HIV Seropositivity and Correlates of Infection among Heterosexually Active Adults in High-Risk Areas in South Florida

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Abstract The U.S. HIV/AIDS epidemic disproportionately impacts lower-income populations. We conducted a cross-sectional study of heterosexually active adults (N=1076) in areas with high poverty and HIV/AIDS rates in South Florida in 2007. Using venue-based sampling, anonymous interviews and HIV tests were conducted at randomly selected venues (primarily retail businesses not associated with risk behaviors). The sample's HIV infection rate was 7.1%. Half (52.2%) of the infections were previously undiagnosed. Our findings underscore the impact of social and environmental factors on HIV risk, as well as the need to increase and optimize HIV testing and other prevention services.

Keywords Heterosexuals, HIV, Poverty, South Florida, Behavioral surveillance

Background

It has been suggested that HIV infections resulting from heterosexual transmission may be underestimated and are increasing. The potential shift in the HIV/AIDS epidemic to one with increased prominence of heterosexual transmission has been characterized by increases in infections among populations with lower income and low levels of education [1].

The CDC-funded National HIV Behavioral Surveillance (NHBS) System conducts behavioral surveillance among groups at high risk for HIV infection (i.e., men who have sex with men, injection drug users, and heterosexuals at increased risk for HIV infection) [2]. NHBS activities are implemented in rotating cycles so that data are collected from each risk group approximately once every three years. The first cycle of NHBS focusing on heterosexuals at increased risk for HIV infection was completed in late 2007 and carried out in 25 metropolitan statistical areas exhibiting high AIDS prevalence. This paper describes the social characteristics and sexual and drug use risk behaviors of HIV-positive and HIV-negative individuals participating in the NHBS heterosexual cycle in Miami-Dade and Broward (Ft. Lauderdale) counties, Florida.

Methods

Methodology for conducting NHBS has been described [3]. For this study cycle, sampling was conducted within high-risk areas (HRAs), defined as census tracts exhibiting high rates of poverty and heterosexually acquired HIV/AIDS cases. HRAs were identified using U.S. Census Bureau poverty data (from the Census 2000) and Florida Department of Health HIV/AIDS surveillance data (heterosexually acquired HIV and AIDS cases among males and females and cases with no identified risk among females, diagnosed from January 2001 through February

2006). Each census tract in Miami-Dade and Broward counties was assigned a standardized value based on its combined HIV/AIDS and poverty data. A plot of the values showing a skewed line was examined to determine the logical cut-off point distinguishing census tracts with high and low values in each county. Census tracts with high values (i.e., the top 40% in Miami-Dade County and the top 27% in Broward County) were determined HRAs. A subset of fourteen HRAs was selected for sampling with consideration of the areas' standardized values (highest values were preferred), number of viable venues for sampling (e.g., with adequate attendance, reasonably safe), and racial/ethnic and geographic representation of South Florida's at-risk heterosexual populations.

Recruitment was conducted outside 117 randomly selected venues (mostly retail businesses not associated with risk behaviors, such as Laundromats, grocery stores, and nail salons) within the selected HRAs between January and October 2007. Venue-based, time-space sampling [4] was used. Persons approached by study staff were screened for eligibility in a mobile van outside the venue where they were recruited. Eligibility criteria included residence in Miami-Dade, Broward or Palm Beach County, Florida; being 18-50 years of age; having had vaginal or anal sex with a member of the opposite sex in the last 12 months; being able to complete the interview in English or Spanish; being male or female (not transgender); and being a first-time participant. Eligible and interested persons consented to an anonymous interview (approximately 45 minutes in length) and HIV test in the mobile van or scheduled an appointment for another time and location. Participants received an incentive for completing the interview ($25) and HIV test ($25) and elected either a rapid finger stick test (OraQuick ADVANCE) or an oral swab test (OraSure). Confirmatory testing (EIA and Western Blot) was conducted on dried blood spot or oral specimens. The study was approved by both the Florida Department of Health and Western Institutional Review Boards.

Of the 1831 persons approached by study staff, 1329 (72.6%) agreed to be screened for eligibility. Of those screened, 1226 (92.2%) were eligible and 1222 (91.9%) completed the anonymous NHBS questionnaire and HIV test. To better isolate the effect of heterosexual risk behavior on HIV transmission, individuals reporting injection drug use or male-to-male sexual activity during their lifetimes (N=146) were excluded from this analysis, resulting in 1076 participants. Chi-square tests were used to determine bivariate relationships. Variables showing a relationship at an alpha level of 0.05 or less were entered into a logistic regression model to determine factors associated with HIV positivity (based on HIV testing data).

Results

Of the 1076 participants, 7.1% tested HIV positive (8.3% of the entire sample of 1222 tested positive). There were no statistically significant differences in infection rates between racial/ethnic groups ($p>0.05$). Of the 76 who tested HIV positive, 40 (52.6%) were unaware of their HIV status (data not shown in tabular form). Persons unaware of their HIV infection were more likely than persons aware of their infection to be non-Hispanic black (90.0% vs. 69.4%, $p=0.049$, data not shown in tabular form); no other significant differences were found between these two groups. The majority of participants (79.4%) reported testing for HIV in their lifetimes and 39.4% reported testing in the last 12 months (excluding persons diagnosed with HIV over 12 months ago) (data not shown in tabular form).

Table 1 describes the demographic and behavioral characteristics of the sample by serostatus. Factors shown to correlate with HIV seropositivity in bivariate analysis included

older age, employment status, homelessness in the last 12 months, increased crack use, and a diagnosis of syphilis or Chlamydia in the last 12 months.

Table 1. Selected Characteristics of the Sample by HIV Serostatus (N=1076)

	HIV- (N=1000) N (%)	**HIV+** (N=76) N (%)	**p-value**
Gender			0.164
Male	556 (93.9)	36 (6.1)	
Female	444 (91.7)	40 (8.3)	
Age			<0.001
18-29	395 (97.3)	11 (2.7)	
30-39	259 (92.5)	21 (7.5)	
40-50	346 (88.7)	44 (11.3)	
Race/Ethnicity			0.991
Non-Hispanic White/Other	41 (93.2)	3 (6.8)	
Non-Hispanic Black	819 (93.1)	61 (6.9)	
Hispanic	140 (92.1)	12 (7.9)	
Education			0.271
< High School/GED	396 (91.9)	35 (8.1)	
High School/GED	400 (92.8)	31 (7.2)	
Post High School/GED	204 (95.3)	10 (4.7)	
Employment Status			<0.001
Full/Part Time	447 (97.0)	14 (3.0)	
Retired/Disabled/Other	86 (83.5)	17 (16.5)	
Unemployed	467 (91.2)	45 (8.8)	
Annual Income			0.084
< $15,000	698 (92.0)	61 (8.0)	
≥ $15,000	285 (95.0)	15 (5.0)	
Homeless in Last 12 Months			0.05
No	815 (93.7)	55 (6.3)	
Yes	185 (89.8)	21 (10.2)	
Number of Sex Partners in Last 12 Months			0.582
1	394 (92.5)	32 (7.5)	
> 1	605 (93.4)	43 (6.6)	
Had Any Unprotected Sex[a] in Last 12 Months			0.238
No	316 (91.6)	29 (8.4)	
Yes	684 (93.6)	47 (6.4)	
Number of Exchange Partners[b] in Last 12 Months			0.434
0	954 (93.1)	71 (6.9)	
> 0	46 (90.2)	5 (9.8)	
Number of Casual Partners[c] in Last 12 Months			0.142
0	518 (91.8)	46 (8.2)	
> 0	482 (94.1)	30 (5.9)	

Crack Use in Last 12 Months			0.001
No use	892 (94.3)	54 (5.7)	
≤ 1/week	31 (88.6)	4 (11.4)	
> 1/week	77 (81.1)	18 (18.9)	
Cocaine (not Crack) Use in Last 12 Months			0.374
No use	837 (92.7)	66 (7.3)	
≤ 1/week	79 (91.9)	7 (8.1)	
> 1/week	84 (96.6)	3 (3.4)	
Binge Drinking[d] in Last 12 Months			0.483
No	685 (92.6)	55 (7.4)	
Yes	312 (93.8)	21 (6.3)	
Syphilis Diagnosis in Last 12 Months			0.001
No	947 (93.6)	65 (6.4)	
Yes	52 (82.5)	11 (17.5)	
Gonorrhea Diagnosis in Last 12 Months			0.083
No	827 (93.6)	57 (6.4)	
Yes	171 (90.0)	19 (10.0)	
Chlamadia Diagnosis in Last 12 Months			0.005
No	902 (93.7)	61 (6.3)	
Yes	96 (86.5)	15 (13.5)	
Tested for HIV in Last 12 Months[e]			0.058
No	579 (95.1)	30 (4.9)	
Yes	385 (97.5)	10 (2.5)	
Tested for HIV in Lifetime			0.915
No	205 (92.8)	16 (7.2)	
Yes	792 (93.0)	61 (7.0)	

[a]Unprotected sex is defined as vaginal or anal sex without a condom.
[b]An exchange partner is defined as a woman/man with whom one has sex in exchange for things like money or drugs.
[c]A casual partner is defined as a woman/man with whom one has sex, but does not feel committed to or does not know very well.
[d]Binge drinking is defined as ≥ 4 drinks in one sitting for women and ≥ 5 drinks for men.
[e]Excludes persons diagnosed with HIV over 12 months ago.

Variables that remained significantly associated with HIV positivity in the logistic regression analysis (Table 2) were being age 30 or older (adjusted odds ratio [AOR]=2.22, 95% CI 1.02-4.86 for ages 30-39) (AOR=2.70, 95% CI 1.32-5.54 for ages 40-50), being retired or disabled (AOR=9.38, 95% CI 4.05-21.69) or unemployed (AOR=2.42, 95% CI 1.28-4.57) compared to employed, and crack use greater than once a week (AOR=2.08, 95% CI 1.08-4.00) compared to no crack use.

Table 2. Logistic Regression of Factors Associated with HIV Infection (N=997)		
Variable	**AOR**	**95% CI**
Sex		
Male	1.00	
Female	1.31	0.80, 2.16
Age		
18-29	1.00	
30-39	2.22	1.02, 4.86
40-50	2.70	1.32, 5.54
Race/Ethnicity		
Non-Hispanic White/Other	1.00	
Non-Hispanic Black	0.66	0.14, 3.14
Hispanic	0.81	0.15, 4.35
Employment Status		
Full/Part-Time	1.00	
Retired/Disabled	9.38	4.05, 21.69
Unemployed	2.42	1.28, 4.57
Crack Use in Last 12 Months		
No Use	1.00	
≤ 1/Week	1.15	0.32, 4.07
> 1/Week	2.08	1.08, 4.00

Discussion

Three important findings of this study are (1) the high prevalence of HIV among this heterosexual sample, (2) the similar infection rates across racial/ethnic groups, and (3) the large proportion of individuals who were unaware of their infection.

The study eligibility criteria did not include high-risk behavior (e.g., multiple sex partners, unprotected sex), and the sampling method did not target high-risk venues (e.g., STD clinics). The population sampled was recruited primarily at retail businesses not associated with risk behavior (e.g., Laundromats, grocery stores, nail salons). Thus, the high seropositivity rate found suggests the impact of social and environmental factors on HIV risk. Research has indicated that structural factors such as poverty, unstable housing, and illicit drug marketing have facilitated the high prevalence of HIV [5-7], which is unexplained by sexual risk behaviors alone. No high-risk sex variables that we examined were associated with HIV status even in bivariate analysis. To our knowledge, the HIV seropositivity among our sample is the highest of those in cities where this study was conducted. Using similar analytic criteria, CDC found a 2.1% HIV seropositivity rate among participants from 23 participating cities [8]; NHBS data from New York City [9], Washington DC [10], and Baltimore [11] also show relatively high rates of infection among participants. CDC's analysis found that infection rates among participants living in poverty areas did not differ significantly by race/ethnicity and that HIV seropositivity rates were inversely related to socioeconomic status [8]. Our data also revealed equally high infection rates across racial/ethnic groups. More investigation is needed to determine how important the social milieu is in the HIV epidemic. While it is estimated that approximately one-fifth of infected individuals in the U.S. are unaware of their infection [12],

among this high-risk group, the figure was over 50%. Awareness of HIV-positive status may lead to decreases in risky sexual behaviors [13]. The high rate of previously undiagnosed infection among this population is disturbing and reinforces the need to increase and optimize HIV testing efforts. However, increased HIV testing alone may not be sufficient in reducing HIV transmission, given the relatively high proportion of the sample who had recently tested for HIV. Program planners should assess and ensure the availability of HIV prevention services in areas with high rates of HIV/AIDS cases and poverty; community-level interventions may be particularly beneficial [8]. As this high-prevalence sample was recruited mostly from retail businesses not associated with high-risk behavior, such venues in areas with high rates of HIV/AIDS and poverty should not be overlooked as potential locations for HIV prevention marketing and service delivery. Our finding that increased crack use was significantly associated with HIV infection underscores the importance of offering HIV/AIDS services in drug treatment settings and of linking drug-abusing clients to treatment services. Meeting the HIV prevention needs of the population sampled will require increased funding and resources.

This study has several limitations. Due to the study's cross-sectional design, causal relationships could not be determined. The HIV prevalence data for non-Hispanic whites/others (three cases among 44 participants) are not sufficient for reliable interpretation. Data were not weighted by venue selection probability or clustered for venue sampled. Face-to-face interviews are subject to many biases, including the potential underreporting of stigmatized behaviors and conditions (e.g., being previously diagnosed with HIV or an STD); however, interviews were conducted anonymously by a highly experienced research team. Venue-based, time-space sampling is only generalizable to the population meeting eligibility criteria and attending venues on the sampling frame. However, given the number, variety, and broad attendance of venues sampled, we deem our findings to be widely applicable and particularly valuable for informing outreach-based public health interventions and campaigns [4].

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Acknowledgements

Funding for this study and analysis was provided by the Centers for Disease Control and Prevention under Program Announcement 04017/Cooperative Agreement U62/CCU423598.

Final Publication

The final publication is available at www.springerlink.com (http://www.springerlink.com/content/g3q1401q142j1pr4/)