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Florida Public Health Review

Volume 15

Article 5

2018

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Recommended Citation

Forrest, David W.; Cardenas, Gabriel; Dodson, Charlene S.; Metsch, Lisa R.; LaLota, Marlene; and Spencer, Emma (2018) "Trends in the HIV Epidemic among Men Who Have Sex with Men in Miami-Dade County, Florida, 2004-2014," *Florida Public Health Review*: Vol. 15, Article 5.

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Trends in the HIV Epidemic among Men Who Have Sex with Men in Miami-Dade County, Florida, 2004-2014

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ABSTRACT

Miami, Florida has a large population of Hispanic and black men who have sex with men (MSM), a population more likely to become HIV infected than white MSM. We present here HIV behavioral trends in this population that reflect the effects of public health prevention in Miami over a 10-year period. Using National HIV Behavioral Surveillance (NHBS) data of MSM in Miami-Dade County, Florida, in 2004-05, 2008, 2011 and 2014, chi-square trend analyses were used to assess the epidemiologic trends related to HIV infection rates, HIV testing rates, undiagnosed HIV infection, use antiretroviral therapy (ART) and access to HIV care. Of 258, 527, 511, and 536 MSM, HIV rates have remained steady between 22.5% (95% CI 17.4-27.6) in 2004-05 to a high of 25.9% (95% CI 22.2-29.6) in MSM4 in 2014, with no significant trend. There was an increase in HIV testing in the past six months between 2004 (48.4%;95% CI 41.8-55.0) and 2014 (55.8;95% CI 51.3-60.3), $p < .001$; and a decrease in unrecognized HIV infection from 48.3% (95% CI 35.4-61.2) in 2004 to 31.4% (95% CI 23.7-39.1) in 2014, $p = .004$, over the same period. Being currently on ART and knowledge of pre-exposure prophylaxis (PrEP) also increased significantly during this 10-year period. HIV surveillance is providing valuable information, notably, as HIV testing rates have gone up unrecognized infections have decreased. Continued use of the NHBS system should provide insights into the epidemic and assist in reaching public health goals for the control of HIV infections.

Forrest, D.W., Cardenas, G., Dodson, C.S., Metsch, L.R., & LaLota, M. (2018). Trends in the HIV epidemic among men who have sex with men in Miami-Dade County, Florida, 2004-2014. *Florida Public Health Review*, 15, 41-48.

BACKGROUND

Miami has a unique, heterogeneous mixture of cultures, with a large Hispanic and black population, (2010 U.S. Census), and accordingly, a large population of men who have sex with men (MSM). Minority MSM populations contract HIV at inordinately high rates (Scott & Fuqua, 2014; CDC, 2012; Prejean & Song, 2011; CDC 2005; CDC, 2010a; CDC, 2010b; San Francisco Department of Public Health, 2012; Lieb & Prejean, 2011; Cantania & Osmond, 2001). Studies show that Miami-Dade County has high rates of HIV risk behaviors, drug use, and undiagnosed HIV infection among MSM (Akin et al., 2008; CDC, 2005; CDC, 2010a; Darrow et al., 2005; Fernandez et al., 2005; Fernandez et al., 2007;

Finlayson et al., 2011; Forrest et al., 2010; MacKeller et al., 2005; Oster et al., 2014; Valleroy et al., 2000; Webster et al. 2003), resulting in an inordinately high HIV seropositivity rate in Miami-Dade County, with an HIV prevalence as high as 29.3% in a sample of MSM who have sex only with men (Forrest et al., 2015). In addition, minority MSM in Miami-Dade are more likely to die from HIV/AIDS than white MSM (Lieb et al., 2007).

PURPOSE

In 2000, CDC and partners developed an HIV Prevention Strategic plan with national goals, including: strengthening the capacity nationwide to monitor the epidemic, develop and implement

effective HIV prevention interventions, and evaluate prevention programs. The National HIV Behavioral Surveillance (NHBS) was created with those purposes in mind. In this article, we will be presenting trends in HIV prevalence, and self-reported STI and specific drug use rates and HIV risk related behavior with trend analysis across four cycles of NHBS-MSM in Miami-Dade County, Florida. Whereas some data for each single cycle in Miami-Dade County have been reported previously by us (Forrest et al., 2010; Forrest et al., 2015) along with the other NHBS sites by CDC (CDC, 2005; Sanchez et al., 2006; CDC 2010a; Finlayson et al., 2011; CDC, 2013; CDC, 2014; Wejnert et al. 2013), there have been only two studies that have done a similar trend analysis with NHBS data at the local level: one using three rounds in San Francisco (Raymond et al., 2013) and another using two rounds in San Juan, Puerto Rico (Miranda de Leon et al., 2017), but none with Miami-Dade County NHBS data. Increasing awareness of these trends in Miami is crucial in the justification of ongoing NHBS data collection and advancement of prevention programs and research related to HIV for the MSM population.

METHODS

We analyzed cross-sectional data from the Miami-Dade County, Florida, site of the National HIV Behavioral Surveillance among MSM collected during four annual cycles: NHBS-MSM1 (July 2004 through April 2005), NHBS-MSM2 (June through November 2008), NHBS-MSM3 (July through December 2011) and NHBS-MSM4 (July through December 2014). In all four samples, venue-based, time-space sampling was used to recruit MSM who are at least 18 years old and residents of Miami-Dade County, Florida, to participate in face-to-face interviews. In addition to the national core NHBS questionnaire that includes demographics, behavioral risks for HIV, HIV testing history, and use of HIV-prevention services and programs (Sanchez et al., 2006), a local questionnaire assessed depression, social support and crystal methamphetamine use. A more detailed description of the NHBS-MSM study and methodology has been previously reported (CDC, 2005; MacKellar et al., 2007; Sanchez et al., 2006). All participants who reported oral or anal sex with at least one male sex partner in the past 12 months are included in this analysis.

Demographic characteristic variables shown in Table 1 include race/ethnicity, age, education, sexual identity and recruitment venues. The chi-square test for independence of proportions was used to test for differences in demographic characteristics across cycles and is given in Table 1.

HIV infection was determined by the OraQuick Advance Rapid HIV Test using a blood sample for NHBS-MSM1, NHBS-MSM2 and NHBS-MSM3, the

Clearview Complete Rapid HIV test for NHBS-MSM4, followed by a confirmatory test using Western Blot for all cycles, or by use of Western Blot using the OraSure Oral Specimen alone in rare cases where blood collection was not possible. HIV confirmatory testing was conducted by the Florida Department of Health.

Self-reported HIV positive refers to participants who reported receiving an HIV positive test result prior to the NHBS interview.

Undiagnosed HIV infection refers to participants who self-reported an HIV negative or unknown status but tested HIV positive based on their confirmatory test in one of the four MSM cycles. Only participants who completed the survey and HIV testing during each MSM cycle are included in this analysis.

Tested for HIV in the past six months was calculated from the time elapsed since the participant's reported date of their most recent HIV test and the date the NHBS interview was conducted.

Currently on ART refers to self-reported HIV positive participants reporting that they were currently taking antiretroviral therapy (ART) to treat their HIV infection in the MSM2, MSM3 and MSM4 cycles. Self-reported HIV positive participants in the MSM1 cycle were asked if they had ever taken ART.

Accessed care within three months after HIV diagnosis was calculated for HIV positive participants from the time between the date of the participant's first HIV positive test result and their reported first visit to a medical provider for HIV care.

Knowledge of PrEP was based on the participant's response to the question: "Before today, have you ever heard of people who do not have HIV taking anti-HIV medicines to keep from getting HIV?"

Syphilis in past 12 months, gonorrhea in past 12 months, and chlamydia in past 12 months was based on self-reported diagnosis of these sexually transmitted infections within the past 12 months.

Multiple male sex partners in past 12 months was assessed using the self-reported number of male oral or anal sex partners in the past 12 months. Any participant who reported having oral or anal sex with more than one male sexual partner in the past 12 months is included.

Powdered cocaine use in past 12 months, crack cocaine use in past 12 months and methamphetamine use in past 12 months was based on the participant's self-reported use of these drugs.

We calculated the point estimates with 95% confidence intervals (95% CI) at each time point. A chi-square "linear-by-linear" analysis in SPSS was done to test for trends in the proportions over the four time points, and the p-values are given in the table. All analyses were conducted on unweighted data following the practice of previous publications of national level NHBS data (CDC, 2005; Sanchez et al.,

2006; CDC, 2010a; Finlayson et al., 2011; CDC, 2013; CDC, 2014; Wejnert et al., 2013).

RESULTS

Table 1 displays the sample sizes and characteristics for the four NHBS-MSM cycles discussed in this paper. There were significant differences in the sample populations between cycles by the categories of race/ethnicity, age, education and sexual identity (Table 1). The percentage of the sample recruited at different types of venues also varied between cycles, with the percentage recruited at dance clubs increasing from 16.2% (11.6,20.8) in the MSM1 cycle to 44.5% (40.3,48.7) in the MSM4 cycle; and the percentage recruited at street locations decreasing from 24.3% (18.9,29.7) in MSM1 to 0.0% in the MSM4 cycle; and the percentage recruited at bars decreasing from 27.9% (22.3,33.6) in MSM1 to 12% (9.2,14.8) in MSM4.

Table 2 displays the rates of HIV infection, which were similar between the four cycles, with a low of 22.5% with a 95% CI (17.4, 27.6) in MSM1 to a high of 25.9% (22.2, 29.6) in MSM4 (Table 2). We found a steady decrease in undiagnosed HIV infection from 48.3% (35.4, 61.2) in MSM1 to 31.4% (23.7, 39.1) in MSM4 ($p = .004$); and a concomitant increase in self-reported HIV positive status with 12.0% (8.0, 16.0) reporting HIV positive status in MSM1, 14.0% (11.0, 17.0) in MSM2, 16.0% (12.8, 19.2) in MSM3, and 17.8% (14.6, 21.0) in MSM4 ($p = .019$). This matches well with a significant increase in HIV testing in the past six months between 2008 and 2014 from 34.5% with a 95% CI (30.1, 38.9) in MSM2, 45.2% (40.5, 49.9) in MSM3, to 55.8% (51.3, 60.3) in MSM4 ($p < .001$). We also find an increase in the percentage who self-reported that they are currently on ART between 2008 and 2014 from 72.3% (64.7, 79.9) in MSM2, 87.6% (81.5, 93.7) in MSM3, to 93.8% (89.0, 98.6) in MSM4 ($p < .001$). Awareness of the use of antiretroviral medications as pre-exposure prophylaxis (PrEP) increased dramatically between 2011 and 2014 from 20% (16.2, 23.8) reporting they had heard of PrEP in MSM3 to 40.7% (36.1%, 45.3%) reporting awareness of PrEP in MSM4 ($p < .001$). Self-reports of several indicators of possible HIV risk, such as STI infection, are varied. There is no significant trend over the four cycles in the percentage who self-reported a diagnosis of syphilis ($p < .171$), gonorrhea ($p < .360$), or chlamydia ($p < .931$), in the past 12 months. Reports of multiple male sex partners in the past 12 months remained above 78% for all four cycles with no trend ($p = .245$). We found a small but not statistically significant decrease in powdered cocaine use from a high of 29.6% (24.0, 35.2) in MSM1 to a low of 23.6% (20.0, 27.2) in MSM4 ($p = .092$); a significant decrease in crack cocaine use in the past 12 months with 16.2% (11.7, 20.7) in MSM1, 10.2% (7.6, 12.8) in MSM2, 3.7% (2.1, 5.3) in MSM3 and 7.6%

(5.4, 9.8) in MSM4 ($p < .001$); and a significant decrease in methamphetamine use in the past 12 months with a high of 19.4% (14.5, 24.3) in MSM1 and a low of 6.0% (3.9, 8.1) in MSM3 ($p < .001$). Overall, these indicators show continued risk of HIV infection among MSM in Miami.

DISCUSSION

Our findings from the four NHBS-MSM cycles provide a profile of the HIV epidemic among MSM in Miami-Dade County from 2004 through 2014. Notably, while rates of recent HIV testing have increased during the 2008 to 2014 period among NHBS-MSM participants, rates of undiagnosed HIV infection among NHBS-MSM participants have steadily decreased between 2004 and 2014 (Table 2 and Figure 1). This is encouraging because targeted HIV testing efforts among MSM in Miami-Dade has been a major prevention strategy during this period. For example, Miami's high HIV rates led to its being included in the Enhanced Comprehensive HIV Prevention Planning (ECHPP) Project, a three-year demonstration project that began in 2010 and was funded by CDC's Division of HIV/AIDS Prevention (DHAP) for the 12 municipalities with the highest number of people living with AIDS in the United States (CDC-ECHPP).

Also encouraging is an increase on the reported percentage currently on ART between 2008 and 2014 (Table 2) and an increasing awareness of PrEP in the period 2011 to 2014 (Table 2). Increased rates of ART use among HIV positive MSM together with PrEP use among high-risk HIV negative MSM may hold significant potential for reducing new HIV infections among MSM, for whom rates of sex without condoms among sero-condordant and sero-discordant MSM have increased during this period (Paz-Bailey et al, 2016). HIV rates and self-reported rates of syphilis, gonorrhea, chlamydia, are fairly stable over the 10-year period (Table 2).

Several study limitations should be recognized. These data are from Miami-Dade County, Florida, and are not necessarily representative of all MSM in this county or other areas. It is not possible to determine if the differences in the reported characteristics are due an actual change in the characteristics of the population or a difference in the samples. However, the sampling methods are the same for each cycle of NHBS-MSM and the sample sizes are adequate for accurate estimates of the rates for each characteristic for each year. These data are self-reported and, as such, stigmatized behaviors may have been underreported and more positively viewed behaviors may be overreported. Also, the NHBS study for this population is done every three years and rates in the years that were not studied were not collected and are not available. Lastly, the analysis

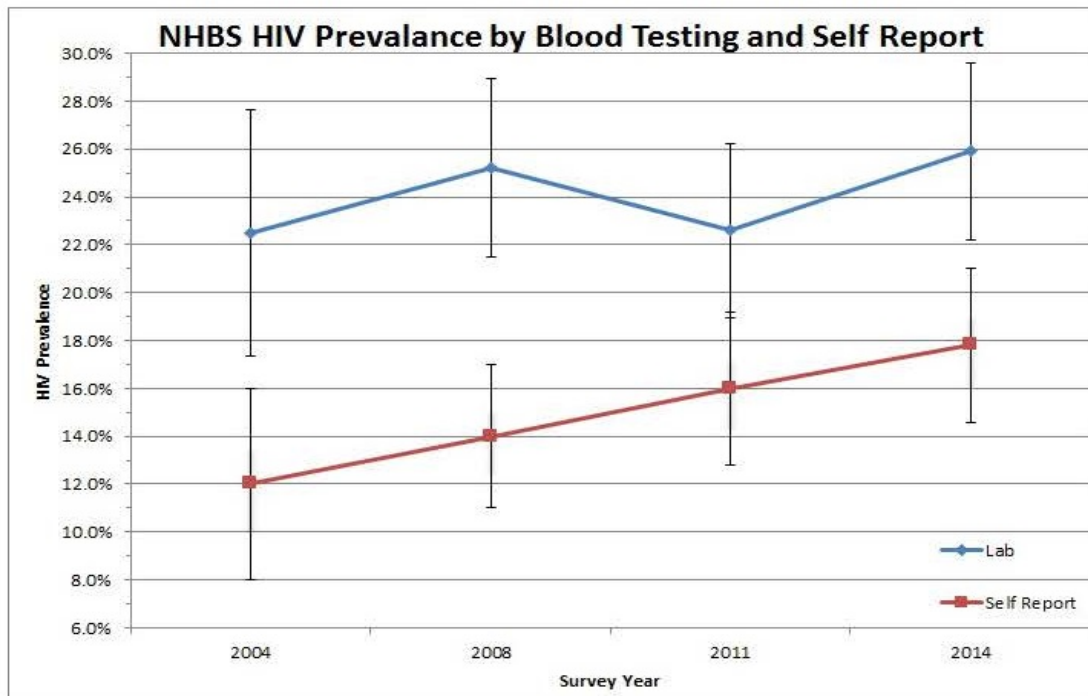
Table 1. Demographic Characteristics of MSM in NHBS-MSM1, NHBS-MSM2, NHBS-MSM3 and NHBS-MSM4 Cycles, Miami-Dade County, FL.

	MSM1 2004-05 (N=258)			MSM2 2008 (N=527)			MSM3 2011 (N=511)			MSM3 2014 (N=536)			P
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	
Race													<0.001
Non-Hispanic Black	40	15.6	11.2,20.1	94	17.8	15.2,20.4	94	18.4	15.8,21.0	160	29.9	26.0,33.8	
Non-Hispanic White	58	22.7	17.5,27.8	52	9.9	7.9,11.9	59	11.6	9.4,13.8	45	8.4	6.0,10.8	
Hispanic	148	57.8	51.8,63.9	368	69.8	66.7,72.9	345	67.7	64.5,70.9	325	60.6	56.4,64.8	
Other	10	3.9	1.5,6.3	13	2.5	1.4,3.6	12	2.4	1.4,3.4	6	1.1	0.2,2.0	
Age in years													<0.001
18-22	39	15.1	10.7,19.5	81	15.4	13.0,17.8	101	19.8	17.1,22.5	58	10.7	8.0,13.3	
23-29	66	25.6	20.2,30.9	115	21.8	19.0,24.6	137	26.8	23.8,29.8	165	30.6	26.7,34.5	
30-39	109	42.2	36.2,48.3	151	28.7	25.6,31.8	111	21.7	18.9,24.5	148	27.4	23.6,31.2	
40-49	41	15.9	11.4,20.4	135	25.6	22.7,28.5	112	21.9	19.1,24.7	109	20.2	16.8,23.6	
50+	3	1.2	0.2,5	45	8.5	6.6,10.4	50	9.8	7.8,11.8	60	11.1	8.4,13.8	
Education													<0.001
< HS Grad	37	14.3	10.0,18.6	78	14.8	12.4,17.2	32	6.3	4.7,7.9	42	7.8	5.5,10.1	
HS Grad or GED	55	21.3	16.3,26.3	162	30.7	27.6,33.8	129	25.2	22.3,28.1	160	29.6	25.7,33.5	
Some College, Assoc or Technical School	71	27.5	22.0,33.0	157	29.8	26.7,32.9	212	41.5	38.2,44.8	201	37.2	33.1,41.3	
College Grad	79	30.6	25.3,36.3	117	22.2	19.4,25.0	103	20.2	17.5,22.9	99	18.3	15.0,21.6	
Post Grad	16	6.2	3.2,9.2	13	2.5	1.4,3.6	35	6.9	5.2,8.6	38	7.0	4.8,9.2	
Sexual identity (self report)													<0.001
Heterosexual	8	3.1	1.0,5.2	16	3.0	1.8,4.2	5	1.0	0.3,1.7	7	1.3	0.3,2.3	
Homosexual/Gay	175	67.8	62.1,73.6	338	64.1	60.9,67.3	408	80.0	77.3,82.7	419	77.6	74.0,81.2	
Bisexual	73	28.3	22.8,33.8	170	32.3	29.1,35.5	97	19.0	16.4,21.6	114	21.1	17.6,24.6	
Venues													
Bar	69	27.9	22.3,33.6	81	15.4	12.3,18.5	72	14.1	11.1,17.1	66	12.0	9.2,14.8	
Cafe or restaurant	7	2.8	0.8,4.9	39	7.4	5.2,9.6	46	9.0	6.5,11.5	18	3.3	1.8,4.8	
Dance club	40	16.2	11.6,20.8	133	25.2	21.5,28.9	187	36.6	32.4,40.8	245	44.5	40.3,48.7	
Fitness club or gym	29	11.7	7.7,15.8	4	0.8	0.1,6	22	4.3	2.5,6.1	14	2.5	1.2,3.8	
House ball event	0	0.0	0,0	12	2.3	1.0,3.6	50	9.8	7.2,12.4	0	0.0	0,0	
Park or beach	14	5.7	2.8,8.6	16	3.0	1.5,4.5	16	3.1	1.6,4.6	10	1.8	0.7,2.93	
Retail Business	18	7.3	4.0,10.5	0	0.0	0,0	0	0.0	0,0	0	0.0	0,0	
Sex environment	1	0.4	0.1,2	123	23.3	19.7,26.9	73	14.3	11.2,17.4	142	25.8	22.1,29.5	
Social organization	4	1.6	0.3,2	21	4.0	2.3,5.7	20	3.9	2.2,5.6	16	2.9	1.5,4.3	
Street location	60	24.3	18.9,29.7	95	18.0	14.7,21.3	22	4.3	2.5,6.1	0	0.0	0,0	
Gay Pride event	0	0.0	0,0	0	0.0	0,0	0	0.0	0,0	40	7.3	5.1,9.5	

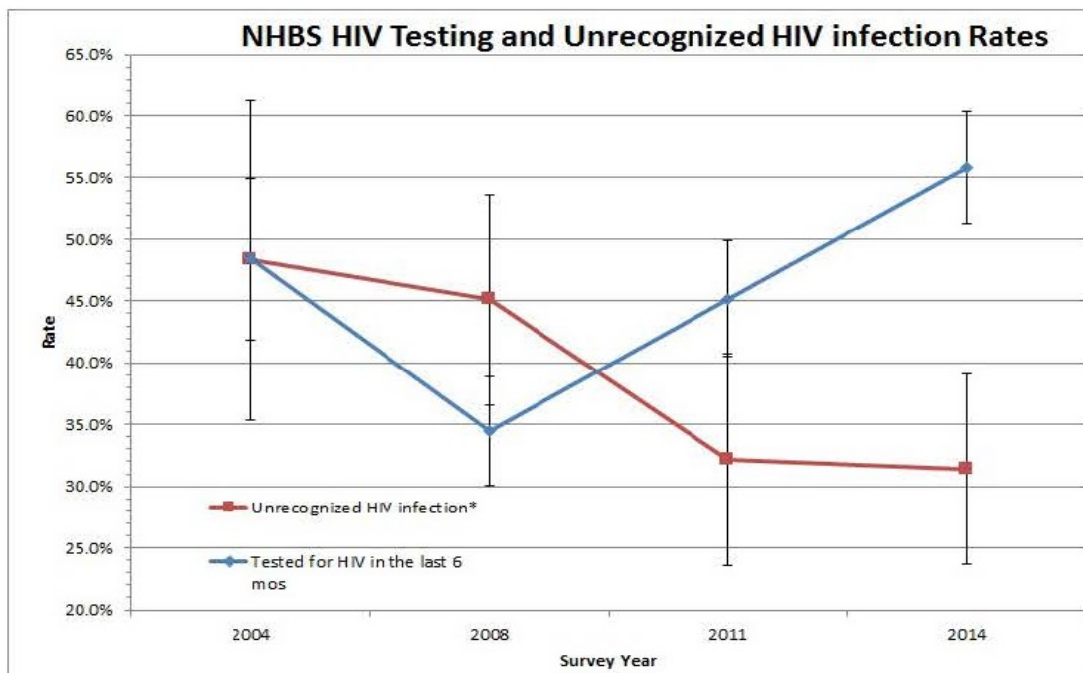
	MSM1 2004-05		MSM2 2008		MSM3 2011		MSM4 2014		χ ² Test for trend
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
HIV positive (by serological test in study)	22.5%	17.4% 27.6%	25.2%	21.5% 28.9%	22.6%	19.0% 26.2%	25.9%	22.2% 29.6%	0.488
Self-reported HIV positive	12.0%	8.0% 16.0%	14.0%	11.0% 17.0%	16.0%	12.8% 19.2%	17.8%	14.6% 21.0%	0.019
Undiagnosed HIV infection*	48.3%	35.4% 61.2%	45.1%	36.6% 53.6%	32.2%	23.6% 40.8%	31.4%	23.7% 39.1%	0.004
Tested for HIV in the past 6 months (if not known HIV+ in 6 months)(n=225,455,440,473)	48.4%	41.8% 55.0%	34.5%	30.1% 38.9%	45.2%	40.5% 49.9%	55.8%	51.3% 60.3%	<0.001
Currently on ART**	-	- -	72.3%	64.7% 79.9%	87.6%	81.5% 93.7%	93.8%	89.0% 98.6%	<0.001
Accessed HIV care within 3 months after HIV diagnosis (of self-reported HIV+)	80.0%	65.6% 94.4%	72.6%	62.2% 83.0%	75.6%	66.3% 84.9%	78.0%	69.7% 86.3%	0.782
Knowledge of Prep	-	- -	-	- -	20.0%	16.2% 23.8%	40.7%	36.1% 45.3%	<0.001
Syphilis in past 12 months (self report)	4.6%	2.0% 7.2%	5.3%	3.4% 7.2%	3.5%	1.9% 5.1%	7.3%	5.1% 9.5%	0.171
Gonorrhea in past 12 months (self report)	3.9%	1.5% 6.3%	7.8%	5.5% 10.1%	3.5%	1.9% 5.1%	4.9%	3.1% 6.7%	0.360
Chlamydia in past 12 months (self report)	0.8%	0.0% 1.9%	4.4%	2.6% 6.2%	2.0%	0.8% 3.2%	4.4%	2.7% 6.1%	0.931
Multiple male sexual partners in past 12 months	88.4%	84.5% 92.3%	78.9%	75.4% 82.4%	82.8%	79.5% 86.1%	82.0%	78.7% 85.3%	0.245
Powdered Cocaine use in past 12 months	29.6%	24.0% 35.2%	25.4%	21.7% 29.1%	24.3%	20.6% 28.0%	23.6%	20.0% 27.2%	0.092
Crack cocaine use in past 12 months	16.2%	11.7% 20.7%	10.2%	7.6% 12.8%	3.7%	2.1% 5.3%	7.6%	5.4% 9.8%	<0.001
Methamphetamine use in past 12 months	19.4%	14.5% 24.3%	6.9%	4.7% 9.1%	6.0%	3.9% 8.1%	8.6%	6.2% 11.0%	<0.001

*Those individuals who self-reported an HIV negative or unknown status but tested HIV positive on their confirmatory test in NHBS.
 **Of self-reported HIV positive participants. MSM1 participants asked ever on ART = 83.3%.

Figure 1. Trends in HIV Prevalence and HIV Testing Rates among Four Cycles of NHBS among MSM in Miami-Dade County, Florida, 2004-2014



Graph A – HIV prevalence showing HIV test results to self-reported HIV status



Graph B – rates of HIV testing within the past six months and previously undiagnosed HIV infection

was cross-sectional, so neither time order nor changes in behavior over time per individual could be established.

Despite these limitations, NHBS-MSM in Miami-Dade County, Florida, should continue to provide insights into the local HIV epidemic among men who have sex with men. Miami-Dade has a large population of MSM and is a multi-cultural community with extensive ties to the Caribbean and South America, as well as a large African American population, all in need of services that can be informed by NHBS to limit new HIV infections.

ACKNOWLEDGEMENTS

Funding for this project and analysis was provided by the Centers for Disease Control and Prevention and the Florida Department of Health.

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