Please note: An erratum has been published for this issue. To view the erratum, please click here.

Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

Weekly / Vol. 64 / No. 24 June 26, 2015

National HIV Testing Day — June 27, 2015

National HIV Testing Day, June 27, promotes the importance of testing in detecting, treating, and preventing human immunodeficiency virus (HIV) infection. HIV testing is the essential entry point to a continuum of prevention, health care, and social services that improve the quality of life and the length of survival for persons with HIV (*1*). Recent findings show significantly greater health benefits for persons who start antiretroviral therapy (ART) earlier (*2*). Persons with HIV who receive appropriate treatment, monitoring, and health care also reduce their chances of transmitting HIV to others (*3*). The key to HIV treatment, care, and prevention is learning one's status through testing.

In 2011, an estimated 1.2 million persons were living with HIV infection in the United States; an estimated 86% were diagnosed with HIV, 40% were engaged in HIV medical care, 37% were prescribed ART, and 30% achieved viral suppression (*1*). This issue of *MMWR* includes a report presenting estimates of the prevalence of diagnosed and undiagnosed HIV infections by state during 2008–2012.

Additional information on National HIV Testing Day is available at http://www.cdc.gov/features/HIVtesting. Basic testing information for consumers is available at http://www.cdc.gov/hiv/basics/testing.html.

Additional information on HIV testing for health professionals is available at http://www.cdc.gov/hiv/testing. CDC's guidelines for HIV testing of serum and plasma specimens are available at http://www.cdc.gov/hiv/testing/laboratorytests.html.

References

1. Bradley H, Hall HI, Wolitski RJ, et al. Vital signs: HIV diagnosis, care, and treatment among persons living with HIV—United States, 2011. MMWR Morb Mortal Wkly Rep 2014;63:1113–7.
2. National Institute of Allergy and Infectious Diseases. Starting antiretroviral treatment early improves outcomes for HIV-infected individuals. Available at http://www.niaid.nih.gov/news/newsreleases/2015/Pages/START.aspx.
3. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med 2011;365:493–505.

Prevalence of Diagnosed and Undiagnosed HIV Infection — United States, 2008–2012

H. Irene Hall, PhD[1]; Qian An, PhD[1]; Tian Tang, MS[2]; Ruiguang Song, PhD[1]; Mi Chen, MS[1]; Timothy Green, PhD[1]; Jian Kang, PhD[3]
(Author affiliations at end of text)

Persons unaware of their human immunodeficiency virus (HIV) infection contribute nearly one third of ongoing transmission in the United States (*1*). Among the estimated 1.2 million persons living with HIV in the United States in 2011, 14% had undiagnosed infections (*2*). To accelerate progress toward reducing undiagnosed HIV infection, CDC and its partners have pursued an approach that includes expanding HIV testing in communities with high HIV infection rates (*3*). To measure the prevalence of diagnosed and undiagnosed HIV infection for the 50 states and the District of Columbia (DC), CDC analyzed data from the National HIV Surveillance System. In 42 jurisdictions with numerically stable estimates, HIV prevalence in 2012 ranged from 110 per 100,000 persons (Iowa) to 3,936 per 100,000 (DC). The percentage of persons living with diagnosed HIV ranged from 77% in Louisiana to

INSIDE

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

≥90% in Colorado, Connecticut, Delaware, Hawaii, and New York. In 39 jurisdictions with numerically stable estimates, the percentage of HIV cases with diagnosed infection among men who have sex with men (MSM) ranged from 75% in Louisiana to ≥90% in Hawaii and New York. These data demonstrate the need for interventions and public health strategies to reduce the prevalence of undiagnosed HIV infection. Because the percentage of persons with undiagnosed HIV varies by geographic area, efforts tailored to each area's unique circumstances might be needed to increase the percentage of persons aware of their infection.

HIV surveillance data for persons aged ≥13 years from 50 states and DC reported to CDC through June 2014 were used to estimate the prevalence of diagnosed and undiagnosed HIV infection for 2008–2012. (Data for all years during the period 2008–2012 are available online at http://stacks.cdc.gov/view/cdc/31699.) Data were adjusted for reporting delays (*2*), missing transmission category (*2*), incorrect diagnosis dates, and underreporting. Although acquired immune deficiency syndrome (AIDS) has been reportable in all jurisdictions since the early 1980s, confidential name-based HIV reporting was implemented over time in different jurisdictions. To correct for erroneous HIV diagnosis dates resulting from the reporting of prevalent cases shortly after implementation of HIV reporting, the year of HIV diagnosis was adjusted among persons who received an AIDS diagnosis before and during the first 2 years after implementation of HIV reporting in a jurisdiction. AIDS cases were classified into two groups: 1) those diagnosed after 2 years of implementing HIV reporting (reference group) and 2) all other AIDS cases. In both groups, cases were stratified by year of AIDS diagnosis and vital status in December 2012. To ensure the same distribution of year of diagnosis in both groups, the distribution of year of HIV diagnosis in the reference group was used to adjust the year of HIV diagnosis of AIDS cases in the second group, by randomly distributing cases to earlier years in which the number of HIV diagnoses was less than expected and separately by jurisdiction of residence at AIDS diagnosis. Similarly, to adjust for underreporting of the number of HIV diagnoses before and during the first 2 years of implementation of HIV reporting, all HIV cases were classified into two groups: 1) HIV diagnoses after 2 years of implementing HIV reporting, or in jurisdictions with HIV reporting before 2000* (reference group) and 2) all other HIV cases. In both groups, cases were stratified by year of HIV diagnosis and AIDS status, both at diagnosis and at the end of study period.

The year of HIV diagnosis among cases of AIDS diagnosed during the same calendar year in the reference group was used to adjust the number of nonsimultaneous HIV and AIDS diagnoses (among persons with disease never classified as AIDS, to maintain the actual number ever classified as AIDS) in the

* Except Texas and Florida, which reported few HIV cases diagnosed before 1999 and 1997, respectively.

The *MMWR* series of publications is published by the Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30329-4027.

Suggested citation: [Author names; first three, then et al., if more than six.] [Report title]. MMWR Morb Mortal Wkly Rep 2015;64:[inclusive page numbers].

Centers for Disease Control and Prevention

Thomas R. Frieden, MD, MPH, *Director*
Harold W. Jaffe, MD, MA, *Associate Director for Science*
Joanne Cono, MD, ScM, *Director, Office of Science Quality*
Chesley L. Richards, MD, MPH, *Deputy Director for Public Health Scientific Services*
Michael F. Iademarco, MD, MPH, *Director, Center for Surveillance, Epidemiology, and Laboratory Services*

***MMWR* Editorial and Production Staff (Weekly)**

Sonja A. Rasmussen, MD, MS, *Editor-in-Chief*
Charlotte K. Kent, PhD, MPH, *Executive Editor*
Jacqueline Gindler, MD, *Acting Editor*
Teresa F. Rutledge, *Managing Editor*
Douglas W. Weatherwax, *Lead Technical Writer-Editor*
Teresa M. Hood, MS, Jude C. Rutledge, *Writer-Editors*
Martha F. Boyd, *Lead Visual Information Specialist*
Maureen A. Leahy, Julia C. Martinroe,
Stephen R. Spriggs, Brian E. Wood,
Visual Information Specialists
Quang M. Doan, MBA, Phyllis H. King,
Terraye M. Starr, *Information Technology Specialists*

***MMWR* Editorial Board**

Timothy F. Jones, MD, Nashville, TN, *Chairman*
Matthew L. Boulton, MD, MPH, Ann Arbor, MI
Virginia A. Caine, MD, Indianapolis, IN
Jonathan E. Fielding, MD, MPH, MBA, Los Angeles, CA
David W. Fleming, MD, Seattle, WA
William E. Halperin, MD, DrPH, MPH, Newark, NJ
King K. Holmes, MD, PhD, Seattle, WA
William L. Roper, MD, MPH, Chapel Hill, NC
Rima F. Khabbaz, MD, Atlanta, GA
Patricia Quinlisk, MD, MPH, Des Moines, IA
Patrick L. Remington, MD, MPH, Madison, WI
William Schaffner, MD, Nashville, TN

second group of HIV cases so that the proportional distribution of same-year HIV and AIDS diagnosis was the same in both groups. This adjustment was done by jurisdiction of residence at HIV diagnosis. Individual adjustment weights were assigned to each case and combined with reporting delay weights for HIV diagnosis, AIDS diagnosis, and death, so annual numbers of HIV diagnoses, same-year AIDS diagnoses, and deaths could be obtained for any subpopulation.

Using the estimated annual number of HIV diagnoses and the severity of disease at diagnosis (i.e., whether the infection was classified as AIDS in the same calendar year the HIV diagnosis was made), a back-calculation model was fitted to estimate HIV prevalence, based on estimated cumulative HIV incidence (*2*). The overall HIV prevalence estimate was calculated by subtracting the estimated cumulative number of deaths that had occurred among those infected by the end of a given year from the estimated cumulative number of HIV infections. The estimated undiagnosed HIV prevalence was calculated by subtracting the estimated number of diagnosed HIV infections in living persons from the number of persons included in estimated overall HIV prevalence. Estimates for jurisdictions with an average of <60 diagnoses per year over the most recent 5 years (2008–2012) were considered numerically unstable.

In 42 jurisdictions with numerically stable estimates, the estimated prevalence of persons living with diagnosed or undiagnosed HIV infection in 2012 ranged from 110 per 100,000 persons (Iowa) to 3,936 per 100,000 persons (DC) (Table 1). The estimated percentage of persons living with HIV who had received a diagnosis of HIV by the end of 2012 ranged from 77% in Louisiana to ≥90% in Colorado, Connecticut, Delaware, Hawaii, and New York. During 2008–2012, HIV prevalence increased ≥5% in 36 jurisdictions, with numerically significant increases in 23 jurisdictions.[†] (An expanded table, presenting data for all years during the period 2008–2012, is available online at http://stacks.cdc.gov/view/cdc/31699.) The percentage of persons living with diagnosed HIV infection increased by ≥5% in eight jurisdictions (Arizona, DC, Iowa, Mississippi, Nebraska, New Mexico, North Carolina, and Rhode Island); however, these changes were not numerically significant.

In 39 jurisdictions with numerically stable estimates, the number of MSM living with HIV in 2012 ranged from 1,600 in Delaware and in Iowa to 134,400 in California (Table 2). The percentage of those who had their infection diagnosed ranged from 75% in Louisiana to ≥90% in Hawaii and New York.

[†] Alabama, Arizona, Arkansas, California, District of Columbia, Florida, Georgia, Illinois, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, and Virginia.

Discussion

The percentage of persons living with HIV who had received a diagnosis of HIV infection varied by jurisdiction. At the end of 2012, five jurisdictions (Colorado, Connecticut, Delaware, Hawaii, and New York) met the National HIV/AIDS Strategy objective to increase the percentage of persons living with HIV who know their serostatus to ≥90%, a critical component of the strategy to meet the goal of reducing new HIV infections in the Unites States (*4*). Among MSM, who constitute approximately 60% of persons diagnosed with HIV each year (*2*) and who are a target population for HIV testing, the estimated percentage with HIV who had received an HIV diagnosis was as low as 75% in Louisiana, with only two jurisdictions meeting the goal of ≥90%. Monitoring HIV prevalence can help in the planning for service needs. Increases in prevalence can indicate stable HIV incidence or increasing HIV incidence, with improved care and treatment prolonging survival; this is reflected in decreases in death rates among persons living with HIV during the same period (*5*). In jurisdictions where ≥90% of persons living with HIV had received an HIV diagnosis by the end of 2012, HIV prevalence was stable, which could indicate that the HIV spread has slowed.

HIV diagnosis is the essential first step in the HIV care continuum. Diagnosis allows persons to receive care and treatment to reduce viral load, increase immune function, and thereby reduce risk for transmission, morbidity, and mortality (*6*). Persons who are aware of their infection can also make behavioral changes to reduce transmission. CDC recommends that adolescents and adults be tested for HIV infection at least once and persons at increased risk for HIV infection (including MSM and persons who inject drugs) be tested at least annually (*7*). Decreases in undiagnosed HIV infection in recent years might be attributable to intensified testing efforts, and evidence suggests that the percentage of persons ever tested for HIV infection has increased (*8*) and that the time from infection to diagnosis has decreased (*9*).

The findings in this report are subject to at least two limitations. First, persons living with HIV might move from one jurisdiction to another, resulting in delays in updating residential information in surveillance data. Prevalence estimates were based on the most recent known address, so delays or errors in address reporting, or imbalanced in- and out-migration could affect jurisdictional estimates. Second, because HIV reporting was implemented over time by different jurisdictions, data adjustments were required to account for incomplete reporting and reporting of prevalent cases (delayed diagnosis years). The adjustments for incomplete reporting were conducted separately for high-morbidity jurisdictions and all other jurisdictions combined. This adjustment might not

TABLE 1. Estimated* number of persons aged ≥13 years with HIV infection (diagnosed and undiagnosed), and percentage of those with diagnosed HIV infection, by jurisdiction† — United States, 2012

	Persons living with diagnosed or undiagnosed HIV infection				Persons living with undiagnosed HIV infection		Persons living with diagnosed HIV infection	
Jurisdiction	**No.**	**(95% CI)**	**Rate§**	**(95% CI)**	**No.**	**(95% CI)**	**%**	**(95% CI)**
Alabama	14,400	(13,600–15,300)	358	(338–381)	2,300	(1,500–3,200)	84.0	(78.6–89.2)
Alaska¶	790	(710–900)	133	(120–152)	70	(0–190)	91.1	(78.0–99.9)
Arizona	16,200	(15,700–16,700)	301	(292–310)	1,900	(1,400–2,500)	88.3	(85.0–91.4)
Arkansas	5,800	(5,500–6,200)	238	(226–254)	1,000	(620–1,400)	82.8	(77.2–89.3)
California	183,300	(180,100–186,900)	583	(573–595)	20,700	(17,100–24,300)	88.7	(86.7–90.3)
Colorado	12,600	(12,100–13,100)	294	(282–305)	1,300	(740–1,800)	89.7	(86.1–93.3)
Connecticut	13,500	(12,900–14,100)	444	(424–464)	1,300	(850–1,800)	90.4	(86.8–93.9)
Delaware	4,300	(4,000–4,500)	559	(520–585)	430	(120–720)	90.0	(83.5–96.9)
District of Columbia	21,700	(20,900–22,400)	3,936	(3,791–4,063)	2,300	(1,400–3,100)	89.4	(86.2–93.2)
Florida	127,900	(125,400–130,000)	777	(761–789)	15,900	(13,500–17,900)	87.6	(86.1–89.3)
Georgia	57,300	(55,700–58,700)	706	(686–723)	10,700	(9,000–12,300)	81.3	(79.1–83.8)
Hawaii	3,500	(3,300–3,700)	300	(283–318)	250	(0–500)	92.9	(86.3–100.0)
Idaho¶	1,100	(1,000–1,200)	86	(78–93)	100	(0–220)	90.9	(81.5–100.0)
Illinois	45,700	(44,100–47,000)	427	(413–440)	7,500	(5,800–8,700)	83.6	(81.3–86.9)
Indiana	11,400	(10,700–11,900)	211	(198–220)	1,700	(970–2,200)	85.1	(80.7–90.0)
Iowa	2,800	(2,600–3,000)	110	(102–117)	520	(280–750)	81.4	(74.8–89.2)
Kansas	3,700	(3,400–3,900)	157	(144–165)	560	(310–780)	84.9	(78.8–91.0)
Kentucky	8,300	(7,900–8,700)	228	(217–239)	1,200	(780–1,700)	85.5	(80.7–90.6)
Louisiana	22,600	(21,700–23,500)	596	(572–619)	5,100	(4,200–6,000)	77.4	(74.3–80.5)
Maine¶	1,800	(1,600–1,900)	157	(140–166)	90	(0–230)	95.0	(86.8–100.0)
Maryland	43,300	(41,500–45,000)	880	(843–914)	8,100	(6,200–9,900)	81.3	(77.8–85.0)
Massachusetts	27,000	(26,200–27,900)	477	(463–493)	4,100	(3,300–5,000)	84.8	(81.6–87.5)
Michigan	17,500	(16,800–18,200)	211	(203–219)	2,700	(1,900–3,500)	84.6	(80.5–88.1)
Minnesota	8,400	(8,000–8,800)	188	(180–197)	1,200	(760–1,600)	85.7	(81.2–90.0)
Mississippi	10,300	(9,600–10,900)	420	(392–445)	1,700	(1,100–2,200)	83.5	(79.3–88.1)
Missouri	13,200	(12,600–13,900)	263	(251–277)	1,800	(1,300–2,600)	86.4	(81.6–90.1)
Montana¶	650	(550–730)	77	(65–86)	30	(0–130)	95.4	(80.7–99.7)
Nebraska	2,200	(2,000–2,400)	145	(132–158)	290	(110–490)	86.8	(79.4–94.4)
Nevada	9,600	(9,100–10,100)	421	(399–443)	1,400	(740–1,900)	85.4	(81.0–91.4)
New Hampshire¶	1,600	(1,500–1,800)	141	(132–159)	120	(0–310)	92.5	(82.4–100.0)
New Jersey	43,100	(41,800–44,500)	580	(563–599)	6,800	(5,500–8,200)	84.2	(81.3–87.0)
New Mexico	3,600	(3,400–3,800)	210	(199–222)	400	(160–630)	88.9	(82.7–95.0)
New York	177,000	(174,800–179,600)	1,070	(1,057–1,086)	12,600	(10,000–15,400)	92.9	(91.4–94.3)
North Carolina	32,000	(31,100–32,900)	395	(384–406)	4,200	(3,100–5,200)	86.9	(84.1–89.9)
North Dakota¶	330	(270–390)	56	(46–67)	20	(0–100)	93.9	(73.9–100.0)
Ohio	22,900	(22,100–23,700)	237	(229–245)	4,200	(3,400–5,000)	81.7	(78.7–84.7)
Oklahoma	6,700	(6,300–7,100)	214	(201–227)	1,100	(680–1,600)	83.6	(78.4–89.5)
Oregon	8,400	(7,900–8,700)	256	(241–265)	1,100	(540–1,500)	86.9	(82.1–92.3)
Pennsylvania	40,900	(39,700–42,100)	378	(367–389)	5,700	(4,500–6,700)	86.1	(83.8–88.8)
Rhode Island	2,500	(2,300–2,700)	278	(256–300)	280	(10–490)	88.8	(81.1–98.9)
South Carolina	19,300	(18,200–20,100)	489	(461–510)	3,200	(2,000–4,000)	83.4	(79.2–88.3)
South Dakota¶	520	(450–590)	76	(66–86)	90	(10–180)	82.7	(68.7–98.3)
Tennessee	19,200	(18,300–19,800)	357	(340–368)	2,700	(1,700–3,400)	85.9	(82.4–89.9)
Texas	104,300	(101,800–106,200)	497	(485–506)	18,000	(15,300–19,800)	82.7	(81.2–84.7)
Utah	2,900	(2,700–3,200)	132	(123–146)	430	(160–700)	85.2	(76.6–94.1)
Vermont¶	810	(730–890)	150	(135–165)	0	(0–50)	100.0	(93.7–100.0)
Virginia	25,100	(24,200–25,900)	367	(354–379)	3,200	(2,300–4,100)	87.3	(83.9–90.4)
Washington	15,400	(14,700–16,200)	268	(256–282)	1,900	(1,200–2,600)	87.7	(83.7–91.5)
West Virginia	2,200	(2,000–2,400)	139	(126–152)	330	(150–520)	85.0	(76.6–92.6)
Wisconsin	6,400	(6,000–6,900)	134	(125–144)	980	(450–1,530)	84.7	(77.7–92.4)
Wyoming¶	320	(260–390)	67	(55–82)	40	(0–110)	87.5	(68.6–100.0)
Total**	**1,218,400**	**(1,207,100–1,228,200)**	**467**	**(462.5–470.5)**	**156,300**	**(144,100–165,900)**	**87.2**	**(86.4–88.0)**

Abbreviations: HIV = human immunodeficiency virus; CI = confidence interval.

* Estimates were derived by using back-calculation. Estimates were rounded to the nearest 100 for numbers >1,000 and to the nearest 10 for numbers <1,000 to reflect the uncertainty inherent in statistical estimates.

† Persons whose most recent known address or residence at death is in the jurisdiction by December 31, 2012.

§ Per 100,000 population.

¶ Estimates for jurisdictions with <60 diagnoses per year (average) over the most recent 5 years (2008–2012) are considered numerically unstable.

** Because column totals were calculated independently and to correspond to methods for national estimates with 24-month reporting delay, the values in each column might not sum to the column total.

TABLE 2. Estimated* number of males aged ≥13 years with HIV infection (diagnosed and undiagnosed) attributed to male-to-male sexual contact and percentages of those with diagnosed HIV infection, by jurisdiction† — United States, 2012

Jurisdiction	Persons living with diagnosed or undiagnosed HIV infection		Persons living with undiagnosed HIV infection		Persons living with diagnosed HIV infection	
	No.	(95% CI)	No.	(95% CI)	%	(95% CI)
Alabama	7,900	(7,400–8,400)	1,600	(990–2,000)	79.7	(75.5–85.3)
Alaska§	410	(350–480)	20	(0–270)	95.1	(77.4–96.7)
Arizona	10,500	(10,100–11,000)	1,200	(630–1,800)	88.6	(83.9–93.4)
Arkansas	3,500	(3,200–3,900)	800	(450–1,260)	77.1	(69.0–83.8)
California	134,400	(132,700–136,400)	16,400	(14,100–18,500)	87.8	(86.4–89.2)
Colorado	8,900	(8,500–9,200)	950	(510–1,360)	89.3	(85.1–93.8)
Connecticut	4,600	(4,300–4,900)	710	(320–1,000)	84.6	(78.8–92.1)
Delaware	1,600	(1,500–1,800)	240	(10–430)	85.0	(75.9–96.6)
District of Columbia	11,300	(10,900–11,900)	1,400	(820–2,000)	87.6	(82.5–91.9)
Florida	60,500	(58,900–62,000)	8,100	(6,500–9,600)	86.6	(84.1–88.9)
Georgia	33,100	(31,800–34,100)	6,900	(5,400–8,000)	79.2	(76.3–82.9)
Hawaii	2,500	(2,400–2,700)	220	(0–640)	91.2	(83.1–95.7)
Idaho§	630	(560–710)	80	(0–220)	87.3	(72.1–96.9)
Illinois	27,800	(26,600–28,600)	5,300	(4,200–6,200)	80.9	(78.3–84.3)
Indiana	6,900	(6,500–7,300)	1,000	(530–1,420)	85.5	(80.3–91.8)
Iowa	1,600	(1,400–1,800)	330	(130–550)	79.4	(69.5–89.3)
Kansas	2,200	(2,000–2,400)	380	(170–590)	82.7	(75.8–90.3)
Kentucky	5,300	(5,000–5,600)	890	(480–1,210)	83.2	(77.8–90.5)
Louisiana	10,700	(10,000–11,300)	2,700	(2,000–3,300)	74.8	(70.0–79.9)
Maine§	1,200	(1,000–1,300)	90	(0–460)	92.5	(83.7–94.9)
Maryland	16,200	(15,300–16,900)	3,900	(2,900–4,900)	75.9	(71.7–80.5)
Massachusetts	12,200	(11,500–12,800)	2,000	(1,300–2,700)	83.6	(79.0–87.9)
Michigan	10,900	(10,100–11,600)	1,900	(1,200–2,700)	82.6	(76.8–88.1)
Minnesota	5,200	(5,000–5,500)	770	(360–1,200)	85.2	(78.6–91.9)
Mississippi	5,400	(5,000–5,900)	1,200	(740–1,700)	77.8	(70.5–84.7)
Missouri	9,100	(8,600–9,500)	1,500	(960–1,900)	83.5	(78.7–88.7)
Montana§	420	(360–480)	30	(0–220)	92.9	(75.9–95.1)
Nebraska§	1,300	(1,200–1,400)	190	(40–320)	85.4	(76.9–95.4)
Nevada	6,500	(6,100–6,800)	1,000	(590–1,400)	84.6	(79.3–90.3)
New Hampshire§	950	(830–1,050)	120	(0–290)	87.4	(77.6–94.7)
New Jersey	16,800	(15,800–17,800)	3,700	(2,400–4,800)	78.0	(73.5–84.5)
New Mexico	2,400	(2,200–2,600)	280	(50–480)	88.3	(81.0–97.7)
New York	75,900	(73,900–78,200)	7,700	(5,700–10,000)	89.9	(87.0–92.4)
North Carolina	16,100	(15,400–16,600)	2,600	(1,900–3,400)	83.9	(80.0–87.3)
North Dakota§	190	(130–230)	20	(0–150)	89.5	(59.2–95.4)
Ohio	14,800	(14,200–15,400)	3,100	(2,300–3,800)	79.1	(75.1–83.0)
Oklahoma	4,100	(3,800–4,400)	740	(370–1,060)	82.0	(75.9–89.5)
Oregon	5,800	(5,500–6,200)	850	(350–1,230)	85.3	(79.4–92.8)
Pennsylvania	16,100	(15,200–17,000)	2,700	(1,800–3,600)	83.2	(78.3–87.8)
Rhode Island§	1,100	(1,000–1,300)	200	(50–350)	81.8	(71.6–92.3)
South Carolina	9,500	(8,900–10,000)	2,000	(1,400–2,600)	78.9	(73.5–85.0)
South Dakota§	200	(160–240)	30	(0–80)	85.0	(66.5–97.7)
Tennessee	11,000	(10,600–11,500)	1,800	(1,300–2,200)	83.6	(80.1–87.6)
Texas	62,400	(61,000–63,700)	12,100	(10,400–13,200)	80.6	(78.7–83.0)
Utah	1,700	(1,500–1,800)	250	(40–440)	85.3	(75.1–95.5)
Vermont§	520	(450–590)	0	(0–30)	100.0	(94.5–100.0)
Virginia	13,500	(12,900–14,200)	2,000	(1,300–2,700)	85.2	(80.6–89.4)
Washington	10,400	(9,900–10,800)	1,300	(650–1,700)	87.5	(83.2–93.1)
West Virginia§	1,200	(1,100–1,300)	200	(40–350)	83.3	(73.3–92.1)
Wisconsin	4,000	(3,700–4,200)	650	(320–980)	83.8	(77.2–89.9)
Wyoming§	180	(140–220)	40	(0–120)	77.8	(57.6–94.2)
Total¶	**666,900**	**(659,900–674,300)**	**98,700**	**(91,200–105,400)**	**85.2**	**(84.2–86.2)**

Abbreviations: HIV = human immunodeficiency virus; CI = confidence interval.

* Estimates were derived by using back-calculation. Estimates were rounded to the nearest 100 for numbers >1,000 and to the nearest 10 for numbers <1,000 to reflect the uncertainty inherent in statistical estimates.

† Persons whose most recent known address or residence at death is in the jurisdiction by December 31, 2012.

§ Estimates for jurisdictions with <60 diagnoses per year (average) over the most recent 5 years (2008–2012) are considered numerically unstable.

¶ Because column totals were calculated independently and to correspond to methods for national estimates with 24-month reporting delay, the values in each column might not sum to the column total.

Summary

What is already known on this topic?

Among the estimated 1.2 million persons living with human immunodeficiency virus (HIV) infection in the United States in 2011, 14% were living with undiagnosed infection. The majority of persons who received a diagnosis of HIV infection in 2011 were men who have sex with men (62%).

What is added by this report?

In 42 jurisdictions with numerically stable estimates, HIV prevalence in 2012 ranged from 110 per 100,000 persons (Iowa) to 3,936 per 100,000 (District of Columbia). The percentage of HIV-infected persons with diagnosed HIV ranged from 77% in Louisiana to ≥90% in Colorado, Connecticut, Delaware, Hawaii, and New York. Among men who have sex with men, the percentage of HIV cases that were diagnosed ranged from 75% in Louisiana to ≥90% in Hawaii and New York in 39 jurisdictions with numerically stable estimates.

What are the implications for public health practice?

To achieve the National HIV/AIDS Strategy's objective to increase the percentage of persons living with HIV who know their serostatus to ≥90%, sustained efforts are needed to fully implement routine HIV testing. The percentage of persons with undiagnosed HIV varies by geographic area, and efforts tailored to each area's unique needs and situations might be needed to increase the percentage of persons aware of their infection.

be accurate for low-morbidity jurisdictions, although results might appear stable.

To advance the goals of the National HIV/AIDS Strategy (i.e., reducing new HIV infections, improving health outcomes among persons living with HIV, and reducing HIV-related disparities), CDC and its partners have been pursuing a prevention approach to maximize the impact of current HIV testing efforts (*3*). The results presented in this report show that although the overall percentage of persons living with HIV who have received a diagnosis of HIV infection is high, additional efforts are needed to ensure that all jurisdictions meet the goals of the strategy. Continued efforts to implement routine HIV screening in health care settings and focus on targeted testing in non–health care settings to access populations in communities with disproportionately high HIV burden, including the 10 jurisdictions with the highest number of undiagnosed infections[§] comprising about 68% of all undiagnosed infections, might help further reduce undiagnosed HIV infection. With an estimated 40% of persons living with HIV engaged in HIV medical care, 37% prescribed antiretroviral therapy (ART), and 30% having achieved viral suppression in 2011, improvements are also critical in other steps of the continuum of care to reach the United Nations' goals of ≥90% of persons living with diagnosed HIV infection receiving ART and ≥90% of persons receiving ART having viral suppression by 2020, and ultimately reduce HIV transmission in the United States (*6,10*).

[§] California, Florida, Georgia, Illinois, Louisiana, Maryland, New Jersey, New York, Ohio, and Texas.

[1]Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC; [2]ICF International, Atlanta, Georgia; [3]Emory University, Atlanta, Georgia.

Corresponding author: H. Irene Hall, ixh1@cdc.gov, 404-639-2050.

References

1. Skarbinski J, Rosenberg E, Paz-Bailey G, et al. Human immunodeficiency virus transmission at each step of the care continuum in the United States. JAMA Intern Med 2015;175:588–96.
2. CDC. Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas, 2012. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/hiv/pdf/surveillance_report_vol_19_no_3.pdf.
3. CDC. HIV prevention in the United States: expanding the impact. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/nchhstp/newsroom/HivFactSheets/Future/index.htm.
4. Office of National AIDS Policy. National HIV/AIDS strategy for the United States. Washington, DC: Office of National AIDS Policy; 2010. Available at https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas.pdf.
5. Siddiqi AE, Hu X, Hall HI. Mortality among blacks or African Americans with HIV infection—United States, 2008–2012. MMWR Morb Mortal Wkly Rep 2015;64:81–6.
6. Bradley H, Hall HI, Wolitski RJ, et al. Vital signs: HIV diagnosis, care, and treatment among persons living with HIV—United States, 2011. MMWR Morb Mortal Wkly Rep 2014;63:1113–7.
7. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. MMWR Recomm Rep 2006;55(No. RR-14).
8. CDC. HIV testing trends in the United States, 2000–2011. Atlanta, GA: US Department of Health and Human Services, CDC; 2013. Available at http://www.cdc.gov/hiv/pdf/testing_trends.pdf.
9. Hall HI, Song R, Szwarcwald CL, Green T. Time from infection with the human immunodeficiency virus to diagnosis, United States. J Acquir Immune Defic Syndr 2015;69:248–51.
10. Joint United Nations Programme on HIV/AIDS. 90-90-90: an ambitious treatment target to help end the AIDS epidemic. Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS; 2014. Available at http://www.unaids.org/sites/default/files/media_asset/90-90-90_en_0.pdf.

Identifying New Positives and Linkage to HIV Medical Care — 23 Testing Site Types, United States, 2013

Puja Seth, PhD[1]; Guoshen Wang, MS[1]; Nicoline T. Collins, MPH[1]; Lisa Belcher, PhD[1] (Author affiliations at end of text)

Among the estimated 1.2 million persons living with human immunodeficiency virus (HIV) infection in the United States, approximately 14% have not had their HIV diagnosed (*1*). Certain populations, such as African Americans/blacks (in this report referred to as blacks), men who have sex with men (MSM), and Hispanics/Latinos (in this report referred to as Hispanics), are disproportionately affected by HIV. In areas where HIV prevalence is ≥0.1%, CDC recommends routine HIV screening in health care settings for persons aged 13–64 years. Implementation of HIV screening as part of routine care can increase the number of HIV diagnoses, destigmatize HIV testing, and improve access to care for persons with new HIV infections (*2*). Additionally, targeted testing in non–health care settings might facilitate access to persons in at-risk populations (e.g., MSM, blacks, and Hispanics) who are unaware of their status and do not routinely seek care (*3*). CDC analyzed data for 23 testing site types submitted by 61 health departments and 151 CDC-funded community-based organizations to determine 1) the number of HIV tests* conducted, 2) the percentage of persons with new diagnoses of HIV infection (in this report referred to as new positives), and 3) the percentage of persons who were linked to HIV medical care within 90 days after receiving diagnoses at specific site types within health care and non–health care settings. The results indicated that, in health care settings, primary care and sexually transmitted disease (STD) clinics accounted for substantially more HIV tests than did other sites, and STD clinics identified more new positives. In non–health care settings, HIV counseling and testing sites accounted for the most tests and identified the highest number of new positives. Examining program data by site type shows which sites performed better in diagnosing new positives and informs decisions about program planning and allocation of CDC HIV testing resources among and within settings.

In 2013, CDC funded 61 health departments† and 151 community-based organizations to provide HIV testing and HIV prevention services in the United States. Data on CDC-funded HIV testing and other HIV prevention activities are collected locally. Required data are submitted via a secure CDC-supported web-based data system. CDC and grantees use these data for monitoring and evaluation of HIV testing and service delivery.

Valid HIV tests are records in which data on test technology (conventional, rapid, nucleic acid amplification testing, or other) or test result (positive, negative, indeterminate, or invalid) or both are reported. Persons who test positive for HIV and report no prior positive test results are categorized as new positives. Linkage to HIV medical care is defined as attendance at first medical appointment within 90 days of the current test date. Attendance at first medical appointment can be confirmed by client report, HIV care provider report, or HIV surveillance record check. To account for missing data on linkage to care, both minimum and maximum percentages were calculated.§ A primary goal of the National HIV/AIDS Strategy is to link 85.0% of all new positives to HIV medical care within 90 days of diagnosis (*4*).

HIV testing records submitted to CDC by June 2, 2014, were analyzed and stratified by 23 site types in health care and non–health care settings,¶ selected racial/ethnic categories (whites, blacks, and Hispanics), and selected target populations (MSM, heterosexual males, and heterosexual females).**

In 2013, a total of 3,343,633 CDC-funded HIV tests were conducted in the United States; HIV test setting data were available for 3,276,594 (98.0%). In health care settings, the highest percentages of tests were conducted in primary care clinics (27.2%), STD clinics (25.6%), emergency departments (15.0%), other health care settings (12.8%), and correctional

* HIV tests are the outcome of one or more individual HIV tests performed to determine a person's HIV status. During one testing event, a person might be tested once (e.g., one rapid test or one conventional test) or multiple times (e.g., one rapid test followed by one conventional test to confirm a preliminary HIV-positive test result).

† Health departments in the 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and eight directly funded city/county health departments (Baltimore. Maryland; Chicago, Illinois; Fulton County, Georgia; Houston, Texas; Los Angeles County, California; New York City, New York; Philadelphia, Pennsylvania; and San Francisco, California).

§ The minimum was calculated by including missing/invalid data in the denominator, and the maximum was calculated by excluding missing/invalid data from the denominator.

¶ A health care setting is one that provides both medical diagnostic and treatment services (e.g., inpatient facilities, outpatient facilities, and emergency departments). A non–health care setting is one that does not provide both medical diagnostic and treatment services (e.g., HIV counseling and testing sites and community settings).

** Men who have sex with men are males who reported male-to-male sexual contact in the past 12 months. Heterosexual males are those who only reported heterosexual contact with a female in the past 12 months. Heterosexual females are those who only reported heterosexual contract with a male in the past 12 months. To determine target populations, CDC requires the collection of data on all tested persons in non–health care settings but only on all HIV-positive persons in health care settings.

facilities (10.5%). The percentage of new positives ranged from 0.2% to 0.8% and was highest in STD clinics (0.8%), unspecified outpatient facilities (0.5%), substance abuse treatment facilities (0.4%), HIV clinics (0.4%), and inpatient facilities (0.4%). In non–health care settings, the highest percentage of tests were conducted in HIV counseling and testing sites (46.7%), other non–health care settings (20.5%), and community settings (13.8%). The percentage of new positives ranged from 0.2% to 1.3% and was highest for partner services field visits (i.e., field testing of sexual partners of HIV-positive persons) (1.3%); bar, club, or adult entertainment venues (1.2%); individual residences (1.1%); and HIV counseling testing sites (1.0%) (Table 1).

No HIV testing site met the National HIV/AIDS Strategy goal of 85.0% linked to HIV medical care within 90 days of diagnosis based on the minimum percentages calculated. However, using the maximum percentages calculated, the goal was met by eight of the 12 site types among health care settings, including all except for the following: unspecified outpatient facilities (0.0%), HIV clinics (19.4%), women's health clinics (57.1%), and TB clinics (72.2%). STD clinics identified the largest percentage of new positives (0.8%) among all health care settings and also met the National HIV/AIDS Strategy linkage goal. The linkage goal also was met by seven of 11 site types in non–health care settings, including all except for the following: community settings (67.7%), individual residences

TABLE 1. HIV tests, persons with newly diagnosed HIV infection, and persons linked to HIV medical care, by testing setting and site type — 61 health departments and 151 community-based organizations, United States, 2013

	HIV tests*†		Persons with newly diagnosed HIV infection§		Persons with newly diagnosed HIV infection linked to HIV medical care within 90 days¶		
Testing setting/Site type	**No.**	**(%, column)**	**No.**	**(%, row)**	**No.**	**(Minimum %)**	**(Maximum %)**
Health care settings							
Primary care clinic	659,306	(27.2)	2,178	(0.3)	1,202	(55.2)	(89.2)
STD clinic	621,010	(25.6)	4,766	(0.8)	2,636	(55.3)	(85.3)
Emergency department	363,064	(15.0)	1,075	(0.3)	355	(33.0)	(85.7)
Health care, other	310,159	(12.8)	918	(0.3)	558	(60.8)	(86.8)
Correctional facility	254,719	(10.5)	841	(0.3)	319	(37.9)	(88.9)
Substance abuse treatment facility	61,386	(2.5)	230	(0.4)	118	(51.3)	(90.1)
HIV clinic	49,611	(2.0)	214	(0.4)	14	(6.5)	(19.4)
Inpatient facility	39,563	(1.6)	153	(0.4)	84	(54.9)	(94.4)
Tuberculosis clinic	36,527	(1.5)	101	(0.3)	13	(12.9)	(72.2)
Outpatient facility, unspecified	11,857	(0.5)	55	(0.5)	0	(0.0)	(0.0)
Women's health clinic	11,807	(0.5)	30	(0.3)	4	(13.3)	(57.1)
Dental clinic	2,390	(0.1)	5	(0.2)	3	(60.0)	(100.0)
Total	**2,421,399**	**(100.0)**	**10,566**	**(0.4)**	**5,306**	**(50.2)**	**(85.9)**
Non–health care settings							
HIV counseling and testing site	399,535	(46.7)	3,860	(1.0)	2,135	(55.3)	(91.8)
Non–health care, other	174,935	(20.5)	716	(0.4)	134	(18.7)	(88.2)
Community setting	118,027	(13.8)	835	(0.7)	343	(41.1)	(67.7)
Public area	42,046	(4.9)	307	(0.7)	129	(42.0)	(78.7)
Commercial venue	31,435	(3.7)	188	(0.6)	79	(42.0)	(91.9)
School or educational facility	26,884	(3.1)	65	(0.2)	38	(58.5)	(86.4)
Field visit (partner services)	21,848	(2.6)	286	(1.3)	218	(76.2)	(96.0)
Bar, club, or adult entertainment	21,243	(2.5)	253	(1.2)	111	(43.9)	(87.4)
Shelter or transitional housing	13,051	(1.5)	55	(0.4)	27	(49.1)	(96.4)
Syringe exchange program	3,975	(0.5)	17	(0.4)	8	(47.1)	(61.5)
Individual residence	2,216	(0.3)	25	(1.1)	7	(28.0)	(63.6)
Total	**855,195**	**(100.0)**	**6,607**	**(0.8)**	**3,229**	**(48.9)**	**(87.6)**
Missing/Invalid	67,039	(2.0)	253	(0.4)	17	(6.7)	(53.1)
Overall total	**3,343,633**	**(100.0)**	**17,426**	**(0.5)**	**8,552**	**(49.1)**	**(86.5)**

Abbreviations: HIV = human immunodeficiency virus; STD = sexually transmitted disease.

* HIV tests are the outcome of one or more individual HIV tests performed to determine a person's HIV status. During one testing event, a person might be tested once (e.g., one rapid test or one conventional test) or multiple times (e.g., one rapid reactive test followed by one conventional test to confirm a preliminary HIV-positive test result). Valid HIV tests are defined as records for which a test technology (conventional, rapid, nucleic acid amplification testing, or other) was reported or a test result (positive, negative, indeterminate, or invalid) was reported.

† For site types in health care settings, the denominator was the total number of HIV tests in health care settings (2,421,399). For site types in non–health care settings, the denominator was the total number of HIV tests in non–health care settings (855,195). For missing/invalid data, the denominator was the overall total number of HIV tests (3,343,633).

§ Persons who tested HIV-positive and did not report a prior positive test result were categorized as persons with newly identified HIV infection.

¶ Minimum percentages include missing data in the denominator and likely underestimate performance. Maximum percentages exclude missing data from the denominator and likely overestimate performance.

(63.6%), public areas (78.7%), and syringe exchange programs (61.5%). HIV counseling and testing sites identified the largest number of new positives linked to HIV care (2,135) (Table 1).

The percentage of new positives identified in different setting types ranged from 0.0% to 0.8% among whites, 0.2% to 2.3% among blacks, and 0.1% to 1.3% among Hispanics for both health care and non–health care settings. Within health care settings, the highest percentage of new positives among whites was found in STD clinics (0.5%) and unspecified outpatient facilities (0.4%), among blacks in STD clinics (0.8%) and substance abuse treatment facilities (0.7%), and among Hispanics in STD clinics (1.0%) and dental clinics (0.5%). In non–health care settings, the highest percentage of new positives was found in bar, club, or adult entertainment venues among blacks (2.3%), Hispanics (1.3%), and whites (0.8%); partner services field visits among blacks (2.0%) and whites (0.8%); individual residences among Hispanics (1.2%); and HIV counseling testing sites among whites (0.8%) (Table 2).

In non–health care settings, among target populations, for MSM, the percentage of new positives ranged from 0.6% in syringe exchange programs to 5.8% in partner services field visits. For heterosexual men, the percentage of new positives ranged from 0.1% in bar, club, or adult entertainment venues to 0.8% in partner services field visits. For heterosexual women, the percentage of new positives ranged from 0.1% in school or educational facilities and other non–health care settings to 0.7% in partner services field visits. Other settings with the highest percentage of new positives included other non–health care settings for MSM (3.7%), community settings for heterosexual men (0.6%), individual residences for heterosexual women (0.6%), and HIV counseling and testing sites for MSM (2.7%) and heterosexual men (0.5%) (Table 3).

TABLE 2. HIV tests and persons with newly diagnosed HIV infection, by testing setting and site type and race/ethnicity — 61 health departments and 151 community-based organizations, United States, 2013

	HIV tests*						Persons with newly diagnosed HIV infection					
	Whites		Blacks		Hispanics		Whites		Blacks		Hispanics	
Testing setting/Site type	No.	(%, column)	No.	(%, column)	No.	(%, column)	No.	(%)	No.	(%)	No.	(%)
Health care settings												
Primary care clinic	158,589	(24.0)	280,172	(25.4)	167,387	(33.3)	509	(0.3)	1,031	(0.4)	465	(0.3)
STD clinic	178,528	(27.0)	314,687	(28.5)	93,010	(18.5)	935	(0.5)	2,624	(0.8)	926	(1.0)
Emergency department	68,838	(10.4)	181,346	(16.4)	91,333	(18.2)	144	(0.2)	693	(0.4)	198	(0.2)
Health care, other	91,557	(13.9)	132,097	(12.0)	68,757	(13.7)	126	(0.1)	542	(0.4)	207	(0.3)
Correctional facility	75,403	(11.4)	116,691	(10.6)	48,263	(9.6)	154	(0.2)	543	(0.5)	112	(0.2)
Substance abuse treatment facility	29,579	(4.5)	19,428	(1.8)	8,905	(1.8)	68	(0.2)	133	(0.7)	19	(0.2)
HIV clinic	25,212	(3.8)	20,425	(1.8)	3,026	(0.6)	76	(0.3)	125	(0.6)	8	(0.3)
Inpatient facility	9,319	(1.4)	17,025	(1.5)	9,922	(2.0)	29	(0.3)	73	(0.4)	25	(0.3)
Tuberculosis clinic	11,036	(1.7)	14,230	(1.3)	7,825	(1.6)	14	(0.1)	73	(0.5)	7	(0.1)
Outpatient facility, unspecified	7,130	(1.1)	2,380	(0.2)	1,686	(0.3)	26	(0.4)	14	(0.6)	7	(0.4)
Women's health clinic	4,556	(0.7)	4,425	(0.4)	2,298	(0.5)	3	(0.1)	24	(0.5)	2	(0.1)
Dental clinic	473	(0.1)	1,229	(0.1)	584	(0.1)	0	(0.0)	2	(0.2)	3	(0.5)
Total	**660,220**	**(100.0)**	**1,104,135**	**(100.0)**	**502,996**	**(100.0)**	**2,084**	**(0.3)**	**5,877**	**(0.5)**	**1,979**	**(0.4)**
Non–health care settings												
HIV counseling and testing site	112,067	(50.2)	148,932	(41.3)	107,792	(52.4)	872	(0.8)	1,862	(1.3)	924	(0.9)
Non–health care, other	40,795	(18.3)	89,048	(24.7)	30,737	(14.9)	105	(0.3)	478	(0.5)	86	(0.3)
Community setting	22,426	(10.0)	64,930	(18.0)	24,646	(12.0)	98	(0.4)	581	(0.9)	130	(0.5)
Public area	7,330	(3.3)	18,897	(5.2)	11,974	(5.8)	25	(0.3)	192	(1.0)	67	(0.6)
Commercial venue	9,250	(4.1)	7,047	(2.0)	11,261	(5.5)	56	(0.6)	61	(0.9)	47	(0.4)
School or educational facility	7,867	(3.5)	12,202	(3.4)	4,778	(2.3)	10	(0.1)	41	(0.3)	11	(0.2)
Field visit (partner services)	8,017	(3.6)	8,216	(2.3)	4,103	(2.0)	63	(0.8)	164	(2.0)	43	(1.0)
Bar, club, or adult entertainment	9,333	(4.2)	3,034	(0.8)	6,953	(3.4)	77	(0.8)	70	(2.3)	89	(1.3)
Shelter or transitional housing	4,447	(2.0)	5,829	(1.6)	2,150	(1.0)	9	(0.2)	29	(0.5)	13	(0.6)
Syringe exchange program	1,595	(0.7)	1,112	(0.3)	966	(0.5)	3	(0.2)	9	(0.8)	4	(0.4)
Individual residence	312	(0.1)	1,574	(0.4)	250	(0.1)	2	(0.6)	19	(1.2)	3	(1.2)
Total	**223,439**	**(100.0)**	**360,821**	**(100.0)**	**205,610**	**(100.0)**	**1,320**	**(0.6)**	**3,506**	**(1.0)**	**1,417**	**(0.7)**
Missing/Invalid	18,314	(2.0)	41,060	(2.7)	4,452	(0.6)	41	(0.2)	188	(0.5)	11	(0.2)
Overall total	**901,973**	**(100.0)**	**1,506,016**	**(100.0)**	**713,058**	**(100.0)**	**3,445**	**(0.4)**	**9,571**	**(0.6)**	**3,407**	**(0.5)**

Abbreviations: HIV = human immunodeficiency virus; STD = sexually transmitted disease.

* For site types in health care settings, the denominator was the total number of HIV tests (660,220 for whites; 1,104,135 for blacks; and 502,996 for Hispanics). For site types in non–health care settings, the denominator was the total number of HIV tests (223,439 for whites; 360,821 for blacks; and 205,610 for Hispanics). For missing/invalid data, the denominator was the overall total number of HIV tests (901,973 for whites; 1,506,016 for blacks; and 713,058 for Hispanics).

TABLE 3. HIV tests and persons with newly diagnosed HIV infection, by target populations and non–health care test site type* — 61 health departments and 151 community-based organizations, United States, 2013

	HIV tests						Persons with newly diagnosed HIV infection					
	MSM		Heterosexual men		Heterosexual women		MSM		Heterosexual men		Heterosexual women	
Non–health care site type	No.	(%, column)	No.	(%, column)	No.	(%, column)	No.	(%)	No.	(%)	No.	(%)
HIV counseling and testing site	89,596	(59.2)	82,168	(43.6)	94,912	(38.7)	2,392	(2.7)	421	(0.5)	350	(0.4)
Non–health care, other	6,959	(4.6)	36,949	(19.6)	72,072	(29.4)	255	(3.7)	164	(0.4)	104	(0.1)
Community setting	15,040	(9.9)	33,694	(17.9)	38,405	(15.7)	297	(2.0)	197	(0.6)	141	(0.4)
Public area	7,550	(5.0)	9,459	(5.0)	10,675	(4.4)	146	(1.9)	40	(0.4)	38	(0.4)
Commercial venue	11,011	(7.3)	5,923	(3.1)	5,352	(2.2)	113	(1.0)	14	(0.2)	9	(0.2)
School or educational facility	3,064	(2.0)	5,933	(3.2)	9,725	(4.0)	39	(1.3)	2	(0.0)	11	(0.1)
Field visit (partner services)	2,192	(1.4)	7,416	(3.9)	7,721	(3.2)	127	(5.8)	59	(0.8)	57	(0.7)
Bar, club, or adult entertainment	13,600	(9.0)	1,397	(0.7)	1,401	(0.6)	225	(1.7)	1	(0.1)	4	(0.3)
Shelter or transitional housing	1,061	(0.7)	4,194	(2.2)	3,314	(1.4)	20	(1.9)	7	(0.2)	8	(0.2)
Syringe exchange program	941	(0.6)	678	(0.4)	756	(0.3)	6	(0.6)	3	(0.4)	3	(0.4)
Individual residence	302	(0.2)	441	(0.2)	711	(0.3)	7	(2.3)	1	(0.2)	4	(0.6)
Total	**151,316**	**(100.0)**	**188,252**	**(100.0)**	**245,044**	**(100.0)**	**3,627**	**(2.4)**	**909**	**(0.4)**	**729**	**(0.3)**

Abbreviations: HIV = human immunodeficiency virus; MSM = men who have sex with men.

* Data used to identify target populations are required for all tests conducted in non–health care settings but are only required for HIV-positive persons who are tested in health care settings.

Summary

What is already known on this topic?

CDC recommends routine screening for human immunodeficiency virus (HIV) infection in health care settings for persons aged 13–64 years in areas where prevalence is ≥0.1% and for persons at increased behavioral or clinical HIV risk in non–health care settings. Targeting HIV testing and prevention efforts toward high-risk groups in non–health care settings has been shown to be necessary to identify persons with undiagnosed HIV and link them to medical care.

What is added by this report?

In 2013, the percentage of newly identified HIV-positive persons varied widely among sites in health care settings (e.g., STD clinics [0.8%] compared with other sites [0.2%–0.5%]). In non–health care settings, HIV counseling and testing sites conducted the most HIV testing and identified the largest number of new positives (3,860), for a positivity percentage of 1.0%.

What are the implications for public health practice?

These findings highlight the importance of examining program data by settings and sites to better understand which are most effective at reaching persons with undiagnosed HIV among the most affected populations and for informing decisions about program planning and allocation of HIV testing resources.

Discussion

STD clinics identified a higher percentage of persons with new diagnoses of HIV infection (0.8%) compared with other health care settings (0.2%–0.5%). New positives identified in non–health care settings ranged from 0.2% to 1.3% overall, 0.3% to 2.3% among blacks, 0.2% to 1.3% among Hispanics, and 0.6% to 5.8% among MSM. The findings indicate that certain site types yield higher percentages of diagnoses among persons who were previously unaware of their HIV infection. They also highlight the importance of local and national program monitoring and evaluation efforts to determine which sites are most effectively providing HIV testing, identifying new positives, and linking new positives to care. Linkage to care percentages within 90 days were low for certain site types (unspecified outpatient facilities and HIV clinics) because some persons were linked after 90 days. Additionally, data from these two site types each represent a single jurisdiction and might not reflect the national linkage percentages for these types of testing sites. These findings might enable health departments and community-based organization programs to effectively allocate HIV testing resources by testing site.

Although testing in non–health care settings identified a higher percentage of new positives, such testing often is more expensive per test than testing in health care settings and might not target all hard-to-reach populations. Conversely, health care settings, which offer more efficient methods of testing and linkage, might miss undiagnosed HIV-positive persons who do not access health care.

The findings in this report are subject to at least three limitations. First, monitoring linkage is challenging. Because of missing data, minimum and maximum percentages were calculated for linkage to care; therefore, the actual percentages lie somewhere between these two values. Second, because this report focuses only on CDC-funded HIV tests, these findings are not generalizable to the entire U.S. population. Finally, because determination of new positives was based on self-report of no prior positive test results, the number of new positives might be overestimated.

Continued efforts to target HIV testing toward high HIV prevalence areas and populations at high risk can facilitate diagnoses of new positives. For example, CDC's Expanded HIV Testing Initiative, which targets testing toward jurisdictions with a high proportion of AIDS diagnoses among blacks, has shown a significant return on investment in HIV testing, diagnosing new positives, and averting new infections (*5*). Activities to reduce behavioral risk factors and improve linkage to care are critical to improve health and prevent HIV transmission to partners (*6,7*). Focusing HIV testing efforts on the most effective sites in both health care and non–health care settings and increasing linkage to medical care could have a large impact on identifying new positives and ensuring that they receive recommended services.

Acknowledgments

Janet Heitgerd, PhD, Dale Stratford, PhD, Samuel Dooley, MD, Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC.

[1]Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC.

Corresponding author: Puja Seth, pseth@cdc.gov, 404-639-6334.

References

1. Bradley H, Hall HI, Wolitski RJ, et al. Vital signs: HIV diagnosis, care, and treatment among persons living with HIV—United States, 2011. MMWR Morb Mortal Wkly Rep 2014;63:1113–7.
2. CDC. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. MMWR Recomm Rep 2006;55(No. RR-14).
3. CDC. Revised guidelines for HIV counseling, testing, and referral. MMWR Recomm Rep 2001;50(No. RR-19).
4. White House Office of National AIDS Policy. National HIV/AIDS strategy for the United States. Washington, DC: The White House; 2010. Available at https://www.whitehouse.gov/sites/default/files/uploads/NHAS.pdf.
5. Hutchinson AB, Farnham PG, Duffy N, et al. Return on public health investment: CDC's expanded HIV testing initiative. J Acquir Immune Defic Syndr 2012;59:281–6.
6. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med 2011;365:493–505.
7. CDC, Health Resources and Services Administration, National Institutes of Health, et al. Recommendations for HIV prevention with adults and adolescents with HIV in the United States, 2014. Available at http://stacks.cdc.gov/view/cdc/26062.

Outbreaks of Illness Associated with Recreational Water — United States, 2011–2012

Michele C. Hlavsa, MPH[1]; Virginia A. Roberts, MSPH[1]; Amy M. Kahler, MS[1]; Elizabeth D. Hilborn, DVM[2]; Taryn R. Mecher, MPH[1,3]; Michael J. Beach, PhD[1]; Timothy J. Wade, PhD[2]; Jonathan S. Yoder, MPH[1] (Author affiliations at end of text)

Outbreaks of illness associated with recreational water use result from exposure to chemicals or infectious pathogens in recreational water venues that are treated (e.g., pools and hot tubs or spas) or untreated (e.g., lakes and oceans). For 2011–2012, the most recent years for which finalized data were available, public health officials from 32 states and Puerto Rico reported 90 recreational water–associated outbreaks to CDC's Waterborne Disease and Outbreak Surveillance System (WBDOSS) via the National Outbreak Reporting System (NORS). The 90 outbreaks resulted in at least 1,788 cases, 95 hospitalizations, and one death. Among 69 (77%) outbreaks associated with treated recreational water, 36 (52%) were caused by *Cryptosporidium*. Among 21 (23%) outbreaks associated with untreated recreational water, seven (33%) were caused by *Escherichia coli* (*E. coli* O157:H7 or *E. coli* O111). Guidance, such as the Model Aquatic Health Code (MAHC), for preventing and controlling recreational water–associated outbreaks can be optimized when informed by national outbreak and laboratory (e.g., molecular typing of *Cryptosporidium*) data.

A recreational water–associated outbreak is the occurrence of similar illnesses in two or more persons, epidemiologically linked by location and time of exposure to recreational water or recreational water–associated chemicals volatilized into the air surrounding the water. Public health officials in the 50 states, the District of Columbia, U.S. territories, and Freely Associated States* voluntarily report outbreaks of recreational water–associated illness to CDC. In 2010, waterborne outbreaks became nationally notifiable. This report summarizes data on recreational water–associated outbreaks electronically reported by October 30, 2014 to CDC's WBDOSS (http://www.cdc.gov/healthywater/surveillance/) for 2011 and 2012 via NORS.† Data requested for each outbreak include the number of cases,§ hospitalizations, and deaths; etiology; setting (e.g., hotel) and venue (e.g., hot tub or spa) where the exposure occurred; earliest illness onset date; and illness type. All outbreaks are classified according to the strength of data implicating recreational water as the outbreak vehicle (*1*).¶ Outbreak reports classified as Class I have the strongest supporting epidemiologic, clinical laboratory and environmental health data, and those classified as Class IV, the weakest. Classification does not assess adequacy or completeness of investigations.** Negative binomial regression (PROC GENMOD in SAS 9.3 [Cary, NC]) was used to assess trends in the number of outbreaks over time.

For the years 2011 and 2012, public health officials from 32 states and Puerto Rico reported 90 recreational water–associated outbreaks (http://www.cdc.gov/healthywater/surveillance/rec-water-tables-figures.html) (Figure 1), which resulted in at least 1,788 cases, 95 (5%) hospitalizations, and one death. Etiology was confirmed for 73 (81%) outbreaks: 69 (77%) outbreaks were caused by infectious pathogens, including two outbreaks with multiple etiologies, and four (4%) by chemicals (Table). Among the outbreaks caused by infectious pathogens, 37 (54%) were caused by *Cryptosporidium*. On the basis of data reported to CDC, 37 (41%) of the 90 outbreak reports were categorized as class IV.

Outbreaks associated with treated recreational water accounted for 69 (77%) of the 90 outbreaks reported for 2011–2012, and resulted in at least 1,309 cases, 73 hospitalizations, and one reported death. The median number of cases reported for these outbreaks was seven (range: 2–144 cases). Hotels (e.g., hotel, motel, lodge, or inn) were the setting of 13 (19%) of the treated recreational water–associated outbreaks. Twelve (92%) of these 13 outbreaks started outside of June–August; ten (77%) were at least in part associated with a spa. Among the 69 outbreaks, 36 (52%) were caused by *Cryptosporidium*. The 69 outbreaks had a seasonal distribution, with 42 (61%) starting in June–August (Figure 1). Acute gastrointestinal illness was the disease manifestation in 34 (81%) of these summer outbreaks, with *Cryptosporidium* causing 32 (94%) of them. Since 1988, the year that the first U.S. treated recreational

* Includes Marshall Islands, Federated States of Micronesia, and Republic of Palau.

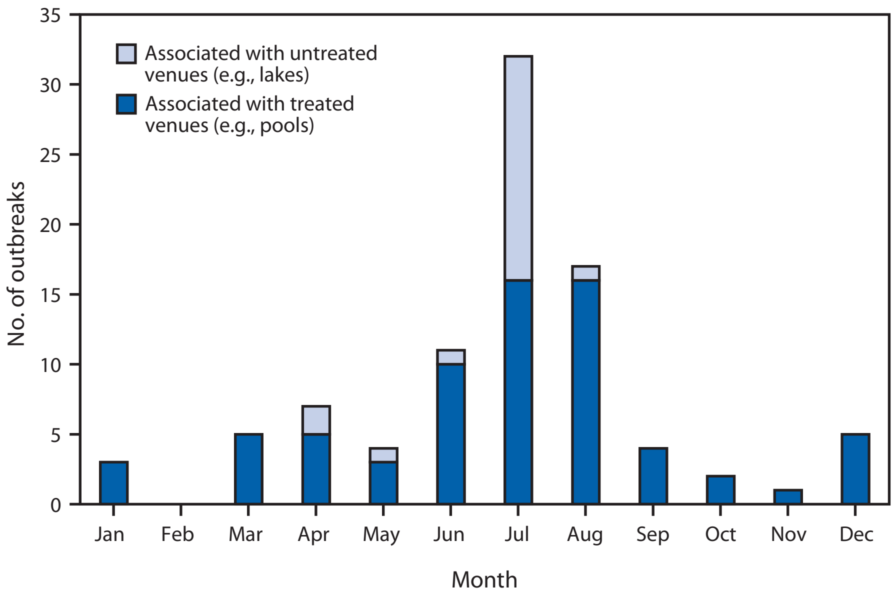
† Forms and guidance available at http://www.cdc.gov/nors/forms.html; outbreaks resulting from recreational water exposures on cruise ships are not reported to WBDOSS.

§ If based on the estimated number of total cases, reporting agencies were not asked to provide supporting evidence.

¶ Classes delineated at http://www.cdc.gov/healthywater/surveillance/recreational/outbreak-classifications.html.

** Outbreaks and subsequent investigations occur under different circumstances, and not all outbreaks can be vigorously investigated. Multiple factors contribute to the ability to collect and report optimal epidemiologic, clinical laboratory, and environmental health data.

FIGURE 1. Number* of outbreaks associated with recreational water, by month — United States, 2011–2012†



* Total n = 90.
† Numbers for 2011 and 2012 are combined for each month.

Summary

What is already known on this topic?

Treated and untreated recreational water–associated outbreaks occur throughout the United States and their incidence has been increasing in recent years. CDC collects data on waterborne outbreaks electronically submitted by the 50 states, the District of Columbia, U.S. territories, and Freely Associated States to CDC's Waterborne Disease and Outbreak Surveillance System via the National Outbreak Reporting System.

What is added by this report?

For 2011–2012, a total of 90 recreational water–associated outbreaks were reported to CDC, resulting in at least 1,788 cases, 95 hospitalizations, and one death. *Cryptosporidium* caused over half of the outbreaks associated with treated recreational water venues (e.g., pools). *Escherichia coli* O157:H7 and O111 caused one third of outbreaks associated with untreated recreational water (e.g., lakes).

What are the implications for public health practice?

Guidance, such as the Model Aquatic Health Code (MAHC), to prevent and control recreational water–associated outbreaks can be optimized when informed by national outbreak and laboratory (e.g., molecular typing of *Cryptosporidium*) data.

water–associated outbreak of cryptosporidiosis was detected (*2*,*3*) (Figure 2), the number of these outbreaks reported annually (range: 0–40 outbreaks) has significantly increased (negative binomial regression; p<0.001). Incidence of these cryptosporidiosis outbreaks has also, at least in part, driven the significant increase (negative binomial regression; p<0.001) in the overall number of recreational water–associated outbreaks reported annually (range: 6–84).

For 2011–2012, 21 (23%) outbreaks were associated with untreated recreational water. These outbreaks resulted in at least 479 cases and 22 hospitalizations. The median number of cases reported for these outbreaks was 16 (range: 2–125). Twenty (95%) of these outbreaks were associated with fresh water; 18 (86%) began in June–August; and seven (33%) were caused by *E. coli* O157:H7 or O111. One outbreak associated with exposure to cyanobacterial toxins was reported.

Discussion

Cryptosporidium continues to be the dominant etiology of recreational water–associated outbreaks. Half of all treated recreational water–associated outbreaks reported for 2011–2012 were caused by *Cryptosporidium*. Among treated recreational water–associated outbreaks of gastrointestinal illness that began in June–August, >90% were caused by *Cryptosporidium,* an extremely chlorine-tolerant parasite that can survive in water at CDC-recommended chlorine levels (1–3 mg/L) and pH (7.2–7.8) for >10 days (*4*). In contrast, among 14 untreated recreational water–associated outbreaks of gastrointestinal illness starting in June–August, 7% (one) were caused by *Cryptosporidium*. The decreased diversity of infectious etiologies causing treated recreational water–associated outbreaks is likely a consequence of the aquatic sector's reliance on halogen disinfection (e.g., chlorine or bromine) and maintenance of proper pH, which are well documented to inactivate most infectious pathogens within minutes (*5*). Continued reporting of treated recreational water–associated outbreaks caused by chlorine-intolerant pathogens (e.g., *E. coli* O157:H7 and norovirus) highlights the need for continued vigilance in maintaining water quality (i.e., disinfectant level and pH), as has been recommended for decades (*5*).

In the United States, codes regulating public treated recreational water venues are independently written and enforced by individual state or local agencies; the consequent variation in the codes is a potential barrier to preventing and controlling outbreaks associated with these venues. In August 2014, CDC released the first edition of MAHC (http://www.cdc.gov/mahc), a comprehensive set of science-based and best-practice recommendations to reduce risk for illness and injury at public, treated recreational water venues. MAHC represents

TABLE. Number* of outbreaks, cases, and hospitalizations associated with recreational water, by etiology and type of water exposure — United States, 2011–2012

	Type of exposure						Total for treated and untreated exposure					
	Treated			Untreated			Outbreaks		Cases†		Hospitalized	
Etiology	Outbreaks	Cases†	Hospitalized	Outbreaks	Cases	Hospitalized	No.	(%)	No.	(%)	No.	(%)§
Bacterium	14	75	24	7	76	18	21	(23)	151	(8)	42	(44)
Escherichia coli O111	0	0	0	2	11	0	2		11		0	
Escherichia coli O157:H7	2	21	5	3	31	15	5		52		20	
Legionella spp.	9	33	18	0	0	0	9		33		18	
Pseudomonas aeruginosa	2	16	0	0	0	0	2		16		0	
Shigella sonnei	1	5	1	2	34	3	3		39		4	
Parasite	37	895	44	4	72	0	41	(46)	967	(54)	44	(46)
Avian schistosomes	0	0	0	1	43	0	1		43		0	
Cryptosporidium spp.	36	874	44	1	16	0	37		890		44	
Giardia intestinalis	1	21	0	2	13	0	3		34		0	
Virus	2	122	0	3	85	1	5	(6)	207	(12)	1	(1)
Adenovirus	0	0	0	1	32	1	1		32		1	
Norovirus	2	122	0	2	53	0	4		175		0	
Chemical	3	57	0	1	8	0	4	(4)	65	(4)	0	(0)
Chlorine	2	46	0	0	0	0	2		46		0	
Chlorine gas	1	11	0	0	0	0	1		11		0	
Cyanobacterial toxin(s)	0	0	0	1	8	0	1		8		0	
Multiple¶	0	0	0	2	181	2	2	(2)	181	(10)	2	(2)
Giardia intestinalis, norovirus	0	0	0	1	125	1	1		125		1	
Escherichia coli, Plesiomonas shigelloides, Shigella sonnei	0	0	0	1	56	1	1		56		1	
Unidentified	13	160	5	4	57	1	17	(19)	217	(12)	6	6
Suspected avian schistosomes	0	0	0	3	22	1	3		22		1	
Suspected pool chemical	1	3	0	0	0	0	1		3		0	
Suspected chloramine	2	13	0	0	0	0	2		13		0	
Suspected chlorine	1	12	0	0	0	0	1		12		0	
Suspected chlorine gas	1	3	0	0	0	0	1		3		0	
Suspected *Legionella* spp.	2	52	1	0	0	0	2		52		1	
Suspected norovirus	2	21	4	1	35	0	3		56		4	
Suspected *P. aeruginosa*	4	56	0	0	0	0	4		56		0	
Total	**69**	**1,309**	**73**	**21**	**479**	**22**	**90**		**1,788**		**95**	
(%)	**(77)**	**(73)**	**(77)**	**(23)**	**(27)**	**(23)**		**(100)**		**(100)**		**(100)**

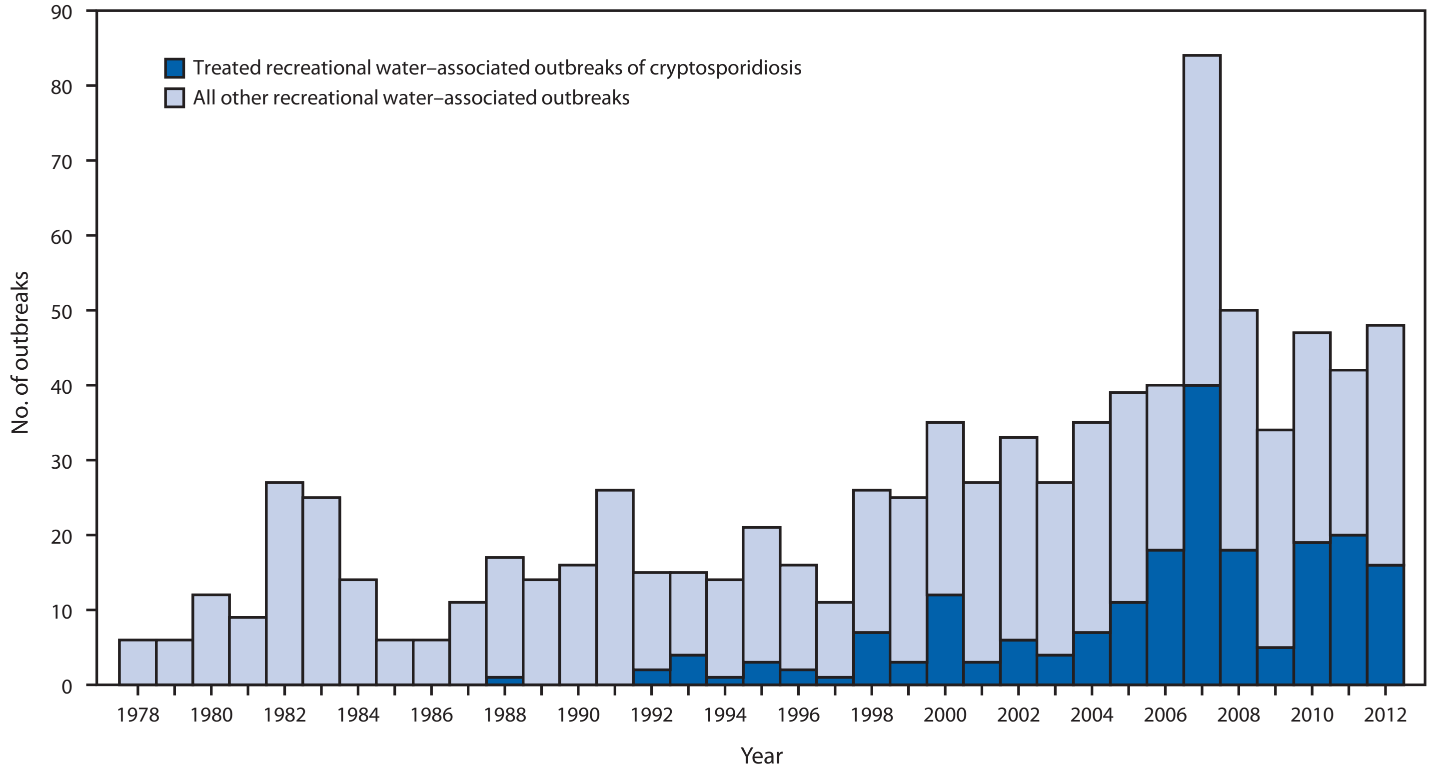
* n = 90.
† One death was reported for an outbreak-related case of legionellosis.
§ Percentages do not add up to 100% because of rounding.
¶ Defined as outbreaks in which more than one type of etiologic agent (e.g., bacterium or virus) is detected in specimens from affected persons. Clinical test results were historically reported to CDC at the clinical specimen level (e.g., five of 10 stool specimens tested positive for *Cryptosporidium*). Multiple etiologies were assigned when each etiologic agent was found in ≥5% of positive clinical specimens. However, clinical test results are reported at the person level (e.g., five of 10 persons tested positive for *Cryptosporidium*) in the National Outbreak Reporting System. Therefore previously published data on multiple etiology assignments might not be directly comparable to such data presented in this report.

the culmination of a 7-year, multi-stakeholder effort and is an evolving resource that addresses emerging public health threats, such as treated recreational water-associated outbreaks of cryptosporidiosis, by incorporating the latest scientifically validated technologies that inactivate or remove infectious pathogens. For example, MAHC recommends additional water treatment (e.g., ultraviolet light or ozone) to inactivate *Cryptosporidium* oocysts at venues where WBDOSS data indicate there is increased risk for transmission. MAHC recommendations can be voluntarily adopted, in part or as a whole, by state and local jurisdictions.

The number of reported untreated recreational water–associated outbreaks confirmed or suspected to be caused by cyanobacterial toxins has decreased, from 11 (2009–2010) to one (2011–2012) (*6*). This decrease is likely the result of a decrease in outbreak reporting rather than a true decrease in incidence. CDC is currently developing a mechanism for reporting algal bloom–associated individual cases through NORS to better characterize their epidemiology.

The findings in this report are subject to at least two limitations. First, the outbreak counts presented are likely

FIGURE 2. Number* of outbreaks associated with recreational water, by year — United States, 1978–2012



* Total n = 879.

an underestimate of actual incidence. Many factors can present barriers to the detection, investigation, and reporting of outbreaks: 1) mild illness; 2) small outbreak size; 3) long incubation periods; 4) wide geographic dispersion of ill swimmers; 5) transient nature of contamination; 6) setting or venue of outbreak exposure (e.g., residential backyard pool); and 7) potential lack of communication between those who respond to outbreaks of chemical etiology (e.g., hazardous materials personnel) and those who usually report outbreaks (e.g., infectious disease epidemiologists). Second, because of variation in public health capacity and reporting requirements across jurisdictions, those reporting outbreaks most frequently might not be those in which outbreaks most frequently occur.

Increasingly, molecular typing tools are being employed to understand the epidemiology of waterborne disease and outbreaks. Most species and genotypes of *Cryptosporidium* are morphologically indistinguishable from one another, and only molecular methods can distinguish species and subtypes and thereby elucidate transmission pathways (*7*,*8*). Systematic national genotyping and subtyping of *Cryptosporidium* in clinical specimens and environmental samples through CryptoNet (http://www.cdc.gov/parasites/crypto/cryptonet.html) can identify circulating *Cryptosporidium* species and subtypes and help identify epidemiologic linkages between reported cases. Molecular typing could substantially help elucidate cryptosporidiosis epidemiology in the United States and inform development of future guidance to prevent recreational water–associated and other outbreaks of cryptosporidiosis (*9*,*10*).

Acknowledgments

State, territorial, local, and Freely Associated State waterborne disease coordinators, epidemiologists, and environmental health personnel; Lihua Xiao, Sarah A. Collier, Kathleen E. Fullerton, Division of Foodborne, Waterborne, and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC.

[1]Division of Foodborne, Waterborne, and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC; [2]Environmental Protection Agency; [3]Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee.

Corresponding author: Michele C. Hlavsa, mhlavsa@cdc.gov, 404-718-4695.

References

1. CDC. Surveillance for waterborne disease outbreaks and other health events associated with recreational water—United States, 2007–2008. MMWR Surveill Summ 2011;60(No. SS-12):1–32.
2. CDC. Epidemiologic notes and reports swimming-associated cryptosporidiosis—Los Angeles County. MMWR Morb Mortal Wkly Rep 1990;39:343–5.
3. Sorvillo FJ, Fujioka K, Nahlen B, Tormey MP, Kebabjian R, Mascola L. Swimming-associated cryptosporidiosis. Am J Public Health 1992;82:742–4.
4. Shields JM, Hill VR, Arrowood MJ, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. J Water Health 2008;6:513–20.
5. White GC. Chlorination of potable water. In: Handbook of chlorination and alternative disinfectants 4th ed. New York, NY: John Wiley & Sons; 1999: 331–536.
6. CDC. Recreational water–associated disease outbreaks—United States, 2009–2010. MMWR Morb Mortal Wkly Rep 2014;63:6–10.
7. Blackburn BG, Mazurek JM, Hlavsa M, et al. Cryptosporidiosis associated with ozonated apple cider. Emerg Infect Dis 2006;12:684–6.
8. Valderrama AL, Hlavsa MC, Cronquist A, et al. Multiple risk factors associated with a large statewide increase in cryptosporidiosis. Epidemiol Infect 2009;137:1781–8.
9. Xiao L. Molecular epidemiology of cryptosporidiosis: an update. Exp Parasitol 2010;124:80–9.
10. Chalmers RM, Elwin K, Thomas AL, Guy EC, Mason B. Long-term *Cryptosporidium* typing reveals the aetiology and species-specific epidemiology of human cryptosporidiosis in England and Wales, 2000 to 2003. Euro Surveill 2009;14:1–9.

State Tobacco Control Program Spending — United States, 2011

Jidong Huang, PhD[1]; Kimp Walton, MS[2]; Robert B. Gerzoff, MS[2]; Brian A. King, PhD[2]; Frank J. Chaloupka, PhD[1,3] (Author affiliations at end of text)

Evidence-based, statewide tobacco control programs that are comprehensive, sustained, and accountable reduce smoking rates and tobacco-related diseases and deaths (*1*,*2*). States that made larger investments in tobacco prevention and control have seen larger declines in cigarettes sales than the United States as a whole (*3*), and the prevalence of smoking has declined faster as spending for tobacco control programs has increased (*4*,*5*). CDC's *Best Practices for Comprehensive Tobacco Control Programs* (Best Practices) outlines the elements of an evidence-based state tobacco control program and provides recommended state funding levels to substantially reduce tobacco-related disease, disability, and death (*1*,*2*). To analyze states' spending in relation to program components outlined within Best Practices, CDC assessed state tobacco control programs' expenditures for fiscal year 2011. In 2011, states spent approximately $658 million on tobacco control and prevention, which accounts for less than 3% of the states' revenues from the sale of tobacco products and only 17.8% of the level recommended by CDC.* Evidence suggests that funding tobacco prevention and control efforts at the levels recommended in Best Practices could achieve larger and more rapid reductions in tobacco use and associated morbidity and mortality (*2*,*3*).

Following CDC's first publication of Best Practices in 1999, overall funding for state tobacco control programs has more than doubled, and states restructured their tobacco control programs to align with CDC's goals and programmatic recommendations (*2*). The 1999 report recommended that states invest a combined $1.6 to $4.2 billion annually in such programs. In 2007, the recommendation was updated to $3.7 billion annually (*1*). These recommendations were updated again in 2014 ($3.3 billion) to reflect additional state experiences in implementing comprehensive tobacco control programs, new scientific literature, and changes in state populations, inflation, media costs, Affordable Care Act effects, and the national tobacco control landscape (*2*). To date, all 50 states and the District of Columbia (DC) have state tobacco control programs that are funded through various revenue streams, including tobacco industry master settlement payments to states, cigarette excise tax revenues, state general funds, federal government funds, and nonprofit organizations.†

For this analysis, researchers from the Health Policy Center at the University of Illinois at Chicago obtained reports of state tobacco control programs' expenditures for fiscal year 2011 for all 50 states and DC. They directly contacted representatives within relevant state organizations and agencies, and accessed their websites.§ When multiple agencies and organizations were responsible for a state's tobacco control program, expenditures from each organization were combined. In addition to total tobacco control expenditures, expenditure data were collected for the five program components outlined in Best Practices (2007): 1) state and community interventions; 2) health communication interventions; 3) cessation interventions; 4) surveillance and evaluation; and 5) administration and management (*1*).¶ Expenditures for the United States and for each state were calculated by program component, as overall, per capita, and percentage of recommended funding levels in Best Practices (2007).**

In fiscal year 2011, combined expenditures by all 50 states and DC for tobacco prevention and control activities totaled $658.15 million (Table 1); by state, overall expenditures ranged from $1.68 million in New Hampshire to $94.66 million in California. By program component, combined expenditures by all 50 states and DC were $272.38 million for state and community interventions, $123.53 million for health

* Settlement revenue data (2011) were obtained from the National Association of Attorneys General. Net state cigarette excise tax revenues data (2011) were obtained from *The Tax Burden on Tobacco, 2011*. Revenues not included are excise taxes collected on smokeless tobacco products, local excise taxes, and state or local sales taxes.

† Additional information available at http://www.lungusa2.org/slati/.

§ Additional information available at http://tobacconomics.org/research/methodology-state-tobacco-control-and-prevention-expenditures-fy-2008-2011.

¶ State and community interventions comprised those that encompass changing local and statewide smoke-free air policies, reducing exposure to secondhand smoke, eliminating tobacco-related disparities, or implementing community and school programs aimed at reducing youth tobacco use. Health communication interventions comprised those that addressed youth and adult tobacco use behavior through television, radio, billboard, print, or web-based advertising; media advocacy; health promotion activities; efforts to reduce or replace tobacco industry sponsorship and promotions, or messages targeted to specific audiences. Cessation interventions comprised state quitlines or other cessation services. Surveillance and evaluation efforts and resources comprised surveys and research that monitor tobacco-related attitudes, behaviors, and health outcomes. They also include evaluation of the achievement and effectiveness of various tobacco control program interventions and goals. Administration and management resources comprised salary and fringe benefits for personnel that manage and operate state tobacco control programs.

** This report analyzed the program components and recommendation funding levels from Best Practices-2007 instead of the more recent Best Practices-2014 because the former report contained the published funding recommendations that applied to fiscal year 2011.

TABLE 1. National and state tobacco prevention and control expenditures, by program component, fiscal year 2011

State	Program component (million $)					
	Total spending	State/Community	Health communication	Cessation	Surveillance/ Evaluation	Administration/ Management
United States	$658.15	$272.38	$123.53	$134.09	$61.35	66.79
Alabama	9.01	5.69	0.56	1.83	0.24	0.68
Alaska	10.66	4.44	1.82	2.56	0.97	0.88
Arizona	19.15	7.85	3.61	4.42	0.45	2.83
Arkansas	13.38	5.97	1.37	3.51	1.02	1.51
California	94.66	41.09	15.01	7.27	21.17	10.12
Colorado	29.15	17.68	0.92	2.58	4.35	3.62
Connecticut	1.69	0.65	0.40	0.49	0.09	0.05
Delaware	9.30	4.30	1.00	1.00	1.40	1.60
DC	2.47	0.92	0.66	0.36	0.16	0.37
Florida	61.29	16.86	20.53	15.77	5.36	2.78
Georgia	3.46	1.02	0.44	1.13	0.33	0.54
Hawaii	8.05	3.25	1.73	1.36	0.63	1.08
Idaho	3.09	0.51	0.91	0.95	0.24	0.48
Illinois	15.87	8.76	1.12	3.82	0.77	1.41
Indiana	9.35	5.99	0.90	1.00	0.56	0.90
Iowa	8.03	3.94	1.75	1.58	0.20	0.55
Kansas	2.64	1.68	0.09	0.19	0.07	0.61
Kentucky	4.33	2.75	0.16	0.67	0.16	0.60
Louisiana	11.15	3.80	3.44	1.87	0.65	1.39
Maine	7.60	1.40	1.38	2.85	1.20	0.78
Maryland	6.02	2.43	0.00	2.41	0.45	0.73
Massachusetts	6.48	3.22	0.63	1.83	0.65	0.16
Michigan	5.93	2.87	0.33	1.33	0.21	1.20
Minnesota	19.63	6.42	4.69	2.98	2.31	3.22
Mississippi	11.70	5.56	2.00	1.73	0.96	1.45
Missouri	10.03	3.24	1.79	2.38	1.11	1.51
Montana	8.24	4.91	1.27	1.17	0.04	0.85
Nebraska	4.11	2.33	0.59	0.29	0.17	0.73
Nevada	5.84	1.96	2.00	0.79	0.16	0.93
New Hampshire	1.68	0.31	0.10	0.85	0.15	0.28
New Jersey	3.59	1.50	0.64	0.63	0.00	0.83
New Mexico	7.83	2.26	1.92	2.07	0.37	1.22
New York	57.67	20.22	17.77	16.73	0.72	2.23
North Carolina	20.40	10.54	4.84	2.13	1.93	0.97
North Dakota	7.68	3.45	0.87	2.61	0.37	0.38
Ohio	3.98	0.56	0.72	1.90	0.23	0.57
Oklahoma	24.72	6.77	5.13	7.28	2.04	3.50
Oregon	9.34	5.46	2.07	0.85	0.46	0.51
Pennsylvania	22.06	9.15	2.92	6.81	1.26	1.93
Rhode Island	3.84	1.01	0.64	0.71	0.34	1.14
South Carolina	4.04	1.84	0.20	1.36	0.07	0.57
South Dakota	4.88	1.20	0.63	2.43	0.22	0.40
Tennessee	2.12	0.87	0.35	0.50	0.08	0.31
Texas	18.67	8.82	3.63	3.48	0.96	1.79
Utah	8.39	2.93	1.59	1.80	0.91	1.16
Vermont	4.52	2.06	1.03	0.99	0.33	0.10
Virginia	12.06	2.14	4.15	1.79	1.88	2.10
Washington	17.48	9.95	0.79	4.16	1.24	1.34
West Virginia	7.20	2.55	1.30	2.20	0.57	0.58
Wisconsin	7.67	4.85	0.42	1.47	0.43	0.51
Wyoming	6.03	2.50	0.75	1.22	0.73	0.84

Abbreviation: DC = District of Columbia.

communication interventions, $134.09 million for cessation interventions, $61.35 million for surveillance and evaluation, and $66.79 million for administration and management.

Combined expenditures by all 50 states and DC for tobacco prevention and control activities were $2.11 per capita (Table 2); by state, per capita expenditures ranged from $0.33 in Tennessee to $14.74 in Alaska. By program component, combined per capita expenditures by all 50 states and DC were $0.87 for state and community interventions, $0.40 for health communication interventions, $0.43 for cessation

TABLE 2. Per capita national and state tobacco prevention and control expenditures, by program component, fiscal year 2011

State	Program component ($)					
	Total spending	State/Community	Health communication	Cessation	Surveillance/ Evaluation	Administration/ Management
United States	2.11	0.87	0.40	0.43	0.20	0.21
Alabama	1.88	1.18	0.12	0.38	0.05	0.14
Alaska	14.74	6.14	2.52	3.54	1.34	1.21
Arizona	2.95	1.21	0.56	0.68	0.07	0.44
Arkansas	4.55	2.03	0.47	1.19	0.35	0.52
California	2.51	1.09	0.40	0.19	0.56	0.27
Colorado	5.70	3.45	0.18	0.50	0.85	0.71
Connecticut	0.47	0.18	0.11	0.14	0.03	0.01
Delaware	10.25	4.74	1.10	1.10	1.54	1.76
DC	4.00	1.49	1.06	0.59	0.27	0.60
Florida	3.22	0.88	1.08	0.83	0.28	0.15
Georgia	0.35	0.10	0.04	0.12	0.03	0.06
Hawaii	5.85	2.36	1.26	0.99	0.46	0.79
Idaho	1.95	0.32	0.57	0.60	0.15	0.30
Illinois	1.23	0.68	0.09	0.30	0.06	0.11
Indiana	1.43	0.92	0.14	0.15	0.09	0.14
Iowa	2.62	1.29	0.57	0.52	0.07	0.18
Kansas	0.92	0.58	0.03	0.07	0.03	0.21
Kentucky	0.99	0.63	0.04	0.15	0.04	0.14
Louisiana	2.44	0.83	0.75	0.41	0.14	0.30
Maine	5.72	1.05	1.04	2.14	0.90	0.58
Maryland	1.03	0.42	0.00	0.41	0.08	0.13
Massachusetts	0.98	0.49	0.10	0.28	0.10	0.02
Michigan	0.60	0.29	0.03	0.13	0.02	0.12
Minnesota	3.67	1.20	0.88	0.56	0.43	0.60
Mississippi	3.93	1.87	0.67	0.58	0. 32	0.49
Missouri	1.67	0.54	0.30	0.40	0.18	0.25
Montana	8.26	4.92	1.27	1.17	0.04	0.86
Nebraska	2.23	1.26	0.32	0.16	0.09	0.40
Nevada	2.15	0.72	0.74	0.29	0.06	0.34
New Hampshire	1.28	0.23	0.08	0.64	0.11	0.21
New Jersey	0.41	0.17	0.07	0.07	0.00	0.09
New Mexico	3.76	1.08	0.92	0.99	0.18	0.59
New York	2.96	1.04	0.91	0.86	0.04	0.11
North Carolina	2.11	1.09	0.50	0.22	0.20	0.10
North Dakota	11.23	5.04	1.27	3.82	0.54	0.55
Ohio	0.34	0.05	0.06	0.16	0.02	0.05
Oklahoma	6.52	1.79	1.35	1.92	0.54	0.92
Oregon	2.41	1.41	0.53	0.22	0.12	0.13
Pennsylvania	1.73	0.72	0.23	0.53	0.10	0.15
Rhode Island	3.65	0.96	0.61	0.68	0.32	1.08
South Carolina	0.86	0.39	0.04	0.29	0.01	0.12
South Dakota	5.92	1.45	0.76	2.95	0.27	0.49
Tennessee	0.33	0.14	0.05	0.08	0.01	0.05
Texas	0.73	0.34	0.14	0.14	0.04	0.07
Utah	2.98	1.04	0.56	0.64	0.32	0.41
Vermont	7.21	3.29	1.64	1.58	0.53	0.16
Virginia	1.49	0.26	0.51	0.22	0.23	0.26
Washington	2.56	1.46	0.12	0.61	0.18	0.20
West Virginia	3.88	1.37	0.70	1.19	0.31	0.31
Wisconsin	1.34	0.85	0.07	0.26	0.07	0.09
Wyoming	10.62	4.41	1.31	2.15	1.29	1.47

Abbreviation: DC = District of Columbia.

interventions, $0.20 for surveillance and evaluation, and $0.21 for administration and management.

Combined expenditures by all 50 states and DC for tobacco prevention and control activities were 17.8% of the level recommended by CDC (Table 3). Eight states spent 50% or more of the recommended level (Alaska, Colorado, Delaware, Hawaii, Montana, North Dakota, Oklahoma, and Wyoming), while 13 states (Connecticut, Georgia, Kansas, Kentucky, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, Ohio, South Carolina, Tennessee, and Texas) spent less

TABLE 3. National and state tobacco control and prevention expenditures as a percentage of 2007 CDC-recommended levels, by program component, fiscal year 2011

	Program component (% of CDC-recommended levels)					
State	Total spending	State/Community	Health Communication	Cessation	Surveillance/ Evaluation	Administration/ Management
United States	17.8	18.6	17.5	12.8	19.1	41.5
Alabama	15.9	24.5	7.2	10.0	5.0	27.3
Alaska	99.6	83.7	130.0	98.4	107.3	175.0
Arizona	28.1	27.1	35.7	22.0	7.7	94.3
Arkansas	36.8	39.0	27.4	31.0	31.8	94.6
California	21.4	24.1	13.7	7.0	55.1	52.7
Colorado	53.6	76.2	10.7	16.7	92.6	150.8
Connecticut	3.8	3.7	4.4	4.4	2.4	2.6
Delaware	66.9	76.8	30.3	31.3	116.7	266.7
DC	23.6	19.1	28.6	18.2	18.2	73.8
Florida	29.1	21.5	56.7	23.0	29.3	30.2
Georgia	3.0	2.3	1.8	3.5	3.2	10.6
Hawaii	52.9	45.7	91.2	32.4	48.1	154.9
Idaho	18.3	6.5	38.0	21.7	15.7	68.1
Illinois	10.1	13.8	4.1	8.3	5.6	20.8
Indiana	11.9	19.0	7.8	3.9	8.1	26.5
Iowa	21.9	24.6	36.5	14.3	6.4	34.3
Kansas	8.2	11.4	2.5	2.0	2.6	43.6
Kentucky	7.6	11.9	2.3	3.4	3.1	23.8
Louisiana	20.8	16.7	50.6	11.1	13.9	60.3
Maine	41.1	17.9	43.2	55.8	75.1	96.9
Maryland	9.5	9.9	0.0	13.2	8.2	26.1
Massachusetts	7.2	10.2	2.5	8.5	8.3	4.1
Michigan	4.9	5.8	1.9	3.4	2.0	22.6
Minnesota	33.6	26.0	51.5	17.5	45.3	129.0
Mississippi	29.8	35.2	32.3	14.3	28.2	85.5
Missouri	13.7	11.2	15.4	10.3	17.3	47.2
Montana	59.3	77.9	50.7	35.5	3.5	142.3
Nebraska	19.1	25.0	16.8	4.9	9.2	81.1
Nevada	18.0	14.5	37.1	8.4	5.8	66.4
New Hampshire	8.8	4.4	2.0	18.8	8.8	34.8
New Jersey	3.0	3.6	1.9	2.2	0.0	16.0
New Mexico	33.5	20.7	73.7	30.0	18.4	122.1
New York	22.7	22.5	26.9	25.7	3.2	20.0
North Carolina	19.1	24.6	29.9	6.3	20.7	21.1
North Dakota	82.6	73.4	72.6	118.7	46.4	93.8
Ohio	2.7	1.0	3.1	4.3	1.8	9.0
Oklahoma	54.9	35.1	106.8	48.5	52.3	175.0
Oregon	21.7	30.7	29.5	6.7	12.5	26.7
Pennsylvania	14.2	16.4	9.1	14.4	9.3	28.4
Rhode Island	25.3	15.1	23.8	18.7	26.2	162.4
South Carolina	6.5	9.0	1.2	8.2	1.2	21.1
South Dakota	43.2	21.7	41.7	86.9	22.1	80.2
Tennessee	3.0	3.1	3.3	2.1	1.4	10.1
Texas	7.0	7.7	8.4	4.7	4.1	15.4
Utah	35.5	25.3	43.0	34.6	43.1	115.7
Vermont	43.4	44.8	44.8	47.2	37.0	20.0
Virginia	11.7	6.4	13.9	6.8	20.9	46.6
Washington	26.0	34.4	8.6	20.4	21.1	46.3
West Virginia	25.9	24.5	22.8	27.2	23.8	48.3
Wisconsin	11.9	17.6	5.3	7.3	7.6	18.0
Wyoming	67.0	56.9	49.7	64.2	91.4	208.8

Abbreviation: DC = District of Columbia.

than 10% of the recommended level. By program component, expenditures as a percentage of the recommended amount were 18.6% for state and community interventions, 17.5% for health communication interventions, 12.8% for cessation interventions, 19.1% for surveillance and evaluation, and 41.5% for administration and management.

Please note: An erratum has been published for this issue. To view the erratum, please click here.

Discussion

The findings in this report reveal that state investments in tobacco prevention and control programs in fiscal year 2011 were considerably less than levels recommended in CDC's Best Practices (*1*,*2*). In 2011, states spent only $658 million (<3% of $24.2 billion they received from tobacco tax revenues and Master Settlement Agreement payments*) in tobacco control and prevention activities, compared with the $8.8 billion that tobacco companies spent on cigarette and smokeless tobacco advertising and promotion that year (*6*,*7*). Despite significant declines in cigarette smoking in recent years, 17.8% of U.S. adults and 15.7% of high school students still smoke cigarettes (*8*,*9*). Moreover, the prevalence of use of other tobacco products such as cigars and smokeless tobacco has not changed (*3*), and the prevalence of use of emerging products, including electronic cigarettes (e-cigarettes) and hookah, has rapidly increased (*3*). Investing in comprehensive tobacco control programs and implementing evidence-based interventions have been shown to reduce youth initiation, tobacco-related disease and death, and tobacco-related health care costs and lost productivity. Moreover, if states allocate funding for tobacco control at CDC's Best Practices levels, they have the potential to achieve larger and more sustainable reductions in all forms of tobacco use and associated morbidity and mortality (*2*,*3*).

These findings demonstrate a considerable gap between state investments in tobacco prevention and control and CDC's Best Practices recommendations. Although all states derive revenues from cigarette excise taxes, few states have a statutory requirement requiring that a portion of these revenues be dedicated to tobacco prevention and control (*10*). Instead, most cigarette tax revenues are used for general purposes. Additionally, although in recent years state cigarette excise taxes have nationally increased, these tax increases largely have come in response to shortfalls in state budgets, rather than as initiatives to increase tobacco control spending (*1*,*2*). Many state programs have experienced and are facing substantial state government cuts to tobacco control funding, resulting in the near-elimination of tobacco control programs in those states (*2*). In 2014, despite combined revenue of more than $25 billion from settlement payments and tobacco taxes for all states, states have appropriated only $481.2 million (1.9%)[††] to comprehensive tobacco control programs, an amount <15% of the CDC-recommended level of funding for all states combined (*2*). Only two states, Alaska and North Dakota, currently fund tobacco control programs at CDC-recommended levels.[§§] Implementing comprehensive tobacco control programs at CDC-recommended levels could have a substantial impact: millions fewer persons in the United States would smoke and hundreds of thousands of premature tobacco-related deaths could be prevented; long-term investments could have even greater effects (*2*,*3*).

Summary

What is already known on this topic?

Evidence-based, statewide tobacco control programs that are comprehensive, sustained, and accountable reduce smoking rates and tobacco-related diseases and deaths. States that made larger investments in tobacco prevention and control saw larger declines in cigarettes sales than the United States as a whole. The prevalence of smoking has declined faster as spending for tobacco control programs has increased.

What is added by this report?

In fiscal year 2011, for tobacco prevention and control activities, all 50 states and the District of Columbia combined spent $658 million ($2.11 per capita) in the following categories: 41.4% on state and community interventions ($272 million [$0.87 per capita]); 18.8% on health communication interventions ($124 million [$0.40 per capita]); 20.4% on cessation interventions ($134 million [$0.43 per capita]); 9.3% on surveillance and evaluation ($61 million [$0.20 per capita]); and 10.1% on surveillance and evaluation ($67 million [$0.21 per capita]). The total spent was 17.8% of CDC's recommended amount.

What are the implications for public health practice?

State investments in tobacco prevention and control programs in fiscal year 2011 were considerably less than levels recommended in CDC's Best Practices. Full implementation of comprehensive tobacco control policies and evidence-based interventions at CDC-recommended funding levels could result in a substantial reduction in tobacco-related morbidity and mortality and billions of dollars in savings from averted medical costs and lost productivity in the United States.

The findings in this report are subject to at least three limitations. First, some expenditure data might not have been captured because it was spent by agencies or organizations that were not tracked, which could result in underestimation. For example, direct service expenditures on cessation by private insurers were not captured, neither were the direct expenditures on cessation made by state Medicaid in most states. However, aggregated state tobacco control expenditures were comparable with state tobacco control funding data reported elsewhere (*10*). Second, expenditure data were self-reported. As a result, variations might exist with regard to expenditure classifications across states. Finally, private organizations or foundations using private funds to conduct tobacco prevention and control activities were not included in the reported expenditures, which would lead to underestimation.

Each day in the United States, the tobacco industry spent nearly $24 million to advertise and promote cigarettes and

[††] Additional information available at https://www.tobaccofreekids.org/what_we_do/state_local/prevention_cessation/.

[§§] Additional information available at http://www.tobaccofreekids.org/microsites/statereport2015/.

smokeless tobacco (*6*,*7*). During the same period, more than 3,200 youth younger than 18 years of age smoked their first cigarette and another 2,100 youth and young adults who are occasional smokers progressed to become daily smokers (*3*). If current rates continue, 5.6 million Americans younger than 18 years of age who are alive today are projected to die prematurely from smoking-related disease (*3*). However, the tobacco-use epidemic can be markedly reduced by implementing interventions that are known to work. Full implementation of comprehensive tobacco control policies and evidence-based interventions at CDC-recommended funding levels could result in a substantial reduction in tobacco-related morbidity and mortality and billions of dollars in savings from averted medical costs and lost productivity in the United States (*2*,*3*).

[1]Health Policy Center, University of Illinois at Chicago, Illinois; [2]Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC; [3]Department of Economics and School of Public Health, University of Illinois at Chicago, Illinois.

Corresponding author: Kimp Walton, kwalton@cdc.gov, 770-488-6094.

Acknowledgments

Melissa Bachler, Steven Binns, Cezary Gwarnicki, University of Illinois at Chicago; Michael A. Tynan, Oregon Health Authority, Public Health Division, Office of the State Public Health Directory, Portland, Oregon.

References

1. CDC. Best practices for comprehensive tobacco control programs—2007. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2007. Available at ftp://ftp.cdc.gov/pub/fda/fda/BestPractices_Complete.pdf.
2. CDC. Best practices for comprehensive tobacco control programs—2014. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at http://www.cdc.gov/tobacco/stateandcommunity/best_practices/index.htm?source=govdelivery/.
3. US Department of Health and Human Services. The health consequences of smoking—50 years of progress: a report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at http://www.surgeongeneral.gov/library/reports/50-years-of-progress/index.html.
4. Farrelly MC, Pechacek TF, Thomas KY, Nelson D. The impact of tobacco control programs on adult smoking. Am J Public Health 2008;98:304–9.
5. Tauras JA, Chaloupka FJ, Farrelly MC, et al. State tobacco control spending and youth smoking. Am J Public Health 2005;95:338–44.
6. Federal Trade Commission. Federal Trade Commission smokeless tobacco report for 2011. Washington, DC: Federal Trade Commission; 2013.
7. Federal Trade Commission. Federal Trade Commission cigarette report for 2011. Washington, DC: Federal Trade Commission; 2013.
8. Kann L, Kinchen S, Shanklin SL, et al. Youth risk behavior surveillance—United States, 2013. MMWR Surveill Summ 2014;63(No. SS–4):1–168.
9. Jamal A, Agaku IT, O'Connor E, King BA, Kenemer JB, Neff L. Current cigarette smoking among adults—United States, 2005–2013. MMWR Morb Mortal Wkly Rep 2014;63:1108–12.
10. CDC. State tobacco revenues compared with tobacco control appropriations—United States, 1998–2010. MMWR Morb Mortal Wkly Rep 2012;61:370–4.

Notes from the Field

Measles Transmission in an International Airport at a Domestic Terminal Gate — April–May 2014

Emily Banerjee, MPH[1]; Cynthia Hickman, MPH[1]; Kathryn Engels[1]; Cynthia Kenyon, MPH[1] (Author affiliations at end of text)

On April 22, 2014, the Minnesota Department of Health notified CDC of a case of measles in a child aged 19 months who had documentation of receiving 1 dose of measles, mumps, and rubella vaccine at age 12 months. The child's illness was clinically compatible with measles, which was confirmed by polymerase chain reaction and immunoglobulin M serology at the Minnesota Department of Health Public Health Laboratory. The child was febrile and developed a rash on April 17 while on an international flight from India to the United States before taking a connecting flight from Chicago to Minneapolis. Persons with measles are infectious from 4 days before to 4 days after rash onset (*1*). Therefore, travelers were exposed on both the international and domestic flights. CDC's Division of Global Migration and Quarantine was contacted and provided information on potentially exposed persons to relevant health departments for follow-up. No documented transmission was reported as a result of the two flight exposures.

On May 5, the Massachusetts Department of Public Health contacted the Minnesota Department of Health to report a case of measles in a Minnesota resident aged 46 years with unknown vaccination status, who was traveling in Massachusetts for business when a rash was observed. The case was confirmed by polymerase chain reaction and immunoglobulin M serology at the Massachusetts Department of Public Health Laboratory. This person had no known exposures or international travel, and did not fly on the same aircraft as the child from Minnesota on April 17. However, investigation revealed that both patients had traveled through a Chicago airport and used the same gate for their respective flights. Measles is a highly communicable disease, and infectious droplets can remain suspended in the air for up to 2 hours after an infected person leaves the area (*2*).

Although transmission could have occurred anywhere in the airport where the child and the adult shared airspace, it most likely occurred in the gate area during the 46-minute interval between the arrival of the adult's flight and the scheduled departure of the child's flight. The airline confirmed that domestic flights board 30–45 minutes before departure, and families with children typically board first. The child's family likely would have been preparing to board near the front of the gate area when the arriving adult exited his aircraft and passed through the area. Both cases were genotyped as D8 (endemic in India, where the child evidently acquired measles), and the corresponding nucleotide sequences were determined to be identical. The adult was admitted for isolation only at a Massachusetts hospital during the last 5 days of his infectious period. The child was admitted for 3 days at a Minnesota hospital. Both recovered fully without complications.

Measles transmission at international airports has been documented previously (*3*). Airport settings facilitate the mixing of persons from countries where measles is endemic around the world. The infectiousness of measles is evident when considering that transmission in this case occurred at a domestic terminal during a short period with brief contact.

Vaccinated persons can acquire measles for various reasons, including primary or secondary vaccine failure or improper vaccine storage, handling, or administration; however, measles transmission from a vaccinated person is rare (*4*). Although primary vaccine failure was not laboratory confirmed in this case, the child's highly elevated acute immunoglobulin M serology result and classic clinical presentation were consistent with immunologic naïveté before infection (*4*). This incident also underscores the importance of CDC's recommendation for international travelers aged ≥12 months to receive 2 doses of measles, mumps, and rubella vaccine separated by at least 28 days, with the first dose administered at age ≥12 months (*1*).

Acknowledgments

Steve Fleming, EdM, Massachusetts Department of Public Health; Minneapolis Quarantine Station, Division of Global Migration and Quarantine, National Center for Emerging and Zoonotic Infectious Diseases, CDC; Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, CDC; Hennepin County Human Services and Public Health Department; Saint Paul – Ramsey County Public Health; Dakota County Public Health Department.

[1]Minnesota Department of Health.

Corresponding author: Emily Banerjee, emily.banerjee@state.mn.us, 651-201-5488.

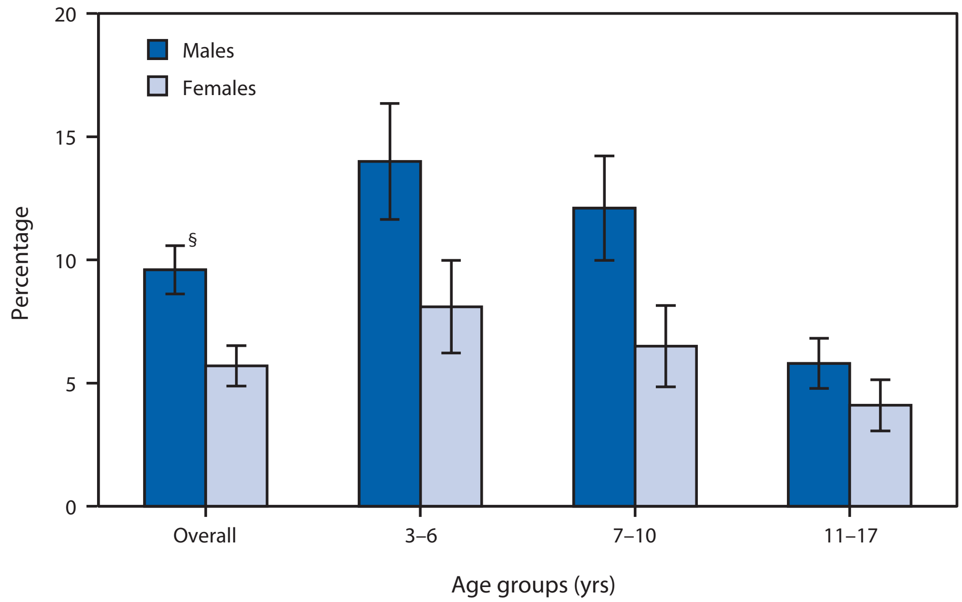
References

1. CDC. Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep 2013;62(No. RR-4).
2. CDC. Epidemiology and prevention of vaccine-preventable diseases. Atkinson W, Wolfe S, Hamborsky J, eds. 12th ed. Washington, DC: Public Health Foundation; 2012.
3. Vega JS, Escobedo M, Schulte CR, et al.; Centers for Disease Control and Prevention (CDC). Notes from the field: measles transmission at a domestic terminal gate in an international airport—United States, January 2014. MMWR Morb Mortal Wkly Rep 2014;63:1211.
4. Rota JS, Hickman CJ, Sowers SB, Rota PA, Mercader S, Bellini WJ. Two case studies of modified measles in vaccinated physicians exposed to primary measles cases: high risk of infection but low risk of transmission. J Infect Dis 2011;204(Suppl 1):S559–63.

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Children and Adolescents Aged 3–17 Years with a Reported Communication Disorder During the Previous 12 Months,* by Sex and Age Group — National Health Interview Survey, United States, 2012†



* Based on a positive response from a knowledgeable adult to any of the following four questions regarding a sample child in the household: "During the past 12 months, has [child's name] had any problems or difficulties that lasted for 1 week or longer with 1) voice, such as too weak, hoarse, or strained; 2) swallowing food or beverages; 3) speaking, such as making speech sounds correctly or stuttering; or 4) learning, using, or understanding words or sentences."

† Estimates were derived from the National Health Interview Survey sample child component, based on household interviews with a national sample of the civilian, noninstitutionalized U.S. population.

§ 95% confidence interval.

During 2012, among children and adolescents aged 3–17 years, males (9.6%) were more likely than females (5.7%) to have had a communication disorder during the previous 12 months; this difference was observed overall and also for each age group (3–6, 7–10, and 11–17 years). The percentage of children and adolescents who had a communication disorder in the previous 12 months declined with increasing age for both males and females.

Source: Black LI, Vahratian A, Hoffman HJ. Communication disorders and use of intervention services among children aged 3–17 years: United States, 2012. NCHS data brief, no. 205. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2015. Available at http://www.cdc.gov/nchs/data/databriefs/db205.pdf.

Reported by: Lindsey I. Black, MPH, lblack1@cdc.gov, 301-458-4548; Anjel Vahratian, PhD.

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format. To receive an electronic copy each week, visit *MMWR*'s free subscription page at *http://www.cdc.gov/mmwr/mmwrsubscribe.html*. Paper copy subscriptions are available through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone 202-512-1800.

Readers who have difficulty accessing this PDF file may access the HTML file at *http://www.cdc.gov/mmwr/index2015.html*. Address all inquiries about the *MMWR* Series, including material to be considered for publication, to Executive Editor, *MMWR* Series, Mailstop E-90, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30329-4027 or to mmwrq@cdc.gov.

All material in the *MMWR* Series is in the public domain and may be used and reprinted without permission; citation as to source, however, is appreciated.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of these sites. URL addresses listed in *MMWR* were current as of the date of publication.

ISSN: 0149-2195