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World TB Day — March 24, 2016

World TB Day is recognized each year on March 24, which commemorates the date in 1882 when Dr. Robert Koch announced his discovery of *Mycobacterium tuberculosis*, the bacillus that causes tuberculosis (TB). World TB Day is an opportunity to raise awareness about TB and support worldwide TB prevention and control efforts. The U.S. theme for World TB Day, "Unite to End TB," highlights how much more needs to be done to eliminate TB in the United States.

After 2 decades of annual declines, TB incidence in the United States has leveled at approximately 3.0 new cases per 100,000 persons. (*1*,*2*). The determinants of this leveling in TB incidence are not yet clear; further evaluation of available data is required to understand the causes of this trend.

CDC is committed to eliminating TB in the United States. Staying on the path toward TB elimination will require more intensive efforts, both in the United States and globally. These efforts will not only focus on strengthening existing systems for interrupting TB transmission, but also on increasing testing and treatment of persons with latent TB infection. Additional information about World TB Day and CDC's TB elimination activities is available on CDC's website (http://www.cdc.gov/tb/worldtbday).

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Leveling of Tuberculosis Incidence — United States, 2013–2015

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After 2 decades of progress toward tuberculosis (TB) elimination with annual decreases of ≥0.2 cases per 100,000 persons (*1*), TB incidence in the United States remained approximately 3.0 cases per 100,000 persons during 2013–2015. Preliminary data reported to the National Tuberculosis Surveillance System indicate that TB incidence among foreign-born persons in the United States (15.1 cases per 100,000) has remained approximately 13 times the incidence among U.S.-born persons (1.2 cases per 100,000). Resuming progress toward TB elimination in the United States will require intensification of efforts both in the United States and globally, including increasing U.S. efforts to detect and treat latent TB infection,

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strengthening systems to interrupt TB transmission in the United States and globally, accelerating reductions in TB globally, particularly in the countries of origin for most U.S. cases.

Health departments in the 50 states and District of Columbia (DC) electronically report verified TB cases that meet the CDC and Council of State and Territorial Epidemiologists case definition to the National Tuberculosis Surveillance System (*2*). Reports include the patient's demographic information, medical and social risk factors for TB, and clinical information about the TB case. U.S.-born persons are defined as persons born in the United States, American Samoa, the Federated States of Micronesia, Guam, the Republic of the Marshall Islands, the Commonwealth of the Northern Mariana Islands, Puerto Rico, the Republic of Palau, the U.S. Virgin Islands, and U.S. minor outlying islands, or persons born elsewhere to a U.S. citizen (*3*). Race/ethnicity is self-identified. Persons of Hispanic ethnicity might be of any race or multiple races; non-Hispanic persons are categorized by race. CDC calculates state and overall national TB incidence by using July 1 midyear population estimates from the U.S. Census Bureau (*3*). The Current Population Survey provides the population denominators for incidence according to national origin and race/ethnicity (*4*). TB case counts and incidence per 100,000 population during 2015 and percent change from 2014 were calculated for the 50 states and DC and for each census division.

As they did during the previous 7 years, four states (California, Florida, New York, and Texas) reported >500 cases each in 2015 (Table 1). Together, these four states accounted for 4,839 TB cases, or approximately half (50.6%) of all reported cases. State-specific incidence ranged from 0.5 cases per 100,000 persons (West Virginia) to 9.1 TB cases per 100,000 persons (Alaska) (median state incidence = 2.0). By census division, the highest TB incidence was reported in the Middle Atlantic, West South Central, and Pacific divisions. The largest increases in TB incidence from 2014 to 2015 occurred in the East North Central, New England, Mountain, and West South Central divisions.

Among the 9,563 TB cases reported during 2015, 3,201 (33.5%) occurred among U.S.-born persons, corresponding to an annual TB incidence of 1.2 per 100,000 persons. The 6,335 TB cases among foreign-born persons in the United States (66.2% of the total U.S. cases) corresponded to an annual TB incidence of 15.1 per 100,000 persons (Table 2). Overall national TB incidence remained approximately 3.0 cases per 100,000 persons during 2013–2015 (Figure).

In 2015, most U.S.-born persons reported with TB were either non-Hispanic blacks (1,144 cases) or non-Hispanic whites (991 cases) (Table 2). Among U.S.-born non-Hispanic blacks, TB incidence was at an all-time low (3.3 cases per 100,000 persons). Incidence among U.S.-born non-Hispanic whites remained the lowest (0.5 cases per 100,000). Although U.S.-born Hispanics had the third highest case count (661 cases), they had the second lowest incidence (1.8 cases per 100,000). U.S.-born Native Hawaiians/other Pacific Islanders had the highest incidence (12.7 cases per 100,000), followed by U.S.-born American Indians/Alaska

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TABLE 1. Tuberculosis (TB) case counts and incidence, by U.S. Census division and state — United States, 2014 and 2015*

Census division/ state	No. reported TB cases			TB incidence per 100,000 persons†		
	2014	2015*	% change	2014	2015*	% change§
Division 1: New England						
Connecticut	60	70	16.7	1.7	1.9	16.8
Maine	14	18	28.6	1.1	1.4	28.7
Massachusetts	199	192	-3.5	2.9	2.8	-4.1
New Hampshire	11	13	18.2	0.8	1.0	17.9
Rhode Island	21	30	42.9	2.0	2.8	42.7
Vermont	2	7	250.0	0.3	1.1	250.4
Total	**307**	**330**	**7.5**	**2.1**	**2.2**	**7.2**
Division 2: Middle Atlantic						
New Jersey	307	326	6.2	3.4	3.6	6.0
New York	784	766	-2.3	4.0	3.9	-2.5
Pennsylvania	208	200	-3.8	1.6	1.6	-3.9
Total	**1,299**	**1,292**	**-0.5**	**3.1**	**3.1**	**-0.7**
Division 3: East North Central						
Illinois	320	344	7.5	2.5	2.7	7.7
Indiana	108	116	7.4	1.6	1.8	7.1
Michigan	105	130	23.8	1.1	1.3	23.7
Ohio	156	143	-8.3	1.3	1.2	-8.5
Wisconsin	48	69	43.8	0.8	1.2	43.5
Total	**737**	**802**	**8.8**	**1.6**	**1.7**	**8.7**
Division 4: West North Central						
Iowa	54	38	-29.6	1.7	1.2	-30.0
Kansas	40	36	-10.0	1.4	1.2	-10.3
Minnesota	147	150	2.0	2.7	2.7	1.4
Missouri	80	93	16.3	1.3	1.5	15.9
Nebraska	38	33	-13.2	2.0	1.7	-13.8
North Dakota	15	9	-40.0	2.0	1.2	-41.3
South Dakota	8	17	112.5	0.9	2.0	111.2
Total	**382**	**376**	**-1.6**	**1.8**	**1.8**	**-2.1**
Division 5: South Atlantic						
Delaware	22	23	4.5	2.4	2.4	3.4
District of Columbia	32	33	3.1	4.8	4.9	1.2
Florida	595	602	1.2	3.0	3.0	-0.6
Georgia	335	322	-3.9	3.3	3.2	-5.0
Maryland	198	176	-11.1	3.3	2.9	-11.6
North Carolina	195	201	3.1	2.0	2.0	2.0
South Carolina	79	104	31.6	1.6	2.1	29.8
Virginia	198	213	7.6	2.4	2.5	6.9
West Virginia	13	10	-23.1	0.7	0.5	-22.9
Total	**1,667**	**1,684**	**1.0**	**2.7**	**2.7**	**-0.2**

TABLE 1. (*Continued*) Tuberculosis (TB) case counts and incidence, by U.S. Census division and state — United States, 2014 and 2015*

Census division/ state	No. reported TB cases			TB incidence per 100,000 persons†		
	2014	2015*	% change	2014	2015*	% change§
Division 6: East South Central						
Alabama	133	119	-10.5	2.7	2.4	-10.8
Kentucky	80	67	-16.3	1.8	1.5	-16.5
Mississippi	74	74	0.0	2.5	2.5	0.0
Tennessee	151	131	-13.2	2.3	2.0	-13.9
Total	**438**	**391**	**-10.7**	**2.3**	**2.1**	**-11.1**
Division 7: West South Central						
Arkansas	93	90	-3.2	3.1	3.0	-3.6
Louisiana	121	119	-1.7	2.6	2.5	-2.1
Oklahoma	59	67	13.6	1.5	1.7	12.6
Texas	1,269	1,334	5.1	4.7	4.9	3.2
Total	**1,542**	**1,610**	**4.4**	**4.0**	**4.1**	**2.9**
Division 8: Mountain						
Arizona	193	198	2.6	2.9	2.9	1.1
Colorado	64	73	14.1	1.2	1.3	12.0
Idaho	11	11	0.0	0.7	0.7	-1.2
Montana	6	9	50.0	0.6	0.9	48.6
Nevada	74	85	14.9	2.6	2.9	12.8
New Mexico	50	46	-8.0	2.4	2.2	-8.0
Utah	31	37	19.4	1.1	1.2	17.3
Wyoming	2	4	100.0	0.3	0.7	99.4
Total	**431**	**463**	**7.4**	**1.9**	**2.0**	**5.9**
Division 9: Pacific						
Alaska	62	67	8.1	8.4	9.1	7.9
California	2,134	2,137	0.1	5.5	5.5	-0.8
Hawaii	136	127	-6.6	9.6	8.9	-7.4
Oregon	77	76	-1.3	1.9	1.9	-2.7
Washington	194	208	7.2	2.7	2.9	5.6
Total	**2,603**	**2,615**	**0.5**	**5.0**	**5.0**	**-0.6**
Total U.S. Population	**9,406**	**9,563**	**1.7**	**2.9**	**3.0**	**0.9**

* TB case counts are based on provisional National Tuberculosis Surveillance System data as of March 4, 2016. Updated data will be available in CDC's annual TB surveillance report later this year (http://www.cdc.gov/tb/statistics/).

† CDC calculates state and national TB incidence by using the U.S. Census Bureau's July 1 midyear population estimates (http://www.census.gov/popest/data/national/totals/2015/index.html).

§ Percentage change in incidence is calculated on the basis of unrounded incidence for 2014 and 2015.

Natives (6.8 cases per 100,000). A total of 344 TB cases occurred among U.S.-born persons aged <15 years (0.6 cases per 100,000), representing 10.7% of all U.S.-born persons reported as having incident TB in 2015.

In 2015, among foreign-born persons with reported TB in the United States, Asians had both the highest case count (3,007 cases) and highest incidence (28.2 cases per 100,000 persons). The top five countries of origin for foreign-born persons with TB were Mexico (n = 1,250; 19.7%), the Philippines (n = 819; 12.9%), India (n = 578; 9.1%), Vietnam (n = 513; 8.1%), and China (n = 424; 6.7%). Together, these countries represent 45.2% of the foreign-born population in the United States (*4*), but accounted for 56.6% (3,584 cases) of all TB cases among foreign-born persons. Although Mexico-born persons accounted for the largest proportion of foreign-born persons reported with TB, their TB incidence in the United States (10.4 cases per 100,000) was lower than that among persons born in China (24.9 cases per 100,000), India (23.9 cases per 100,000), the Philippines (46.9 cases per 100,000), and Vietnam (47.8 cases per 100,000). From 2014 to 2015, the number of TB cases among Philippines-born persons grew from 755 to 819 (8.5% increase), and the number of TB cases among India-born persons grew from 479 to 578 (20.7% increase). The Philippines-born population in the United States grew from 1,639,286 to 1,747,287 (population growth of 6.6%), and the India-born population grew from 2,166,930 to 2,421,795 (population growth of 11.8%) (*4*).

TABLE 2. Tuberculosis (TB) case counts and incidence, by national origin and race/ethnicity — United States, 2012–2015*

U.S. population group†	2012		2013		2014		2015*	
	No. cases	Incidence per 100,000 persons§	No. cases	Incidence per 100,000 persons§	No. cases	Incidence per 100,000 persons§	No. cases	Incidence per 100,000 persons§
U.S.-born								
Hispanic	692	2.0	655	1.9	652	1.8	661	1.8
White, non-Hispanic	1,272	0.7	1,100	0.6	967	0.5	991	0.5
Black, non-Hispanic	1,345	4.0	1,250	3.6	1,183	3.4	1,144	3.3
Asian	120	2.0	151	2.4	137	2.1	141	2.1
American Indian/Alaska Native	145	6.8	125	5.7	117	5.2	141	6.8
Native Hawaiian/other Pacific Islander	51	8.4	44	6.1	83	12.4	88	12.7
Multiple or unknown race/ethnicity	33		37		38		35	
Total U.S.-born¶	**3,658**	**1.4**	**3,362**	**1.2**	**3,177**	**1.2**	**3,201**	**1.2**
Foreign-born								
Hispanic	2,096	11.5	2,039	11.2	2,093	11.2	2,024	10.3
White, non-Hispanic	297	3.7	322	4.2	279	3.6	258	3.4
Black, non-Hispanic	898	27.7	836	24.5	828	23.6	845	22.8
Asian	2,845	29.9	2,848	29.0	2,852	28.7	3,007	28.2
Multiple, other,** or unknown race/ethnicity	142	—	146	—	171	—	201	—
Total foreign-born¶	**6,278**	**15.9**	**6,191**	**15.6**	**6,223**	**15.4**	**6,335**	**15.1**
Unknown national origin	**4**	**—**	**9**	**—**	**6**	**—**	**27**	**—**
Total United States¶	**9,940**	**3.2**	**9,562**	**3.0**	**9,406††**	**2.9††**	**9,563***	**3.0**

* Provisional National Tuberculosis Surveillance System data as of March 4, 2016. Updated data will be available in CDC's annual TB surveillance report later this year (http://www.cdc.gov/tb/statistics/).

† Persons of Hispanic ethnicity might be of any race or multiple races; non-Hispanic persons are categorized by race.

§ Overall national TB incidence calculated by using July 1 midyear population estimates from the U.S. Census Bureau (http://www.census.gov/popest/data/national/totals/2015/index.html). The Current Population Survey (http://dataferrett.census.gov) provided the population denominators for incidence according to national origin and race/ethnicity.

¶ Incidence provided in the text and this table is rounded. Year-to-year TB incidence per 100,000 U.S.-born population declined 7.0% from 2011 to 2012 (from 1.46 to 1.36 cases), declined 8.8% in 2013 (to 1.24 cases), declined 6.0% in 2014 (to 1.16 cases), and increased 0.3% in 2015 (to 1.17 cases). TB incidence per 100,000 foreign-born population declined 5.9% from 2011 to 2012 (from 16.91 to 15.90), declined 1.8% in 2013 (to 15.61 cases), declined 1.1% in 2014 (to 15.43 cases), and declined 2.3% in 2015 (to 15.08 cases).

** Other includes a total of four persons reported as American Indians/Alaska Natives (one in 2012, two in 2013, zero in 2014, one in 2015) and a total of 51 as Native Hawaiians/other Pacific Islanders (12 in 2012, 17 in 2013, eight in 2014, 14 in 2015).

†† The provisional number of TB cases for 2014 was 9,412, which corresponded to an incidence of 2.951 per 100,000 persons (i.e., rounded up to 3.0); the updated number of TB cases for 2014 is 9,406, which corresponds to an incidence of 2.949 cases per 100,000 persons (i.e., rounds down to 2.9).

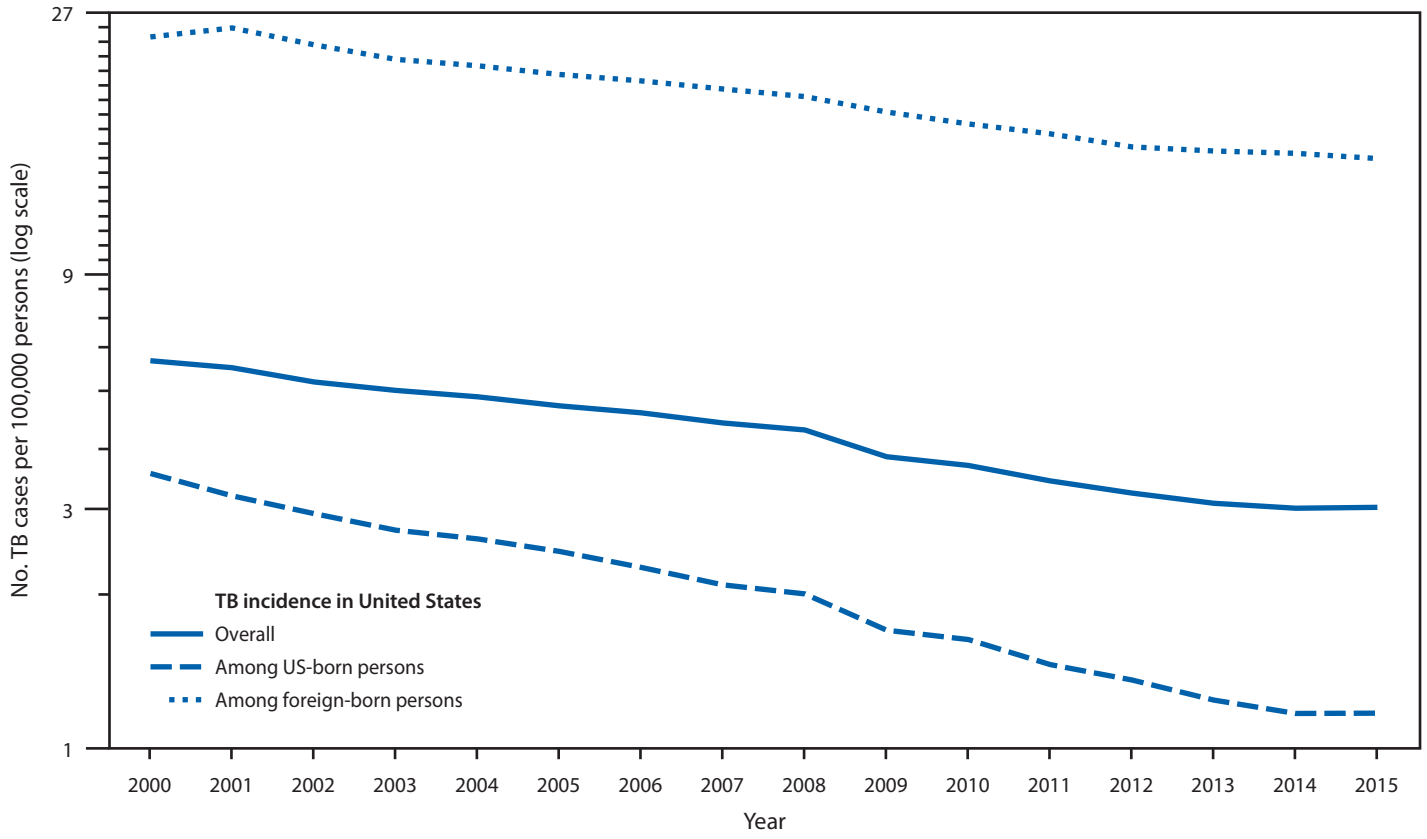
Ninety-six TB cases occurred among foreign-born persons aged <15 years (6.0 cases per 100,000), representing 1.5% of all foreign-born persons reported as having incident TB in the United States in 2015.

Discussion

After 2 decades of annual declines (*1*), TB incidence in the United States has leveled at approximately 3.0 new cases per 100,000 persons. Epidemiologic modeling suggests that even if the previously observed annual declines in the United States had been sustained, TB elimination, defined as <1 TB case per one million persons annually (*5*), would not occur by the end of this century (*6*). The determinants of this leveling in TB incidence are not yet clear; further evaluation of available data is required to understand the causes of this trend.

The 1985–1992 TB resurgence was attributed to the human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome epidemic, immigration from countries with higher TB incidence, and increased TB transmission within the United States (*7*). However, the proportion of TB patients coinfected with HIV has declined substantially in the United States (5.6% of TB patients in 2015 with known HIV status were coinfected, including 7.8% of the U.S.-born), and TB incidence among U.S. foreign-born persons has continued to decline (*1*). In contrast, the stabilization of TB incidence among U.S.-born persons (Table 2), together with evidence provided by molecular genotyping of TB cases (*1*,*8*), demonstrates that TB transmission within the United States continues to occur. The continued occurrence of TB cases among U.S.-born children is further corroboration, because TB disease in a young child is a sentinel event representing recent infection (*5*,*7*). Substance abuse, incarceration, and homelessness associated with TB outbreaks highlight some of the complicated case management work required on the health department frontlines of TB control (*9*).

FIGURE. Tuberculosis (TB) incidence overall and among U.S.- and foreign-born persons, by year — United States, 2000–2015



* Provisional National Tuberculosis Surveillance System data as of March 4, 2016. Updated data will be available in CDC's annual TB surveillance report later this year (http://www.cdc.gov/tb/statistics/).

Effective TB control requires diagnosing cases as early as possible during the illness, thus allowing earlier airborne precautions and curative treatment to interrupt transmission (*5*,*9*). An early diagnosis for a patient with infectious TB also permits a timely contact investigation, which is essential to detect and prevent additional TB cases. Recently infected contacts, particularly children, benefit greatly from treatment to avert progression to active TB disease (*5*,*7*). TB prevention, timely diagnosis, and treatment completion are necessary for all groups, but especially for groups disproportionally affected by TB. Since 2003, TB incidence among Native Hawaiians/other Pacific Islanders and American Indians/Alaska Natives has remained high despite declining incidence among Hispanics and non-Hispanic Asians, whites, and blacks (*1*).

Two thirds of all U.S. TB cases occur among foreign-born persons, often years after arrival (*10*), which is consistent with disease progression following years of untreated latent TB infection. Epidemiologic modeling indicates that eliminating the threat of TB in the United States will require additional strategies to reduce TB in the countries of origin and expand treatment of latent TB infection among the foreign-born persons (*6*). Despite recent declines in TB incidence among foreign-born persons, these persons continue to have a higher risk for TB, reflecting the importance of further intensifying the global battle against TB and underscoring the importance of interventions to screen and treat U.S.-bound permanent immigrants and refugees for TB disease. TB elimination will require both global interventions and a substantial improvement in larger scale identification and treatment of latent TB infection among foreign-born persons living in the United States (*6*), consistent with CDC's strategic plan for the national elimination of TB (http://www.cdc.gov/tb/about/strategicplan.htm).

TB is preventable and curable, and its elimination would have widespread health, economic, and social benefits. Resuming declines in TB incidence will require more comprehensive public health approaches, both globally and domestically. These include increasing case detection and cure rates globally, reducing TB transmission in institutional settings such as health care settings and correctional facilities, and increasing detection and treatment of preexisting latent TB infection among the U.S. populations most affected by TB. Finally, more emphasis should be placed on interrupting the relatively limited, but persistent, ongoing TB transmission (e.g., among persons experiencing homelessness) in the United States, as well

Summary

What is already known about this topic?

Uniform national reporting of tuberculosis (TB) cases in the United States began in 1953. During 1993–2012, the annual incidence of reported TB cases has always been ≥0.2 cases per 100,000 persons lower than the previous year.

What is added by this report?

Preliminary data for 2015 indicate an incidence of 3.0 cases per 100,000 persons, approximately the same incidence as during 2013 and 2014. After 2 decades of declining incidence, progress toward TB elimination in the United States appears to have stalled.

What are the implications for public health practice?

Resuming declines in TB incidence in the United States will require intensification of efforts both domestically and globally. More emphasis should be placed on strengthening U.S. systems for detecting and treating latent TB infection and interrupting TB transmission, as well as accelerating reductions in TB globally.

as continuing research on better means to diagnose, treat, and prevent TB infection and disease.

This report is limited to provisional National Tuberculosis Surveillance System data as of March 4, 2016. Updated data will be available in CDC's annual TB surveillance report (*1*) later this year (http://www.cdc.gov/tb/statistics/), although the final TB case count is not expected to change substantially.

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Tuberculosis Among Temporary Visa Holders Working in the Tourism Industry — United States, 2012–2014

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Tuberculosis (TB) is a contagious bacterial disease of global concern. During 2013, an estimated nine million incident TB cases occurred worldwide (*1*). The majority (82%) were diagnosed in 22 countries, including South Africa and the Philippines, where annual incidence was 860 TB cases per 100,000 persons and 292 TB cases per 100,000 persons, respectively (*1*). The 2013 TB incidence in the United States was three cases per 100,000 persons (*2*). Under the Immigration and Nationality Act, TB screening is required for persons seeking permanent residence in the United States (i.e., immigrants and refugees), but it is not routinely required for nonimmigrants who are issued temporary visas for school or work (*3*). A portion of the U.S. tourism industry relies on temporary visa holders to accommodate seasonal and fluctuating demand for service personnel (*4*). This report describes three foreign-born persons holding temporary visas who had infectious TB while working at tourist destinations in the United States during 2012–2014. Multiple factors, including dormitory-style housing, transient work patterns, and diagnostic delays might have contributed to increased opportunity for TB transmission. Clinicians in seasonally driven tourist destinations should be aware of the potential for imported TB disease in foreign-born seasonal workers and promptly report suspected cases to health officials.

Case Reports

Case 1. In March 2012, a man aged 25 years from the Philippines arrived in Arizona to work as a cafeteria attendant in a National Park Service lodge. The rural county in which the park is located typically reported five TB cases each year. The man resided in an employee cabin with two roommates. He had been treating himself intermittently with levofloxacin for neck swelling that began in January 2012; in February 2012, he experienced fever, night sweats, and cough. After working in Arizona for 3 months (March–May 2012), he relocated to Minnesota in June to visit family and find other work. Five days after his arrival in Minnesota, he was admitted to a hospital. He received a diagnosis of acid-fast bacilli (AFB) smear-positive pulmonary TB disease and disseminated TB of the neck, lung, liver, and spleen. Cultures grew *Mycobacterium tuberculosis* that was resistant to isoniazid and levofloxacin, and the genotype was not previously reported in the United States (*2*). His TB risk factors included previous residence in the Philippines.

During the ensuing TB contact investigation, 10 employees in Arizona were evaluated; 19 additional contacts, including the patient's two roommates, were no longer working at the park and unable to be contacted for a TB evaluation. Among the 10 employees who received a tuberculin skin test (TST), one female had a positive result, but no TB symptoms and a normal chest radiograph; health professionals determined that she probably had latent TB infection before the recent exposure and did not recommend further testing. The remaining nine persons had negative TST results (induration <5 mm) at initial and follow-up testing. In Minnesota, three household contacts were identified, including one foreign-born household contact who had a history of treated latent TB infection, and two persons who had negative TST results. No additional active TB cases were identified among screened contacts, and no genotype-matching cases had been reported in the United States as of March 18, 2016 (*5*).

Case 2. In April 2012, a man aged 49 years from the Philippines arrived in Michigan for temporary employment at resort A on Mackinac Island, which has a population of approximately 500 persons and had not reported a TB case since 1995. The man worked as a butcher at the resort restaurant and lived in a dormitory with one roommate. When the resort closed for the season in October 2012, he relocated to California. In May 2013, he was admitted to a hospital with cough, weight loss, night sweats, chills, fever, and shortness of breath; he reported that his symptoms had begun while working in Michigan. He received a diagnosis of AFB smear-positive pulmonary TB disease. The *M. tuberculosis* isolate was susceptible to first-line TB medications isoniazid, rifampin, ethambutol, and pyrazinamide. The genotype was well-established in other parts of the United States (i.e., >100 previous TB cases since 2005), but had not been seen before in Michigan. His TB risk factors included diabetes and previous residence in the Philippines.

A contact investigation was initiated on Mackinac Island during the 2013 tourist season. Thirty-six (53%) of 68 employees who had had contact with the index patient during 2012 had left the state and did not return; health authorities in the jurisdictions to which they traveled were notified. The remaining 32 (47%) employees had returned to the island and were evaluated for TB. Nineteen (59%) had either a negative TST

or interferon-gamma release assay (IGRA) result (*6*). The 13 (41%) persons with positive IGRA results were all temporary employees from the Philippines; none had a chest radiograph consistent with active disease and all were considered to have latent TB infection. In California, five family members of the patient were contacts: one had a history of treated latent TB infection, and one of the remaining four had a positive IGRA result and was considered to have latent TB infection. No additional active TB cases were identified among screened contacts. In 2014, a genotype-matching TB case was diagnosed in another Filipino immigrant in Michigan; no epidemiologic association between the two patients is evident.

Case 3. In April 2014, a woman aged 21 years from South Africa arrived for temporary employment at resort B on Mackinac Island. She worked as a housekeeper and laundry attendant and lived in a dormitory with three roommates. In June–July 2014, she sought medical care five times at both a local emergency department and a clinic, where she reported worsening signs and symptoms of pneumonia that included shortness of breath, cough, and weight loss. A different physician examined the patient at each visit. In August 2014, she received a diagnosis of AFB smear–positive pulmonary TB disease. The *M. tuberculosis* isolate was resistant to isoniazid and the genotype was not previously reported in the United States. Her TB risk factors included contact in December 2013 with a relative with active TB disease, and previous residence in South Africa.

IGRAs were performed on all 26 resort employees who had contact with the index patient. Fourteen (54%) had positive IGRA results, including 11 temporary employees from South Africa, two U.S.-born year-round employees, and one Jamaica-born seasonal employee. None had a history of known TB infection and all were considered to have latent TB infection. One U.S.-born contact who initially tested negative by IGRA had a positive IGRA result at the 8-week follow-up examination, providing evidence of recent TB infection. No additional active TB cases were identified among screened contacts, and no genotype-matching cases had been reported in the United States as of March 18, 2016.

Discussion

This report documents three incident cases of infectious TB among foreign-born, temporary workers. In addition to vacation resorts and national parks, sectors of the U.S. tourism industry that rely on temporary visa holders to accommodate the fluctuating and seasonal demand for service personnel include amusement parks, ski lodges, and cultural or historical sites (*4*). Although the cases described here were counted for the purposes of national TB surveillance, TB incidence among temporary visa holders is difficult to estimate, in part because TB cases are not included in official case counts when a person is in the United States for <90 days (*2*). Despite this exclusion, approximately two thirds of TB cases in the United States occur among foreign-born persons, and their corresponding TB incidence in 2014 (15.4 cases per 100,000 population) was >10-fold higher than that among U.S.-born persons (1.2 cases per 100,000 population) (*2*).

TB screening is not routinely required for persons entering the United States as nonimmigrants (*3*). During 2013, the U.S. Department of State granted temporary admission to approximately 600,000 students and 400,000 temporary workers and their families (*7*). The length of stay for these students and temporary workers ranged from months to years, depending on visa type (*7*,*8*).

This case series was consistent with a 2005–2006 cross-sectional study that determined seeking care for TB symptoms to be the primary reason for the TB diagnosis among temporary visa holders (*9*). Lack of TB awareness among clinicians can contribute to delayed diagnoses. Diagnostic and treatment delays extend the patient's infectious period, thereby allowing increased opportunities for transmission. In the third case report, the patient had sought medical attention five times for worsening signs and symptoms, including weight loss, cough, and shortness of breath, yet TB remained undiagnosed for 3 months.

TB contact investigations among temporary workers are also challenging. Tourism industries have substantial turnover in seasonal employment. In two of the case reports described here, the majority of contacts, including roommates at high risk for TB, had left the state or country at the time contact investigations were initiated, and could not be reached. However, secondary TB cases within the United States as a consequence of any of these three cases seem unlikely, given the nationally unique *M. tuberculosis* genotypes for cases 1 and 3, and birth in the Philippines as the only known commonality between case 2 and other TB cases with that genotype.

The findings in this report are subject to at least two limitations. First, because the majority of infected contacts were temporary employees from high TB incidence countries where the contacts might have been previously infected, interpreting TB test results was challenging. A positive TB test does not necessarily mean that transmission occurred as a result of exposure to the TB patients described here. Second, these three recent TB cases among foreign-born temporary workers might not be representative of all cases; no generalizations can be made regarding all temporary workers.

Increased awareness concerning the potential for active TB among foreign-born temporary workers is needed. Public

Summary

What is already known about this topic?

Tuberculosis (TB) is a global disease; the majority of TB cases in the United States occur among foreign-born persons. TB screening requirements exist for persons seeking permanent status in the United States (i.e., immigrants and refugees), but not for temporary visitors (e.g., students and workers).

What is added by this report?

Three foreign-born persons holding temporary visas had infectious TB while working at U.S. tourist destinations. Multiple factors, including dormitory-style housing, transient work patterns, and diagnostic delays might have contributed to increased opportunity for TB transmission.

What are the implications for public health practice?

Public health authorities might consider providing TB education for employers and clinicians in seasonally driven tourist destinations. Employers might consider implementing TB screening for temporary workers from countries with a high incidence of TB cases. All employers should encourage employees to seek medical attention early during the course of an illness. Clinicians should be aware of the potential for imported TB disease in foreign-born seasonal workers and promptly report suspected cases to health officials to limit TB transmission.

health authorities might consider providing TB education for employers and clinicians in the tourism sector. Employers might consider implementing TB screening for temporary workers from countries with a high incidence of TB cases, and all employers should encourage employees to seek medical attention early during the course of an illness. Clinicians should promptly recognize TB signs and symptoms and inquire about previous travel to or residence in countries with a high incidence of TB cases.

A medical exam that includes TB screening is required for persons seeking permanent residence in the United States, including immigrants and refugees, and CDC has the U.S. regulatory oversight of the overseas medical examination process (42 CFR, Part 34) (*3*). As part of the National Action Plan for Combating Antibiotic Resistant Bacteria initiative, CDC is working with interagency partners to expand premigration TB screening beyond immigrants and refugees (*10*). Until global TB elimination is reached, increased TB awareness among clinicians serving foreign-born temporary workers, followed by prompt treatment and public health follow-up after active TB is diagnosed, is necessary to reduce the potential for TB transmission.

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Photokeratitis Linked to Metal Halide Bulbs in Two Gymnasiums — Philadelphia, Pennsylvania, 2011 and 2013

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In December 2011 and December 2013, the Philadelphia Department of Public Health (PDPH) received separate reports of clusters of photokeratitis linked to gymnasium events. Photokeratitis, a painful eye condition resulting from unprotected exposure to ultraviolet radiation, has previously been linked to metal halide lamps with broken outer envelopes (*1*,*2*). To investigate the cause of these clusters and further characterize patients with photokeratitis, PDPH administered questionnaires to potentially exposed persons, established a case definition, and conducted environmental assessments of both gymnasiums. Because event attendee registration information was available, a cohort study was conducted to evaluate the 2011 cluster of 242 persons who met the photokeratitis case definition. A case-series investigation was conducted to evaluate the 2013 cluster of 20 persons who met the photokeratitis case definition for that event. These investigations indicated that Type R metal halide bulbs with broken outer envelopes found in both gymnasiums were the probable cause of the photokeratitis. The Food and Drug Administration has made a number of recommendations regarding the use of metal halide bulbs in facilities where bulbs are at elevated risk for breaking, such as schools and indoor sports facilities (*3*). Because Type R metal halide lamps do not self-extinguish once the outer envelope is broken, these bulbs should be removed from settings with a high risk for outer envelope rupture, such as gymnasiums, or should be placed within enclosed fixtures. In instances where these bulbs cannot be exchanged for self-extinguishing lamps, Type R lamps with a broken outer envelope should be replaced immediately to limit exposure to ultraviolet radiation. A broken outer envelope can be detected by the presence of glass on the floor, or visual examination of the bulb when the power is turned off. A broken outer envelope is difficult to detect when the lamp is emitting light.

Investigation of 2011 Outbreak

During December 4–6, 2011, a total of 127 persons sought care at local emergency departments (EDs) and physicians' offices for eye irritation, including burning, redness, tearing, and foreign-body sensation. Active surveillance by the Poison Control Center (PCC) at The Children's Hospital of Philadelphia alerted PDPH, and it was learned that all patients had attended a 9-hour cheerleading event at a local high school gymnasium on December 4. The ED that treated 12 of the first patients reported that their symptoms were consistent with acute conjunctivitis caused by a chemical irritant. Philadelphia police, fire, and health departments evaluated the gymnasium, including reviewing video footage and testing for hazardous chemicals. The Hazardous Materials Unit of the Philadelphia Fire Department tested for the presence and concentration of toxic industrial chemicals, radioactive materials, volatile organic compounds, and hazardous gases. Wipe testing was performed to ascertain the presence of tear gas residues and quaternary ammonium compounds. All tests for chemical agents were negative; however, a metal halide bulb with a broken outer envelope was found in the gymnasium ceiling. Through video verification, this bulb was determined to have been operational both at the time of environmental assessment and during the cheerleading competition and was identified as the likely source of eye irritation.

On December 7, a web-based survey was conducted to ascertain attendees' exposure and symptom histories. The survey was e-mailed to all cheerleading team coaches, who then distributed the survey link to the parents of each squad member. The survey requested information for all event attendees in each household. A case of photokeratitis was defined as the occurrence of two or more acute eye symptoms in a person who attended the competition.

Surveys were completed by 760 persons, representing approximately 75% of attendees. Among respondents, 242 (32%) met the case definition. Acute eye symptoms reported included burning eyes (93%), red eyes (86%), tearing eyes (76%), and foreign body sensation (74%) (Table 1). The median interval between exposure and symptom onset was 9 hours (range = 0–72 hours). The median age of symptomatic persons was 29 years (range = 2 weeks–72 years). Among the 127 persons who sought care, 99 (78%) went to EDs. Risk for becoming a case was higher among those who sat in the bleachers for ≥2 hours and was lower for persons wearing contact lenses or eyeglasses (Table 2). Affected persons spent more time in the gymnasium (mean = 5 hours) than nonaffected persons (mean = 3 hours) ($p<0.01$).

TABLE 1. Predominant clinical symptoms reported by photokeratitis patients who attended events in two gymnasiums — Philadelphia, Pennsylvania, 2011 and 2013

Symptom	Cheerleading competition, December 4, 2011 (n = 242)* No. (%)	Recreation center, December 23–30, 2013 (n = 20)† No. (%)
Burning eyes	225 (93)	20 (100)
Red eyes	207 (86)	19 (95)
Tearing eyes	183 (76)	19 (95)
Foreign body sensation	180 (74)	13 (65)
Blurry vision	123 (51)	16 (80)
Eyelid swelling	102 (42)	8 (40)
Skin irritation	49 (20)	4 (20)

* Cohort study.
† Case series.

Investigation of 2013 Outbreak

On December 28, 2013, seven persons were evaluated at a local Philadelphia ED for symptoms of photokeratitis, including burning eyes, red eyes, and tearing, following activities at a recreation center gymnasium. PCC reported this cluster of eye irritation to PDPH. During the following week, three additional persons with photokeratitis linked to the same recreation center gymnasium were seen at a local eye hospital. PDPH staff conducted an environmental health assessment at the recreation center. The gymnasium included a basketball court and one set of spectator bleachers, illuminated by 10 industrial ceiling lamps. No evidence of a chemical agent was found. A functioning metal halide lamp with a broken outer envelope was identified in the gymnasium. Informed by the 2011 photokeratitis outbreak, PDPH identified a compromised metal halide lamp as the source of eye irritation in these 10 patients.

A case of photokeratitis was defined as the occurrence of two or more symptoms of acute eye irritation in a person who had engaged in activities at the gymnasium during December 23–30, 2013. As a result of the strong epidemiologic link between the reported cases and this gymnasium, PDPH conducted additional case-finding through a search of ED chief complaint data for the terms "conjunctivitis," "eye injury," "pink eye," "eye emergency," "red eyes," and "burning eyes," and identified 12 additional persons with symptoms suggesting photokeratitis. Further case-finding entailed asking photokeratitis patients to provide names and contact information for other persons present at the recreation center. Eighteen additional exposed persons were identified in this manner for a total of 40 potential patients. Seven persons identified through ED chief complaint data and 12 persons identified through interviews with photokeratitis patients could not be contacted.

TABLE 2. Analysis of two risk factors for photokeratitis among attendees in a gymnasium at a cheerleading competition — Philadelphia, Pennsylvania, 2011

Risk factor	Cases (n = 242) No. (%)	Noncases (n = 518) No. (%)	Total (N = 760)	Relative risk (95% CI)
Time sitting in bleachers				
≥2 hours	166 (69)	267 (52)	433	1.65 (1.31–2.08)
<2 hours	76 (31)	251 (48)	327	Referent
Use of eyeglasses or contact lenses				
Yes	39 (16)	132 (25)	171	0.66 (0.49–0.89)
No	203 (84)	386 (75)	589	Referent

Abbreviation: CI = confidence interval.

A telephone-based questionnaire to ascertain clinical symptoms and recreation center exposure history was administered to 21 contacted suspected patients. The exposure period among interviewed persons was December 23–30, 2013. A total of 20 patients met the case definition. Eighteen reported playing basketball in the gymnasium, and two were spectators. Eighteen patients were male, and the median age was 26 years (range = 14–57 years). Seventeen of the 20 patients sought care at EDs. Length of gymnasium exposure ranged from 30 minutes to 4 hours. Predominant acute eye symptoms included burning (100%), redness (95%), and tearing (95%) (Table 1). Four patients also reported peeling or flaking skin. Symptom duration ranged from 3 hours to 9 days. Among 16 patients, symptoms resolved 1–3 days after onset. In 10 of the 17 photokeratitis patients who sought health care, infectious conjunctivitis (five patients), dry eyes (three), or allergic reactions (two) were the initial diagnoses.

Discussion

Metal halide lamps produce an electric arc that travels through a mixture of mercury and metal halide gases, generating an intense white light. Commonly used for overhead lighting, each lamp has a coated outer glass bulb surrounding the arc tube, which serves to filter out ultraviolet light. Broken metal halide lamps pose a risk for photokeratitis among exposed persons. In the first cluster reported, 242 persons developed photokeratitis following exposure to a single compromised metal halide bulb, and in the second, as few as 30 minutes of exposure to a metal halide bulb with a broken outer envelope resulted in 20 photokeratitis cases.

The link between photokeratitis and metal halide bulbs has been reported previously. In February 2002, the North Carolina Division of Public Health investigated 13 cases of eye and skin burns in a school gymnasium that were presumed to be caused by a broken metal halide lamp (*1*), and in

Summary

What is already known about this topic?

Exposure to broken metal halide bulbs can result in skin and eye irritation, including photokeratitis, particularly in settings such as sports facilities where balls or other objects are routinely thrown.

What is added by this report?

In December 2011 and December 2013, separate clusters of photokeratitis were linked to gymnasium events in Philadelphia where broken metal halide bulbs were in use. Predominant symptoms included burning or red eyes, tearing eyes, foreign body sensation, blurry vision, eyelid swelling, and skin irritation.

What are the implications for public health practice?

Broken metal halide bulbs pose a continuing risk for photokeratitis, particularly in high-risk settings such as gymnasiums. Improved provider education regarding the clinical presentation and exposures associated with photokeratitis might prevent misdiagnosis and promote the expedient identification of future exposures. Facility managers need to be trained to examine bulbs for breaks and replace them immediately upon bulb rupture.

2003, the Tennessee Department of Health identified three separate clusters of photokeratitis and skin burns linked to damaged metal halide bulbs in school and municipal gymnasiums (*2*). Recommendations from both the Food and Drug Administration and the National Electrical Manufacturers Association cite broken metal halide bulbs as a cause of skin burns and eye irritation, particularly in settings such as sports facilities where balls or other objects are routinely thrown (*3*,*4*).

Although the acute symptoms of photokeratitis resolve within a few days, the association with long-term sequelae such as corneal neuropathy is not known. Educational strategies aimed at both facilities management personnel and health care providers are needed. Facilities management personnel should be made aware of the dangers posed by operational metal halide bulbs with broken outer envelopes. Ideally, per Food and Drug Administration recommendations, all nonextinguishing Type R metal halide bulbs should be replaced with self-extinguishing Type T bulbs to avoid unintentional exposure to ultraviolet radiation without the protective outer envelope (*3*). However, Type T bulbs can take as long as 15 minutes to self-extinguish after the outer envelope has been broken. If a lamp of any type breaks, persons should leave the area immediately (*5*). When replacement with Type T bulbs is not feasible, a broken bulb must be removed immediately and replaced with an unbroken bulb. Type R bulbs should not be used in high-risk settings, and should be placed within protective casings to reduce the risk for outer envelope rupture. Facility managers need to be trained to examine bulbs for breaks and replace them immediately upon bulb rupture. A suspected broken bulb should never be examined when the lamp is turned on.

During both of the photokeratitis outbreaks described in this report, patient symptoms were confused with those resulting from a chemical exposure, infectious conjunctivitis, dry eye conditions, or allergic reactions. During the 2013 outbreak, early identification of photokeratitis symptoms could have accelerated identification and removal of the broken metal halide bulb, thus preventing continued exposure of persons using the gymnasium later in the week. In both reported clusters, collaboration between PCC and PDPH facilitated the identification of the cause of eye irritation and an appropriate public health response.

The findings in this report are subject to at least three limitations. First, for both events, clinical symptoms and exposure duration were unverified and dependent on patient recall, which might have resulted in recall or reporting bias. Second, during the 2013 outbreak, lists of gymnasium users and their contact information were not maintained; therefore, it was not possible to identify all of the exposed persons. Finally, because no asymptomatic exposed persons were identified for the 2013 event, measures of risk could not be calculated.

Extensive collaboration between clinicians and interagency partners facilitated rapid identification, reporting, and investigation of these clusters, and permitted determination of the sources of photokeratitis. Improved provider education regarding the clinical presentation and exposures associated with photokeratitis might reduce misdiagnosis and promote the expedient identification of future exposures.

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Travel-Associated Zika Virus Disease Cases Among U.S. Residents — United States, January 2015–February 2016

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On March 18, 2016, this report was posted as an MMWR *Early Release on the* MMWR *website (http://www.cdc.gov/mmwr).*

Zika virus is an emerging mosquito-borne flavivirus. Recent outbreaks of Zika virus disease in the Pacific Islands and the Region of the Americas have identified new modes of transmission and clinical manifestations, including adverse pregnancy outcomes. However, data on the epidemiology and clinical findings of laboratory-confirmed Zika virus disease remain limited. During January 1, 2015–February 26, 2016, a total of 116 residents of 33 U.S. states and the District of Columbia had laboratory evidence of recent Zika virus infection based on testing performed at CDC. Cases included one congenital infection and 115 persons who reported recent travel to areas with active Zika virus transmission (n = 110) or sexual contact with such a traveler (n = 5). All 115 patients had clinical illness, with the most common signs and symptoms being rash (98%; n = 113), fever (82%; 94), and arthralgia (66%; 76). Health care providers should educate patients, particularly pregnant women, about the risks for, and measures to prevent, infection with Zika virus and other mosquito-borne viruses. Zika virus disease should be considered in patients with acute onset of fever, rash, arthralgia, or conjunctivitis, who traveled to areas with ongoing Zika virus transmission (http://www.cdc.gov/zika/geo/index.html) or who had unprotected sex with a person who traveled to one of those areas and developed compatible symptoms within 2 weeks of returning.

Zika virus is primarily transmitted to humans by *Aedes aegypti* mosquitoes (*1*). Most infections are asymptomatic (*2*). When occurring, clinical illness is generally mild and characterized by acute onset of fever, maculopapular rash, arthralgia, or nonpurulent conjunctivitis. Symptoms usually last from several days to a week. Severe disease requiring hospitalization is uncommon, and deaths are rare.

In addition to mosquito-borne transmission, Zika virus infections have been reported through intrauterine transmission resulting in congenital infection, intrapartum transmission from a viremic mother to her newborn, sexual transmission, and laboratory exposure (*3*,*4*). Increasing evidence suggests that Zika virus infection during pregnancy can result in microcephaly, other congenital anomalies, and fetal losses (*5*). Guillain-Barré syndrome also has been associated with recent Zika virus disease (*6*). However, the frequency of these outcomes is not known. To characterize Zika virus disease among U.S. residents, CDC reviewed demographics, exposures, and reported symptoms of patients with laboratory-evidence of recent Zika virus infection in the United States.

Zika virus disease cases among residents of U.S. states with specimens tested at CDC's Arboviral Diseases Branch during January 1, 2015–February 26, 2016 were identified. The cases included in this report had laboratory evidence of Zika virus infection based on the following findings in serum: 1) Zika virus RNA detected by reverse transcription-polymerase chain reaction (RT-PCR); 2) anti-Zika virus immunoglobulin M (IgM) antibodies detected by enzyme-linked immunosorbent assay (ELISA) with ≥4-fold higher neutralizing antibody titers against Zika virus compared with neutralizing antibody titers against dengue virus; or 3) anti-Zika virus IgM antibodies with <4-fold difference in neutralizing antibody titers between Zika and dengue viruses and a direct epidemiologic link to a person with laboratory evidence of recent Zika virus infection (i.e., vertical transmission from mother to baby or sexual contact). State and local health departments collected information on patient demographics, dates of travel, and clinical signs and symptoms.

During January 1, 2015–February 26, 2016, a total of 116 residents of 33 states and the District of Columbia with laboratory evidence of recent Zika virus infection were identified on the basis of testing at CDC. One case occurred in a full-term infant born with severe congenital microcephaly, whose mother had Zika virus disease in Brazil during the first trimester of pregnancy (*5*). Among the remaining 115 patients (including the infant's mother), 24 (21%) had illness onset in 2015 and 91 (79%) in 2016. Seventy-five (65%) cases occurred in females (Table 1). The median age of patients was 38 years (range = 3–81 years); 11 (10%) cases occurred in children and adolescents aged <18 years. Of the 115 patients, 110 (96%) reported recent travel to areas of active Zika virus transmission and five (4%) did not travel but reported sexual contact with a traveler who had symptomatic illness. The most frequently reported countries with active Zika virus transmission visited by patients were Haiti (n = 27), El Salvador (16), Colombia (11), Honduras (11), and Guatemala (10).

All 115 patients reported a clinical illness with onset during March 2015–February 2016 (Figure). The most commonly reported signs and symptoms were rash (98%), fever (82%), arthralgia (66%), headache (57%), myalgia (55%), and conjunctivitis (37%) (Table 2). Among all 115 patients, 110 (96%) reported two or more of the following symptoms: rash, fever, arthralgia, and conjunctivitis; 75 (65%) reported three or more of these signs or symptoms. Four (3%) patients were hospitalized; no deaths occurred. Among the 109 travelers who had known travel dates, patients reported becoming ill a median of 1 day after returning home (range = 37 days before return to 11 days after return).

Laboratory evidence of Zika virus infection included positive RT-PCR test results in 28 (24%) cases and positive serologic test results in 87 (76%) cases; two (2%) cases had serologic evidence of a recent unspecified flavivirus infection and were classified as Zika virus disease cases based on their epidemiologic link to a confirmed case (one vertical transmission and one sexual contact).

TABLE 1. Characteristics of 115 residents of U.S. states and the District of Columbia with laboratory evidence of Zika virus disease — January 1, 2015–February 26, 2016*,†

Characteristic	No. (%)
Female	75 (65)
Age group (yrs)	
<10	4 (3)
10–19	10 (9)
20–29	23 (20)
30–39	22 (19)
40–49	19 (17)
50–59	23 (20)
60–69	13 (11)
≥70	1 (1)
Region visited	
Central America	42 (37)
Caribbean	38 (33)
South America	21 (18)
Southeast Asia and Pacific Islands	7 (6)
North America (Mexico)	2 (2)
No travel§	5 (4)
Hospitalized	4 (3)
Died	0 (0)

* Testing performed at CDC's Arboviral Diseases Branch laboratory.
† Excludes one infant born with severe congenital microcephaly after maternal infection in Brazil during the first trimester of pregnancy.
§ Sexual contacts of travelers.

Discussion

Before 2015, Zika virus disease among U.S. travelers was uncommon. This likely was because of low levels of Zika virus transmission in travel destinations and limited disease recognition in the United States. Local mosquito-borne transmission of Zika virus has not been documented in U.S. states. With the recent outbreaks in the Americas, the number of Zika virus disease cases among travelers visiting or returning to the United States has increased and will likely continue to increase. These imported cases might result in local human-to-mosquito-to-human transmission of the virus in U.S. states that have the appropriate mosquito vectors.

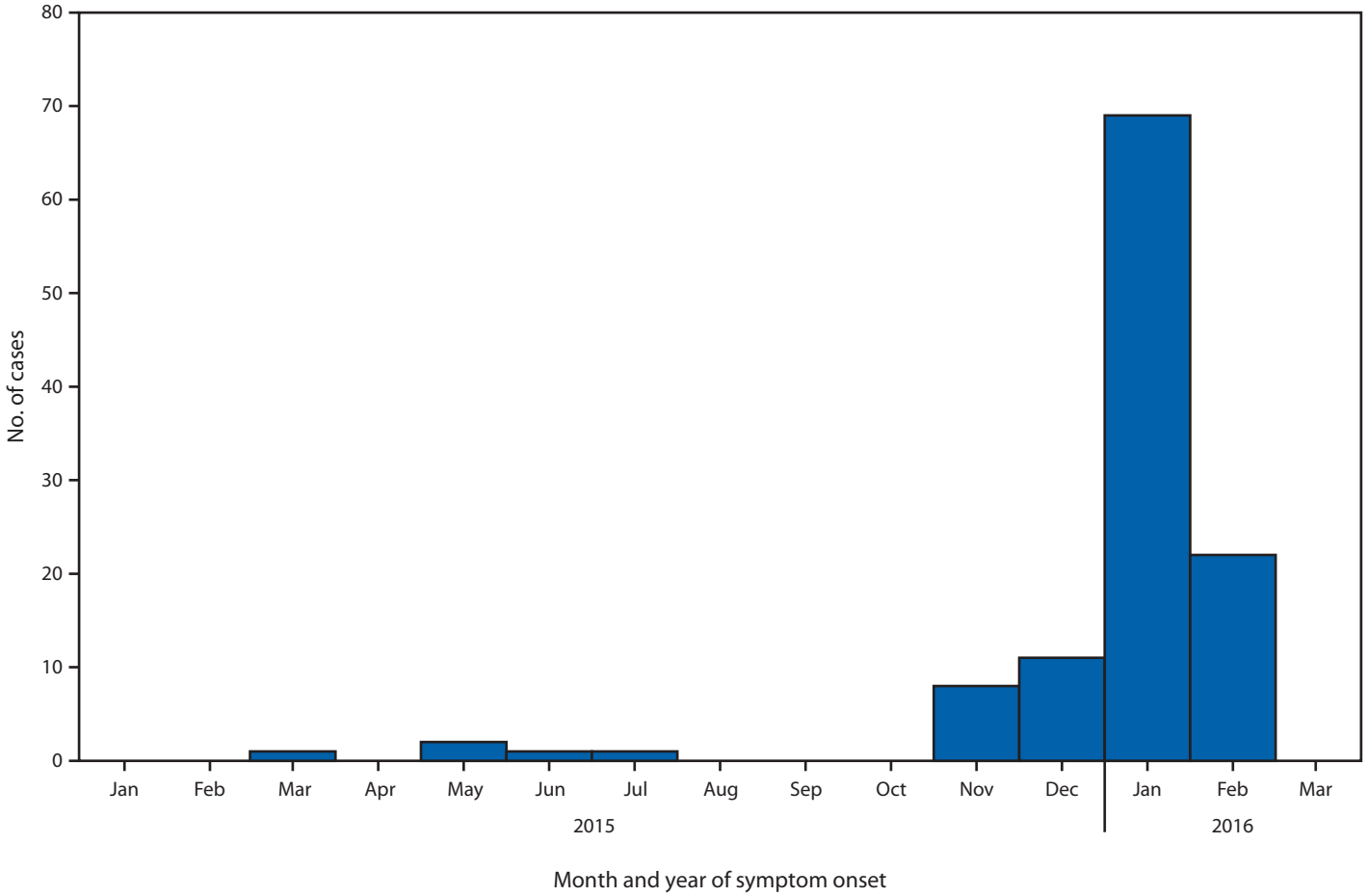
This report increases the number of laboratory-confirmed sexually transmitted Zika virus disease cases reported in the United States; two cases included here were previously reported as probable cases and were confirmed through additional testing (*4*). Sexually transmitted cases will be increasingly recognized among contacts of returning travelers and there is risk for congenital, perinatal, or transfusion-associated transmission. CDC has issued guidelines to reduce the risk for travel-associated infections, especially among pregnant women and sexual contacts of travelers (*4*,*7*). Temporary deferral of blood donors with recent travel to Zika-affected areas also has been recommended to reduce the risk for transfusion-associated transmission (*8*).

The cases presented in this report have clinical findings similar to those of Zika virus disease cases previously reported from other countries. Most had fever and rash; however, rates of conjunctivitis are lower than those seen in previous outbreaks (*2*). The majority (95%) of cases occurred in travelers to areas with ongoing mosquito-borne Zika virus transmission.

This evaluation was limited to cases with testing performed at CDC through February 26, 2016. Zika virus RT-PCR and anti-Zika IgM antibody testing is now available at an increasing number of state, territorial, and local health departments, and additional cases have been diagnosed and reported from state and territorial health departments beyond those included in this report (http://www.cdc.gov/zika/geo/united-states.html). On February 26, 2016, the Council of State and Territorial Epidemiologists (CSTE) approved interim case definitions for Zika virus disease and Zika virus congenital infection and added them to the list of nationally notifiable conditions (*9*). Subsequent reports of Zika virus disease cases will include cases reported to ArboNET, the national arboviral surveillance system, using the interim CSTE case definitions.

Health care providers should educate patients about the risks for Zika virus disease and measures to prevent Zika virus infection and other mosquito-borne infections. Zika virus disease should be considered in patients with acute onset of fever, rash, arthralgia, or conjunctivitis who traveled to areas with ongoing transmission or had unprotected sex with someone who traveled to those areas and developed compatible symptoms within 2 weeks of returning. Until more is known about the effects of Zika virus infection on the developing fetus, pregnant women should postpone travel to areas where Zika virus transmission is ongoing. Pregnant women who do travel to one of these areas should talk to their health care provider before traveling and strictly follow steps to avoid mosquito

FIGURE. Month of illness onset for 115 patients with laboratory evidence of Zika virus infection among residents of U.S. states and the District of Columbia — January 1, 2015–February 26, 2016*



* Testing performed at CDC's Arboviral Diseases Branch laboratory.

TABLE 2. Clinical signs and symptoms reported by 115 residents of U.S. states and the District of Columbia with laboratory evidence of Zika virus disease — January 1, 2015–February 26, 2016*

	Yes†	No	Unknown
Sign/symptom	No. (%)	No. (%)	No. (%)
Rash	113 (98)	1 (1)	1 (1)
Fever	94 (82)	20 (17)	1 (1)
Arthralgia	76 (66)	33 (29)	6 (5)
Headache	65 (57)	37 (32)	13 (11)
Myalgia	63 (55)	38 (33)	14 (12)
Conjunctivitis	43 (37)	53 (46)	19 (17)
Diarrhea	22 (19)	63 (55)	30 (26)
Vomiting	6 (5)	79 (69)	30 (26)

* Testing performed at CDC's Arboviral Diseases Branch laboratory.
† Some patients had more than one sign and/or symptom.

bites (http://www.cdc.gov/features/stopmosquitoes/) during travel. Pregnant women who develop a clinically compatible illness during or within 2 weeks of returning from an area with Zika virus transmission should be tested for Zika virus infection; testing may also be offered to asymptomatic pregnant women 2–12 weeks after travel to an area with active Zika transmission (*7*). Fetuses and infants of women infected with Zika virus during pregnancy should be evaluated for possible congenital infection (*10*). CDC has established a registry to collect information on Zika virus infection during pregnancy and congenital infection.*

Health care providers are encouraged to report suspected Zika virus disease cases to their state or local health departments to facilitate diagnosis and mitigate the risk for local transmission in areas where *Aedes aegypti* or *Aedes albopictus* mosquitoes are currently active. State health departments should report laboratory-confirmed cases of Zika virus disease to CDC (*8*).

* Please send inquiries about the pregnancy registry to ZikaPregnancy@cdc.gov.

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State and local health departments.

The Zika Virus Response Epidemiology and Laboratory Team

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Summary

What is already known about this topic?

Zika virus is an emerging mosquito-borne flavivirus. Recent outbreaks of Zika virus disease in the Pacific Islands and the Region of the Americas have identified new modes of transmission and clinical manifestations, including adverse pregnancy outcomes.

What is added by this report?

During January 1, 2015–February 26, 2016, a total of 116 residents of U.S. states and the District of Columbia had laboratory evidence of recent Zika virus infection based on testing performed at CDC, including one congenital infection and 115 persons who reported recent travel to areas with active Zika virus transmission (n = 110) or sexual contact with such a traveler (n = 5).

What are the implications for public health practice?

Health care providers should educate patients about the risks for Zika virus disease and measures to prevent Zika virus infection and other mosquito-borne infections. Zika virus disease should be considered in patients with acute onset of fever, rash, arthralgia, or conjunctivitis who traveled to areas with ongoing transmission or had unprotected sex with someone who traveled to those areas and developed compatible symptoms within 2 weeks of returning.

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Preventing Transmission of Zika Virus in Labor and Delivery Settings Through Implementation of Standard Precautions — United States, 2016

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Zika virus transmission was detected in the Region of the Americas (Americas) in Brazil in May 2015, and as of March 21, 2016, local mosquito-borne transmission of Zika virus had been reported in 32 countries and territories in the Americas, including Puerto Rico and the U.S. Virgin Islands.* Most persons infected with Zika virus have a mild illness or are asymptomatic. However, increasing evidence supports a link between Zika virus infection during pregnancy and adverse pregnancy and birth outcomes (*1*), and a possible association between recent Zika virus infection and Guillain-Barré syndrome has been reported (*2*). Although Zika virus is primarily transmitted through the bite of *Aedes* species of mosquitoes, sexual transmission also has been documented (*3*). Zika virus RNA has been detected in a number of body fluids, including blood, urine, saliva, and amniotic fluid (*3*–*5*), and whereas transmission associated with occupational exposure to these body fluids is theoretically possible, it has not been documented. Although there are no reports of transmission of Zika virus from infected patients to health care personnel or other patients, minimizing exposures to body fluids is important to reduce the possibility of such transmission. CDC recommends Standard Precautions in all health care settings to protect both health care personnel and patients from infection with Zika virus as well as from blood-borne pathogens (e.g., human immunodeficiency virus [HIV] and hepatitis C virus [HCV]) (*6*). Because of the potential for exposure to large volumes of body fluids during the labor and delivery process and the sometimes unpredictable and fast-paced nature of obstetrical care, the use of Standard Precautions in these settings is essential to prevent possible transmission of Zika virus from patients to health care personnel.

Use of Standard Precautions in Health Care Settings

Health care personnel should adhere to Standard Precautions in every health care setting. Standard Precautions are designed to protect health care personnel and to prevent them from spreading infections to patients. They are based on the premise that all blood, body fluids, secretions, excretions (except sweat), nonintact skin, and mucous membranes might contain transmissible infectious agents and include 1) hand hygiene, 2) use of personal protective equipment (PPE), 3) respiratory hygiene and cough etiquette, 4) safe injection practices, and 5) safe handling of potentially contaminated equipment or surfaces in the patient environment (*6*). Because patients with Zika virus infection might be asymptomatic, Standard Precautions should be in place at all times, regardless of whether the infection is suspected or confirmed. Health care personnel should assess the potential for exposure to potentially infectious material during health care delivery and protect themselves accordingly, based on the level of clinical interaction with the patient and the physical distance at which care is provided (*6*). In addition, health care providers should use soap and water or alcohol-based products (gels, rinses, foams), at a minimum, before and after a patient contact and after removing PPE, including gloves (*6*).

Use of Standard Precautions in Labor and Delivery Settings

Pregnant women lose an average of 500 mL of blood during uncomplicated vaginal deliveries, with higher losses during complicated vaginal deliveries and cesarean deliveries (*7*). Amniotic fluid volume at the time of full-term delivery typically exceeds 500 mL (*8*). Eye protection used during deliveries has been demonstrated to be contaminated with blood and body fluids (*9*), and when double layers of gloves are used for procedures and surgeries, the outer layers often have significant perforations, whereas the inner layers are intact or have many fewer perforations (*10*). Although health care personnel in these settings are at substantial risk for exposure to blood and body fluids, varying levels of adherence to Standard Precautions have been reported in health care settings, including in labor and delivery units (*11*). Numerous barriers to the appropriate use of PPE have been cited, including the perception that PPE is uncomfortable and limits dexterity, fogging of goggles or face masks, the misperception that prescription eyeglasses provide adequate eye protection, lack of available PPE, forgetting to use PPE, lack of time in urgent clinical situations to don appropriate PPE, the perception that the patient poses minimal risk, and concerns about interference with patient care (*11*). Given the theoretic risk for transmission of Zika virus through contact with body fluids in a health care

* http://www.cdc.gov/zika/geo/active-countries.html.

setting in which female health care personnel might be pregnant, or male or female health care personnel might be trying to conceive a pregnancy, the outbreak of Zika virus disease provides an opportunity to emphasize the importance of maintaining appropriate infection control.

The goals of Standard Precautions include 1) preventing contact between a patient's body fluids and health care personnel's mucous membranes (including conjunctivae), skin, and clothing; 2) preventing health care personnel from carrying potentially infectious material from one patient to another; and 3) avoiding unnecessary exposure to contaminated sharp implements. Health care personnel must assess the likelihood of body fluid exposure, based on the type of contact and the nature of the procedure or activity, and use appropriate PPE. For example, because the risk for splashes to areas of the body other than the hands is small when performing vaginal examinations of pregnant women with minimal cervical dilation and intact membranes, only gloves are required. Placement of a fetal scalp electrode when membranes have already been ruptured or handling newborns before blood and amniotic fluid have been removed from the newborn's skin require protection of health care personnel's skin and clothing using gloves and an impermeable gown. In contrast, when performing procedures where exposure to body fluids is anticipated, such as an amniotomy or placement of an intrauterine pressure catheter, protection of mucous membranes, skin, and clothing are recommended, with a mask and eye protection, in addition to gloves and an impermeable gown.

Anesthesia providers in the labor and delivery setting should adhere to Standard Precautions and wear sterile gloves and a surgical mask when placing a catheter or administering intrathecal injections; additional PPE should be worn based on anticipated exposure to body fluids (*6*). Double gloves might minimize the risk for percutaneous injury when sharps are handled. Patient body fluids also should not come into direct contact with health care personnel clothing or footwear. When performing procedures including vaginal deliveries, manual placenta removal, bimanual uterine massage, and repair of vaginal lacerations, PPE should include (in addition to mucous membrane and skin protection) impermeable gowns and knee-high impermeable shoe covers. Clothing, skin, and mucous membrane protections should be maintained for procedures performed in operating room settings.

Health care personnel should assess their risk for exposure and select PPE appropriate for the situation, and all personnel on a team involved in the same procedures should use the same level of PPE. All health care personnel should be trained in the correct use and disposal of PPE and be able to demonstrate the ability to don PPE quickly in urgent situations and remove it safely. Non–health care personnel in attendance should be positioned away from areas of exposure risk or adequately protected. Any occupational exposures, including mucous membrane exposure following splash of body fluids, sustained by health care personnel should be reported as soon as possible to the facility's occupational health clinic to ensure appropriate assessment of health care personnel, and so that any systemic safety risks can be addressed.

In addition to use of PPE by health care personnel, placement of disposable absorbent material on the floor around the procedure and delivery area to absorb fluid can reduce the risk for splash exposure to body fluids. Infection control supplies should be available and accessible in all patient care areas where they will be needed. Standard cleaning and disinfection procedures for environmental surfaces, using Environmental Protection Agency-registered hospital disinfectants, should be followed.

Importance of Ongoing Education and Training

Standard Precautions represent the minimum infection prevention expectations for safe care across all health care settings. Ongoing education and training of all health care personnel in a facility, including those employed by outside entities, on the principles and rationale for use of Standard Precautions and use of specific PPE help ensure that infection control policies and procedures are understood and followed (*6*). These educational efforts should emphasize that infection prevention strategies enhance the quality of patient care and do not alter the relationship between provider and patient. Barriers (e.g., cost and lack of standardized protocols in facilities) to implementation of Standard Precautions and use of PPE should be addressed as soon as they are recognized. Facility, nursing, and obstetric leadership is critical for instituting infection prevention policies and promoting routine use of and adherence to Standard Precautions (*6*). Infectious disease outbreaks, such as the current Zika virus disease outbreak, provide an opportunity to emphasize the importance of adherence to published infection prevention strategies to prevent transmission of infectious diseases in all health care settings, including labor and delivery units.

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Notes from the Field

Injuries Associated with Bison Encounters — Yellowstone National Park, 2015

Cara Cherry, DVM[1,2]; Kirsten Leong, PhD[3]; Rick Wallen MS[4]; Danielle Buttke DVM, PhD[2]

Since 1980, bison have injured more pedestrian visitors to Yellowstone National Park (Yellowstone) than any other animal (*1*). After the occurrence of 33 bison-related injuries during 1983–1985 (range = 10–13/year), the park implemented successful outreach campaigns (*1*) to reduce the average number of injuries to 0.8/year (range = 0–2/year) during 2010–2014 (unpublished data, National Park Service, September 2015). During May–July 2015, five injuries associated with bison encounters occurred (Table). Case reports were reviewed to evaluate circumstances surrounding these injuries to inform prevention.

American bison (*Bison bison*) are the largest terrestrial mammals in the Western Hemisphere (*2*). Yellowstone is home to the largest U.S. bison population on public land, with an estimated 4,900 bison in July 2015 (*3*). Mating season occurs during July–September, coinciding with Yellowstone's peak tourism season. Mature bull aggressiveness increases during mating season (*2*). Yellowstone promulgates regulations that prohibit visitors from "willfully approaching, remaining, viewing, or engaging in any activity within 300 ft (91 m) of bears or wolves, or within 75 ft (23 m) of any other wildlife, including nesting birds, or within any distance that disturbs, displaces or otherwise interferes with the free unimpeded movement of wildlife, or creates or contributes to a potentially hazardous condition or situation" (*4*,*5*). Yellowstone conducts extensive education campaigns to warn visitors of the dangers of approaching wildlife and inform visitors on the required viewing distances. A graphic flyer is distributed at park entrances, and signs are present throughout campgrounds, developed areas, along roadsides, and in the visitor centers.

The five persons injured during 2015 (four Yellowstone visitors and one employee) ranged in age from 16 to 68 years (median = 43 years); four were female. Every incident occurred in developed areas, such as hiking trails or geyser basins. Two persons were gored, and three were tossed into the air. Four persons required hospitalization, three of whom were transported by helicopter ambulance. There were no deaths.

All encounters resulted from failure to maintain the required distance of 75 ft (23 m) from bison. Four injuries occurred when three or more persons approached the bison. Two persons were injured while walking on hiking trails. Three persons sustained injuries while taking photographs at a distance of approximately 3–6 ft (1–2 m) from bison, including two who turned their back on the bison to take the photograph; one person reported taking a cell phone self-portrait (selfie), which necessitated getting close to the animal.

During 1980–1999, a total of 10 of 35 bison encounters (29%) involved photography (*1*); the majority of persons were ≥10 ft (3 m) from the bison, unlike the 3–6 ft (1–2 m) reported with recent photography-related injuries. Smart phones now meet the needs of most casual photographers. Smart phones are owned by 64% of American adults, and 67% of smart phone owners report using their phone to share pictures and videos (*6*). The popularity of smart phone photography with its limited zoom capacity and social media sharing of selfies might explain why visitors disregard park regulations and approach wildlife more closely than when traditional camera technology was used. Educating visitors about wildlife behavior and the need to maintain distances of 75–300 ft (23–91 m) from wildlife for safety of persons and wildlife is critical. Injury prevention campaigns that identify and target the underlying motivations of visitors to not comply with viewing distances might prevent future injuries.

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TABLE. Injuries associated with bison encounters — Yellowstone National Park, 2015

Age	Sex	Park affiliation	Activity	Distance from bison	Encounter type	Injuries
16	Female	Visitor	Photography; turned back to bison	3–6 ft	Gored	Serious
62	Male	Visitor	Photography	3–5 ft	Tossed	Serious
19	Female	Employee	Walking; did not observe bison	10 ft	Tossed	Minor
68	Female	Visitor	Walking; observed bison and continued to walk past	NA	Gored	Serious
43	Female	Visitor	Photography; turned back to bison	6 ft	Tossed	Minor

Abbreviation: NA = not available.

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Errata

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In the report, "CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016," three errors occurred. On page 1, the last sentence of the Summary should read, "CDC has provided a checklist for prescribing opioids for chronic pain (http://stacks.cdc.gov/view/cdc/38025) as well as a website (**http://www.cdc.gov/drugoverdose/prescribing/resources.html**) with additional tools to guide clinicians in implementing the recommendations." On page 8, the first sentence of the first full paragraph should read, "NCIPC announced an open meeting of the NCIPC BSC in the Federal Register on January 11, **2016**." On page 49, in the fourth line of the Stakeholder Review Group, the affiliation for Gerald "Jerry" F. Joseph should read, "American College of **Obstetricians and Gynecologists**."

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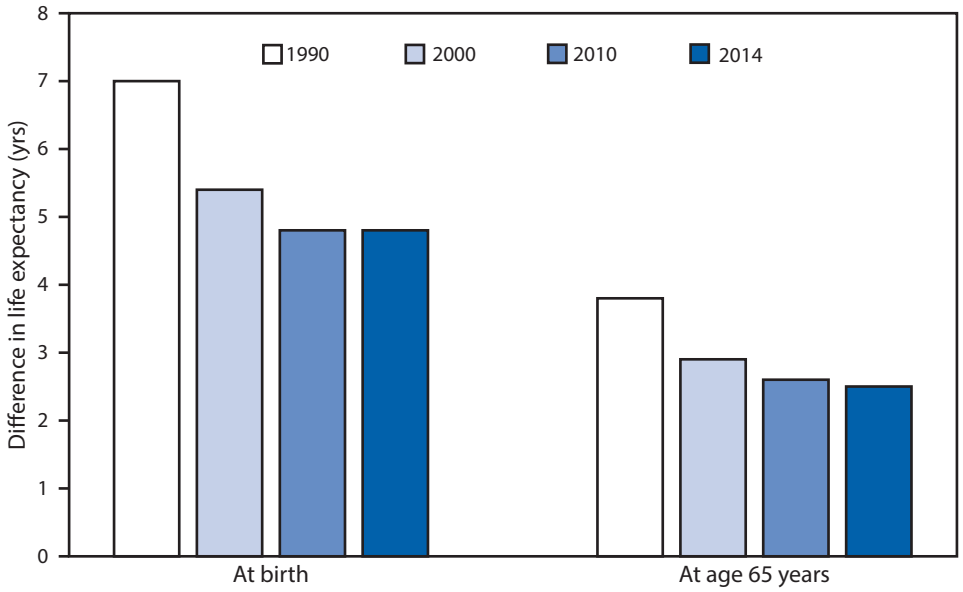
In the report, "Notes from the Field: Lymphocytic Choriomeningitis Virus Meningoencephalitis from a Household Rodent Infestation — Minnesota, 2015," on page 248, the first sentence of the fourth paragraph should read, "The family was referred for integrated pest management services through **the St. Paul-Ramsey County Department of Public Health, with assistance from the Minnesota Department of Health Healthy Homes grant program**."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Difference in Life Expectancy Between Females and Males at Birth and at Age 65 Years — National Vital Statistics System, United States, 1990, 2000, 2010, and 2014



Females born in 2014 can expect to live 4.8 years longer than males born in the same year. This difference in life expectancy between females and males has not changed since 2010, but decreased from 5.4 years in 2000 and 7.0 years in 1990. The difference in life expectancy between females and males who were aged 65 years in 2014 was 2.5 years, a decrease from 2.6 years in 2010, 2.9 years in 2000, and 3.8 years in 1990.

Source: CDC. National Vital Statistics System. http://www.cdc.gov/nchs/nvss.htm.

Reported by: Yelena Gorina, MPH, MS, yag9@cdc.gov, 301-458-4241.

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