

Progress Towards HIV Care Continuum Goals: Results from 36 AIDSVu Cities

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Abstract

Background: Public health surveillance data are critical to understanding the current state of the human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) epidemic. Surveillance data provide significant insight into patterns within and progress towards achieving targets for each of the steps in the HIV care continuum. If these data are disseminated, they can be used to prioritize certain steps in the continuum, locations, and/or groups of people.

Objective: We sought to develop and report indicators of progress towards the National HIV/AIDS Strategy (NHAS) goals for U.S. cities and to characterize progress towards those goals with categorical metrics.

Methods: Health departments used standardized SAS code to calculate care continuum indicators (late diagnosis, linkage to medical care, receipt of medical care, and HIV viral load suppression) from National HIV Surveillance System data to ensure comparability across jurisdictions. We report 2018 descriptive statistics for continuum steps for 36 U.S. cities and their progress towards 2020 National HIV/AIDS Strategy (NHAS) goals as of 2018. Indicators are reported categorically as met or surpassed the goal (green), within 25% of attaining the goal (yellow), or further than 25% from achieving the goal (red).

Results: Cities were closest to meeting NHAS goals for timely diagnoses, with all cities (100%) within 25 percentage points of meeting the goal. Only 8% of cities were >25% from achieving the goal for receipt of care, but 69% of cities were >25% from achieving the goal for viral suppression.

Conclusions: Evaluation involving common analytic methods enables unbiased comparisons of the HIV care continuum across cities. Display of progress with graphical indicators allows communication of progress to stakeholders. AIDSVu analyses of HIV surveillance data facilitate cities' ability to benchmark their progress against that of other cities with similar characteristics. By identifying peer cities (e.g., cities with analogous populations or similar NHAS goal challenges), the public display of indicators can promote dialogue between cities with comparable challenges and opportunities.

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Progress Towards HIV Care Continuum Goals: Results from 36 AIDSVu Cities

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Background. Public health surveillance data are critical to understanding the current state of the human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) epidemic. Surveillance data provide significant insight into patterns within and progress towards achieving targets for each of the steps in the HIV care continuum. Such targets include those outlined in the National HIV/AIDS strategy (NHAS) goals. If these data are disseminated, they can be used to prioritize certain steps in the continuum, locations, and/or groups of people.

Objective. We sought to develop and report indicators of progress towards the NHAS goals for U.S. cities and to characterize progress towards those goals with categorical metrics.

Methods. Health departments used standardized SAS code to calculate care continuum indicators (late diagnosis, linkage to medical care, receipt of medical care, and HIV viral load suppression) from National HIV Surveillance System data to ensure comparability across jurisdictions. We report 2018 descriptive statistics for continuum steps for 36 U.S. cities and their progress towards 2020 National HIV/AIDS Strategy (NHAS) goals as of 2018. Indicators are reported categorically as met or surpassed the goal (green), within 25% of attaining the goal (yellow), or further than 25% from achieving the goal (red).

Results. Cities were closest to meeting NHAS goals for timely diagnoses compared to the goals for linkage to care, receipt of care, and viral load suppression, with all cities (100%) within 25 percentage points of meeting the goal. Only 8% of cities were >25% from achieving the goal for receipt of care, but 69% of cities were >25% from achieving the goal for viral suppression.

Conclusions. Display of progress with graphical indicators allows communication of progress to stakeholders. AIDSVu analyses of HIV surveillance data facilitate cities' ability to benchmark their progress against that of other cities with similar characteristics. By identifying peer cities (e.g., cities with analogous populations or similar NHAS goal challenges), the public display of indicators can promote dialogue between cities with comparable challenges and opportunities.

Keywords: HIV, epidemiology, surveillance, HIV care continuum, cities

INTRODUCTION

Public health surveillance data are foundational in the understanding of the current state of the human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) epidemic [1]. Surveillance data provide significant insight into patterns within and progress towards achieving

targets for each of the steps in the HIV care continuum—here, defined as timely diagnosis of HIV infection, linkage to HIV medical care, receipt of HIV medical care, and HIV viral load suppression—for particular geographic areas and/or populations [2]. Dissemination of these data can be used to prioritize certain steps in the continuum, locations, and/or groups of people.

AIDSVu was created in 2009 as part of a cooperative private-public-academic partnership between Emory University's Rollins School of Public Health, Gilead Sciences, Inc., and the Center for AIDS Research at Emory University [3]. AIDSVu aims to provide policymakers, health departments, and others who have a stake in health with an instrument to educate the public, monitor progress and trends, and judiciously advocate for resources and plan programs. Here, we report, for the first time, descriptive statistics for 36 U.S. cities' status on each of the HIV care continuum steps and their progress towards achieving 2020 National HIV/AIDS Strategy (NHAS) goals based on AIDSVu data.⁴ We describe a standardized method to compare HIV care continuum data at the city, regional, and national levels [1-4].

METHODS

Data Collection

The data used in this analysis were obtained through a data request in spring of 2020 sent to the health departments for continuum indicators for people with HIV (PWH) aged ≥ 13 years from the enhanced HIV/AIDS reporting system (eHARS). Except for a few cities who did not allow their data to be viewed online, these data are also on display online at AIDSVU.org [3]. AIDSVu is an online mapping and data tool for HIV and HIV-related data. Thirty-six cities provided stratified data without identifiers on late HIV diagnoses, linkage to HIV care, receipt of HIV care, and HIV viral suppression. The AIDSVu website contains data from years other than 2018, with varying numbers of cities contributing to data each year. Thus, although in 2018, there were only 36 cities willing to provide their data; in other years, there were more or fewer cities that granted access to their data. In this study, we define cities as single counties that include the named city as well as single counties, multiple counties, and metropolitan statistical areas (MSAs). Use of common SAS code to calculate indicators assured comparability of indicators across jurisdictions. Data stratifications for display (i.e., by age, sex, race) were chosen by the jurisdictions. Age is age at diagnosis for those with late diagnoses; age for the other HIV continuum measures is age in 2018.

Although AIDSVu HIV care continuum indicators were guided by a process that involved the Center for Disease Control and Prevention's (CDC), the counts and percentages for each of the 4 HIV care continuum indicators are defined slightly differently from those of the CDC; in addition to being stated here, they can be found at AIDSVu. Org [5, 3]. Late HIV diagnoses were assessed

among persons aged 13+ new HIV diagnoses in 2018. An HIV diagnosis was considered late if the person received an AIDS diagnosis within 3 months of their initial HIV diagnosis. It should be noted that we want the percentages of late diagnoses to be low and the percentages for other indicators to be high. Linkage to care was defined as having a CD4 or HIV viral load test within 1 month of diagnosis among those at least 13 years of age with a new HIV diagnosis in 2018. The numerator for the receipt of care definition included individuals ≥ 13 years of age with ≥ 1 CD4 or HIV viral load test within 2018 among individuals who were alive throughout 2018. The denominator included those living with HIV in 2018 who had at least one previous CD4 or HIV viral load test. Those living with HIV throughout 2018 (excludes those newly diagnoses in 2018) with an HIV viral load < 200 copies/mL for their most recent test within 2018 were determined to be virally suppressed.

Data Analysis

Descriptive analyses were conducted for 2018 data from 36 cities (see footnote in Table 1 for all included cities) using SAS (Version 9.4, Cary, North Carolina). Cities were categorized by US Census region (i.e., Midwest, 2 cities; Northeast, 9 cities; South, 21 cities; West, 4 cities). National HIV case counts and percentages for late diagnoses, linkage to care, receipt of care, and viral suppression were obtained from the CDC's HIV Surveillance Report for 2018 [6]. We compared indicators reported by the cities with NHAS-designated HIV care continuum benchmarks proposed to be achieved by 2020 [4]. There is currently an updated set of goals through 2025 [7]; however, because our data are from 2018, we chose to compare the data to 2020 goals. Given that there is not an NHAS indicator for percent of late diagnoses, we used the goal for the indicator called "Knowledge of HIV+ Status", which was 90% [4]. Our version of this indicator will be called "timely diagnoses" and will represent the inverse of the late diagnosis indicator, indicating that an HIV diagnosis was not given within 3 months of an AIDS diagnosis ("Knowledge of Status" is not tied to a particular time period of receipt of diagnosis). Henceforth, the term "timely" diagnosis will be used when discussing progress toward the NHAS goals and "late" diagnosis will be utilized otherwise.

The linkage to care goal was to have 85% of persons with a new HIV diagnosis have an HIV medical care visit within 1 month of diagnosis. We used the retention in care goal of 85% to represent receipt of care within a year. For viral suppression, the goal was to have at least 80% of people virally suppressed.

Cities' progress towards each of the HIV care continuum goals was assessed by determining the relative % difference from each goal. For example, the NHAS goal for linkages to care was 85% and the percentage of people in Atlanta with newly diagnosed HIV linked to an HIV care provider was

78% in 2018. To calculate Atlanta's progress, we subtracted 0.78 from 0.85, divided that answer by 0.78, and multiplied it by 100% to say that Atlanta was within 10% of achieving the NHAS goal for linkage to care. We categorized city- and target-specific progress toward the goal as follows: met or surpassed the goal, within 25% of attaining the goal, or further than 25% from achieving the goal. We applied the same method to each of the priority populations for the individual cities' progress tables. We defined priority populations as sex, race/ethnicity, and age groups. We categorized age as the following: 13 – 24 years old, 25 – 44 years old, 45 – 59 years old, and 60+ years old. We calculated the percentage of cities that were within 25% of meeting the goal for a particular category within the priority populations for each indicator.

Ethical Considerations

Because this study used publicly available, deidentified data, ethical review was not warranted. Given that this study relied on the use of secondary deidentified data (numbers were aggregated to the city/county level), institutional review board review was not required.

RESULTS

All cities' HIV Care Continuum indicators

Within our 36 cities, 439,866 people were living with HIV and 4% of those ($n = 15,769$) were newly living with an HIV diagnosis as of 2018. Of the people newly living with HIV, 81% ($n = 66,890$) were male and 54% ($n = 44,710$) were aged 25-44 years. Among the race/ethnicity groups with available data, the highest percentage (49%) of new diagnoses was among Black people, followed by Hispanic people (27%). Table 1 displays the counts and percentages for each of the HIV care continuum indicators at the national, regional, and city levels. Nineteen cities had lower percentages (i.e., more favorable) for late diagnoses than that for the national average (20.8%). Only 3 cities had higher percentages for linkages to care than that for the national average (80.2%). For receipt of care, more than half of the cities (23) had higher percentages than the percentage for the national average (75.7%). Compared to the national percentage for viral suppression (64.7%), 10 cities had higher percentages. These comparisons were made with the idea that our unit of analysis, a city, was broadly defined with cities themselves deciding how their jurisdiction was defined—whether that be at the city, singly county, multi-county, or MSA level.

Among all 36 cities, Seattle had the highest percentages for both linkage to care and viral suppression. Despite having the most progress for receipt of care, New Haven had a high percentage for late diagnoses compared to other cities, highlighting the heterogeneity in care continuum indicators' performance across cities.

<u>Table 1. HIV Care Continuum Indicators among People Diagnosed with HIV and Progress towards 2020 Goals by Region and City, 36 US</u>
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	Cities, 2018			
	Timely Diagnoses n (%)	Linkage to Care n (%)	Receipt of Care n (%)	Viral Suppression n (%)
NHAS Goals, %	90%	85%	85%	80%
National*	37,428 (20.8%)	26,858 (80.2%)	661,816 (75.7%)	565,195 (64.7%)
Regional				
Midwest	905 (18.9)	3,715 (77.4)	14,659 (72.8)	11,412 (56.7)
Northeast [¥]	3,958 (20.1)	1,478 (75.7)	11,5136 (69.8)	98,377 (59.6)
South	10,094 (20.0)	33,623 (69.0)	166,653 (76.2)	132,020 (59.0)
West [×]	1,636 (21)	4,706 (74.0)	2,714 (70.2)	23,611 (61.2)
City**				
Atlanta ^Δ	1504 (19.5%)	5,321 (69.0%)	24,981 (75.6%)	20,576 (59.5%)
Austin ^Δ	270 (28.0%)	946 (63.2%)	5,036 (85.4%)	4,330 (70.9%)
Baltimore [~]	578 (22.1%)	1,986 (75.9%)	13,358 (80.5%)	11,326 (63.1%)
Baton Rouge	188 (19.3%)	711 (72.8%)	3,091 (85.7%)	2,624 (69.7%)
Birmingham [~]	177 (21.3%)	576 (69.2%)	3,299 (85.7%)	2,757 (66.0%)
Bridgeport ^Δ	98 (26.6%)	282 (76.8%)	1,897 (79.2%)	1,593 (63.5%)
Charleston	101 (22.7%)	329 (73.9%)	1,318 (70.3%)	1,138 (57.0%)
Charlotte ^Δ	226 (16.5%)	842 (61.4%)	4,734 (78.0%)	4,078 (61.8%)
Chicago	788 (18.8%)	3,227 (77.1%)	12,297 (75.5%)	9,339 (54.3%)
Columbia ^Δ	187 (24.2%)	598 (77.5%)	1,655 (66.9%)	1,384 (51.5%)
Dallas ^Δ	862 (20.4%)	2,866 (68.0%)	13,675 (80.6%)	10,703 (59.5%)
Denver [~]	312 (21.8%)	No data available	6,154 (74.0%)	5,463 (55.4%)
Fort Lauderdale ^Δ	632 (18.5%)	2,544 (74.5%)	15,279 (82.6%)	13,285 (68.5%)
Fort Worth ^Δ	311 (22.3%)	893 (63.9%)	4,295 (80.3%)	3,587 (62.4%)
Hampton Roads ^Δ	286 (19.6%)	932 (63.7%)	4,607 (74.1%)	4,213 (61.8%)
Hartford ^Δ	118 (26.2%)	344 (76.4%)	2,385 (83.0%)	2,093 (69.6%)
Houston	1,256 (20.0%)	4,028 (64.0%)	18,750 (77.2%)	15,471 (59.9%)
Jacksonville [~]	341 (21.2%)	1,020 (63.5%)	5,611 (82.7%)	4,412 (62.7%)
Las Vegas ^Δ	467 (21.9%)	1,715 (80.6%)	5,965 (72.1%)	5,149 (57.2%)
Miami ^Δ	1,054 (17.3%)	4,144 (68.0%)	18,128 (78.3%)	15,418 (60.1%)
Milwaukee ^Δ	117 (19.0%)	488 (79.2%)	2,362 (85.9%)	2,073 (70.8%)
Newark	171 (19.7%)	598 (68.9%)	2,566 (56.5%)	1,926 (62.3%)
New Haven ^Δ	101 (24.0%)	340 (81.0%)	2,634 (87.5%)	1,847 (62.3%)
New Orleans [~]	316 (20.1%)	1,103 (70.2%)	5,130 (81.0%)	4,421 (65.4%)
New York City	2,116 (20.1%)	7,972 (75.9%)	70,945 (75.8%)	61,702 (61.3%)

Orlando~	698 (22.6%)	1,936 (62.6%)	9,763 (81.2%)	8,541 (68.1%)
Philadelphia	454 (18.2%)	1,970 (79.0%)	11,711 (69.6%)	9,832 (54.8%)
Phoenix^	502 (19.1%)	1,608 (61.2%)	8,051 (76.8%)	6,552 (57.4%)
Providence	44 (31.2%)	No data available	347 (67.1%)	310 (58.1%)
Raleigh^	143 (20.2%)	461 (65.2%)	2,685 (75.1%)	2,285 (60.2%)
Richmond^	186 (18.7%)	658 (66.2%)	3,496 (76.5%)	3,066 (62.3%)
San Antonio^	332 (17.7%)	1,041 (55.3%)	5,078 (79.8%)	4,287 (63.9%)
Seattle^	355 (22.1%)	1,383 (86.3%)	6,934 (85.6%)	6,447 (77.6%)
Tampa~	662 (24.1%)	1,724 (62.9%)	10,442 (84.3%)	9,120 (71.5%)
Washington D.C.	278 (15.4%)	1,296 (71.8%)	9,293 (70.9%)	7,748 (56.1%)
West Palm Beach^	362 (24.4%)	950 (63.9%)	5,600 (77.9%)	4,865 (62.0%)

Color coding: green—met or surpassed NHAS goal; yellow—within 25% of meeting NHAS goal; red— $\geq$ 25% of meeting NHAS goal

*This section represents national estimates—not all 36 cities combined.

**Included cities: Atlanta, GA; Austin, TX; Baltimore, MD; Baton Rouge, LA; Birmingham, AL; Bridgeport, CT; Charleston, SC; Charlotte, NC; Chicago, IL; Columbia, SC; Dallas, TX; Denver, CO; Fort Lauderdale, FL; Fort Worth, TX; Hartford, CT; Hampton Roads, VA; Houston, TX; Jacksonville, FL; Las Vegas, NV; Miami, FL; Milwaukee, WI; New Orleans, LA; Newark, NJ; New Haven, CT; New York City, NY; Orlando, FL; Philadelphia, PA; Providence, RI; Phoenix, AZ; Raleigh, NC; Richmond, VA; San Antonio, TX; Seattle, WA; Tampa, FL; Washington D.C.; West Palm Beach, FL

^Each of these cities represents a single county.

~Each of these cities represents multiple counties.

^ Each of these cities represents a metropolitan statistical area.

^Does not include data from Providence.

^Does not include data from Denver.

Cities' progress towards the HIV Care Continuum goals

Overall, cities were closest to meeting the 2020 goals for timely diagnoses and receipt of care, and struggled the most with meeting the goal for viral suppression (Table 1). The 2020 NHAS goal specified that at least 85% of people with newly diagnosed HIV should be linked to care. At the end of 2018, most cities (61.8%) were within 25% of this goal; one city (Seattle) surpassed the goal. All but 3 of the 36 cities were at least within 25% from meeting the receipt of care goal. For viral suppression, most cities (69.4%) were not within 25% of the goal, and no cities met or surpassed the goal.

Cities' progress towards the HIV Care Continuum goals by priority populations

The percentage of cities—broken down by sex, race/ethnicity, and age groups—that met, or were within 25% of reaching the 2020 NHAS HIV care continuum goals can be found in Table 2. Overall, receipt of care was the indicator closest to meeting the goal for select demographic groups: 97% of cities met or were close to meeting the goal for females, Black people, and 13-24-year-olds. Viral suppression was the indicator for which most group-specific city proportions did not meet the goal. Of all race/ethnicities, the White population had the highest percentage of cities that were close to meeting/had met the goal for that indicator. Only 1 demographic group—13-24 year-olds—within

the 36 cities had met or surpassed the goal for timely diagnoses. Compared to other race/ethnicity groups, the Black population had the highest percentage of cities that met or were close to meeting the timely diagnosis and receipt of care goals (97% for both). The greatest variation within a demographic category across all indicators was found for age groups. Higher age was associated with a lower percentage of cities whose people had timely knowledge of their HIV+ status. The opposite trend occurred within the linkage to care indicator for age (e.g., cities' older people had higher linkage to care). Across races/ethnicities, the greatest variation was seen in percentages of cities close to meeting/had met the goal for viral suppression.

Table 2. All 36 Cities, Priority Populations HIV Care Continuum Indicators - Progress Towards 2020 Goal as of 2018
% Close to meeting or met

		Timely Diagnosis (Goal=90%)	Linked to Care (Goal=85%)	Receipt of Care (Retention in Care Goal=85%)	Viral Suppression (Goal=80%)
	Overall				
Gender	Male				
	Female				
Race	Black				
	Hispanic				
	White				
Age Groups	13 - 24				
	25 - 44				
	45 - 59				
	60+				

Color coding: green—met or surpassed NHAS goal; yellow—within 25% of meeting NHAS goal; red—25% of meeting NHAS goal

DISCUSSION

The HIV care continuum can be a useful public health tool to characterize the state of the HIV epidemic in defined areas. Much of the progress along the continuum is framed in the context of national goals, but all public health is local, and national goals will not be achieved unless they are consistently met in the cities with the largest HIV epidemics. Within cities, goals cannot be achieved until they are consistently met within key impacted communities. Cities have a strong understanding of their community's perceptions of HIV, and the needs of those affected by and infected with HIV, which can be used to tailor and focus efforts. For example, in 2016 New York City clinical providers and community-based organizations created the PlaySure Network [8]. This network is dedicated to making HIV-related services such as testing, treatment, and pre-exposure prophylaxis available to all

New Yorkers [8].

Here, we expand the geographic level of analysis of the HIV care continuum beyond the county-level data disseminated by CDC [9]. Twenty-one of the 36 cities included here are among the largest cities in the U.S. (population over 350,000 people) and are located within 23 Ending the HIV Epidemic counties [10]. The 36 cities in this analysis account for approximately 38% of all new HIV diagnoses in the U.S. and dependent areas in 2018, and illustrate city-level progress in meeting national goals overall and for particular race/ethnicity, gender, and age groups [11]. Understanding the city-level patterns of inequities in access to and sustained engagement in HIV care can inform local public health action needed to improve the HIV care continuum.

Many cities publish their own surveillance reports, but different cities may use different methods to calculate key indicators. To date a consistently derived set of indicators that surpasses the depth of the county level in some cases has not been available. Our data suggest that viral suppression among Black and Hispanic people is lower in city estimates compared to corresponding county estimates, which illustrates the value of producing city-specific data and stratifying demographic populations to gain more precise insight into where interventions are most needed [3,9].

Similarly, examining NHAS goals at the local level has great impact. All cities were within 25% of meeting the timely diagnoses goal, but varied in how close they were to achieving the linkage to care and receipt of care goals, with 36% of cities >25% from meeting the linkage to care goal and only 1 city that met or surpassed the linkage to care goal. Viral suppression posed the greatest challenge for cities, with only 31% of cities falling within 25% of meeting the NHAS goal and none meeting or surpassing the goal. Among cities, there were substantial differences in meeting linkage and viral suppression goals among racial/ethnic groups. Finally, a higher percentage of cities were close to or met the NHAS goals for younger populations for timely diagnoses, but a low percentage of cities were close to or met the goal for viral suppression. The former may reflect older people's perception of lower risk of HIV acquisition, while the latter may signal that younger people are less likely to stay engaged in care [12]. Additionally, younger people are unlikely to be diagnosed 8+ years after their infection (the estimated duration of infection associated with late diagnosis) because their infection mostly likely happened between ages 15 and 25.

Among the 36 cities, there was none that achieved or surpassed the timely diagnosis NHAS goal for 2020. Thus, diagnosing people with HIV in a timely manner seems to be a challenge for cities overall. The CDC recommends that everyone ages 13 to 64 years be screened for HIV once in their lifetime, with those with certain risk factors tested annually [13]. Routine testing for those at

high risk of acquiring HIV can make substantial inroads to reduce the number of late diagnoses, but it will not allow cities to reach 100% of all those at risk of acquiring HIV. Anyone can contract HIV, so even for cities that are close to meeting the late diagnosis goals, the last few who are diagnosed late are hardest to reach. Providers and patients' ability to assess their risks for HIV may not be optimal. Some studies suggest that older people are more likely to be diagnosed with advanced HIV and women have a higher likelihood of being diagnosed with HIV in a hospital [12, 14]. This finding may reflect low perceived risk among these demographic groups, leading to less testing as a part of routine care [11]. Additionally, fear of stigma may also play a role in individuals not requesting or being offered test at younger ages or outside of hospital settings. Offering HIV tests as part of typical general care may therefore help decrease the number of late diagnoses overall. Young people, who are often healthy, may not feel compelled to regularly engage with the healthcare system, so cities should focus on installing and/or making low-cost HIV testing services available at more accessible locations such as retail pharmacies and at home (self-test kits) [15]. CDC recently announced a multiyear program to distribute HIV self-test kits directly to people who request them; this program will include direct marketing to populations with increased risks for HIV [16]. Cities will be able to incorporate referrals to the program into local prevention programming. The idea of distributing self-test kits by mail may be more acceptable after the national experience with government distribution of COVID self-test kits [17].

Local, structural and social factors can play a significant role in PWH's ability to be linked to care. When there is no formal system to foster tight-knit communication between public health facilities, HIV testing sites, and HIV providers, it can be difficult to effectively link people newly diagnosed with HIV to care. Gathering consent to share an HIV diagnosis with relevant providers at the time of diagnosis can be another avenue [18]. Additionally, shortages of local providers who can treat people with HIV may lead to long wait times for appointments that may discourage initiation of care [19-20]. It is also important to consider the local communities' general attitudes towards HIV as this may discourage people from showing up at facilities that others know may be associated with treatment for HIV [19]. Implementation of the following has been found to promote successful linkage to care: patient navigators, mental health services, care coordination, staff training, and reduced time to provider appointments [21].

Our data highlight the importance of stratifying the HIV care continuum by demographic populations. Priority populations may differ across cities and existing prevention and care interventions may not be designed for the priority population of interest, thus requiring adaptations of the intervention. One study constructed a dynamic HIV transmission model that incorporated

information regarding HIV micro epidemics within 6 differing U.S. cities and evidence-based interventions to determine what cost-effective combination of approaches resulted in the most health benefit [22]. The researchers found that approaches needed to be tailored to each of the 36 cities because they each had varying levels of high-risk, vulnerable populations for which some interventions worked better than others [22]. Using consistent methods of deriving HIV care continuum indicators can enable cities to discover commonalities, such as similar high-risk populations, that may promote discussions of best practices and learning more easily.

Limitations of the General Field

In this report, we presented the proportion of late diagnoses among people diagnosed with HIV in 36 cities in 2018. However, this indicator has been found to be flawed and should be used to measure late HIV diagnosis with caution because it is affected by both HIV incidence and testing [23-25]. We recommend CDC dropping this indicator and developing a new one to monitor HIV diagnosis, e.g., probability of diagnosis within 1 year of infection [26]. The late diagnosis definition is also imperfect in that it may capture those who rapidly progress to AIDS despite having tested negative for HIV within the prior year or two.

Intermittent access to care can be difficult to isolate from the receipt of care definition because it relies on testing alone. Using the CDC definition for receipt of care means that people who do not have a CD4 or viral load test will exclude people stably in care who seek care but do not receive either test for whatever reason.

Limitations of This Study

Our study has several limitations. It only included data from people who were diagnosed. Thus, we do not provide insight into what populations of people are living with undiagnosed HIV. The lack of data on undiagnosed HIV means that are our percentages for the 4 indicators underrepresent the true estimates. More work needs to be done to fully capture the entire population of people with HIV. Furthermore, to measure receipt of care and viral suppression, we used HIV case reporting data to estimate the denominator, i.e., the number of PWH at the end of 2018. Studies have shown that such a method can overestimate the number of PWH in a jurisdiction [27]. Additionally, not all cities had the same capacity to de-duplicate their data, contributing further to potential inflation of denominators. Therefore, we may have overestimated our denominator and underestimated receipt of care and viral suppression. However, because the same method was used across all 36 cities, the rankings of receipt of care and viral suppression by city and region were likely to be valid. Cities themselves decided whether they provided input for their city alone, the county that encompassed their city, multiple counties including the one with their city, or an MSA

that included their city. Cities' data reporting was not complete, including exclusions of cases missing a zip code. This percentage raises questions regarding biases that may result from potentially not capturing certain groups of people more than others. Additionally, this data does not include categories for two groups of people who are known to be at increased risk for HIV acquisition—men who have sex with men and people who inject drugs. Furthermore, we did not have information on nativity.

These comparisons were made with the idea that our unit of analysis, a city, was broadly defined with cities themselves deciding how their jurisdiction was defined—whether that be at the city, singly county, multi-county, or MSA level.”

Finally, we do not include data for all major cities across the United States, such as those in California who have their own reporting mechanisms. Therefore, we are not capturing the full spectrum of progress towards the HIV Care continuum goals in all major cities across the United States.

Public Health Implications

National strategy goals cannot be achieved without first meeting these goals at the city-level. Cities represent a fundamental unit for change, with cities knowing how to best reach and support the communities that dwell within their bounds. Cities have often been at the forefront of enacting fundamental policies—such as certain cities' that make it their practice to provide pre-exposure prophylaxis at minimal cost—to prevent the transmission of HIV and improve the lives of those living with HIV. Similar to vaccination for the coronavirus 2019 for which about 67% of the U.S. population had received at least one dose of the vaccine as of July 2021 and the remaining one-third of the population has been more difficult to vaccinate, it will also be difficult to reach the remaining population who have not received their diagnosis of HIV [28]. Advocating for primary care practices to offer HIV tests to general patient panels, rather than only high-risk patients, can facilitate timely diagnoses for all people at risk of acquiring HIV. Our data suggest that linkages to care present challenges to some cities. Cities can encourage their public health departments that may offer HIV testing to create strong ties and relationships with those that provide HIV treatment services, so that there is minimal delay and a smooth transfer of patients to HIV providers. Most cities in our study seem to have some success in ensuring that people receive HIV care once they surpass the barrier of being linked to it in the first place. Our data suggest opportunities for improvement at the far end of the HIV care continuum, namely, viral suppression, which is the culmination of dedicated commitment and adequate and acceptable access to care. Those at highest risk for acquiring HIV may sometimes be some of the most vulnerable people in our cities who need the most resources to

ensure that their local environment recognizes their needs and addresses them in a timely, steady, and supportive manner. With the nation's renewed efforts to end the HIV epidemic, cities—especially high prevalence ones—are receiving even more dedicated monies to combat this issue, making achieving national HIV care continuum goals more possible than ever before.

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DATA AVAILABILITY

AIDSVu data for the most current datasets are publicly available for download at <https://aidsvu.org/resources/#!/dataset>. Those interested in obtaining the data that support this study's findings can contact individual state or local health departments—depending on the entity responsible for HIV surveillance data—with requests.

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ABBREVIATIONS

human immunodeficiency virus (HIV); acquired immune deficiency syndrome (AIDS); National HIV/AIDS Strategy (NHAS); people with HIV (PWH); metropolitan statistical areas (MSAs); enhanced HIV/AIDS reporting system (eHARS); Center for Disease Control and Prevention (CDC)