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Assessing Differences in CDC-Funded HIV Testing by Urbanicity, United States, 2016

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Abstract

HIV prevention efforts have contributed to a decline in annual HIV infections in the United States. However, progress has been uneven and certain groups and geographic areas continue to be disproportionately affected. Subsequent to implementation of CDC's high-impact HIV prevention approach to reducing new infections, we analyzed national-level CDC-funded HIV test data from 2016 to describe the population being reached in three urbanicity settings (metropolitan; ≥ 1,000,000 population; urban; 50,000–999,999; rural: < 50,000). Over 70% of CDC-funded HIV tests and almost 80% of persons newly diagnosed with HIV as a result of CDC-funded testing occurred in metropolitan areas. Nonetheless, CDC-funded testing efforts are reaching urban and rural areas, especially in the South, providing opportunities to identify persons unaware of their HIV status and link those with newly diagnosed HIV to medical care and prevention services. While CDC-funded testing efforts have continued to focus on population subgroups and geographic areas at greatest risk, efforts should also continue in rural areas and among groups in need with a low national burden.

Keywords

HIV; Testing; Prevention; Rural; Urban

Introduction

HIV prevention efforts have contributed to a decline in estimated annual HIV infections in the United States. However, progress has been uneven and some groups are disproportionately affected. In 2016, gay, bisexual, and other men who have sex with men (collectively referred to as MSM) accounted for 67% (26,570) of all new HIV diagnoses

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(39,872) and 83% of diagnoses among males. By race/ethnicity, blacks/African Americans accounted for 45% (17,528) of new HIV diagnoses although they comprise 12% of the population, and Hispanics/Latinos accounted for 24% (9766) of new HIV diagnoses yet comprise 18% of the population [1]. Of the estimated 1.1 million people living with HIV in 2015, an estimated 162,500 (15%) had not been diagnosed [2].

The burden of HIV is also not evenly distributed geographically. Population rates of persons diagnosed with HIV in 2016 were highest in the South (16.8/100,000 people), followed by the Northeast (11.6), West (9.8), and the Midwest (7.6). Southern states accounted for over half of new diagnoses and for an estimated 45% of all people living with diagnosed HIV in the United States in 2015 [1], Eight of the 10 states with the highest rates of new HIV diagnoses are in the South, as are nine of the 10 metropolitan statistical areas (MSAs) with the highest rates [1], Similar to the rest of the country, the majority of HIV diagnoses in the South occur in urban areas with populations of 500,000 or more; however, the South has higher HIV diagnosis rates in suburban and rural areas than other regions [3].

Rural residents at risk for or living with HIV face unique challenges [4], One national survey found the likelihoods of having ever been tested for HIV and tested in the past year decreased as residence became more rural [5], People living with HIV in rural areas are more likely to receive a late-stage diagnosis or have advanced disease at medical care entry [6–9] and have lower levels of retention in care and viral suppression [10, 11] than their urban counterparts. Often, rural residents at risk for or living with HIV experience barriers that include higher local stigma about HIV infection, limited availability of providers specializing in HIV, and significant travel burdens to obtain care [4, 12–16]. Recent reports of HIV outbreaks associated with injection drug use in rural areas further highlight the unique challenges [17, 18].

In 2012, the US Centers for Disease Control and Prevention (CDC) introduced a high-impact HIV prevention (HIP) approach to reducing new HIV infections. HIP involves using combinations of scientifically proven, cost-effective and scalable interventions with particular attention to the most heavily affected populations and geographic areas. Under HIP, CDC-funded programs implement multiple high-impact HIV prevention strategies, including increasing diagnosis of HIV infection through HIV testing in healthcare and non-healthcare settings and ensuring that people with diagnosed HIV are linked to and engaged in effective, ongoing treatment and prevention services [19–21]. To support HIP, CDC funding to health departments was realigned to reflect the number of people living with diagnosed HIV in their corresponding area in 2008. This resulted in increased funding to some health departments, including many southern states and several directly funded cities, and decreased funding to others. To ensure a smooth transition, CDC implemented allocation shifts over a period of time, resulting in full implementation in 2016.

The purpose of this analysis was to describe the population being reached by CDC-funded HIV testing in 2016, 4 years after introduction of HIP (and associated funding shifts). Using national-level CDC-funded HIV test data, we examined the demographic and test location characteristics of persons tested and, among those with newly diagnosed HIV, linkage to HIV medical care and referrals to prevention services—in three urbanicity settings (defined

as the population of the county where testing occurred): metropolitan (≥ 1,000,000 population), urban (50,000–999,999) and rural (< 50,000).

Methods

Data Source

CDC's National HIV Prevention Program Monitoring & Evaluation (NHM&E) system includes program data on HIV testing and other high-impact prevention activities reported by CDC-funded grantees. This analysis focused on HIV test data reported for 2016 by 59 health departments (including the 50 states, District of Columbia, and 8 cities—Atlanta, Baltimore, Chicago, Houston, Los Angeles, New York City, Philadelphia and San Francisco) and 102 directly funded community-based organizations located primarily in large US cities. Required HIV test data include basic demographic information for all persons tested; risk information for all persons tested in non-healthcare settings and for those testing HIV-positive in healthcare settings; and linkage and referral information for persons with a positive test result. Data are submitted by grantees electronically to CDC and do not contain any personally identifiable information. CDC-funded tests represent about 15% of all HIV tests conducted nationally from public and private sources.

Variable Definitions

A *CDC-funded HIV test* represents the final determination of test result (positive or negative) for an individual as part of a test event that may have included multiple tests (e.g., a preliminary test followed by a confirmatory test). Test data are not de-duplicated; hence, one person with repeat testing in the same year may be represented more than once.

Persons with newly diagnosed HIV are those who tested HIV-positive and were not found to be previously reported in the jurisdiction's HIV surveillance system. If surveillance verification was not possible, self-report of previous negative status was used. Approximately 70% of new HIV diagnoses are verified using HIV surveillance data. *HIV-positivity* is the percentage of all CDC-funded HIV tests that resulted in a new HIV diagnosis.

Persons tested and persons with newly diagnosed HIV are described by age, gender and race/ethnicity. *Age at test* was determined by calculating the difference between the year of the person's birth and the year of the HIV test. For this analysis, persons were grouped as 13–19, 20–29, 30–39, 40–49 and ≥ 50 years. Tests among persons under 13 years were not included. *Gender* is the person's self-reported current gender identity and is reported to CDC as female, male, female-to-male transgender, or male-to-female transgender. Additionally, in order to identify transgender persons, sex at birth and current gender identity were examined; if the self-reported genders did not match, the person was classified as transgender. For this analysis, gender is reported as female, male, or transgender. The *race/ethnicity* variable was created by combining self-reports of race and ethnicity (Hispanic or Latino). For this analysis, race/ethnicity is categorized as black/African American, Hispanic/Latino, white, or other (including American Indian/Alaska Native, Asian, Native Hawaiian/Other Pacific Islander, and Multi-Race).

For each CDC-funded test, *test setting* is the setting where the test was provided. *Healthcare settings* include inpatient facilities, outpatient facilities, emergency rooms, and correctional facilities. Non-healthcare settings include HIV counseling and testing sites and community settings. *Region* is the US census region where the test was conducted: Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin); Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont); South (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia); and West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington).

Linkage to HIV medical care is the percentage of all persons with newly diagnosed HIV who attended their first medical care appointment within 90 days of receipt of positive test result. *Referral to partner services* is the percentage of persons with newly diagnosed HIV who were referred for partner services (including notification of current and past sex partners of potential HIV exposure and referral for testing). *Interview for partner services* is the percentage of persons with newly diagnosed HIV who were referred and interviewed for partner services. *Referral to HIV prevention services* is the percentage of persons with newly diagnosed HIV who were referred for prevention services (interventions aimed at reducing the risk of transmitting or acquiring HIV such as prevention counseling, effective behavioral interventions, or risk-reduction counseling).

Urbanicity reflects the population size of the county where the test was performed. We created the *urbanicity* variable using the National Center for Health Statistics (NCHS) 2013 Urban-Rural Classification Scheme for Counties [22]. Each test record contains a state and county Federal Information Processing Standards (FIPS) code and zip code of test location. For records with missing county FIPS code, we assigned a county FIPS code based on Housing and Urban Development (HUD) US Postal Services (USPS) Zip Code Crosswalk Files, 3rd quarter 2016 [23]. If more than one county FIPS code aligned with a zip code, we used the county FIPS code with the greater portion of the ZIP code population. Using state and county FIPS code variables, we linked test record data with the NCHS classification code. We collapsed the six NCHS categories into three categories: metropolitan (population of ≥ 1,000,000); urban (population of 50,000–999,999); and rural (population of < 50,000).

Analysis

The final analytic dataset contained 2,964,577 HIV test records or 97.7% of all 2016 test records (3,035,128). We excluded records reported by US Dependent Areas (42,612), records with incorrect or unmerged county FIPS code (20,886), and records for persons under 13 years at test (7053).

We used descriptive statistics to generate frequency distributions for CDC-funded HIV tests and persons with newly diagnosed HIV by demographic characteristics (age, gender, race/ethnicity) and testing location (test setting, geographic region). Additionally, among persons with newly diagnosed HIV, we generated frequency distributions for linkage to HIV medical

care, referral to partner services, interview for partner services, and referral to HIV prevention services.

We conducted a Chi square test for associations to assess the relationship between urbanicity setting and the following categorical variables: age; gender; race/ethnicity; test setting; and geographic region. Among persons with newly diagnosed HIV, we tested for associations between urbanicity setting and the following dichotomous (yes/no) variables: linkage to HIV medical care; referral to partner services; interview for partner services; and referral to HIV prevention services. Significance was assessed at the $\alpha = 0.05$ level. All data were analyzed using SAS 9.3 (SAS Institute, Cary, NC).

Results

CDC-Funded HIV Tests

A total of 2,964,577 CDC-funded HIV tests were included in this analysis; 71.5% occurred in metropolitan areas, 20.9% in urban areas, and 7.6% in rural areas (Table 1). Differences in the distribution of CDC-funded tests by demographic characteristics/testing location and urbanicity setting were statistically significant ($p < 0.0001$).

Age

The majority of tests occurred in persons aged 20–39 years (62.0%). However, a greater percentage of persons aged 13–19 years were tested in rural areas (12.3%) compared to metropolitan (6.1%) and urban (7.9%) areas. Conversely, a greater percentage of persons aged 40 years or older were tested in metropolitan areas (33.1%) compared to urban (28.2%) or rural (20.5%) areas.

Gender

Males accounted for a majority (51.0%) of the tests conducted. A higher percentage of males were tested in metropolitan areas (53.8%), whereas a higher percentage of females were tested in urban (53.0%) and rural (62.3%) areas.

Race/Ethnicity

Overall, nearly half (45.4%) of tests conducted were among blacks/African Americans; blacks/African Americans had the highest percentage of tests in each urbanicity setting (metropolitan: 46.2%, urban: 41.1%, rural: 48.9%). However, higher percentages of whites were tested in urban (39.6%) and rural (40.1%) areas compared to metropolitan areas (23.3%).

Test Setting

Over three-quarters (77.1%) of tests were conducted in healthcare settings; this was consistent across urbanicity settings (metropolitan: 77.2%; urban: 76.5%; rural: 78.1%).

Region

Over one-half (55.5%) of tests were conducted in the South. Tests conducted in the South also made up the greatest proportion within each urbanicity setting, with the highest percentage in rural areas (83.8%; urban: 64.2%; metropolitan: 49.9%).

Persons with Newly Diagnosed HIV

A total of 11,363 persons with newly diagnosed HIV were identified through CDC-funded HIV testing (HIV positivity of 0.4%). Of those 11,363 persons, 78.9% were tested in metropolitan areas, 18.3% in urban areas, and 2.8% in rural areas (Table 2). HIV positivity was highest in metropolitan areas (0.4%), followed by urban (0.3%) and rural (0.1%) areas. Differences in the distribution of new diagnoses by demographic characteristics/testing location and urbanicity setting were statistically significant ($p < 0.0001$).

Age

The largest number of persons with newly diagnosed HIV were in the age groups 20–29 years (5041; 44.4%) and 30–39 years (2873; 25.3%). There were small differences in the percentage distribution of age groups by urbanicity setting. For example, a higher percentage of persons in the youngest (13–19) and oldest (50 and older) age groups were newly diagnosed HIV-positive in rural (4.4, 18.6%, respectively) as compared to urban (3.9, 14.7%, respectively) and metropolitan (3.1, 13.2%, respectively) areas.

Gender

Males had the largest number of new HIV diagnoses (9530; 84.1%). A higher percentage of males were newly diagnosed with HIV in metropolitan areas (84.7%), followed by urban (82.7%) and rural (77.7%) areas. The percentage of new diagnoses among transgender persons was also highest in metropolitan areas (2.1%) and lowest in rural areas (0.6%). Conversely, the percentage of females with newly diagnosed HIV was higher in rural areas (21.7%) compared to urban (15.9%) and metropolitan (13.2%) areas.

Race/Ethnicity

The majority of new diagnoses were among blacks/African Americans (5635; 51.1%) with higher percentages in urban (55.2%) and rural (54.6%) areas as compared to metropolitan areas (50.0%). The percentage of whites with newly diagnosed HIV was higher in rural (32.2%) and urban (28.2%) areas than in metropolitan areas (18.8%). There was a higher percentage of Hispanics/Latinos with newly diagnosed HIV in metropolitan areas (27.2%) than in urban (13.7%) and rural (10.7%) areas.

Test Setting

The majority of persons with newly diagnosed HIV were tested in a healthcare setting (62.4%). The percentage of new HIV diagnoses in healthcare/correctional settings was higher in rural areas (83.0%) as compared to urban (62.4%) and metropolitan (61.7%) areas.

Region

Almost half of all new diagnoses were in the South (5625; 49.5%). The percentage of new HIV diagnoses in the South was higher in rural areas (74.8%) as compared to urban (66.3%) and metropolitan (44.7%) areas. In the Northeast and West, the percentage of new HIV diagnoses was highest in metropolitan areas (15.5 and 26.0%, respectively) and lowest in rural areas (4.4 and 6.3%, respectively).

Linkage to HIV Medical Care Within 90 Days

Overall, about 85% of persons with newly diagnosed HIV were linked to HIV medical care within 90 days (Table 3). The percentage was slightly higher in rural areas (86.5%) compared to urban (84.2%) and metropolitan (84.8%) areas. However, differences in linkage to HIV medical care by urbanicity setting were not statistically significant ($p = 0.614$).

Referral to Partner Services

Almost all persons with newly diagnosed HIV were referred to partner services (90.1%). The percentage not referred was higher in metropolitan areas (11.1%) than in urban (5.3%) and rural (6.5%) areas. Differences in referral to partner services by urbanicity setting were statistically significant ($p < 0.0001$).

Interview for Partner Services

Although not as high as referral to partner services, almost three-quarters of persons with newly diagnosed HIV were interviewed for partner services. The percentage interviewed was higher in rural areas (85.0%) than in urban (79.9%) and metropolitan (72.0%) areas. Differences in interview for partner services by urbanicity setting were statistically significant ($p < 0.0001$).

Referral to HIV Prevention Services

Over 80% of persons with newly diagnosed HIV were referred to HIV prevention services. The percentage not referred was higher in metropolitan (18.4%) and rural (14.4%) areas than in urban areas (8.8%). Differences in referral to HIV prevention services by urbanicity setting were statistically significant ($p < 0.0001$).

Discussion

Four years following the introduction of HIP, CDC-funded HIV testing and new diagnoses continue to occur primarily in metropolitan areas. In 2016, metropolitan areas accounted for 72% of all CDC-funded tests and almost 80% of all new diagnoses. However, we did find variations in testing and new diagnoses by urbanicity setting. For example, males accounted for half of all CDC-funded HIV testing, with a higher proportion being tested in metropolitan areas. They accounted for 85% of new diagnoses in metropolitan areas but only 78% of new diagnoses in rural areas. About half of CDC-funded HIV tests and new diagnoses occurred in the South; however, this was more pronounced in rural areas, with 84% of HIV tests and 75% of new diagnoses occurring in rural areas in the South. Although testing in a healthcare setting was consistent across urbanicity settings at about 75%, the

percentage of new diagnoses from healthcare settings in rural areas was higher than those in urban and metropolitan areas. This is consistent with previous work that found persons residing in rural areas were more likely to be tested in a healthcare setting than a non-healthcare setting [5]. Some reasons for this finding may be a lack of community-based organizations in rural areas or, where available, limited testing resources [12]. It is also possible that fear of stigma may play a role in higher testing in healthcare settings—persons may feel greater anonymity seeking testing in a healthcare setting.

Although a majority of persons are newly diagnosed with HIV in metropolitan areas [1, 3], some rural areas—especially those in the South—have an HIV prevalence similar to or greater than metropolitan and urban areas [15]. Furthermore, race/ethnicity disparities can be more pronounced in rural areas; in 2011, seven of the eight high-prevalence rural counties in the United States exceeded the national average of persons living with HIV who are black/African American, Hispanic/Latino, or other minorities [15]. An emerging cause of concern in rural areas is the epidemic of prescription opioid misuse and abuse, which has led to increased injection drug use and thus placing new populations at risk for HIV [17, 18]. Transmitting HIV can occur if an HIV-negative person injects with the same equipment used prior by a person living with HIV [24]. Given that rural residents may already have barriers that include higher local stigma about HIV infection, limited availability of providers specializing in HIV and substance abuse, hospital closures, and significant travel burdens to obtain care [4, 12–16, 25], public health officials should be alert to instances where HIV prevention and care resources may be needed in rural areas.

Of all Southern States, those in the Deep South (i.e., Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas) face additional challenges. In 2014, the Deep South had the highest HIV diagnosis rate and the highest number of persons with newly diagnosed HIV compared to other US regions. The proportion of blacks/African Americans diagnosed with HIV was higher in the Deep South than in the United States overall; among MSM in the Deep South, increases in the proportion of new diagnoses occurred only for black/African American and Latino/Hispanic MSM [25]. In 2015, the Southern HIV/AIDS Strategy Initiative, along with 25 bipartisan Congress members, called on CDC to allocate HIV prevention resources and targeted prevention efforts to rural and suburban areas in the Deep South, as disease burden in several Deep South states were typically located outside of MSAs eligible for funding [26, 27]. In 2016, we found that 13.6% of CDC-funded tests were conducted in rural areas in the Deep South versus 7.6% nationally and that 5.0% of persons with newly diagnosed HIV were in rural areas in the Deep South versus 2.8% nationally (data not published).

Finally, in line with data from the National HIV Surveillance System [11], we found that a majority of persons newly diagnosed with HIV were linked to care within 90 days, regardless of urbanicity setting. However, the percentages of persons referred to partner services and referred to HIV prevention services were highest in urban areas; the proportion of persons interviewed for partner services was highest in rural areas. This may be due to various reasons, including differences in population sizes (e.g., fewer number of persons to follow up with in rural areas); the availability of HIV prevention and medical services (e.g., greater availability in urban areas compared to rural areas); the utilization of medical

services (e.g., rural persons were more likely to visit a doctor in the past year and to have a regular doctor than non-rural persons [28]); and/or other factors.

Limitations to this analysis were primarily related to data that are submitted to the NHM&E system. Firstly, we were not able to examine the data by risk population (e.g., MSM) because risk information is available only for a subset of all tests, and primarily for those testing in non-healthcare settings. Secondly, there is potential for overestimation of persons with newly diagnosed HIV because not all jurisdictions verify new diagnoses with a surveillance system, thus potentially counting persons with previously diagnosed HIV as newly diagnosed. However, approximately 70% of new HIV diagnoses are verified with surveillance information. Finally, definitions of urbanicity vary by the classification schemes used and groupings of categories within a classification scheme; thus, along with the fact that NHM&E data are program data and therefore not nationally representative, our results may not be directly comparable to other analyses examining the factor of urbanicity in HIV testing and new HIV diagnoses [3, 5, 8–11, 15, 16].

Conclusion

In the United States, new diagnoses of HIV remain highest in metropolitan areas. It is not surprising then that metropolitan areas account for over 70% of CDC-funded HIV tests conducted and almost 80% of persons newly diagnosed with HIV through CDC-funded testing. However, CDC-funded testing efforts are reaching urban and rural areas, especially in the South, providing opportunities to identify persons unaware of their HIV status and link those with newly diagnosed HIV to medical care and prevention services. While CDC-funded testing efforts have continued to focus on population subgroups and geographic areas at greatest risk, efforts should also continue in rural areas and among groups in need with a low national burden.

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Table 1

Demographic characteristics of persons tested and testing location, by urbanicity—CDC-funded HIV testing, United States, 2016

	Overall[a] N (%)	Urbanicity (county population)		
		Metropolitan (> 1,000,000)	Urban (50,000–999,000)	Rural (< 50,000)
CDC-funded HIV tests	2,964,577	2,118,265 (71.5)	620,984 (20.9)	225,328 (7.6)
Persons tested				
Age at test *				
13–19 years	204,414 (6.9)	127,958 (6.1)	48,892 (7.9)	27,564 (12.3)
20–29 years	1,113,789 (37.7)	760,950 (36.1)	251,745 (40.7)	101,094 (45.0)
30–39 years	716,522 (24.3)	522,526 (24.8)	143,976 (23.3)	50,020 (22.2)
40–49 years	402,788 (13.7)	309,344 (14.7)	71,813 (11.6)	21,631 (9.6)
≥ 50 years	514,362 (17.4)	386,822 (18.4)	102,949 (16.6)	24,591 (10.9)
Gender *				
Female	1,415,882 (48.5)	949,711 (45.7)	326,513 (53.0)	139,658 (62.3)
Male	1,488,854 (51.0)	1,117,579 (53.8)	286,951 (46.6)	84,324 (37.6)
Transgender	14,642 (0.5)	12,094 (0.6)	2202 (0.4)	346 (0.2)
Race/ethnicity *				
Black/African American	1,254,454 (45.4)	912,742 (46.2)	239,766 (41.1)	101,946 (48.9)
Hispanic/Latino	626,544 (22.7)	517,667 (26.2)	91,407 (15.7)	17,470 (8.4)
White	774,307 (28.0)	459,389 (23.3)	231,308 (39.6)	83,610 (40.1)
Other[b]	110,637 (4.0)	83,992 (4.3)	21,261 (3.6)	5384 (2.6)
Testing location				
Test setting *				
Healthcare	2,283,750 (77.1)	1,633,807 (77.2)	474,118 (76.5)	175,825 (78.1)
Non-healthcare	677,272 (22.9)	482,052 (22.8)	145,916 (23.5)	49,304 (21.9)
Geographic region *				
Midwest	435,959 (14.7)	332,293 (15.7)	81,022 (13.1)	22,644 (10.1)
Northeast	467,284 (15.8)	374,919 (17.7)	86,138 (13.9)	6227 (2.8)
South	1,644,780 (55.5)	1,057,239 (49.9)	398,788 (64.2)	188,753 (83.8)
West	416,554 (14.1)	353,814 (16.7)	55,036 (8.9)	7704 (3.4)

[*] Significantly associated with urbanicity, $p < 0.0001$

[a] Discrepancies between US total and subgroup totals are due to missing or invalid data

[b] American Indian/Alaska Native, Asian, Native Hawaiian/Other Pacific Islander, or multiple race/ethnicity

Table 2

Demographic characteristics and testing location of persons with newly diagnosed HIV infection, by urbanicity—CDC-funded HIV testing, United States, 2016

	Overall[a] N (%)	Urbanicity (county population)		
		Metropolitan (> 1,000,000)	Urban (50,000–999,000)	Rural (< 50,000)
Persons with newly diagnosed HIV	11,363	8969 (78.9)	2076 (18.3)	318 (2.8)
HIV-positivity (%)[b]	0.4	0.4	0.3	0.1
Age at test*				
13–19 years	376 (3.3)	282 (3.1)	80 (3.9)	14 (4.4)
20–29 years	5041 (44.4)	3895 (43.5)	1002 (48.3)	144 (45.3)
30–39 years	2873 (25.3)	2347 (26.2)	461 (22.2)	65 (20.4)
40–49 years	1513 (13.3)	1250 (14.0)	227 (10.9)	36 (11.3)
> 50 years	1549 (13.7)	1184 (13.2)	306 (14.7)	59 (18.6)
Gender*				
Female	1578 (13.9)	1180 (13.2)	329 (15.9)	69 (21.7)
Male	9530 (84.1)	7570 (84.7)	1713 (82.7)	247 (77.7)
Transgender	218 (1.9)	186 (2.1)	30 (1.5)	2 (0.6)
Race/ethnicity*				
Black/African American	5635 (51.1)	4350 (50.0)	1119 (55.2)	166 (54.6)
Hispanic/Latino	2671 (24.2)	2363 (27.2)	277 (13.7)	31 (10.2)
White	2306 (20.9)	1637 (18.8)	571 (28.2)	98 (32.2)
Other[c]	421 (3.8)	353 (4.1)	59 (2.9)	9 (3.0)
Testing location				
Test setting*				
Healthcare	7079 (62.4)	5522 (61.7)	1294 (62.4)	263 (83.0)
Non-healthcare	4260 (37.6)	3425 (38.3)	781 (37.6)	54 (17.0)
Geographic region*				
Midwest	1540 (13.6)	1235 (13.8)	259 (12.5)	46 (14.5)
Northeast	1646 (14.5)	1388 (15.5)	244 (11.8)	14 (4.4)

	Overall[a] N (%)	Urbanicity (county population)		
		Metropolitan (> 1,000,000)	Urban (50,000–999,000)	Rural (< 50,000)
South	5625 (49.5)	4011 (44.7)	1376 (66.3)	238 (74.8)
West	2552 (22.5)	2335 (26.0)	197 (9.5)	20 (6.3)

[*] Significantly associated with urbanicity, $p < 0.0001$

[a] Discrepancies between US total and subgroup totals are due to missing or invalid data

[b] Number of persons with newly diagnosed HIV infection divided by total number of tests

[c] American Indian/Alaska Native, Asian, Native Hawaiian/Other Pacific Islander, or multiple race/ethnicity

Table 3

Linkage to HIV medical care, referral and interview for partner services, and referral to HIV prevention services, by urbanicity— CDC-funded HIV testing, United States, 2016

	Overall[a] N (%)	Urbanicity (countypopulation)		
		Metropolitan (> 1,000,000)	Urban (50,000–999,000)	Rural (< 50,000)
Linkage to HIV medical care within 90 days				
Yes	7812 (84.7)	6116 (84.8)	1465 (84.2)	231 (86.5)
No	1410 (15.3)	1100 (15.2)	274 (15.8)	36 (13.5)
Referral to partner services*				
Yes	9431 (90.1)	7325 (88.9)	1834 (94.7)	272 (93.5)
No	1032 (9.9)	911 (11.1)	102 (5.3)	19 (6.5)
Interview for partner services*				
Yes	7054 (73.8)	5390 (72.0)	1427 (79.9)	237 (85.0)
No	2499 (26.2)	2099 (28.0)	358 (20.1)	42 (15.1)
Referral to HIV prevention services*				
Yes	7512 (83.4)	5859 (81.6)	1445 (91.2)	208 (85.6)
No	1500 (16.6)	1325 (18.4)	140 (8.8)	35 (14.4)

*Significantly associated with urbanicity, $p < 0.0001$

[a]Discrepancies between US total and subgroup totals are due to missing/invalid data