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State-Specific Rates of Primary and Secondary Syphilis Among Men Who Have Sex with Men — United States, 2015

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In 2015, the rate of reported primary and secondary syphilis in the United States was 7.5 cases per 100,000 population, nearly four times the previous lowest documented rate of 2.1 in 2000 (*1*). In 2015, 81.7% of male primary and secondary syphilis cases with information on the sex of the sex partner were among gay, bisexual, and other men who have sex with men (collectively referred to as MSM) (*1*). These data suggest a disproportionate incidence of disease among MSM. However, attempts to quantify this disparity have been hindered by limited data on the size of the MSM population at the state level. To produce the first estimates of state-specific rates of primary and secondary syphilis among MSM, CDC used MSM population estimates based on a new methodology (*2*) and primary and secondary syphilis case counts reported in 2015 to the National Notifiable Diseases Surveillance System. Among 44 states reporting information on the sex of sex partners for ≥70% of male cases, the overall rate of primary and secondary syphilis among all men (aged ≥18 years) in the United States in 2015 was 17.5 per 100,000, compared with 309.0 among MSM and 2.9 among men who reported sex with women only. The overall rate of primary and secondary syphilis among MSM was 106.0 times the rate among men who have sex with women only and 167.5 times the rate among women.* These data highlight the disproportionate impact of syphilis among MSM and underscore the need for innovative and targeted syphilis prevention measures at the state and local level, especially among MSM. It is important that health care providers recognize the signs and symptoms of syphilis, screen sexually active MSM for syphilis at least annually, and provide timely treatment according to national sexually transmitted diseases treatment guidelines (*3*).

Case reports of primary and secondary syphilis cases for MSM, men who have sex with women only, and women were obtained from national data reported regularly by all states for 2015. These data include limited demographic and clinical information, including the sex of sex partners. Population estimates of the number of MSM by state were obtained using new methodology that makes use of census and population-based survey data (*2*). To estimate the MSM population size, the estimated percentage of MSM among men was adjusted (*4*) according to each U.S. county's percentage of households with a male head and a male partner, obtained from American Community Survey summary data and urban-rural classification (large central metropolitan, large fringe metropolitan,

* In this report "women" is used to describe both females aged ≥18 years (used for calculating rates for women) and females of unknown ages (used for calculating rates for men who had sex with women only).

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medium or small metropolitan, or nonmetropolitan or rural) from the National Center for Health Statistics (*4*). The county's percentage of MSM was adjusted according to the ratio of its percentage of male same-sex households to the overall percentage among all counties at the same urban-rural classification, which was then multiplied by the number of men in the county to achieve the estimated MSM population size. This final number was then scaled to equal 3.9% of the adult male population, based on a prior national MSM estimate (*5*).

To optimize stability of the estimates, the analysis was limited to the 44 states that included sex of sex partner in ≥70% of male primary and secondary syphilis case reports for 2015. The 70% threshold represented the best balance between including male cases of primary and secondary syphilis while gathering the most complete epidemiologic data for those cases. State-specific rates of primary and secondary syphilis among MSM were compared with rates of primary and secondary syphilis among men who have sex with women only and also among women (cases in men with unknown sex of sex partner were excluded from this analysis). Rate ratios were calculated as 1) the rate of primary and secondary syphilis among MSM divided by the rate among men who have sex with women only and 2) the rate among MSM divided by the rate among women.[†]

Primary and secondary syphilis cases in the 44 states included in the analysis accounted for 83.4% of all 23,872 reported primary and secondary syphilis cases in the United States in 2015. Among the reported primary and secondary syphilis cases among men and women in these 44 states in 2015, 12,118 (60.8%) were among MSM, including 10,942 (54.9%) among men who had sex with men only and 1,176 (5.9%) cases among men who had sex with both men and women.

Among the 44 states, the overall rates of primary and secondary syphilis in 2015 among all men, MSM, men who have sex with women only, and women were 17.5, 309.0, 2.9, and 1.8 cases per 100,000 population, respectively. State-specific rates among MSM ranged from 73.1 per 100,000 population (Alaska) to 748.3 (North Carolina) (Table 1). The overall U.S. rate of primary and secondary syphilis among MSM was 106.0 times the rate among men who have sex with women only, with state-specific rate ratios ranging from 39.2 (Minnesota) to 342.1 (Hawaii). The overall rate of primary and secondary syphilis among MSM was 167.5 times the rate among women, with state-specific rate ratios ranging from 63.7 (Louisiana) to 2,140.3 (Hawaii).

Rates of primary and secondary syphilis among MSM varied by U.S. Census region and by state, with the highest rates in the South and West. Four of the five states with the highest primary and secondary syphilis rates among MSM were southern states (Louisiana, Mississippi, North Carolina, and South Carolina) (Table 2). Among states with the 10 highest rates of primary and secondary syphilis in the United States in 2015 (*1*), five states (Arizona, Louisiana, Mississippi, Nevada, and North

[†] Rate ratios were rounded to tenths.

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Carolina) also ranked among the top 10 states with the highest rates of primary and secondary syphilis among MSM (Table 2).

Discussion

These are the first state-specific rates of primary and secondary syphilis reported for MSM in the United States. The lowest state-specific MSM primary and secondary syphilis rate (73.1 in Alaska) exceeded the highest overall U.S. primary and secondary syphilis rate (70.9), which was observed in 1946. In every state, the incidence of reported syphilis among MSM was higher than the incidence among men who have sex with women only, with rate ratios ranging from 39.2 to 342.1. These data support CDC's earlier findings using national population size estimates, which highlighted national disparities in syphilis incidence. In the earlier findings, the rate of syphilis incidence among MSM was estimated to be 154 per 100,000 population, compared with 2.2 per 100,000 among other men, resulting in a rate ratio of 71 (*5*), in comparison to the estimate of 106.0 in the current analysis. However, the previous findings were limited in their applicability to state or local areas because the percentage of adult males who are MSM varies widely among states.

Although state-specific incidence rates varied, even in low incidence states (e.g., North Dakota), syphilis rates among MSM were higher than those among men who have sex with women only. The geographic variation highlights the importance of these data for state and local health departments, which can use these data to better understand their local syphilis epidemiology and target resources and interventions to address disparities between MSM and other population groups. The comparison of state-specific rates also highlights the high disease incidence in the South. Four of the five states with the highest primary and secondary syphilis incidence rates among MSM in 2015 were southern states. The estimates of state-specific rates among men who have sex with women only, although lower than those among MSM, also have implications for the rates of syphilis among women. Trends in congenital syphilis tend to follow trends in the incidence of primary and secondary syphilis among women of reproductive age, which has been increasing recently (*6*). Congenital syphilis can result in serious health consequences in infants (*6*). Although CDC is limited by its data usage agreement with the Council of State and Territorial Epidemiologists to conduct data analysis at the state level (*7*), further analyses at the county level by state and local health jurisdictions could be helpful to inform public health action by elucidating geographic disparities in greater detail.

The findings in this report are subject to at least four limitations. First, analyses were restricted to states where the sex of sex partners (male, female, or both) was reported for ≥70% of male cases of primary and secondary syphilis cases during 2015. Although 83.4% of all reported primary and secondary syphilis reported in the United States during 2015 were included, these jurisdictions might not be representative of all persons who receive a diagnosis of primary and secondary syphilis. Second, the denominators used in calculating the rates of primary and secondary syphilis were estimates of the number of MSM in each state, based on the reporting of same-sex households in the American Community Survey; underreporting of same-sex households could result in an underestimation of the MSM population and an overestimation of primary and secondary syphilis rates. Third, cases of syphilis in men for whom the sex of sex partners was unknown were excluded in calculations for both MSM and men who have sex with women only. If MSM are more likely to underreport the sex of their sex partner, this might result in an underestimation of the rate of syphilis among MSM and consequent rate ratio when comparing syphilis rates among MSM and men who have sex with women only. Improving the quality of case report data regarding sex of sex partner information could increase the awareness of public health officials regarding the characteristics of syphilis within their communities. Finally, primary and secondary syphilis case report data likely underestimate the actual number of incident syphilis infections in the United States because not all infections are diagnosed and reported (*8*).

Despite these limitations, these findings are consistent with previous reports that showed pronounced disparities in primary and secondary syphilis rates between MSM and men who have sex with women only (*5*), and the use of state-specific MSM population sizes and primary and secondary syphilis case counts permits comparison of primary and secondary syphilis rates by state. Rates among MSM compared with men who have sex with women only were higher in every state, but state-specific data suggested that certain states might have a greater need for syphilis prevention. Because MSM represent the majority of all primary and secondary syphilis cases, the success of syphilis prevention programs is contingent upon addressing the high rates of syphilis among MSM. It is important that both private and public health care providers 1) recognize the signs and symptoms of syphilis, 2) conduct a comprehensive sexual history, 3) screen all sexually active MSM for syphilis at least annually, and 4) provide timely treatment according to national sexually transmitted diseases treatment guidelines (*3*). Part of this sexual history includes eliciting information on sexual practices and the sex of patients' sex partners.[§]

[§] https://www.cdc.gov/STD/treatment/SexualHistory.pdf.

TABLE 1. Rates and rate ratios for primary and secondary syphilis among men who have sex with men (MSM), among men who have sex with women only, and among women, by state and overall — United States, 2015*

State†	MSM		Rate of primary and secondary syphilis per 100,000 population			Rate ratio§	
	Estimated no. in population	% of all men	MSM	Men who have sex with women only	Women	MSM compared with men who have sex with women only	MSM compared with women
Overall	**3,921,515**	**3.8**	**309.0**	**2.9**	**1.8**	**106.0**	**167.5**
Alabama	41,822	2.3	320.4	2.4	1.9	131.5	169.4
Alaska	5,469	1.9	73.1	1.1	0.4	67.8	189.5
Arizona	112,102	4.5	385.4	3.3	1.7	116.1	222.0
Arkansas	19,101	1.7	314.1	3.4	2.2	92.9	140.6
California	796,926	5.5	332.2	3.9	3.1	85.8	108.0
Colorado	74,742	3.6	248.9	1.2	0.2	205.5	1,023.7
Connecticut	43,542	3.2	112.5	0.7	1.0	162.7	117.6
Florida	351,797	4.6	370.1	4.5	2.4	82.7	152.3
Hawaii	15,707	2.8	388.4	1.1	0.2	342.1	2,140.3
Idaho	9,979	1.7	320.7	2.4	1.3	131.0	242.7
Illinois	199,075	4.1	311.9	2.5	1.5	124.6	203.8
Indiana	72,413	3.0	290.0	1.5	1.1	193.3	266.6
Iowa	20,924	1.8	219.8	1.0	0.4	226.7	531.7
Kansas	21,906	2.0	228.2	1.3	1.4	169.6	168.1
Kentucky	47,576	2.9	159.7	1.9	1.3	84.5	126.8
Louisiana	43,204	2.5	601.8	8.4	9.5	71.9	63.7
Maine	14,375	2.8	118.3	0.4	1.1	295.3	108.9
Maryland	83,668	3.8	325.1	4.5	2.4	72.0	137.9
Massachusetts	110,254	4.3	278.4	1.1	0.9	247.3	324.2
Michigan	116,354	3.1	233.8	1.4	0.8	163.8	280.2
Minnesota	82,510	4.0	147.9	3.8	1.7	39.2	87.0
Mississippi	20,184	1.9	658.9	4.1	2.6	161.0	251.3
Missouri	72,875	3.2	204.5	3.8	2.2	53.9	93.0
Montana	6,800	1.7	132.4	0.5	0.0	254.1	—¶
Nevada	51,990	4.8	398.2	4.9	1.8	81.3	216.6
New Hampshire	13,868	2.7	187.5	1.2	0.6	155.3	337.8
New Jersey	136,271	4.1	152.6	1.3	0.7	117.2	219.3
New Mexico	18,675	2.4	428.4	2.5	1.4	169.2	314.0
North Carolina	105,707	2.9	748.3	5.3	2.7	140.0	278.2
North Dakota	4,840	1.7	165.3	1.1	0.0	150.4	—
Ohio	146,033	3.4	214.3	2.9	1.4	73.3	157.5
Oklahoma	37,006	2.6	418.9	2.3	1.4	185.4	297.6
Oregon	60,932	4.0	313.5	2.8	2.2	111.9	142.1
Pennsylvania	162,848	3.3	256.1	1.6	0.8	159.3	310.5
Rhode Island	24,745	6.1	226.3	2.7	0.9	84.6	248.9
South Carolina	35,388	2.0	536.9	2.9	1.7	187.8	307.9
South Dakota	4,937	1.5	405.1	2.6	2.2	156.2	186.2
Tennessee	73,460	3.0	325.3	2.8	0.9	115.4	371.3
Texas	378,310	3.9	289.4	3.2	2.2	90.1	133.9
Utah	33,898	3.3	132.8	0.5	0.2	251.1	679.2
Vermont	7,142	2.9	126.0	0.0	0.0	—	—
Virginia	115,515	3.7	210.4	1.5	0.5	138.3	436.0
Washington	113,504	4.2	306.6	1.9	1.1	160.6	290.6
West Virginia	13,141	1.8	197.9	2.3	1.2	87.2	165.0

* Data based on 2015 cases reported to CDC by June 8, 2016.

† To optimize stability of the estimates, the analysis was limited to the 44 states that included sex of sex partner in ≥70% of male primary and secondary syphilis case reports for 2015.

§ Rate ratios were calculated as 1) the rate of primary and secondary syphilis among MSM divided by the rate among men who have sex with women only and 2) the rate among MSM divided by the rate among women. In this report "women" is used to describe both females aged ≥18 years (used for calculating rates for women), and females of unknown ages (used for calculating rates for men who had sex with women only). Rate ratios were rounded to tenths.

¶ Montana, North Dakota, and Vermont had no cases of primary and secondary syphilis reported among women for 2015, resulting in an undefined rate ratio comparing MSM with women. Vermont had no cases of primary and secondary syphilis reported among men who had sex with women only in 2015, resulting in an undefined rate ratio comparing MSM with men who have sex with women only.

TABLE 2. States ranked from highest to lowest, by rates of primary and secondary syphilis cases overall and among men who have sex with men (MSM) and men who have sex with women only, and by rate ratios comparing the rates for MSM with the rates for men who have sex with women only and the rates for women — United States, 2015*

	Rate of primary and secondary syphilis per 100,000 population			Rate ratio§	
Rank†	Overall primary and secondary syphilis	Primary and secondary syphilis among MSM	Primary and secondary syphilis among men who have sex with women only	MSM compared with men who have sex with women only	MSM compared with women
1	Louisiana	North Carolina	Louisiana	Hawaii	Hawaii
2	California	Mississippi	North Carolina	Maine	Colorado
3	North Carolina	Louisiana	Nevada	Montana	Utah
4	Nevada	South Carolina	Maryland	Utah	Iowa
5	Florida	New Mexico	Florida	Massachusetts	Virginia
6	Arizona	Oklahoma	Mississippi	Iowa	Tennessee
7	Oregon	South Dakota	California	Colorado	New Hampshire
8	Maryland	Nevada	Missouri	Indiana	Massachusetts
9	Illinois	Hawaii	Minnesota	South Carolina	New Mexico
10	Mississippi	Arizona	Arkansas	Oklahoma	Pennsylvania
11	Rhode Island	Florida	Arizona	Kansas	South Carolina
12	Hawaii	California	Texas	New Mexico	Oklahoma
13	Washington	Tennessee	Ohio	Michigan	Washington
14	Texas	Maryland	South Carolina	Connecticut	Michigan
15	Massachusetts	Idaho	Tennessee	Mississippi	North Carolina
16	South Carolina	Alabama	Oregon	Washington	Indiana
17	Alabama	Arkansas	Rhode Island	Pennsylvania	Mississippi
18	New Mexico	Oregon	South Dakota	South Dakota	Rhode Island
19	Oklahoma	Illinois	New Mexico	New Hampshire	Idaho
20	Tennessee	Washington	Illinois	North Dakota	Arizona
21	Pennsylvania	Indiana	Idaho	North Carolina	New Jersey
22	Missouri	Texas	Alabama	Virginia	Nevada
23	Ohio	Massachusetts	West Virginia	Alabama	Illinois
24	Colorado	Pennsylvania	Oklahoma	Idaho	Alaska
25	South Dakota	Colorado	Washington	Illinois	South Dakota
26	Arkansas	Michigan	Kentucky	New Jersey	Alabama
27	Minnesota	Kansas	Pennsylvania	Arizona	Kansas
28	Indiana	Rhode Island	Virginia	Tennessee	West Virginia
29	New Jersey	Iowa	Indiana	Oregon	Ohio
30	Michigan	Ohio	Michigan	Arkansas	Florida
31	Virginia	Virginia	Kansas	Texas	Oregon
32	Idaho	Missouri	New Jersey	West Virginia	Arkansas
33	Kentucky	West Virginia	Colorado	California	Maryland
34	New Hampshire	New Hampshire	New Hampshire	Rhode Island	Texas
35	Kansas	North Dakota	Hawaii	Kentucky	Kentucky
36	West Virginia	Kentucky	Massachusetts	Florida	Connecticut
37	Connecticut	New Jersey	North Dakota	Nevada	Maine
38	Iowa	Minnesota	Alaska	Ohio	California
39	Utah	Utah	Iowa	Maryland	Missouri
40	Maine	Montana	Connecticut	Louisiana	Minnesota
41	North Dakota	Vermont	Utah	Alaska	Louisiana
42	Vermont	Maine	Montana	Missouri	—¶
43	Montana	Connecticut	Maine	Minnesota	—
44	Alaska	Alaska	Vermont	—	—

* Data based on 2015 cases reported to CDC by June 8, 2016.

† To optimize stability of the estimates, the analysis was limited to the 44 states that included the sex of sex partners in ≥70% of male primary and secondary syphilis case reports for 2015.

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¶ Montana, North Dakota, and Vermont had no cases of primary and secondary syphilis reported among women for 2015, resulting in an undefined rate ratio comparing MSM with women. Vermont had no cases of primary and secondary syphilis reported among men who had sex with women only in 2015, resulting in an undefined rate ratio comparing MSM with men who have sex with women only.

Summary

What is already known about this topic?

Syphilis rates in the United States have been steadily increasing since 2001, and gay, bisexual, and other men who have sex with men (collectively referred to as MSM) represent a disproportionate number of cases. In the absence of reliable, state-specific denominators it has been difficult to estimate state-specific rates and rate ratios to accurately measure the geographic variation and disparity.

What is added by this report?

State-specific rate ratios comparing the rate of syphilis among MSM with the rate among men reporting sex with women only ranged from 39.2 (Minnesota) to 342.1 (Hawaii); overall, MSM had a rate of primary and secondary syphilis 106.0 times the rate among men who reported sex with women only.

What are the implications for public health practice?

These state-specific rates further highlight the disproportionate impact of syphilis among MSM. Providers should screen sexually active MSM for syphilis at least annually and provide timely treatment according to national sexually transmitted diseases treatment guidelines.

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HIV Services Provided by STD Programs in State and Local Health Departments — United States, 2013–2014

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The incidence of human immunodeficiency virus (HIV) infection in the United States is higher among persons with other sexually transmitted diseases (STDs), and the incidence of other STDs is increased among persons with HIV infection (*1*). Because infection with an STD increases the risk for HIV acquisition and transmission (*1–4*), successfully treating STDs might help reduce the spread of HIV among persons at high risk (*1–4*). Because health department STD programs provide services to populations who are at risk for HIV, ensuring service integration and coordination could potentially reduce the incidence of STDs and HIV. Program integration refers to the combining of STD and HIV prevention programs through structural, service, or policy-related changes such as combining funding streams, performing STD and HIV case matching, or integrating staff members (*5*). Some STD programs in U.S. health departments are partially or fully integrated with an HIV program (STD/HIV program), whereas other STD programs are completely separate. To assess the extent of provision of HIV services by state and local health department STD programs, CDC analyzed data from a sample of 311 local health departments and 56 state and directly funded city health departments derived from a national survey of STD programs. CDC found variation in the provision of HIV services by STD programs at the state and local levels. Overall, 73.1% of state health departments and 16.1% of local health departments matched STD case report data with HIV data to analyze possible syndemics (co-occurring epidemics that exacerbate the negative health effects of any of the diseases) and overlaps. Similarly, 94.1% of state health departments and 46.7% of local health departments performed site visits to HIV care providers to provide STD information or public health updates. One fourth of state health departments and 39.4% of local health departments provided HIV testing in nonclinical settings (field testing) for STD contacts, and all of these programs linked HIV cases to care. STD programs are providing some HIV services; however, delivery of certain specific services could be improved.

Given the likely synergistic relationship between STDs and HIV and the potential role of STDs in HIV acquisition (*2–4*), public STD programs, including clinics and health department programs that provide STD services, could be an important venue for providing HIV services to populations at high risk (*6*) and persons not well connected to health care. One study, a convenience sample of 10 U.S. jurisdictions, found that public STD clinics diagnosed approximately 10%–35% of HIV cases within those jurisdictions (*6*). The extent of the provision of other HIV services by public STD programs has not been assessed at a national level. This national-level report examines the current state of HIV services provided by public STD programs.

This report included two separate types of respondents: local health departments and state health departments. First, a sample of 311 local health departments was drawn from the 1,225 local health departments that indicated that they provided STD screening or treatment in a 2010 National Profile of Local Health Departments survey. This sample included cities and counties with the 50 highest number of reported cases or rates of STDs in 2010 and the six cities directly funded by CDC's Division of STD Prevention.* Second, all 50 states are directly funded by CDC's Division of STD Prevention and were included in the state sample. From December 2013 to January 2014, a survey was sent to primary contacts of the sampled STD programs in 1) local health departments, including health departments within U.S. cities, counties, and other sub-state regions (i.e., county clusters) and 2) state health departments across the United States. Weights based on U.S. Census region, jurisdiction size, and nonresponse were used in all analyses focusing on local health departments. Jurisdiction population size was categorized as small (<50,000), medium (50,000–499,999) and large (≥500,000). The extent of HIV field testing, linkage to care, and follow-up for persons testing positive for HIV during partner services, program visits to HIV care providers, and epidemiology and surveillance activities related to HIV were assessed. Provision of HIV services by health department type (state versus local) was examined using logistic regression models; among local health departments, chi-square analyses were used to determine whether jurisdiction size was associated with type of HIV service provided.

The response rate was 47.6% for local health departments and 60.7% for state health departments. The largest proportion of responding local health departments were from the South (35.8%) followed by the Midwest (28.4%), West (20.9%), and Northeast (14.9%) U.S. Census regions, whereas the largest proportion of responding state health departments were from the West (30.3%) followed by the Northeast (27.3%),

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Midwest (21.2%), and South (21.2%) regions. Among local health departments, 39.2% had jurisdictions classified as small, 35.1% as medium, and 25.7% as large.

Differences were identified among HIV services provided by STD programs in local and state health departments (Table 1). A significantly higher percentage of state health departments conducted visits to HIV care providers (94.1%) than did local health departments (46.7%). A higher proportion of surveyed state health departments reported targeting prevention activities to populations at high risk (92.3%) than did local health departments (58.4%). A higher percentage of state health departments than local health departments matched STD case report data with HIV data to analyze syndemics and overlaps (73.1% versus 16.1%). Nonsignificant differences were also found between local and state health departments for some HIV services. For example, 25.0% of local health departments and 39.4% of state health departments provided HIV field testing for STD contacts. All state and local health departments that field-tested STD contacts for HIV linked to care any persons with HIV identified during partner services field-testing. A majority of local health departments reported that disease intervention specialists or communicable disease investigators were responsible for performing linkages to care (52.3%), followed by public health nurses (31.9%) and persons in other job categories (15.8%). In state health departments, disease intervention specialists or communicable disease investigators performed most of the linkages to care (83.3%), followed by public health nurses (8.3%) and community health outreach workers (8.3%).

For local health departments only, the delivery of HIV services by STD programs was examined by jurisdiction size (Table 2). Local health departments with small jurisdictions were significantly less likely to offer HIV field testing for STD contacts (11.4%) than were those with medium (37.8%) and large (39.0%) jurisdictions. Performing site visits to HIV care providers was significantly associated with jurisdiction size and was more commonly reported by large (95.6%) and medium (59.0%) than small jurisdictions (26.0%).

TABLE 1. HIV services provided by STD programs in local and state health departments* — United States, 2013–2014

	Local health departments (unweighted n = 148)		State health departments (unweighted n = 33)		p value
Services	**No.**	**Weighted % (95% CI)**	**No.**	**% (95% CI)**	**(Local versus state)**
HIV field testing for STD contacts (n = 1,225)					0.11
Yes	35	25.0 (17.7–34.1)	13	39.4 (23.9–57.4)	
No	113	75.0 (65.9–82.3)	20	60.6 (42.6–76.1)	
Linkage to care for persons found to be HIV+ during partner-services field testing (n = 306)					0.07
Yes, by health department staff members (n = 200)	23	65.4 (45.8–80.9)	12	92.3 (58.9–99.0)	0.05
DIS/CDI	13	52.3 (29.8–73.9)	10	83.3 (50.7–96.1)	
Public health nurse	7	31.9 (14.8–55.8)	1	8.3 (1.1–43.4)	
Community health outreach worker	0	—	1	8.3 (1.1–43.4)	
Other	3	15.8 (4.4–43.3)	0	—	
Yes, by referral	12	34.6 (19.1–54.2)	1	7.7 (1.0–41.1)	
No	0	—	0	—	
Follow-up of HIV patients who have been linked to care (n = 306)					0.86
Yes	32	89.3 (70.6–96.7)	12	92.3 (58.9–99.0)	
No	2	5.9 (1.4–21.4)	1	7.7 (1.0–41.1)	
Don't know	1	4.8 (0.7–27.5)	0	—	
Program visited HIV care providers (n = 516)					<0.01
Yes	38	46.7 (33.2–60.8)	16	94.1 (66.1–99.2)	
No	28	53.3 (39.2–66.8)	1	5.9 (0.8–33.9)	
Match STD case report data with HIV data to analyze syndemics/overlaps (n = 947)					<0.01
Yes	19	16.1 (9.7–25.5)	19	73.1 (52.4–87.0)	
No	95	83.9 (74.5–90.3)	7	26.9 (13.0–47.6)	
Target prevention activities to population at high risk (n = 947)					0.01
Yes	71	58.4 (47.6–68.4)	24	92.3 (72.7–98.2)	
No	43	41.6 (31.6–52.4)	2	7.7 (1.8–27.3)	
Publish and disseminate data on a health department website at least annually (n = 947)					<0.01
Yes	30	22.2 (14.8–31.9)	18	69.2 (48.6–84.3)	
No	84	77.8 (68.1–85.2)	8	30.8 (15.7–51.4)	

Abbreviations: CDI = communicable disease investigator; CI = confidence intervals; DIS = disease intervention specialist; HIV = human immunodeficiency virus; HIV+ = HIV positive; STD = sexually transmitted diseases.

* Table shows unweighted numbers, weighted column percentages, and weighted 95% CIs for local health departments. Weighted numbers are included next to each variable for local health departments. Unweighted numbers, column percentages, and 95% CIs are shown for state health departments.

Discussion

Many public STD programs in state and local health departments reported that they provided multiple HIV services. Among programs that provided HIV field testing services, all provided linkages to HIV care, with most using health department staff members to provide this linkage, rather than simply providing a referral. Also, approximately two thirds of STD programs in state and local health departments provided follow-up for newly identified HIV cases that were linked to care. Finally, the majority of state health departments reported that they visited HIV care providers, matched STD case report data with HIV data to analyze syndemics and/or overlaps, targeted prevention activities to populations at high risk, and published and disseminated surveillance data on the health department at least annually.

Despite encouraging progress, areas where improvements in provision of HIV services by STD programs might be beneficial were also identified. For example, fewer than half of STD programs indicated that they provided HIV field testing for STD contacts; in particular, local health departments in small jurisdictions were unlikely to provide HIV field testing. HIV field testing is especially important for syphilis cases, because the sexual networks of syphilis patients overlap with those of persons with HIV infection, and approximately half of men with syphilis have concomitant HIV infection (*7*). Furthermore, fewer than one in six STD programs in local health departments matched STD and HIV case data, and fewer than one in four disseminated surveillance data on a health department website. Finally, fewer local health departments targeted prevention to those at high risk than did state health departments.

The findings in this report are subject to at least four limitations. First, the response rate for local health departments was only 47.6%; however, weights were applied to local

TABLE 2. HIV services provided by STD programs in local health departments,* by jurisdiction size — United States, 2013–2014

		Jurisdiction size (population)			
		<50,000	50,000–499,999	≥500,000	
Services	Unweighted no.	Weighted % (95% CI)	Weighted % (95% CI)	Weighted % (95% CI)	p value
HIV field testing for STD contacts (n = 1,225)					<0.01
Yes,	35	11.4 (2.5–20.2)	37.8 (23.0–52.4)	39.0 (21.4–56.6)	
No	113	88.6 (79.8–97.5)	62.2 (47.6–76.9)	61.0 (43.4–78.6)	
Linkage to care for persons found to be HIV+ during partner-services field testing (n = 306)					0.52†
Yes, by health department staff members (n = 200)	23	51.7 (8.6–94.8)	72.4 (48.2–96.5)	55.0 (23.7–86.2)	
DIS/CDI	13	68.9 (13.1–100.0)	43.7 (12.2–75.1)	80.3 (52.2–100.0)	
Public health nurse	7	31.1 (0.0–86.9)	35.7 (6.5–64.9)	9.4 (0.0–29.0)	
Community health outreach worker	0	—	—	—	
Other	3	0.0	20.6 (0.0–47.7)	10.3 (0.0–31.5)	
Yes, by referral	12	48.3 (5.2–91.4)	27.6 (3.5–51.8)	45.0 (13.8–76.2)	
No	0	—	—	—	
Follow-up of HIV patients who have been linked to care (n = 306)					<0.001
Yes	32	100.0 (0.0–100.0)	83.3 (64.4–100.0)	100.0 (0.0–100.0)	
No	2	—	9.2 (0.0–22.3)	—	
Don't know	1	8.7 (0.2–17.3)	5.0 (0.0–12.2)	5.7 (0.0–13.5)	
Program visited HIV care providers (n = 516)					<0.01
Yes	38	26.0 (6.5–45.5)	59.0 (35.2–82.8)	95.6 (86.8–100.0)	
No	28	74.0 (54.5–93.5)	41.0 (17.2–64.8)	4.4 (0.0–13.2)	
Match STD case report data with HIV data to analyze syndemics/overlaps (n = 947)					0.23
Yes	19	18.8 (5.9–31.7)	10.4 (0.0–20.8)	30.7 (11.3–50.1)	
No	95	81.2 (68.3–94.1)	89.6 (79.2–100.0)	69.3 (49.9–88.7)	
Target prevention activities to population at high risk (n = 947)					0.36
Yes	71	55.0 (38.9–71.1)	58.1 (41.8–74.3)	78.8 (61.8–95.9)	
No	43	45.0 (28.9–61.1)	41.9 (25.7–58.2)	21.2 (4.1–38.2)	
Publish and disseminate data on a health department website at least annually (n = 947)					<0.01
Yes	30	8.0 (0.24–15.8)	34.1 (18.4–49.7)	37.8 (17.9–57.7)	
No	84	92.0 (84.2–99.8)	65.9 (50.3–81.6)	62.2 (42.3–82.1)	

Abbreviations: CDI = communicable disease investigator; CI = confidence intervals; DIS = disease intervention specialist; HIV = human immunodeficiency virus; HIV+ = HIV positive; STD = sexually transmitted diseases.

* Table shows unweighted numbers, weighted column percentages, and weighted 95% CIs for local health departments. Weighted numbers are included next to each variable for local health departments.

† p value represents differences detected between DIS/CDI and public health nurses only given the zero values in the community health outreach worker and other categories.

Summary

What is already known about this topic?

STD programs in health departments often provide both STD services and HIV-specific services, including partner services such as interviewing and testing sex partners.

What is added by this report?

Findings from this report show that STD programs often provide integral HIV specific services including HIV field testing for STD contacts and linking those found to be HIV-positive to care. This report also illustrates that state health departments often perform visits to HIV providers to provide STD information or public health updates as well as perform epidemiologic activities, including matching STD cases report data with HIV data to analyze interactions between the diseases or overlaps.

What are the implications for public health practices?

STD programs can play an essential role in reducing HIV transmission among patients with STD diagnoses. Front line interaction with STD patients and contacts at high risk for HIV provides opportunities for quicker HIV testing and linkage to care. STD programs might also gain important insights in STD and HIV epidemiology as well as possible interactions between the diseases by matching and analyzing STD case report and HIV data, to the extent such data sharing is possible.

health department data to adjust for nonresponse. Second, the survey did not assess whether STD and HIV programs were integrated, and if so, the extent of integration. Third, these survey items were limited to questions about STD program activities, and it is possible that other government or community-based organizations are providing such services. A more comprehensive assessment of all HIV activities might yield a better picture of what services are being provided in a community. Finally, the survey did not ask about HIV clinical services, such as HIV testing in STD clinics.

Given the recognized association between STDs and HIV risk, STD programs can and do play a role in HIV prevention (*1*–*4*). These findings highlight some of these important efforts as well as suggest areas for possible expansion. It is important to note that health department public clinics that provide STD services, particularly STD clinics, serve populations at risk for HIV and often serve as surveillance sites for both STDs and HIV (*8*). Such clinics might serve as access points to deliver HIV prevention services for persons at risk who might otherwise lack access to health care. Also, the importance of public STD clinics to support HIV surveillance through reporting new HIV cases identified during partner services and to provide HIV services to STD cases and their partners was demonstrated early on in the HIV epidemic during the late 1980s (*9*). Therefore, data collected through STD programs often illuminate important opportunities for enhancing STD and HIV surveillance data and helping inform future decisions affecting STD and HIV prevention programs. Finally, numerous STD clinics have been closed for reasons that include budget decreases (*10*); these closures might impact HIV services, increasing the importance of health department visits to HIV care providers (e.g., to remind providers of STD testing recommendations in jurisdictions lacking STD clinics) and STD/HIV case data matching (*10*). Evaluating the impact of STD program reduction on these services can help identify the impact of STD program reduction on HIV prevention and linkage to care.

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Surveillance Systems to Track Progress Toward Polio Eradication — Worldwide, 2015–2016

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Global measures to eradicate polio began in 1988; as of 2014, four of six World Health Organization (WHO) regions have been certified polio-free. Within the two endemic regions (African and Eastern Mediterranean), Nigeria, Afghanistan, and Pakistan have never interrupted transmission of wild poliovirus (WPV) (*1*). The primary means of detecting poliovirus transmission is surveillance for acute flaccid paralysis (AFP) among children aged <15 years, combined with collection and testing of stool specimens from persons with AFP for detection of WPV and vaccine-derived polioviruses (VDPVs) (viruses that differ genetically from vaccine viruses and can emerge in areas with low vaccination coverage and cause paralysis) in WHO-accredited laboratories within the Global Polio Laboratory Network (*2*,*3*). AFP surveillance is supplemented by environmental surveillance for polioviruses in sewage from selected locations (*4*). Genomic sequencing of the VP1-coding region of isolated polioviruses enables mapping transmission by time and place, assessment of potential gaps in surveillance, and identification of the emergence of VDPVs. This report presents poliovirus surveillance data from 2015 and 2016, with particular focus on 20 countries in the African Region and six in the Eastern Mediterranean Region that reported WPV or circulating VDPVs (cVDPVs) during 2011–2016, as well as the three countries most affected by the 2014–2015 Ebola virus disease (Ebola) outbreak (Guinea, Liberia, and Sierra Leone). During 2016, 12 (60%) of the 20 African Region countries and all six of the Eastern Mediterranean Region countries met both surveillance quality indicators (nonpolio AFP rates of ≥2 per 100,000 persons aged <15 years per year and ≥80% of AFP cases with adequate stool specimens [stool adequacy]) at the national level; however, provincial-level variation was seen. To complete and certify polio eradication, surveillance gaps must be identified and surveillance activities, including supervision, monitoring, and specimen collection and handling, further strengthened.

Acute Flaccid Paralysis Surveillance

The quality of AFP surveillance is measured by two principal indicators. The first is the nonpolio AFP (NPAFP) rate (i.e., the number of NPAFP cases per 100,000 children aged <15 years per year of observation). An NPAFP rate ≥2 is considered sufficiently sensitive to detect WPV or VDPV cases if poliovirus is circulating. The second indicator is the collection of adequate stool specimens from ≥80% of AFP cases, indicating that surveillance can effectively identify WPV and VDPV among persons with AFP (*3*). Stool adequacy refers to collection of two stool specimens ≥24 hours apart, within 14 days of paralysis onset, and the arrival of these specimens in good condition* at a WHO-accredited laboratory.

Among 47 African Region countries, 32,250 AFP cases were reported in 2016 and 26,052 in 2015. Although no WPV type 1 (WPV1) cases were reported in the African Region in 2015, all four WPV1 cases that occurred in the African Region in 2016 were reported from Nigeria (*5*). Eighteen cVDPV cases were reported in the African Region during 2015, including eight cVDPV type 2 (cVDPV2) cases (one from Nigeria and seven from Guinea) and 10 cVDPV type 1 (cVDPV1) cases (all from Madagascar). During 2016, only one cVDPV case was reported in the African Region, a cVDPV2 case from Nigeria (Table 1). Among the 20 countries evaluated in the African Region, 12 met both of the national surveillance indicators in 2016 compared with 10 in 2015. Among the three countries most affected by Ebola (Guinea, Liberia, and Sierra Leone), only Guinea met the NPAFP indicator and only Liberia met the stool adequacy indicator in 2015; however, because of insufficient clinical knowledge about how to exclude Ebola virus from clinical specimens, nearly all stool specimens from 2015 were untested and destroyed. In 2016, all three of the Ebola-affected countries had NPAFP rates ≥2, but only Guinea also achieved ≥80% stool adequacy.

Among 21 Eastern Mediterranean Region countries, 13,215 AFP cases were reported in 2015, and 15,956 in 2016. Two Eastern Mediterranean Region countries (Afghanistan and Pakistan) reported WPV1 cases in 2015 (n = 74) and 2016 (33). The number of WPV1 cases reported by Afghanistan declined from 20 in 2015 to 13 in 2016; the number reported from Pakistan declined from 54 (2015) to 20 (2016). Two cVDPV2 cases were reported from the region in 2015 compared with one in 2016; all three cVDPV2 cases were reported from Pakistan. All six Eastern Mediterranean Region countries

* Reverse cold chain maintained and received without leakage or desiccation at a WHO-accredited laboratory. Reverse cold chain is maintained when stool specimens are stored at 4°–8°C (32°–39°F) immediately after collection, frozen at -20°C (-4°F) when received for processing, and shipped to a WHO-accredited laboratory in dry ice or cold packs. Freezing of specimens is unnecessary if specimens can be received at a WHO-accredited laboratory within 72 hours of collection.

TABLE 1. National and subnational acute flaccid paralysis (AFP) surveillance indicators and number of confirmed wild poliovirus (WPV) and circulating vaccine-derived poliovirus (cVDPV) cases, by country, for all countries with poliovirus transmission during 2011–2016 or that were affected by the Ebola outbreak in West Africa within the World Health Organization (WHO) African Region and Eastern Mediterranean Region, 2015 and 2016*

WHO Region/Country	No. AFP cases (all ages)	Regional/ National NPAFP rate†	Subnational areas with NPAFP rate ≥2§ (%)	Regional/ National AFP cases with adequate specimens¶ (%)	Subnational areas with ≥80% adequate specimens (%)	Population in areas meeting both indicators** (%)	No. confirmed WPV cases*	No. confirmed cVDPV cases*,††
2015								
AFR (all 47 countries)§§	**26,052**	**6.2**	**NA**	**90**	**NA**	**NA**	**0**	**18**
Countries reporting WPV or cVDPV transmission during 2011–2016 and Ebola-affected countries (Guinea, Liberia, and Sierra Leone)								
Angola	414	3.8	100	95	100	100	0	0
Cameroon	619	5.6	100	83	80	67	0	0
CAR	81	3.9	71	80	43	34	0	0
Chad	433	6.6	100	87	78	87	0	0
Cote d'Ivoire	353	4.0	85	90	80	71	0	0
DRC¶¶	2,117	6.0	100	74	9	6	0	0
Equatorial Guinea	9	2.9	43	22	0	0	0	0
Ethiopia¶¶	1,179	2.8	82	76	45	29	0	0
Gabon¶¶	61	8.6	100	33	0	0	0	0
Guinea	146	2.7	75	75	38	26	0	7
Kenya	619	3.1	89	85	74	68	0	0
Liberia	22	1.2	60	95	60	44	0	0
Madagascar	522	4.8	95	59	9	17	0	10
Mali	247	3.2	78	84	67	79	0	0
Mozambique	321	2.4	90	80	60	49	0	0
Niger¶¶	214	2.1	63	61	0	0	0	0
Nigeria	13,970	17.1	100	98	100	100	0	1
Republic of the Congo¶¶	117	5.3	100	78	45	29	0	0
Sierra Leone	41	1.5	50	79	25	23	0	0
South Sudan	331	6.5	100	94	90	90	0	0
EMR (all 21 countries)***	**13,215**	**6.4**	**NA**	**90**	**NA**	**NA**	**74**	**2**
Countries reporting WPV or cVDPV transmission during 2011–2016								
Afghanistan	2,738	18.9	100	93	94	94	20	0
Iraq	520	3.7	84	82	58	49	0	0
Pakistan	5,814	9.3	100	87	75	97	54	2
Somalia	281	5.4	100	96	100	100	0	0
Syria†††	236	3.1	57	85	71	43	0	0
Yemen	537	5.4	96	91	87	95	0	0

See table footnotes on the next page.

reviewed met both surveillance indicators in 2015 and 2016; however, national-level surveillance indicators masked subthreshold surveillance performance at subnational levels in both regions (Table 1) (Figure).

Environmental Surveillance

Testing of sewage samples supplements AFP surveillance by identifying poliovirus transmission that might occur in the absence of detected AFP cases (*4*). In April 2016, all OPV-using countries switched from using trivalent OPV (tOPV) to bivalent OPV (bOPV), containing vaccine virus types 1 and 3, to reduce circulation of type 2 vaccine virus, which is responsible for most cVDPVs (*6*). Testing sewage is useful for monitoring the decline of oral poliovirus vaccine (OPV) type 2-related poliovirus (OPV2) in the environment after the global switch. The number of environmental surveillance collection sites increased within Afghanistan, Nigeria, and Pakistan from 21 at the end of 2011 to 138 as of February 2017. Frequency of sample collection also affects the ability to detect virus. Environmental surveillance is conducted in 34 countries without recent active WPV transmission, including nine on the African continent.

In Nigeria, sewage sampling is conducted at 57 sites in 15 states and the Federal Capital Territory. No WPVs have been isolated from sewage since May 2014, when WPV1 was isolated from one sample in Kaduna State. Low-level transmission of a cVDPV2 that emerged in Nigeria in 2005 and of a cVDPV2 that originated in Chad in 2012 was documented from samples collected during 2015–2016; the most recent cVDPV2 was detected from specimens collected in Borno State in March, 2016. Environmental sampling in Afghanistan is conducted at 15 sites in five provinces at high risk for WPV transmission. WPV1 was detected in samples collected in all five provinces in 2015 and in two provinces (Hilmand and

TABLE 1. (*Continued*) National and subnational acute flaccid paralysis (AFP) surveillance indicators and number of confirmed wild poliovirus (WPV) and circulating vaccine-derived poliovirus (cVDPV) cases, by country, for all countries with poliovirus transmission during 2011–2016 or that were affected by the Ebola outbreak in West Africa within the World Health Organization (WHO) African Region and Eastern Mediterranean Region, 2015 and 2016*

WHO Region/Country	No. AFP cases (all ages)	Regional/ National NPAFP rate†	Subnational areas with NPAFP rate ≥2§ (%)	Regional/ National AFP cases with adequate specimens¶ (%)	Subnational areas with ≥80% adequate specimens (%)	Population in areas meeting both indicators** (%)	No. confirmed WPV cases*	No. confirmed cVDPV cases*,††
2016								
AFR (all 47 countries)§§	**32,250**	**7.5**	**NA**	**90**	**NA**	**NA**	**4**	**1**
Countries reporting WPV or cVDPV transmission during 2011–2016 and Ebola-affected countries (Guinea, Liberia, and Sierra Leone)								
Angola	396	3.5	94	94	100	84	0	0
Cameroon	871	7.9	100	85	90	82	0	0
CAR¶¶	143	7.0	100	73	43	40	0	0
Chad	484	7.2	100	83	72	76	0	0
Cote d'Ivoire	371	4.2	85	93	85	74	0	0
DRC¶¶	1,827	5.1	100	79	46	53	0	0
Equatorial Guinea	3	1.0	14	33	0	0	0	0
Ethiopia¶¶	1,048	2.5	82	78	36	8	0	0
Gabon¶¶	43	6.1	100	28	10	3	0	0
Guinea	1,065	20.1	100	87	88	85	0	0
Kenya	553	2.7	87	89	77	68	0	0
Liberia	69	3.5	87	75	47	40	0	0
Madagascar	788	7.6	95	85	77	81	0	0
Mali	307	3.8	89	89	78	96	0	0
Mozambique	426	3.3	100	82	50	65	0	0
Niger¶¶	366	3.5	88	63	0	0	0	0
Nigeria	17,837	21.2	100	98	100	100	4	1
Republic of the Congo	82	3.7	82	82	73	78	0	0
Sierra Leone	68	2.6	100	76	50	45	0	0
South Sudan	323	6.3	90	91	80	70	0	0
EMR (all 21 countries)***	**15,956**	**7.7**	**NA**	**90**	**NA**	**NA**	**33**	**1**
Countries reporting WPV or cVDPV transmission during 2011–2016								
Afghanistan	2,903	20.0	100	92	97	99	13	0
Iraq	605	4.2	89	80	63	48	0	0
Pakistan	7,797	12.5	100	88	88	99	20	1
Somalia	316	5.9	100	99	100	100	0	0
Syria†††	303	3.9	71	79	43	28	0	0
Yemen	715	7.1	100	91	91	97	0	0

Abbreviations: AFR = African Region; CAR = Central African Republic; DRC = Democratic Republic of the Congo; Ebola = Ebola virus disease; EMR = Eastern Mediterranean Region; NA = not applicable; NPAFP = nonpolio AFP.

* Data as of February 12, 2017.

† Per 100,000 persons aged <15 years per year.

§ For all subnational areas regardless of population size.

¶ Standard WHO target is adequate stool specimen collection from ≥80% of AFP cases, assessed by timeliness and condition. In this analysis, timeliness was defined as two specimens collected ≥24 hours apart (≥1 calendar day in this data set), and both within 14 days of paralysis onset. Condition was defined as specimens arriving in good condition (reverse cold chain maintained and received without leakage or desiccation) in a WHO-accredited laboratory.

** Percent of the country's population living in subnational areas which met both surveillance indicators (NPAFP rates of ≥2 per 100,000 persons aged <15 years per year and ≥80% of AFP cases with adequate specimens).

†† cVDPV was associated with two or more cases of AFP with genetically linked VDPVs. Guidelines for classification of cVDPV changed in 2015 and can be found at http://polioeradication.org/wp-content/uploads/2016/07/VDPV_ReportingClassification.pdf.

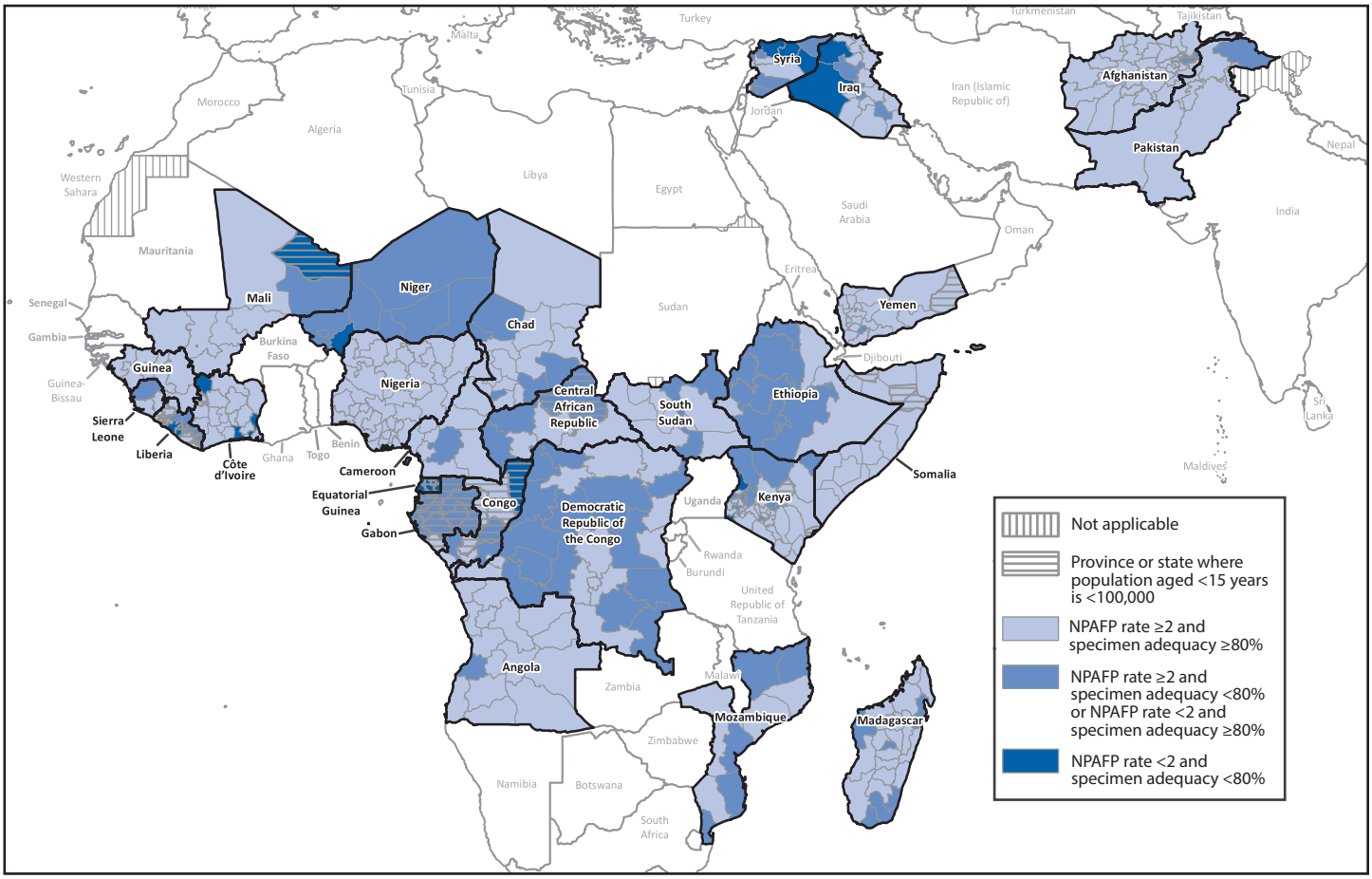
§§ Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cabo Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Ethiopia, Eritrea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Togo, Uganda, Tanzania, Zambia, and Zimbabwe.

¶¶ Stool adequacy dropped to <80% when stool condition was included with timeliness. Timeliness was defined as two specimens collected ≥24 hours apart (≥1 calendar day in this data set), and both within 14 days of paralysis onset. Condition was defined as specimens arriving in good condition (reverse cold chain maintained and received without leakage or desiccation) in a WHO-accredited laboratory.

*** Afghanistan, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen.

††† The NPAFP rate for Syria is artificially low because of displaced populations and the lack of official data from areas not under government control.

FIGURE. Combined performance indicators for the quality of acute flaccid paralysis surveillance* in subnational areas (states and provinces) of 26 countries that had poliovirus transmission during 2011–2016 or were affected by the Ebola outbreak in West Africa during 2014–2015 — World Health Organization African and Eastern Mediterranean Regions, 2016†



Abbreviations: AFP = acute flaccid paralysis; NPAFP = nonpolio AFP.

* The Global Polio Eradication Initiative has set the following targets for countries with current or recent wild poliovirus transmission and their states/provinces: 1) NPAFP detection rate of ≥2 cases per 100,000 persons aged <15 years per year, and 2) adequate stool specimen collection from ≥80% of AFP cases, with specimen adequacy assessed by timeliness and condition. Timeliness was defined as two specimens collected ≥24 hours apart (≥1 calendar day) and both within 14 days of paralysis onset. Good condition was defined as specimens arriving without leakage or desiccation in a maintained reverse cold chain at a World Health Organization–accredited laboratory.

† Data are for AFP cases with onset during 2016, reported as of February 14, 2017.

Nangarhar) in 2016. In Pakistan, sampling is conducted at 62 sites in five provinces/regions, including 25 new sites in 2016. The proportion of samples testing positive for WPV1 significantly decreased ($p<0.001$) from 19.6% (86/439) in 2015 to 10.6% (69/648) in 2016. WPV1 was detected in all five provinces/regions in both years.

Global Polio Laboratory Network

The Global Polio Laboratory Network consists of 146 WHO-accredited poliovirus laboratories in all WHO regions. Global Polio Laboratory Network member laboratories follow standardized protocols to 1) isolate and identify poliovirus, 2) conduct intratypic differentiation to identify WPV or screen for Sabin (vaccine) poliovirus and VDPVs (*7*), and 3) conduct genomic sequencing. Sequencing results help monitor pathways of poliovirus transmission by comparing the nucleotide sequence of the VP1-coding region of poliovirus isolates. To meet standard laboratory timeliness indicators for stool specimen processing, laboratories should report ≥80% of poliovirus isolation results within 14 days of specimen receipt, ≥80% of intratypic differentiation results within 7 days of isolate receipt, and ≥80% of sequencing results within 7 days of intratypic differentiation results. The standard programmatic indicator combining field and laboratory performance is to report intratypic differentiation results for ≥80% of isolates from AFP cases within 60 days of paralysis onset. This indicator considers the entire interval from paralysis onset to specimen testing. The accuracy and quality of testing at Global

Polio Laboratory Network member laboratories is monitored through an annual accreditation program that includes onsite reviews and proficiency testing.

Global Polio Laboratory Network laboratories met timeliness indicators for poliovirus isolation for both years in all regions except the European Region in 2015 (Table 2). The overall timeliness indicator for onset to intratypic differentiation results was met in both years in all regions except the European Region in 2015. The Global Polio Laboratory Network tested 192,250 stool specimens in 2015 and 220,920 in 2016. WPV1 was isolated from 74 AFP case specimens in 2015 and from 37 AFP case specimens in 2016. In addition, cVDPV was detected in 33 AFP case specimens in 2015 and 11 AFP case specimens in 2016.

In 2016, the West Africa B1 (WEAF-B1) genotype was isolated in Nigeria, where it had last been detected in 2014. In Afghanistan and Pakistan, the only genotype isolated in 2016 was South Asia (SOAS); this was the only genotype isolated worldwide in 2015. Overall genetic diversity declined among WPV1 isolates in 2016.

A poliovirus isolate with ≥1.5% nucleotide divergence in genomic sequencing of the VP1-coding region compared with previous isolates is called an "orphan" virus; orphan viruses indicate prolonged undetected virus circulation and gaps in AFP surveillance. In 2016, as in 2015, genomic sequencing indicated that WPV1 and cVDPV cases were likely missed by AFP surveillance. Orphan WPV1 isolates were associated with one of 20 WPV1 cases reported from Pakistan and three of four WPV1 cases reported in Nigeria in 2016. Orphan cVDPVs were isolated from stool specimens of AFP patients in four countries (Pakistan, Afghanistan, Nigeria, and Cameroon) in 2015; in 2016, only Nigeria reported an orphan cVDPV virus from a stool specimen of an AFP case contact in Borno State.

Three countries outside the African and Eastern Mediterranean Regions reported cVDPVs in 2015: Ukraine (cVDPV1), Laos (cVDPV1), and Myanmar (cVDPV2). No additional VDPV cases were detected in Ukraine or Myanmar in 2016; the last case in Laos had onset in January 2016.

Discussion

The number of reported WPV cases declined to the lowest point ever in 2016. Although the majority of national-level surveillance quality indicators improved in 2016, considerable variation was seen at subnational levels. Despite meeting surveillance indicator standards for several years at the state level in Nigeria, the discovery of previously undetected circulation of individual WPV lineages for several years as well as continued inaccessibility of certain geographical areas with underimmunized persons has raised concerns (*5*), prompting detailed reviews of surveillance and geographic accessibility.

Summary

What is already known about this topic?

Surveillance is a cornerstone of polio eradication programs. Acute flaccid paralysis (AFP) surveillance is the primary means of poliovirus detection, supplemented by environmental surveillance (i.e., the collection of sewage samples for poliovirus testing) to identify poliovirus circulation in the absence of detected AFP cases.

What is added by this report?

Although surveillance performance indicators are improving, gaps remain, including substantial variation at subnational levels (i.e., in 2016, of 20 African Region countries, 19 met the NPAFP target at the national level versus 11 at all subnational levels). The number of environmental surveillance locations has increased substantially (from 21 at the end of 2011 in Afghanistan, Nigeria, and Pakistan to 138 as of February 2017) and has enhanced the ability to detect poliovirus circulation and possible AFP surveillance gaps. In countries previously affected by Ebola, surveillance quality is improving, although further measures are needed to reach preoutbreak levels.

What are the implications for public health practice?

Rapid improvements in AFP surveillance are needed in several African Region countries to ensure timely certification of polio-free status. Gaps in surveillance quality, especially at the subnational level, need to be identified and resolved through well-supervised active and monitored passive surveillance, and supplemental environmental and virologic surveillance. As long as polioviruses continue to circulate in any country, all countries remain at risk.

Although conflict has limited access in several areas (including Somalia, South Sudan, and Syria), effective community-based surveillance provides some assurance of the absence of poliovirus circulation in many of those areas.

Certification of polio-free status requires at least 3 years of timely and sensitive polio surveillance (*8*), including timely stool collection, and timely and appropriate transport of specimens to the laboratory. Specimen condition was a particular concern in the Democratic Republic of the Congo, Ethiopia, Gabon, Madagascar, and Niger in 2016. With the end of the Ebola outbreak, polio surveillance performance is improving in West Africa, although more work remains to return to pre-outbreak surveillance quality indicators.

The findings in this report are subject to at least two limitations. First, the surveillance indicators do not fully reflect security-related issues, issues associated with mobile and difficult-to-access populations, or other factors that affect surveillance performance. For example, in Iraq and the Syria, population movements related to conflict make interpretation of AFP surveillance indicators difficult. Second, high NPAFP rates do not necessarily imply sensitive surveillance, because

TABLE 2. Number of poliovirus isolates from stool specimens of persons with acute flaccid paralysis and timing of results, by World Health Organization (WHO) region, 2015 and 2016*

WHO region/ Year	No. specimens	No. poliovirus isolates			% Poliovirus isolation results on time¶	% ITD results within 7 days of receipt at laboratory**	% ITD results within 60 days of paralysis onset
		Wild	Sabin†	cVDPV§			
African							
2015	50,960	0	3,579	18	82	79	95
2016	65,520	4	4,771	4	95	94	97
Americas							
2015	1,698	0	44	0	84	100	100
2016	4,246	0	18	0	84	92	91
Eastern Mediterranean							
2015	25,827	74	951	2	93	99	95
2016	31,928	33	1,612	1	94	98	98
European							
2015	3,655	0	106	4	63	93	70
2016	3,480	0	71	0	82	100	86
South-East Asia							
2015	96,783	0	3,335	2	97	86	98
2016	101,550	0	5,247	2	98	99.5	99
Western Pacific							
2015	13,327	0	194	7	96	98	86
2016	14,196	0	253	4	96	98	96
Total††							
2015	**192,250**	**74**	**8,209**	**33**	**89**	**85**	**96**
2016	**220,920**	**37**	**11,972**	**11**	**96**	**97**	**98**

Abbreviations: cVDPV = circulating vaccine-derived poliovirus; ITD = intratypic differentiation.

* Data as of February 14, 2017.

† Either 1) concordant Sabin-like results in ITD test and VDPV screening, or 2) ≤1% VP1 nucleotide sequence difference compared with Sabin vaccine virus (≤0.6% for type 2).

§ For poliovirus types 1 and 3, 10 or more VP1 nucleotide differences from the respective poliovirus; for poliovirus type 2, six or more VP1 nucleotide differences from Sabin type 2 poliovirus.

¶ Results reported within 14 days for laboratories in the following WHO regions: African, Americas, Eastern Mediterranean, and South-East Asia, and Western Pacific. Results reported within 28 days for the European Region.

** Results of ITD reported within 7 days of receipt of specimen.

†† For the last three indicators, total represents weighted mean percent of regional performance.

a proportion of reported AFP cases might not be actual AFP cases, and not all actual AFP cases might be detected.

Supervision and monitoring of AFP surveillance can help ensure that all actual AFP cases are identified, reported, and appropriately investigated. As polio case counts decrease, maintenance of sensitive AFP surveillance becomes increasingly critical. Environmental surveillance has been an important supplement to AFP surveillance, and when carefully conducted, can improve detection of circulating virus, particularly in areas at high risk with suboptimal AFP surveillance. The risk for WPV and cVDPV importation and for cVDPV emergence exists even in countries in polio-free regions. To achieve polio eradication, surveillance performance should be closely monitored and quality should be maintained globally to promptly identify and respond to all cases of polio.

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Vital Signs: Update on Zika Virus–Associated Birth Defects and Evaluation of All U.S. Infants with Congenital Zika Virus Exposure — U.S. Zika Pregnancy Registry, 2016

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Abstract

Background: In collaboration with state, tribal, local, and territorial health departments, CDC established the U.S. Zika Pregnancy Registry (USZPR) in early 2016 to monitor pregnant women with laboratory evidence of possible recent Zika virus infection and their infants.

Methods: This report includes an analysis of completed pregnancies (which include live births and pregnancy losses, regardless of gestational age) in the 50 U.S. states and the District of Columbia (DC) with laboratory evidence of possible recent Zika virus infection reported to the USZPR from January 15 to December 27, 2016. Birth defects potentially associated with Zika virus infection during pregnancy include brain abnormalities and/or microcephaly, eye abnormalities, other consequences of central nervous system dysfunction, and neural tube defects and other early brain malformations.

Results: During the analysis period, 1,297 pregnant women in 44 states were reported to the USZPR. Zika virus–associated birth defects were reported for 51 (5%) of the 972 fetuses/infants from completed pregnancies with laboratory evidence of possible recent Zika virus infection (95% confidence interval [CI] = 4%–7%); the proportion was higher when restricted to pregnancies with laboratory-confirmed Zika virus infection (24/250 completed pregnancies [10%, 95% CI = 7%–14%]). Birth defects were reported in 15% (95% CI = 8%–26%) of fetuses/infants of completed pregnancies with confirmed Zika virus infection in the first trimester. Among 895 liveborn infants from pregnancies with possible recent Zika virus infection, postnatal neuroimaging was reported for 221 (25%), and Zika virus testing of at least one infant specimen was reported for 585 (65%).

Conclusions and Implications for Public Health Practice: These findings highlight why pregnant women should avoid Zika virus exposure. Because the full clinical spectrum of congenital Zika virus infection is not yet known, all infants born to women with laboratory evidence of possible recent Zika virus infection during pregnancy should receive postnatal neuroimaging and Zika virus testing in addition to a comprehensive newborn physical exam and hearing screen. Identification and follow-up care of infants born to women with laboratory evidence of possible recent Zika virus infection during pregnancy and infants with possible congenital Zika virus infection can ensure that appropriate clinical services are available.

Introduction

In response to the outbreak of Zika virus in the World Health Organization Region of the Americas and concerns about birth defects linked to Zika virus infection during pregnancy, CDC issued a travel notice on January 15, 2016, advising pregnant women to consider postponing travel to areas with active transmission of Zika virus. As part of the initial phase of the emergency response, CDC collaborated with state, tribal, local, and territorial health departments to establish the U.S. Zika Pregnancy Registry (USZPR) as an enhanced national surveillance system to monitor pregnancy and fetal/infant outcomes among pregnancies with laboratory evidence of possible recent Zika virus infection (*1*). The USZPR includes data on pregnant women and their infants at birth and at ages 2, 6, and 12 months.

The USZPR includes data from all 50 states, DC, and all U.S. territories except Puerto Rico; pregnancies in Puerto Rico are monitored separately by the Zika Active Pregnancy Surveillance System (*2*). To be included in the USZPR, either the pregnant woman, placenta, or fetus/infant must have laboratory evidence of possible recent Zika virus infection. Pregnant women in the United States and U.S. territories (with the exception of Puerto Rico) with laboratory evidence of possible recent Zika virus infection (regardless of whether they have symptoms) and the periconceptionally,* prenatally, or perinatally exposed infants born to these women are eligible to be included. The USZPR also includes infants with laboratory evidence of possible congenital Zika virus infection (regardless of whether they have symptoms or findings at birth) and their mothers.

This report updates the previous report (*3*) from the USZPR and provides data on pregnancies completed in the 50 U.S. states and DC from December 1, 2015 through December 27, 2016, reported to CDC from January 15, 2016, through March 14, 2017.† Completed pregnancies include those of any length of gestation that end in a liveborn infant or a pregnancy loss. The baseline prevalence of defects consistent with those that have been observed with congenital Zika virus infection was approximately 2.9 per 1,000 live births in the pre-Zika years (*4*). The initial findings from the USZPR represent an approximate twentyfold increase in Zika virus–associated birth defects among pregnant women with laboratory evidence of possible recent Zika virus infection, with an approximate thirtyfold increase in brain abnormalities and/or microcephaly. Updated data in this report can also be compared with this benchmark (*3*,*4*).

Methods

The USZPR defines laboratory evidence of possible recent Zika virus infection as 1) recent Zika virus infection detected by a Zika virus RNA nucleic acid test (NAT, e.g., reverse transcription–polymerase chain reaction [RT-PCR]) on any maternal, placental, or fetal/infant specimen or 2) detection of recent Zika virus infection or recent unspecified flavivirus infection by serologic tests on a maternal or infant specimen (i.e., either positive or equivocal Zika virus immunoglobulin M [IgM] AND Zika virus plaque reduction neutralization test [PRNT] titer ≥10, regardless of dengue virus PRNT value; or negative Zika virus IgM, AND positive or equivocal dengue virus IgM, AND Zika virus PRNT titer ≥10, regardless of dengue virus PRNT titer). Infants with positive or equivocal Zika virus IgM are included, provided a confirmatory PRNT has been performed on a maternal or infant specimen. The USZPR laboratory inclusion criteria are specified as "possible" recent Zika virus infection because the USZPR includes mother-infant pairs with serological evidence of a recent unspecified flavivirus infection, as well as those with laboratory-confirmed Zika virus infection.

Analyses were done on both the overall completed pregnancies in the USZPR from the 50 U.S. states and DC and a subset of completed pregnancies that demonstrated confirmed recent Zika virus infection (*5*,*6*). These are pregnancies in which the presence of Zika virus RNA in a maternal, placental, or fetal/infant specimen was documented by a positive NAT, or in which Zika virus IgM was positive or equivocal and Zika virus PRNT titer was ≥10 and dengue virus PRNT was <10.

Among symptomatic women, gestational timing of Zika virus infection was calculated using symptom onset date. Among asymptomatic women, the trimester of exposure was calculated using dates of travel to areas of active Zika virus transmission or sexual exposure. First trimester exposure was classified into two categories: 1) women with symptoms or exposure in the first trimester only§ (defined as first trimester or first trimester and periconceptional period); and 2) women with exposure during multiple trimesters including the first trimester. Estimates were not calculated for exposure in other trimesters because of small numbers. Pregnant women who did not have first trimester exposure might have had exposure in the periconceptional period only, second trimester, third trimester, or both the second and third trimester; for many women, the information on trimester of exposure was missing.

The Zika virus–associated birth defects (henceforth referred to as "birth defects") were analyzed in two mutually exclusive categories: 1) brain abnormalities and/or microcephaly regardless of the presence of additional birth defects, and 2) neural tube defects and other early brain malformations, eye abnormalities, and other consequences of central nervous system dysfunction, among fetuses and infants without evident brain abnormalities or microcephaly (*7*). Clinical experts reviewed reported information to ensure that each fetus or infant with birth defects met the criteria of the USZPR case definition.

The proportion of fetuses or infants with birth defects among completed pregnancies was estimated among asymptomatic and symptomatic pregnant women, and women with first trimester exposure, using the Wilson score interval and 95% CI for a binomial proportion. Outcomes from multiple gestation pregnancies were counted once. Separate estimates were calculated for pregnancies with any laboratory evidence of recent Zika

* Periconceptional exposure is defined as maternal Zika virus infection during the 8 weeks before conception (6 weeks before and 2 weeks after the first day of the last menstrual period).

† Data on pregnancies reported to CDC by December 27, 2016; all data have been updated with additional information reported on these pregnancies through March 14, 2017. Completed pregnancies are limited to those with a pregnancy completion date on or before December 27, 2016.

§ First trimester is defined as last menstrual period +14 days to 13 weeks, 6 days (97 days).

virus infection and for the subset of pregnancies with laboratory-confirmed recent Zika virus infection. For all liveborn infants with and without birth defects, the proportion who had any reported postnatal neuroimaging (cranial ultrasound, computed tomography, or magnetic resonance imaging) was calculated, as well as the proportion who had laboratory testing for Zika virus reported on an infant specimen. CDC released updated Interim Guidance for the Evaluation and Management of Infants with Possible Congenital Zika Virus Infection in August 2016 (*8*), which stated that postnatal neuroimaging and testing should be routine for all infants born to women with laboratory evidence of Zika virus infection during pregnancy; the proportion of infants with neuroimaging performed was calculated before and after this guidance was released.

Results

From January 15 through December 27, 2016, a total of 1,297 pregnancies with possible recent Zika virus infection were reported to the USZPR from 44 states (Figure 1), including 972 completed pregnancies with reported outcomes (895 liveborn infants and 77 pregnancy losses). Among the completed pregnancies, 599 (62%) pregnant women were asymptomatic, 348 (36%) were symptomatic, and 25 (3%) had missing symptom information (Table 1).

Birth defects were reported for 51 (5%) of the 972 completed pregnancies with laboratory evidence of possible recent Zika virus infection. The proportion was higher among completed pregnancies with confirmed Zika virus infection (24/250, 10%). Among completed pregnancies with confirmed Zika virus infection, 217 of 250 (87%) tested positive by RT-PCR, including 24 pregnancies with a fetus or infant with birth defects.

Birth defects were reported in similar proportions of fetuses/infants whose mothers did and did not report symptoms of Zika virus disease during pregnancy. Brain abnormalities and/or microcephaly were reported in 43 (84%) of 51 fetuses/infants with birth defects. Among pregnancies with confirmed Zika virus infection, brain abnormalities and/or microcephaly were reported in 18 (75%) of 24 fetuses/infants with birth defects. The 51 fetuses or infants with birth defects were from pregnancies with Zika virus exposure from the following 16 countries/territories with active Zika virus transmission: Barbados, Belize, Brazil, Cape Verde, Colombia, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Puerto Rico, Republic of Marshall Islands, and Venezuela.

Birth defects were reported in a higher proportion of fetuses or infants whose mothers were infected during the first trimester of pregnancy. Among 157 pregnancies in which women had symptom onset or exposure to Zika virus infection during the first trimester, 14 (9%) fetuses/infants had reported birth defects (Table 1). When pregnancies with symptom onset or exposure during first trimester were limited to those with laboratory-confirmed Zika virus infection, nine (15%) of 60 completed pregnancies had reported birth defects.

Among the 895 liveborn infants, postnatal neuroimaging results were reported to the USZPR for 221 (25%). Zika virus testing results of any specimen were reported for 585 (65%) infants; 94 (11%) of all 895 liveborn infants had positive Zika virus test results. Among the 45 liveborn infants with birth defects, 25 (56%) had positive infant Zika virus testing results reported, and 29 (64%) had postnatal neuroimaging reported to the USZPR (Table 2). Among the 850 liveborn infants without birth defects, 69 (8%) had positive infant Zika virus testing results reported, and 192 (23%) had postnatal neuroimaging reported to the USZPR. The percentage of infants reported to have received postnatal neuroimaging was 20% among 406 born through August 2016, and 28% among 489 born during September–December 2016, after the updated CDC guidance was released (*8*) (Figure 2).

Conclusions and Comments

The number of pregnant women with laboratory evidence of possible recent Zika virus infection and the number of fetuses/infants with Zika virus–associated birth defects continues to

FIGURE 1. Cumulative number of pregnant women with laboratory evidence of possible recent Zika virus infection reported to the U.S. Zika Pregnancy Registry, by month of report — United States, January–December 2016 (n = 1,297)

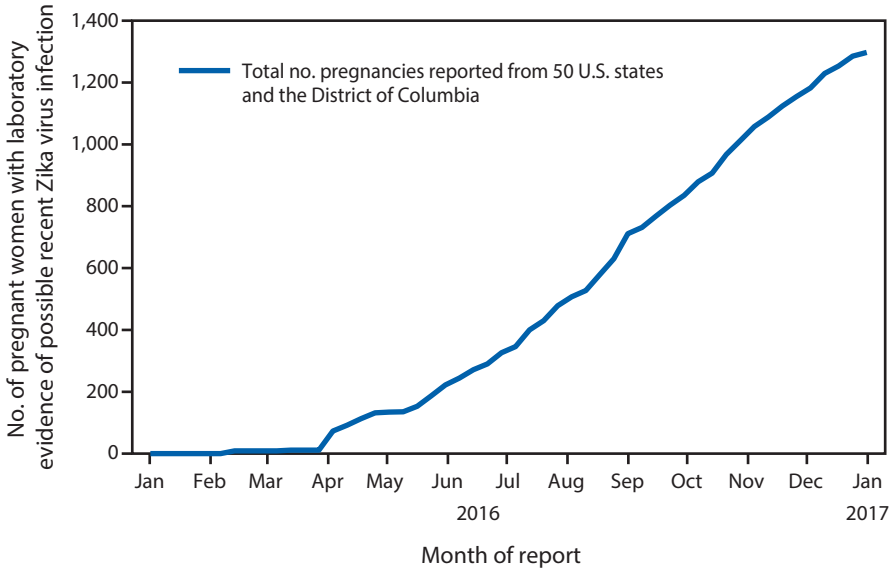


TABLE 1. Pregnancy outcomes* for 972 women with completed pregnancies† with laboratory evidence of possible recent Zika virus infection, by maternal symptom status and timing of symptom onset or exposure — U.S. Zika Pregnancy Registry, United States, December 2015–December 2016

Characteristic	Brain abnormalities and/or microcephaly (No.)	NTDs and early brain malformations, eye abnormalities, or consequences of CNS dysfunction without brain abnormalities or microcephaly (No.)	Total with ≥1 birth defect (No.)	Completed pregnancies (No.)	Proportion affected by Zika virus–associated birth defects, % (95% CI§)
Any laboratory evidence of possible recent Zika virus infection¶					
Total	**43**	**8**	**51**	**972**	**5 (4–7)**
Maternal symptom status					
Symptoms of Zika virus infection reported	18	3	21	348	6 (4–9)
No symptoms of Zika virus infection reported	24	4	28	599	5 (3–7)
Unknown	1	1	2	25	—
Timing of symptoms or exposure**					
First trimester††,§§	13	1	14	157	9 (5–14)
Multiple trimesters including first	22	6	28	396	7 (5–10)
Confirmed evidence of Zika virus infection¶¶					
Total	**18**	**6**	**24**	**250**	**10 (7–14)**
Maternal symptom status					
Symptoms of Zika virus infection reported	8	3	11	141	8 (4–13)
No symptoms of Zika virus infection reported	10	2	12	102	12 (7–19)
Unknown	0	1	1	7	—
Timing of symptoms or exposure**					
First trimester††,§§	8	1	9	60	15 (8–26)
Multiple trimesters including first	8	4	12	58	21 (12–33)

Abbreviations: CI = confidence interval; CNS = central nervous system; IgM=immunoglobulin M; NAT=nucleic acid test; NTD = neural tube defect; PRNT = plaque reduction neutralization test; RT-PCR = reverse transcription–polymerase chain reaction.

* Outcomes for multiple gestation pregnancies are counted once.

† Includes live births, spontaneous abortions, terminations, and stillbirths.

§ 95% CI for a binomial proportion using Wilson score interval.

¶ Includes maternal, placental, or fetal/infant laboratory evidence of possible recent Zika virus infection based on presence of Zika virus RNA by a positive NAT (e.g., RT-PCR) or similar test, serological evidence of a recent Zika virus infection, or serological evidence of a recent unspecified flavivirus infection.

** Estimates were not calculated for exposure in other trimesters because of small numbers. Pregnant women who did not have first trimester exposure might have had exposure in the periconceptional period only (8 weeks before conception or 6 weeks before and 2 weeks after the first day of the last menstrual period), second trimester, third trimester, both the second and third trimester; many women were missing information on trimester of exposure.

†† First trimester is defined as last menstrual period +14 days to 13 weeks, 6 days (97 days).

§§ First trimester exposure includes women with exposure limited to the first trimester and women with exposure limited to the first trimester and periconceptional period.

¶¶ Includes maternal, placental, or fetal/infant laboratory evidence of confirmed Zika virus infection based on presence of Zika virus RNA by a positive NAT (e.g., RT-PCR) or similar test or serological results of IgM positive/equivocal with Zika PRNT ≥10 and dengue PRNT <10.

increase in the United States. The proportion of fetuses and infants with birth defects among pregnancies with confirmed Zika virus infection at any time during pregnancy was more than 30 times higher than the baseline prevalence in the pre-Zika years, and a higher proportion of those with first trimester infections had birth defects (*4*). Although microcephaly was the first recognized birth defect reported in association with congenital Zika virus infection, Zika virus–associated brain abnormalities can occur without microcephaly, and neuroimaging is needed to detect these abnormalities (*9*). Neuroimaging is also used in other congenital infections to identify brain abnormalities; for example, neuroimaging findings in infants with congenital cytomegalovirus infection are correlated with neurodevelopmental outcomes (*10*). Postnatal neuroimaging is recommended for all infants born to women with laboratory evidence of Zika virus infection to identify infants with brain anomalies that warrant additional evaluation to ensure that appropriate intervention is provided (*8*). Based on data reported to the USZPR, the majority of these infants had not received recommended neuroimaging. In addition to infants with birth defects, complete follow-up and routine developmental assessment of all infants born to women with laboratory evidence of possible recent Zika virus infection is essential to help identify future outcomes potentially associated with congenital Zika virus infection and ensure that the referrals to appropriate support and follow-up care are made.

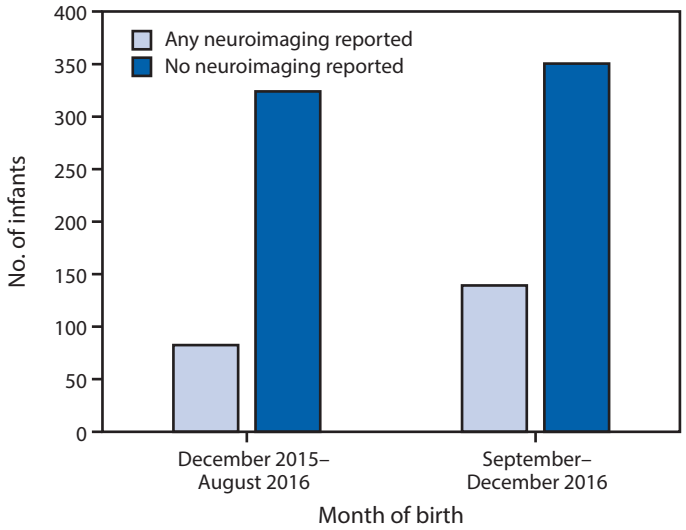
The findings in this report are subject to at least four limitations. First, selection bias might affect which pregnancies are

TABLE 2. Postnatal neuroimaging* and infant Zika virus testing results for 895 liveborn infants in the U.S. Zika Pregnancy Registry — 50 U.S. states and the District of Columbia, 2016

Testing	No (%) liveborn infants		
	With birth defects	Without birth defects	Total
Total	**45**	**850**	**895**
Neuroimaging			
Any neuroimaging reported to USZPR	29 (64)	192 (23)	**221 (25)**
Infant Zika virus testing			
Positive test result on an infant specimen†,§	25 (56)	69 (8)	**94 (11)**
Negative infant test results among infants with ≥1 infant specimen reported as tested	17 (38)	474 (56)	**491 (55)**
No infant specimen test results reported to USZPR	3 (7)	307 (36)	**310 (35)**

Abbreviations: IgM= immunoglobulin M; NAT=nucleic acid test; RT-PCR = reverse transcription–polymerase chain reaction; USZPR = U.S. Zika Pregnancy Registry.
* Neuroimaging includes any cranial ultrasound, computed tomography, or magnetic resonance imaging test reported to the USZPR.
† Positive infant tests included the presence of Zika virus RNA by a positive NAT (e.g., RT-PCR) and/or serological results of IgM positive/equivocal.
§ Infant specimens include serum, urine, blood, cerebrospinal fluid, cord serum, and cord blood.

FIGURE 2. Postnatal neuroimaging for infants reported to the U.S. Zika Pregnancy Registry, by month of birth — United States, December 2015–December 2016



reported to the USZPR, because pregnant women with symptoms of Zika virus disease might be more likely than asymptomatic women to be tested. Pregnant women with Zika virus exposure and prenatally detected fetal abnormalities or infants with birth defects might be more likely to be tested for Zika virus infection. In addition, pregnancies resulting in a loss might be more likely to have had a confirmed Zika virus infection and more likely to have the placenta or other pathologic specimens tested (*11*). However, it is also possible that birth defects in pregnancy losses, including stillbirths, have not been reported. Second, while CDC has worked closely with state and local health departments to obtain complete information, delays in reporting postnatal neuroimaging or infant Zika virus testing results are possible. In addition, some of the pregnancies included in the analysis were completed before CDC's most recent infant guidance (*8*) was released, and thus, current recommendations for neuroimaging or testing might not have been implemented. Third, current testing methodologies are limited in that they can only identify recent Zika virus infections (*5*) and might miss those women who are tested when Zika virus RNA and/or IgM is no longer detectable; these pregnancies would not be included in the USZPR unless the fetus/infant or placenta has a positive Zika virus test result. Also, serologic testing cannot readily discriminate between flaviviruses because of crossreactivity (*5*); therefore, some pregnancies in the USZPR might have had a recent infection with a flavivirus other than Zika virus which could lead to an underestimate of the proportion of fetuses/infants affected. For this reason, in this report, analysis of the subset of pregnancies with laboratory-confirmed recent Zika virus infection was included. Finally, limited data are available about other maternal risk factors for birth defects, including genetic or other infectious causes, which might be causal factors for a few of the birth defects reported here.

These findings underscore the serious risk for birth defects posed by Zika virus infection during pregnancy and highlight why pregnant women should avoid Zika virus exposure and that all pregnant women should be screened for possible Zika virus exposure at every prenatal visit, with testing of pregnant women and infants in accordance with current guidance (https://www.cdc.gov/zika/pdfs/zikapreg_screeningtool.pdf) (*8*,*12*). Zika virus testing of infants is recommended for 1) all infants born to women with laboratory evidence of Zika virus infection in pregnancy and 2) infants with findings suggestive of congenital Zika syndrome born to women with an epidemiologic link suggesting possible transmission, regardless of maternal testing results. Infants without abnormalities born to women with an epidemiological link suggesting possible Zika virus exposure during pregnancy, and for whom maternal testing was not performed or was performed more than 12 weeks after exposure, should have a comprehensive exam. If there is concern about infant follow-up or maternal testing is not performed, infant Zika virus testing should be considered. The initial evaluation of infants should include a comprehensive physical examination, including a neurologic examination, postnatal neuroimaging, and standard newborn hearing screen. Additional evaluation might be considered based on clinical and laboratory findings, however routine developmental assessment is recommended as part of pediatric care (*8*). Based on initial USZPR reports, most infants born to women with laboratory evidence of

Key Points

- In 2016, a total of 1,297 pregnancies with possible recent Zika virus infection were reported to the U.S. Zika Pregnancy Registry from 44 states.
- Approximately one in 10 pregnancies with laboratory-confirmed Zika virus infection resulted in a fetus or infant with Zika virus–associated birth defects.
- The proportion of fetuses and infants with Zika virus–associated birth defects was highest among those with first trimester Zika virus infections.
- Only 25% of infants from pregnancies with possible recent Zika virus infection reported receiving postnatal neuroimaging.
- Identification and follow-up care of infants born to mothers with laboratory evidence of possible recent Zika virus infection during pregnancy and infants with congenital Zika virus infection can ensure that appropriate intervention services are available to affected infants.
- Additional information is available at https://www.cdc.gov/vitalsigns/.

possible recent Zika virus infection during pregnancy might not be receiving the recommended evaluation (e.g., postnatal neuroimaging). CDC is working with public health officials, professional societies, and health care providers to increase awareness of and adherence to CDC guidance for the evaluation and management of infants with possible congenital Zika virus infection. Identification and follow-up care of infants born to mothers with laboratory evidence of possible recent Zika virus infection during pregnancy and infants with possible congenital Zika virus infection can ensure that appropriate intervention services are available to affected infants.

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Announcement

Sexually Transmitted Diseases Awareness Month — April 2017

April is Sexually Transmitted Diseases (STDs) Awareness Month. This year, CDC is dedicating the month's social media and web-based communication outreach activities to syphilis prevention. This observance provides an opportunity to share prevention messages and important resources with health care providers and affected populations.

U.S. surveillance data for 2015 indicate a sharp increase in reported syphilis cases: 23,872 primary and secondary syphilis cases were reported, for a rate of 7.5 cases per 100,000 persons, representing the highest annual number and the highest rate of reported syphilis cases in approximately 20 years and a 19% increase since 2014 (*1*). Primary and secondary syphilis are the earliest stages of infection, are indicators of incident infection, and differ in signs and symptoms. Primary stage signs/symptoms include a painless sore or sores at the site of infection. Secondary stage signs/symptoms can include skin rash, swollen lymph nodes, and fever.

From 2014 to 2015, syphilis rates increased in every region, a majority of age groups, and almost every racial/ethnic group. Syphilis rates are particularly high among gay, bisexual, and other men who have sex with men (MSM), who accounted for 82% of cases where the sex of sex partner is known. Approximately half of MSM with syphilis are also living with human immunodeficiency virus (*1*). Syphilis rates also increased 27% among women from 2014 to 2015, which has resulted in a surge in the number and rate of infants born with congenital syphilis. In 2015, the number of congenital syphilis cases was the highest it has been since 2001 (*1*).

Information and resources for persons, health care providers, and prevention partners is available at https://www.cdc.gov/std/sam/.

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Erratum

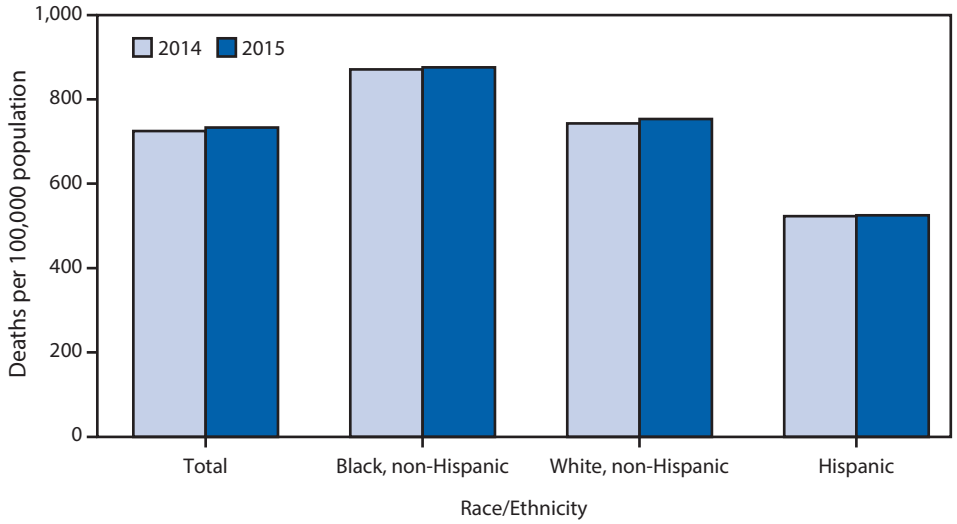
Vol. 66, No. 5

In the report "Notes from the Field: Mortality Associated with Hurricane Matthew — United States, October 2016" on page 145, the last sentence of the first paragraph should have read "This report summarizes state-confirmed Hurricane Matthew–associated deaths that occurred during October 1–October 21 in Florida, Georgia, North Carolina, **and Virginia**."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Age-Adjusted Death Rates,* by Race/Ethnicity† — National Vital Statistics System, United States, 2014–2015



* Deaths are per 100,000 population and are age-adjusted to the 2000 U.S. standard population.
† Data for Total include persons in all racial/ethnic populations, not just non-Hispanic blacks, non-Hispanic whites, and Hispanics. Persons who are of Hispanic ethnicity might be of any race.

From 2014 to 2015, the age-adjusted death rate for the total U.S. population increased 1.2% from 724.6 to 733.1 per 100,000 population. The rate increased 0.6% from 870.7 to 876.1 for non-Hispanic blacks and 1.4% from 742.8 to 753.2 for non-Hispanic whites. The rate for Hispanic persons did not change significantly. The highest rate was recorded for the non-Hispanic black population, followed by the non-Hispanic white and Hispanic populations.

Source: National Vital Statistics System. Underlying cause of death data, 2014–2015. https://wonder.cdc.gov/ucd-icd10.html.

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