

# Men Who Have Sex With Men Have a 140-Fold Higher Risk for Newly Diagnosed HIV and Syphilis Compared With Heterosexual Men in New York City

Preeti Pathela, DrPH, MPH,\* Sarah L. Braunstein, PhD, MPH,† Julia A. Schillinger, MD, MSc,\*‡ Colin Shepard, MD,† Monica Sweeney, MD, MPH,† and Susan Blank, MD, MPH\*‡

**Objectives:** To describe the population of men who have sex with men (MSM) in New York City, compare their demographics, risk behaviors, and new HIV and primary and secondary (P&S) syphilis rates with those of men who have sex with women (MSW), and examine trends in infection rates among MSM.

**Design:** Population denominators and demographic and behavioral data were obtained from population-based surveys during 2005–2008. Numbers of new HIV and P&S syphilis diagnoses were extracted from city-wide disease surveillance registries.

**Methods:** We calculated overall, age-specific and race/ethnicity-specific case rates and rate ratios for MSM and MSW and analyzed trends in MSM rates by age and race/ethnicity.

**Results:** The average prevalence of male same-sex behavior during 2005–2008 (5.0%; 95% CI: 4.5 to 5.6) differed by both age and race/ethnicity (2.3% among non-Hispanic black men; 7.4% among non-Hispanic white men). Compared with MSW, MSM differed significantly on all demographics and reported a higher prevalence of condom use at last sex (62.9% vs. 38.3%) and of past-year HIV testing (53.6% vs. 27.2%) but also more past-year sex partners. MSM HIV and P&S syphilis rates were 2526.9/100,000 and 707.0/100,000, each of which was over 140 times MSW rates. Rates were highest among young and black MSM. Over 4 years, HIV rates more than doubled and P&S syphilis rates increased 6-fold among 18-year-old to 29-year-old MSM.

**Conclusions:** The substantial population of MSM in New York City is at high risk for acquisition of sexually transmitted infections given high rates of newly diagnosed infections and ongoing risk behaviors. Intensified and innovative efforts to implement and evaluate prevention programs are required.

**Key Words:** HIV/AIDS rates, health disparities, men who have sex with men, syphilis rates

(*J Acquir Immune Defic Syndr* 2011;58:408–416)

## INTRODUCTION

The successful targeting of resources for the prevention and treatment of sexually transmitted diseases (STD), including HIV, benefits from knowledge of the population size and demographic and behavioral characteristics of those at highest risk for infections. Although national and local data have shown that men who have sex with men (MSM) comprise the majority of new HIV and new syphilis cases in the United States, understanding the full burden of disease among the MSM population has been challenging given that, until recently, direct estimates of MSM numbers in the general population were unavailable.

Several recent population-based studies using MSM denominator estimates from behavioral surveillance have quantified point prevalence of HIV<sup>1,2</sup> or primary and secondary (P&S) syphilis and HIV rates among MSM.<sup>3</sup> Our analysis adds to this body of work by examining trends in newly diagnosed HIV and P&S syphilis among sexually active MSM in New York City (NYC), an epicenter of the US HIV epidemic. In NYC, the proportion of reported male HIV diagnoses that were among MSM increased by 19% in just 5 years.<sup>4</sup> MSM have also been disproportionately affected by P&S syphilis since the outbreak began in 1999. In 2008, 87% of male P&S syphilis cases in NYC reported sex with other men.<sup>5</sup> To effectively plan, implement, and evaluate programs aimed at preventing transmission of HIV and other STDs, we describe the population of MSM in NYC, compare demographic and behavioral characteristics of MSM and men who have sex with women (MSW), estimate rates of disease in both groups, and examine disparities among MSM by race/ethnicity and age using 3 population-based data sources.

## METHODS

### Data Sources

#### NYC Community Health Survey

Since 2002, the NYC Department of Health and Mental Hygiene (DOHMH) has conducted an annual, cross-sectional, population-based survey [the Community Health Survey

Received for publication May 12, 2011; accepted August 1, 2011.

From the \*Bureau of Sexually Transmitted Disease Control; and †Bureau of HIV Prevention, New York City Department of Health and Mental Hygiene; and ‡Division of Sexually Transmitted Disease Prevention, Centers for Disease Control and Prevention, New York City, NY.

The authors have no funding or conflicts of interest to disclose.

The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Correspondence to: Preeti Pathela, DrPH, MPH, New York City Department of Health and Mental Hygiene, Gotham Center, 42-09 28th Street, Queens, New York 11101-4132 (e-mail: ppathela@health.nyc.gov).

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(CHS)], to collect information on self-reported health status and risk behaviors among NYC residents. The CHS samples noninstitutionalized individuals aged  $\geq 18$  years utilizing a stratified sample design to produce neighborhood and city-wide estimates. For the 2005–2008 surveys, households with landline telephones were selected using random digit dialing, and 1 adult per household was randomly selected for interview. Surveys were approved by the NYC DOHMH Institutional Review Board.

Sample weights were constructed, adjusting for the respondent's probability of selection and weighting each record up to the neighborhood population while accounting for the respondent's age, sex, and race. Datasets comprised of multiple survey years are processed in a similar manner to the CHS from an individual year, with the additional sample size permitting poststratification by age/sex and race/ethnicity within NYC neighborhoods using a constrained raking procedure. CHS cooperation rates<sup>6</sup> over the 4 years ranged from 79.3% to 90.7%. A total of 11,217 men aged 18–64 years participated in the 2005–2008 surveys.

During each survey, men were asked about demographic and behavioral topics, including numbers of female and male sex partners in the last 12 months. Consistent with the US National Health and Nutrition Examination Surveys (NHANES), sex was defined as oral, vaginal, or anal sex.

### HIV/AIDS Surveillance Registry

Health care providers and laboratories are required by law to report new cases of HIV infection and HIV illness and AIDS cases to the NYC DOHMH. We extracted data on males aged 18–64 years who were newly diagnosed with HIV (with or without AIDS) between 2005 and 2008 and reported to the HIV/AIDS Surveillance Registry through June 2010. Data included patient race/ethnicity, and age and transmission risk at the time of HIV diagnosis. Males reporting a history of sex with males, either as a sole risk factor or with injection drug use (3.4% of the 6767 known MSM with new HIV diagnoses from 2005 through 2008) comprised the numerator for the estimated rate of new HIV diagnoses among MSM. Consistent with the Centers for Disease Control and Prevention definition of heterosexual risk, males whose reported transmission risk was a history of sex with females with a history of hemophilia, HIV infection, injection drug use, transplant, or transfusion were classified as MSW. Among HIV-diagnosed male cases with known transmission risk, 81% were MSM, 11% were MSW, and 8% had other reported risk; 29% had unknown transmission risk at the time of report, which is comparable with the national figure.<sup>7</sup>

### STD Surveillance Registry

Health care providers and laboratories are required by law to report reactive syphilis tests and syphilis of any stage to the NYC DOHMH, whose staff attempt to interview all P&S syphilis cases. We extracted case reports for males aged 18–64 years diagnosed with P&S syphilis between 2005 and 2008. Reports included race/ethnicity, age at diagnosis, and sex of partner for interviewed cases (61% of male cases). Interviewed males reporting sex with males or with both males and females during the referent period (3 months before

diagnosis for primary and 6 months before diagnosis for secondary syphilis) were defined as the numerator for the estimated rate of P&S syphilis diagnoses among MSM. Males reporting sex with only females during the referent period comprised the numerator for the rate among MSW. Among P&S syphilis–diagnosed male cases with known sex of partner, 89% were MSM and 11% were MSW. Due to lack of interview or refusal to report sex of partners, 42% of male P&S cases could not be classified as MSM or MSW.

### Analysis

For population denominators, male CHS respondents aged 18–64 years who reported having sex during the past 12 months were included in the analysis ( $n = 8345$ ). Respondents who reported at least 1 male sex partner (regardless of whether female partners were also reported) were classified as MSM and respondents who reported only female sex partners were classified as MSW.

SUDAAN 10.0 (Research Triangle Institute, NC) was used for analyses of survey data. The weighted prevalence and population size of MSM (rounded to the nearest 1000) in NYC during 2005–2008 were estimated, overall and by age and race/ethnicity. Weighted demographic, health status, and behavioral characteristics were described for MSM and MSW, with estimates age-adjusted to the Census 2000 US population. An estimate was considered unstable if its relative standard error was  $>30\%$ . For comparisons of MSM with MSW, differences between weighted prevalence estimates were considered statistically significant if  $\chi^2$   $P$  values were  $<0.05$ . Among subgroups of MSM, prevalence estimates were considered statistically significantly different if  $t$  test  $P$  values were  $<0.05$ .

We estimated rates of new HIV and P&S syphilis diagnoses (per 100,000 population) among sexually active MSM and MSW by dividing the number of cases in each group over 4 years (from 2005 to 2008 HIV/AIDS and STD surveillance registries) by the cumulative 4-year estimated populations of MSM and MSW (from CHS). To include all new diagnoses in the numerators, for each disease, we applied proportions of male cases known to be MSM and MSW to the groups with unknown transmission risk or sex of partner. For subgroup analyses by age group and race/ethnicity, we redistributed cases with unknown risk/sex of partner according to the age and race/ethnicity categories of cases that had this information. We calculated case rates for MSM and MSW overall, by age group, and for 3 main race/ethnicity categories (non-Hispanic white, non-Hispanic black, and Hispanic), and MSM to MSW rate ratios. Additionally, we examined trends in new infection rates among MSM by age and race/ethnicity, using as denominators the annual weighted numbers of MSM (unadjusted for age) from the CHS.

## RESULTS

### Prevalence and Population Size of MSM

The estimated numbers of males aged 18–64 years living in NYC were 2,510,677 in 2005; 2,533,183 in 2006; 2,583,187 in 2007; and 2,607,031 in 2008.<sup>8</sup> Based on an

MSM prevalence of 6.1% (95% CI: 4.9 to 7.5) in 2005, 4.7% (95% CI: 3.8 to 5.8) in 2006, 5.0% (95% CI: 4.0 to 6.2) in 2007, and 4.6% (95% CI: 3.5 to 6.0) in 2008, there were an estimated 112,000 MSM in 2005; 88,000 MSM in 2006; 89,000 MSM in 2007; and 90,000 MSM in 2008. The average prevalence of male same-sex behavior for years 2005–2008 (5.0%; 95% CI: 4.5 to 5.6) was highest among men aged 40–49 years (8.0%) and lowest among men aged 18–29 years (3.9%) (Table 1). Prevalence of male same-sex behavior also differed by race/ethnicity, ranging from 2.2% and 2.3% among non-Hispanic Asian and black men, respectively, to 7.4% among non-Hispanic white men.

## Demographic and Behavioral Characteristics

MSM were significantly different from MSW with regard to all demographic variables examined (Table 2). Unlike MSW, MSM had a skewed age distribution, with 38.0% aged 40–49 years. Among MSM, the majority (58.8%) were white. MSM were more likely than MSW to be US-born, have a higher education, and lower poverty level (all  $P < 0.001$ ). A sizeable proportion of MSM (14.6%) reported a heterosexual/straight sexual identity. Although the subpopulation of black MSM was relatively small and yielded an unstable estimate for straight identity, more black MSM (24.3%; 95% CI: 12.1 to 42.7) and Hispanic MSM (18.8%; 95% CI: 11.3 to 29.7) reported being straight, compared with white MSM (9.7%; 95% CI: 5.6 to 16.2).

MSM were more likely than MSW to report good to excellent general health but also more likely to report poor mental health status and diagnoses of depression (26.0% vs. 10.5%,  $P < 0.001$ ) (Table 2). MSM were significantly more likely than MSW to have a primary health care provider and to have visited their provider in the past year.

MSM were more likely than MSW to have been HIV tested, both in the last year (53.6% vs. 27.2%,  $P < 0.001$ ) and

ever (84.8% vs. 59.7%,  $P < 0.001$ ) (Table 2). Among MSM, 18-year to 29-year olds (66.0%) were more likely than 30-year to 39-year olds (47.4%,  $p=0.033$ ) and 50-year to 64-year olds (46.8%,  $P = 0.022$ ) to have HIV tested in the last year. Self-reported HIV testing in the last year was 65.5% among black MSM (95% CI: 51.6 to 77.1), 61.2% among Hispanic MSM (95% CI: 50.3 to 71.1), and 51.1% among white MSM (95% CI: 42.9 to 59.3).

MSM reported more sex partners in the past year than MSW; 29.1% of MSM and 8.7% of MSW reported  $\geq 4$  partners (Table 2). Likelihood of reporting multiple partners among MSM did not vary by age or race/ethnicity. Almost two-thirds (62.9%) of MSM reported using a condom at last sex act, compared with 38.3% of MSW (Table 2). Among MSM, condom use at last sex was more prevalent among 18-year to 29-year olds (65.0%) than among 30-year to 39-year olds (54.9%,  $P = 0.040$ ) and 50-year to 64-year olds (52.3%,  $P = 0.017$ ), but did not vary among white, black, and Hispanic MSM.

## HIV and Primary and Secondary Syphilis Rates

### HIV

The number of new HIV diagnoses among MSM increased from 2370 in 2005 to 2499 in 2008 (a 5.4% increase), whereas diagnoses among MSW decreased steadily from 369 in 2005 to 258 in 2008 (a 30.1% decrease). During 2005–2008, there were 9571 new HIV cases among MSM and 1249 among MSW, resulting in an MSM HIV case rate that was 140.4 as high (95% CI: 132.1 to 148.7) as the rate among MSW (2526.9/100,000 vs. 18.0/100,000) (Table 3). MSM/MSW rate ratios varied substantially by age and by race/ethnicity. Among MSM, HIV rates decreased with increasing age; the rate for 18-year to 29-year olds (5956.4/100,000) was almost twice the rate among 30-year to 39-year

**TABLE 1.** Number of Sexually Active Males Aged 18–64 Years, Age-Adjusted\* Weighted Percent and Number of Sexually Active MSM by Selected Characteristics—NYC, 2005–2008

Characteristic	Sample Size of Sexually Active Males	Prevalence of MSM	95% CI	Estimated MSM Population
Total	8345	5.0	4.5 to 5.6	93,000
Age group				
18–29	1345	3.9	2.8 to 5.3	17,000
30–39	2055	4.5	3.6 to 5.6	24,000
40–49	2177	8.0	6.7 to 9.6	35,000
50–64	2640	4.3	3.5 to 5.2	17,000
Race/ethnicity				
Non-Hispanic White	3573	7.4	6.4 to 8.6	56,000
Non-Hispanic Black	1837	2.3	1.7 to 3.2	9,000
Hispanic	2085	4.3	3.4 to 5.4	22,000
Non-Hispanic Asian/PI	631	2.2†	1.1 to 4.3	3,000
Non-Hispanic Other‡	219	6.5†	3.2 to 12.8	4,000

Source: NYC CHSs, 2005–2008.

\*Adjusted to the year 2000 US Standard Population.

†Estimate should be interpreted with caution. Estimate's relative standard error (a measure of estimate precision) is greater than 30% or the sample size is too small, making the estimate potentially unreliable.

‡Includes American Indian, Alaska Native, multiple races, or other race.

**TABLE 2.** Age-Adjusted\* Demographic and Behavioral Characteristics Among MSM and MSW, NYC, 2005–2008

	MSM (n = 499)		MSW (n = 7800)		$\chi^2$ P, MSM vs. MSW
	Weighted %	95% CI	Weighted %	95% CI	
<b>Age group</b>					
18–29	18.0	13.5 to 23.7	24.4	23.1 to 25.8	<0.001
30–39	25.9	21.2 to 31.3	29.8	28.6 to 31.1	
40–49	38.0	32.6 to 43.7	23.7	22.6 to 24.8	
50–64	18.0	14.8 to 21.8	22.1	21.1 to 23.1	
<b>Race/ethnicity</b>					
Non-Hispanic White	58.8	53.0 to 64.3	38.8	37.5 to 40.0	<0.001
Non-Hispanic Black	9.5	7.0 to 12.9	21.9	20.8 to 22.9	
Hispanic	24.1	19.4 to 29.5	27.2	26.0 to 28.5	
Non-Hispanic A/PI	3.6†	1.9 to 7.0	9.2	8.4 to 10.0	
Non-Hispanic Other	3.9†	1.9 to 8.1	3.0	2.5 to 3.5	
<b>Borough of residence</b>					
Bronx	10.0	6.6 to 14.9	15.4	14.5 to 16.4	<0.001
Brooklyn	23.0	18.6 to 28.2	29.1	28.1 to 30.2	
Manhattan	47.9	42.3 to 53.5	20.6	19.5 to 21.7	
Queens	17.6	13.8 to 22.2	28.8	27.6 to 29.9	
Staten Island	1.5†	0.8 to 2.8	6.1	5.7 to 6.6	
<b>Country of birth</b>					
US	79.4	74.4 to 83.6	55.5	54.2 to 56.8	<0.001
Foreign	20.6	16.4 to 25.6	44.5	43.2 to 45.8	
<b>Marital status</b>					
Married /coupled	42.2	37.0 to 47.5	64.3	63.1 to 65.4	<0.001
Widowed/separated/divorced	8.3	5.9 to 11.5	9.2	8.5 to 9.9	
Never married	49.6	44.4 to 54.7	26.5	25.6 to 27.5	
<b>Education</b>					
High school or less	21.5	16.9 to 27.0	38.3	36.9 to 39.6	<0.001
Some college or more	78.5	73.0 to 83.1	61.7	60.4 to 63.1	
<b>Federal poverty level</b>					
FPL <200%	20.4	15.9 to 25.8	32.1	30.8 to 33.4	<0.001
FPL ≥200%	76.8	71.4 to 81.5	62.7	61.3 to 64.0	
Unknown	2.8†	1.1 to 6.7	5.3	4.6 to 6.0	
<b>Sexual identity</b>					
Heterosexual/straight	14.6	11.0 to 19.2	99.4	99.1 to 99.5	<0.001
Gay	73.5	68.0 to 78.3	0.1†	0.0 to 0.3	
Bisexual	11.9	8.7 to 16.1	0.5	0.4 to 0.8	
<b>General health status</b>					
Excellent/very good	61.6	56.0 to 66.9	50.8	49.5 to 52.2	<0.001
Good	26.3	21.6 to 31.7	34.2	32.9 to 35.6	
Fair/poor	12.1	9.1 to 16.0	14.9	14.0 to 15.9	
<b>Health insurance</b>					
Yes	85.8	81.0 to 89.5	77.2	75.9 to 78.4	0.001
No	14.2	10.4 to 18.9	22.8	21.6 to 24.1	
<b>Primary health care provider</b>					
Yes	81.8	76.2 to 86.2	74.2	72.9 to 75.4	0.014
No	18.2	13.8 to 23.8	25.8	24.6 to 27.1	
<b>PCP visit in last year‡</b>					
Yes	87.4	80.1 to 92.3	82.5	80.9 to 84.0	0.036
No	12.6	7.7 to 19.9	17.5	16.0 to 19.1	
<b>No. days mental health not good (past 30 days)</b>					
0	45.3	40.0 to 50.6	60.8	59.4 to 62.1	<0.001
1–13	42.7	37.6 to 47.9	29.5	28.2 to 30.8	
≥14	12.1	8.9 to 16.1	9.7	8.9 to 16.1	

(continued on next page)



**TABLE 2. (Continued) Age-Adjusted\* Demographic and Behavioral Characteristics Among MSM and MSW, NYC, 2005–2008**

	MSM (n = 499)		MSW (n = 7800)		$\chi^2$ P, MSM vs. MSW
	Weighted %	95% CI	Weighted %	95% CI	
Diagnosed depression ever					
Yes	26.0	21.7 to 30.7	10.5	9.7 to 11.3	<0.001
No	74.0	69.3 to 78.3	89.5	88.7 to 90.3	
HIV test ever§					
Yes	84.8	79.1 to 89.2	59.7	58.2 to 61.3	<0.001
No	15.2	10.8 to 20.9	40.3	38.7 to 41.8	
HIV test in past year					
Yes	53.6	48.0 to 59.1	27.2	26.0 to 28.5	<0.001
No	46.4	40.9 to 52.0	72.8	71.5 to 74.0	
No. sex partners in last year					
1	44.5	38.9 to 50.2	77.6	76.4 to 78.7	<0.001
2	15.6	11.9 to 20.2	8.8	8.1 to 9.7	
3	10.8	7.7 to 14.9	4.9	4.3 to 5.5	
4+	29.1	24.2 to 34.5	8.7	7.9 to 9.5	
Mean, median, IQR	7.5, 2, 3	—	1.7, 1, 0	—	—
Condom use at last sex					
Yes	62.9	57.1 to 68.3	38.3	36.8 to 39.7	<0.001
No	37.1	31.7 to 42.9	61.7	60.3 to 63.2	

Source: NYC CHSs, 2005–2008.

\*Adjusted to the year 2000 U.S. Standard Population.

†RSE &gt; 30%.

‡Question asked in 2006, 2007 and 2008 only and of respondents who reported having a PCP; prevalence estimates based on responses from 345 MSM and 5583 MSW.

§Question asked in 2005, 2007 and 2008 only; prevalence estimates based on responses from 375 MSM and 5787 MSW.

||Question asked in 2005, 2006 and 2008 only; prevalence estimates based on responses from 377 MSM and 5826 MSW.

A/PI, Asian/Pacific Islander; FPL, federal poverty level; PCP, primary care physician; IQR, interquartile range.

olds, and 4.6 to 6.2 times as high as the rates among MSM aged 40 and older. Among MSW, 18-year to 29-year olds had the lowest HIV rate (12.1/100,000) of all age groups, leading to the highest MSM/MSW rate ratio (490.3). Among MSM, rates were highest for black MSM (8780.7/100,000), which were double that of Hispanic MSM (3520.7/100,000).

### Syphilis

P&S syphilis cases among both MSM and MSW increased steadily, from 496 in 2005 to 895 in 2008 among MSM (an 80.4% increase), and from 84 in 2005 to 114 in 2008 among MSW (a 35.7% increase). The total number of P&S syphilis cases over 4 years was 2678 among MSM and 334 among MSW, resulting in an MSM P&S syphilis case rate that was 147.3 times as high (95% CI: 130.5 to 163.2) as the rate among MSW (707.0/100,000 vs. 4.8/100,000) (Table 3). P&S syphilis rates among MSM followed the same pattern as HIV rates, wherein they decreased with increasing age and were highest among black (2,375.9/100,000), followed by Hispanic MSM (754.1/100,000), who had approximately one-third the rate of black MSM. In every age group, MSM had more than 100 times the rate of P&S syphilis compared with MSW. MSM/MSW rate ratios by race/ethnicity ranged from 183.0 (black) to 255.7 (white).

### MSM HIV and Syphilis Trends

Figure 1 shows rates among MSM by age group from 2005 through 2008. There were marked increases in HIV diagnoses among 18-year-old to 29-year-old MSM, with case

rates more than doubling from 3078.7/100,000 (95% CI: 2875.7 to 3281.6 per 100,000) in 2005 to 8870.0/100,000 in 2008 (95% CI: 8342.7 to 9397.3 per 100,000) (Fig. 1A). Although the P&S syphilis rate among 18-year-old to 29-year-old MSM in 2005 was lower than the HIV rate that year, it increased much more dramatically, increasing 6-fold to reach 2900.4/100,000 in 2008 (95% CI: 2598.6 to 3202.1 per 100,000) (Fig. 1B). During this period, both HIV and P&S syphilis case rates among 30-year-old to 39-year-old MSM peaked in 2007.

Figure 2 shows rates by race/ethnicity category from 2005 through 2008. After peaks in 2006 and 2007 for Hispanic and black MSM, respectively, HIV rates remained relatively steady (Fig. 2A). P&S syphilis rates increased dramatically for black and Hispanic MSM from 2005 to 2007, with the rate among Hispanic MSM increasing 6-fold, whereas the rate rose steadily for white MSM (Fig. 2B).

### DISCUSSION

The population of MSM in NYC is large, diverse, and has high rates of risky sexual behaviors. There are substantial differences in the characteristics and newly diagnosed infection rates of MSM, as compared with MSW. Our analysis triangulated population-based behavioral surveys and HIV and STD surveillance registries and identified alarmingly high rates and rising trends in 2 epidemiologically linked health conditions among MSM. The planning, implementation, and evaluation of programs and policy to reduce disease burden among MSM will require continued and innovative efforts.

**TABLE 3.** New HIV and Primary and Secondary Syphilis Case Rates Among MSM and MSW Aged 18–64 Years—NYC, 2005–2008

	HIV*			Primary and Secondary Syphilis		
	MSM	MSW	MSM/MSW Case Rate Ratio	MSM	MSW	MSM/MSW Case Rate Ratio
Number of cases (redistributed)	9571	1249	—	2678	334	—
Estimated population†	379,000	6,923,000	—	379,000	6,923,000	—
Overall case rate/100,000 (95% CI)	2526.9 (2476.3 to 2577.5)	18.0 (17.0 to 19.0)	140.4 (132.1 to 148.7)	707.0 (680.2 to 733.8)	4.8 (4.3 to 5.3)	147.3 (130.5 to 163.2)
By age group, yrs						
18–29	5956.4 (5769.8 to 6143.0)	12.1 (10.4 to 13.8)	490.3 (418.5 to 558.3)	1419.1 (1328.0 to 1510.2)	8.1 (6.7 to 9.5)	175.0 (143.0 to 207.0)
30–39	3332.8 (3214.6 to 3451.0)	18.6 (16.7 to 20.5)	179.4 (160.4 to 198.4)	1077.4 (1010.2 to 1144.6)	5.4 (4.4 to 6.4)	201.3 (161.8 to 240.8)
40–49	1292.1 (1234.7 to 1349.5)	26.7 (24.2 to 29.2)	48.4 (43.4 to 53.5)	402.9 (370.8 to 435.0)	3.7 (2.8 to 4.6)	108.2 (79.7 to 136.7)
50–64	961.2 (887.6 to 1034.8)	15.3 (13.3 to 17.3)	63.0 (53.5 to 72.5)	221.6 (186.3 to 256.9)	2.1 (1.4 to 2.8)	107.4 (65.9 to 148.9)
By race/ethnicity						
Non-Hispanic white	1241.9 (1195.9 to 1287.9)	20.0 (18.3 to 21.7)	62.1 (56.4 to 67.9)	276.3 (254.6 to 298.0)	1.1 (0.7 to 1.5)	255.7 (160.5 to 350.9)
Non-Hispanic black	8780.7 (8483.8 to 9077.6)	27.0 (24.4 to 29.6)	325.5 (292.0 to 359.0)	2375.9 (2221.4 to 2530.4)	13.0 (11.2 to 14.8)	183.0 (154.8 to 211.3)
Hispanic	3520.7 (3395.8 to 3645.6)	8.4 (7.1 to 9.7)	418.3 (351.6 to 485.1)	754.1 (696.3 to 811.9)	3.6 (2.7 to 4.5)	212.2 (158.8 to 265.6)

\*As reported to the NYC DOHMH by June 30, 2010.

†Denominator source is combined CHSs, 2005–2008. Denominators are based on reported sex partners in the prior 12 months among sexually active respondents, weighted to the NYC population per Census 2000, and rounded to the nearest thousand.

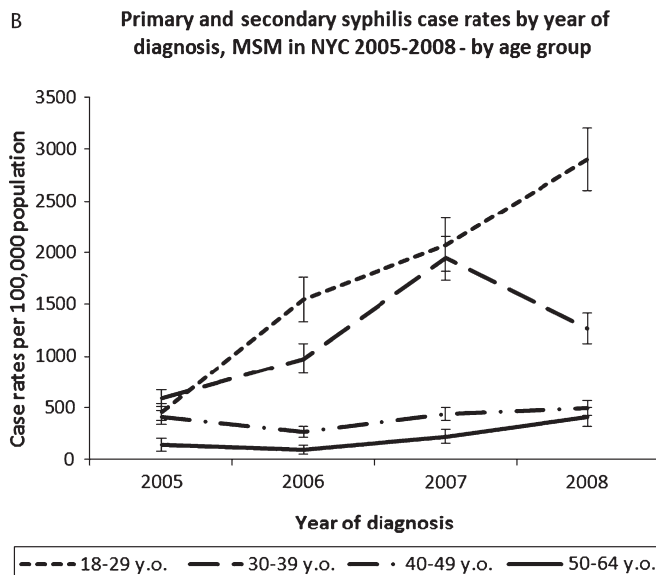
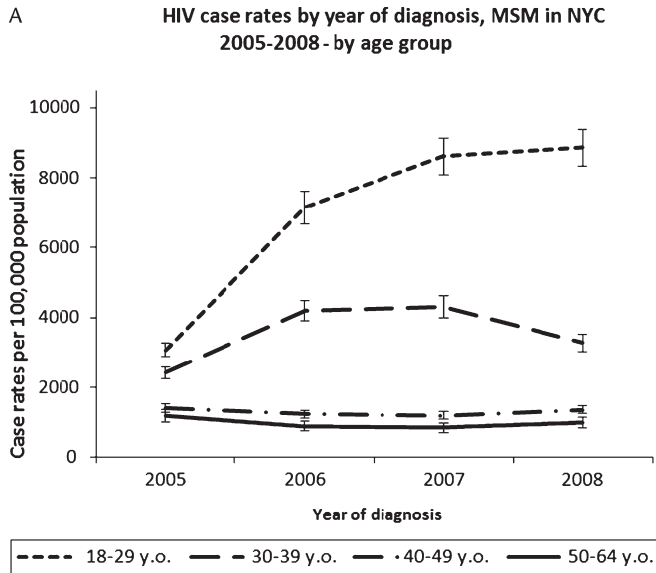
We found that 5% or 1 in every 20 sexually active NYC men reported same-sex behavior in the last year. This is almost double the national prevalence of male same-sex behavior estimated by the 2001–2006 NHANES and 2002 National Survey of Family Growth (both 2.9%), which included respondents of narrower age ranges but used comparable survey questions.<sup>1</sup> Given that previous research has indicated that same-sex behavior is more prevalent in large cities,<sup>9</sup> the higher prevalence in NYC is not surprising. With the backdrop of a mature HIV epidemic, decade-long syphilis epidemic, and evidence of ongoing sexual risk behaviors, however, the substantial size of this high-risk population means that high rates of disease could persist for some time.

Consistent with NHANES, we found that among major racial/ethnic groups, the prevalence of same-sex behavior was highest among non-Hispanic white men and lowest among non-Hispanic black men. It has been suggested that relative to white MSM, black MSM may not disclose same-sex behavior due to other sensitizing experiences with prejudice (eg, racism) or concerns about losing connections to their communities, and underreporting may be one explanation for observed racial/ethnic distributions among urban MSM.<sup>10,11</sup> Alternatively, the higher proportion of white MSM in urban settings could be related to the phenomenon of seeking out large cities for early-life career opportunities that complement the social advantages of living in gay-friendly environments.<sup>12</sup>

Estimated HIV and syphilis case rates among NYC MSM and MSW were higher than estimated rates at the national level.<sup>3</sup> Rates among NYC MSM were an order of

magnitude higher; they had HIV and P&S syphilis case rates that were at least 2.5 and 4 times the national rates, respectively. Although reducing racial disparities in STD/HIV infection has been a national health priority, investigators examining MSM and MSW chlamydia and gonorrhea rates<sup>13</sup> have proposed that the disparities paradigm be expanded to include sexual behavior. Indeed, compared with NYC MSW, MSM were at least 140 times as likely to be diagnosed with either HIV or P&S syphilis. The much higher HIV diagnosis rates among MSM could be due, in part, to higher testing rates; CHS data showed that 54% of MSM versus 27% of MSW tested for HIV in the past year. Syphilis diagnoses among MSM could be prompting some additional HIV testing and diagnosis. Disparities by sexual behavior could be driven somewhat by differential testing rates, but clearly MSM in NYC are significantly burdened with STD,<sup>14–16</sup> and these disparities warrant extra public health attention and resources.

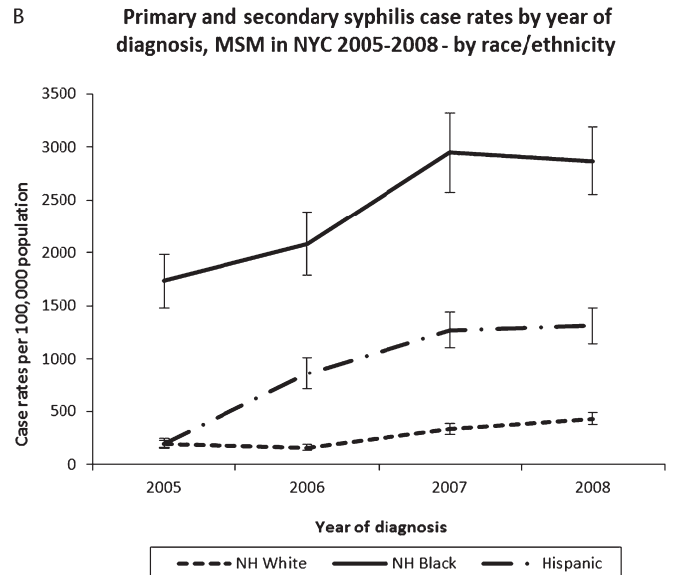
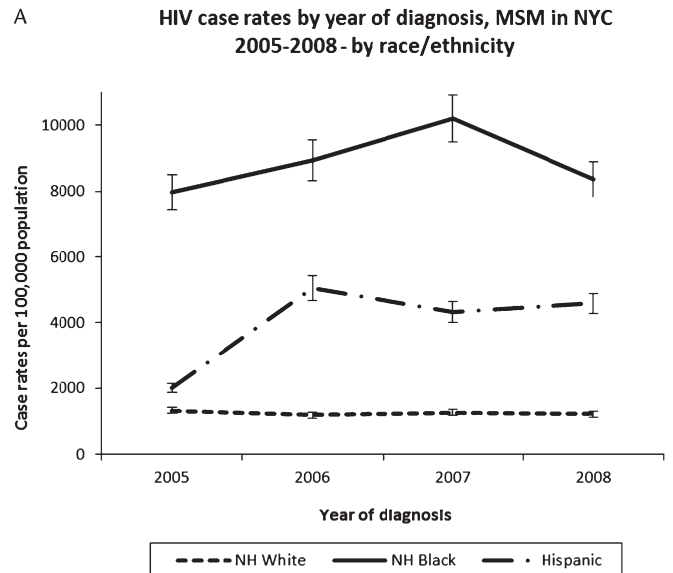
For both HIV and P&S syphilis, case rates among younger NYC MSM (ages 18–29 years) were approximately double the overall MSM rates and increased dramatically between 2005 and 2008. Although our data indicate a possible leveling off of HIV, they show a continued steep rise in syphilis rates in this group. Differing patterns by disease among young MSM could be explained by the fact that approximately 40% of 18-year-old to 29-year-old MSM with newly diagnosed P&S syphilis have already been diagnosed with HIV and are therefore not at risk for incident HIV infection. This hypothesis is supported by the pronounced



**FIGURE 1.** A, HIV case rates by year of diagnosis, MSM in NYC 2005–2008—by age group. B, Primary and secondary syphilis case rates by year of diagnosis, MSM in NYC 2005–2008—by age group.

divergence in HIV and syphilis trends among non-Hispanic blacks, a group in which HIV prevalence is particularly high. The difference could also be attributable to seroadaptive behaviors (eg, serosorting, serodisclosure) used by some MSM to reduce HIV risk<sup>17</sup> or to differential effectiveness of prevention programs on the 2 diseases. Nonetheless, increases in syphilis diagnoses indicate ongoing unprotected sex and signal the potential for increases in HIV acquisition among HIV-uninfected young MSM.

Black MSM in NYC had disproportionately high rates of both new HIV and P&S syphilis diagnoses, more than 3 times the overall NYC MSM rates. The elevated HIV rate may reflect higher HIV testing rates among this subgroup;



**FIGURE 2.** A, HIV case rates by year of diagnosis, MSM in NYC 2005–2008—by race/ethnicity. B, Primary and secondary syphilis case rates by year of diagnosis, MSM in NYC 2005–2008—by race/ethnicity.

among black MSM CHS respondents, 65% reported HIV testing in the previous year. However, despite high testing rates, there remains a high risk of ongoing transmission. Young black MSM have reported onset of sexual behaviors with other men at younger ages and have been more likely to engage in unprotected receptive anal intercourse with casual partners than their white counterparts, which are possible contributing factors to the disproportionate rise in new diagnoses.<sup>18</sup> Black MSM have been found to be diagnosed relatively late with HIV<sup>19–21</sup>; indeed, in NYC in 2008, a higher proportion of young black MSM (aged 20–29) were diagnosed with AIDS within 1 month of an HIV diagnosis than young white MSM (11% vs. 7%). Furthermore, once HIV

infected, black MSM may be less likely to seek or have access to quality care and treatment than white MSM.<sup>22–24</sup>

Several features of this analysis may have had an impact on denominator estimates and/or case numbers. First, the 2005–2008 CHS sampled only landline telephones. Exclusion of cell phone–only users could introduce a bias if there were meaningful differences between them and the sampled landline users. However, when the 2009 CHS modified its sampling strategy to include cell phone users, there were no major differences in nearly all CHS indicators between 2009 and previous survey years.<sup>25</sup> Second, the calculation of rates requires a precise estimation of the size of the relevant population. Socially stigmatized behaviors such as male-to-male sexual contact may be prone to underreporting in surveys, which could lead to underestimation of the MSM population size and consequent overestimation of HIV and syphilis case rates. A sensitivity analysis in which we used the upper limit of the 2005 CHS estimate for prevalence of male same-sex behavior (7.5%), rather than the average 4-year prevalence (5%), increased our cumulative 4-year MSM population from ~379,000 to ~550,000 and decreased our MSW population to ~6,750,000. MSM and MSW new HIV diagnosis rates were recalculated as 1747.7/100,000 and 18.5/100,000, respectively (rate ratio: 94.5); MSM and MSW P&S syphilis rates were 489.0/100,000 and 4.9/100,000, respectively (rate ratio: 98.9). Thus, MSM still had a substantially higher risk of new infections compared with MSW. Third, per surveillance practices at NYC DOHMH, HIV diagnoses are attributed to MSM if the patient reports any history of sex with men before diagnosis; this diverges from practices in syphilis surveillance and the CHS, which ascertain recent reported sexual behavior. Although the comparatively longer period for classifying sexual behavior used in HIV surveillance could overestimate MSM HIV case numbers relative to MSM denominator estimates, data from field interviews of newly diagnosed HIV cases have demonstrated good correlation between ever and past-year MSM behavior (Chi-Chi Udeagu, personal communication, December 4, 2010). Fourth, this analysis was done using separate databases, with HIV rates calculated using one registry and syphilis rates another. This allowed for comparison of rates by only the crudest demographics. Finally, our MSM population estimate would have included some number of men who had been HIV infected before our study period and inclusion of such non-susceptible persons would have inflated our denominator, resulting in underestimated new HIV diagnosis rates. This may be especially true for older MSM.

Our approach to redistributing the 42% of P&S cases and 29% of HIV cases without reported transmission risk assumed a similar distribution of cases among those with known and unknown risk. In exploratory analyses, we found that white syphilis cases and black and older HIV cases were more likely than other subgroups to be missing risk information. If the proportion of MSM among groups missing this information were in fact different from those for whom it is known, case rates based on our redistribution methods could be overestimated or underestimated. Case rates could be conservative if same-sex behavior was underreported by cases with known risk and some proportion of true MSM cases

was misclassified as MSW. For instance, in sensitivity analyses in which we reallocated the proportion of male cases with unknown risk so that all of them were classified as MSM, the new HIV diagnosis rates among MSM and MSW became 2622.7/100,000 and 12.9/100,000, respectively (rate ratio: 203.0); MSM and MSW P&S syphilis case rates changed to 745.1/100,000 and 2.8/100,000, respectively (rate ratio: 267.4). Alternatively, adjusting the proportion of cases with unknown risk so that only 50% were classified as MSM and 50% as MSW yielded new HIV case rates of 2204.7/100,000 and 36.0/100,000 among MSM and MSW, respectively (rate ratio: 61.2), and MSM and MSW P&S syphilis rates of 575.4/100,000 and 12.2/100,000 (rate ratio: 47.3). Results of these sensitivity analyses represent a plausible range within which the true numerators likely lie.

We examined HIV and P&S syphilis epidemics in NYC and found significant overlap between them, with young and non-Hispanic black MSM disproportionately affected by both conditions. It is critical to revise current data systems to enable integration of HIV and STD case data; this would allow for better identification and characterization of the population affected by these synergistic epidemics and would facilitate analyses to drive additional research, programming, and policy. Reducing health disparities associated with sexual behavior and STD is a complex task. A critical step is improving STD/HIV screening and testing coverage to increase the number of persons who are aware of their infections, which can lead to behavior change, decrease secondary transmission, and link infected individuals to care, treatment, and prevention services.<sup>26</sup> Centers for Disease Control and Prevention's 2010 STD Treatment Guidelines call for annual STD/HIV screening for sexually active MSM and more frequent screening for MSM who report high-risk behaviors.<sup>27</sup> To achieve this, it is imperative that providers are skilled in identifying MSM. A substantial proportion of MSM do not identify as gay. Therefore, providers need to be competent at taking a nonjudgmental sexual history that ascertains sex of sex partners and specific sexual practices with all partners.

## ACKNOWLEDGMENTS

*We thank our colleagues at the Division of Epidemiology, New York City DOHMH: Leena Gupta, MPH, for conducting the final data check and Donna Eisenhower, DrPH, for her work in conducting and overseeing the annual NYC DOHMH CHS.*

## REFERENCES

- Xu F, Sternberg MR, Markowitz LE. Men who have sex with men in the United States: demographic and behavioral characteristics and prevalence of HIV and HSV-2 infection: results from National Health and Nutrition Examination Survey 2001–2006. *Sex Transm Dis*. 2010;37:399–405.
- Manning SE, Thorpe LE, Ramaswamy C, et al. Estimation of HIV prevalence, risk factors, and testing frequency among sexually active men who have sex with men, aged 18–64 years—New York City. 2002. *J Urban Health*. 2007;84:212–225.
- Purcell DW, Johnson C, Lansky A, et al. Calculating disease rates for risk groups: estimating the national population size of men who have sex with men. Presented at: Program and abstracts of the 2010 national STD prevention conference; March 8–11, 2010; Atlanta, GA.



4. NYC DOHMH. HIV Epidemiology and Field Services Program, October 2009 Surveillance Semiannual Report. Available at: <http://www.nyc.gov/html/doh/downloads/pdf/dires/dires-2009-report-semi2.pdf>. Accessed August 25, 2010.
5. NYC DOHMH. Bureau of Sexually Transmitted Disease Control Quarterly Report. Vol 7, No 1. March 2009. Available at: <http://www.nyc.gov/html/doh/downloads/pdf/std/std-quarterlyreport2009-1.pdf>. Accessed August 25, 2010.
6. The American Association for Public Opinion Research. 2009. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*. 6th edition. Lenexa, Kansas: AAPOR.
7. Centers for Disease Control and Prevention. HIV Surveillance Report, 2008; Vol 20. Available at: <http://www.cdc.gov/hiv/topics/surveillance/resources/reports/>. Accessed February 16, 2011.
8. NYC DOHMH neighborhood population estimates, modified from US Census Bureau vintage population estimates, 2005-2008. Available at: <http://sasebiweb100.health.dohmh.nycnet/EpiQuery/Census/index2001.html>. Accessed August 25, 2010.
9. Laumann E, Gagnon J, Michael R, et al. *The Social Organization of Sexuality: Sexual Practices in the United States*. Chicago, IL: University of Chicago Press; 1994.
10. Black D, Gates G, Sanders S, et al. Demographics of the gay and lesbian population in the United States: evidence from available systematic data sources. *Demography*. 2000;37:139-154.
11. Millett GA, Flores SA, Peterson JL, et al. Explaining disparities in HIV infection among black and white men who have sex with men: a meta-analysis of HIV risk behaviors. *AIDS*. 2007;21:2083-2091.
12. Catania JA, Canchola J, Pollack L, et al. Understanding the demographic characteristics of urban men who have sex with men. *J Homosex*. 2006; 51:33-51.
13. Scott HM, Bernstein KT, Raymond HF, et al. Racial/ethnic and sexual behavior disparities in rates of sexually transmitted infections, San Francisco, 1999-2008. *BMC Public Health*. 2010;10:315-322.
14. Centers for Disease Control and Prevention. Primary and secondary syphilis among men who have sex with men—New York city, 2001. *MMWR Morb Mortal Wkly Rep*. 2002;51:853-856.
15. Blank S, Schillinger J, Harbatkin D. Lymphogranuloma venereum in the industrialised world. *Lancet*. 2005;365:1607-1608.
16. Schillinger JA, McKinney CM, Garg R, et al. Seroprevalence of herpes simplex virus type 2 and characteristics associated with undiagnosed infection: New York City, 2004. *Sex Transm Dis*. 2008;35:599-606.
17. McDaid LM, Hart GJ. Sexual risk behaviour for transmission of HIV in men who have sex with men: recent findings and potential interventions. *Curr Opin HIV AIDS*. 2010;5:311-315.
18. Halkitis PN, Brockwell S, Siconolfi DE, et al. Sexual behaviors of adolescent emerging and young adult men who have sex with men ages 13-29 in New York City. *J Acquir Immune Defic Syndr*. 2011;56:285-291.
19. MacKellar DA, Valleroy LA, Secura GM, et al. Unrecognized HIV infection, risk behaviors, and perceptions of risk among young men who have sex with men: opportunities for advancing HIV prevention in the third decade of HIV/AIDS. *J Acquir Immune Defic Syndr*. 2005;38: 603-614.
20. Centers for Disease Control and Prevention. HIV prevalence, unrecognized infection, and HIV testing among men who have sex with men—five U.S. cities, June 2004–April 2005. *MMWR Morb Mortal Wkly Rep*. 2005;54: 597-601.
21. McGinnis KA, Fine MJ, Sharma RK, et al. Understanding racial disparities in HIV using data from the Veterans Aging Cohort 3-Site Study and VA Administrative Data. *Am J Public Health*. 2003;93:1728-1733.
22. Jain S, Schwarcz S, Katz M, et al. Elevated risk of death for African Americans with AIDS, San Francisco, 1996-2002. *J Health Care Poor Underserved*. 2006;17:493-503.
23. Wong MD, Cunningham WE, Shapiro MF, et al. Disparities in HIV treatment and physician attitudes about delaying protease inhibitors for nonadherent patients. *J Gen Intern Med*. 2004;19:366-374.
24. King WD, Wong MD, Shapiro MF. Does racial concordance between HIV positive patients and their physicians affect the time to receipt of protease inhibitors. *J Gen Intern Med*. 2004;19:1146-1153.
25. Corey C, Eisenhower D, Immerwahr S, et al. Including New Yorkers who can only be reached by cell phones in the community health survey: results from the 2008 cell phone survey, 2011 pilot survey. Epi Research Report May 1-8, 2010. Available at: <http://www.nyc.gov/html/doh/downloads/pdf/epi/epibrief-cellpilot.pdf>. Accessed July 15, 2011.
26. Steele CB, Meléndez-Morales L, Campoluci R, et al. Health disparities in HIV/AIDS, viral hepatitis, sexually transmitted diseases, and tuberculosis: issues, burden, and response. A retrospective review, 2000-2004. Available at: <http://www.cdc.gov/nchstp/healthdisparities>. Accessed March 30, 2011.
27. Centers for Disease Control and Prevention. Sexually Transmitted Diseases Treatment Guidelines, 2010. *MMWR Morb Mortal Wkly Rep*. 2010; 59:1-110.