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Arthritis Awareness Month — May 2016

May is Arthritis Awareness Month. The 2016 theme for the observance is "See Arthritis" (http://www.cdc.gov/features/arthritisawareness/index.html). The theme is designed to raise awareness about the seriousness of arthritis by focusing on accounts from persons affected by the disease.

An estimated 52.5 million (22.7%) adults in the United States have self-reported doctor-diagnosed arthritis. Of those, 22.7 million (9.8% of U.S. adults) have arthritis-attributable activity limitation (AAAL) (*1*). Arthritis also commonly co-occurs with obesity, heart disease, and diabetes (*1*). The prevalence of arthritis is projected to increase 49% to 78.4 million (25.9% of U.S. adults) by 2040, and the number of adults with AAAL is projected to increase 52% to 34.6 million (11.4% of U.S. adults) (*2*). Arthritis and AAAL will remain large and growing problems for clinical and public health systems for many years to come. Clinicians and public health professionals might find these projections useful in planning for future clinical and public health needs, including health care utilization, workforce demands, and health policy development.

Information about arthritis and proven community-based programs that can help with managing arthritis is available at http://www.cdc.gov/arthritis and http://www.cdc.gov/arthritis/interventions.

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Prevalence of Doctor-Diagnosed Arthritis at State and County Levels — United States, 2014

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Doctor-diagnosed arthritis is a common chronic condition that affects approximately 52.5 million (22.7%) adults in the United States and is a leading cause of disability (*1,2*). The prevalence of doctor-diagnosed arthritis has been well documented at the national level (*1*), but little has been published at the state level and the county level, where interventions are carried out and can have their greatest effect. To estimate the prevalence of doctor-diagnosed arthritis among adults at the state and county levels, CDC analyzed data from the 2014 Behavioral Risk Factor Surveillance System (BRFSS). This report summarizes the results of that analysis, which found that, for all 50 states and the District of Columbia (DC) overall, the age-standardized median prevalence of doctor-diagnosed arthritis was 24% (range = 18.8%–35.5%). The age-standardized model-predicted prevalence of doctor-diagnosed arthritis varied substantially by county, with estimates ranging from 15.8% to 38.6%. The high prevalence of arthritis in all counties, and the high frequency of arthritis-attributable limitations (*1*) among adults with arthritis, suggests that states and counties might benefit from expanding

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underused, evidence-based interventions for arthritis that can reduce arthritis symptoms and improve self-management.

BRFSS is an annual, random-digit–dialed landline and cellphone survey representative of the noninstitutionalized adult population aged ≥18 years of the 50 states, DC, and the U.S. territories.* In 2014, a total of 464,664 interviews among adults were completed, and data from 50 states, DC, Puerto Rico, and Guam are included in this report. Response rates ranged from 25.1% to 60.1%, with a median of 47.0%.† Respondents were classified as having doctor-diagnosed arthritis if they answered "yes" to the question, "Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?"

All analyses used sampling weights to account for the complex sample design, nonresponse, noncoverage, and cellphone-only households. Data were weighted using an iterative proportional weighting (raking) procedure.§ For the combined sample of 50 states and DC, unadjusted and age-standardized weighted prevalences with 95% confidence intervals (CIs) for doctor-diagnosed arthritis were estimated by age group (18–44, 45–64, and ≥65 years), sex, race (non-Hispanic white, non-Hispanic black, Hispanic, American Indian/Alaska Native, Asian, Native Hawaiian/Pacific Islander, two or more races, and other non-Hispanic), and education level (less than high school, high school graduate or equivalent, more than high school). Estimates were age-standardized to the projected year 2000 U.S. standard population using three age-groups (18–44, 45–64, and ≥65 years) (*3*). For states and territories, unadjusted and age-standardized weighted prevalence with CIs for doctor-diagnosed arthritis were estimated, with medians and ranges based on all 50 states and DC; differences were considered statistically significant if the CIs of the age-standardized estimates did not overlap.

A multilevel regression and poststratification approach (*4,5*) was used to estimate model-predicted arthritis prevalence for counties in all 50 states and DC (3,142 counties). The multilevel regression model included 2014 BRFSS individual-level data on age group, sex, and race/ethnicity, and county-level poverty (percentage under 150% poverty level) from the American Community Survey 5-year estimates, and county-level and state-level random effects. Census Vintage 2014 county population estimates (http://www.census.gov/popest/data/counties/asrh/2014/index.html) were then used to generate final predicted county-level estimates of arthritis prevalence. These estimates were age-standardized to the projected 2000 U.S. standard population using 13 age groups for the population aged ≥18 years (*3*), and reported in quintiles based on data from all 3,142 counties in the 50 states and DC.

* http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm.

† The response rate was the number of respondents who completed the survey as a proportion of all eligible and likely eligible persons. Response rates for BRFSS were calculated using standards set by American Association of Public Opinion Research response rate formula no. 4. Additional information available at http://www.cdc.gov/brfss/annual_data/2014/2014_responserates.html.

§ http://www.cdc.gov/brfss/annual_data/2014/pdf/weighting-data.pdf.

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For the combined sample of the 50 states and DC, the prevalence of arthritis ranged from 8.8% among those aged 18–44 years to 53.3 percent among those aged ≥65 years (Table 1). Age-standardized prevalences were higher for women than men and among persons with less compared with more education. Compared with white or black non-Hispanics, those who were American Indian/Alaska Native or identifying as multiracial had higher prevalences, and Hispanics and Asians had lower prevalences of doctor-diagnosed arthritis.

The estimated age-standardized prevalences of arthritis varied among states and counties. For states and territories, doctor-diagnosed arthritis ranged from 18.8% in Hawaii to 35.5% in West Virginia (median = 24.0%) (Table 2). In 2014, 47 states, DC, and Guam had an age-standardized prevalence of doctor-diagnosed arthritis of ≥20%, and four states had an age-standardized prevalence of arthritis of ≥30% (Table 2).

At the county level (Figure), counties along the Appalachian Mountains, the Mississippi River, and the Ohio River tended to be in the highest quintiles of age-standardized model-predicted arthritis prevalence. The majority of counties in Alabama, Kentucky, Michigan, Tennessee, and West Virginia also were in the highest quintile.

Discussion

In 2014 doctor-diagnosed arthritis was common in the 50 states and DC (age-standardized median prevalence = 24.0%), affecting at least one in five adults in 47 states, DC, and Guam and nearly one in three adults in four states. The estimated age-standardized, model-predicted prevalence of doctor-diagnosed arthritis among U.S. counties ranged from 15.8% to 38.6% in the 3,142 counties in 50 states and DC, indicating that it is a large problem in all counties.

The high prevalence of arthritis in all counties is particularly problematic because 43.2% of adults attribute activity limitations to their arthritis (*1*), and few are aware of interventions that have been shown to reduce their joint pain (e.g., physical activity) and help them better manage their arthritis (i.e., self-management education). Arthritis also is a common comorbidity. Half of adults with heart disease or diabetes and one third of adults with obesity have arthritis; adults with both arthritis and one of these conditions are less able to be physically active, which is important for managing the other three conditions (*6*–*8*).

For those with arthritis, physical activity reduces joint pain (*9*) and can be accomplished by walking, biking, swimming, and other low-impact activities. Community programs such as "EnhanceFitness" and "Walk With Ease" offer guidance on how to safely be physically active. In addition, adults can improve their confidence in managing their arthritis symptoms through community self-management education interventions.[¶]

[¶] http://www.cdc.gov/arthritis/interventions/marketing-support/compendium/docs/pdf/compendium-2012.pdf.

TABLE 1. Weighted prevalence of doctor-diagnosed arthritis* among adults aged ≥18 years, by selected characteristics — 2014 Behavioral Risk Factor Surveillance System, 50 states and the District of Columbia

Characteristic	No.	Weighted no. in population (in 1,000s)[†]	Unadjusted % (95% CI)	Age-standardized[§] % (95% CI)
Overall	**161,814**	**63,283**	**25.6 (25.4–25.8)**	**23.7 (23.4–23.9)**
Age group (yrs)				
18–44	12,486	10,155	8.8 (8.5–9.1)	— (—)
45–64	64,041	27,987	33.1 (32.7–33.6)	— (—)
≥65	85,287	25,141	53.3 (52.8–53.8)	— (—)
Sex				
Men	55,676	25,800	21.5 (21.1–21.8)	20.5 (20.2–20.8)
Women	106,138	37,483	29.5 (29.2–29.9)	26.5 (26.2–26.8)
Race/Ethnicity				
White, non-Hispanic	130,172	45,567	29.3 (29.0–29.6)	25.0 (24.8–25.3)
Black, non-Hispanic	12,707	7,156	25.3 (24.5–26.0)	25.0 (24.3–25.6)
Hispanic	8,163	6,064	15.2 (14.6–15.8)	18.9 (18.2–19.5)
American Indian/Alaska Native	2,476	743	30.8 (28.7–33.0)	29.6 (27.7–31.6)
Asian	1,373	1,449	12.2 (10.7–13.9)	15.6 (13.9–17.6)
Native Hawaiian/Pacific Islander	326	96	18.4 (14.5–23.2)	23.2 (18.9–28.2)
Multiracial	3,189	902	28.6 (26.9–30.5)	31.0 (29.4–32.7)
Other, non-Hispanic	668	218	21.0 (18.3–24.0)	22.0 (19.5–24.7)
Education level				
<High school	16,399	11,008	30.6 (29.8–31.4)	27.7 (26.9–28.4)
High school or equivalent	51,262	19,480	28.0 (27.6–28.5)	25.0 (24.6–25.4)
>High school	93,040	32,372	23.3 (23.0–23.6)	22.1 (21.8–22.3)

Abbreviation: CI = confidence interval.

* Doctor-diagnosed arthritis was defined as an affirmative response to the question, "Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?"

[†] Weighted number of adults in the population with doctor-diagnosed arthritis.

[§] Doctor-diagnosed arthritis prevalence estimates were adjusted to the projected 2000 U.S. standard population.

TABLE 2. Weighted unadjusted and age-standardized prevalence of doctor-diagnosed arthritis* among adults aged ≥18 years, by state/area — Behavioral Risk Factor Surveillance System, United States,† 2014

State/Area	No.	Weighted no. in population (in 1,000s)§	Unadjusted % (95% CI)	Age-standardized¶ % (95% CI)	Prevalence level**
Alabama	3,914	1,266	34.0 (32.7–35.3)	31.1 (30.0–32.3)	High
Alaska	1,261	121	21.9 (20.4–23.5)	22.3 (20.9–23.7)	Low
Arizona	5,566	1,260	24.9 (23.9–25.9)	22.9 (22.0–23.8)	Intermediate
Arkansas	2,251	685	30.4 (28.7–32.2)	27.7 (26.1–29.3)	High
California	2,159	5,963	20.3 (19.3–21.4)	19.7 (18.8–20.6)	Low
Colorado	4,176	933	22.8 (22.0–23.6)	21.9 (21.2–22.6)	Low
Connecticut	2,520	675	24.0 (22.8–25.2)	21.1 (20.1–22.2)	Low
Delaware	1,577	193	26.6 (25.0–28.3)	23.5 (22.1–24.9)	Intermediate
DC	1,293	104	19.2 (17.5–21.0)	20.6 (19.0–22.3)	Low
Florida	3,614	4,241	27.0 (25.9–28.1)	22.9 (22.0–23.9)	Intermediate
Georgia	2,313	1,915	25.2 (23.9–26.5)	24.3 (23.2–25.5)	Intermediate
Hawaii	1,847	230	20.7 (19.5–22.0)	18.8 (17.7–20.1)	Low
Idaho	1,882	297	24.8 (23.3–26.3)	23.2 (21.9–24.6)	Intermediate
Illinois	1,628	2,476	25.1 (23.6–26.5)	23.4 (22.1–24.8)	Intermediate
Indiana	4,406	1,459	29.2 (28.1–30.2)	27.1 (26.2–28.1)	High
Iowa	2,798	617	25.9 (24.8–27.1)	23.3 (22.3–24.3)	Intermediate
Kansas	4,555	552	25.4 (24.6–26.2)	23.5 (22.8–24.2)	Intermediate
Kentucky	5,013	1,151	33.9 (32.6–35.3)	31.4 (30.0–32.7)	High
Louisiana	2,368	953	27.1 (25.9–28.3)	25.6 (24.5–26.7)	High
Maine	3,540	335	31.4 (30.2–32.7)	26.7 (25.6–27.8)	High
Maryland	4,732	1,181	25.6 (24.4–26.8)	23.7 (22.6–24.8)	Intermediate
Massachusetts	5,749	1,459	27.3 (26.3–28.4)	24.9 (24.0–25.9)	Intermediate
Michigan	3,373	2,438	31.9 (30.7–33.1)	28.7 (27.6–29.9)	High
Minnesota	4,447	911	21.8 (21.1–22.5)	20.0 (19.4–20.7)	Low
Mississippi	1,697	657	29.2 (27.5–31.0)	27.1 (25.6–28.6)	High
Missouri	2,844	1,304	28.0 (26.6–29.4)	25.3 (24.1–26.6)	Intermediate
Montana	2,657	208	26.0 (24.7–27.4)	22.8 (21.7–24.0)	Intermediate
Nebraska	7,459	347	24.6 (23.8–25.4)	22.6 (21.9–23.4)	Intermediate
Nevada	1,214	496	23.1 (21.2–25.1)	21.8 (20.0–23.6)	Low
New Hampshire	2,229	286	27.2 (25.7–28.6)	23.9 (22.7–25.3)	Intermediate
New Jersey	3,988	1,567	22.7 (21.7–23.7)	20.5 (19.6–21.3)	Low
New Mexico	2,888	407	25.8 (24.5–27.2)	23.8 (22.6–25.1)	Intermediate
New York	2,134	3,724	24.2 (23.0–25.4)	22.3 (21.2–23.3)	Low
North Carolina	2,513	2,116	27.7 (26.5–28.8)	25.5 (24.5–26.6)	Intermediate
North Dakota	2,677	145	25.0 (23.7–26.4)	23.2 (22.1–24.4)	Intermediate
Ohio	4,457	2,752	30.8 (29.6–32.1)	27.8 (26.7–29.0)	High
Oklahoma	3,130	806	27.5 (26.4–28.6)	25.6 (24.6–26.6)	High
Oregon	1,836	808	26.1 (24.7–27.6)	23.8 (22.5–25.1)	Intermediate
Pennsylvania	4,345	3,047	30.3 (29.2–31.5)	26.6 (25.6–27.7)	High
Rhode Island	2,358	228	27.4 (26.0–28.8)	24.5 (23.4–25.8)	Intermediate
South Carolina	4,237	1,117	30.0 (28.9–31.1)	27.3 (26.3–28.3)	High
South Dakota	2,467	168	26.0 (24.4–27.7)	23.4 (22.0–24.8)	Intermediate
Tennessee	2,204	1,643	32.6 (30.9–34.4)	30.1 (28.5–31.7)	High
Texas	4,598	3,843	19.4 (18.5–20.4)	19.3 (18.4–20.2)	Low
Utah	3,892	413	20.1 (19.3–20.8)	21.4 (20.7–22.1)	Low
Vermont	2,104	141	28.0 (26.7–29.2)	24.3 (23.2–25.4)	Intermediate
Virginia	3,255	1,690	26.2 (25.1–27.3)	24.4 (23.5–25.4)	Intermediate
Washington	3,576	1,402	25.7 (24.6–26.8)	24.1 (23.1–25.1)	Intermediate
West Virginia	2,879	586	40.0 (38.6–41.4)	35.5 (34.1–36.8)	High
Wisconsin	2,365	1,143	25.7 (24.4–27.1)	23.1 (22.0–24.3)	Intermediate
Wyoming	2,407	115	25.6 (24.0–27.2)	23.9 (22.4–25.4)	Intermediate
Median††			*26.0*	*24.0*	
Range			*19.4–40.0*	*18.8–35.5*	
Puerto Rico	432	17	15.7 (13.9–17.6)	18.0 (16.2–20.0)	
Guam	1,990	689	24.6 (23.3–25.8)	22.4 (21.3–23.5)	

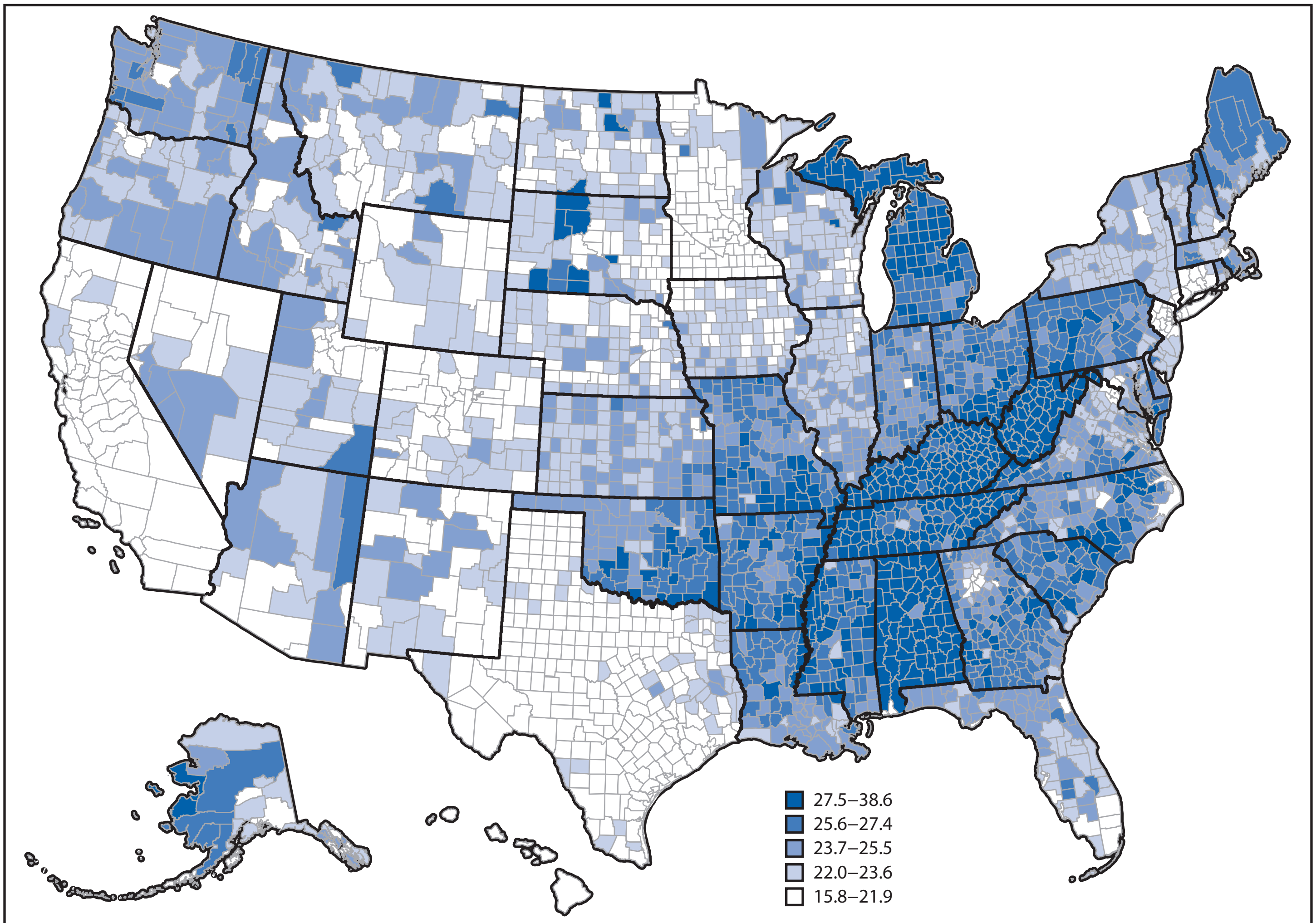
Abbreviations: CI = confidence interval; DC = District of Columbia.
* Doctor-diagnosed arthritis was defined as an affirmative response to the question, "Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?"
† Includes all 50 states, DC, Puerto Rico, and Guam.
§ Weighted number of adults in the population with doctor-diagnosed arthritis.
¶ Doctor-diagnosed arthritis prevalence estimates were adjusted to the projected 2000 U.S. standard population.
** For all 50 states and DC, age-standardized arthritis prevalence estimates in the lowest quartile were considered "low." Estimates in the two middle quartiles were considered "intermediate," and estimates in the top quartile were considered "high."
†† Median calculation was based on all 50 states and DC.

The findings in this report are subject to at least four limitations. First, doctor-diagnosed arthritis was self-reported and not confirmed by a health care professional; however, this case definition has been shown to be sufficiently sensitive for public health surveillance (*10*). Second, the 2014 median survey response rate for all states and DC was 47.0% and ranged from 25.1% to 60.1%; lower response rates can result in nonresponse bias, although the application of sampling weights is expected to reduce some nonresponse bias. Third, the model used for county-level estimates did not account for potential geographic correlations between counties or states (i.e., observations for nearby counties and states might be clustered and therefore not independent). Finally, county-level estimates are predicted using a statistical modeling approach, and results can vary from those produced by other methods, although the methods used here have been validated against direct estimates for some other chronic conditions (*5*).

CDC currently funds arthritis programs in 12 states to disseminate arthritis-related information and implement evidence-based arthritis interventions in their communities.** Given the high prevalence of arthritis in all counties, health care providers and public health practitioners can address arthritis and other chronic conditions by prioritizing self-management education and appropriate physical activity interventions as an effective way to improve health outcomes.

** http://www.cdc.gov/arthritis/state_programs/programs.

FIGURE. Age-standardized, model-predicted estimates of the percentage of adults with doctor-diagnosed arthritis, by county — United States, 2014



Sources: CDC. Behavioral Risk Factor Surveillance System, 2014. Census county characteristics: vintage 2014 population estimates. American Community Survey, 2010–2014.

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Summary

What is already known about this topic?

Arthritis is a leading cause of disability that affected an estimated 52.5 million (22.7%) adults in 2012 and is expected to affect 78.4 million (25.9%) adults in 2040.

What is added by this report?

The prevalence of doctor-diagnosed arthritis has been well documented at the national level, but little has been published at the state level or county level, where interventions are carried out and can have their greatest effect. This analysis of 2014 Behavioral Risk Factor Surveillance System data found that the prevalence of arthritis ranged from 18.8% to 35.5% among states and from 15.8% to 38.6% among counties.

What are the implications for public health practice?

Given the high prevalence of arthritis, health care providers and public health professionals can address arthritis by prioritizing self-management education and appropriate physical activity interventions as effective ways to improve health outcomes.

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Binational Dengue Outbreak Along the United States–Mexico Border — Yuma County, Arizona, and Sonora, Mexico, 2014

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Dengue is an acute febrile illness caused by any of four dengue virus types (DENV-1–4). DENVs are transmitted by mosquitos of the genus *Aedes* (*1*) and are endemic throughout the tropics (*2*). In 2010, an estimated 390 million DENV infections occurred worldwide (*2*). During 2007–2013, a total of three to 10 dengue cases were reported annually in Arizona and all were travel-associated. During September–December 2014, coincident with a dengue outbreak in Sonora, Mexico, 93 travel-associated dengue cases were reported in Arizona residents; 70 (75%) cases were among residents of Yuma County, which borders San Luis Río Colorado, Sonora, Mexico. San Luis Río Colorado reported its first case of locally acquired dengue in September 2014. To investigate the temporal relationship of the dengue outbreaks in Yuma County and San Luis Río Colorado and compare patient characteristics and signs and symptoms, passive surveillance data from both locations were analyzed. In addition, household-based cluster investigations were conducted near the residences of reported dengue cases in Yuma County to identify unreported cases and assess risk for local transmission. Surveillance data identified 52 locally acquired cases (21% hospitalized) in San Luis Río Colorado and 70 travel-associated cases (66% hospitalized) in Yuma County with illness onset during September–December 2014. Among 194 persons who participated in the cluster investigations in Yuma County, 152 (78%) traveled to Mexico at least monthly during the preceding 3 months. Four (2%) of 161 Yuma County residents who provided serum samples for diagnostic testing during cluster investigations had detectable DENV immunoglobulin M (IgM); one reported a recent febrile illness, and all four had traveled to Mexico during the preceding 3 months. Entomologic assessments among 105 households revealed 24 water containers per 100 houses colonized by *Ae. aegypti*. Frequent travel to Mexico and *Ae. aegypti* colonization indicate risk for local transmission of DENV in Yuma County. Public health officials in Sonora and Arizona should continue to collaborate on dengue surveillance and educate the public regarding mosquito abatement and avoidance practices. Clinicians evaluating patients from the U.S.-Mexico border region should consider dengue in patients with acute febrile illness and report suspected cases to public health authorities.

In areas of Mexico where dengue is endemic, approximately 30% of patients with suspected dengue are tested by enzyme-linked immunosorbent assay (ELISA) to detect nonstructural protein 1 (NS1) or DENV IgM or immunoglobulin G; approximately 10% of NS1-positive specimens are further tested by reverse transcription-polymerase chain reaction (RT-PCR) to identify the infecting DENV (*3*). Symptomatic patients who are not tested are classified as probable cases. Disease severity is classified according to 1997 World Health Organization (WHO) dengue case definitions (*4*).

In Arizona, suspected dengue cases are reported by health care providers and commercial laboratories. When possible, specimens from suspected dengue cases at commercial laboratories are forwarded to CDC Dengue Branch for confirmatory testing by real time RT-PCR (rRT-PCR) for detection and typing of DENV, and by anti-DENV IgM ELISA.

Passive surveillance data from Yuma County and San Luis Rio Colorado were reviewed, and laboratory-confirmed cases from Yuma County and San Luis Rio Colorado were analyzed. Available medical records of patients in Yuma County with symptom onset during September–December 2014 were abstracted, using a modification of CDC's Dengue Case Investigation Form.* Clinical case classifications were assigned using both the 1997 (*4*) and 2009 WHO dengue case definitions (*1*).

During December 15–19, 2014, and January 15–16, 2015, household-based cluster investigations were conducted in Yuma County by public health workers from Yuma County Department of Public Health, Arizona Department of Health Services, University of Arizona, and CDC. Households within a 50-meter radius of residences of persons with laboratory-confirmed dengue were visited within 90 days of the patient's reported illness onset. Among households where at least one adult agreed to participate, individual and household questionnaires were administered in English or Spanish to collect information on demographic, medical, and behavioral characteristics. Blood specimens were collected and sera were tested by rRT-PCR and anti-DENV IgM ELISA. Entomologic assessments of the house and yard were conducted to identify

* Variables added to the CDC's Dengue Case Investigation Form included admission to the intensive care unit (ICU), length of stay in ICU, and if care was received in Mexico. Variables removed included length of residency in current city, history of yellow fever vaccine, and history of previous dengue diagnosis. http://www.cdc.gov/dengue/resources/dengueCaseReports/DCIF_English.pdf.

potential and colonized mosquito breeding sites. Data were translated into Breteau, container, and house indices (established indicators of mosquito density) (*5*).

During September–November 2014, a total of 52 laboratory-confirmed dengue cases were identified in San Luis Río Colorado, Sonora: 30 (58%) by detection of NS1, 21 (40%) by detection of DENV IgM, and 1 (2%) by NS1 and RT-PCR. Thirty-two (62%) patients were female; the median age was 34.5 years (range = 0–76 years). Symptom onset dates ranged from September 20–November 13 (Figure). The most commonly reported signs and symptoms were fever (100%), headache (98%), arthralgia (92%), and myalgia (90%) (Table 1). Three (6%) patients met the case definition for dengue hemorrhagic fever[†] (DHF), and 11 (21%) were hospitalized; there were no deaths.

[†] Dengue hemorrhagic fever is characterized by all of the following: fever lasting 2–7 days, evidence of hemorrhagic manifestation or a positive tourniquet test, thrombocytopenia (platelets ≤100,000/μL), and evidence of plasma leakage indicated by hemoconcentration (an increase in hematocrit ≥20% above average for age or a decrease in hematocrit ≥20% of baseline after fluid replacement therapy), or pleural effusion, or ascites or hypoproteinemia. http://www.cdc.gov/dengue/clinicalLab/caseDef.html.

In Yuma County, 70 laboratory-confirmed cases were identified during October 18–December 5. Eight (11%) were positive by rRT-PCR alone, 48 (69%) by IgM ELISA alone, and 14 (20%) by both rRT-PCR and IgM ELISA. Forty-two (60%) patients were female, the median age was 48 years (range = 1–87 years), and the most commonly reported symptoms were fever (87%), myalgia (61%), headache (61%), and rash (40%). No patients met the case definition for DHF; 37 (53%) were hospitalized, and none died. Travel history was available for 60 (86%) patients, and all reported travel to Mexico <14 days before illness onset. DENV-1 was the only DENV detected by RT-PCR from patients in San Luis Rio Colorado and Yuma County.

In Yuma County, 39 household-based cluster investigations were conducted (median number of households/cluster investigation = 3; range = 1–6). Among 351 eligible houses, 55 (16%) heads-of-household refused; 162 (46%) houses were occupied, but no residents were present; and 21 (6%) houses appeared vacant, leaving 113 (32%) participating households. Among the 113 responding heads-of-household, 50 (44%) reported lacking screens on some or all household windows; 44 (39%)

FIGURE. Number of laboratory-confirmed dengue cases, by week of symptom onset — San Luis Río Colorado, Sonora, Mexico, and Yuma County, Arizona, 2014

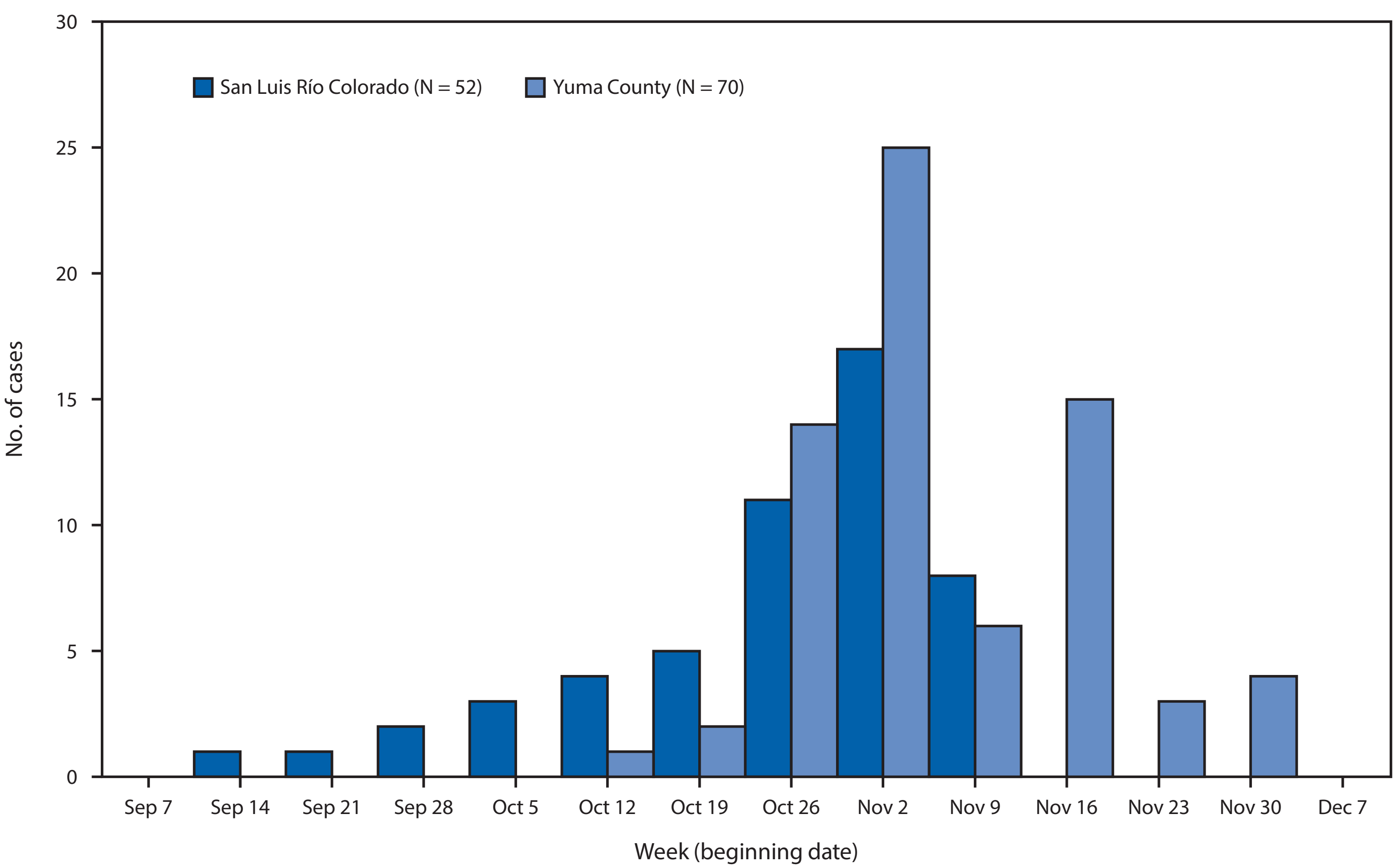

TABLE 1. Demographic characteristics and reported signs and symptoms of laboratory-confirmed dengue cases — Yuma County, Arizona, and San Luis Rio Colorado, Sonoma, Mexico, October–December 2014

Characteristic	San Luis Río Colorado (n = 52) No. (%)	Yuma County (n = 70) No. (%)
Female	32 (62)	42 (60)
Hospitalized	11 (21)	37 (53)
Signs and symptoms		
Fever	52 (100)	61 (87)
Headache	51 (98)	43 (61)
Myalgia	47 (90)	43 (61)
Arthralgia	48 (92)	25 (36)
Eye pain	39 (75)	16 (23)
Rash	21 (40)	28 (40)
Persistent vomiting	3 (6)	14 (20)
Abdominal pain	3 (6)	23 (33)
Ascites or pleural effusion	0 (0)	1 (1)
Bleeding manifestations		
Major*	3 (6)	1 (1)
Minor†	7 (13)	14 (20)
Nausea or vomiting	NA§	40 (57)
Diarrhea	NA§	25 (36)
Anorexia	NA§	15 (21)
Lethargy	NA§	15 (21)
Cough	NA§	12 (17)
Hepatomegaly	NA§	1 (1)
Thrombocytopenia¶	NA§	34 (49)
Low serum albumin**	NA§	16 (23)
Low serum protein**,††	NA§	8 (11)
Clinical case definition		
Dengue fever	49 (94)	51 (70)
1997 WHO case definitions		
Dengue hemorrhagic fever	3 (6)	0 (0)
2009 WHO case definitions		
Dengue fever	NA§	18†† (26)
Dengue with warning signs	NA§	28 (40)
Severe dengue	NA§	5 (7)

Abbreviations: NA = not available; WHO = World Health Organization.
* Purpura or ecchymosis (two persons); hematemesis (two persons).
† Petechiae, bleeding gums, epistaxis, unspecified mucosal bleeding, and hematuria.
§ These variables not collected by passive surveillance used by Sonora Department of Public Health.
¶ ≤100,000 platelets/μL.
** Lower than age-specified values.
†† Nineteen (27%) cases did not meet case definition of dengue fever based on available medical records (nine cases, fever not documented; 10 cases, ≥2 additional compatible symptoms not documented).

reported leaving windows open during the night or day; and 97 (86%) reported using air conditioning (Table 2). Among 447 residents of the participating households, 194 (43%) responded to an individual questionnaire (median = 1 person/household; range = 1–6) and 253 (57%) refused or were absent. Median age of participants was 40 years (range = 1–86 years); median duration of residence in Arizona was 14.5 years (range = 1 month–72 years). During the 3 months before interview, 152 (78%) participants reported having traveled to Mexico at least once a month and 32 (16%) reported using mosquito repellent (Table 2). Among 161 participants without a previous dengue diagnosis who provided samples for testing, four (2%) had detectable DENV IgM, indicating recent infection. All had traveled to Mexico during the preceding 3 months, and one reported a recent febrile illness.

TABLE 2. Individual participant and household characteristics from household-based cluster investigations of dengue — Yuma County, Arizona, December 2014–January 2015

Individual characteristic (n = 194 persons)	No. (%)
Female	115 (59)
Use mosquito repellent*	32 (16)
Travel to Mexico*	
Daily	5 (3)
Weekly	99 (51)
Monthly	48 (25)
Yearly	3 (2)
No travel or unknown	39 (20)
Survey conducted in Spanish	129 (66)
Febrile illness*	56 (29)
Method of payment for medical care	
Medicaid	113 (58)
Medicare	15 (8)
Other insurance	27 (14)
Care in Mexico	24 (12)
No access	11 (6)
Other or missing	4 (2)
Household characteristics (n = 113 households)	
Water source is public piping*	109 (96)
Store water in open container*	11 (10)
Visitors from outside United States*	45 (40)
Febrile illness in household*	51 (45)
Screens on some windows*	25 (22)
Screens on all windows*	63 (56)
Leave windows open*	44 (39)
Use air conditioning*	97 (86)
Mosquitoes observed inside home*	42 (37)
Sprayed or used other method to control mosquitoes*	42 (37)
Have septic tank	10 (9)

* During the preceding 3 months.

Entomologic assessments in 105 households revealed 24 *Ae. aegypti* colonized containers/100 houses (Breteau index), indicating an elevated risk for DENV transmission (*5*). Among the 1,908 water containers surveyed, 25 (1.3%) were colonized (container index). Twelve (11.4%) houses had ≥1 colonized container (house index). The most common types of infested containers were buckets and plastic containers other than buckets, representing 40% and 16% of all infested containers, respectively.

Discussion

Since 2005, two confirmed dengue outbreaks in Mexico that affected the U.S.-Mexico border region have been reported. During 2005 in Brownsville, Texas, 25 dengue cases (including three locally acquired cases) were reported (*6*), and during 2013 in Cameron, Hidalgo, and Willacy counties (Texas), 53 cases (26 locally acquired) were reported (*7*). These outbreaks highlight risk for local DENV transmission in the United

States, particularly during epidemics in northern Mexico. The number of DENV infections among persons residing near the border is likely higher than the number of reported cases: a 2004 serosurvey of 300 residents of southern Texas identified recent infection among 2% and past infection among 40% (*8*).

This outbreak of travel-associated dengue in Arizona was associated with a ninefold increase in cases compared with any previous single year. Although no locally acquired DENV infections were identified in Arizona during 2014, the increase in travel-associated cases is noteworthy, because established populations of *Ae. aegypti* put Yuma County at risk for local DENV transmission. The Breteau and household indices identified in the household cluster investigation are above WHO thresholds of 20% and 5%, respectively, indicating that Yuma County has an elevated risk for local DENV transmission (*5*). However, such indices were established in areas with endemic dengue, where human-mosquito interaction might exceed that in southern Arizona (*9*). During a 1999 dengue outbreak in Texas, although *Ae. aegypti* mosquito densities were higher in Texas than in Mexico, DENV transmission was less common because of environmental and behavioral factors (e.g., air conditioning use) that limit human-mosquito interaction (*9*). The Arizona-Sonora border region might have similar cross-border differences in environmental factors that limit local DENV transmission, which might explain the absence of identified local DENV infections in Yuma County during 2014, despite active case finding. Alternatively, travel frequency to Mexico might have obscured infection within Yuma County, with locally acquired infections misclassified as travel-associated.

Although the proportion of reported patients with DHF was lower in Yuma County than in San Luis Río Colorado, a higher proportion of patients in Yuma County (53%) were hospitalized than in San Luis Río Colorado (21%). This might be because clinicians in Yuma County had a lower threshold for admitting dengue patients to the hospital. In a survey of 197 health care providers in Arizona, lack of confidence to treat mild dengue and severe dengue was reported by 58% and 73% of respondents, respectively (Arizona Department of Health Services, unpublished data, 2014). Dengue patients who do not have warning signs (abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation [ascites or pleural effusion], mucosal bleeding, lethargy or restlessness, liver enlargement >2 cm, or increase in hematocrit concurrent with rapid decrease in platelet count)[§] or high-risk comorbid conditions can be monitored as outpatients with follow-up (*1*). Clinicians can improve their knowledge of dengue clinical case management through a course available online.[¶]

[§] http://www.cdc.gov/dengue/clinicalLab/caseDef.html.
[¶] http://www.cdc.gov/dengue/training/cme.html.

Summary

What is already known about this topic?

Dengue is an acute febrile illness caused by any of four dengue virus-types (DENV-1–4), which are transmitted by mosquitos of the genus *Aedes* and are endemic throughout the tropics and subtropics. During 2010, an estimated 390 million DENV infections and 96 million clinically apparent cases occurred worldwide. Since 2005, two reported dengue outbreaks in Mexico that spread to Texas along the U.S.-Mexico border region have been reported.

What is added by this report?

During September–December 2014, while a dengue outbreak was ongoing in Sonora, Mexico, 93 travel-associated dengue cases were reported in Arizona; 75% of cases were among residents of Yuma County, which borders San Luis Río Colorado, Sonora, Mexico. Among 194 persons in Yuma County surveyed, 152 (78%) reported travelling to Mexico ≥1 time/month, and elevated Breteau, household, and container *Aedes* mosquito density indices were consistent with an increased risk for DENV transmission, demonstrating that Yuma County is at risk for local DENV transmission.

What are the implications for public health practice?

Sharing surveillance data among local, state, and federal public health workers in the United States and Mexico can enable timely detection of binational disease outbreaks. Border communities with *Aedes* mosquitos are at risk for local transmission of DENV, chikungunya virus, and Zika virus infections. Public health messaging to the community should continue to emphasize the importance of mosquito control and avoidance, and conduct surveillance for *Aedes* mosquitoes to identify areas at risk and prepare response plans for imported and locally acquired DENV, chikungunya virus, and Zika virus infections.

The findings in this report are subject to at least three limitations. First, differences in dengue surveillance protocols between San Luis Río Colorado and Yuma County precluded direct statistical case data comparisons. Second, because not all households or household residents were included in the household cluster investigation, locally acquired dengue cases might not have been identified. Finally, because the investigation was conducted during the colder months of December–January, which reduces the ability of *Ae. aegypti* to survive and reproduce (*10*), measured mosquito indices and the associated risk for DENV transmission were likely underestimated compared with those during the outbreak peak.

The collaboration among public health authorities in Mexico and the United States and between local, state, and federal health officials facilitated the sharing of clinical and epidemiologic data and enabled active case finding; ongoing sharing of surveillance data might facilitate timely detection of cross-border outbreaks. An increase in the number of dengue cases in communities near international borders can prompt public health officials to increase surveillance efforts and enhance public education regarding mosquito control and avoidance. Notifying health care providers about dengue cases through channels such as the Health Alert Network can raise the index of suspicion for dengue and lower the testing threshold. Public health messaging to the community should emphasize the importance of regularly emptying or disposing of water containers that can serve as mosquito breeding sites; covering or using insecticides in water containers that cannot be emptied; and avoiding mosquito bites by applying mosquito repellent, installing and maintaining window screens, using air conditioning when inside, and wearing long clothing. Public health officials should conduct surveillance for *Aedes* mosquitos to identify areas at risk and prepare response plans for imported and locally acquired dengue cases (*1*). Health care providers should solicit travel histories from patients with febrile illnesses, request correct molecular and serologic dengue diagnostic testing for persons with compatible symptoms (*1*), and report suspected cases to public health authorities. Because *Aedes* mosquitoes also transmit chikungunya and Zika viruses, there is risk for local transmission of these pathogens and a need for vector control and mosquito bite prevention strategies in the border region.

[1]Arizona Department of Health Services; [2]Epidemic Intelligence Service, Division of Scientific Education and Professional Development, CDC; [3]Yuma County Public Health Services District, Yuma, Arizona, [4]Field Services Branch, Division of State and Local Readiness, CDC; [5]Sonora Department of Health, Hermosillo, Sonora, Mexico; [6]San Luis Río Colorado Hospital, San Luis Río Colorado, Sonora, Mexico; [7]Division of Vector-Borne Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC, San Juan, Puerto Rico; [8]University of Arizona; [9]National Center for Atmospheric Research, Boulder, Colorado; [10]Division of Global Migration and Quarantine, National Center for Emerging and Zoonotic Infectious Diseases, CDC, San Diego, California.

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Announcement

Healthy and Safe Swimming Week — May 23–29, 2016

May 23–29, 2016, marks the 12th annual Healthy and Safe Swimming Week.* This observance highlights ways that swimmers; parents of young swimmers; aquatic facility operators; residential pool, hot tub, or spa owners; beach managers; and public health officials can maximize the health benefits of water-based physical activity while minimizing the risk for recreational water–associated illness and injury.

This year's theme is "Check out Healthy and Safe Swimming." Swimmers and parents of young swimmers can help protect their health and that of their families and friends by checking the latest inspection results for public pools, hot tubs, spas, interactive water play venues (water playgrounds), and other aquatic venues. They can also complete their own quick but effective inspection before getting in the water (http://www.cdc.gov/healthywater/healthyswimming/materials/infographic-inspection.html). The latest *MMWR Surveillance Summary* reports on violations of public health codes identified during routine inspections of public aquatic facilities and resulting immediate closures (*1*). A public health communications toolkit for Healthy and Safe Swimming Week is available online (http://www.cdc.gov/healthywater/observances/hss-week/response-tools-public-health.html).

CDC also will release the second edition of the Model Aquatic Health Code (MAHC) during the 2016 summer swim season (Memorial Day–Labor Day) (*2*). The MAHC is national guidance that can help state and local jurisdictions and the aquatics sector make swimming and other recreational water activities healthier and safer. Content of this edition of the MAHC reflects the input from state and local public health colleagues who joined the Council for the Model Aquatic Health Code (CMAHC; https://cmahc.org/index.php). Members of the CMAHC† dedicated time to review the first edition of the MAHC, propose revisions to promote public health, and vote on approximately 160 change requests.

* http://www.cdc.gov/healthywater/observances/hss-week/index.html.

† Additional information on how to become a CMAHC member is available online (http://www.cmahc.org/membership.php).

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Announcement

Click It or Ticket Campaign — May 23–June 5, 2016

Click It or Ticket is a national campaign coordinated annually by the National Highway Traffic Safety Administration to increase the proper use of seat belts. In 2014, more than 21,000 passenger vehicle occupants died in motor vehicle crashes in the United States; 49% were unrestrained at the time of the crash (*1*). An additional 2.4 million occupants (restrained and unrestrained) were treated in emergency departments for nonfatal crash-related injuries (*2*).

Using a seat belt is one of the most effective ways to prevent serious injury or death among older children, teens, and adults in the event of a crash. Research has found that when lap/shoulder seat belts are used, the risk for fatal injury is reduced by approximately half (*3*). Despite the effectiveness of seat belts, millions of persons in the United States continue to travel unrestrained (*4*).

Click It or Ticket takes place this year during May 23–June 5, 2016. Law enforcement agencies across the nation will conduct intensive, high-visibility enforcement of seat belt laws during both daytime and nighttime hours. Nighttime enforcement of seat belt laws is encouraged because seat belt use is lower at night (*5*). Additional information regarding the 2016 Click It or Ticket campaign activities is available from National Highway Traffic Safety Administration at http://www.nhtsa.gov/Driving+Safety/Occupant+Protection.

State-specific fact sheets on seat belt use and strategies to increase restraint use are available from CDC at http://www.cdc.gov/motorvehiclesafety/seatbelts/states.html. States can also calculate the expected number and monetized value of injuries prevented and lives saved by primary seat belt laws, as well as implementation costs, using CDC's Motor Vehicle Prioritizing Interventions and Cost Calculator for States tool at http://www.cdc.gov/motorvehiclesafety/calculator/. Additional information on preventing motor vehicle crash-related injuries is available from CDC at http://www.cdc.gov/motorvehiclesafety.

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Errata

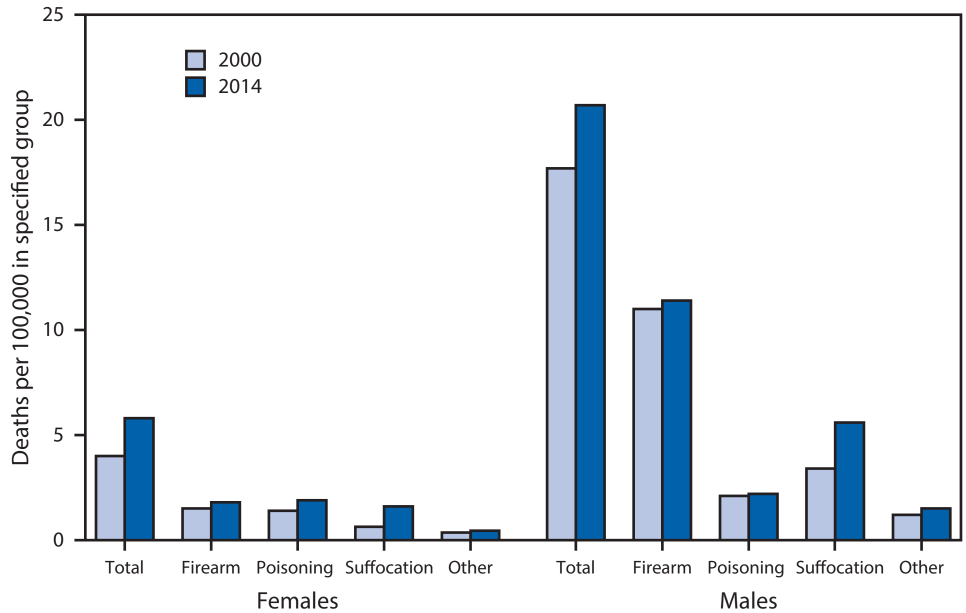
Vol. 65, No. 18

In the report, “Progress Toward Polio Eradication — Worldwide, 2015–2016,” on page 471, in Table 2, the title should have read “Number of reported poliovirus cases, by country — worldwide, January 1, **2015**–May 4, 2016,” and the heading for the second column should have been “**2015** (January–December).”

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Age-Adjusted Suicide Rates* for Females and Males, by Method† — National Vital Statistics System, United States, 2000 and 2014



* From 2000 through 2014, there was a statistically significant ($p<0.05$) increase in the total suicide rate and the rates for each method, for both females and males.

† Suicides by different methods are identified with *International Classification of Diseases* (ICD)–10 codes: X72–X74 for firearms, X60–X69 for poisoning, X70 for suffocation, and X71, X75–X84, U03, and Y87.0 for other. Poisoning includes intentional self-harm by toxic exposure to drugs, alcohol, gases, vapors, pesticides, chemicals, or other noxious substances. Suffocation includes intentional self-harm by hanging, strangulation, and suffocation. Other includes intentional self-harm by cutting/piercing; drowning; fall; fire/flame; other land transport; other specified, classifiable injury; other specified, not elsewhere classified injury; and unspecified injury. Suicides include decedents of all ages.

From 2000 to 2014, the age-adjusted suicide rate increased from 4.0 to 5.8 per 100,000 for females and from 17.7 to 20.7 for males. Suicide rates by specific method (firearm, poisoning, suffocation, or other methods) also increased, with the greatest increase seen for suicides by suffocation. During the 15-year period, the rate of suicide by suffocation more than doubled for females from 0.7 to 1.6 and increased from 3.4 to 5.6 for males. In 2014, among females, suicide by poisoning had the highest rate (1.9), and among males, suicide by firearm had the highest rate (11.4).

Sources: CDC/NCHS, National Vital Statistics System, Mortality Data. http://www.cdc.gov/nchs/deaths.htm.

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