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Factors Associated with HIV Antiretroviral Therapy among Men Who Have Sex with Men in 20 US Cities, 2014

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Abstract Reducing HIV among men who have sex with men (MSM) is a national goal, and early diagnosis, timely linkage to HIV medical care, and ongoing care and treatment are critical for improving health outcomes for MSM with HIV and preventing transmission to others. We assessed demographic, social, and economic factors associated with HIV antiretroviral treatment among HIV-infected MSM. Data are from the National HIV Behavioral Surveillance (NHBS) collected in 2014 among MSM. We estimated prevalence ratios and 95% confidence intervals using average marginal predictions from logistic regression. Overall, 89% of HIV-positive MSM reported currently taking antiretroviral therapy (ART). After controlling for other variables, we found that higher perceived community stigma and not having health insurance were significant risk factors for not taking ART. We also found that high socioeconomic status (SES) was associated with taking ART. Race/ethnicity was not significantly associated with taking ART in either the unadjusted or adjusted analyses. Findings suggest that to increase ART use for MSM with HIV, we need to move beyond individual-level approaches and move towards the development, dissemination, and evaluation of structural and policy interventions that respond to these important social and economic factors.

Keywords MSM · National HIV Behavioral Surveillance · Antiretroviral Therapy · Stigma · Health Insurance · SES · Race/ethnicity

Introduction

Although gay, bisexual, and other men who have sex with men (collectively referred to as MSM) represent approximately 2% of the US population [1], in 2017, they accounted for 66.5% of new diagnoses of HIV infection in the US and six dependent areas; MSM who inject drugs account for an additional 3.2% [2]. In addition, incidence (i.e., new infections) of HIV infection decreased from 2008 to 2015 for all transmission categories except for MSM [3]. Reducing HIV among MSM is a national goal, and early diagnosis, timely linkage to HIV medical care, ongoing care and treatment, and achieving and maintaining viral suppression will contribute to improving the health outcomes for MSM with HIV and preventing transmission to others [4]. Previous research shows that antiretroviral therapy (ART) reduces the risk of sexual HIV transmission [5, 6]. More recent research shows that when people taking ART can achieve and maintain viral suppression, they have effectively no risk of sexually transmitting HIV

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[7–11]. A National HIV Behavioral Surveillance (NHBS) data trend analysis among self-reported HIV-positive MSM found that from 2008 to 2014, ART prevalence increased from 69 to 88% [12]. Although this trend is promising, National HIV Surveillance System (NHSS) data report that among MSM with diagnosed HIV infection at the end of 2015, only 57.9% were retained in continuous HIV medical care and only 63% had achieved viral suppression [13]. It is important to understand the reasons that some HIV-positive MSM are not taking the ART they need to become virally suppressed.

The purpose of this study is to learn more about the factors associated with HIV-positive MSM's engagement in HIV medical care and treatment. We analyze 2014 NHBS data of HIV-positive MSM to further assess whether key social and economic factors, including socioeconomic status, homelessness, incarceration, health insurance, discrimination related to being gay/bisexual, and perceived community stigma related to having HIV were associated with taking ART for self-reported HIV-positive MSM in 20 US cities.

Methods

Design

For this cross-sectional study, we analyzed data from NHBS collected in 2014 among MSM.

Sample, Setting, and Data Collection

NHBS monitors HIV seroprevalence, risk behaviors, testing, treatment, and prevention in the USA among three populations: MSM, persons who inject drugs, and heterosexual adults at increased risk for HIV. Each population is surveyed every three calendar years and data for this analysis were collected in 2014 during the fourth MSM cycle of NHBS. Detailed sampling and data collection procedures have been previously published [14–16]. Data were collected from 20 metropolitan statistical areas (MSAs) with the highest HIV prevalence overall: Atlanta, GA; Baltimore, MD; Boston, MA; Chicago, IL; Dallas, TX; Denver, CO; Detroit, MI; Houston, TX; Los Angeles, CA; Miami, FL; New Orleans, LA; Nassau-Suffolk, NY; Newark, NJ; New York, NY; Philadelphia, PA; San Diego, CA; San Francisco, CA; San Juan, PR; Seattle, WA; and Washington, DC.

MSM were recruited for interviews and HIV testing using venue-based, time-location sampling methods. Through a formative assessment, staff identified venues frequented (e.g., bars, clubs, gyms, parks, street locations, or social organizations) where at least 50% of the patrons were MSM and determined days and times at each identified venue when MSM were most likely to be present. Sampling involved randomly selecting venues and day/time periods for recruitment events. During an event, a trained recruiter systematically approached men attending the venue to ask about screening for eligibility. Eligible men were those who were born male and self-identified as male, were aged 18 years or older, lived in the participating city, were able to complete the survey in English or Spanish, reported ever having oral or anal sex with another man, and had not previously participated in the NHBS-MSM survey during 2014. Data were collected by trained interviewers using a computer-assisted personal interview. All MSM who self-reported a prior HIV-positive test with a valid interview (as assessed by the interviewer's confidence in the respondent's answers) were included in this analysis.

Measures

Outcome The outcome of this analysis was current ART. Current ART was measured by asking whether the participant was currently taking ART at the time of the interview (i.e., "Are you currently taking antiretroviral medicines to treat your HIV infection?"). The response options were "yes" or "no."

Demographics Participants reported one or more race categories (American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, and White). Ethnicity was asked about separately and participants who reported Hispanic or Latino ethnicity were considered Hispanic or Latino, regardless of their reported race. Participants' race/ethnicity was coded into four mutually exclusive categories (Hispanic/Latino, Black/African American, White, or other). The "other" race/ethnicity category included American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, and multiple races. Age was calculated from the reported date of birth and categories used for this analysis were 18–29, 30–39, 40–49, and ≥ 50 years. Participants reported whether they were born in the USA (yes/no). Region of residence was analyzed using the four continental regions defined by the US Census Bureau (South, West, Midwest, Northeast). Puerto Rico was combined with the South due to small sample sizes.

Time since Diagnosis with HIV Participants reported the date of their first HIV-positive test. The time since diagnosis was dichotomized as ≤ 3 years and > 3 years for this analysis. The 3-year time frame was selected because this was the most recent cutoff that provided sufficient sample size to conduct analysis for both groups, with a sample size just over 500 in the smaller group.

Discrimination Related to Being Gay or Bisexual Participants reported whether they had experienced specific types of discrimination related to being gay or bisexual (i.e., "During the past 12 months, have any of the following things happened to you because someone knew or assumed you were attracted to men?"). The five questions asked whether they had: been called names/insulted; received poorer services than other people in restaurants, stores, other business, or agencies; been treated unfairly at work or school; been denied or given lower-quality healthcare; or been physically attacked or injured. Questions were adapted from a previous study [19]. Responses to questions were combined and coded as yes (experienced one or more of the five types of discrimination) or no (experienced none).

Perceived Community Stigma Related to Having HIV Perceived community stigma was measured using four questions with five possible responses for each ranging from strongly agree to strongly disagree (i.e., "Please tell me how strongly you agree or disagree with each statement."). Questions were adapted from two previous studies [20, 21]. The four questions asked whether most people in the respondent's city would: discriminate against someone with HIV; support the rights of a person with HIV to live and work wherever they wanted to; not be friends with someone with HIV; and think that people who got HIV through sex or drug use have gotten what they deserve. Response scores were reverse coded as appropriate. A lower score represents less perceived community stigma and a higher score represents more perceived community stigma. For all respondents with data for at least three of the four questions, the average score was calculated (with possible scores ranging between 1 and 5). The Cronbach's alpha for the four items was .72.

Socioeconomic Status, Homelessness, Health Insurance, and Incarceration History Participants reported whether they had been homeless in the last year (yes/no), currently had health insurance (yes/no), and were ever incarcerated (yes/no). Similar to previous NHBS studies, we used a composite measure of socioeconomic status (SES) [17, 18]. SES was constructed as three categories based upon reported income and educational attainment. Low SES was defined as having an income < $25,000 or no high school diploma. Medium SES was defined as having an income $25,000–$49,999 or high school diploma (but not categorized as low SES based upon the criterion above). High SES was defined as having an income > $50,000 and a college degree.

Analyses

Descriptive statistics and models were conducted using weighted analyses to account for the complex sampling methodology used to recruit MSM. The weights accounted for sampling, non-response, and multiplicity (the increased probability of recruiting individuals who frequently visited venues in the sampling universe) [22, 23]. To assess the association between the independent variables and taking ART, univariable and multivariable logistic regressions were conducted. Unadjusted prevalence ratios (PR) and adjusted prevalence ratios (aPR) and 95% confidence intervals were estimated using average marginal predictions from regression. Analyses reflect complete case analysis, and approximately 1% of records were omitted due to missing data on independent or dependent variables. Although perceived community stigma related to having HIV was analyzed as a continuous variable in the logistic model, prevalence ratios were estimated at each point of the scale (as compared to the lowest possible score of 1). All analyses were conducted using SUDAAN 11 (RTI International, Research Triangle Park, NC).

Results

Sample Characteristics

This analysis included 1716 MSM who, in 2014, reported having a previous HIV-positive test (prior to applying weights). Characteristics of the weighted analyzed sample are summarized in Table 1. In the sample, 38% were Black/African American, 34%

Table 1 Characteristics of HIV-positive men who have sex with men, National HIV Behavioral Surveillance, 20 US cities, 2014 (*N* = 1716)

	Number	%
Demographics		
Race/ethnicity		
Black/African American	659	38.4
Hispanic/Latino [a]	355	20.7
White	582	33.9
Other [b]	120	7.0
Age (years)		
18–29	455	26.5
30–39	432	25.2
40–49	450	26.2
50+	379	22.1
Born in the USA		
Yes	1545	90.0
No	171	10.0
Region of residence		
South and Puerto Rico	796	46.4
West	465	27.1
Midwest	168	9.8
Northeast	287	16.7
Social characteristics		
Socioeconomic status [c]		
Low	834	48.6
Medium	612	35.7
High	270	15.7
Homeless, past year		
Yes	202	11.8
No	1514	88.2
Incarcerated, ever		
Yes	557	32.5
No	1159	67.5
Health insurance		
Yes	1470	85.7
No	245	14.3
Years since HIV diagnosis		
≤ 3 years	518	30.6
> 3 years	1177	69.4
Discrimination related to being gay/bisexual[d]		
Yes	657	38.3
No	1058	61.7

Frequencies are based upon weighted counts to account for sampling, non-response, and multiplicity. Some totals may not add up due to the exclusion of observations with missing data

[a] Hispanic/Latino based upon ethnicity reported and may include individuals of any race

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

[c] Low SES was defined as having an income < $25,000 *or* no high school diploma. Medium SES was defined as having an income $25,000–$49,999 or high school diploma (but not categorized as low SES based upon the criterion above). High SES was defined as having an income > $50,000 and a college degree

[d] Experiencing one or more of five measured types of discrimination related to being gay or bisexual

were White, and 21% were Hispanic/Latino. The mean age was 39.2 (SD = 1.7) years (categorical frequencies provided in Table 1). The majority (90%) were born in the USA, 46% lived in the South or Puerto Rico, and nearly half (49%) were low SES. Homelessness in the past year was reported by 12% and ever been incarcerated was reported by 33%. Most had health insurance (86%) and were diagnosed with HIV more than 3 years ago (69%). Thirty-eight percent reported experiencing discrimination related to being gay or bisexual in the past year. The average perceived community stigma related to having HIV was 2.70 (SD = 0.81) on a scale from 1 to 5, suggesting moderate stigma (not shown in the table). Overall, 89% of MSM reported currently taking ART (not shown in the table).

Factors Associated with Taking ART

Descriptive statistics for taking ART by covariates and the results of analyses are presented in Table 2. In the unadjusted models, a higher prevalence of taking ART was associated with older age, residence in the West, Midwest, or Northeast regions (as compared to the South and Puerto Rico), and high SES (as compared to low). A lower prevalence of taking ART was associated with homelessness in the past year, ever incarcerated, not having health insurance,

Table 2 Prevalence of taking ART among men who have sex with men, National HIV Behavioral Surveillance, 20 US cities, 2014 (*N* = 1716)

	Weighted % (*n*/*N*)	PR (95% CI)	aPR (95% CI)
Demographics			
Race/Ethnicity			
Black/African American	85.6% (548/658)	0.93 (0.87, 1.00)	NA
Hispanic/Latino[a]	91.9% (315/355)	1.00 (0.94, 1.06)	NA
White	91.7% (535/581)	Referent	NA
Other[b]	82.1% (101/120)	0.90 (0.78, 1.03)	NA
Age (years)			
18–29	82.4% (354/454)	Referent	NA
30–39	85.7% (371/432)	1.04 (0.94, 1.15)	NA
40–49	93.4% (417/450)	1.13 (1.05, 1.22)*	NA
50+	93.6% (357/378)	1.14 (1.05, 1.24)*	NA
Born in the USA			
Yes	88.4% (1347/1543)	Referent	NA
No	92.0% (152/171)	1.04 (0.98, 1.11)	NA
Region of Residence			
South and Puerto Rico	84.9% (678/794)	Referent	NA
West	91.9% (426/465)	1.08 (1.02, 1.15)*	NA
Midwest	93.4% (148/168)	1.10 (1.02, 1.18)*	NA
Northeast	92.3% (247/287)	1.09 (1.02, 1.16)*	NA
Social characteristics			
Socioeconomic status[c]			
Low	85.6% (699/832)	Referent	NA
Medium	88.8% (542/612)	1.04 (0.98, 1.10)	NA
High	96.9% (258/270)	1.13 (1.07, 1.19)*	1.08 (1.01, 1.16)*
Homeless, past year			
Yes	76.7% (159/201)	0.85 (0.75, 0.97)*	NA
No	90.2% (1340/1513)	Referent	Referent
Incarcerated, ever			
Yes	83.8% (457/556)	0.92 (0.86, 0.99)*	NA
No	91.1% (1042/1158)	Referent	NA
Health insurance			
Yes	91.7% (1327/1469)	Referent	Referent
No	71.7% (172/244)	0.78 (0.67, 0.91)*	0.85 (0.76, 0.96)*
Years since HIV diagnosis			
≤ 3 years	83.6% (412/518)	0.92 (0.86, 0.98)*	NA
> 3 years	91.1% (1069/1176)	Referent	NA
Discrimination related to being gay/bisexual[d]			
Yes	86.7% (556/656)	0.96 (0.90, 1.03)	NA
No	90.0% (942/1057)	Referent	NA
Perceived community stigma related to living with HIV[e]			
Lowest	NA	Referent	Referent
Low	NA	0.97 (0.96, 0.98)*	0.97 (0.96, 0.99)*
Moderate	NA	0.92 (0.89, 0.95)*	0.94 (0.90, 0.98)*

Table 2 (continued)

	Weighted % (*n*/*N*)	PR (95% CI)	aPR (95% CI)
High	NA	0.86 (0.78, 0.93)*	0.89 (0.82, 0.97)*
Highest	NA	0.76 (0.63, 0.92)*	0.84 (0.71, 0.98)*

Frequencies are based upon weighted counts to account for sampling, non-response, and multiplicity

*$p < .05$

[a] Hispanic/Latino based upon ethnicity reported and may include individuals of any race

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

[c] Low SES was defined as having an income < $25,000 or no high school diploma. Medium SES was defined as having an income $25,000–$49,999 or high school diploma (but not categorized as low SES based upon the criterion above). High SES was defined as having an income > $50,000 and a college degree

[d] Experiencing one or more of five measured types of discrimination related to being gay or bisexual

[e] Variable was analyzed as a continuous variable. To provide results in a way that could be interpreted, aPRs were estimated from the model for four categories of stigma as compared to the lowest category for presentation of results

being diagnosed for within 3 years, and higher perceived community stigma related to having HIV. In the adjusted analysis, taking ART was significantly lower for those reporting higher perceived community stigma related to having HIV and those reporting not currently having health insurance. Also, taking ART was significantly higher for those with high SES (as compared to low). The prevalence of taking ART was significantly lower for MSM reporting higher perceived community stigma related to having HIV. When estimating prevalence ratios to compare "low," "moderate," "high," and "highest" stigma scores to the lowest score, they ranged from adjusted prevalence ratio (aPR) = 0.97

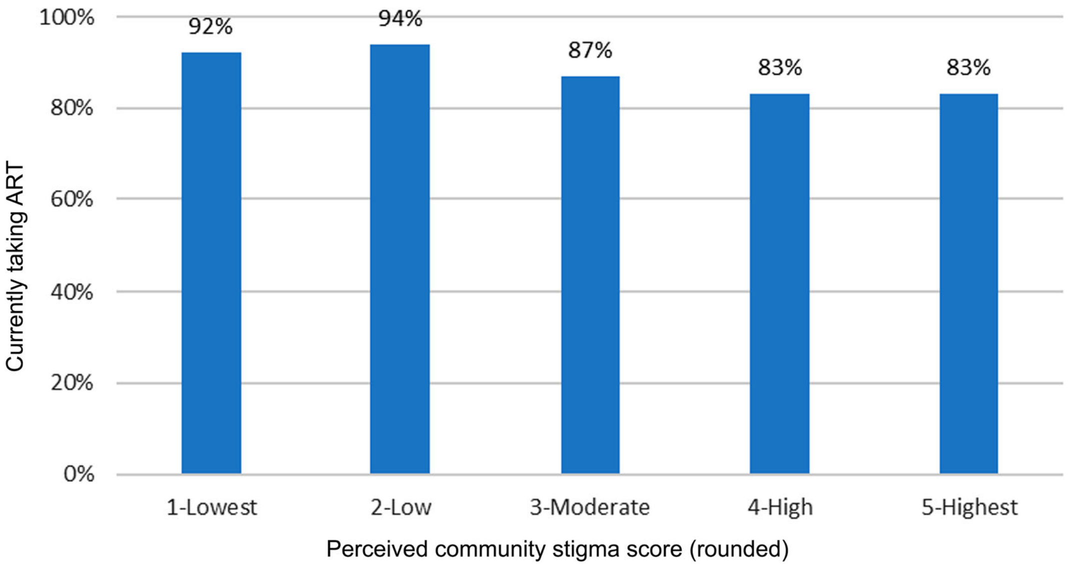

Fig. 1 Percentage of HIV-positive men who have sex with men currently taking ART by perceived community stigma related to having HIV

(95% CI 0.96–0.99) for the lowest non-referent stigma score ("low") to aPR = 0.84, 95% (CI 0.71–0.98) for the highest stigma score ("highest"). Figure 1 shows the percentage of MSM taking ART stratified by perceived community stigma score, rounded to the nearest integer. The prevalence of taking ART was significantly lower (aPR = 0.85, 95% CI 0.76–0.96) among MSM without health insurance compared to those with health insurance. Finally, compared to those with low SES, the prevalence of taking ART was significantly higher among those with high SES (aPR = 1.08, 95% CI 1.01–1.16).

Discussion

For persons with HIV infection, taking and adhering to ART leads to sustained viral suppression, positive health outcomes, and effectively no risk of sexual transmission to others when viral suppression is achieved and maintained [5–11]. We found that among self-reported HIV-positive MSM recruited from 20 major cities with high HIV prevalence, 89% were currently taking ART. Our study explored which factors were associated with taking ART among MSM after controlling for several variables. We found that not having health insurance and higher perceived community stigma related to having HIV were significant risk factors for not taking ART. We also found that having a high SES, compared to a low SES, was associated with taking ART. Interestingly, race/ethnicity was not significantly associated with taking ART in either the unadjusted or adjusted analyses. Although the prevalence of taking ART was 6.1 percentage points lower among Black MSM than White MSM in the descriptive analysis, the difference was not statistically significant. In an analysis of 2008 NHBS data, the prevalence of taking ART was 13 percentage points lower among Black MSM than White MSM [12]. This suggests that progress is being made in reducing long-standing racial disparities in HIV treatment among MSM.

MSM who believed that people in their city would discriminate against them because they had HIV were less likely to take ART. These men may have been discouraged from accessing HIV medical care for fear that they would be treated poorly because they had HIV. This finding is consistent with other studies that have shown that among persons with HIV, high levels of HIV-related stigma are associated with lower levels of adherence to ART and lower access to HIV medical care and medical care in general [24–28]. For MSM, HIV-related stigma may be compounded by stigma related to being gay or bisexual—a stigma commonly experienced by MSM. One study found that 41% of MSM reported experiencing verbal harassment, discrimination, or physical assault related to being a sexual minority over the past year [29].

We found that the prevalence of taking ART was lower among MSM who did not have health insurance compared to MSM with health insurance. Persons who are uninsured are substantially less likely to have a usual source of health care or recent health care visit than persons who have health insurance. Not only does not having health insurance limit access to ART, it also limits access to other types of care that would help prevent illness, control acute episodes, or manage chronic conditions (including HIV) to avoid making them worse [30]. Having health insurance is also a predictor of whether persons at high risk for HIV, including MSM, use pre-exposure prophylaxis (PrEP) to prevent HIV infection prior to exposure. One study found that insured patients were four times more likely to use PrEP services compared to the uninsured [31]. Lack of access to health care coupled with fear of being stigmatized by the healthcare system may lead to poor health-related outcomes for MSM with HIV.

Prado et al. argue that to effectively respond to the HIV epidemic at a population level and reduce HIV health disparities that exist among ethnic minority youth, there must be an emphasis placed on macro-level interventions (e.g., structural or policy interventions) [32]. For example, to respond to stigma and protect people with HIV from violence, retaliation, and discrimination, national HIV goals support strengthening proactive enforcement of civil rights laws; ensuring that federal and state criminal laws reflect current evidence-based public health approaches regarding HIV transmission and prevention; ensuring that messages about anti-stigma civil rights and health information privacy rights are incorporated into federal documents, programs, and educational campaigns; mobilizing communities to educate people and reduce HIV-related stigma; and promoting public leadership of people with HIV [4]. Increasing public awareness of "Treatment as Prevention"—that is that people with HIV who take HIV medicine as prescribed and keep an undetectable viral load (or stay virally suppressed) have effectively no risk of transmitting HIV to their HIV-negative sexual partners—may also help reduce HIV-related stigma for MSM [33].

Another potential approach for reducing the impact that perceived community stigma related to having HIV has on ART use is to promote medical home models similar to those used by Ryan White HIV/AIDS (RWHAP) program facilities. RWHAP facilities offer comprehensive, patient-centered care where care, case management, and support services are integrated and patient-provider relationships are emphasized [34]. One study found that persons with HIV who attended a non-RWHAP-funded facility reported higher HIV-related discrimination compared to those who attended a RWHAP funded facility [35].

To help MSM who lack health insurance, trained health navigators (also known as peer navigators or patient navigators) can work with clients and service providers to connect MSM to timely and essential HIV-related medical and social services. There is evidence to suggest that HIV navigation services may lead to clients obtaining health insurance and improved health outcomes [36].

There are several limitations to the findings in this report. First, NHBS is not a national representative sample and results may not be generalizable to all cities. Weighted results are generalizable to all venue-attending HIV-positive MSM in participating cities. HIV-positive venue-attending MSM may be different from HIV-positive MSM who do not attend venues in unknown but important ways. For example, MSM who are not well enough to attend social venues are unlikely to be included in our sample. Second, because we relied on self-reported data, social desirability may have resulted in the overestimation of ART use. Third, we were only able to look at individual-level factors at the patient level. Factors at the systems, structural, or provider levels were not available for this analysis. For example, beyond examining region, we did not conduct a multi-level analysis to allow for the consideration of characteristics of MSAs as structural predictors. Finally, the cut-off point for defining recent diagnosis was not empirically derived; rather, it was selected to allow for sufficient sample size to conduct analysis for this variable.

In summary, our findings suggest that to increase access to and use of ART among MSM with HIV, we need to continue to develop, disseminate, and evaluate interventions that will respond to these macro-level social and economic factors that prevent access to care and optimal health outcomes.

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Compliance with Ethical Standards

Statement about Research Involving Human Participants and Informed Consent NHBS activities were approved by local institutional review boards for each of the 20 MSAs. The project underwent a CDC review and approval process and was determined to be research in which CDC was not directly engaged and, therefore, did not require review by CDC IRB. All participants were explicitly assured during the recruitment process of the anonymous nature of the survey and the HIV testing. All participants provided oral informed consent to participate in the interview and be tested for HIV. Oral consent was documented electronically on the survey instrument by interviewers for all participants and on hard copy as required by local IRBs. Data collection was anonymous, so written consent was not possible and participant's names or other personal identifiers were not linked to any NHBS instruments. All consent procedures, including oral consent, were approved by local IRBs.

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