives,* and monitoring sources of sodium in the U.S. population can help focus sodium reduction measures (*3*,*4*). Data from 2013–2014 What We Eat in America (WWEIA), the dietary intake portion of the National Health and Nutrition Examination Survey (NHANES),† were analyzed to determine the ranked percentage sodium contribution of selected food categories and sources of sodium intake from all reported foods and beverages, both overall and by demographic subgroups. These latest data include updated food codes and separate estimates for intake among non-Hispanic Asians.§ In 2013–2014, 70% of dietary sodium consumed by persons in the United States came from 25 food categories; breads were the top contributor, accounting for 6% of sodium consumed. A majority of sodium consumed was from food obtained at stores; however, sodium density (mg/1,000 kcal) was highest in food obtained at restaurants. A variety of commonly consumed foods contributes to U.S. sodium intake, emphasizing the importance of sodium reduction across the food supply (*4*).

NHANES is a nationally representative sample of the U.S. noninstitutionalized population that uses a multistage probability sampling design, with oversampling of certain population subgroups, including non-Hispanic blacks, Hispanics, and since 2011–12, non-Hispanic Asians. In 2013–2014, interviews and examinations were conducted among 9,813 participants (68.5% overall response rate), 8,067 of whom were aged ≥2 years and had a complete and reliable 24-hour dietary recall. The dietary recall was conducted in the NHANES mobile examination center, and information on types and amounts of all foods and beverages consumed during the previous 24 hours were self-reported by the participant to a trained interviewer using U.S. Department of Agriculture's (USDA's) automated multiple-pass method.¶ Each reported food or beverage was assigned a food code from the USDA Food and Nutrient Database for Dietary Studies (FNDDS) with corresponding nutrient content by weight.** Nutrient intake from each food for each person was estimated by multiplying the reported amount of food consumed by the nutrient intake per amount. The amount of salt added to food at the table was not collected; thus estimates of sodium intake exclude salt added at the table.†† Each of the 8,537 FNDDS food codes was assigned to one of 153 WWEIA food categories, grouped on the basis of consumption and nutrient content.§§ Similar categories were further combined into 109 categories for this analysis.

The top 25 food categories contributing to sodium consumption were identified and ranked based on their contribution to sodium consumed from all reported foods and beverages, excluding salt added at the table (the sum of the amount of sodium consumed from all foods within a specific category, or source, for all persons, divided by the sum of the amount of sodium consumed from all foods for all persons, and multiplied by 100). Sodium density was used to account for differences in the amount of calories consumed. Analyses were conducted using statistical software that accounts for the complex survey design, and for all estimates, 1-day dietary sample weights were used.

The mean daily sodium intake from foods and beverages among the U.S. population aged ≥2 years was 3,409 mg, and the mean sodium density was 1,683 mg/1,000 kcal. Across age subgroups, sodium intake was highest among persons aged 20–50 years (Table 1). Men had significantly higher sodium intake than did women (T-tests, $p<0.001$) and non-Hispanic Asians consumed a more sodium-dense diet and fewer calories compared with non-Hispanic whites (T-tests, $p<0.05$) (Table 2). Overall, 44% of sodium consumed came from 10 food categories, with 70% from 25 food categories, ranging from 3.8% to 6.2% from the top five: breads (rank = 1), pizza (2), sandwiches (3), cold cuts and cured meats (4), and soups (5), to 1.3% from rice (25) (Table 1). For almost all population subgroups, the top five food categories contributing to sodium intake were among the top 10 categories for the overall population aged ≥2 years. Exceptions to this were milk (fourth highest contributor to sodium intake among children aged 2–5 years), meat mixed dishes (fifth highest contributor among

* https://www.healthypeople.gov/2020/topics-objectives.
† https://www.cdc.gov/nchs/nhanes/index.htm.
§ https://wwwn.cdc.gov/nchs/nhanes/search/nhanes11_12.aspx.
¶ https://www.ars.usda.gov/News/docs.htm?docid=7710.
** https://www.ars.usda.gov/News/docs.htm?docid=12089.
†† https://www.ars.usda.gov/ARSUserFiles/80400530/pdf/0910/discontinuation%20of%20data%20processig%20step-salt%20adjustment.pdf.
§§ https://www.ars.usda.gov/Services/docs.htm?docid=23429.

TABLE 1. Mean intakes of sodium and energy, mean sodium density, and ranked percentage sodium contribution of selected food categories* among persons aged ≥2 years, by age groups — What We Eat in America (WWEIA), National Health and Nutrition Examination Survey, United States, 2013–2014

		Age group (yrs)								
Characteristic		**≥2**	**2–19**	**2-5**	**6–11**	**12–19**	**≥20**	**20–50**	**51–70**	**≥71**
Sample size		8,067	3,020	677	1,047	1,296	5,047	2,733	1,645	669
Mean sodium intake (mg)†		3,409	3,033	2,248	2,992	3,411	3,529	3,754	3,343	2,928
Mean energy intake (kcal)†		2,079	1,885	1,480	1,921	2,038	2,141	2,271	2,042	1,773
Mean sodium density (mg/1,000 kcal)†		1,683	1,627	1,534	1,574	1,706	1,701	1,703	1,699	1,695
Rank§	**WWEIA food category**	**% contribution¶**								
1	Yeast breads¶	6.2	5.7	6.3	5.7	5.5	6.4	5.5	7.6	8.1
2	Pizza	5.9	8.3	5.7	9.8	8.0	5.3	7.1	2.9	1.6
3	All single code sandwiches**	5.7	6.5	4.9	6.4	7.0	5.5	6.4	4.2	4.0
4	Cold cuts and cured meats	5.4	4.1	4.0	3.5	4.4	5.7	5.6	5.6	6.8
5	Soups	3.8	3.1	3.3	3.4	2.9	4.0	3.5	4.4	6.0
6	Burritos and tacos	3.8	4.2	2.6	4.8	4.2	3.7	4.5	2.9	1.1
7	All savory snacks††	3.7	5.2	7.9	4.9	4.6	3.3	3.2	3.5	2.6
8	Chicken, whole pieces	3.7	3.0	2.2	2.6	3.4	3.9	4.1	3.7	2.5
9	Cheese§§	3.5	3.7	4.1	3.7	3.6	3.4	3.4	3.6	2.8
10	Eggs and omelets	2.6	2.0	2.6	1.9	1.9	2.8	2.8	2.8	3.1
11	Meat mixed dishes	2.5	2.0	1.1	2.3	2.1	2.7	2.1	3.4	4.1
12	Pasta mixed dishes, excludes macaroni and cheese	2.5	2.7	2.9	2.5	2.7	2.4	2.3	2.7	2.4
13	Bacon, frankfurters, sausages	2.0	2.2	4.5	1.7	1.8	2.0	1.7	2.4	2.0
14	Tomato-based condiments	1.8	1.6	1.5	1.7	1.7	1.9	2.2	1.7	0.9
15	Salad dressings and vegetable oils	1.8	1.4	0.7	1.1	1.8	2.0	1.9	2.0	2.3
16	Other Mexican mixed dishes	1.8	2.4	3.3	2.6	2.0	1.6	2.1	1.1	0.8
17	Poultry mixed dishes	1.7	1.1	0.7	0.9	1.3	1.8	1.6	2.4	1.7
18	All plain milk	1.6	2.9	4.9	2.9	2.3	1.3	1.1	1.3	2.2
19	Fish	1.5	0.6	1.4	0.5	0.5	1.8	1.5	2.3	1.8
20	Mashed potatoes and white potato mixtures	1.5	1.3	0.6	0.7	1.9	1.6	1.3	1.8	2.8
21	All ready-to-eat cereal	1.5	2.4	3.0	2.6	2.2	1.2	1.0	1.3	2.3
22	French fries and other fried white potatoes	1.4	1.3	1.1	1.3	1.4	1.4	1.4	1.5	0.9
23	Other vegetables and combinations	1.4	0.6	0.9	0.5	0.6	1.6	1.3	1.9	2.0
24	Cakes and pies	1.4	1.0	0.9	0.9	1.0	1.5	1.2	1.8	2.1
25	Rice	1.3	1.3	1.5	1.5	1.2	1.3	1.5	1.0	1.1
28¶¶	Cookies and brownies	1.2	1.4	2.0	1.7	1.1	1.1	1.0	1.2	1.9
29¶¶	Chicken patties, nuggets and tenders	1.2	2.7	2.6	2.9	2.6	0.8	0.9	0.6	0.5
30¶¶	Stir-fry and soy-based sauce mixtures	1.1	1.5	0.4	0.7	—***	1.0	1.1	0.9	0.7
35¶¶	Macaroni and cheese	1.0	1.5	1.5	2.3	1.0	0.8	0.8	0.8	0.8
36¶¶	Pancakes, waffles, and French toast	0.9	1.9	1.7	2.6	1.6	0.6	0.6	0.7	0.5
54¶¶	All flavored milk	0.4	1.2	1.5	1.8	0.7	0.2	0.3	0.1	0.1
	All other categories	24.2	19.2	17.7	17.6	20.7	25.4	25.0	26.0	27.5

* The percentage (%) sodium consumed is defined as the sum of the amount of sodium consumed from each specific WWEIA food category for all participants in the designated group, divided by the sum of sodium consumed from all food categories for all participants in the designated group, multiplied by 100. All estimates use one 24-hour dietary recall, take into account the complex sampling design, and use the 1-day diet sample weights to account for nonresponse and weekend/weekday recalls.

† All estimates use one 24-hour dietary recall, take into account the complex sampling design, and use the 1-day diet sample weights to account for nonresponse and weekend/weekday recalls.

§ Rank based on the percentage of sodium consumed for overall U.S. population aged ≥2 years. Columns of other age groups are ordered by the ranking for the overall U.S. population aged >2 years. WWEIA food categories available at http://www.ars.usda.gov/Services/docs.htm?docid=23429.

¶ Yeast breads, rolls, buns, bagels, and English muffins.

** Sandwiches, identified by a single WWEIA food code, include burgers, frankfurter sandwiches, chicken/turkey sandwiches, egg/breakfast sandwiches, and other sandwiches.

†† Chips, popcorn, pretzels, snack mixes, and crackers.

§§ Natural and processed cheese.

¶¶ Food categories that are in the top 20 contributors to sodium within an age subgroup but not in the top 25 overall.

*** Estimates are statistically unreliable, relative standard error >30%.

adults aged ≥71 years), other Mexican mixed dishes (fifth highest contributor to sodium among Hispanics), and rice and soy-based condiments (second and fifth highest contributors to sodium, respectively, among Asians) (Table 1) (Table 2).

The majority of sodium consumed came from food obtained at stores (60.8%), followed by fast food/pizza restaurants (16.7%), restaurants with waitstaff (10.7%), and school cafeteria or child/adult care center (2% overall; 8.8% among

TABLE 2. Mean intakes of sodium and energy, mean sodium density, and ranked population percent proportion of sodium consumed* among persons aged ≥2 years, by selected food categories, sex, and race/ethnicities — What We Eat In America (WWEIA), National Health and Nutrition Examination Survey, United States, 2013–2014

Characteristic		Sex		Race/Ethnicity			
		Male	Female	Non-Hispanic white	Non-Hispanic black	Hispanic	Non-Hispanic Asian
Sample size		3,934	4,133	3,044	1,762	2,122	789
Mean sodium intake (mg)†		3,915	2,920§	3,407	3,381	3,424	3,538
Mean energy intake (kcal)†		2,382	1,786§	2,080	2,133	2,104	1,853¶
Mean sodium density (mg/1,000 kcal)†		1,681	1,685	1,681	1,636	1,659	1,946¶
Rank**	**WWEIA food category**	**% contribution**					
1	Yeast breads††	6.3	6.2	6.9	5.3	4.7	5.7
2	Pizza	6.2	5.5	5.8	6.8	5.5	3.2
3	All single code sandwiches§§	6.0	5.4	5.3	8.3	6.4	2.5
4	Cold cuts and cured meats	6.0	4.5	6.5	3.6	3.6	2.8
5	Soups	3.5	4.3	3.2	2.6	5.1	10.5
6	Burritos and tacos	4.1	3.4	3.1	1.8	8.9	0.6
7	All savory snacks¶¶	3.3	4.2	3.9	4.2	2.8	1.9
8	Chicken, whole pieces	4.0	3.2	3.2	5.7	4.0	3.8
9	Cheese***	3.4	3.5	3.9	2.8	2.9	1.5
10	Eggs and omelets	2.7	2.6	2.4	2.7	3.3	2.6
11	Meat mixed dishes	2.7	2.3	2.8	2.9	1.6	2.4
12	Pasta mixed dishes, excludes macaroni and cheese	2.7	2.3	2.7	2.4	1.7	1.9
13	Bacon, frankfurters, sausages	2.1	1.9	2.1	3.0	1.3	1.2
14	Tomato-based condiments	1.9	1.7	1.9	1.7	2.0	1.0
15	Salad dressings and vegetable oils	1.5	2.3	2.0	1.8	1.5	1.0
16	Other Mexican mixed dishes	1.7	1.9	1.3	0.5	4.8	0.4
17	Poultry mixed dishes	1.6	1.7	1.9	0.8	1.3	2.0
18	All plain milk	1.8	1.5	1.8	1.0	1.6	1.4
19	Fish	1.5	1.5	1.4	2.6	1.0	2.2
20	Mashed potatoes and white potato mixtures	1.6	1.5	1.9	1.4	0.9	0.5
21	All ready-to-eat cereal	1.5	1.5	1.5	1.4	1.5	0.9
22	French fries and other fried white potatoes	1.4	1.3	1.4	1.6	1.2	1.0
23	Other vegetables and combinations	1.2	1.6	1.5	1.0	0.8	3.0
24	Cakes and pies	1.1	1.7	1.3	1.8	1.2	1.2
25	Rice	1.2	1.4	0.6	1.6	1.6	7.9
26†††	Beef, excludes ground	1.3	1.1	1.2	1.1	1.6	1.0
27†††	Rice mixed dishes	1.1	1.3	0.9	1.4	2.1	1.2
29†††	Chicken patties, nuggets, and tenders	1.1	1.3	1.1	1.7	1.2	—§§§
30†††	Stir-fry and soy-based sauce mixtures	1.1	1.1	1.1	—§§§	1.2	2.7
33†††	Biscuits, muffins, and quick breads	0.9	1.0	1.0	1.7	0.5	—§§§
37†††	Beans, peas, and legumes	0.9	0.9	0.6	1.0	2.1	0.9
41†††	Fried rice and lo/chow mein	0.7	0.8	0.7	0.7	0.5	2.4
43†††	Soy-based condiments	—§§§	0.6	—§§§	—§§§	0.5	3.4
46†††	Tortillas	0.6	0.5	0.3	0.0	1.9	0.4
55†††	Egg rolls, dumplings, and sushi	0.4	0.4	0.4	0.1	—§§§	1.5
	All other categories	20.3	22.1	21.9	22.1	16.9	21.9

* The percentage (%) sodium consumed is defined as the sum of the amount of sodium consumed from each specific WWEIA food category for all participants in the designated group, divided by the sum of sodium consumed from all food categories for all participants in the designated group multiplied by 100. All estimates use one 24-hour dietary recall, take into account the complex sampling design, and use the 1-day diet sample weights to account for nonresponse and weekend/weekday recalls.

† All estimates use one 24-hour dietary recall, take into account the complex sampling design, and use the 1-day diet sample weights to account for nonresponse and weekend/weekday recalls.

§ Statistically significant difference ($p<0.001$) in mean sodium and energy intakes compared with males.

¶ Statistically significant difference ($p<0.001$) compared with non-Hispanic whites.

** Rank based on percentage of sodium consumed for overall U.S. population aged ≥2 years. Columns of other sex and race/ethnic groups are ordered by this ranking. WWEIA food categories available at http://www.ars.usda.gov/Services/docs.htm?docid=23429.

†† Yeast breads, rolls, buns, bagels, and English muffins.

§§ Sandwiches identified by a single WWEIA food code, includes burgers, frankfurter sandwiches, chicken/turkey sandwiches, egg/ breakfast sandwiches, and other sandwiches.

¶¶ Chips, popcorn, pretzels, snack mixes, and crackers.

*** Natural and processed cheese.

††† Food categories that are in the top 20 contributors to sodium within an age subgroup but not in the top 25 overall.

§§§ Estimates are statistically unreliable, relative standard error >30%.

TABLE 3. Percentage of sodium consumed* and mean sodium density,† among persons aged ≥2 years, by food source category and age group — What We Eat in America (WWEIA), National Health and Nutrition Examination Survey, United States, 2013–2014

Population groups	Food source category§				
	Store	Restaurant with fast food/ pizza	Restaurant with waiter/ waitress	Cafeteria at school/ child/adult care center	Other
Total					
% Contribution (SE)	60.8 (0.6)	16.7 (0.5)	10.7 (0.6)	2.0 (0.1)	9.8 (0.6)
Sodium density (mg/1,000 kcal) (SE)	1,557 (25.6)	1,855 (29.1)	2,119 (32.6)	1,676 (38.0)	1,962 (71.0)
Children, aged 2–19 years					
% Contribution (SE)	60.9 (0.6)	16.7 (0.9)	5.4 (0.7)	8.8 (0.7)	8.1 (0.6)
Sodium density (mg/1,000 kcal) (SE)	1,527 (21.5)	1,801 (35.5)	1,972 (59.7)	1,646 (34.6)	1,543 (104.1)
Adults, aged ≥20 years					
% Contribution (SE)	60.7 (0.8)	16.7 (0.5)	12.1 (0.7)	—¶	10.2 (0.6)
Sodium density (mg/1,000 kcal) (SE)	1,566 (34.6)	1,871 (32.2)	2,143 (38.0)	2,179 (366.5)	2,074 (82.7)

Abbreviation: SE = standard error.

* The percentage (%) of sodium consumed is defined as the sum of the amount of sodium consumed from each specific food source category for all participants in the designated group, divided by the sum of sodium consumed from all food source categories for all participants in the designated group multiplied by 100. All estimates use one 24-hour dietary recall, take into account the complex sampling design, and use the 1-day diet sample weights to account for nonresponse and weekend/weekday recalls. Standard errors of the estimates are in parentheses.

† A measure that accounts for differences in the amount of calories consumed from foods obtained from each source, defined as mg of sodium per 1,000 kcal.

§ Food source categories were analyzed from responses to the question, "Where did you get this (most of the ingredients for this) [food name]?" "Cafeteria at school" and "child care center" were combined in one category. Sources other than those shown were combined under "other" and included "from someone else/gift", and 19 other sources (e.g., vending machine), including "missing," "do not know," and "other/specify".

¶ Estimates are statistically unreliable, relative standard error >30%.

children aged 2–19 years). The remaining sodium (9.8%) was consumed from other listed sources. Among the total population and among children, food obtained from restaurants with waitstaff were the most sodium-dense, whereas among adults, food obtained from cafeterias/care centers were as sodium-dense as those from restaurants (Table 3).

Discussion

This analysis found that approximately 70% of sodium consumed by the U.S. population aged ≥2 years came from 25 food categories, with 44% from the top 10 categories alone, and provides the most current data on sources of U.S. sodium intake. These results are consistent with previous reports that found that store-bought and restaurant foods are the main contributors to sodium in the diets of persons in the United States, emphasizing the importance of monitoring sodium content of these foods (*5*,*6*). Average U.S. daily sodium intake continues to exceed the *Healthy People 2020* objective of 2,300 mg (*3*).

Since 2007–2008, a majority of the major food categories contributing to population sodium intake have not changed, with the exception of burritos and tacos, which were previously not ranked in the top 10, but were the sixth highest contributor in 2013–2014 (*5*). This might be attributable in part to an actual increase in consumption of these foods, but more likely represents a difference in collection and coding methodology that capture Mexican mixed dishes as a single food code.¶¶

In addition, rankings for some food categories differed among racial/ethnic groups. Among Hispanics, burritos and tacos contributed 8.9% of sodium intake, compared with 3.8% among the general population. Most notably, among non-Hispanic Asians, the top two sources of sodium were soups and rice, contributing much more dietary sodium than among other racial/ethnic groups. However, FNDDS food codes for rice include sodium from salt added in cooking; this might partially explain the high contribution to sodium, since rice without salt added is naturally low in sodium. Asian-Americans are the fastest growing racial/ethnic group in the United States; as a group, their diets and cardiovascular health and risk factors might differ from those of other racial/ethnic populations in the United States, although data on this subject are limited (*7*,*8*). The racial/ethnic differences in food types contributing to sodium intake suggest the importance of sodium reduction across the food supply, rather than in just a few categories, to reflect diversity in food choices.

While the majority of sodium was obtained from food purchased at stores, 27% of sodium consumed came from food obtained at restaurants, and restaurant food contributed more sodium per calorie than did food obtained from stores, which supports the need to monitor and reduce sodium levels in food across these venues (*4*,*5*).

The findings in this report are subject to at least five limitations. First, dietary data are self-reported and therefore subject to recall bias and underreporting; however, USDA's automated multiple-pass method is a valid measure of population level sodium intake (*9*). Second, the results of this analysis are not generalizable to institutionalized populations. Third, the ranking of food categories by their contribution to sodium intake is influenced by methods of categorizing and defining specific

¶¶ https://www.ars.usda.gov/Services/docs.htm?docid=12068.

Summary

What is already known about this topic?

Reducing sodium intake can reduce blood pressure; hypertension is a risk factor for cardiovascular disease. According to data from the National Health and Nutrition Examination Survey 2007–2008, average daily U.S. sodium intake was 3,266 mg, exceeding *Healthy People 2020* objectives, and 44% of sodium consumed came from just 10 food types.

What is added by this report?

The most recent data, from 2013–2014, indicate that average daily U.S. sodium intake is 3,409 mg (excluding salt added at the table), with 44% of intake from 10 food types and 70% from 25 food types, 61% from food obtained at stores, and highest sodium density (mg/1,000 kcal) from food obtained at restaurants. Food types contributing to intake differ by racial /ethnic group, with current data indicating that non-Hispanic Asians might consume a slightly more sodium-dense diet than that of non-Hispanic whites.

What are the implications for public health practice?

Sodium intake remains high and comes from a variety of food types and places. Monitoring differences in types and sources of intake can help focus sodium reduction measures to reduce blood pressure and cardiovascular disease.

foods. For example, sandwiches, when defined as both single-code sandwiches and combinations of individual sandwich ingredients, contribute about one fifth of total sodium intake by U.S. adults (*10*). Fourth, the data are subject to errors in food coding and composition. Finally, estimates of sodium consumption exclude sodium from salt added at the table, which accounts for an estimated 5%–6% of total sodium intake.

Monitoring population sodium intake and sources of sodium can inform measures to reduce sodium content of the food supply. Since publication of previous reports on sodium intake in the U.S. population, initiatives including CDC's Sodium Reduction in Communities Program,*** New York City's National Sodium Reduction Initiative,††† and the Healthy Hunger-Free Kids Act§§§ are aimed at reducing the sodium content of foods in specific venues and communities, including stores, restaurants and school cafeterias. In 2016, the Food and Drug Administration issued draft voluntary sodium targets to encourage food manufacturers and restaurants to gradually lower the sodium content of food products.¶¶¶ Persons can compare Nutrition Facts labels when shopping, choose lower sodium options, and request nutrition information when dining out. The current data can serve as a baseline to monitor changes in the population's sodium intake and food types contributing to sodium intake overall, and by subgroup to help target initiatives. The results of this study indicate that U.S. sodium intake continues to exceed *Healthy People 2020* targets and comes from a variety of foods and sources. Moderate sodium reduction in the food supply is a key recommended public health strategy to prevent cardiovascular disease (*4*).

*** https://www.cdc.gov/dhdsp/programs/sodium_reduction.htm.

††† https://www1.nyc.gov/site/doh/health/health-topics/national-salt-reduction-initiative.page.

§§§ https://www.fns.usda.gov/school-meals/healthy-hunger-free-kids-act.

¶¶¶ https://www.fda.gov/Food/IngredientsPackagingLabeling/FoodAdditivesIngredients/ucm253316.htm.

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Zika Virus Transmission — Region of the Americas, May 15, 2015–December 15, 2016

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Zika virus, a mosquito-borne flavivirus that can cause rash with fever, emerged in the Region of the Americas on Easter Island, Chile, in 2014 and in northeast Brazil in 2015 (*1*). In response, in May 2015, the Pan American Health Organization (PAHO), which serves as the Regional Office of the Americas for the World Health Organization (WHO), issued recommendations to enhance surveillance for Zika virus. Subsequently, Brazilian investigators reported Guillain-Barré syndrome (GBS), which had been previously recognized among some patients with Zika virus disease, and identified an association between Zika virus infection during pregnancy and congenital microcephaly (*2*). On February 1, 2016, WHO declared Zika virus–related microcephaly clusters and other neurologic disorders a Public Health Emergency of International Concern.* In March 2016, PAHO developed case definitions and surveillance guidance for Zika virus disease and associated complications (*3*). Analysis of reports submitted to PAHO by countries in the region or published in national epidemiologic bulletins revealed that Zika virus transmission had extended to 48 countries and territories in the Region of the Americas by late 2016. Reported Zika virus disease cases peaked at different times in different areas during 2016. Because of ongoing transmission and the risk for recurrence of large outbreaks, response efforts, including surveillance for Zika virus disease and its complications, and vector control and other prevention activities, need to be maintained.

Epidemiologic Surveillance

Data were provided to PAHO by national health authorities under the International Health Regulations or collected from publicly available reports from Ministries of Health. Weekly incidence rates were calculated using 2016 population estimates, except for countries that reported Zika virus circulation in 2015, for which average 2015–2016 population estimates were used.† In this report, case counts for Zika virus and Zika virus–associated GBS represent suspected and laboratory-confirmed cases combined. Depending upon reporting country and territory, epidemiologic week refers either to week of onset or week of report. In Brazil, Zika virus disease became a nationally notifiable condition in February 2016 (*4*); as a result, case counts for 2015 were not available.

From May 15, 2015, when Zika virus circulation was confirmed in Brazil, to December 15, 2016, a total of 707,133 autochthonous Zika virus cases were reported in the Region of the Americas, 175,063 (25%) of which were classified as laboratory-confirmed. Autochthonous Zika virus cases had been identified in two countries (Brazil and Colombia) by October 2015 (Figure 1). Zika virus subsequently spread across the Andean subregion,§ Central America, and Latin and non-Latin Caribbean. Later in 2016, autochthonous cases were detected in countries in the Southern Cone other than Brazil and parts of North America. As of December 15, 2016, local transmission had been reported in 48 countries and territories¶ in the Region of the Americas.

From May 15, 2015, to December 15, 2016, rates of Zika virus disease peaked at different times in different subregions of the Americas (Figure 2). In both the Southern Cone and Andean subregions, rates increased in January, peaked in February, and progressively declined. In Central America, rates peaked in January, followed by a more modest peak in June. In the non-Latin Caribbean, incidence peaks of comparable intensity were reported in February and June. In the Latin Caribbean subregion, where the highest rates of reported Zika virus disease cases were observed, rates began to increase in January 2016, and continued at high levels through July. Reported rates remained relatively low in North America.

As of December 15, 2016, increases in the number of GBS cases had been reported in 13 countries and territories with documented Zika virus transmission, compared with baseline

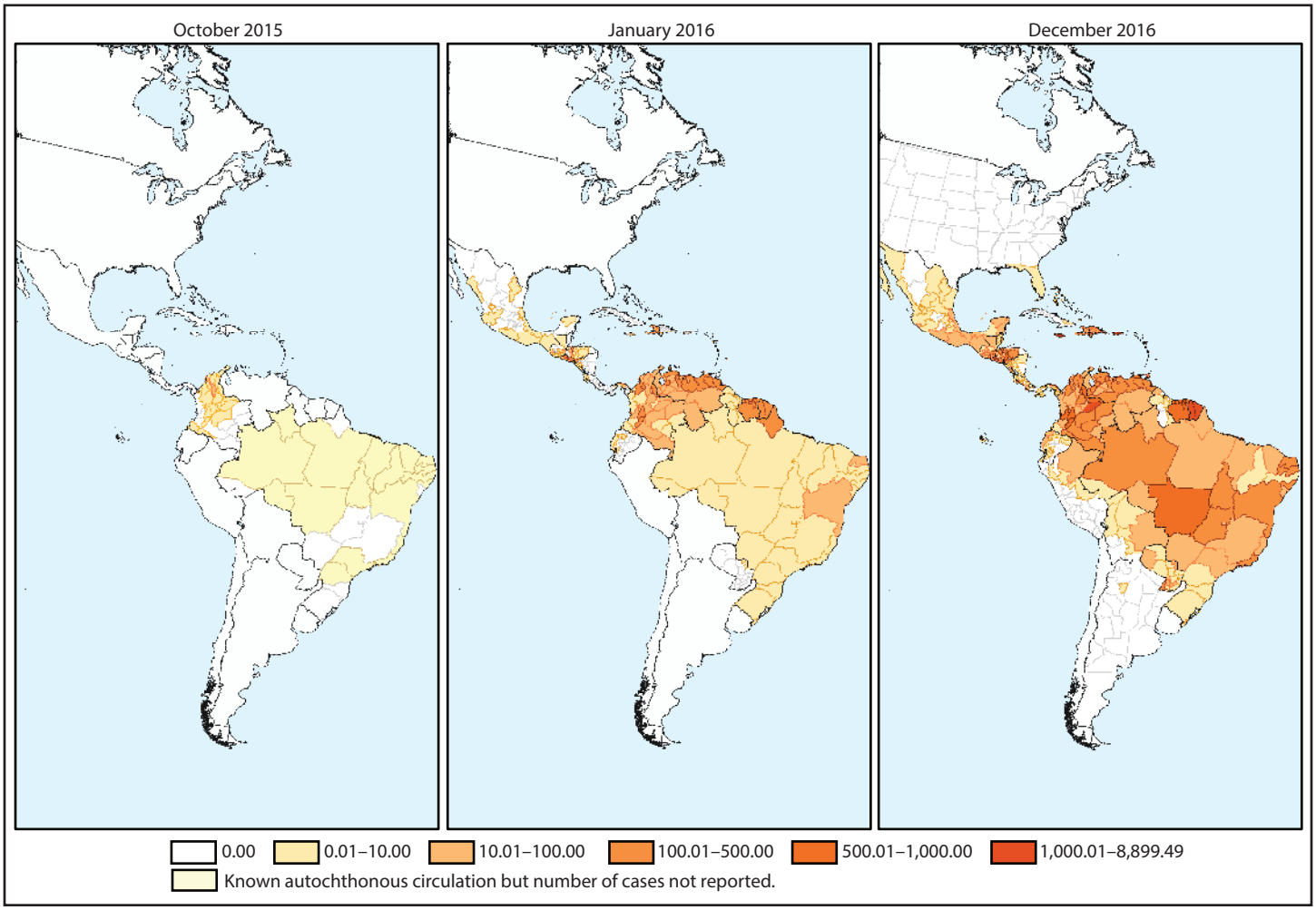
* http://www.who.int/mediacentre/news/statements/2016/1st-emergency-committee-zika/en/.

† https://esa.un.org/unpd/wpp/index.htm.

§ *Southern Cone:* Argentina; Brazil; Paraguay. Andean: Bolivia; Colombia; Ecuador; Peru; Venezuela. *Central America:* Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama. *Non-Latin Caribbean:* Anguilla; Antigua and Barbuda; Aruba; Bahamas; Barbados; Bonaire, Sint Eustatius, and Saba; British Virgin Islands; Cayman Islands; Curaçao; Dominica; Grenada; Guyana; Jamaica; Montserrat; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Sint Maarten; Suriname; Trinidad and Tobago; Turks and Caicos; U.S. Virgin Islands. *Latin Caribbean:* Cuba; Dominican Republic; French Guiana; Guadeloupe; Haiti; Martinique; Puerto Rico; Saint Barthélemy; Saint Martin. *North America:* Mexico; United States.

¶ PAHO follows the International Organization for Standardization 3166 geographic coding provided by the United Nations Statistical Division. The ISO 3166 groups the islands of Bonaire, Sint Eustatius, and Saba together.

FIGURE 1. Cumulative suspected and confirmed cases of Zika virus disease per 100,000 population — Region of the Americas,* October 2015, January 2016, and December 2016



* Maps show first-level administrative divisions (states, departments, and provinces) with circulation of Zika virus, as officially reported by national health authorities. Where data on the incidence of Zika virus disease at the subnational level were not available, the national incidence rate was used for the entire country/territory; Zika virus was not necessarily present throughout the entire shaded area.

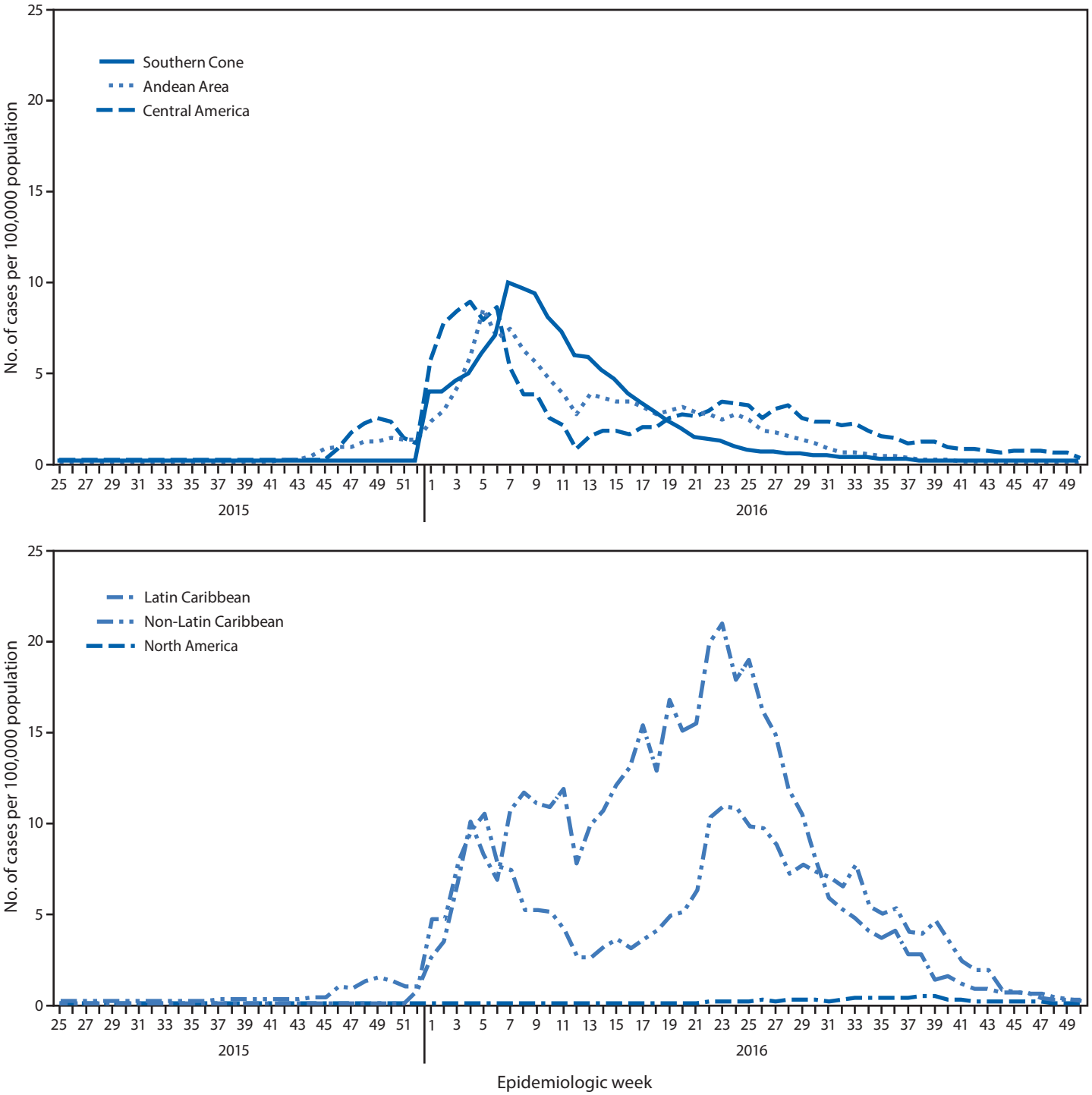
data.** Six additional countries and territories reported laboratory confirmation of Zika virus infection in at least one GBS patient. The temporal trend in reported GBS cases in the 19 countries has largely paralleled that of Zika virus disease cases (Figure 3). Although congenital microcephaly and other neurologic abnormalities have been reported among infants born to mothers who were infected with Zika virus during pregnancy (*5*), variable reporting of congenital Zika virus syndrome did not permit a comparison of trends in reported congenital abnormalities within the region.

** Countries and territories that have reported an increase in the incidence of GBS and laboratory confirmation of Zika virus infection in at least one patient with GBS: Brazil; Colombia; Dominican Republic; El Salvador; French Guiana; Guadeloupe; Guatemala; Honduras; Jamaica; Martinique; Puerto Rico; Suriname; Venezuela. Countries and territories that have reported laboratory confirmation of Zika virus infection in at least one patient with GBS: Bolivia; Costa Rica; Grenada; Haiti; Mexico; Panama.

Public Health Response

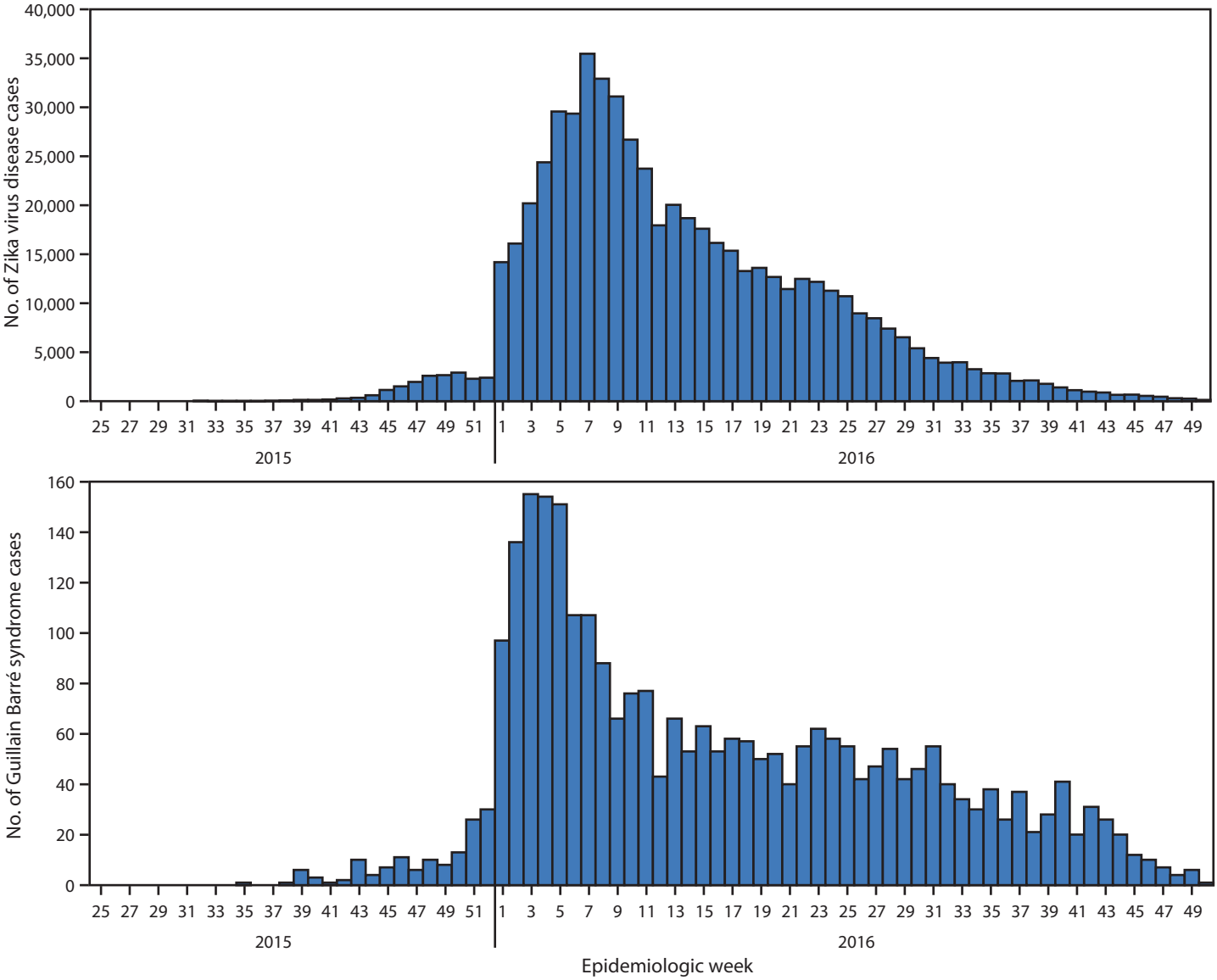
In December 2015, PAHO activated an incident management system to coordinate the regional Zika virus response and developed a framework for action with four pillars: 1) detection of Zika virus and its complications, 2) prevention of new infections, 3) provision of care and support for affected persons and families, and 4) implementation of research to understand the disease and its consequences (*6*). Surveillance and laboratory testing guidelines were issued to assist national authorities in the detection of Zika virus disease cases and associated complications (*3*). In collaboration with CDC, PAHO distributed diagnostic tools, including Trioplex kits for molecular detection and reagents for serologic testing, to 26 countries and territories. Multicountry workshops were organized to provide training in surveillance and laboratory diagnosis.

FIGURE 2. Suspected and confirmed cases of Zika virus disease per 100,000 population, by subregion* and epidemiologic week — Region of the Americas, May 2015–December 2016



* The following countries and territories reporting Zika virus disease cases by epidemiologic week were included in this figure. *Southern Cone:* Brazil; Paraguay. *Andean:* Bolivia; Colombia; Ecuador; Peru; Venezuela. *Central America:* Belize; Costa Rica; El Salvador; Guatemala; Honduras; Panama. *Non-Latin Caribbean:* Anguilla; Antigua and Barbuda; Aruba; Barbados; Bonaire, Sint Eustatius, and Saba; British Virgin Islands; Cayman Islands; Dominica; Grenada; Guyana; Jamaica; Montserrat; Saint Kitts and Nevis; Saint Vincent and the Grenadines; Sint Maarten; Suriname; Trinidad and Tobago; Turks and Caicos. *Latin Caribbean:* Dominican Republic; French Guiana; Guadeloupe; Haiti; Martinique; Saint Barthélemy; Saint Martin. *North America:* Mexico.

FIGURE 3. Suspected and confirmed cases of Zika virus* and Guillain-Barré syndrome,† by epidemiologic week — Region of the Americas, May 2015–December 2016



* The following countries and territories reporting Zika virus disease cases by epidemiologic week were included in this figure: Anguilla, Antigua and Barbuda, Aruba, Barbados, Belize, Bolivia, Bonaire, St Eustatius, and Saba, Brazil, Cayman Islands, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Panama, Paraguay, Peru, Saint Barthelemy, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Sint Maarten, St. Martin, Suriname, Trinidad and Tobago, Turks and Caicos Islands, Venezuela, British Virgin Islands

† The following countries and territories reporting Guillain-Barré syndrome cases by epidemiologic week were included in this figure: Barbados, Belize, Bolivia, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guadeloupe, Guatemala, Haiti, Honduras, Jamaica, Martinique, Mexico, Panama, Paraguay, Puerto Rico, Saint Vincent and the Grenadines, Suriname, Venezuela.

As of December 15, 2016, in collaboration with the Global Outbreak Alert and Response Network, 86 missions had been conducted in 30 countries and territories during which technical experts, including epidemiologists, entomologists, and virologists, worked with national and local authorities to implement Zika virus control and prevention measures. Assistance was provided to PAHO countries for the implementation of comprehensive health care and social services for infants with congenital abnormalities. PAHO also supported the development of a Zika virus research agenda and standardized protocols to conduct epidemiologic investigations to characterize and evaluate the risk for Zika virus–associated complications (*6*–*7*).

Summary

What is already known about this topic?

Zika virus, a flavivirus that is primarily transmitted by *Aedes* mosquitoes, has rapidly spread throughout the Region of the Americas since 2015. Zika virus infection during pregnancy is a known cause of microcephaly and other congenital abnormalities, and infection is also associated with neurologic disorders, including Guillain-Barré syndrome (GBS).

What is added by this report?

During May 15, 2015–December 15, 2016, autochthonous Zika virus transmission was confirmed in 48 countries and territories in the Region of the Americas. Rates of Zika virus disease peaked at different times in different subregions. During this period, the trend in reported GBS cases paralleled that of reported Zika virus disease cases.

What are the implications for public health practice?

Because of ongoing Zika virus transmission, the occurrence of associated complications, and the risk for recurrence of large outbreaks, countries where *Aedes* mosquitoes are present should continue surveillance for Zika virus disease, GBS, and congenital abnormalities; strengthen capacity for laboratory diagnosis of Zika virus and other arboviruses; and continue the implementation of vector control measures and other prevention activities.

Discussion

Since the emergence of Zika virus in Brazil, the number of countries and territories reporting Zika virus disease cases has quickly increased in the Region of the Americas. Several factors might have contributed to this rapid spread. The absence of previous reports of Zika virus disease outbreaks in the region suggests that populations were immunologically naïve. The presence of *Aedes aegypti* mosquitoes in most countries and territories of the Region of the Americas facilitated widespread establishment of local transmission. In addition, high levels of travel within the region might have promoted spread to previously unaffected areas.

After reporting high numbers of Zika virus disease cases during the first half of 2016, incidence in all PAHO subregions declined. Reasons for the decline might include the reduction in the number of susceptible persons and seasonal or meteorologic changes, especially in areas with a nontropical climate, leading to lower density of *Ae. aegypti*. Variations in these factors among countries might have resulted in the observed subregional differences in incidence patterns.

In this analysis, the temporal pattern of reported Zika virus disease cases paralleled that of GBS cases, a pattern that has been previously reported (*8*) and which has suggested an association between Zika virus and GBS. The relationship between Zika virus infection during pregnancy and the occurrence of congenital abnormalities has been established (*9*). As knowledge in this area evolves, birth defects surveillance will need to adapt to include newly identified abnormalities associated with Zika virus infection.

Zika virus transmission in the Region of the Americas is ongoing, but as of December 15, 2016, it has decreased in intensity. It is expected that the virus will continue to spread and potentially reach all areas where *Ae. aegypti* mosquitoes are present. The future of Zika virus outbreaks is uncertain; however, recurrent outbreaks caused by other *Aedes*-transmitted arboviruses, including dengue and chikungunya, suggest that Zika virus outbreaks might also continue to occur. Additional research is needed to determine whether transmission in animal populations occurs in the Region of the Americas that might contribute to transmission in humans.

The findings in this report are subject to at least four limitations. First, countries and territories varied in their implementation of PAHO's case definitions, laboratory testing, and case reporting procedures. A majority reported all detected cases, whereas a few reported only laboratory-confirmed cases, and several countries and territories reported cases before PAHO's development of standardized case definitions, which made it difficult to determine the exact incidence of Zika virus disease. Second, given the similarities in clinical presentation, an unknown number of suspected cases could have been caused by other arboviruses, which might have led to an overestimation of cases. Third, certain countries and territories did not provide weekly reports of cases, and some reported cases by date of onset, whereas others reported cases by date of notification; these differences might have affected the overall shape of the epidemic curves. Finally, in some areas, results might have been affected by incomplete or delayed reporting from subnational to national levels related to the differences in time it took for countries to build capacity for Zika virus surveillance and laboratory testing.

On November 18, 2016, WHO declared that Zika virus and associated complications remain a considerable public health challenge requiring long-term coordinated action, but no longer represent a Public Health Emergency of International Concern.[††] Because of ongoing transmission, occurrence of associated complications, and risk for recurrence of large outbreaks, countries and territories in the Region of the Americas and other regions where competent vectors are present need to continue surveillance for Zika virus disease and its complications and implementation of prevention and control measures.

The public health response to Zika virus, a flavivirus not previously recognized in the Region of the Americas, has been particularly challenging because of limited knowledge about the virus, modes of transmission, and associated complications.

[††] http://www.who.int/mediacentre/news/statements/2016/zika-fifth-ec/en/.

Difficulties in implementing effective vector-control measures and the absence of antiviral drugs or vaccines have further complicated response efforts. The establishment of national surveillance systems and laboratory testing and implementation of prevention and control measures have been critical for the response. Limiting Zika virus transmission and preventing its associated complications will require continued implementation of comprehensive arboviral disease surveillance, strengthening of surveillance for birth defects and neurologic complications, and continuation of vector control and other prevention activities.

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Yellow Fever Outbreak — Kongo Central Province, Democratic Republic of the Congo, August 2016

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On April 23, 2016, the Democratic Republic of the Congo's (DRC's) Ministry of Health declared a yellow fever outbreak. As of May 24, 2016, approximately 90% of suspected yellow fever cases (n = 459) and deaths (45) were reported in a single province, Kongo Central Province, that borders Angola, where a large yellow fever outbreak had begun in December 2015. Two yellow fever mass vaccination campaigns were conducted in Kongo Central Province during May 25–June 7, 2016 and August 17–28, 2016. In June 2016, the DRC Ministry of Health requested assistance from CDC to control the outbreak. As of August 18, 2016, a total of 410 suspected yellow fever cases and 42 deaths were reported in Kongo Central Province. Thirty seven of the 393 specimens tested in the laboratory were confirmed as positive for yellow fever virus (local outbreak threshold is one laboratory-confirmed case of yellow fever). Although not well-documented for this outbreak, malaria, viral hepatitis, and typhoid fever are common differential diagnoses among suspected yellow fever cases in this region. Other possible diagnoses include Zika, West Nile, or dengue viruses; however, no laboratory-confirmed cases of these viruses were reported. Thirty five of the 37 cases of yellow fever were imported from Angola. Two-thirds of confirmed cases occurred in persons who crossed the DRC-Angola border at one market city on the DRC side, where ≤40,000 travelers cross the border each week on market day. Strategies to improve coordination between health surveillance and cross-border trade activities at land borders and to enhance laboratory and case-based surveillance and health border screening capacity are needed to prevent and control future yellow fever outbreaks.

Yellow fever is an arthropod-borne flavivirus, transmitted in urban outbreaks primarily by *Aedes aegypti* mosquitoes. Signs and symptoms take 3–6 days to develop and include fever, chills, headache, and muscle aches. In general, worldwide approximately 15% of persons with yellow fever develop serious illness that can lead to bleeding, shock, organ failure, and death (*1*). The historic case fatality rate for yellow fever in Africa is approximately 20% (*2*).

Yellow fever vaccine is safe and effective (*2*). Approximately 1.5 million doses were administered in two mass vaccination campaigns conducted in Kongo Central Province; these campaigns were estimated to have reached 99% administrative vaccination coverage (the number of vaccine doses administered divided by the most recent census estimates for the targeted population). The CDC team visited Kongo Central Province during August and September 2016, reviewed yellow fever surveillance data reported in the DRC Integrated Disease Surveillance and Response system, assessed health facilities and border ports of entry, interviewed health and border surveillance officers, and made recommendations for prevention and control.

A suspected yellow fever case was defined by the DRC Ministry of Health (adapted from the World Health Organization's standard case definition) as acute onset of fever, followed by jaundice within 14 days of symptom onset. Laboratory-confirmed cases were defined as 1) detection in serum of yellow fever virus–specific immunoglobulin M and yellow fever–specific neutralizing antibodies or yellow fever virus nucleic acid by polymerase chain reaction, or 2) isolation of yellow fever virus from a blood specimen. In response to the outbreak, the DRC Ministry of Health implemented yellow fever case–based surveillance with immediate notification and field investigation requirements, including collection of blood specimens, ascertainment of vaccination status, and documentation of travel history. On the basis of travel history and location of exposure, laboratory-confirmed cases with no previous vaccination history were classified as imported (from another country) or autochthonous. Health facilities reported all suspected yellow fever cases to the health zone office in their jurisdiction; health zone reports were compiled by the Kongo Central Province Health Division. All blood specimens were sent from affected health zones to the National Institute of Biomedical Research in Kinshasa, DRC's capital, which serves as the national reference laboratory. Surveillance and laboratory data were tabulated in Epi Info and descriptive analyses were performed using statistical software.

From January 4 to August 18, 2016, a total of 410 suspected yellow fever cases, including 42 (10.2%) deaths were reported in Kongo Central Province. Blood specimens from 393 (98.5%) suspected cases were collected and tested for yellow fever virus; 37 (9.4%) were positive, 346 (88.0%) were negative (n = 325) or discarded because of recent vaccination (21), and results for 10 (2.5%) were inconclusive (Table). Among the 37 confirmed cases, 32 (86.5%) were serologically confirmed and five (13.5%) were confirmed by detection of yellow fever

TABLE. Classification of reported yellow fever cases, by confirmation status, outcome, and location of exposure — Kongo Central Province, Democratic Republic of the Congo, January 4–August 18, 2016

Indicator	No. (%)
Reported suspected cases	410 (100)
Deaths* (CFR)	42/410 (10.2)
Specimens collected and tested during investigation*	393/410 (98.5)
Negative and discarded cases†	346/393 (88.0)
Unclassified/inconclusive cases†	10/393 (2.5)
Laboratory-confirmed cases†	37/393 (9.4)
Imported cases§	35/37 (94.6)
Autochthonous cases§	2/37 (5.4)
Deaths (CFR)§	8/37 (21.6)

Abbreviation: CFR = case fatality ratio.
* Among suspected cases.
† Among suspected cases with submitted specimen.
§ Among laboratory-confirmed cases.

virus nucleic acid by polymerase chain reaction or isolation of yellow fever virus.

The median age of persons with laboratory-confirmed cases of yellow fever was 31 years (range = 0–72 years) and 86.4% were male; eight deaths occurred among confirmed cases (case-fatality ratio = 21.6%) (Table). Thirty five (94.5%) laboratory-confirmed yellow fever cases occurred in persons who had been in Angola in the 14 days preceding illness onset and were thus classified as imported from Angola; the other two (5.4%) were classified as autochthonous. The highest numbers of laboratory-confirmed cases were reported in March and April 2016 (Figure 1) and began to decline before the vaccination campaigns. No additional cases were confirmed after June 27, 2016.

Within Kongo Central Province, laboratory-confirmed cases were reported in eight health zones, seven (87.5%) of which border Angola. The highest incidence of laboratory-confirmed yellow fever cases in Kongo Central Province was in Nsona-Mpangu Health Zone (13 cases per 100,000 population; 15 laboratory-confirmed cases) (Figure 2). The market city of Lufu in the Nsona-Mpangu Health Zone accounted for 23 of 35 (65.7%) laboratory-confirmed cases imported from Angola. Lufu is situated on the DRC-Angola border and ≤40,000 travelers cross the border every week on market day (in a 10-hour period ≥65 persons per minute are seen crossing). At the time of the outbreak, four health professionals were assigned to identify travelers with unexplained fever and jaundice consistent with the suspected yellow fever case definition, obtain travel histories, and check yellow fever vaccination certificates.

In some remote areas of Kongo Central Province, because of the absence of correct supplies and standard operating procedures for specimen collection, inappropriate and nonsterile 5-mL vacuum tubes were used to collect blood. The average time between blood collection at health facilities in Kongo Central Province and receipt of specimens at the reference laboratory was 4 days (range = 1–7 days).

Discussion

The yellow fever outbreak in Kongo Central Province was associated with high population mobility across a porous border and was characterized by wide geographic spread in health zones bordering Angola. The Angola-DRC border market city of Lufu was the main port of entry for persons with laboratory-confirmed cases imported from Angola and accounted for two-thirds of imported confirmed cases in the province. Resources allocated for control and screening of ≤40,000 travelers through Lufu each day were insufficient; similar border issues were described during the 2014 Ebola virus outbreak in West Africa (*3*).

Nsona-Mpangu Health Zone recorded the highest yellow fever incidence rate in Kongo Central Province (13 cases per 100,000 population) and in the DRC overall. In contrast, incidence rates in the two neighboring Angolan border provinces of Zaire and Uige were estimated to be substantially lower than those in Nsona-Mpangu (approximately 0.21–2.99 per 100,000) (*4*). In addition, a higher case fatality rate among persons with laboratory-confirmed yellow fever cases was reported in Kongo Central Province (21.6%) compared with the case fatality rate reported by the World Health Organization for Angola (13.6% [121 cases per 884 persons]) (*5*). Although the outbreak was controlled through enhanced surveillance and mass vaccination campaigns, with no laboratory-confirmed cases reported since July 27, the risk for yellow fever transmission persists because of increases in transmission during the annual rainy season and intense cross-border trade activities.

The findings in this report are subject to at least two limitations, both of which were surveillance challenges in Kongo Central Province highlighted by field visits. First, there were insufficient human resources to conduct adequate case-based surveillance and health screening in a context of substantial population movement across porous borders. Second, laboratory supplies for blood specimen collection were lacking and the system for transporting blood specimens from health facilities in Kongo Central Province to the reference laboratory in Kinshasa (about 300 miles) was inefficient. Blood specimens should be sent in a cooler or ordinary domestic vacuum flask to the reference laboratory as soon as possible and not later than 24 hours after collection. Delays in transportation, inadequate supplies for collection of specimens, and inappropriate handling of specimens might have compromised the quality of some specimens, possibly resulting in a low case confirmation rate (9.4%; the confirmation rate during the yellow fever outbreak in Angola was approximately 27%).

To successfully prevent and control future yellow fever outbreaks, laboratory- and case-based surveillance needs to be strengthened, cross-border coordination improved, and

FIGURE 1. Confirmed yellow fever cases, by week of onset and importation status — Kongo Central Province, Democratic Republic of the Congo, January 4–August 18, 2016 (N = 37)

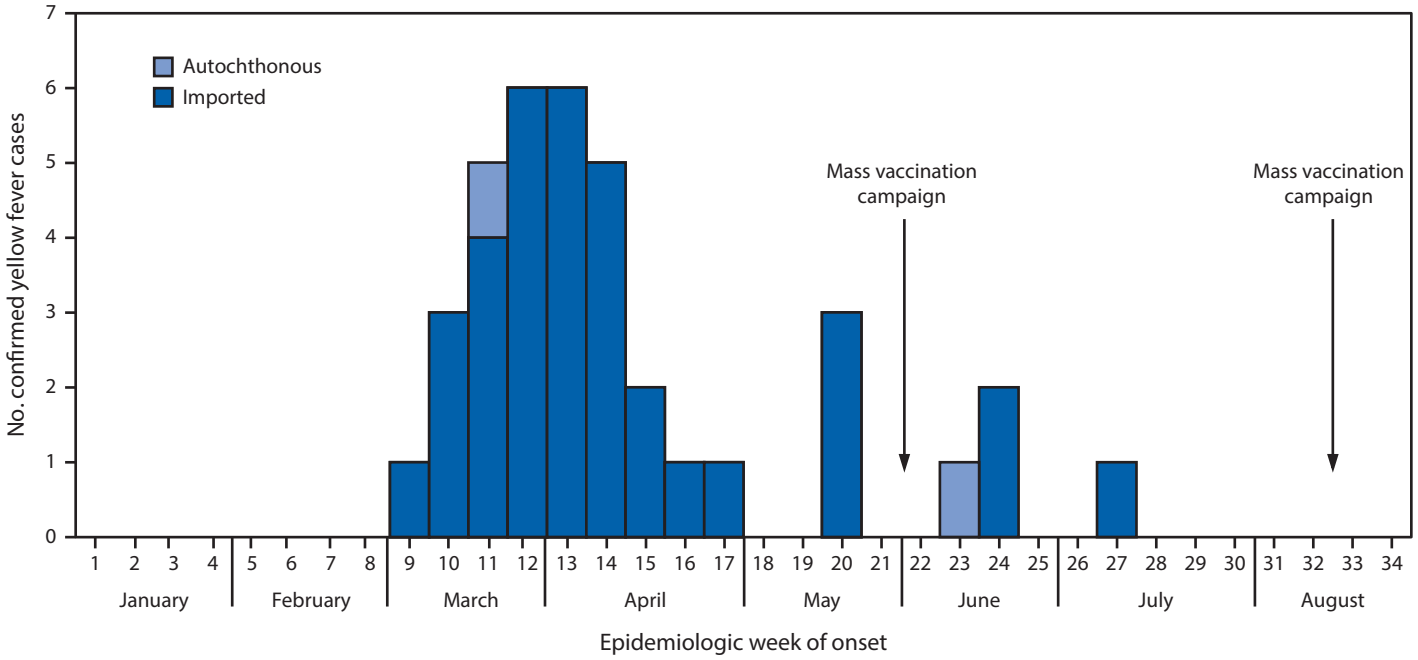
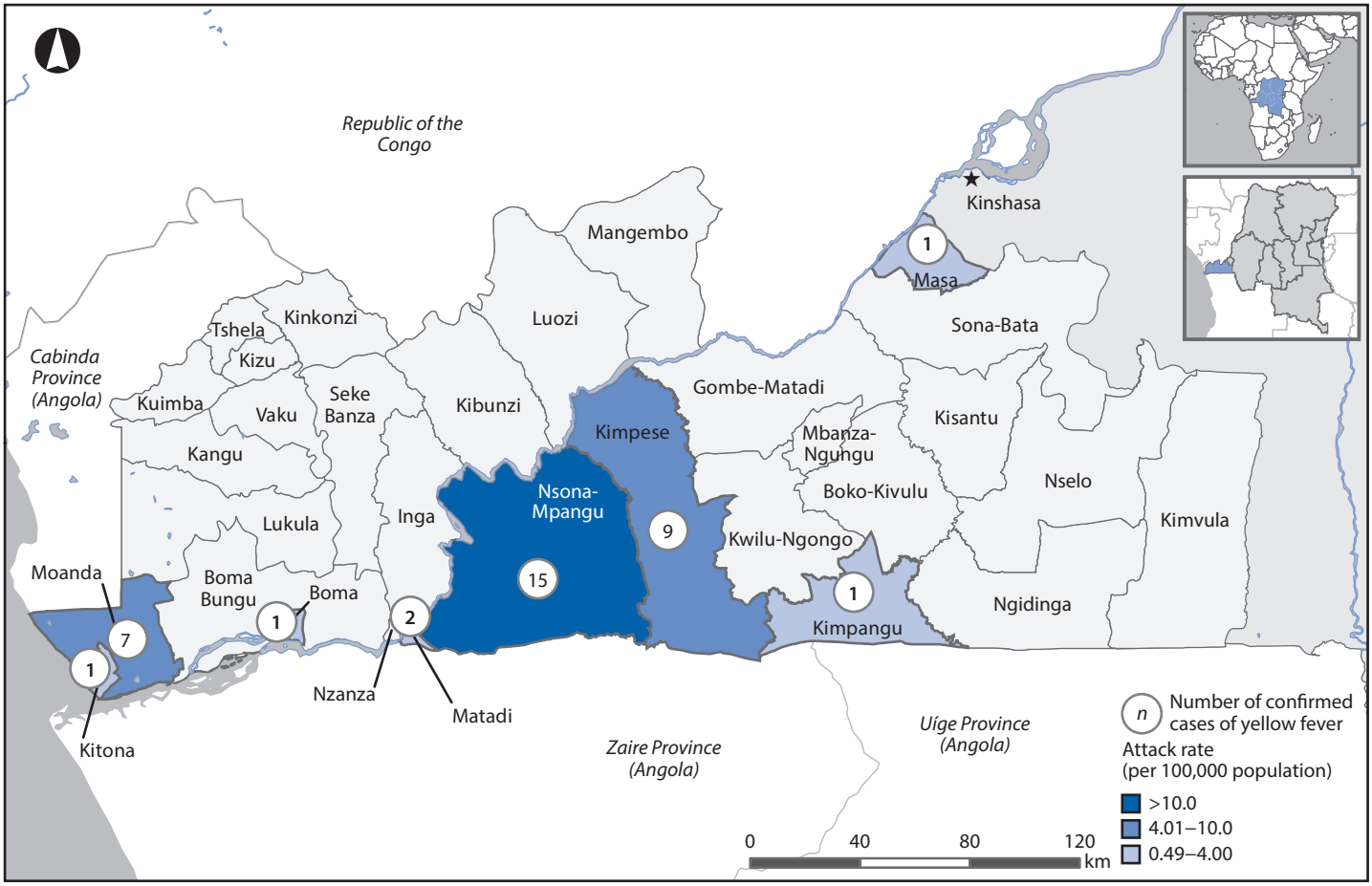


FIGURE 2. Number of confirmed yellow fever cases, by health zone — Kongo Central Province, Democratic Republic of the Congo, January 4–August 18, 2016 (N = 37)



Summary

What is already known about this topic?

Border areas with high population mobility and intense trade activities can foster outbreaks such as yellow fever, particularly in settings where vaccination coverage and health screening capacity are not optimal. In December 2015, a large yellow fever outbreak began in Angola, bordering the Democratic Republic of the Congo (DRC).

What is added by this report?

In February 2016, a yellow fever outbreak was declared in DRC; approximately 90% of suspected cases and deaths occurred in Kongo Central Province. Thirty seven of the 393 specimens tested received laboratory confirmation of yellow fever virus; 35 of these 37 cases were imported from neighboring Angola. Most imported cases occurred in persons who crossed the DRC-Angola border at a single market city, where ≤40,000 travelers cross the border each week on market day, overwhelming the border health screening program. Insufficient laboratory supplies and delayed transport of specimens to the laboratory compromised case confirmation.

What are the implications for public health practice?

Reinforcement of coordination between enhanced laboratory and case-based surveillance, with health border screening and cross-border trade activities, is necessary at land crossing borders to prevent and control future yellow fever outbreaks.

vaccination coverage increased. In addition, more complete yellow fever vector data are needed to better characterize the prevalence and epidemiology of yellow fever outbreaks in this forested border region.

Yellow fever is preventable through vaccination. The DRC Ministry of Health requires all persons aged ≥9 months crossing the border to show proof of yellow fever vaccination upon arrival or to be vaccinated, but the high population mobility and ineffective screening capacity at Kongo Central Province's remote land ports of entry overwhelmed the screening system. Reinforced coordination between health surveillance and cross-border trade activities at land crossing borders is needed to prevent yellow fever transmission.

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Evaluation of Automated Molecular Testing Rollout for Tuberculosis Diagnosis Using Routinely Collected Surveillance Data — Uganda, 2012–2015

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In 2012, Uganda introduced the use of GeneXpert MTB/RIF (Cepheid, Sunnyvale CA), a sensitive, automated, real-time polymerase chain reaction–based platform for tuberculosis (TB) diagnosis, for programmatic use among children, adults with presumptive human immunodeficiency virus (HIV)-associated TB, and symptomatic persons at risk for rifampicin (RIF)-resistant TB. The effect of using the platform's Xpert MTB/RIF assay on TB care and control was assessed using routinely collected programmatic data; in addition, a retrospective review of district quarterly summaries using abstracted TB register data from purposively selected facilities in the capital city of Kampala was conducted. Case notification rates were calculated and nonparametric statistical methods were used for analysis. No statistically significant differences were observed in case notification rates before and after the Xpert MTB/RIF assay became available, although four of 10 districts demonstrated a statistically significant difference in bacteriologically confirmed TB. Once the GeneXpert MTB/RIF platform is established and refined, a more comprehensive evaluation should be conducted.

The Xpert MTB/RIF assay detects genetic sequences of *Mycobacterium tuberculosis* complex as well as mutations associated with resistance to RIF and provides results in 2 hours. The test is much more sensitive than the conventional diagnostic test (sputum smear microscopy), with a pooled sensitivity among persons living with HIV infection of 80% (*1*). The World Health Organization recommends use of the Xpert MTB/RIF assay as the initial diagnostic test in adults and children with presumptive HIV-associated TB or multidrug resistant TB (*2*). It is hoped that the use of a more sensitive diagnostic test will increase case detection and notification; however, an evaluation of the Xpert MTB/RIF assay in Nepal found that use of Xpert MTB/RIF testing was associated with an increase in the proportion of TB diagnoses that were bacteriologically confirmed, but had little impact on overall rate of diagnoses or patient care, which might be the case in locations where clinical diagnosis and empiric TB treatment are common (*3*).

In Uganda, the HIV prevalence in adults is >7% (*4*), and the Xpert MTB/RIF assay is used as the initial diagnostic test for all persons living with HIV, children, and persons at risk for RIF-resistant TB who have any of the principal signs or symptoms of TB (cough, weight loss, night sweats, or fever). As of February 2016, there were 111 GeneXpert instruments installed in 76 (68%) of 111 districts throughout Uganda.

Two retrospective data reviews were conducted. The first was a review of district quarterly reports from 2012 to 2015 submitted to the National Tuberculosis and Leprosy Program; regional case notification rates before and after availability of GeneXpert MTB/RIF testing were compared. Ten districts that had data reported and available for multiple quarters before and after the installation of a GeneXpert instrument were selected, and deidentified data from multiple calendar-year quarters before and after GeneXpert instruments were installed were abstracted. Case notification rates were calculated using the Uganda National Population and Housing Census 2014 (*5*). For the second review, line-listed data (including longitudinal data such as treatment outcomes) were abstracted on all patients registering for TB therapy during 2012–2015 at a convenience sample of six facilities in Kampala, which were selected based on size, ease of access, and completeness of records. At five facilities, data were collected from patients registered during one quarter before and two quarters after the availability of Xpert MTB/RIF assays; at four of those facilities, data were collected over a 24-month period, and at the fifth, data were collected over an 18-month period. Because of high patient volume at the sixth facility (Mulago National Referral Hospital), data were collected from patients registered during the first month of the quarter immediately before introduction of Xpert MTB/RIF testing, and the first month of each of the two quarters immediately after introduction of Xpert MTB/RIF testing.

The Wilcoxon rank sum test was used to test for differences in case notification rates between districts before and after Xpert MTB/RIF testing initiation, and differences were considered statistically significant if $p<0.05$. Because of small sample sizes and uncertainty about the population from which the samples were drawn, nonparametric bootstrap sampling was used to construct confidence intervals for the difference in facility diagnoses before and after installation of GeneXpert instruments. Bootstrap sampling was also used to evaluate treatment outcomes reported by health facilities, specifically evaluating the differences between facilities in the proportion of patients with TB in three mutually exclusive categories:

1) completed TB treatment, 2) stopped TB treatment without completing, and 3) continuing TB treatment at the time of data collection. A total of 100,000 bootstrap samples were used to approximate the true sampling distribution for each model.

Forty quarterly report summaries from the 10 selected districts were abstracted. Although no statistically significant differences in case notification rates before and after Xpert MTB/RIF testing initiation were identified, statistically significant increases in the percentage of bacteriologically confirmed TB cases were found in four districts (Table 1).

A total of 1,650 patient records were abstracted from the six Kampala facility treatment registers. Records from one (Kiseny Health Center IV) indicated a statistically significant increase in the proportion of TB cases that were bacteriologically confirmed after availability of Xpert MTB/RIF testing (Table 2). This health facility also had a statistically significant increase in the proportion of patients who completed TB treatment after Xpert MTB/RIF testing initiation and a decrease in the proportion who stopped treatment before completion. In a second facility (Nsambya Hospital), records indicated a statistically significant decrease in the proportion of patients completing treatment and an increase in the proportion of TB cases continuing in TB treatment (Table 2).

Summary

What is already known about this topic?

The World Health Organization recommends use of the Xpert MTB/RIF assay as the initial diagnostic test in adults and children with presumptive HIV-associated TB or multidrug-resistant TB. Currently, data on the effect of the Xpert MTB/RIF assay on case notification or TB treatment outcomes are limited. Published studies indicate the Xpert MTB/RIF assay might improve the proportion of TB diagnoses that are bacteriologically confirmed, but appears to have little effect on overall rate of diagnoses or patient care, especially in locations where clinical diagnosis and empiric TB treatment are high.

What is added by this report?

This early impact evaluation of the Xpert MTB/RIF rollout demonstrated no apparent increase in overall TB case notification rates after testing became available in Uganda. However, within a few selected districts the proportion of bacteriologically confirmed TB cases did increase after testing became available. These two findings validate previous reports.

What are the implications for public health practice?

The impact of Xpert MTB/RIF testing on TB case notification has not yet been fully realized in Uganda. Findings from this evaluation will help direct operations research, such as a review of the diagnostic algorithm for TB, as well as programmatic interventions, such as training health care workers on Xpert MTB/RIF usage and results interpretation.

Discussion

This early impact evaluation of the rollout of Xpert MTB/RIF testing did not demonstrate an apparent increase in overall TB case notification rates after testing became available in Uganda, although the proportion of bacteriologically confirmed TB cases increased in a few selected districts. Both findings validate previous reports (*3*,*6*,*7*).

Overall, there were no observable differences in treatment outcomes before and after Xpert MTB/RIF testing availability in reviewed health facilities in Kampala, although there was an apparent increase in TB treatment completion in one facility (Kisenyi). Time from specimen collection to treatment initiation (time to treatment), which elsewhere has been reduced by Xpert MTB/RIF test availability and use (*8*,*9*), was not evaluated in this analysis. Reducing time to treatment would be expected to reduce transmission, and could have an epidemiologic impact; moreover, reducing time to treatment might improve outcomes for the sickest patients and patients with multidrug resistant TB.

The lack of effect on TB case notification rates likely reflects the overall low usage rates, given that Xpert MTB/RIF testing was available only to a minority of patients with presumptive TB disease and might have been underused even in the target populations, and also corroborates findings from a previously reported facility-level review (*10*). It is also possible that Xpert MTB/RIF testing might be replacing clinically diagnosed cases, which represented a large proportion of TB cases before Xpert MTB/RIF testing became available, with biologically confirmed cases, as has been suggested in other similar evaluations (*6*). In addition, this might be partially explained by overestimation of the test's sensitivity by clinical staff members. If staff members assume a negative test is definitive, leaving them reluctant to make a clinical diagnosis, then Xpert MTB/RIF testing might have the paradoxical effect of decreasing the likelihood of diagnosing those with bacillary burdens below the level of detection. This possibility merits investigation with focused research; if found to be true, additional training on the sensitivity of the Xpert MTB/RIF assay and the importance of complete clinical appraisal of persons with suspected TB might lead to improved case detection.

The findings in this report are subject to at least five limitations. First, the sampling and the geographic focus of the facility data limit definitive and generalizable conclusions. Second, bootstrapping methods assume the original sample represents the population from which the sample was drawn; as such, the facility-level findings are generalizable only to those facilities. Third, because the study was conducted shortly after Xpert MTB/RIF testing became programmatically available (i.e., during the first 6 months of introduction), limited experience might have resulted in suboptimal usage of the

TABLE 1. Median case notification rates and percentage of cases bacteriologically confirmed before and after Xpert MTB/RIF availability, by selected district (N = 10) — Uganda, 2012–2015*

Region	District	No. quarters† before Xpert MTB/RIF	No. quarters† after Xpert MTB/RIF	Median case notifications per 100,000 population			Median percentage bacteriologically confirmed		
				Before Xpert MTB/RIF	After Xpert MTB/RIF	p value	Before Xpert MTB/RIF	After Xpert MTB/RIF	p value
Northern	Arua	7	2	23	23	0.58	52	62	0.09
Northern	Kitgum	5	3	47	39	0.80	48	67	0.02§
Western	Kabale	5	4	19	21	0.50	64	71	0.06
Western	Kabarole	5	4	34	31	0.87	54	68	0.14
Western	Kisoro	8	3	26	16	0.97	46	55	0.09
Western	Ntungamo	7	3	20	19	0.96	74	89	0.13
Eastern	Mbale	6	4	38	38	0.67	58	73	0.02§
Eastern	Tororo	6	6	31	27	0.99	50	55	0.03§
Central	Mpigi	6	6	26	33	0.17	77	68	0.99
Central	Rakai	7	5	24	29	0.17	67	77	0.01§

* Based on Wilcoxon rank sum test.
† 3-month calendar period.
§ Statistically significant (p≤0.05).

TABLE 2. Difference in proportion of bacteriologically confirmed* TB cases before and after Xpert MTB/RIF installation, and Bootstrap mean difference estimates and 95% CIs for treatment outcomes, by health facility (N = 6) — Kampala, Uganda, 2012 – 2015

Characteristics	Health facility					
	Alive Medical Services	Kisenyi Health Center IV	Kisugu	Mengo	Mulago Ward 5 and 6	Nsambya Hospital
Difference in proportion of bacteriologically confirmed* TB cases %, (95% CI)	8.3 (–3.1 to 29.8)	30.8 (21.3 to 40.2)†	14.9 (–3.8 to 33.3)	–10.1 (–26.3 to 6.3)	–1.7 (–12.6 to 9.3)	5.1 (–14.0 to 24.2)
Bootstrap mean difference estimates (95% CI)§ for TB treatment outcomes						
TB treatment completed	–0.119 (-0.357 to 0.119)	0.184 (0.059 to 0.307)†	–0.153 (–0.364 to 0.056)	–0.012 (–0.130 to 0.097)	–0.064 (–0.169 to 0.040)	–0.728 (–0.839 to –0.598)
Stopped TB treatment before completion	0.000 (–0.214 to 0.214)	–0.179 (-0.292 to 0.063)†	0.071 (–0.105 to 0.249)	0.040 (–0.056 to 0.149)	0.030 (–0.063 to 0.125)	–0.018 (–0.134 to 0.098)
Continuing TB treatment	0.119 (–0.048 to 0.298)	–0.006 (–0.081 to 0.074)	0.082 (–0.051 to 0.233)	–0.028 (–0.079 to 0.031)	0.034 (–0.031 to 0.102)	0.746 (0.608 to 0.866)†

Abbreviations: CI = confidence intervals; TB = tuberculosis.
* Bacteriologically confirmed TB includes cases diagnosed using either GenXpert or culture.
† Statistically significant (p≤0.05).
§ Bootstrap percentile CIs using 100,000 samples per model.

test, misinterpretation of test results, and unreliable data recording. Fourth, because routine programmatic data were used for district-level analyses, it is possible some data were incomplete or erroneous. Finally, data on severity of patient illness, such as clinical stage of HIV infection or CD4 cell count, were not collected, and the number of RIF-resistant TB cases in the sample was very few, precluding assessment of the impact of the Xpert MTB/RIF assay on treatment outcomes in specific subpopulations.

The effect of Xpert MTB/RIF testing on TB case notification has not yet been fully realized in Uganda. Findings from this evaluation will help direct operations research, such as a review of the algorithm for TB diagnosis, as well as programmatic interventions, such as training health care workers on using Xpert MTB/RIF tests and interpreting results. Once the GeneXpert platform is fully established and made more widely available, the national program could consider conducting a reevaluation of the impact of the Xpert MTB/RIF assay and a review of the diagnostic algorithm for TB in Uganda to validate and expand these findings. Additional studies might include a longitudinal study to conduct a more targeted evaluation of the overall introduction of Xpert MTB/RIF testing and the effects on clinical diagnoses, the impact of Xpert MTB/RIF testing on the sickest patients and those with RIF-resistant disease, and an assessment of feasibility and effect of expanding the Xpert MTB/RIF testing algorithm.

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Notes from the Field

Adverse Events Following a Mass Yellow Fever Immunization Campaign — Kongo Central Province, Democratic Republic of the Congo, September 2016

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On April 23, 2016, the Democratic Republic of the Congo (DRC) Ministry of Health reported an outbreak of yellow fever. As of May 24, 2016, among 41 confirmed yellow fever cases, 31 (75.6%) had occurred in Kongo Central Province, in the western part of the country bordering Angola (*1*), where a large yellow outbreak had begun in December 2015. In response, during May 25–June 7, 2016, the DRC Ministry of Health administered approximately 240,000 doses of yellow fever vaccine to all persons aged ≥9 months during a mass vaccination campaign in Matadi, one of 31 health zones in the Kongo Central Province. The administrative vaccination coverage (i.e., the number of vaccine doses administered divided by the most recent census estimates for the target population), was estimated to have reached >99%.

During the campaign, health workers in the Matadi Health Zone were trained to identify adverse events following immunization (AEFIs), complete case report forms, and send forms weekly to both provincial officials and a national expert committee for vaccine pharmacovigilance. Although a provisional classification of AEFIs by severity is made at peripheral and provincial levels at the time of an initial investigation, responsibilities at the national level are to guide the investigation of suspected serious AEFIs, classify them according to standard AEFI cause–specific definitions, recommend additional testing of biologic specimens if warranted, and determine causality.

Because identification of AEFIs through passive surveillance is limited by low reporting rates in Kongo Central Province (estimated <50%), active surveillance (review of hospital records and interviews with health care personnel) for AEFIs after receipt of yellow fever vaccine was piloted in the Matadi Health Zone after the campaign. Results obtained through active surveillance were compared with the results from the existing routine passive AEFI reporting system integrated into the Expanded Program on Immunization (EPI), which was established in the late 1970s to ensure that infants/children and mothers have access to routinely recommended vaccines.

An AEFI was defined for both the passive and active surveillance programs as any untoward medical occurrence (reported by either the vaccine recipient or a health worker) that occurs after immunization (≤30 days after the receipt of yellow fever vaccine) and which is not necessarily causally related to receipt of the vaccine. An active retrospective search to identify AEFIs was conducted at two referral health facilities in the Matadi Health Zone. Data were collected using the national EPI AEFI case investigation form, which was revised based on recommendations in the World Health Organization's field guide, *Surveillance of Adverse Events Following Immunization Against Yellow Fever* (*2*). Trained EPI health zone and provincial surveillance supervisors identified potential AEFI cases through review of hospital registries and medical charts and interviews with emergency department personnel and community health workers. At the peripheral and provincial levels, identified AEFIs were provisionally classified as serious or nonserious. Serious AEFIs included those resulting in death, hospitalization or prolongation of hospitalization, persistent or major disability/incapacity; those that were life-threatening; or those that represented a congenital anomaly/birth defect in an infant after vaccination of the mother during pregnancy. All other AEFIs were classified as nonserious (*3*).

AEFIs identified through this comprehensive review were compared with those detected through passive surveillance during the immunization campaign to assess the completeness and representativeness of passive surveillance data. Overall, 15 AEFIs were identified by active surveillance among approximately 2,800 patient records reviewed at the two targeted referral hospitals, including eight AEFIs previously reported during the immunization campaign (Table). Two AEFIs were classified as serious and 13 as nonserious. The serious AEFIs comprised a spontaneous abortion that occurred after inadvertent administration of yellow vaccine early during an unrecognized pregnancy and a nonspecific gastrointestinal syndrome, both resulting in prolonged hospitalizations. Nonserious AEFIs included cutaneous allergic reactions, itching, fever, and injection site erythema. The incidences were 6.2 per 100,000 vaccine doses administered for all identified AEFIs and 0.8 for serious AEFIs. The AEFI incidence rate using the previous passive EPI surveillance data was 3.3 per 100.000 vaccine doses administered. Previous studies in African settings have found an expected AEFI rate of 8.2 per 100,000 yellow fever vaccine doses administered for all reported AEFIs and 0.4 for any serious AEFI (*4*).

TABLE. Adverse events following immunization (AEFIs) after a mass yellow fever vaccination campaign, identified through active surveillance system — Matadi Health Zone, Kongo Central Province, Democratic Republic of the Congo, September 2016

Patient	Sex	Age (yrs)	Date reported	Vaccine receipt to onset (days)	Description of AEFI (other associated medical conditions)*	Provisional classification peripheral level	Outcome
1†	F	23	5/27/2016	2	Cutaneous allergic reaction, rash, itching	Nonserious	Recovered
2	M	16	5/28/2016	3	Unexplained fever	Nonserious	Recovered
3	M	25	5/28/2016	2	Gastrointestinal syndrome, vomiting, fever	Nonserious	Recovered
4†	M	59	5/30/2016	2	Cutaneous allergic reaction, rash, itching	Nonserious	Recovered
5†	F	36	5/30/2016	2	Injection-site pain and erythema, tiredness, muscle pain	Nonserious	Recovered
6	M	3	5/30/2016	3	Undetermined hematuria and tiredness	Nonserious	Recovered
7†	F	26	5/31/2016	2	Cutaneous allergic reaction, rash, itching	Nonserious	Recovered
8†	F	49	5/31/2016	2	Cutaneous allergic reaction, rash, itching	Nonserious	Recovered
9†	F	14	5/31/2016	2	Cutaneous allergic reaction, rash, itching, fever	Nonserious	Recovered
10†	F	45	5/31/2016	2	Cutaneous allergic reaction, rash, itching, allergic reaction on lips	Nonserious	Recovered
11†	M	29	6/1/2016	2	Cutaneous allergic reaction, rash, itching, injection site pain and erythema	Nonserious	Recovered
12	F	25	6/1/2016	3	Allergic reaction on lips	Nonserious	Recovered
13	F	7	6/2/2016	2	Gastrointestinal syndrome, muscle pain, injection-site pain and erythema (severe malaria and urinary tract infection)	Serious	Recovered after 7-day hospitalization
14	M	17	6/4/2016	2	Eye allergic reaction, conjunctivitis	Nonserious	Recovered
15	F	22	6/11/2016	5	Spontaneous abortion of an unrecognized early pregnancy (endometritis)	Serious	Recovered after 7-day hospitalization

Abbreviations: AEFI = adverse event following immunization; F = female; M = male.
* Descriptions based on the Expanded Program on Immunization AEFI investigation forms, which were revised based on recommendations in the World Health Organization field guide for surveillance of AEFIs following yellow fever vaccination.
† Detected by the routine passive surveillance system.

This enhanced surveillance program found that the passive yellow fever AEFI system failed to identify half of all AEFIs that were identified through active surveillance, including all of the serious AEFIs. The national expert committee for vaccine pharmacovigilance will validate all AEFIs identified through this evaluation; however, discrepancies between AEFIs identified through this pilot active surveillance and through passive surveillance highlight the need for an organized and active data collection system to supplement the lack of sensitivity of passive AEFI detection during a mass immunization campaign (*2*,*3*).

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Announcement

National Public Health Week — April 3–9, 2017

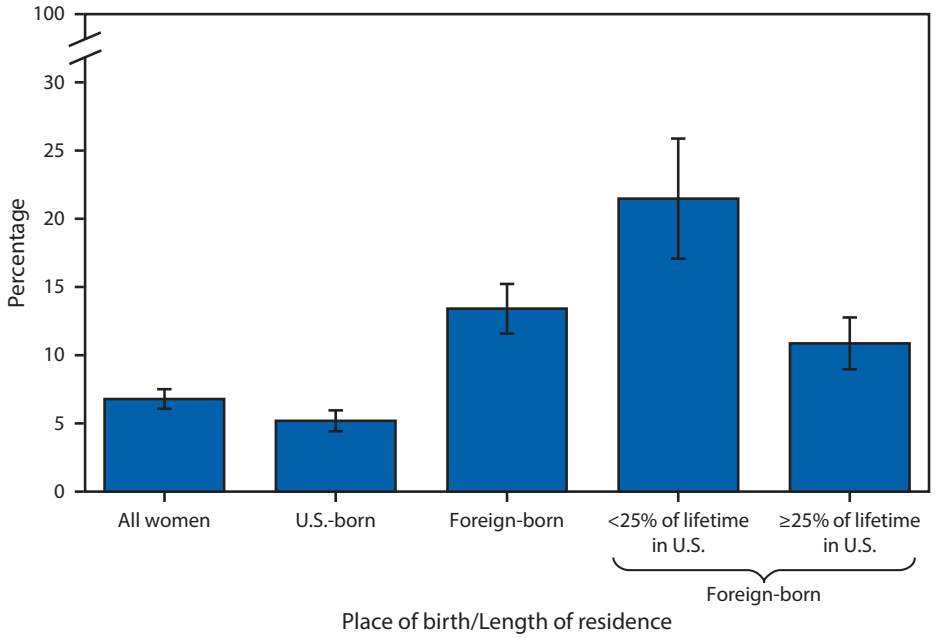
CDC joins the American Public Health Association (APHA) in celebration of National Public Health Week, April 3–9, 2017. Since 1995, APHA has led the observance of National Public Health Week during the first full week of April. The week recognizes the impact of public health on the health of the nation. The 2017 observance focuses on making the United States the Healthiest Nation in One Generation by 2030 by spotlighting the importance of prevention, employing successful strategies for collaboration, and promoting the critical role of a strong public health system.

In conjunction with this year's observance, CDC is partnering to promote APHA's National Public Health Week themes, events, tools, and resources. Additional information is available at http://www.nphw.org/.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of U.S. Women Aged 21–65 Years Who Never Had a Papanicolaou Test (Pap Test),* by Place of Birth and Length of Residence in the United States† — National Health Interview Survey, 2013 and 2015§



* The Papanicolaou test (commonly referred to as Pap test or Pap smear) is a screening method used to detect potentially precancerous and cancerous processes in the cervix. The U.S. Preventive Services Task Force recommends screening for cervical cancer in women aged 21–65 years with cytology (Pap smear) every 3 years.

† Country of birth, number of years residing in the United States, and current age were used to determine nativity and percentage of time in the United States.

§ 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. Estimates are presented with 95% confidence intervals indicated by error bars.

In 2013 and 2015 combined, 6.8% of U.S. women aged 21–65 years had never received a Pap test in their lifetime. Foreign-born women were more than twice as likely as U.S. born women to have never received a Pap test (13.4% versus 5.2%). Foreign-born women who lived in the United States for <25% of their lifetime were almost twice as likely as those who resided in the United States for ≥25% of their lifetime (21.5% versus 10.9%) to have never received a Pap test.

Source: National Health Interview Survey, 2013 and 2015 combined. https://www.cdc.gov/nchs/nhis.htm.

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